

# LBP-1000

## SERVICE MANUAL

REVISION 0

**Canon**

JAN. 2000

**RY8-13A1-000**

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Use of this manual should be strictly supervised to avoid disclosure of confidential information.
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## **PREFACE**

This Service Manual contains basic information required for after-sales service of the laser beam printer LBP-1000 (hereinafter 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, which is prepared for the printer as option, is also 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; final pages were printed on AGFA Selectset avantra 25.

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 Radius PhotoDV capture board system, and modified with Adobe Photoshop™ (J).

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# **CHAPTER 1**

## **PRODUCT INFORMATION**

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## I. FEATURES

### 1. High speed printing

With a built-in high-speed video controller employing a high-performance RISC processor PowerPC for its compact design, this printer has capabilities of printing a maximum of 10 pages per minute in A4 or letter-size paper.

### 2. High resolution

This printer provides clear images and characters using Super Fine Particle Toner and Automatic Image Refinement for its printer engine corresponding to 1200 dpi.

### 3. Paper handling for various media

This printer is capable of handling various paper media. The cassette can accommodate from A5 to legal-size plain paper. Special media, such as OHTs, labels, and envelopes can be printed from the multi-purpose tray. With the optional paper feeder installed in the printer, up to 600 sheets can be loaded.

### 4. Memory saving technology

The Memory Reduction Technology enables printing on A4 or letter-size paper at the resolutions of 1200 × 1200 dpi with only 4 Mbytes of memory.

### 5. Energy saving/Toner consumption reduction

Energy saving functions, such as the On-Demand Fixing Method, enable low-power consumption. The Economy Mode allows the printer to use less toner than usual for lighter printing so that the toner consumption can be reduced.

### 6. PDL auto-switching

This printer supports the Hewlett-Packard's PCL6 printer language. Also, Adobe PostScript 3 can be provided by installing the optional Canon Adobe PostScript 3 Module A-32. This enables PDL auto-switching for PCL and PostScript based on the received data.

### 7. Interface feature

This printer utilizes two IEEE 1284 Standard parallel interfaces, one supports ECP and the other supports the Compatible and Nibble protocols. The optional adapter enables this printer to employ a third party network module.

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## II. SPECIFICATIONS

### A. Printer

#### 1. Printer Engine

- |                                     |  |
|-------------------------------------|--|
| 1) Type                             | Desk-top page printer  |
| 2) Printing method                  | Electrophotography   |
| 3) Printing speed <b>(Note 1)</b>   | About 10 pages/min. (A4, Letter, B5-JIS)   |
| 4) First print time <b>(Note 2)</b> | About 16.6 seconds   |
| 5) Wait time                        | 10 seconds or less (20°C room temperature)   |
| 6) Resolution                       |  |
| Horizontal                          | 1200 DPI   |
| Vertical                            | 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-32 cartridge replacement (about 5,000 A4-sized prints: with image density set in the middle and 4% dot density ratio <b>(Note 3)</b> .)  |
| Transfer                            | Roller transfer  |
| Separation                          | Curvature  |
| Cleaning                            | Blade  |
| Fixing                              | On-demand fixing method  |
| 8) Pick-up                          | Multi-purpose tray   |
|                                     | Cassette   |
|                                     | Paper feeder (option)  |
| Print paper                         | Plain paper, colored paper, labels, recycled paper, OHTs, and envelopes  |
| Paper sizes                         |  |
| Multi-purpose tray                  | Min. (vertical feeding only) 76.2mm(W) × 127mm(L) to max. 215.9mm(W) × 355.6mm(L) sized plain paper (60g/m <sup>2</sup> to 163g/m <sup>2</sup> recommended paper) and paper mentioned above. |
| Cassette                            | Letter, Legal, Executive, A4, A5, B5-JIS sized plain paper (60g/m <sup>2</sup> to 105g/m <sup>2</sup> recommended paper) and colored paper.  |
| Multi-purpose tray capacity         | 12mm stack (about 100 sheets of 80g/m <sup>2</sup> paper or 10 envelopes)  |
| Cassette capacity                   | 26mm stack (about 250 sheets of 80g/m <sup>2</sup> paper)  |
| Cassette type                       | Universal (Letter, Legal, Executive, A4, A5, B5-JIS sizes)   |
| 9) Delivery                         | Face-down/face-up  |
| Face-down tray capacity             | About 150 sheets (80g/m <sup>2</sup> paper)  |
| Face-up tray capacity               | About 50 sheets (80g/m <sup>2</sup> paper)   |
| 10) Duplex print <b>(Note 5)</b>    |  |
| Manual duplexing                    | Plain paper (60g/m <sup>2</sup> to 163g/m <sup>2</sup> recommended paper) on multi-purpose tray only. <b>(Note 4)</b>  |
| 11) Environment                     |  |
| Temperature                         | 10 to 32.5°C   |
| Humidity                            | 20 to 80%RH  |
| Air pressure                        | 747 to 1013hPa (560 ~ 760mmHg/equivalent to 0 ~ 2,600m above the sea level)  |

12) Maximum power consumption	750W or less (20°C room temperature with the rated voltage input. Including cases exceeding a second at its peak value.)
13) Noise level (Officially announced level based on ISO 9296)	Sound power level (1B=10dB) 6.2B or less (printing) 4.0B or less (standby)
	Sound pressure level (Bystander position) 49dB or less (printing) 36dB or less (standby)
	The above figures are the values measured when all the options are installed.
14) Dimensions	399 (w) × 414 (D) × 258.7 (H) mm
15) Weight	About 11.5kg (printer) About 1.2kg (cartridge) About 1.0kg (cassette)
16) Line voltage requirements	220 to 240V (-10%, +6%) 50/60Hz (±2Hz)
17) Option	Paper feeder

- 
- Notes:**
1. A test print at the room temperature of 20°C with the rated voltage input.
  2. When the printer is in the READY state at the room temperature of 20°C with the rated voltage input, the time from the reception of the print instruction command from the video controller to the end of the delivery of a A4-size print in face-down.
  3. The dot ratio of 4% is equivalent to the printing ratio of 5%.
  4. The size smaller than A4 is 100g/m<sup>2</sup> to 163g/m<sup>2</sup>.
  5. When manual duplexing, uncurl the paper delivered into the face-down tray and then set it in the multi-purpose tray.
- 

### 2. Video Controller

1) CPU	RISC Processor (PowerPC401 66MHz)
2) Memory (RAM)	4Mbytes (Expandable to a maximum of 36Mbytes with an option)
3) Memory (ROM)	4Mbytes (Expandable with an option)
4) RAM slot	2
5) ROM slot	3
6) Host interface	IEEE 1284 Standard parallel interface
7) Language	Standard: PCL5e plus PCL6 Standard: Adobe PostScript Level 3
8) Resident font	45 scalable fonts (Micro Type fonts), 27 True Type fonts, 9 Bitmap fonts
9) Optional font	136 fonts for A-32 module
10) Scaler	UFST

Specifications are subject to change with product modification.
---

**B. Option**

**1. Paper feeder**

- |                 |  |
|-----------------|--|
| 1) Paper        | Universal (Letter, Legal, Executive, A4, A5, B5-JIS sizes) |
| 2) Capacity     | 26mm stack (about 250 sheets of 80g/m <sup>2</sup> paper)  |
| 3) Dimensions   | 393 (W) × 395 (D) × 83.5 (H) mm                            |
| 4) Weight       | About 2kg (paper feeder)<br>About 1kg (cassette)           |
| 5) Power supply | DC24V (supplied from the 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 plastic and minute 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

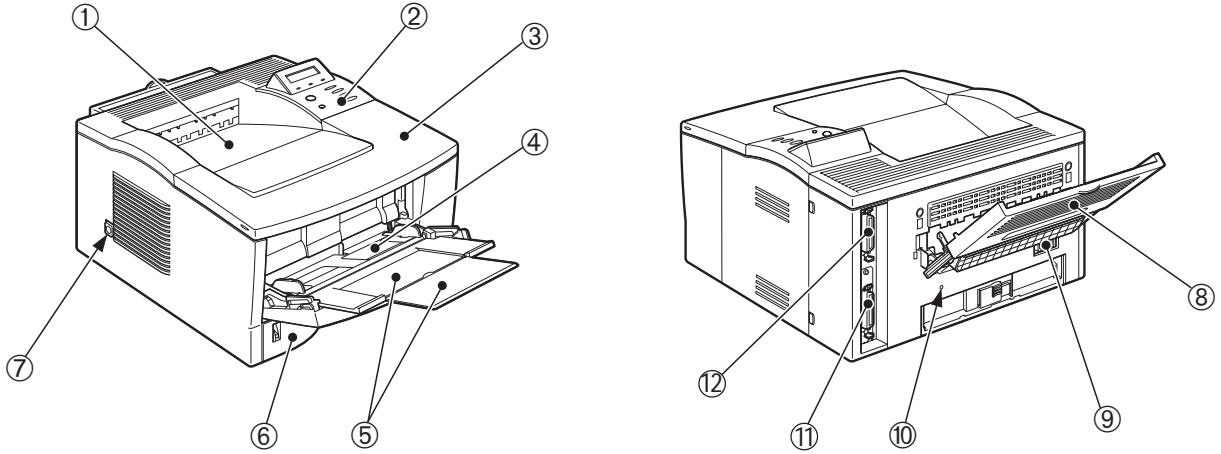
An infinitesimal amount of ozone gas (O<sub>3</sub>) is generated during corona discharge from the charging roller used in this printer. The ozone gas is emitted only when the printer is operating.

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**

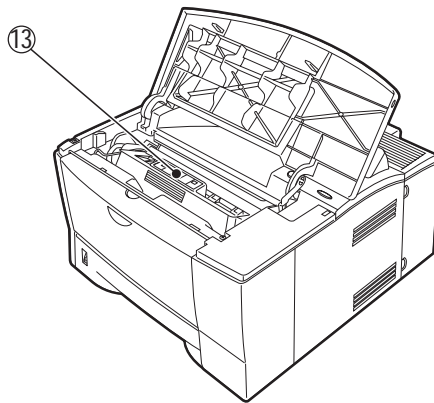
**1. Printer**



**Figure 1-4-1**

- 1: Face-down tray
- 2: Operation panel
- 3: Top cover
- 4: Multi-purpose tray
- 5: Expansion trays
- 6: Cassette

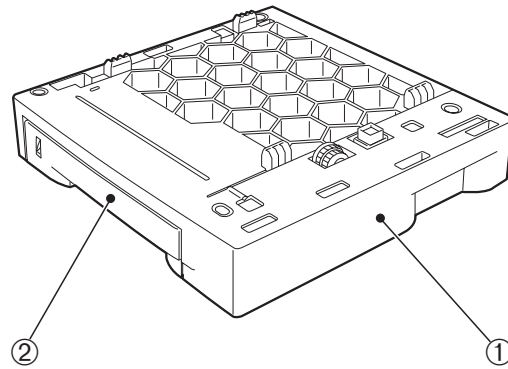
- 7: Power switch
- 8: Face-up tray
- 9: Power receptacle
- 10: Test print switch
- 11: Parallel interface connector 2
- 12: Parallel interface connector 1



**Figure 1-4-2**

- 13: EP-32 cartridge

**2: Paper feeder**



**Figure 1-4-3**

- 1: Paper feeder
- 2: Cassette



## B. Cross-sectional views

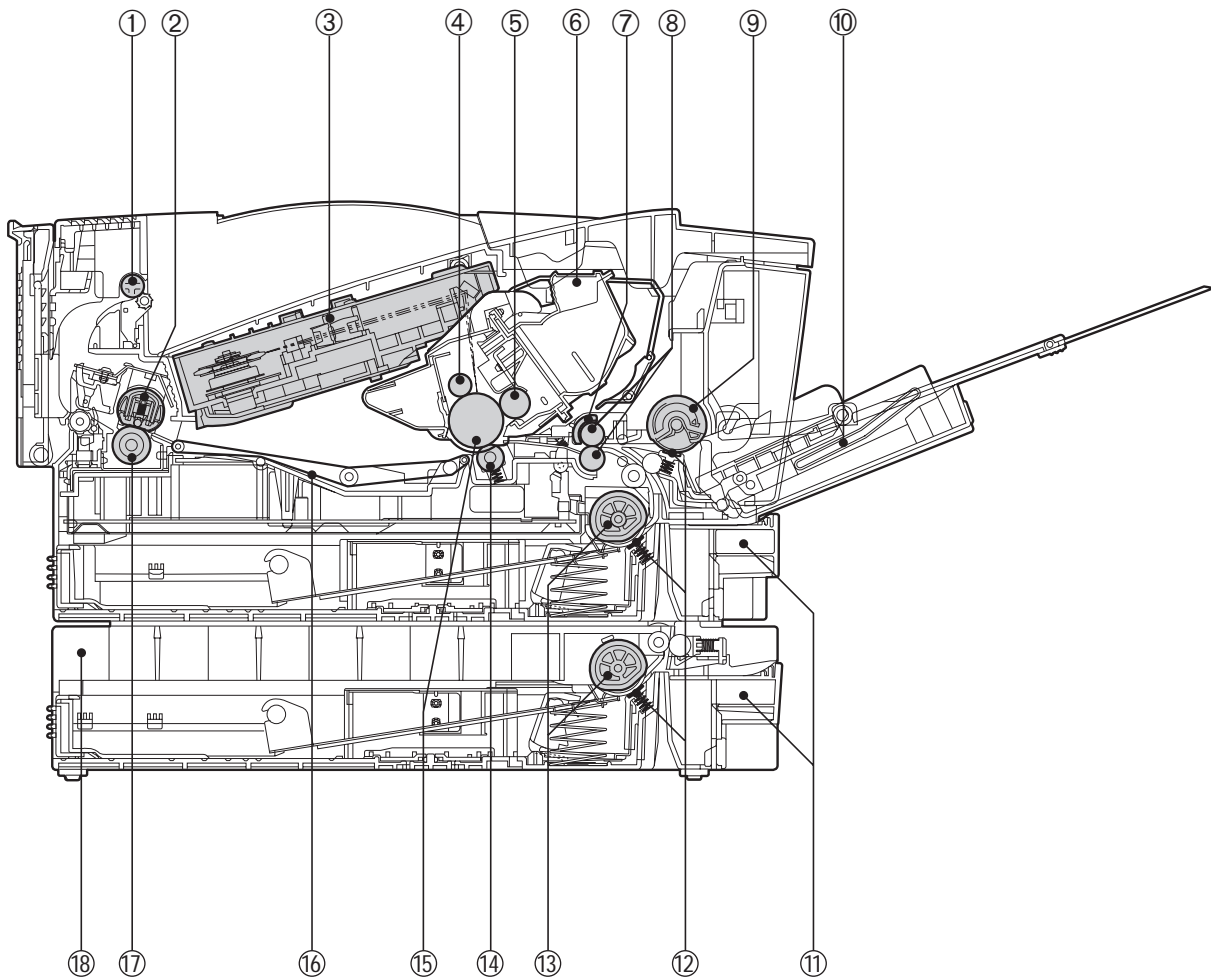


Figure 1-4-4

- |                                      |                              |
|--------------------------------------|------------------------------|
| 1: Delivery roller                   | 10: Multi-purpose tray       |
| 2: Fixing film unit                  | 11: Cassette                 |
| 3: Laser/scanner unit                | 12: Separation pad           |
| 4: Primary charging roller           | 13: Cassette pick-up roller  |
| 5: Developing cylinder               | 14: Transfer charging roller |
| 6: EP-32 cartridge                   | 15: Photosensitive drum      |
| 7: Registration shutter              | 16: Feed belt                |
| 8: Registration roller               | 17: Pressure roller          |
| 9: Multi-purpose tray pick-up roller | 18: Paper feeder (option)    |

## 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:

- Alternating current (AC): -10% and +6% of rated voltage
- Power frequency: 50/60Hz±2Hz

#### 2. Operating environment

Install in a location that meets the following conditions:

- Level, flat surface
- Temperature, humidity within the following ranges:  
Surrounding temperature: 10 to 32.5°C  
Surrounding humidity: 20 to 80%RH (relative humidity)
- Cool, well-ventilated space

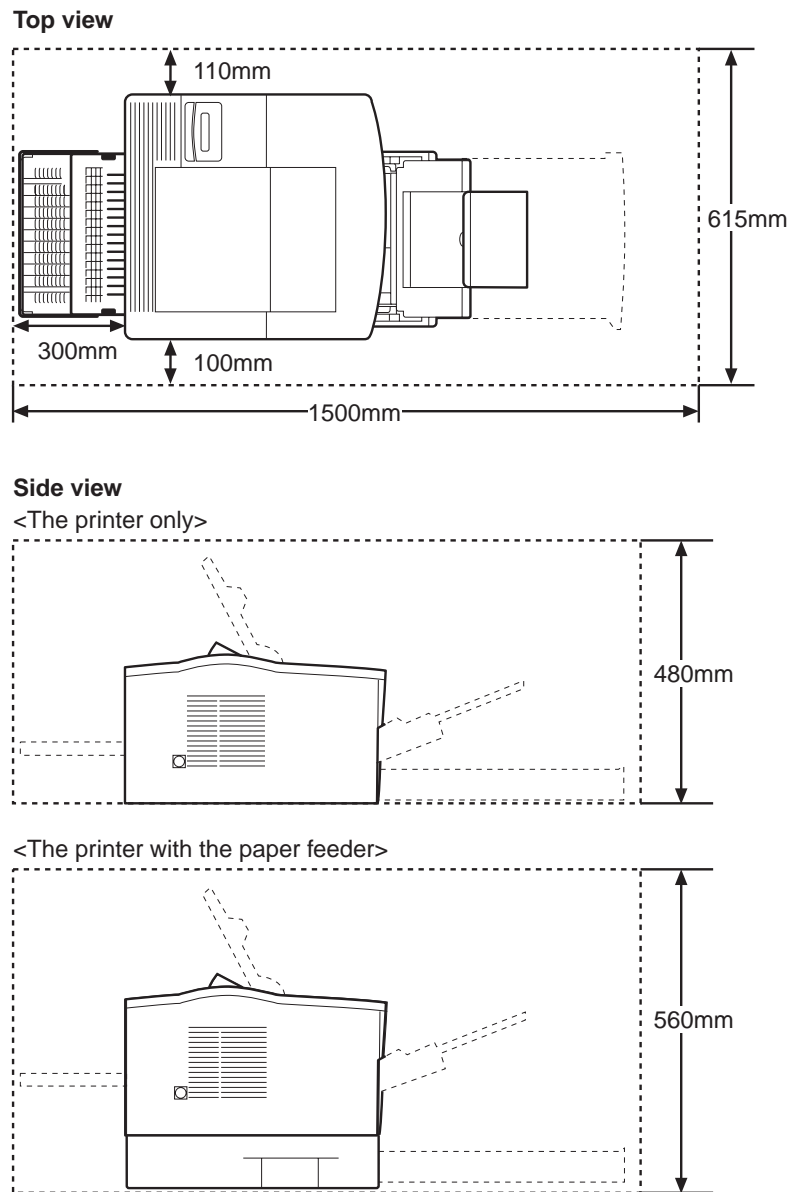
#### Do not install in the following locations:

- 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
- Room with ultrasonic heater

#### 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. 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 option, 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, the EP-32 cartridge, the CD-ROM, and manuals, etc are included.
- 3) Take the plastic bag off the printer and peel off the tape securing the components. Confirm that none of the covers were scratched or deformed during shipment.
- 4) Take out the cassette from the printer, and remove the packing materials and the plastic material (stopper) holding the lifting plate 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 1-5-5 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 the plastic bag off the paper feeder and peel off the tape securing the components. Confirm that the paper feeder was not scratched or deformed during shipment.
- 3) Take out the cassette from the paper feeder, and remove the packing materials and the plastic material (stopper) holding the lifting plate from the cassette.
- 4) Place the paper feeder on a flat surface.
- 5) Lift the printer, and align the positioning pins of the paper feeder with the positioning holes of the printer.

#### 4. Operation confirmation

- 1) Take out the cassette.
- 2) Set the side guide plate to the position corresponding to the paper size.
- 3) Lower the lifting plate and lock it with the pressure release lever.
- 4) Load paper in the cassette.
- 5) Plug the power cord into the printer and outlet, and turn the power switch ON. Be sure to use the enclosed power cord.
- 6) After the printer enters the STANDBY mode, press the test print switch (see Figure 1-4-2) to make a test print. Check if the density of the output image is correct.
- 7) Keep clean around the printer and ensure that it is ready for use at anytime.

#### 5. Operation cautions

- a. When powering ON, the printer must be powered ON after the host computer. When powering OFF, the printer must be powered OFF before the host computer. If the host computer is powered ON/OFF while the printer is ON, the noise may enter the printer through the cables connecting the printer and host computer together, and an error may occur.
- b. When plugging/unplugging the connector attaching the printer and host computer together,

be sure to power OFF both the printer and host computer, and to unplug the power cord from the outlet. If the connector is plugged/unplugged while the printer is ON, it may break the printer down.

- c. When installing and uninstalling the Adobe PostScript Module A-32, flash ROM, or Expansion RAM DIMM (all of these are options), be sure to switch OFF the printer.
- d. A maximum length of three meters of shielded cable must be used for connecting the printer and host computer.

**D. Storing, Handling the EP-32 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.

**1. 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)

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

---

**2. 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.

**a. Storage environment**

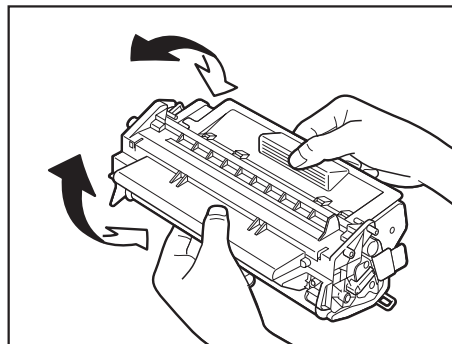
- 1) Be sure to store in the protective bag.
- 2) Avoid locations exposed to direct sunlight, near windows, etc. Do not leave the cartridge in cars for any extended period of time as heat can damage it.
- 3) Avoid high, low, and changeable temperature/humidity locations.
- 4) Avoid sites with corrosive 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 cartridge out of reach of children.

**b. 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.

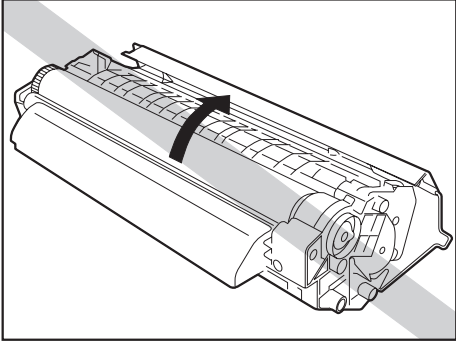
**3. Handling**

- 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 cleaner 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, image defects (black lines), may appear on printed images. In such cases, leaving the cartridge in the dark for a day will rectify the problem. However, if the drum has been exposed to strong light for an extended period of time, leaving it in the dark may not erase the black lines.
  - 5) Do not open the photosensitive drum protective shield by hand nor touch the drum surface. Do not clean the drum.
  - 6) Do not stand the cartridge on end nor place it upside down. Always place it with the label side on top.
  - 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.

### 1. Cartridge

Rock the cartridge or replace, when necessary.

### 2. Transfer guide unit

When replacing the cartridge, wipe the transfer guide unit with a tightly wrung wet soft cloth, and then with a dry cloth.

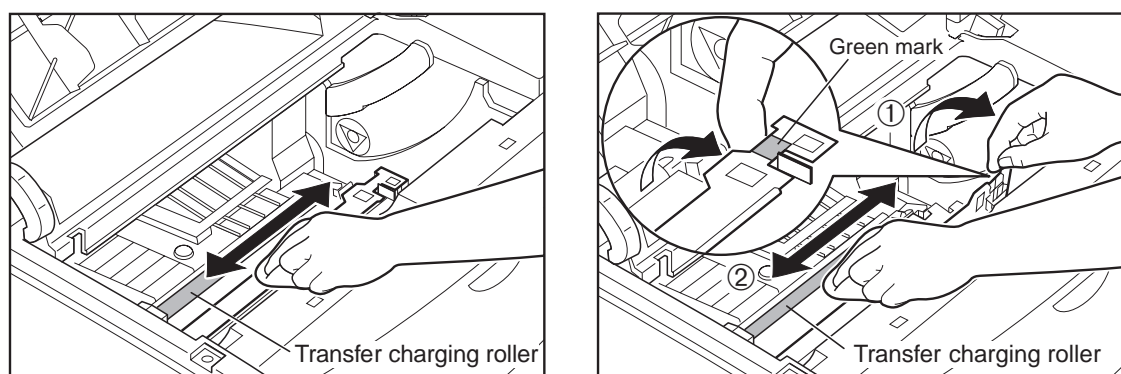


Figure 1-6-1

### 3. Pressure roller

When black spots adhere to the surface or the back of the print, clean the pressure roller as below.

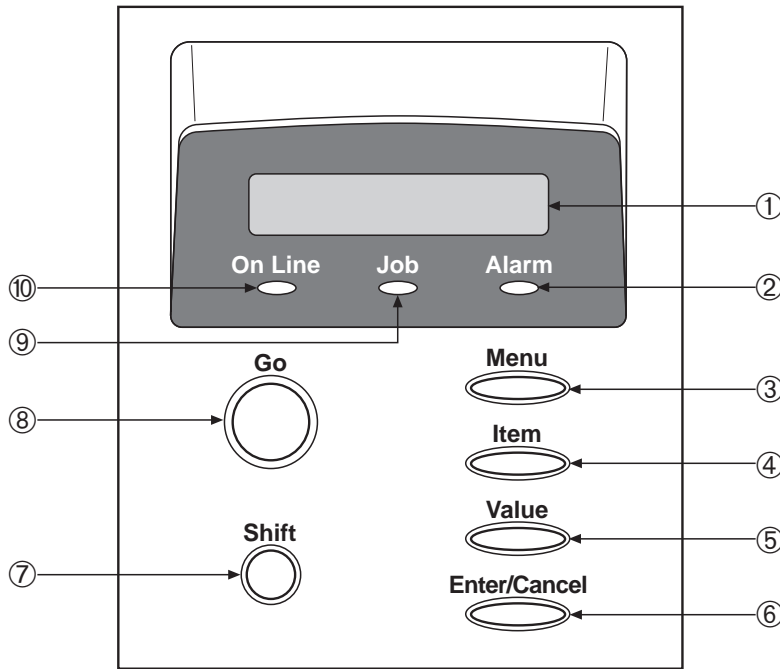
- 1) Open the face-up tray to switch to the face-up delivery.
- 2) Open the multi-purpose tray, and then load A4-size print paper.
- 3) Press the Go key to off-line the printer.
- 4) Keep pressing the Menu key until the "TEST MENU" message appears in the upper line of the status display panel.
- 5) Keep pressing the Item key until the "CLEANING PAGE" message appears in the lower line of the status display panel. Press Go key after the message appears so that the printer feeds the paper and starts cleaning the pressure roller.
- 6) Press the Go key to set the printer off-line.

**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.

- **Alarm indicator: 2**

**ON:**

An error has occurred and printing has stopped.

**OFF:**

Operation in normal and there is no error.

- **Menu key: 3**

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: 4**

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: 5**

With an item name displayed, press Value key 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: 6**

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 key to clear all resources in the printer memory but leave the menu settings unaffected. If there other jobs are 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: 7**

Press the Shift and another keys 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 operation panel.

- **Go: 8**

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 key 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.

- **Job indicator: 9**

**ON:**

A page buffer has been composed and is currently stored in printer memory.

**OFF:**

There is no data stored in printer memory.

- **On Line indicator: 10**

**ON:**

The printer is on-line.

**Blinking:**

The printer is processing a print job.

**OFF:**

The printer is off-line.

### **B. Operation Panel Menus**

You can access the following menus through the operation panel:

- PCL MENU
- FEEDER MENU
- CONFIG MENU
- MEMCONFIG MENU
- PARALLEL 1 MENU
- PARALLEL 2 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 lists 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

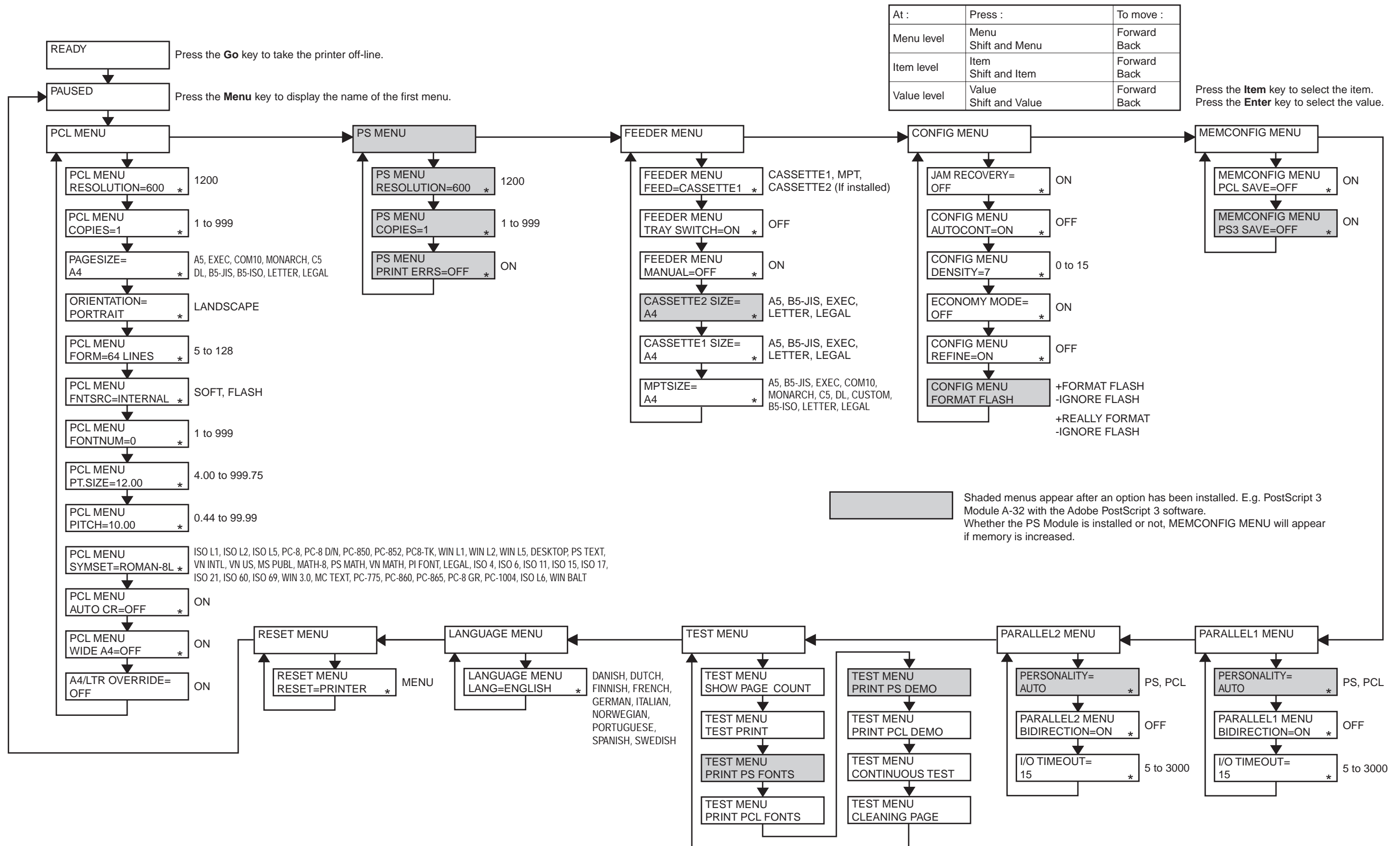





Figure 1-7-2





# 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.

<b>I. BASIC OPERATION .....</b>	<b>2-1</b>	<b>V. PICK-UP/FEED SYSTEM .....</b>	<b>2-32</b>
<b>II. ENGINE CONTROL SYSTEM .....</b>	<b>2-4</b>	<b>VI. VIDEO CONTROL SYSTEM .....</b>	<b>2-38</b>
<b>III. LASER/SCANNER SYSTEM .....</b>	<b>2-18</b>	<b>VI. PAPER FEEDER .....</b>	<b>2-47</b>
<b>IV. IMAGE FORMATION SYSTEM....</b>	<b>2-24</b>		



# I. BASIC OPERATION

## A. Functions

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

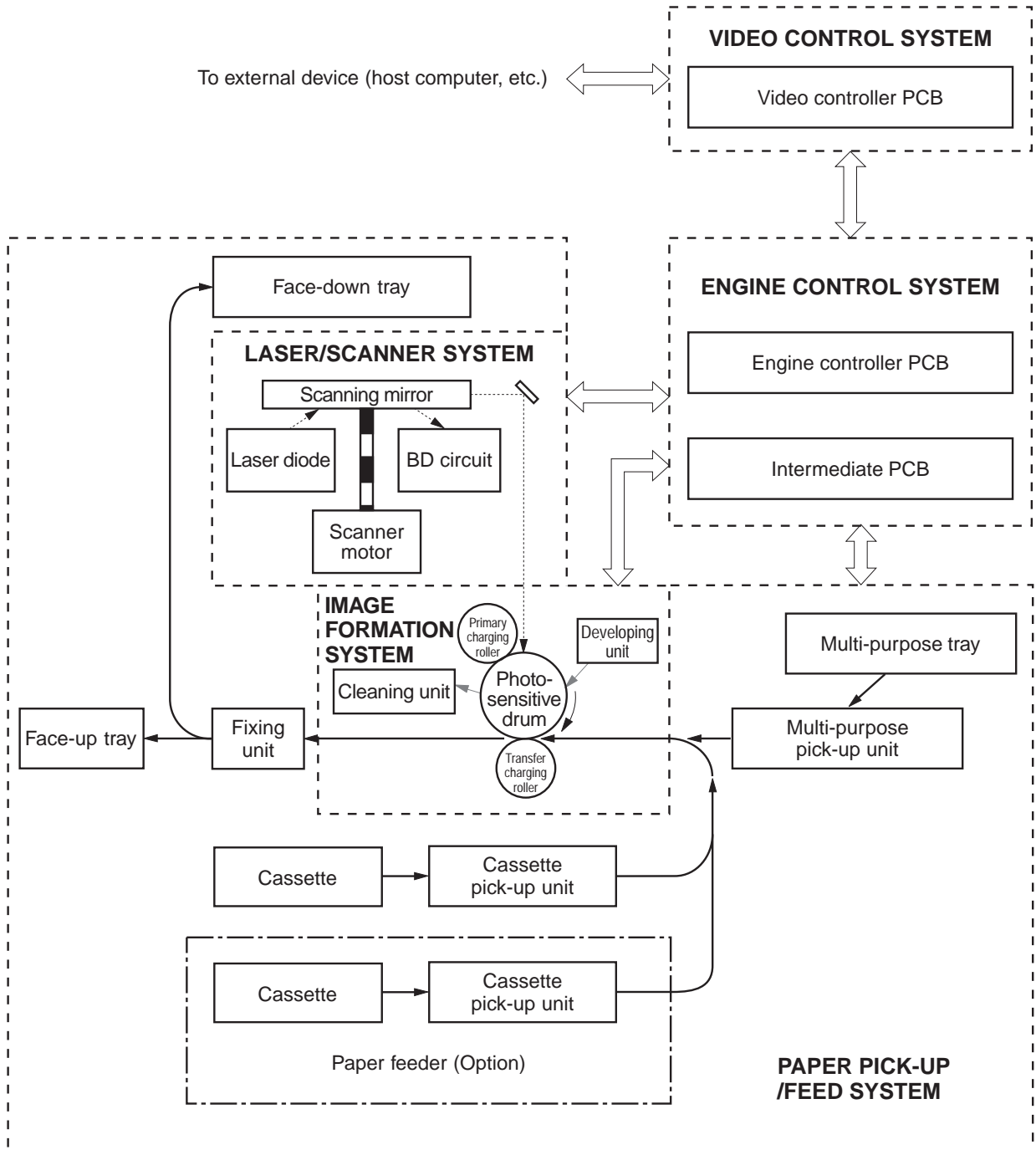


Figure 2-1-1

**B. Basic Operation Sequences**

The operation sequences of this printer are controlled by the microprocessor (CPU) 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**

	Period	Purpose	Remark
WAIT (WAIT period)	From the power-ON until the completion of the main motor initial drive.	Clears the drum surface potential and cleans the transfer charging roller.	Detects whether the cartridge is installed or not.
STBY (STANDBY period)	From the end of the WAIT period until the print instruction command is input from the video controller, or from the end of the LSTR period until the print instruction command is input from the video controller, or until the power is switched OFF.	Maintains the printer in a ready state.	
INTR (INITIAL ROTATION period)	From the input of the print instruction command from the video controller until the paper reaches the top-of-page sensor.	Stabilizes the sensitivity of the photosensitive drum in preparation for printing.	
PRINT (PRINT period)	From the end of the INTR period until 2 seconds after the top-of-page sensor detects the trailing edge of the paper.	Forms an image on the photosensitive drum according to the VIDEO signal input from the video controller, and transfers the toner image to paper.	
LSTR (LAST ROTATION period)	From the completion of printing until the main motor stops rotating.	Delivers the final page out of the printer and cleans the transfer charging roller.	On receiving the print instruction command from the video controller, the printer enters the INITIAL ROTATION period.

**C. Power ON Sequence**

The sequence from power-ON until the printer enters the STANDBY mode is shown below.

- 1) Power-ON
- 2) CPU initialization
- 3) Video interface communication start
- 4) Fixing heater drive
- 5) Main motor and fan drive  
Detects the paper detection status of each sensor in the printer immediately before driving the main motor, and assesses a paper jam if residual paper is detected.
- 6) High-voltage control  
Detects whether or not the cartridge is installed and cleans the transfer charging roller after the primary charging AC bias is turned ON.
- 7) Residual paper check  
After starting the main motor, performs detection of the residual paper in the printer again. If the residual paper is detected, the printer assesses a paper jam or delivers the residual paper automatically according to the situation.
- 8) Failure/abnormality check  
In the periods above, door open, fan motor failure, and fixing unit failure are detected as the need arises.

## II. ENGINE CONTROL SYSTEM

### A. Engine Controller PCB

#### 1. Outline

The operation sequence of this printer is controlled by the CPU on the engine controller PCB. When the power switch is turned ON and the printer enters the STANDBY mode, the CPU outputs signals to drive various loads, such as the laser diode, motors, and solenoids, based on the print instruction command and image data input from the engine controller.

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

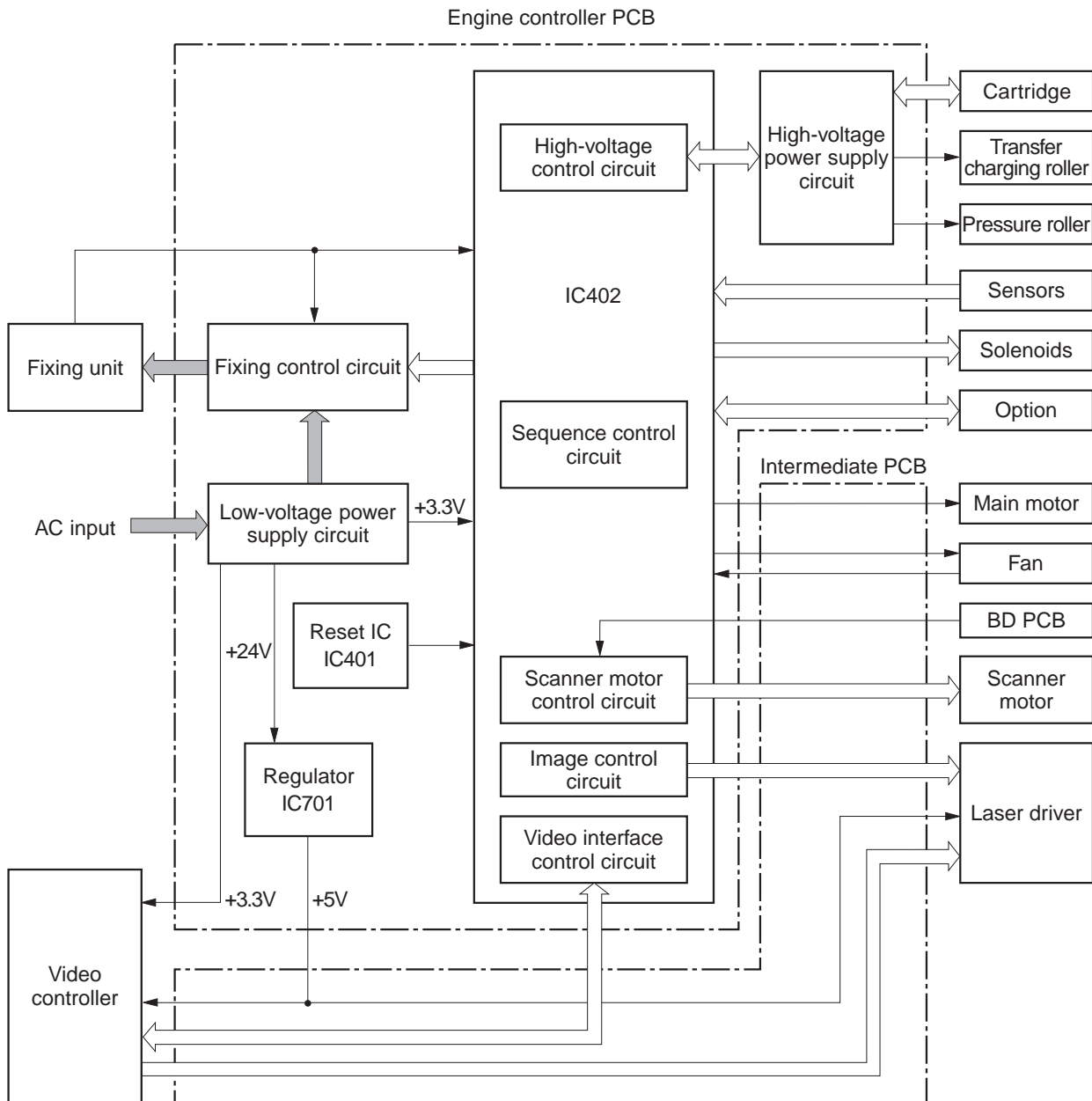


Figure 2-2-1

**2. Functions****a. CPU (IC402)**

The CPU is an 8-bit-single-chip microcomputer IC. This CPU is a single chip CPU with built-in ROM and RAM, and performs the followings according to the control programs stored in the ROM.

- 1) Printer sequence control
- 2) Video interface control
- 3) High-voltage power supply circuit control
- 4) Laser/scanner control
- 5) Sensor control
- 6) Loads (motors, solenoids, etc.) control

**b. Reset IC (IC401)**

IC401 monitors +3.3V and resets the CPU at power-ON.

**c. Regulator (IC701)**

IC701 generates +5V based on +24V supplied from the low-voltage power supply circuit. This +5V is supplied to the laser driver and video controller.

**d. Fixing control circuit**

Refer to “B. Fixing control circuit” in this chapter for details.

**e. High-voltage power supply circuit**

Refer to “C. High-voltage power supply circuit” in this chapter for details.

**f. Low-voltage power supply circuit**

Refer to “D. Low-voltage power supply circuit” in this chapter for details.

3. Engine controller input/output

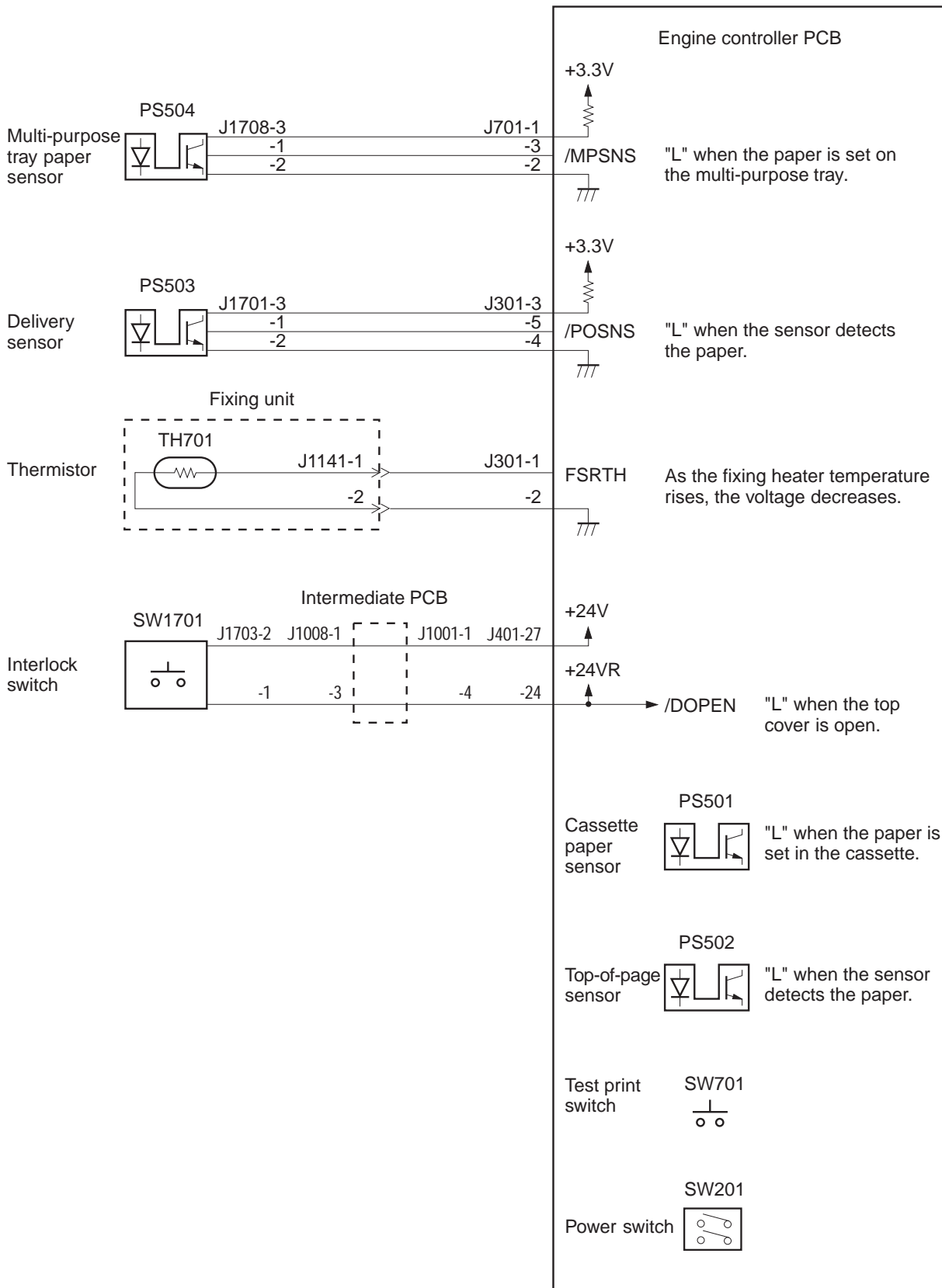


Figure 2-2-2



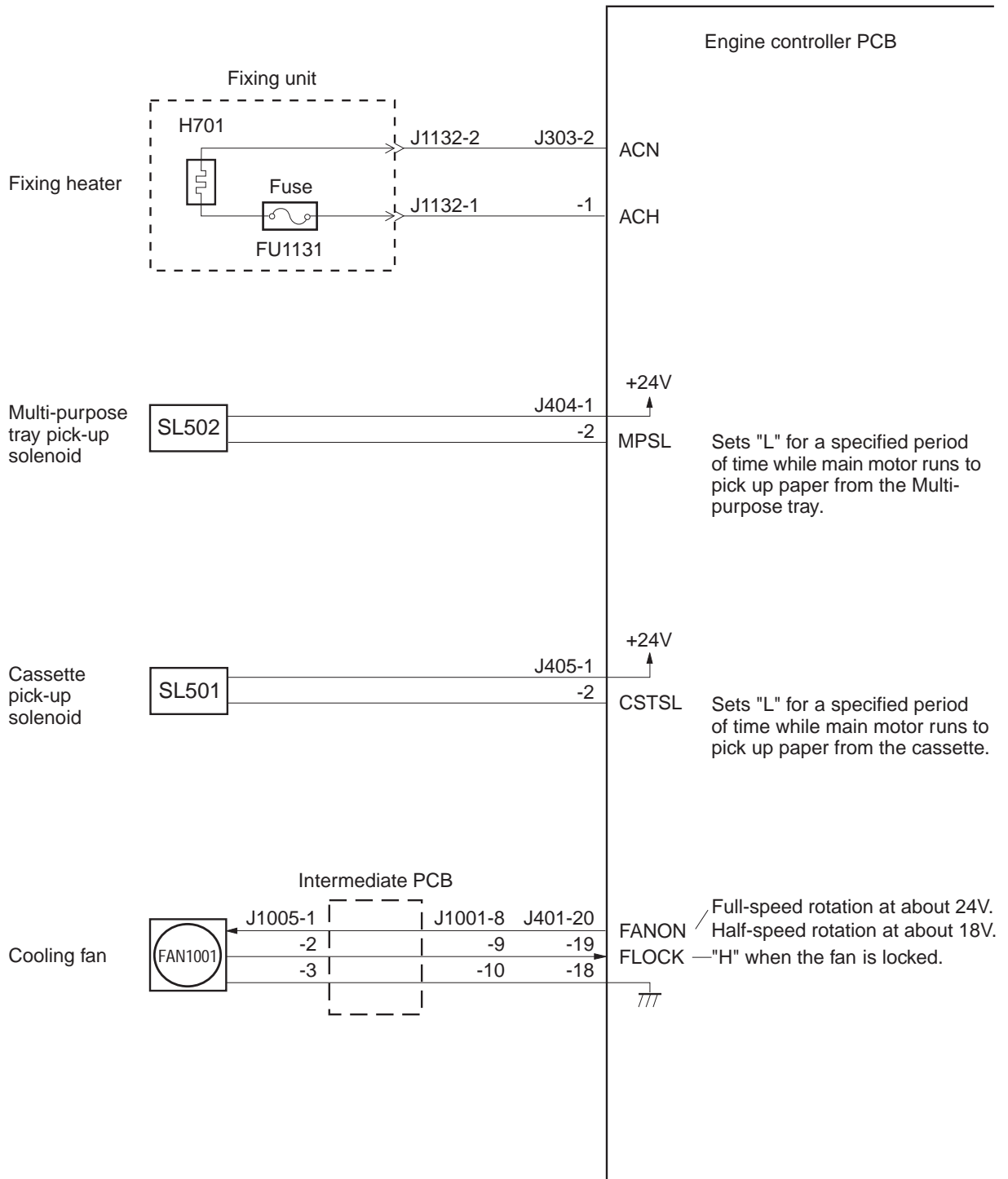


Figure 2-2-3

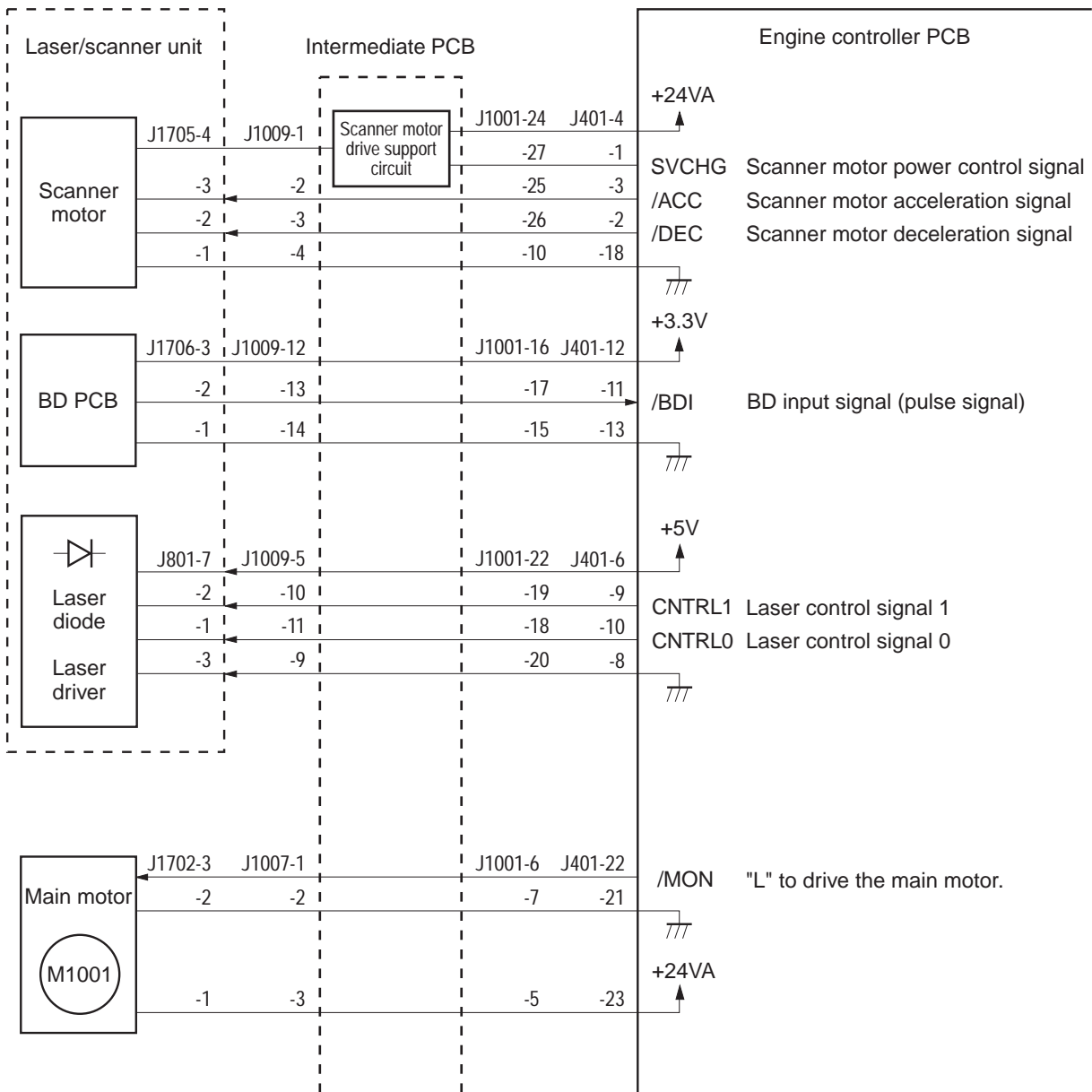


Figure 2-2-4

**B. Fixing Control Circuit**

**1. Fixing temperature control**

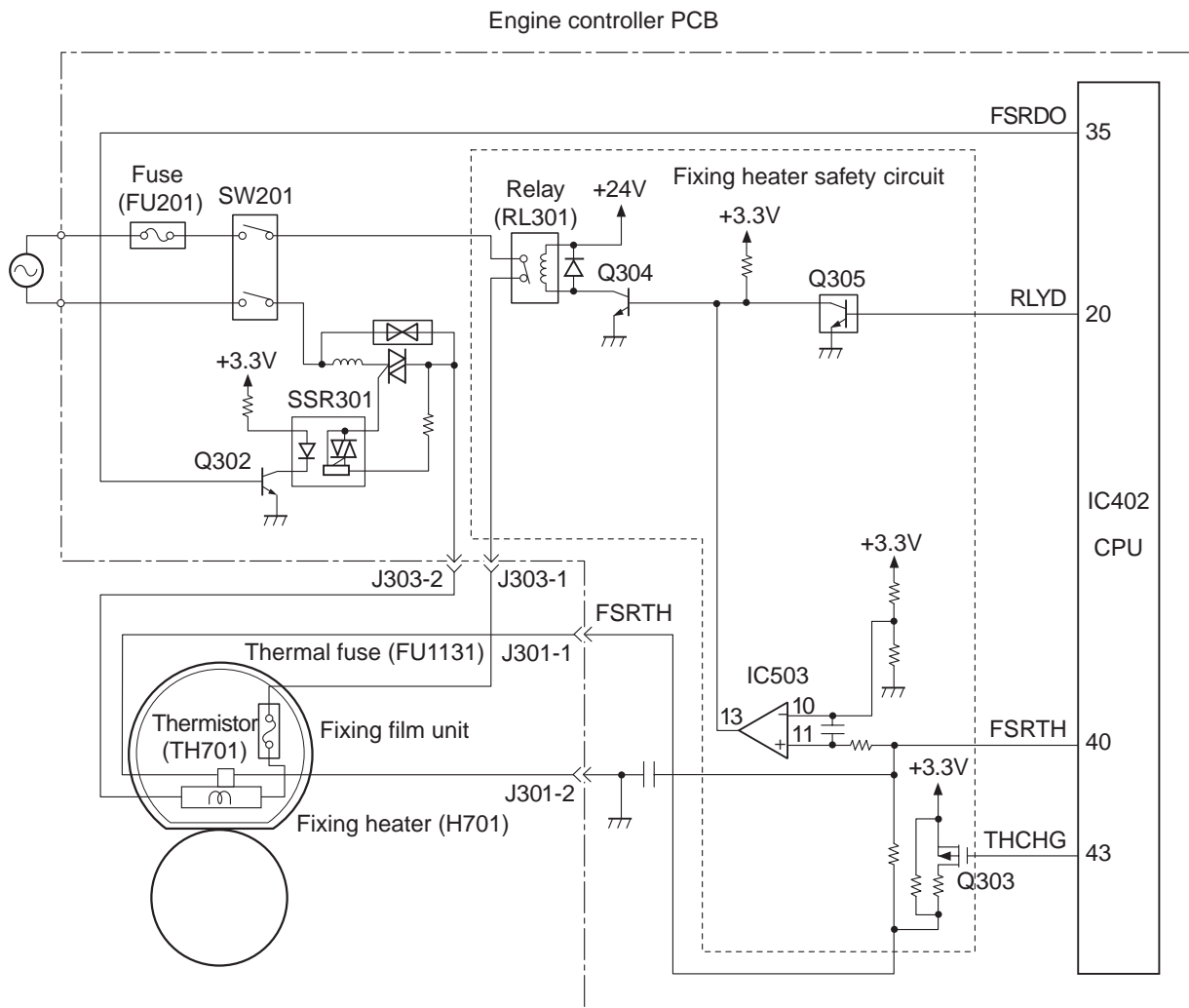
The fixing film unit contains a plate-shaped fixing heater to heat the fixing film.

The fixing heater temperature is detected by the thermistor (TH701) on the fixing heater. When the surface temperature of the fixing heater rises, the resistance value of TH701 decreases, and the voltage of the FIXING HEATER TEMPERATURE DETECTION signal (FSRTH) decreases.

The CPU (IC402) on the engine controller controls the FIXING HEATER DRIVE signal (FSRDO) based on the voltage of the FSRTH signal in order to bring the fixing heater temperature to the specified value.

No power is supplied to the fixing heater when the printer is in the STANDBY mode.

When a print instruction command is input from the video controller, the CPU starts the initial temperature control of the fixing heater.



**Figure 2-2-5**

At this time, the CPU monitors the FSRTH signal and sets the THERMISTOR SWITCHING signal (THCHG) to “H” when the fixing heater temperature is low (Initial temperature control) and to “L” when the temperature is high (Print temperature control) in order to improve the FSRTH

signal detection accuracy.

When the fixing heater temperature reaches the point of 5°C lower than the target print temperature, the CPU starts the print temperature control.

The CPU controls the fixing temperature in the following four modes.

- 1) Initial temperature control: After a print instruction command is input from the video controller, the CPU brings the fixing heater temperature to the point of 5°C lower than the target print temperature.
- 2) Print temperature control: During printing, the CPU controls the fixing heater temperature to be the target print temperature.
- 3) Between-page temperature control: The CPU controls the fixing heater temperature to be low compared to the target print temperature between pages in order to prevent the elevation of the temperature.
- 4) Postprint temperature control: Except for the paper with less than 246mm in length, the CPU controls the fixing heater temperature to be 200°C for 5 seconds after printing.

### 2. Fixing heater safety circuit

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

If the output voltage from the thermistor becomes less than about 0.7V (250°C or more) due to temperature rise of the fixing heater, the output of No.13 pin of the comparator (IC503) becomes “L” and Q304 is turned OFF. This turns OFF the relay (RL301) to interrupt the power supply to the fixing heater regardless of the RELAY DRIVE signal (RLYD) output from the CPU.

### 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 TH701. If it is abnormal, the CPU assesses a fixing heater failure, cuts off the power to the heater, and turns OFF the relay (RL301). 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 temperature of the thermal fuse exceeds about 230°C, the thermal fuse melts and the power to the fixing heater is cut off.
- If the temperature of the fixing heater rises abnormally and the output voltage of TH701 falls below about 0.7V (250°C equivalent), the fixing heater safety circuit cuts off the power to the fixing heater regardless of CPU outputs.

### 4. Fixing unit failure detection

The CPU assesses a fixing unit failure under the conditions (a ~ e) described below and conducts the followings:

- 1) Interrupts the power to the fixing heater.
- 2) Sets the RELAY DRIVE signal (RLYD) to “L” and turns OFF the relay (RL301), as well as reporting the failure to the video controller.

#### a. Abnormally high temperature (all modes)

The CPU assesses an abnormally high temperature when it detects the temperature of 220°C or more for 1 second or more continuously.

#### b. Abnormal warm-up 1 (Initial temperature control mode)

The CPU assesses an abnormal warm-up 1 if the detected temperature is lower than 120°C for 1 second or more continuously after the heater has been energized for 20 seconds.

**c. Abnormal warm-up 2 (initial/print temperature control mode)**

The CPU assesses an abnormal warm-up 2 when the temperature does not exceed the point of 5°C lower than the target print temperature within 75 seconds after starting the supply of power to the heater.

**d. Low temperature during temperature control (print/between-page temperature control mode)**

The CPU assesses a low temperature during temperature control when the detected temperature is lower than 120°C for 1 second or more continuously in the print/between-page temperature control mode.

**e. Broken thermistor wire (all modes)**

The CPU assesses a broken thermistor wire when the output voltage from the thermistor is about 3.2V or more for 1 second or more continuously.

C. High-voltage Power Supply Circuit

1. Outline

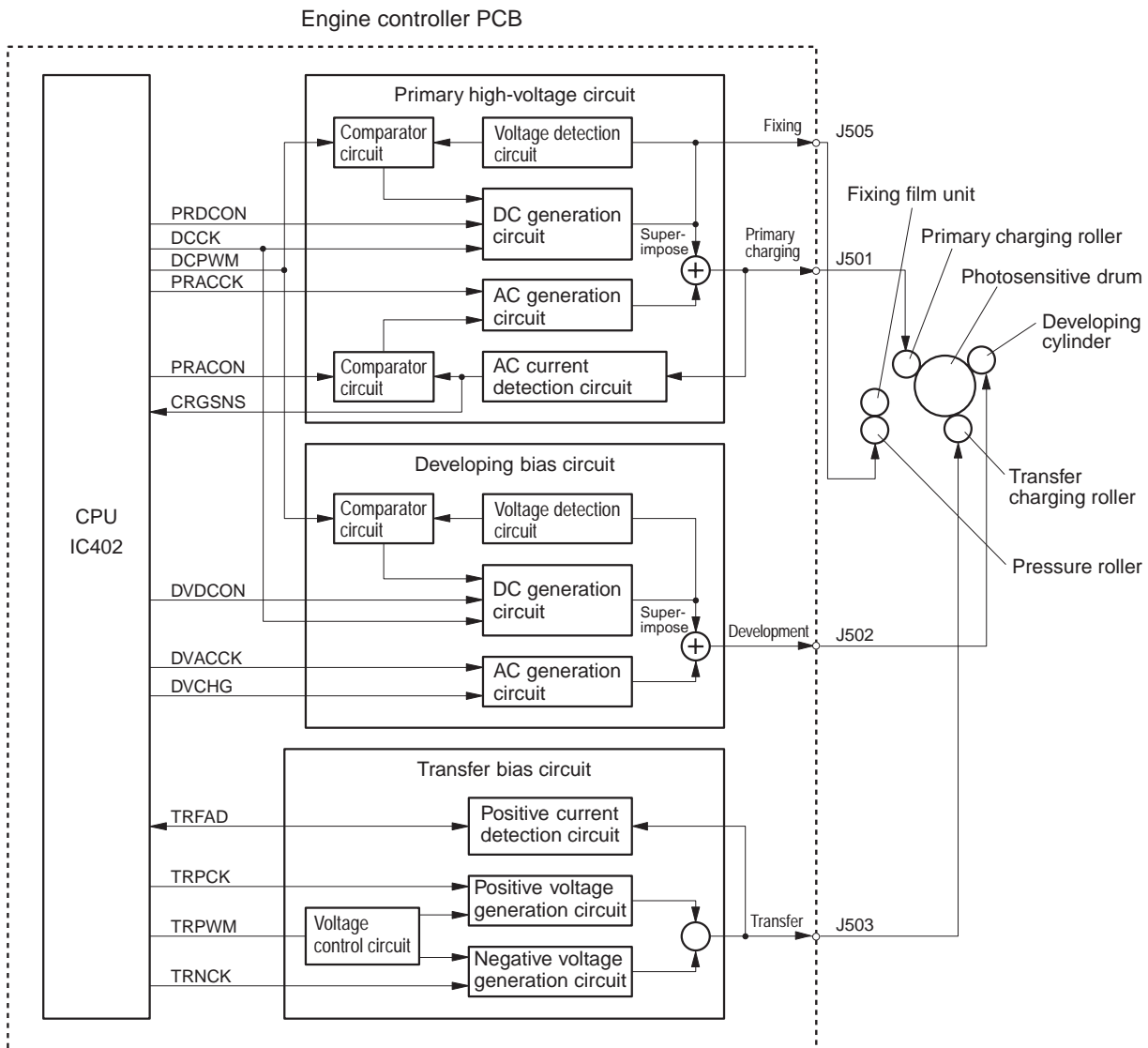


Figure 2-2-6

In response to the instructions from the CPU (IC402) on the engine controller, this circuit applies the superimposed voltage of DC voltage and AC voltage to the primary charging roller and developing cylinder, a positive or negative DC voltage to the transfer charging roller, and a negative DC voltage to the pressure roller.

This circuit changes the primary DC bias and developing DC bias according to the image density information sent from the video controller in order to adjust the image density.

2. Operation

a. Primary charging roller voltage generation

When a print instruction command is sent from the video controller, initial rotation starts and the CPU outputs the PRIMARY AC DRIVE signals (PRACCK and PRACON). As a result, the primary AC bias is applied to the primary charging roller from the AC generation circuit in the primary high-voltage circuit. At the same time, the PRIMARY DC BIAS DRIVE signals (DCCK and

PRDCON) are output, and the primary DC bias is output from the DC generation circuit in the primary high-voltage circuit. 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 (DCPWM) output from the CPU.

#### **b. Developing bias generation**

When the DEVELOPING DC BIAS DRIVE signals (DCCK and DVDCON) are output from the CPU, the developing DC bias is applied to the developing cylinder from the DC generation circuit in the developing bias circuit.

When the DEVELOPING AC BIAS DRIVE signals (DVACCK and DVCHG) are output from the CPU in timing of the image formation, the developing AC bias is applied to the developing cylinder from the AC generation circuit in the developing bias circuit.

Thus, the superimposed voltage of developing DC bias and developing AC bias is applied to the developing cylinder.

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

#### **c. Transfer charging roller voltage generation**

The cleaning, top negative, print or trailing edge bias is applied to the transfer charging roller according to the print sequence.

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

The top negative bias (negative voltage) is applied to the transfer charging roller at a specified timing to prevent the leading edge of the paper from going into the cartridge.

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

The trailing edge bias (positive low voltage) is applied to the transfer charging roller at a specified timing so that the residual toner on the photosensitive drum is not attracted to the transfer charging roller.

When a print instruction command is sent from the video controller, initial rotation starts. Then, the print bias is applied to the transfer charging roller in a specified period of time after application of the top negative bias and output of the /BD signal from the CPU.

A print bias is applied during the print sequence to transfer the toner onto the paper. A trailing edge bias and a top negative bias are applied between pages.

After the completion of printing, a trailing edge bias and a top negative bias are applied again. Then, a cleaning bias is applied to clean the transfer charging roller.

#### **d. Fixing bias generation**

The CPU outputs the PRIMARY DC BIAS DRIVE signals (DCCK and PRDCON), and the primary DC bias is output from the DC generation circuit in the primary high-voltage circuit. At the same time, a negative DC voltage is applied to the fixing film in the fixing unit as a fixing bias.

#### **e. Cartridge detection**

When the PRIMARY AC DRIVE signals (PRACCK and PRACON) are output from the CPU and the primary AC bias is output from the AC generation circuit in the primary high-voltage circuit, the primary high-voltage circuit feeds back the CARTRIDGE DETECTION signal (CRGSNS signal) to the CPU.

The CPU checks the voltage of the CRGSNS signal when the primary AC bias is output during WAIT period in order to detect whether the cartridge is installed or not.

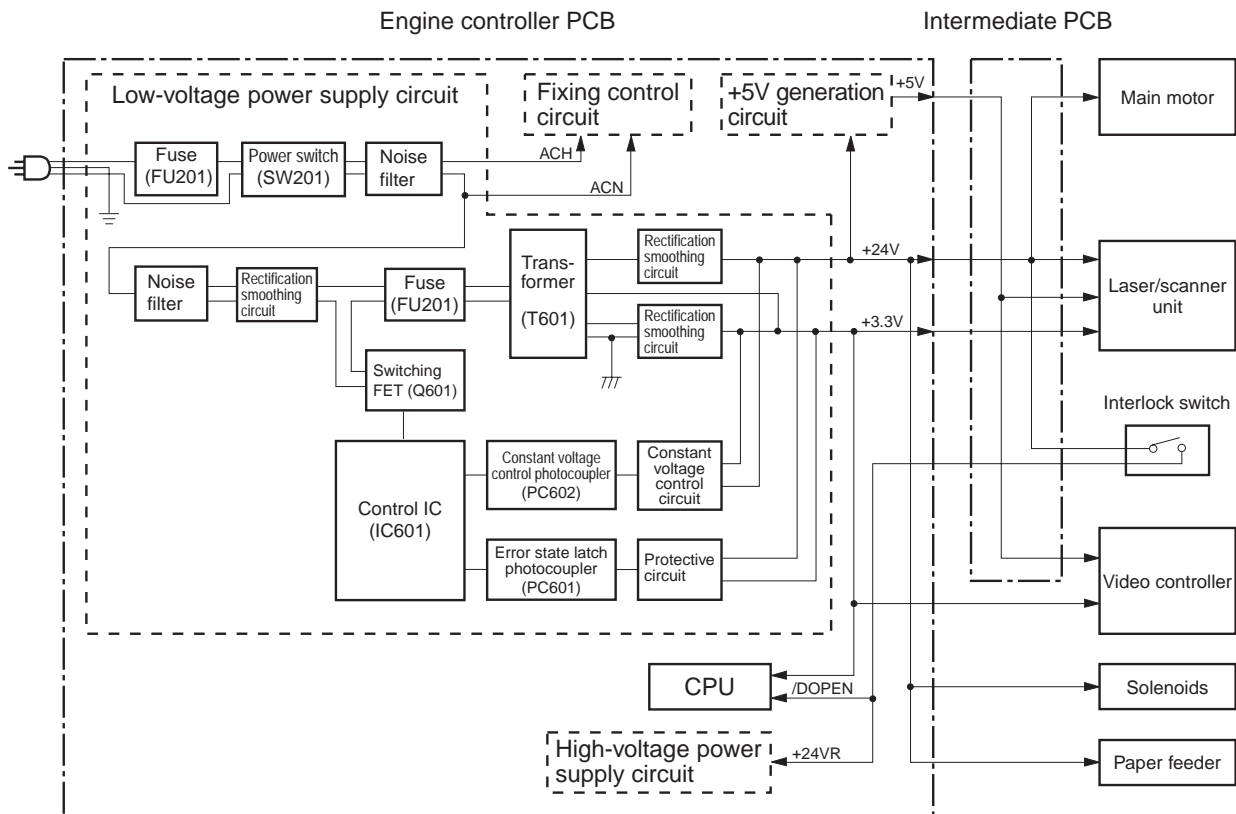
**D. Low-voltage Power Supply Circuit**

**1. Outline**

AC power is supplied to the low-voltage power supply circuit in the engine controller when the power switch (SW201) is turned ON.

The low-voltage power supply circuit supplies +24VDC and +3.3VDC required for the printer.

+24VDC is supplied to the high-voltage power supply circuit and to drive the main motor, scanner motor, fan, etc.. +3.3VDC is supplied to the sensors and ICs on the engine controller PCB. +24VDC is divided into +24V, which is normally supplied from the low-voltage power supply circuit, and +24VR, which is interrupted when the interlock switch (SW1701) is turned OFF by opening the top cover. This +24VR is supplied to the high-voltage power supply circuit on the engine controller. The +24VR also functions as the DOOR OPEN DETECTION signal (/DOPEN). The CPU detects the door open with this signal.



**Figure 2-2-7**

**2. Protective functions**

The +24VDC power supply circuit and +3.3VDC power supply circuit each have the overcurrent/overvoltage protective function, which interrupts the output voltage when troubles such as short-circuit on the load side cause an excessive current flow or generate abnormal voltage, to protect the power supply circuit.

If the overcurrent/overvoltage protective function is activated and no DC voltage is output from the low-voltage power supply circuit, turn OFF the power switch, rectify the problem in the faulty load, and then turn the power switch ON again.

The circuit has two fuses which break and cut off the power supply if overcurrent flows through the AC line.



**E. Video Interface Control**

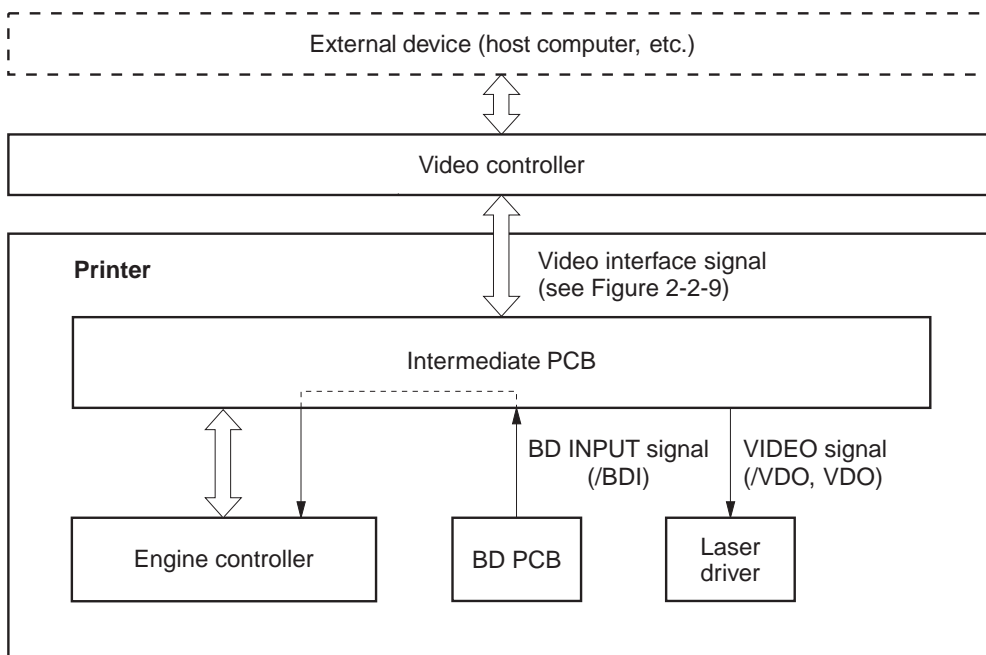
**1. Outline**

The video controller continually monitors the printer by communicating with the engine controller using the video interface. The video controller outputs the video signal through the video interface when the printer is ready to print.

The engine controller draw an image on the photosensitive drum by turning the laser ON/OFF based on the video signal output from the video controller, and then transfer the image onto paper to output it.

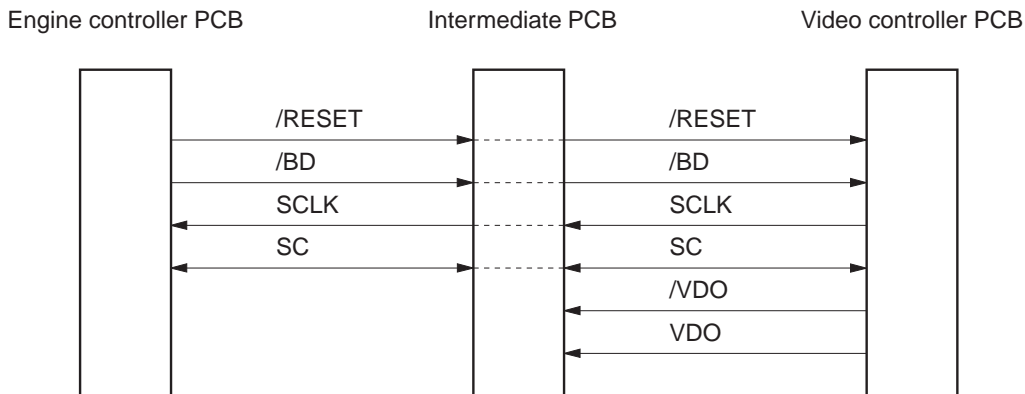
This section describes the types of the interface signals between the engine controller and video controller PCB, and also discusses the operation sequences using the interface signals.

**a. System block diagram**



**Figure 2-2-8**

**b. Video interface signal**



**Figure 2-2-9**

### 2. Operation

Unlike the conventional video interface, which uses an individual signal line for exchanges of each main signal, the video interface of this printer uses command status.

When sending/receiving status and commands, the engine controller and video controller use bi-directional STATUS COMMAND signal (SC) and synchronize data with the SERIAL CLOCK signal (SCLK) output from the video controller.

When the power switch is turned ON, the printer enters the WAIT state.

After the end of the WAIT period, the engine controller sends a ready status to the video controller to notify the video controller that the printer is ready to print.

The video controller sends a print instruction command to the engine controller when the printer is in the READY state and data of a print page is prepared.

On receiving the print instruction command, the engine controller starts the sequence of the INITIAL ROTATION. The engine controller starts sending the /BD signal to the video controller when it detects that the paper has reached the specified position after pick-up operation.

On receiving the /BD signal sent from the engine controller, the video controller sends the VIDEO signals (/VDO, VDO) synchronized to the /BD signal to the laser driver via the intermediate PCB.

The laser driver turns ON/OFF the laser diode based on the /VDO and VDO signals. The laser beam emitted from the laser diode is scanned across the photosensitive drum surface by the scanning mirror to form a latent image.

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

While a page is being printed, the engine controller checks if another print instruction command is being sent from the video controller.

If no command is received, the engine controller completes the PRINT sequence and enters the LAST ROTATION period. At the end of this period, the printer enters STANDBY mode.

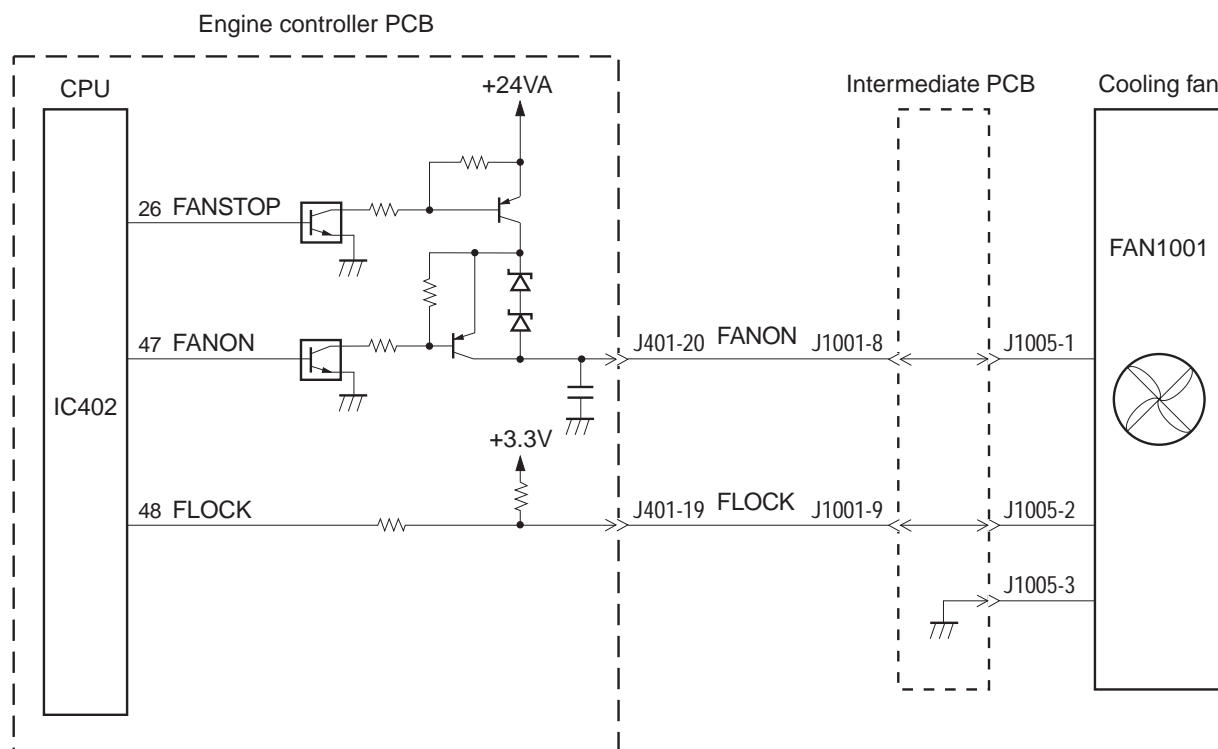
If a print instruction command is being sent, the engine controller continues the PRINT sequence. After the last rotation operation, the printer enters the STANDBY state.

## F. Other Controls

### 1. Fan motor control

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

Figure 2-2-10 shows the fan motor control circuit.



**Figure 2-2-10**

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

At the same time as start of main motor drive, the CPU (IC402) sets the FANSTOP of No. 26 pin to "H" and rotates the fan motor at its full speed by setting the FAN DRIVE signal (FANON) to the voltage level of full-speed rotation.

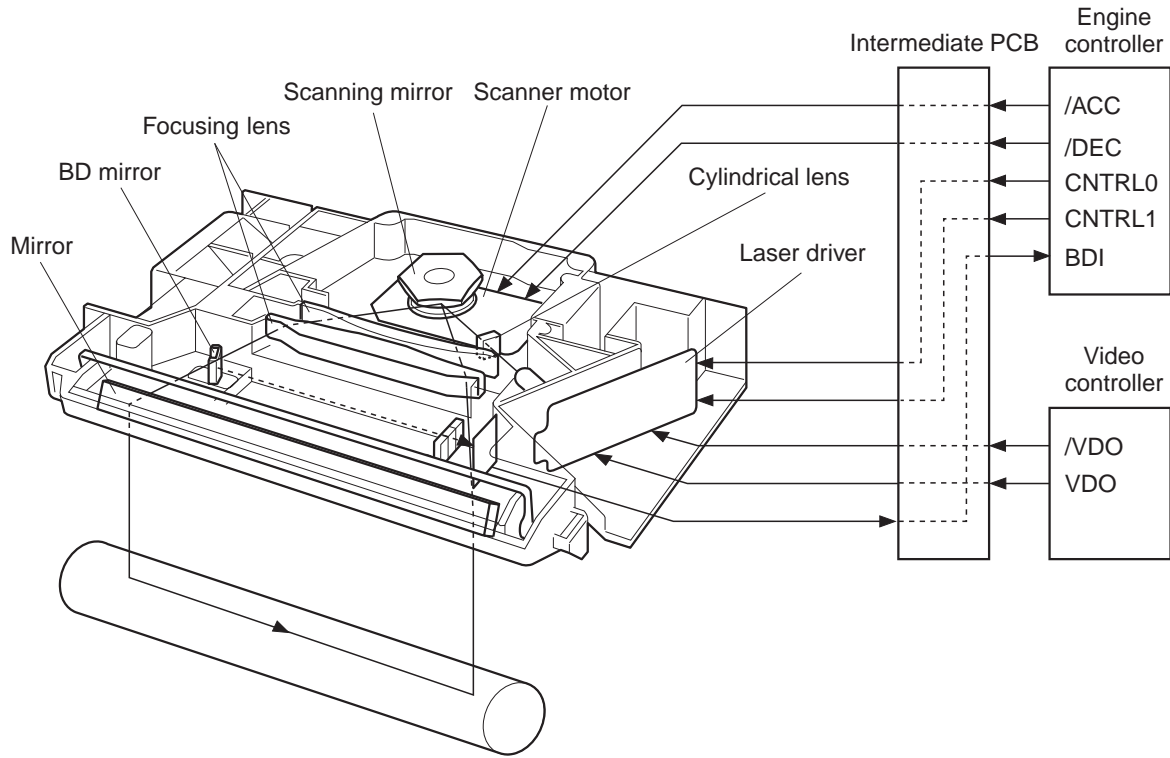
The CPU switches the fan motor drive from full-speed rotation to half-speed rotation by setting the FANON of No. 47 pin to "L" and reducing the FANON signal to the voltage level of half-speed rotation.

The fan motor rotates at its full speed while the main motor is rotating and for 30 seconds after the main motor stops. In other periods, the fan motor repeats full-speed rotation, half-speed rotation, and stop in that order.

The CPU assesses a fan motor failure and reports it to the video controller when the FAN LOCK DETECTION signal (FLOCK) stays "H" for 10 seconds or more continuously while the fan motor is rotating.

**III. LASER/SCANNER SYSTEM**

**A. Outline**



**Figure 2-3-1**

The Engine controller sends the LASER CONTROL signals (CNTRL0, CNTRL1) to the laser driver in the laser/scanner unit. The video controller sends the VIDEO signals (/VDO, VDO) to the laser driver via the intermediate PCB.

The laser driver turns ON the laser diode to emit laser beam according to these signals.

The laser beam strikes the scanning mirror, which is rotating at a constant speed, through the collimator lens and cylindrical lens.

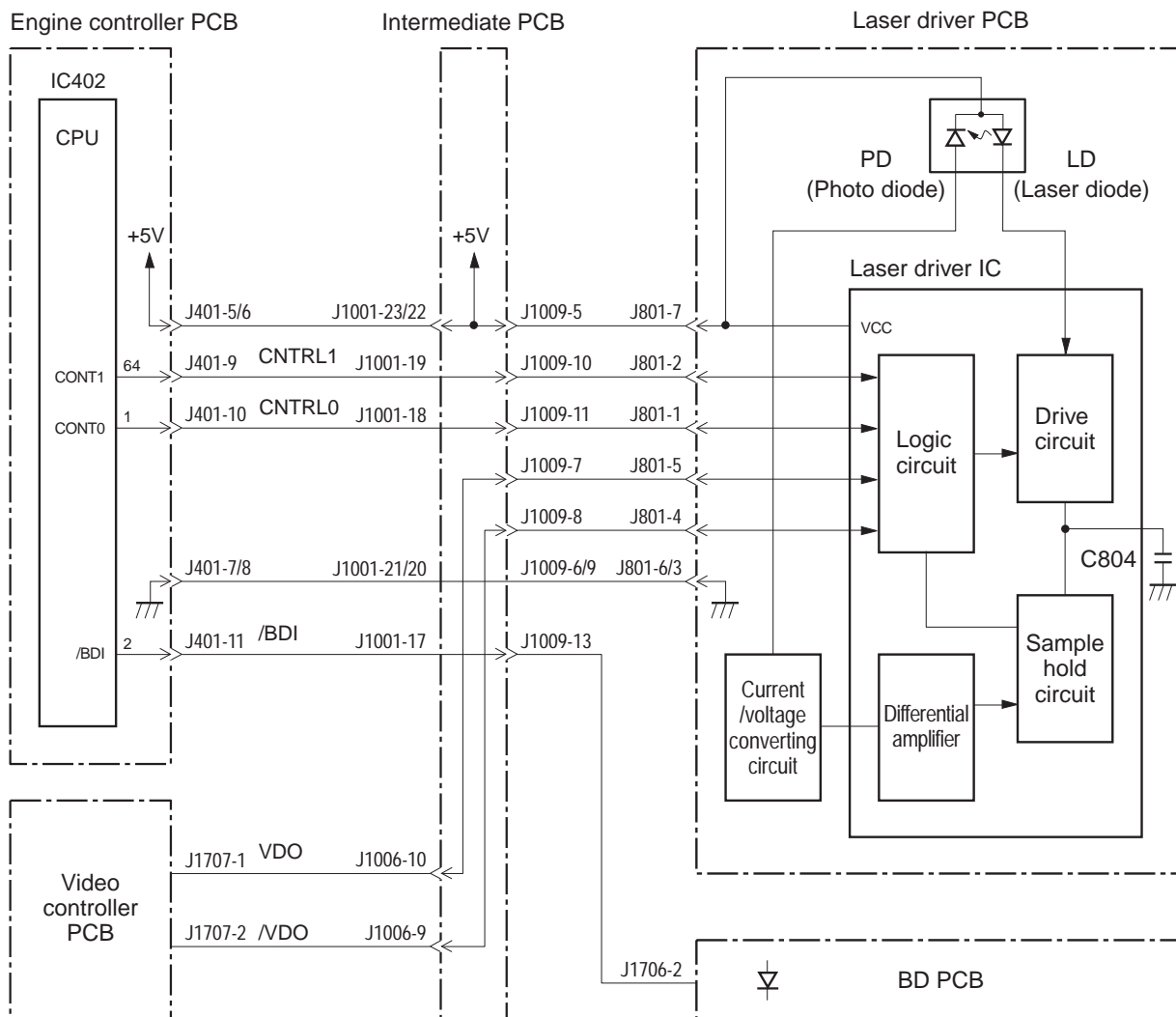
The laser beam reflected from the scanning mirror is brought to a point of focus on the photosensitive drum by the focusing lens and reflecting mirror.

As the scanning mirror rotates at a constant speed, the laser 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 a latent image on the drum surface.

**B. Laser Control Circuit**

**1. Outline**



**Figure 2-3-2**

This circuit turns ON/OFF the laser diode (LD) at a constant intensity in response to the /VDO and VDO signals sent from the video controller.

The /VDO and VDO signals sent from the video controller enter the logic circuit in the laser driver IC via the intermediate PCB.

The LASER CONTROL signals (CNTRL0, CNTRL1) sent from the CPU (IC402) perform forced emission of laser diode, masking in the non-image area, and laser diode automatic power control (APC).

When the CNTRL0 and CNTRL1 signals are “H” and “L” respectively, the laser driver circuit turns ON/OFF the laser diode according to the /VDO and VDO signals.

### 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. The APC is conducted prior to the image formation (Initial APC) and between lines (between line APC).

When the CNTRL0 signal and CNTRL1 signal input to the laser driver IC from the CPU are “L” and “H” respectively, the sample hold circuit in the laser driver IC enters the sample mode (mode in which the APC is performed). At the same time, the laser diode (LD) emits the laser beam forcibly.

The intensity of the laser beam emitted from the laser diode is detected by the photo diode (PD) and fed back to the sample hold circuit via the current/voltage converting circuit and differential amplifier.

The laser driver IC controls the output current of the drive circuit to make the fed back laser intensity become equal to the target laser intensity set in the IC.

When the CNTRL0 signal and CNTRL1 signal become “H”, the laser diode is turned OFF forcibly and the sample hold circuit enters the hold mode. The laser driver IC converts the controlled laser intensity to voltage and stores it in the C804.

### 3. Horizontal sync control

The CPU generates the UNBLANKING signal based on the BD INPUT signal (/BDI) sent from the BD PCB in the laser/scanner unit.

During unblanking period, the CPU controls the LASER CONTROL signal to emit laser forcibly.

There is a small fixed mirror (BD mirror) on the scanning start position in the optical path. The laser beam is reflected by the BD mirror and sent to the BD PCB in the laser/scanner unit.

The BD PCB generates the BD INPUT signal (/BDI) based on the detected laser beam and sends the signal to the CPU.

The CPU generates HORIZONTAL SYNC signal (/BD) based on the /BDI and starts sending the signal to the video controller when it detects that the picked up paper has reached the specified position.

### 4. Image masking control

The CPU performs the image masking control in order to prevent laser beam emission in the non-image area other than the unblanking period.

The laser beam emission enable period of the laser diode is controlled by masking the /VDO and VDO with the LASER CONTROL signals (CNTRL0, CNTRL1) in the logic circuit in the laser driver IC.

The CPU sets the CNTRL0 and CNTRL1 to “H” in the image mask area other than the unblanking period so that the laser diode will not be turned ON/OFF when the /VDO and VDO are sent to the laser driver IC from the video controller.

In image unmasking area, the laser driver IC turns ON/OFF the laser diode based on the /VDO and VDO by setting CNTRL0 to “H” and CNTRL1 to “L.”

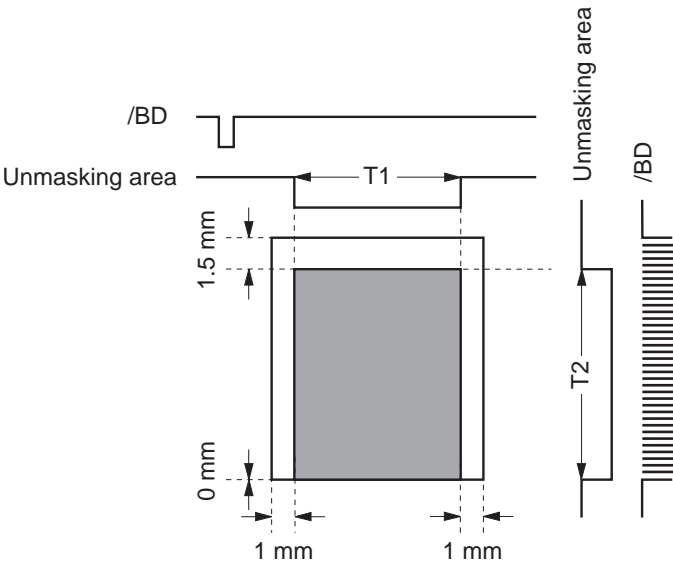
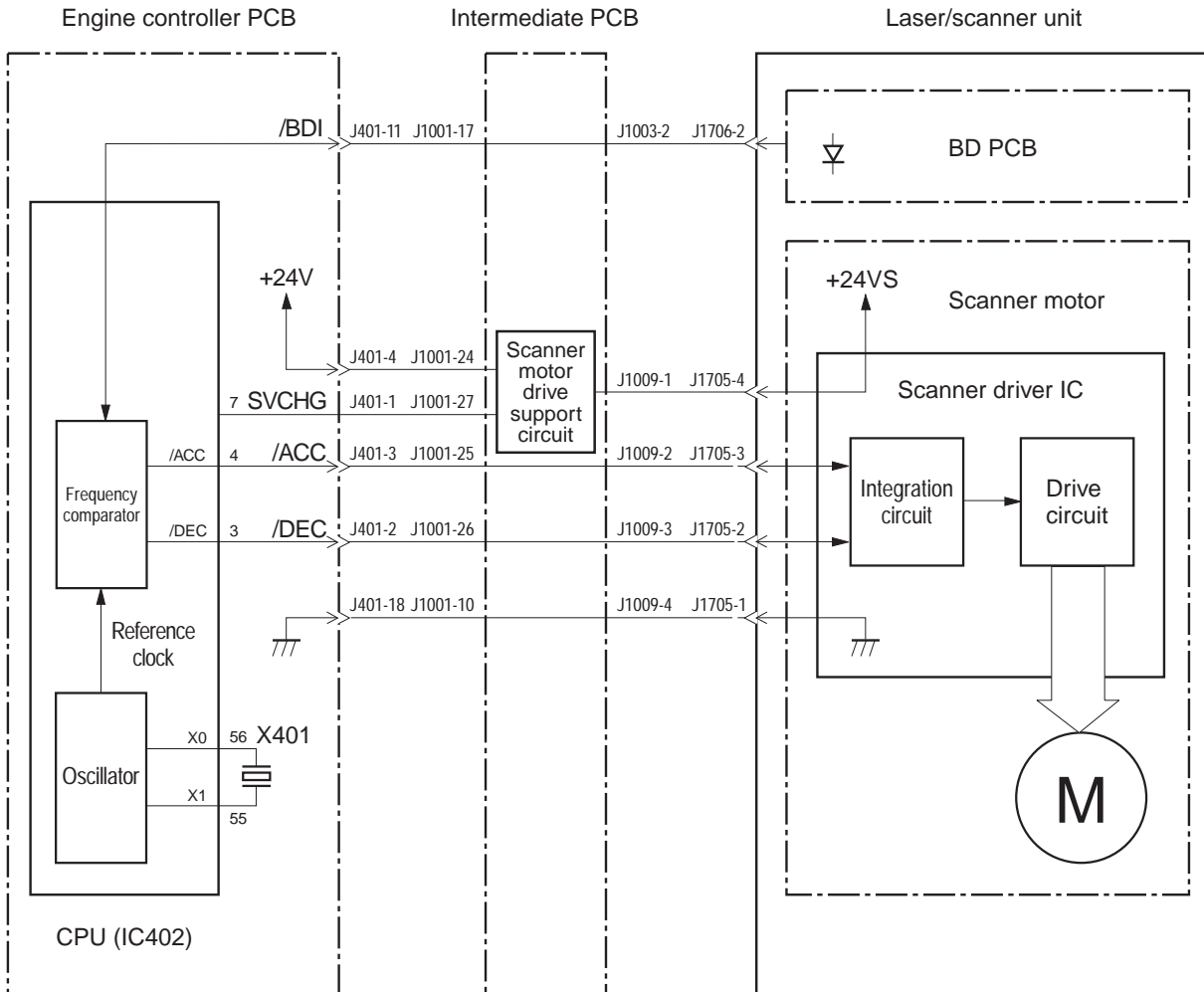


Figure 2-3-3

- Notes:**
- 1. The shaded area indicates the area where the laser beam can write.
  - 2. T1 is the range 1mm toward the center from the right and left sides of the Letter size regardless of the paper size specification.
  - 3. T2 is the range 1.5mm from the leading edge of the paper (start of /BD output) to the trailing edge of the paper.

**C. Scanner System**

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



**Figure 2-3-4**

The scanner motor is a 3-phase, 8-pole DC brushless motor with built in hall elements and is unified with the scanner motor drive circuit.

When the printer is turned ON, the CPU (IC402) divides the oscillation frequency of the crystal oscillator (X401) and generates the reference clock.

When a print instruction command is sent from the video controller, the CPU sets the SCANNER MOTOR ACCELERATION signal (/ACC) to “L” for 1.5 seconds to accelerate the scanner motor rotation forcibly.

At the start of scanner motor drive, the CPU switches the voltage applied to the scanner motor by outputting the SCANNER MOTOR POWER CONTROL signal (SVCHG) to the scanner motor drive support circuit.

Then, the scanner driver IC starts rotating the scanner motor when the /ACC signal goes “L.” The scanner motor keeps accelerating the rotation speed while the ACC signal is “L.”

When the CPU emits the laser forcibly while the scanner motor is rotating, the /BDI signal is sent from the BD PCB. The CPU compares the /BDI cycle with the reference clock in the fre-



quency comparator, and keeps controlling the /ACC signal and /DEC signal so that the scanner motor rotation number becomes the specified value. The CPU determines whether the scanner motor is rotating at the specified rotation number or not by monitoring the /BDI signal.

When stopping the scanner, the SCANNER MOTOR DECELERATION signal (/DEC) is set to "L" to reduce the scanner rotation number.

The CPU detects the following failures and error by monitoring the /BDI signal sent from the BD PCB, and reports it to the video controller.

1) Scanner failure

The CPU assesses a scanner failure when the scanner motor rotation number does not reach the specified value within 10 seconds after the start of scanner motor rotation.

2) BD failure

The CPU assesses a BD failure when the /BDI signal is not detected within 1 second after completion of scanner motor forced acceleration or when the /BDI signal is not detected for 0.5 seconds after the scanner motor rotation has reached the specified number.

3) BD error

The CPU assesses a BD error when the input cycle of /BDI falls out of the range  $\pm 1.7\%$  of the scanner motor specified rotation number after the scanner motor rotation has reached the specified number.

## 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, and charging roller, etc..

When a print instruction command is sent from the video controller, the engine controller drives the main motor to rotate the photosensitive drum, primary charging roller, developing cylinder, and transfer charging roller.

The primary charging roller uniformly applies negative charges to the surface of the photosensitive drum. To form a latent image on the photosensitive drum, the laser beam modulated by the /VDO and VDO signals 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, and then transferred onto paper by the transfer charging roller. Residual toner on the photosensitive drum surface is scrapped off by the cleaning blade. Then, the potential on the drum is made uniform by the primary charging roller in preparation for the next latent image.

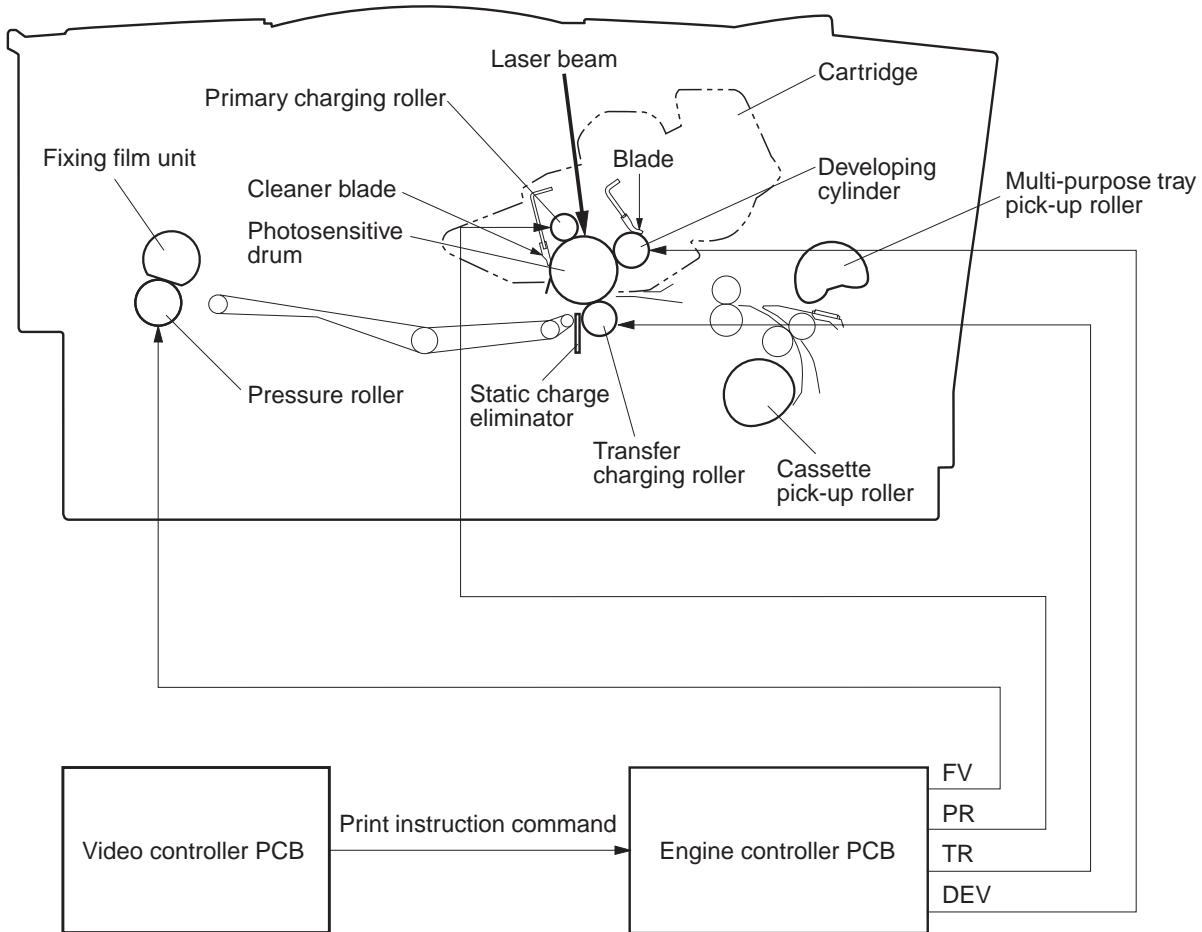
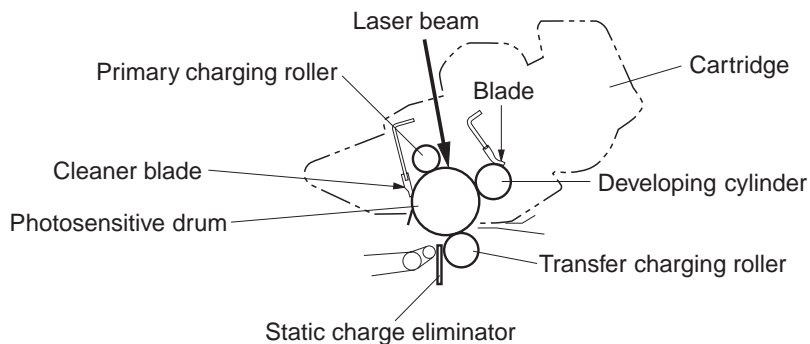


Figure 2-4-1

## B. Printing Process

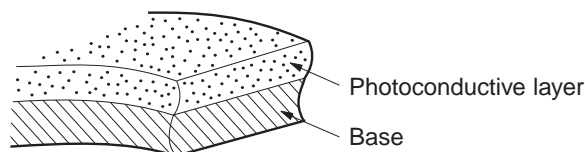
A major portion of the image formation system is contained in the cartridge as shown in Figure 2-4-2.



**Figure 2-4-2**

This printer uses a seamless drum of a double-layer structure 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

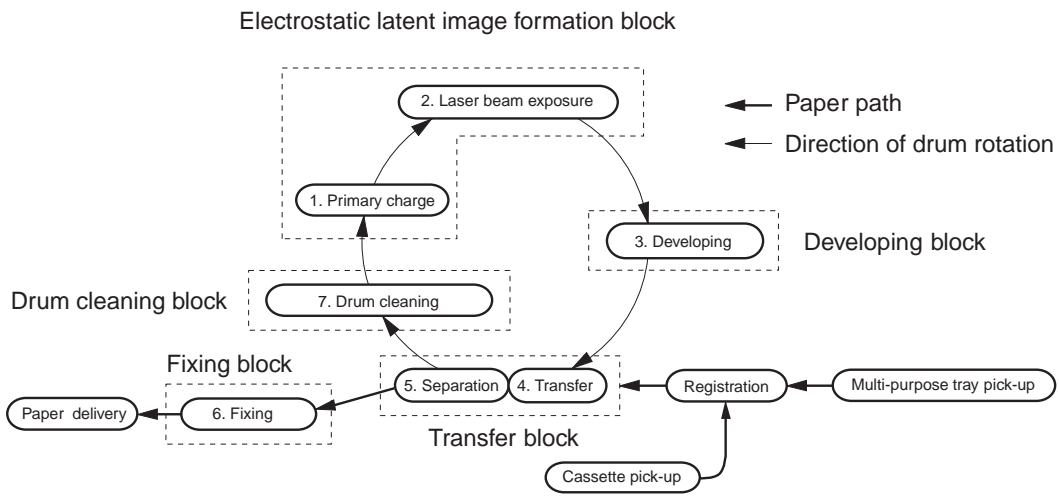


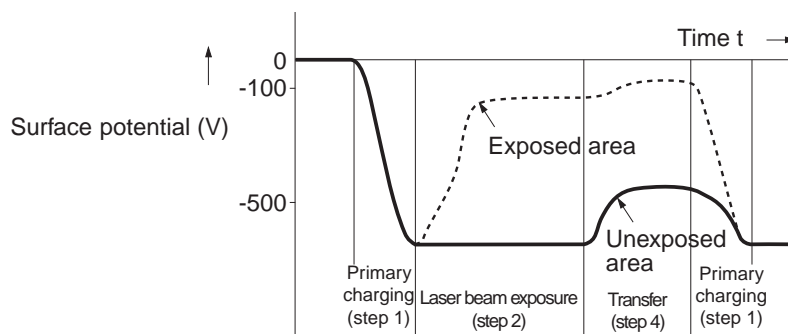
Figure 2-4-4

### 1. Electrostatic latent image formation block

This block follows two steps to produce an electrostatic latent image on the photosensitive drum.

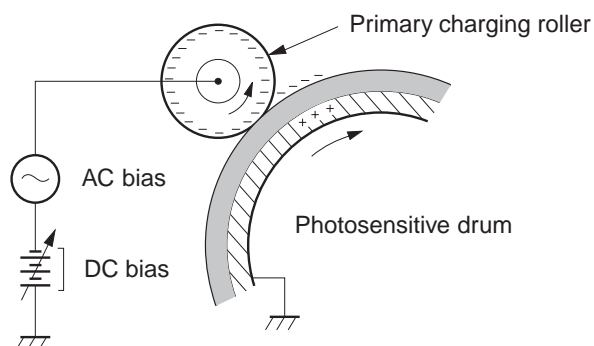
When Step 2 of this block is completed, negative charge remains in the unexposed “dark” areas; however, those in the exposed “light” areas are eliminated.

The 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

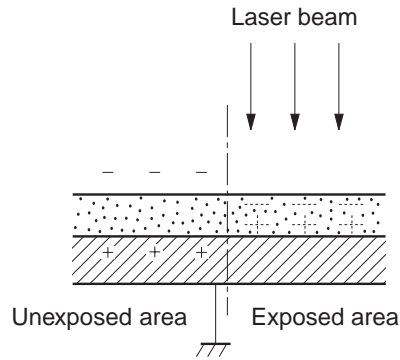


**Figure 2-4-6**

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**



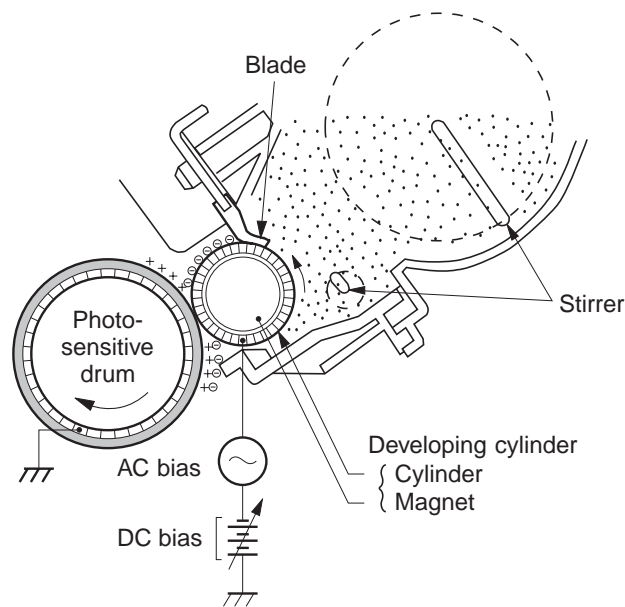
**Figure 2-4-7**

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

**2. Developing block**

Toner particles are placed onto the electrostatic latent image on the drum surface 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**

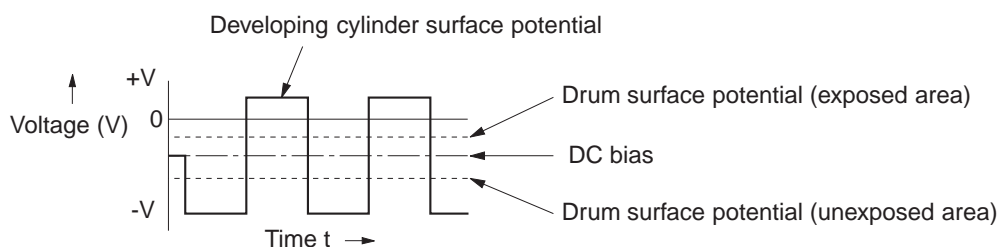
**Note:** Charges in the exposed areas of the photosensitive drum are shown as positive in the figure, even though they are actually negative. It means that the photosensitive drum potential is higher as compared with that of the cylinder.

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

The single-component toner consists of magnetite and a resin binder, and is held to the cylinder by magnetic attraction. The toner is an insulator, and acquires a negative charge from friction of the rotating cylinder.

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

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



**Figure 2-4-9**

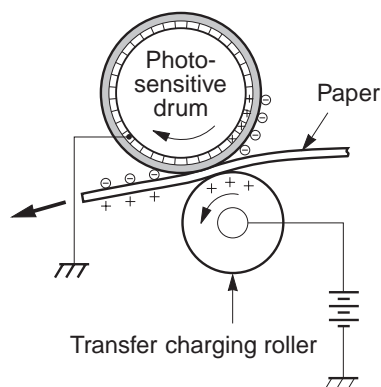
An AC bias is applied to the developing cylinder to help project the toner particles to the drum surface and improve the contrast of the printed image. The center voltage of the AC bias (1600Vp-p) varies with the DC bias voltage. The change in the DC bias changes the potential difference between the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

This printer has a stirring mechanism in the cartridge to ensure that 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

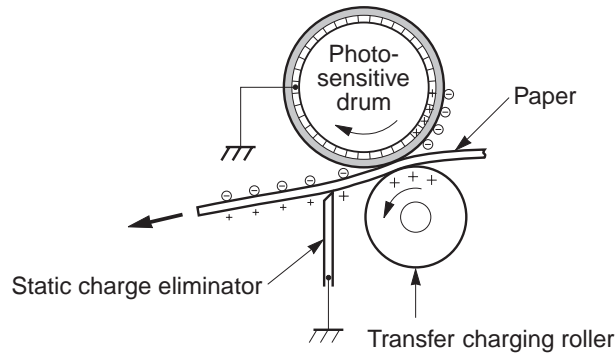


**Figure 2-4-10**

A positive charge applied to the back of the paper attracts 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.

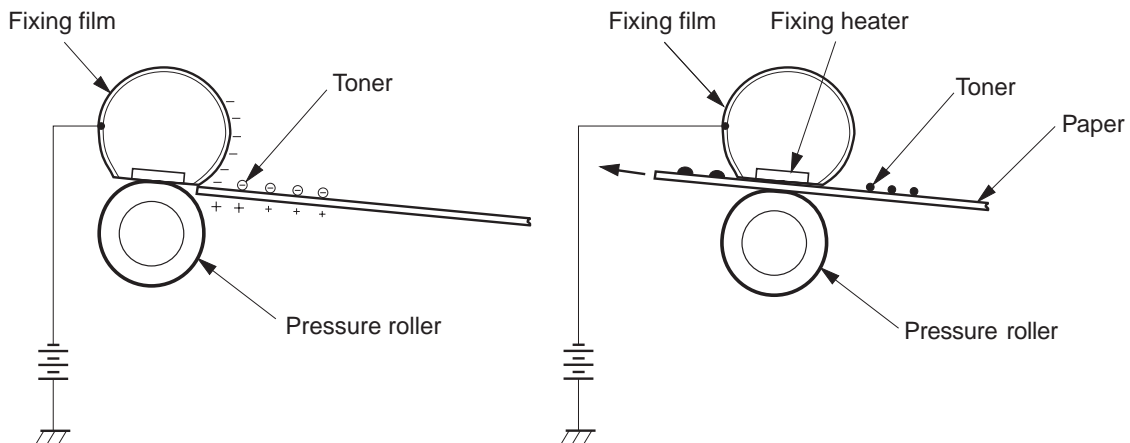
To stabilize the paper feed system and prevent droplets on the printed image at low temperature and humidity, the charge on the back of the paper is reduced by the static charge eliminator.

**4. Fixing block**

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

The toner particles are fused to the paper to make an permanent image by applying pressure and heat to the paper and the toner.

**Step 6: Fixing**



**Figure 2-4-12**

As the toner particles transferred onto the paper are held to the paper by the positive charge



applied to the back of the paper, they may be dispersed at fixing.

This printer applies the negative DC voltage to the fixing film via the pressure roller shaft (pressure roller shaft is a mere continuity path). The negative charge is applied to the paper surface by the fixing film. This improves the adhesion force of the toner particles to the paper and prevents dispersion of the toner particles.

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 of less than 10 seconds and energy conservation are made possible by this method.

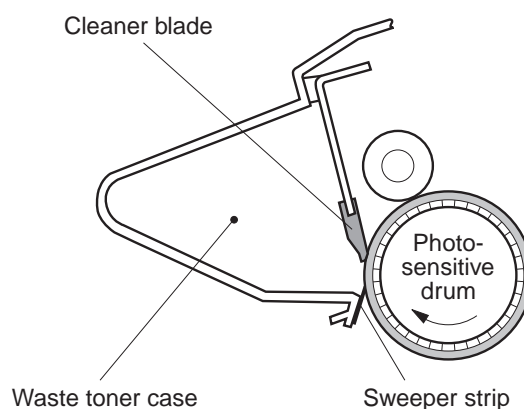
Fixing film is cylindrical film of polyimide. Its surface is coated with fluorine to prevent off-set.

### 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 off 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 toner is collected in the waste toner case.

**V. PICK-UP/FEED SYSTEM**

**A. Outline**

Presence of paper on the multi-purpose tray is detected by the multi-purpose tray paper sensor (PS504). Presence of paper in the cassette is detected by the cassette paper sensor (PS501).

When a print instruction command is input to the engine controller from the video controller, the main motor (M1001) and scanner motor start rotating and the fixing heater temperature control starts.

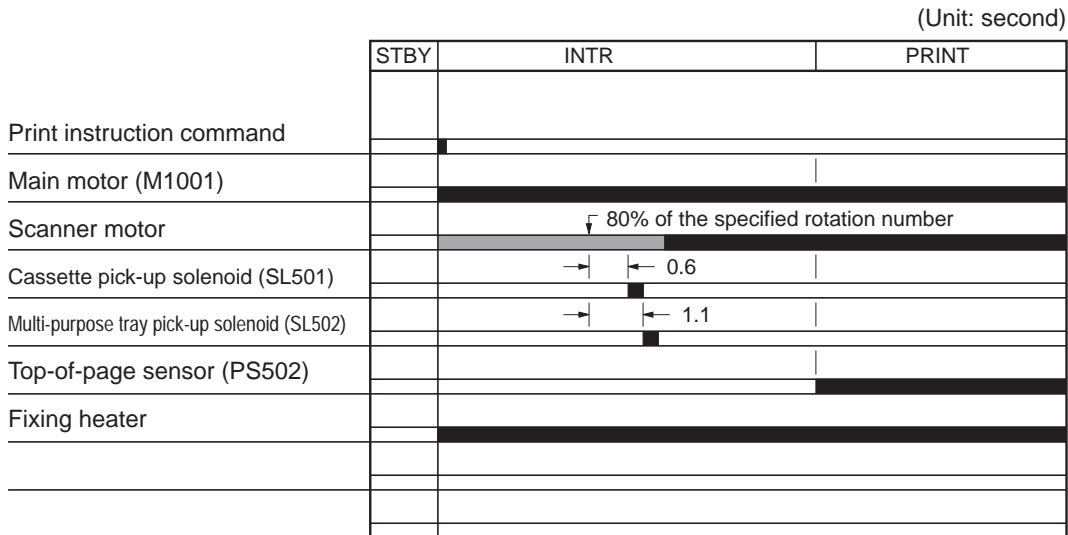
The cassette pick-up solenoid (SL501) or multi-purpose tray pick-up solenoid (SL502) is turned ON when the following three requirements are met.

- 1) After the main motor has been driven for 0.5 seconds.
- 2) In case of paper pick-up from the cassette, after the scanner motor has reached 80% of the specified rotation number for 0.6 seconds, and for 1.1 seconds in case of paper pick-up from the multi-purpose tray.
- 3) The fixing heater temperature has been brought to the specified temperature by the initial temperature control, or the specified period of time has elapsed after start of the temperature control.

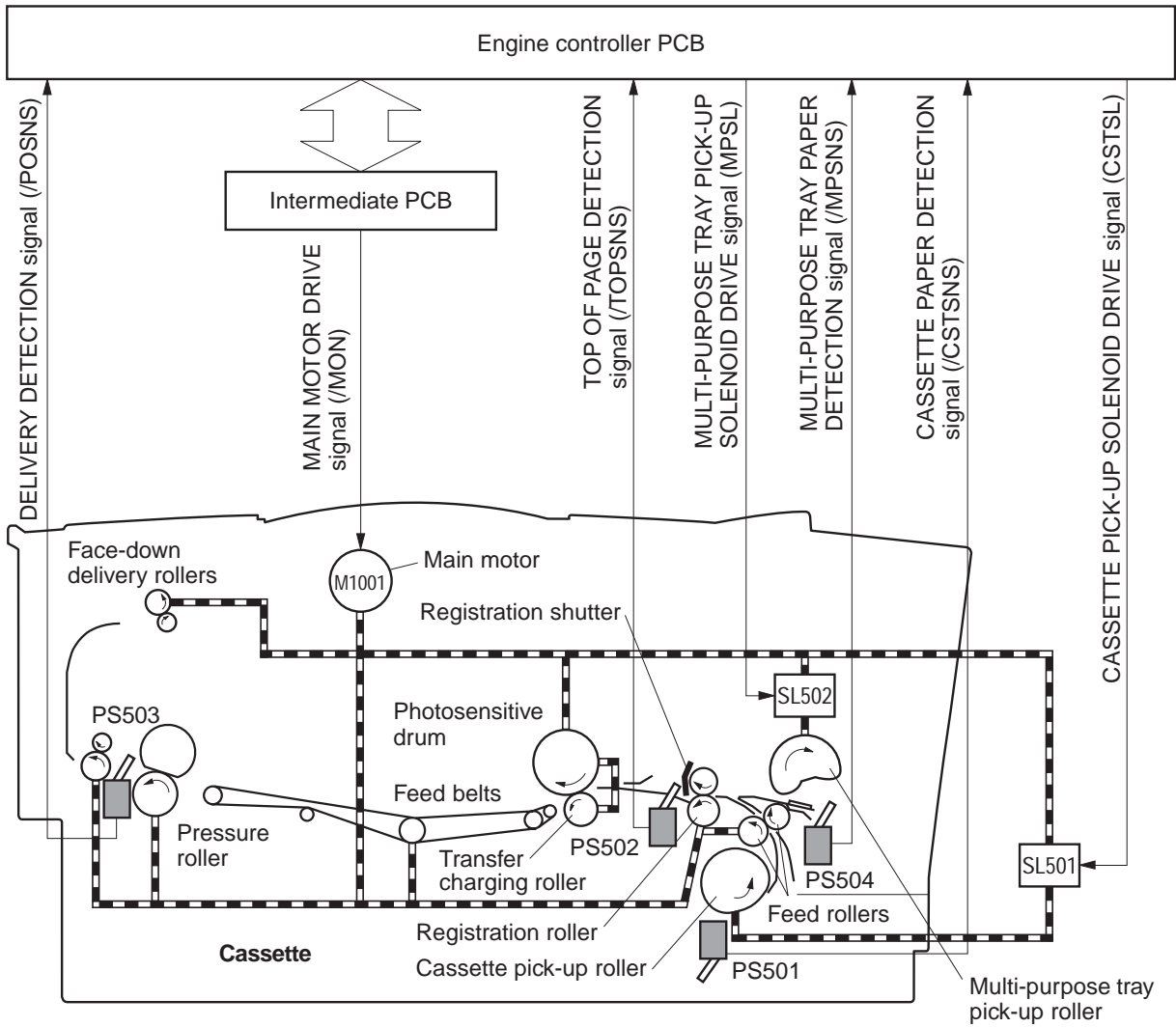
In case of paper pick-up from the cassette, SL501 is turned ON, and the rotation of the main motor is transmitted to the cassette pick-up roller. The cassette pick-up roller makes a rotation, and paper in the cassette is picked up. In case of paper pick-up from the multi-purpose tray, SL502 is turned ON, and the tray cam rotates to lift the tray loaded with paper so that the paper makes contact with the multi-purpose tray pick-up roller. At the same time, the multi-purpose tray pick-up roller makes a rotation to pick-up a sheet of paper from the multi-purpose tray.

The paper is separated from any excessive sheets of paper by the separation pad and fed to the registration roller.

• **Paper pick-up timing**



**Figure 2-5-1**



- PS501: Cassette paper sensor
- PS502: Top-of-page sensor
- PS503: Delivery sensor
- PS504: Multi-purpose tray paper sensor
- SL501: Cassette pick-up solenoid
- SL502: Multi-purpose tray pick-up solenoid

Figure 2-5-2

The paper reaches the registration roller after its skew is corrected by hitting the registration shutter.

The engine controller sends the /BD signal to the video controller in a specified period of time after the top-of-page sensor (PS502) detects the leading edge of the paper. The /BD signal of this printer functions as both VERTICAL SYNC and HORIZONTAL SYNC signals, and is output to the video controller for a period of time corresponding to the paper length.

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 and VDO signals in a specified period of time after the video controller receives the /BD signal. The paper is sent to the fixing/delivery unit after transfer and separation process.

There are two photointerrupters (PS502, PS503) on the paper path for detecting arrival or passing of the paper.

The CPU assesses a paper jam and reports it to the video controller if the paper does not arrive or pass through the sensors within a specified period of time.

As this printer has no paper size detection mechanism, the size of the paper set on the pick-up sources cannot be detected.

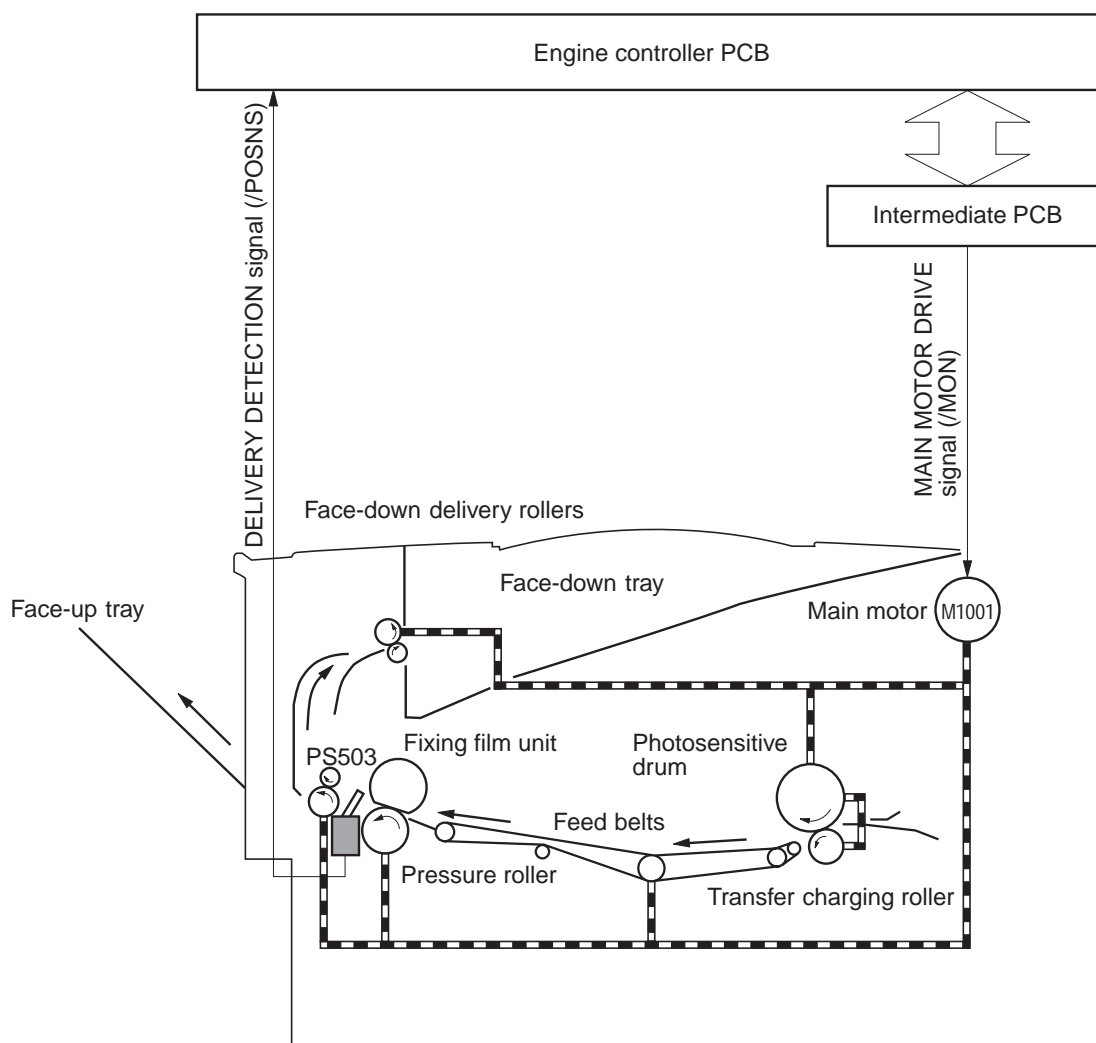
The printer detects the paper size by measuring the time from the top of paper sensor (PS502) detects the leading edge of the paper until the trailing edge of the paper clears the sensor. The CPU assesses a paper size mismatch and reports it to the video controller, if the detected paper size differs from the paper size specified by the video controller.

### B. Fixing and Delivery Unit

The pressure roller and delivery roller in the fixing unit are driven by the main motor (M1001).

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 delivery sensor (PS503). This printer has both a face-up tray and face-down tray. The paper is usually delivered to the face-down tray, but it switches to the face-up tray when the user opens the face-up tray and pulls it up.



**Figure 2-5-3**

### 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.

- Top-of-page sensor (PS502)
- Delivery sensor (PS503)

The CPU determines if a paper jam has occurred by checking for the presence of paper in the sensor at the timing stored in the CPU.

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

#### 1. Pick-up delay jam

This printer performs retry control to redress the pick-up delay jam caused by pick-up error. Pick-up operation is conducted a maximum of twice at the all pick-up sources.

If the top-of-page sensor (PS502) cannot detect the leading edge of the paper within a specified period of time (T) after the start of pick-up operation, the printer performs pick-up operation once again. The CPU assesses a pick-up delay jam, if PS502 cannot detect the leading edge of the paper within the specified period of time (T) after the start of the 2nd pick-up operation. The specified period of time (T) mentioned above is as follows.

- Paper pick-up from the multi-purpose tray: T= about 2.5 seconds
- Paper pick-up from the cassette: T= about 3.0 seconds
- Paper pick-up from the paper feeder: T= about 4.4 seconds

#### 2. Pick-up stationary jam

##### a. When WAIT period starts

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

##### b. During paper feeding

The CPU assesses a pick-up stationary jam if the top-of-page sensor (PS502) cannot detect the trailing edge of the paper within 6.8 seconds after detecting the leading edge of the paper.

#### 3. Delivery delay jam

The CPU assesses a delivery delay jam if the paper does not reach the delivery sensor (PS503) within a specified period of time (T) after the top-of-page sensor (PS502) detects the leading edge of the paper.

- Paper 246mm or more: T= about 4.8 seconds
- Paper 200mm to 246mm (246mm not inclusive): T= about 4.9 seconds
- Paper less than 200mm: T= about 9.9 seconds

#### 4. Wrapping jam

The CPU assesses a wrapping jam if the delivery sensor (PS503) detects no paper in a period from about 0.5 seconds after PS503 detects the leading edge of the paper until about 4.0 seconds after the top-of-page sensor (PS502) detects the trailing edge of the paper.

#### 5. Delivery stationary jam

##### a. When WAIT period starts

The CPU assesses a delivery stationary jam if the delivery sensor (PS503) detects paper when the WAIT period starts.

##### b. During paper feeding

The CPU assesses a delivery stationary jam if the delivery sensor (PS503) cannot detect the trailing edge of the paper within a specified period of time (T) after the top-of-page sensor (PS502)

detects the trailing edge of the paper.

- Paper 200mm or more: T= about 5 seconds
- Paper less than 200mm: T= about 10 seconds

**c. When a pick-up delay jam occurred**

When a pick-up delay jam occurred, the printer enters the LAST ROTATION period to deliver the jammed paper. During this period, the CPU assesses a delivery stationary jam if the delivery sensor (PS503) cannot detect the trailing edge of the paper within 8 seconds after the completion of the forced laser emission.

**d. During pressure roller cleaning**

During pressure roller cleaning, the CPU assesses a delivery stationary jam if the delivery sensor (PS503) cannot detect the trailing edge of the paper within 8 seconds after the 35th feed operation.

# 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 (IC6)

This video controller uses a 32-bit RISC microprocessor (IBM25ACE4111PR) made by IBM Inc. for the CPU, and its operation frequency is 66MHz. The CPU controls the video controller circuit operations according to the control program stored in the ROM. The CPU also has a circuit suited for the LBP control as well as the following functions.

- 1) DRAM control
- 2) ROM control
- 3) Video interface control
- 4) IEEE 1284 parallel port interface control

#### b. ASIC (AIR, IC10)

The ASIC 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

#### c. DRAM (IC2/IC3)

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.

#### d. ROM (IC18)

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 (J8) on the video controller PCB.

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

#### e. EEPROM (IC9)

EEPROM is memory enhancing 4 Kbytes available enough to delete electrically stored data or to store new data, and is used for storing the factory default value and the user set value defined on the operation panel.



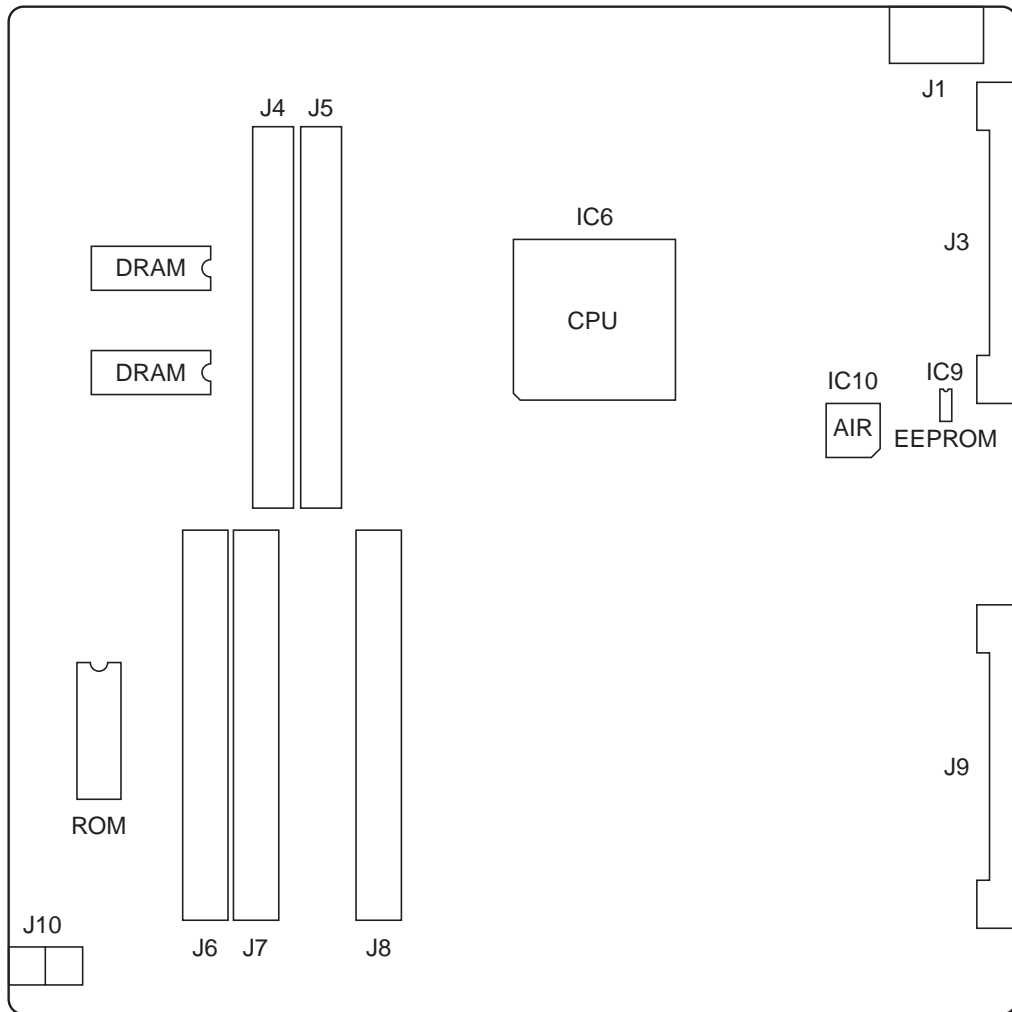


Figure 2-6-1

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Video Controller PCB Block Diagram

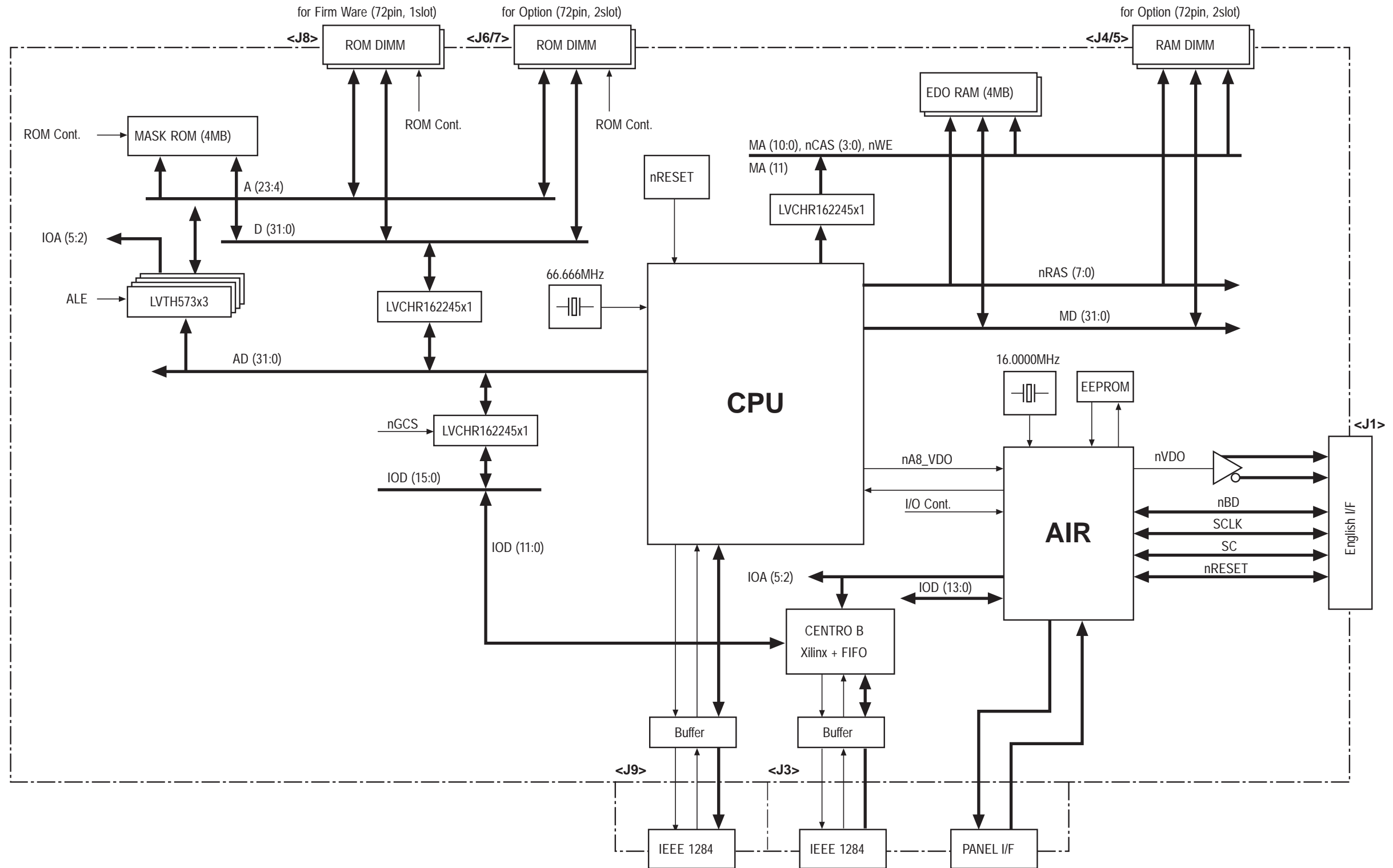


Figure 2-6-2





### C. 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 on the 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, the "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 ON, the specific function can be executed. Only the "Cold Reset" sequence stated below is used by the user.

##### a. Cold Reset

Turn the power ON while pressing the GO key.

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

##### b. Check Sum Functions

Turn the power ON while pressing the GO and Shift keys simultaneously (PPG Check Sum: ROM bank 0) or GO and Value keys simultaneously (PS Check Sum: ROM bank 1).

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 ON while pressing the Menu, Item, and Value keys simultaneously.

To reset the paper size default to Letter, turn the power 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 ON while pressing the Menu and Item keys simultaneously. This function provides a Flash Menu for managing and downloading firmware images.

Not that the function requires an expansion RAM DIMM as the total amount of RAM memory must be 8 Mbytes or more. If the Flash Menu is implemented with 4 Mbytes of memory (default value), the "NOT ENOUGH DRAM TO PROCEED" message will be displayed.

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## VII. PAPER FEEDER

### A. Outline

The operation sequences of the paper feeder are controlled by the engine controller of the printer. The engine controller drives the solenoid at the necessary timing via the paper feeder PCB. Presence/absence of the paper is detected by the paper sensor.

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

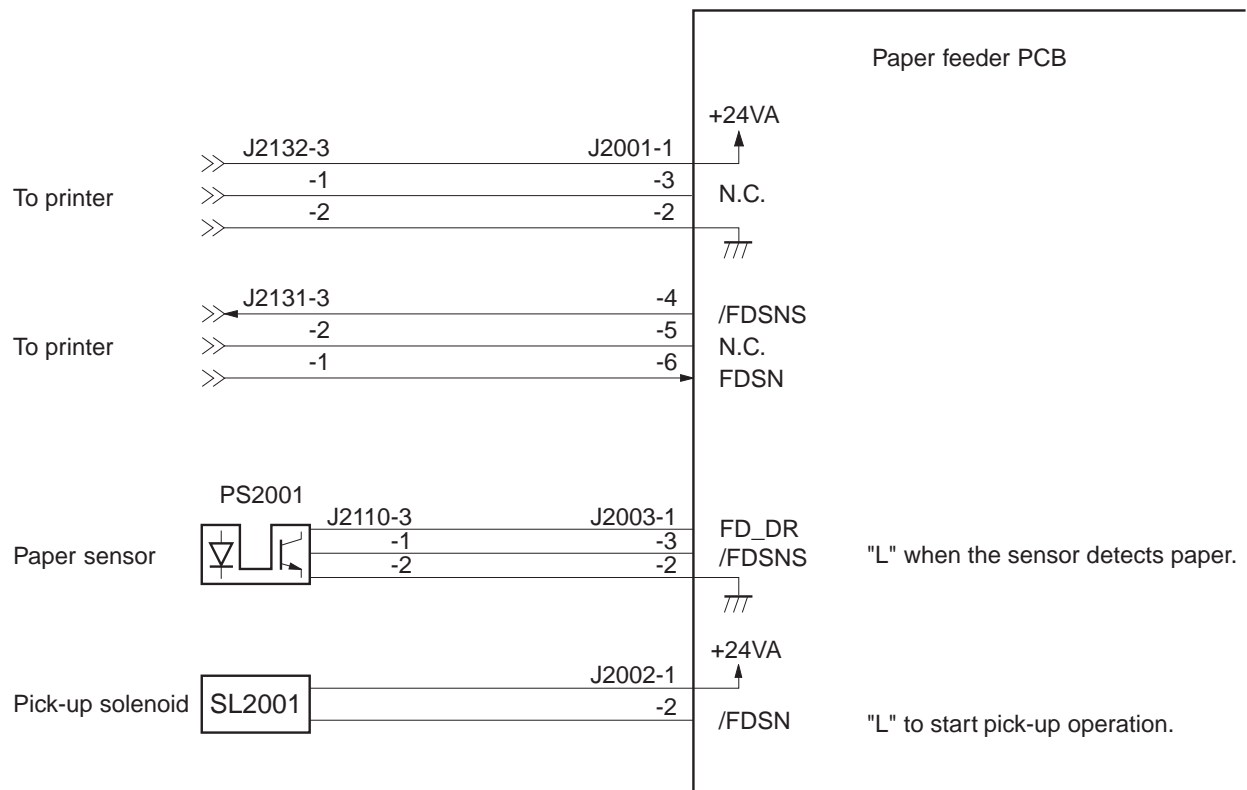
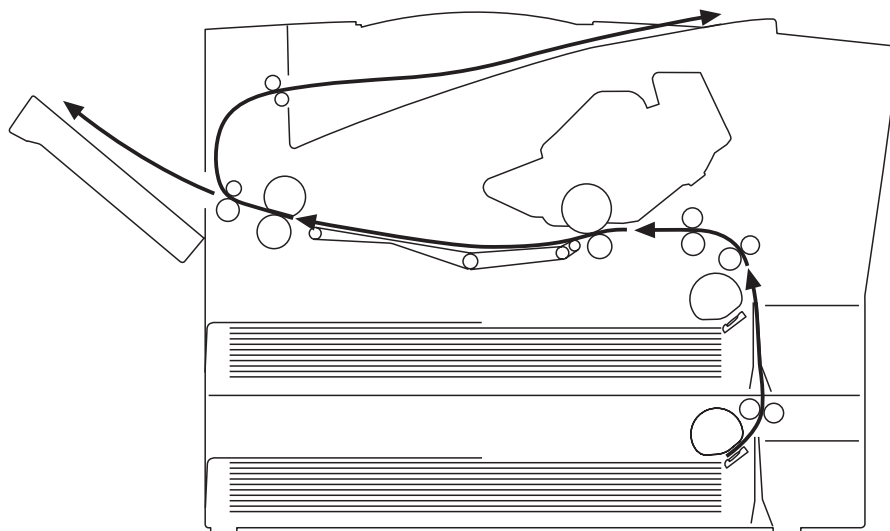


Figure 2-7-1

### 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 drive force of the paper feeder is transmitted from the main motor (M1001) in the printer via the gears.

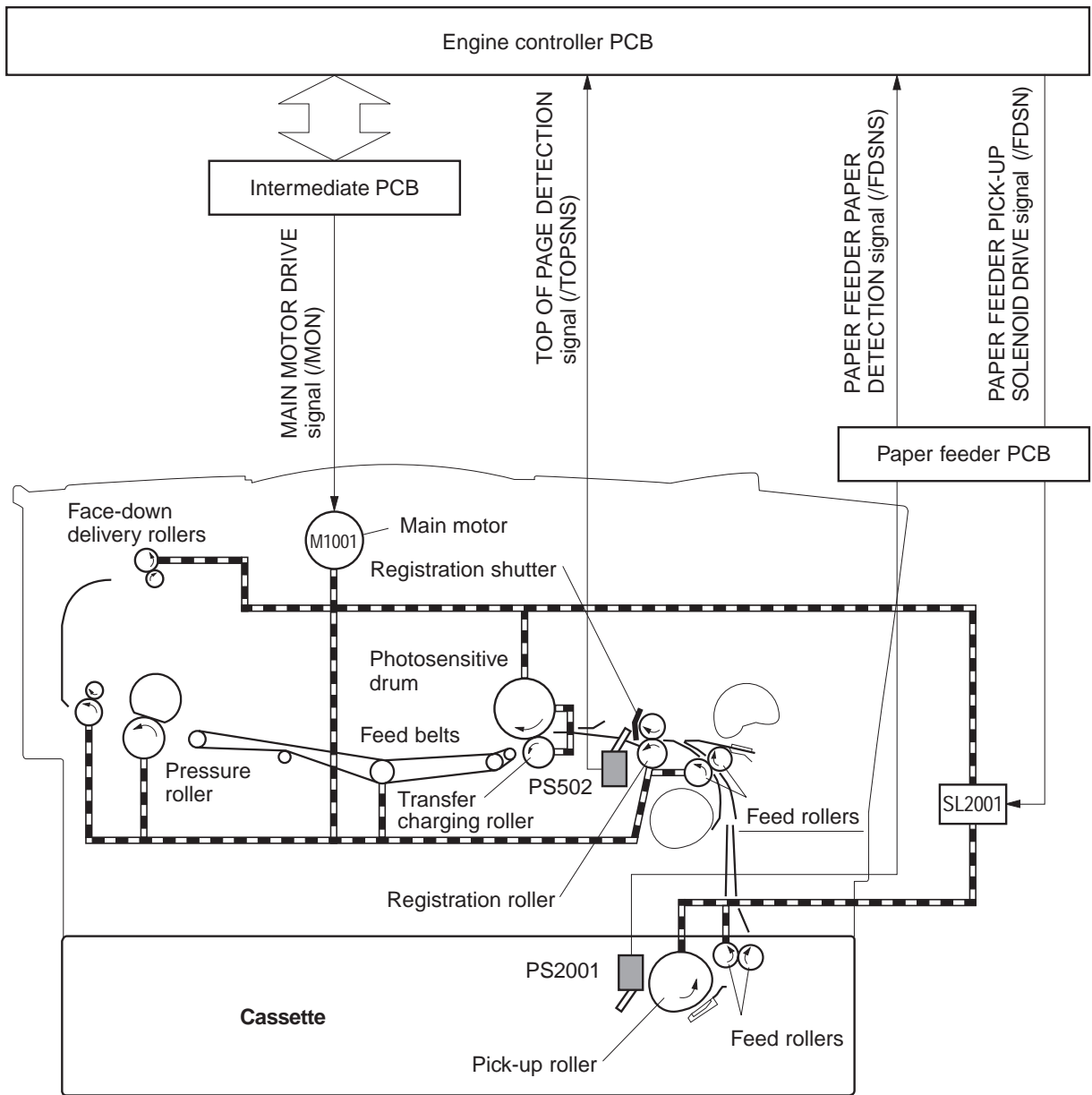
When a print instruction command is input to the engine controller from the video controller, the main motor and scanner motor in the printer start rotating, and the fixing heater temperature control starts.

When the following three requirements are met, the paper feeder pick-up solenoid (SL2001) is turned ON.

- 1) After the main motor has been driven for 0.5 seconds.
- 2) After the scanner motor has reached 80% of the specified rotation number.
- 3) The fixing heater temperature has been brought to the specified temperature by the initial temperature control, or the specified period of time has elapsed after start of the temperature control.

As a result, the main motor rotation is transmitted to the pick-up roller, and the pick-up roller makes one rotation to pick up paper in the cassette. Any excessive sheets are removed by the separation pad, and a sheet of paper is sent to the printer.

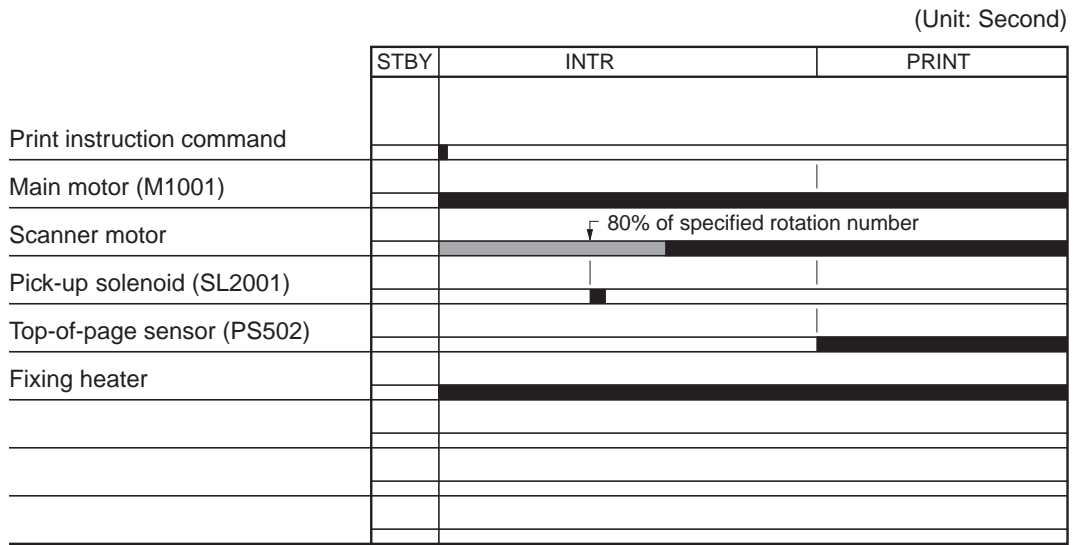
The paper then reaches the registration shutter where its skew is corrected, goes through transfer, separation, fixing and delivery unit and is delivered to the tray.



PS502: top-of-page sensor (Printer)  
 PS2001: Paper feeder paper sensor  
 SL2001: Paper feeder pick-up solenoid

**Figure 2-7-3**

- Paper feeder pick-up timing**



**Figure 2-7-4**

**C. Paper Jam Detection**

Paper jam detection in case of paper pick-up and feeding from the paper feeder is the same as that of the printer. Refer to page 2-36 for the details.



# **CHAPTER 3**

## **THE MECHANICAL SYSTEM**

<b>I. PREFACE.....</b>	<b>3-1</b>	<b>VI. SOLENOIDS .....</b>	<b>3-19</b>
<b>II. EXTERNALS .....</b>	<b>3-2</b>	<b>VII. MOTOR/FAN.....</b>	<b>3-21</b>
<b>III. MAIN UNITS .....</b>	<b>3-7</b>	<b>VIII. PCBS .....</b>	<b>3-23</b>
<b>IV. MAIN PARTS.....</b>	<b>3-10</b>	<b>IX. PAPER FEEDER.....</b>	<b>3-28</b>
<b>V. SWITCH/SENSORS .....</b>	<b>3-16</b>		

## I. PREFACE

This chapter describes disassembly and reassembly procedures of the printer.

The service technician is to find the cause of the failure according to the "Chapter 4 Troubleshooting" and to follow the disassembly procedures in this chapter to replace the defective part(s). Replacement of consumable part(s) is also to be conducted according to the procedures described in this chapter.

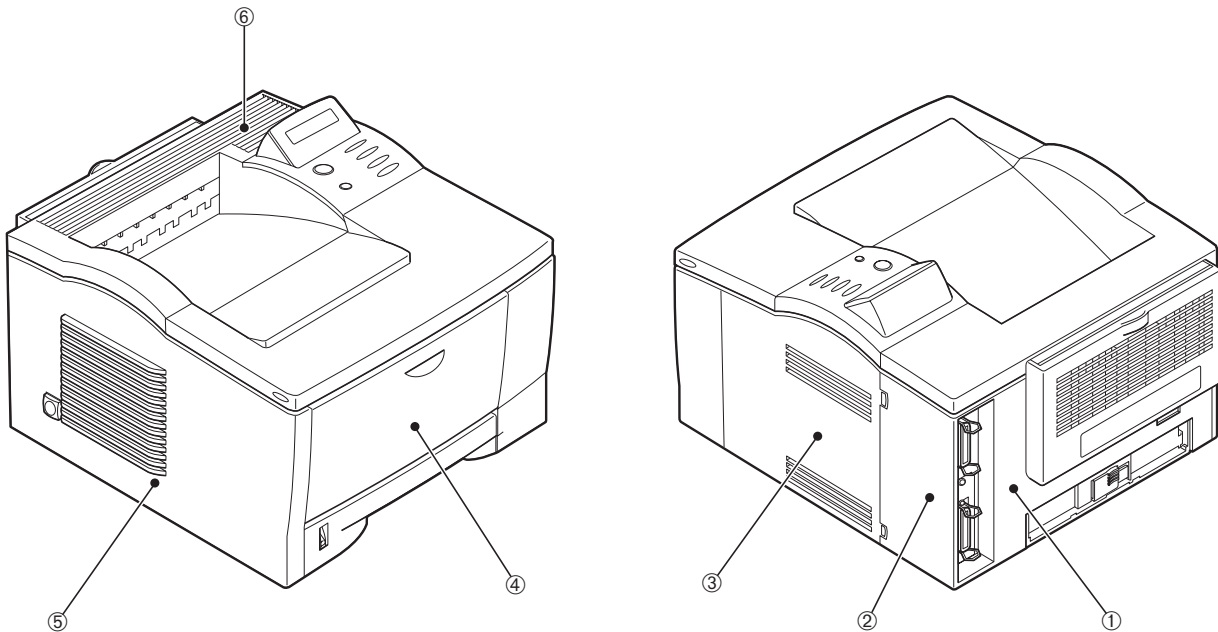
Note the following precautions during disassembly or reassembly.

1. At disassembly, reassembly, or transportation of the printer, remove the toner cartridge if necessary. When the cartridge is out of the printer, put it in a protective bag to prevent light from affecting it.
2. **▲ CAUTION: Before servicing the printer, disconnect its power cord from the electrical outlet.**
3. Assembly is the reverse of disassembly unless otherwise specified.
4. 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.
5. As a general rule, do not operate the printer with any parts removed.
6. Discharge electrical static from your body by touching the metal frame of the printer prior to handling the PCBs in order to avoid causing damage by the difference in static charge at that time.
7. Do not touch the transfer charging roller and the rubber part of the pick-up roller with bare hands.
8. **When placing the printer upside down, if the inside of the printer is dirty, toner and paper dust may enter the laser/scanner unit and cause image defects. Therefore, in such a case, make sure to cover the laser emission hole of the laser/scanner unit with tape.**  
**Also, it is advisable to cover the hole with tape when placing the printer on its side or back.**
9. Use care when disconnecting a flat cable.  
Also, when inserting a flat cable into the connector, be sure to connect it vertically, not obliquely.



## II. EXTERNALS

### A. Locations



- ① Rear cover
- ③ DIMM cover
- ⑤ Left cover
- ⑦ Operation panel

- ② Right cover
- ④ Multi-purpose tray
- ⑥ Top cover unit

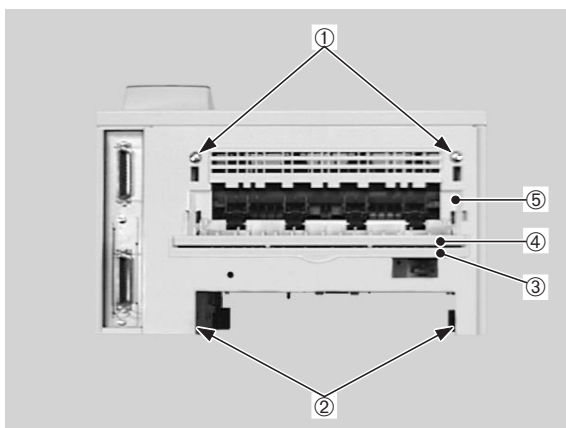
**Figure 3-2-1**

Follow the procedures below to remove the cover(s) if required when cleaning, inspecting, or repairing inside the printer.

The procedures for the covers, which can be removed simply by removing screws without removing other parts, are omitted.

**1. Rear cover**

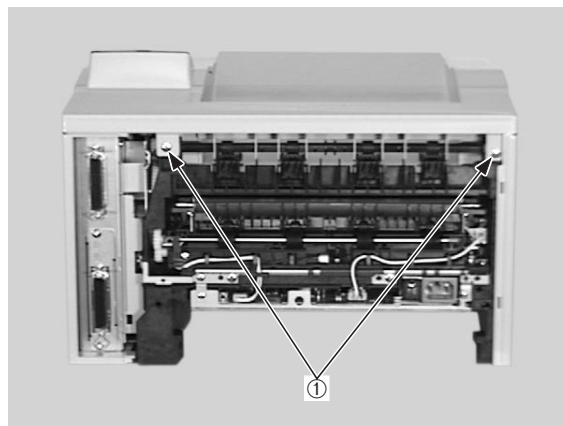
- 1) Remove the cassette.
- 2) Open the face-up tray to its horizontal position by holding the both sides of the tray with the both hands.
- 3) Remove the 2 screws and unhook the 3 claws, and then remove the rear cover with the face-up tray.
- 4) Pull out the expansion tray.
- 5) While pushing the right side of the rear cover to bend it, take out the face-up tray shaft to remove the face-up tray unit from the rear cover.



- ① Screws
- ② Claws
- ③ Expansion tray
- ④ Face-up tray unit
- ⑤ Rear cover

**Figure 3-2-2****2. Top cover unit**

- 1) Open the multi-purpose tray.
- 2) Remove the rear cover.
- 3) Remove the 2 screws.

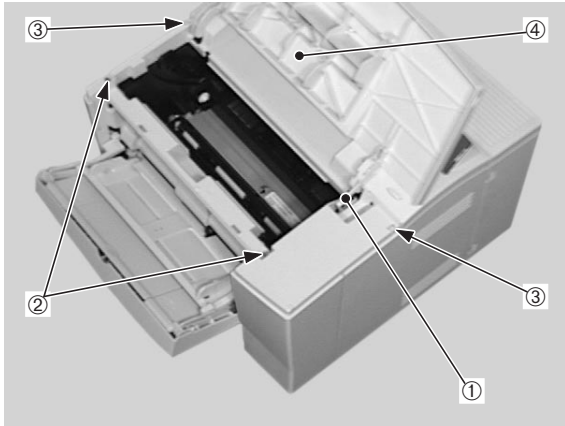


- ① Screws

**Figure 3-2-3**

**Note:** The operation panel on the top cover is attached with the connector PCB and flat cable. In the procedure 5 stated in the following page, if the top cover swing opens, the flat cable may be damaged, so when removing the top cover, slightly lift it and then gently hold the flat cable.

- 4) Unhook the claw, and then remove the arm from the top cover unit.
- 5) Remove the 2 screws, unhook the claw, and then lift up the top cover unit.



- ① Arm                      ② Screws  
③ Claws                    ④ Top cover unit

**Figure 3-2-4**

- 6) Lifting the flat cable, gently remove it from the connector PCB. Remove the top cover.



- ① Flat cable              ② Top cover unit

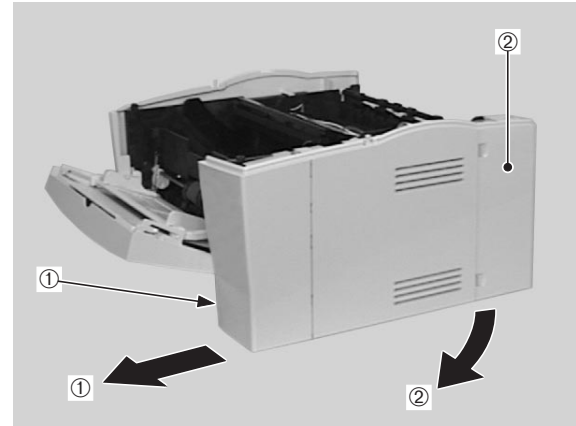
**Figure 3-2-5**

**< Note for reassembly >**

When installing the top cover, be sure to set the flat cable securely.

**3. Right cover**

- 1) Remove the cassette.
- 2) Open the top cover.
- 3) Open the multi-purpose tray.
- 4) Unhook the claw. Slide the right cover toward you (1), and then turn it in the direction of the arrow (2) to remove.

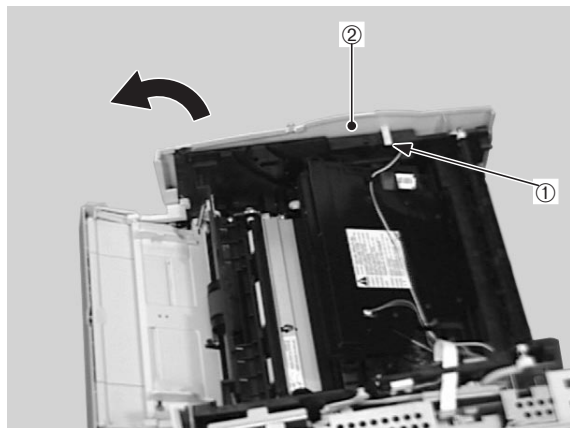


- ① Claw                      ② Right cover

**Figure 3-2-6**

**4. Left cover**

- 1) Remove the top cover unit.
- 2) Unhook the claw, and then lift up the left cover in the direction of the arrow to remove.



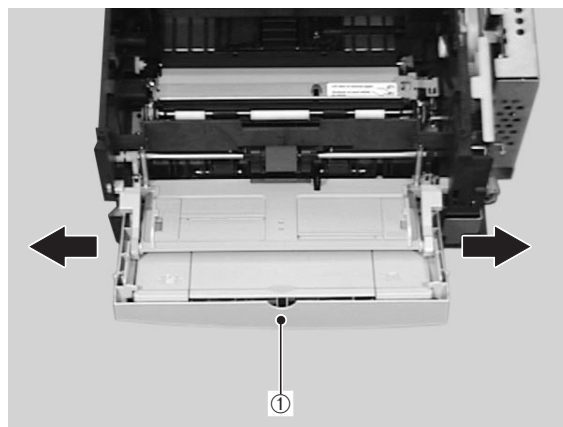
① Claw

② Left cover

**Figure 3-2-7**

**5. Multi-purpose tray**

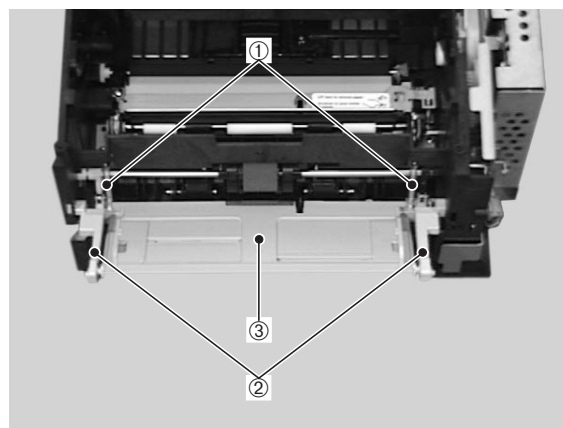
- 1) Open the multi-purpose tray.
- 2) Remove the top cover unit and right and left covers.
- 3) Pulling the side walls of the multi-purpose tray cover outward, remove the multi-purpose tray from the cover, and then slide the cover to the left to remove.



① Multi-purpose tray cover

**Figure 3-2-8**

- 4) Remove the 2 springs from the multi-purpose tray.
- 5) Remove the multi-purpose tray shaft from the hinges to remove the tray.



① Springs

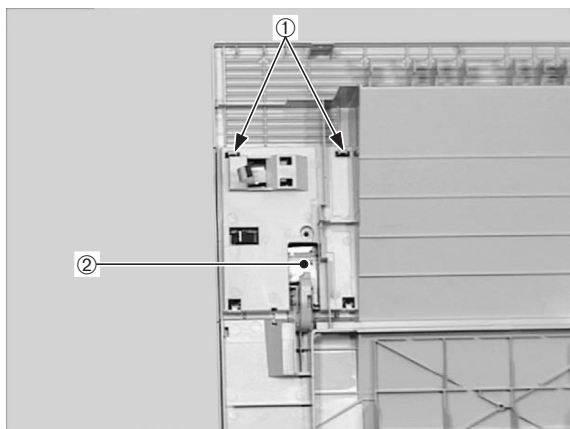
② Hinges

③ Multi-purpose tray

**Figure 3-2-9**

**6. Operation panel**

- 1) Remove the top cover unit.
- 2) Unhook the 2 claws, and then remove the flat cable from the operation panel.



① Claws

② Operation panel

**Figure 3-2-10**

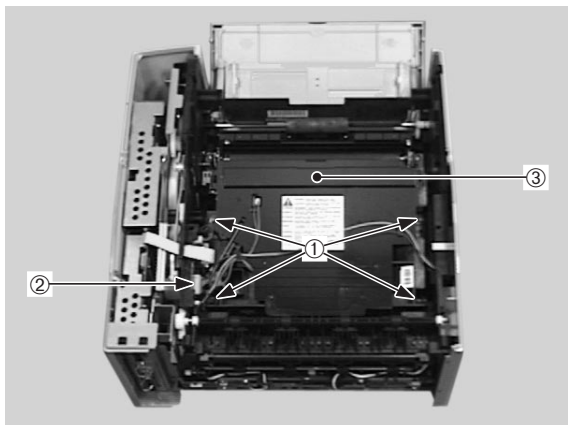
**<Note for reassembly>**

When installing the operation panel, be sure to set the flat cable securely.

### III. MAIN UNITS

#### A. Laser/Scanner Unit

- 1) Remove the EP-32 cartridge.
- 2) Remove the top cover unit.
- 3) Remove the fan cable from the laser/scanner unit.
- 4) Remove the 4 screws, disconnect the connector, and then remove the laser/scanner unit.



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

Figure 3-3-1

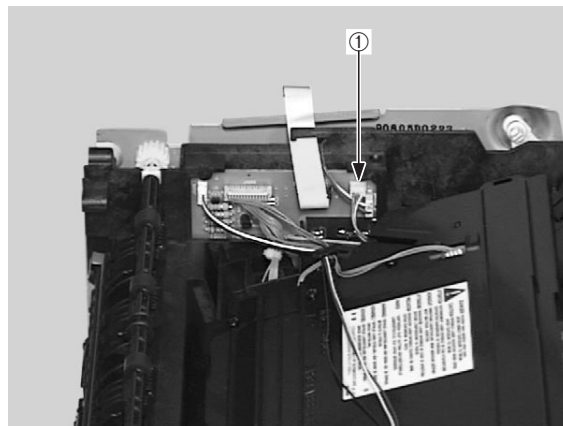
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**Note:** Do not disassemble the laser/scanner unit as it cannot be adjusted in the field

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#### B. Drive Unit

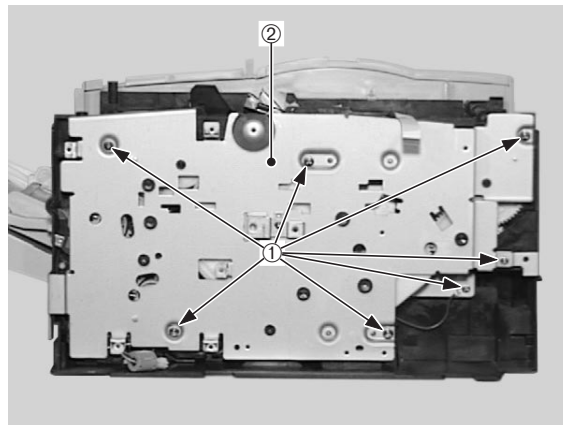
- 1) Remove the video controller unit according to the steps 1) through 4) on page 3-26.
- 2) Disconnect the connector from the intermediate PCB.



- ① Connector

Figure 3-3-2

- 3) Remove the 7 screws and then the drive unit.

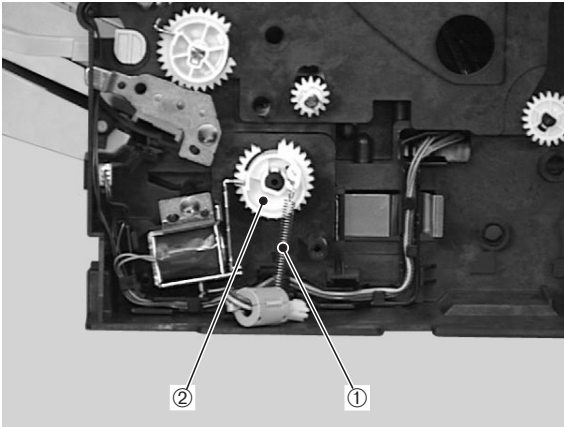


- ① Screws
- ② Drive unit

Figure 3-3-3

**C. Cassette Pick-up Unit**

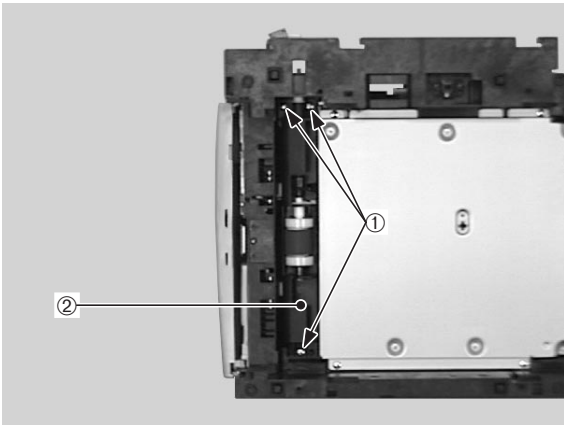
- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Remove the spring and gear.



① Spring                      ② Gear

**Figure 3-3-4**

- 3) Remove the left cover, and then place the printer with its left side at the bottom.
- 4) Remove the 3 screws and then the cassette pick-up unit.

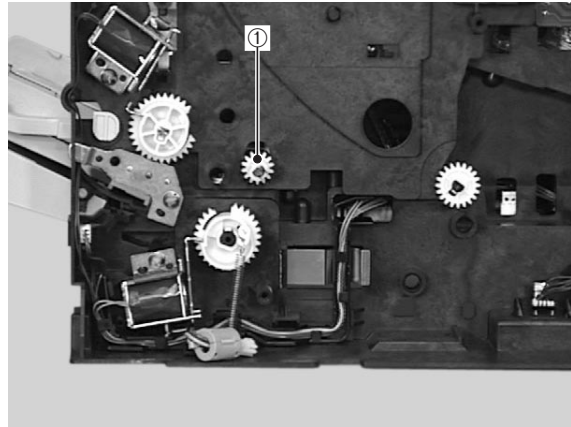


① Screws  
② Cassette pick-up unit

**Figure 3-3-5**

**D. Registration Roller Unit**

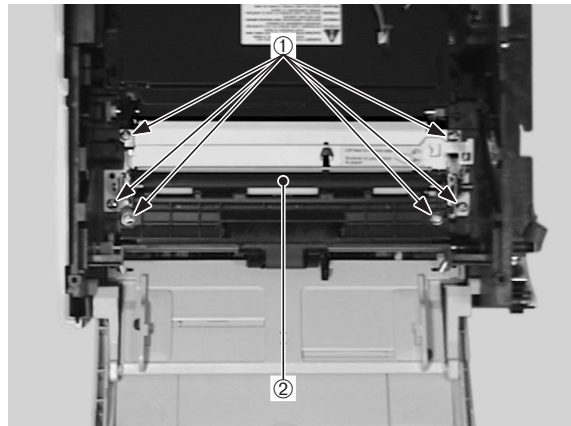
- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Remove the gear.



① Gear

**Figure 3-3-6**

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

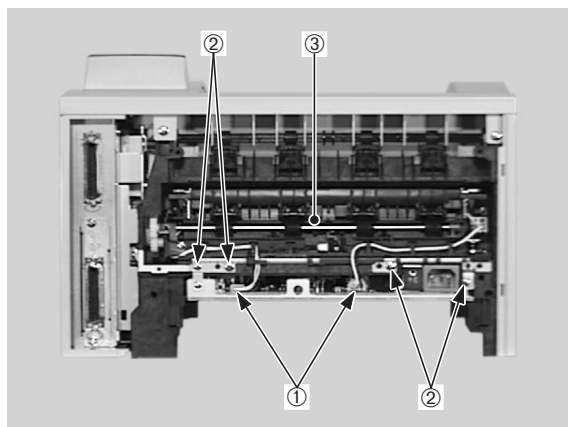


① Screws  
② Registration roller unit

**Figure 3-3-7**

**E. Fixing Unit**

- 1) Turn OFF the power switch, and then unplug the power cable.
- 2) Remove the rear cover.
- 3) Disconnect the 2 connectors, remove the 4 screws, and then pull out the fixing unit toward you.



- ① Connectors                      ② Screws  
③ Fixing unit

**Figure 3-3-8**

---

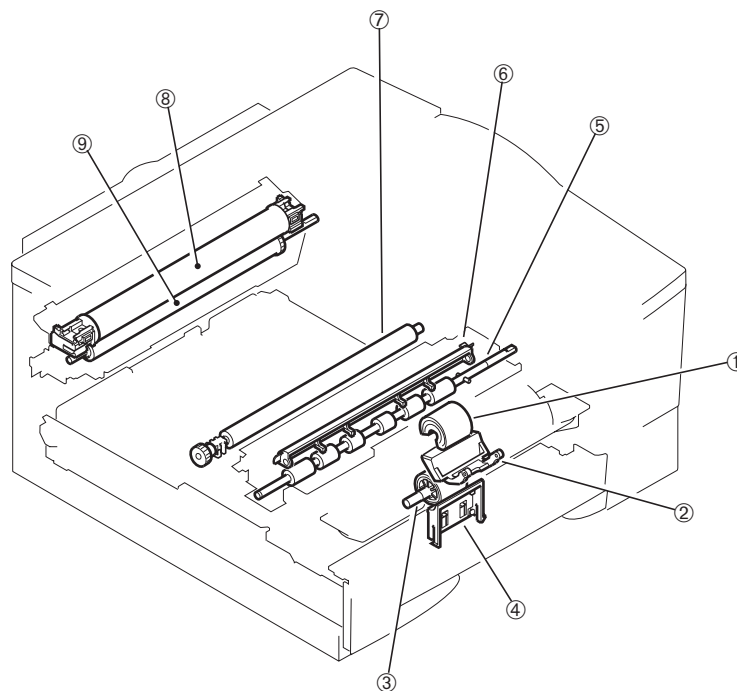
**Note:** Be sure to turn the power OFF and unplug the power cord before replacing the fixing unit. After power-OFF, wait for a while to allow the fixing unit to cool down.

---



**IV. MAIN PARTS**

**A. Locations**



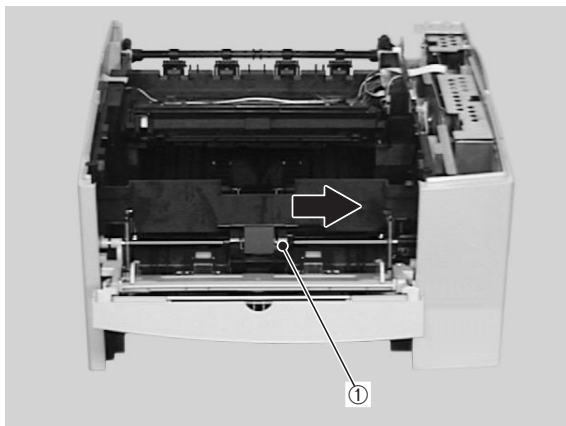
- ① Multi-purpose tray pick-up roller
- ③ Cassette pick-up roller
- ⑤ Lower registration roller
- ⑦ Transfer charging roller
- ⑨ Pressure roller

- ② Separation pad (multi-purpose tray)
- ④ Separation pad (cassette)
- ⑥ Registration shutter
- ⑧ Fixing film unit

**Figure 3-4-1**

**B. Multi-purpose Tray Pick-up Roller**

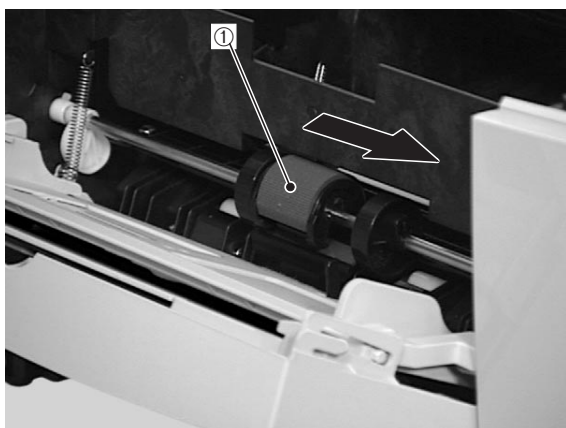
- 1) Open the multi-purpose tray.
- 2) Remove the top cover.
- 3) Unhook the claw of the right multi-purpose tray pick-up sub roller, and then move the sub roller to the right.



① Multi-purpose tray pick-up sub roller

**Figure 3-4-2**

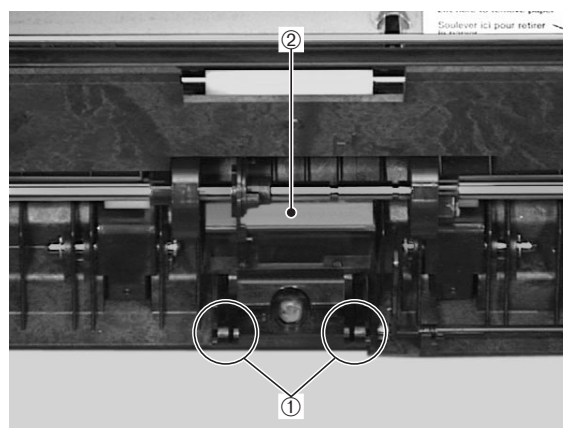
- 4) Unhook the claw of the multi-purpose tray pick-up roller, and then move the roller to the right.
- 5) Pull the multi-purpose tray pick-up roller toward you to remove.



① Multi-purpose tray pick-up roller

**Figure 3-4-3****C. Separation Pad (multi-purpose tray)**

- 1) Remove the multi-purpose tray.
- 2) Unhook the claw of the right and left multi-purpose tray pick-up sub rollers, and move the right sub roller to the right and the left sub roller to the left.
- 3) Remove the multi-purpose tray pick-up roller.
- 4) Remove the 2 shafts of the separation pad, and then pull the separation pad toward you to remove.



① Claws

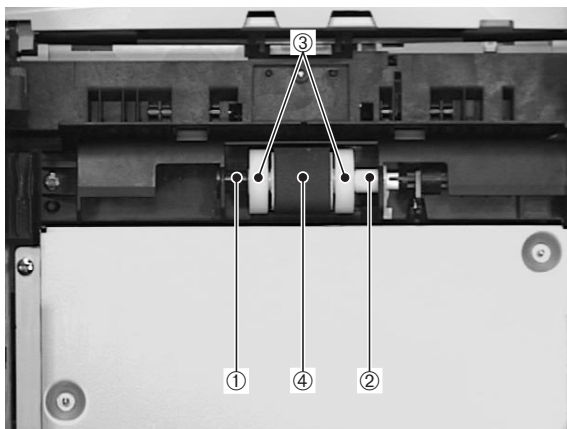
② Separation pad

**Figure 3-4-4****< Note for reassembly >**

When installing the separation pad, be sure to set the spring securely.

**D. Cassette Pick-up Roller**

- 1) Remove the cassette.
- 2) Place the printer on its back.
- 3) Unhook the claw of the left bushing, rotate the bushing, and then pull it out.
- 4) Unhook the claw of the right bushing, and rotate it to remove. Move the right bushing to the right, and remove the shaft on the cassette pick-up roller and then the cassette pick-up roller.
- 5) Remove the 2 sub rollers from the cassette pick-up roller.



- ① Left bushing
- ② Right bushing
- ③ Sub rollers
- ④ Cassette pick-up roller

**Figure 3-4-5**

---

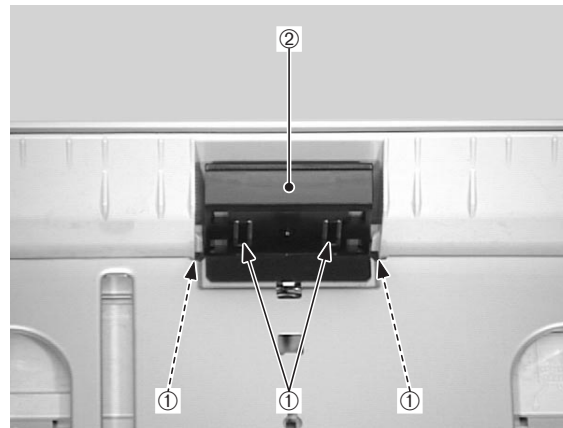
**Notes:**

1. When placing the printer on its back, be sure not to damage the rear cover or remove the cover if necessary,
2. The printer can be placed upside down to conduct this operation. In this case, if the inside of the printer is dirty, toner or paper dust may enter the laser/scanner unit and cause image defects. Therefore, when placing the printer upside down, be sure to cover the laser emission hole of the laser/scanner unit with tape. Also, it is advisable to cover the hole with tape when placing the printer on its side or back.

---

**E. Separation Pad (Cassette)**

- 1) Remove the cassette.
- 2) Press the lifting plate, and then lock it.
- 3) Unhook the 4 claws of the separation pad, and then take out the pad.
- 4) Remove the spring from the pad.



- ① Claws
- ② Separation pad

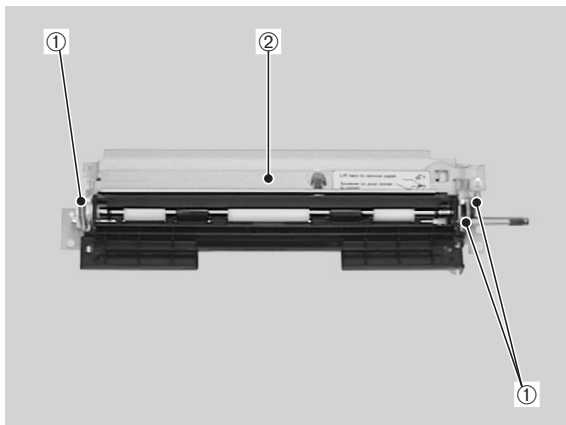
**Figure 3-4-6**

**< Note for reassembly >**

When installing the separation pad, be sure to set the spring securely.

**F. Lower Registration Roller**

- 1) Remove the registration roller unit according to the steps 1) through 3) on page 3-8.
- 2) Remove the 3 springs, and then separate the upper registration roller unit from the registration roller unit.

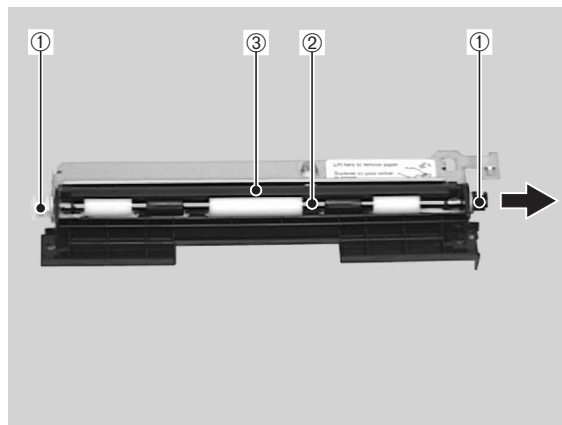


- ① Springs
- ② Upper registration roller unit

**Figure 3-4-7**

**G. Registration Shutter**

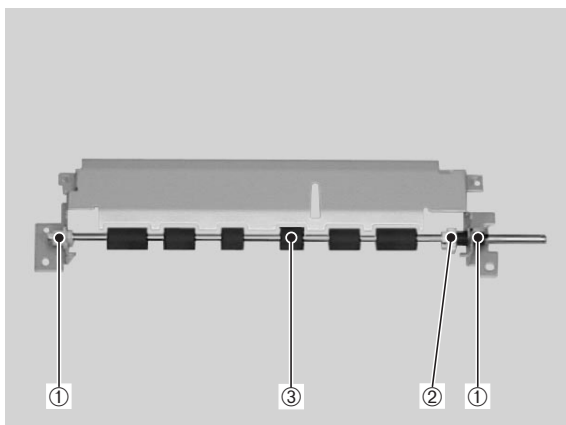
- 1) Remove the registration roller unit according to the steps 1) through 3) on page 3-8.
- 2) Separate the upper registration roller unit from the registration roller unit.
- 3) Remove the 2 bushings from the upper registration roller unit, and then pull the shaft to the right to remove. Remove the registration shutter.



- ① Bushings
- ② Shaft
- ③ Registration shutter

**Figure 3-4-9**

- 3) Remove the 2 bushings, gear, and then the lower registration roller.



- ① Bushings
- ② Gear
- ③ Lower registration roller

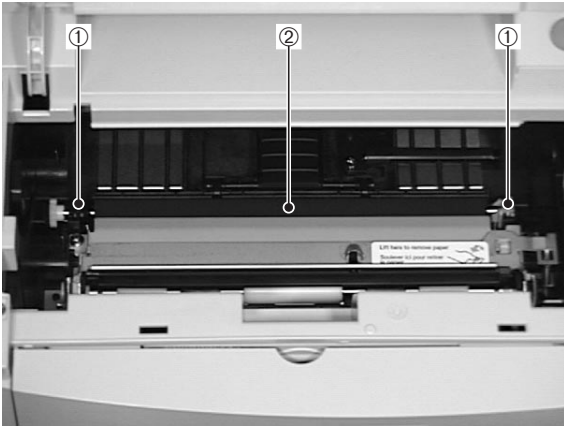
**Figure 3-4-8**

**< Note for reassembly >**

When attaching the registration shutter to the shaft, be sure to set the spring securely.

**H. Transfer Charging Roller**

- 1) Open the top cover.
- 2) Unhook the claw of the left bushing of the transfer charging roller. Lifting the roller slightly, remove the right side of the shaft from the bushing. Remove the transfer charging roller.



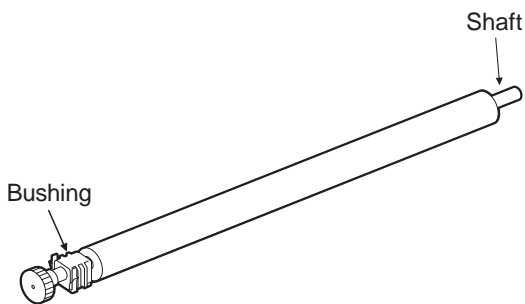
- ① Bushings
- ② Transfer charging roller

**Figure 3-4-10**

**< Notes for reassembly >**

When installing the roller, hold the shaft and bushing, not the sponge area, of the transfer charging roller.

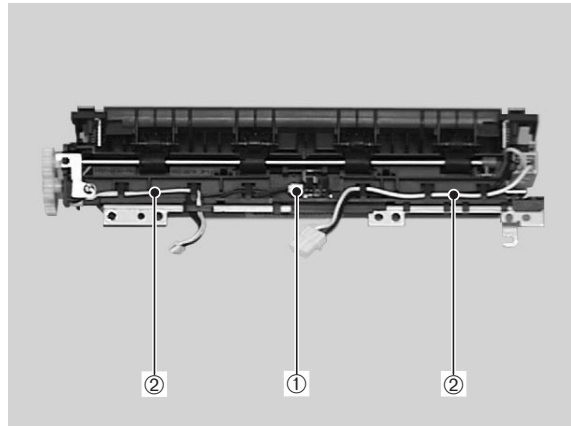
When the roller is set, insert the spring into the boss of the bushing securely so that the bushing pushes the spring.



**Figure 3-4-11**

**I. Fixing Film Unit**

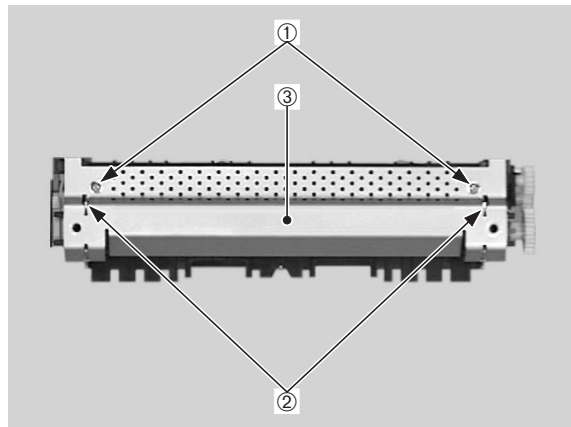
- 1) Remove the fixing unit according to the steps 1) through 3) on page 3-9.
- 2) Disconnect the connector from the delivery sensor.
- 3) Remove the cables from the guides.



- ① Connector
- ② Cables

**Figure 3-4-12**

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

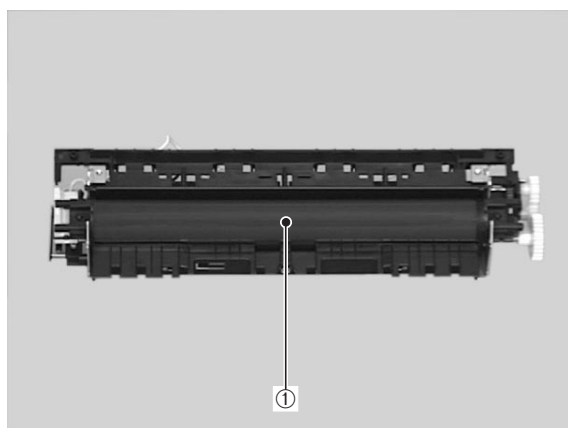


- ① Screws
- ② Claws
- ③ Cover

**Figure 3-4-13**

**Note:** In the procedure 5), use care when unhooking the 2 claws. The cover springs up due to the spring tension.

- 6) Lift up the fixing film unit to remove.



① Fixing film unit

**Figure 3-4-14**

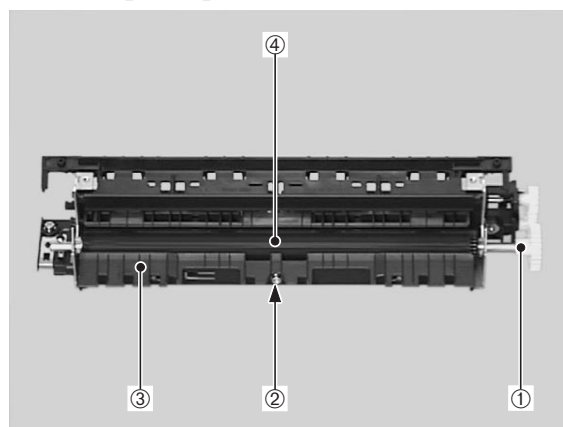
---

**Note:** When replacing the fixing film unit, do not touch the fixing film. Be sure not to damage the AC cable with the edge of the metal plate.

---

#### J. Pressure Roller

- 1) Remove the fixing unit according to the steps 1) through 3) on page 3-9.
- 2) Remove the fixing film unit.
- 3) Remove the gear.
- 4) Remove the screw holding the fixing entrance guide.
- 5) While lifting the claw of the fixing entrance guide, slide the guide to remove.
- 6) Lift up the pressure roller to remove.



- ① Gear
- ② Screw
- ③ Fixing entrance guide
- ④ Pressure roller

**Figure 3-4-15**

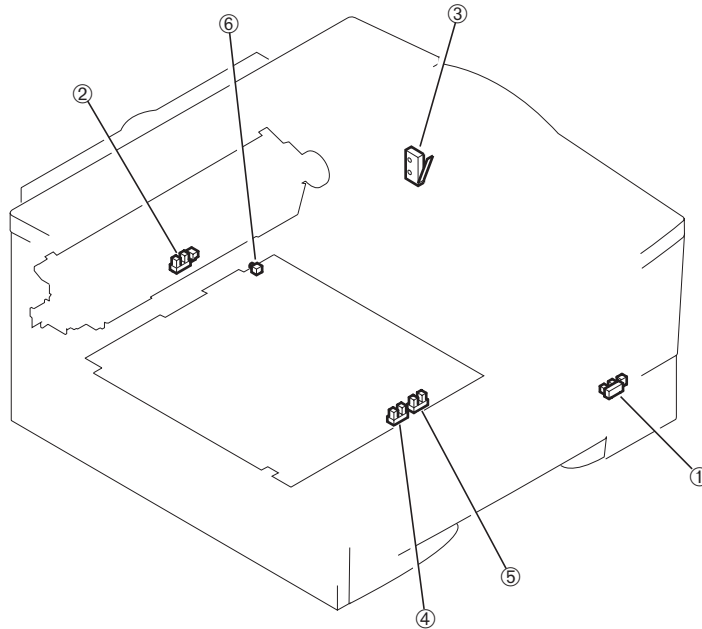
---

**Note:** When lifting up the pressure roller, be sure not to deform the plate spring on the side without gear.

---

## V. SWITCHES/SENSORS

### A. Locations



- ① Multi-purpose tray paper sensor
- ③ Interlock switch
- ⑤ Cassette paper sensor

- ② Delivery sensor
- ④ Top-of-page sensor
- ⑥ Test print switch

**Figure 3-5-1**

**B. Multi-purpose Tray Paper Sensor**

- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Unhook the 2 claws, and then remove the multi-purpose tray paper sensor with the connector.
- 3) Disconnect the connector from the sensor.

**C. Delivery Sensor**

- 1) Remove the fixing unit according to the steps 1) through 3) on page 3-9.
- 2) Disconnect the connector, unhook the 2 claws, and then remove the delivery sensor.



### **D. Interlock Switch**

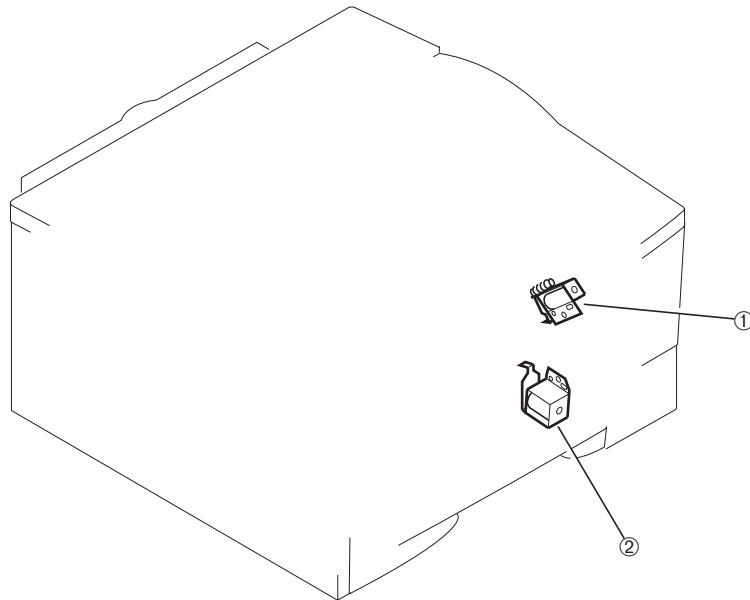
- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Disconnect the connector, and then remove the interlock switch.

### **E. Top-of-Page Sensor/Cassette Paper Sensor/Test Print Switch**

- 1) Remove the engine controller PCB according to the steps 1) through 7) on page 3-24.

## VI. SOLENOIDS

### A. Locations



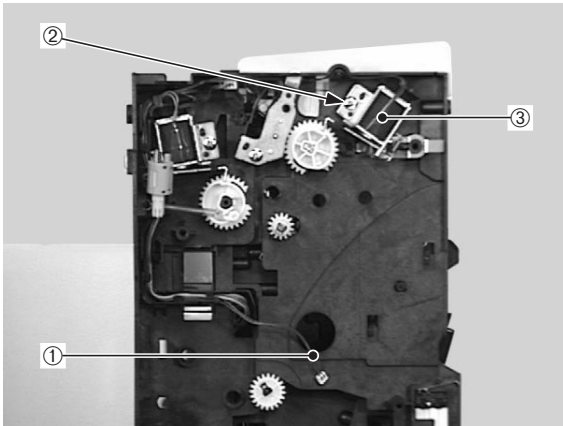
① Multi-purpose tray pick-up solenoid

② Cassette pick-up solenoid

**Figure 3-6-1**

**B. Multi-purpose Tray Pick-up Solenoid**

- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Rotate the engine controller PCB according to the steps 3) through 5) on page 3-24.
- 3) Disconnect the solenoid cable connector from the engine controller PCB.
- 4) Remove the screw and then the multi-purpose tray pick-up solenoid.



- ① Cable
- ② Screw
- ③ Multi-purpose tray pick-up solenoid

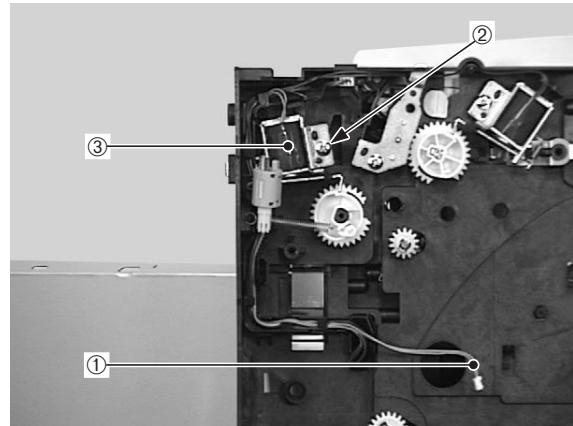
**Figure 3-6-2**

**< Note for reassembly >**

When reassembling, be sure that the cable is set in the cable guide.

**C. Cassette Pick-up Solenoid**

- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Rotate the engine controller PCB according to the steps 3) through 5) on page 3-24.
- 3) Disconnect the solenoid cable connector from the engine controller PCB.
- 4) Remove the screw and then the cassette pick-up solenoid.



- ① Cable
- ② Screw
- ③ Cassette pick-up solenoid

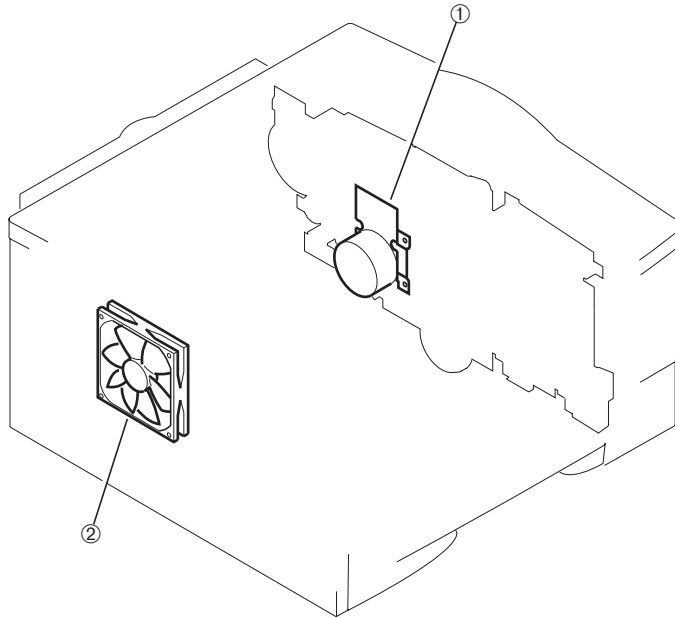
**Figure 3-6-3**

**< Note for reassembly >**

When reassembling, be sure that the cable is set in the cable guide.

**VII. MOTOR/FAN**

**A. Locations**



① Main motor

② Cooling fan

**Figure 3-7-1**

### B. Main Motor

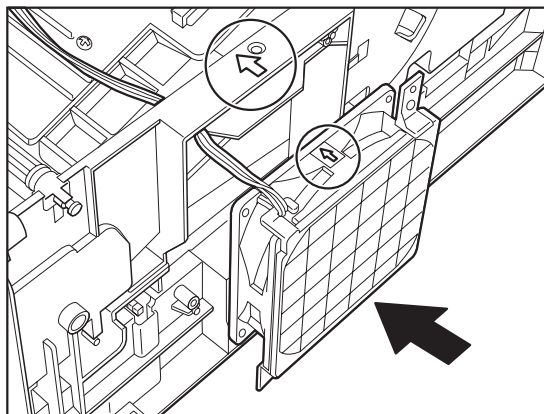
- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Remove the 4 screws and then the main motor.

### C. Cooling Fan

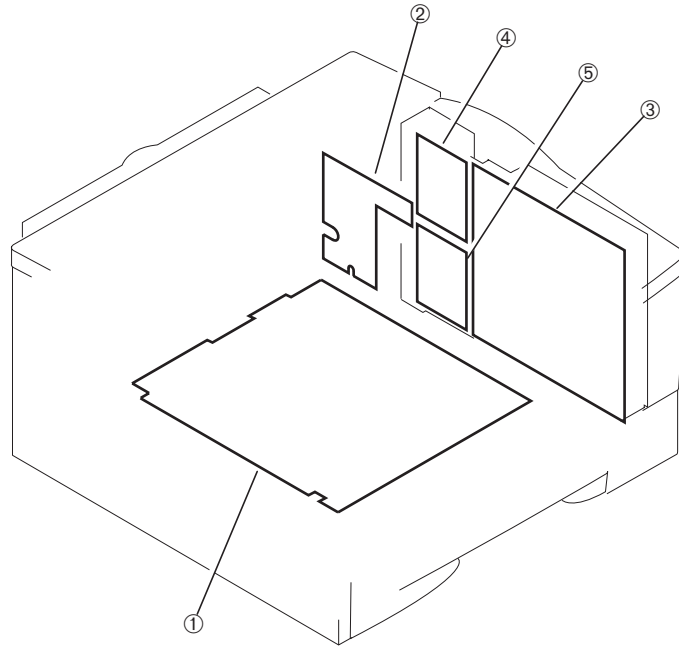
- 1) Remove the top cover unit and left cover.
- 2) Disconnect the connector.
- 3) Remove the 2 screws, and then remove the cooling fan together with the fan filter.

#### < Note for reassembly >

When installing the fan, the surface with the label should be facing inside and the arrow mark on the fan and printer should be pointing at the same direction as shown in the figure below.



**Figure 3-7-2**

**VIII. PCBS****A. Locations**

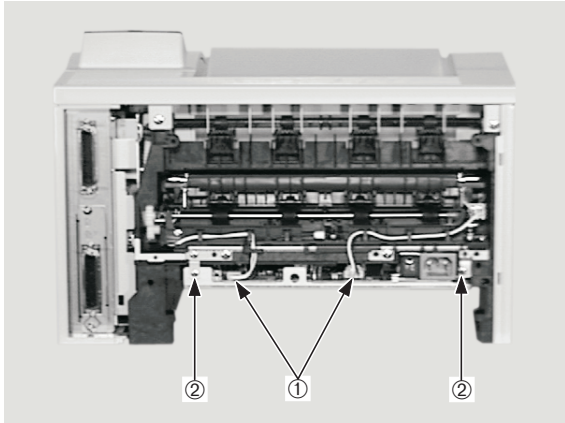
- ① Engine controller PCB
- ③ Video controller PCB
- ⑤ Connector 2 PCB

- ② Intermediate PCB
- ④ Connector 1 PCB

**Figure 3-8-1**

**B. Engine Controller PCB**

- 1) Remove the cassette.
- 2) Remove the rear cover.
- 3) Disconnect the 2 connectors and remove the 2 screws from the back of the printer.



① Connectors      ② Screws

**Figure 3-8-2**

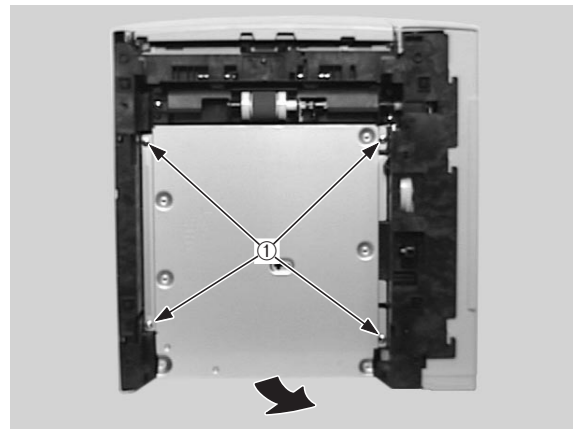
- 4) Place the printer with its back side at the bottom. Be sure that the 2 cables are not pinched by the frame.

---

**Note:** The printer can be placed upside down to conduct this operation. In this case, if the inside of the printer is dirty, toner or paper dust may enter the laser/scanner unit and cause image defects. Therefore, when placing the printer upside down, be sure to cover the laser emission hole of the laser/scanner unit with tape. Also, it is advisable to cover the hole with tape when placing the printer on its side or back.

---

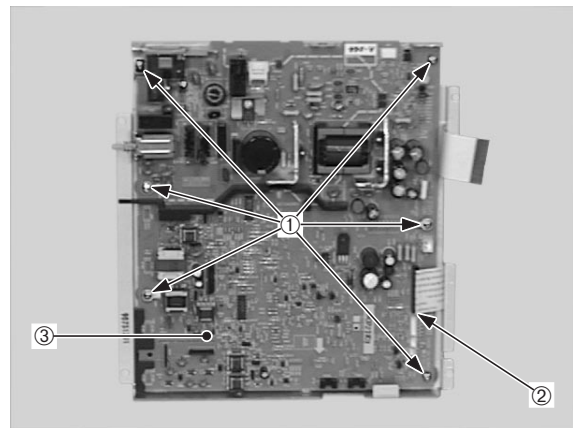
- 5) Remove the 4 screws, lift the power switch side, and then rotate the engine controller PCB.



① Screws

**Figure 3-8-3**

- 6) Disconnect the 6 connectors, and then remove the engine controller unit.
- 7) Remove the 6 screws and spacer, disconnect the connector. Remove the engine controller PCB from the engine controller unit.



① Screws  
 ② Connector  
 ③ Engine controller PCB

**Figure 3-8-4**

**< Note for reassembly >**

When installing the engine controller PCB, be sure to connect the connectors (espe-

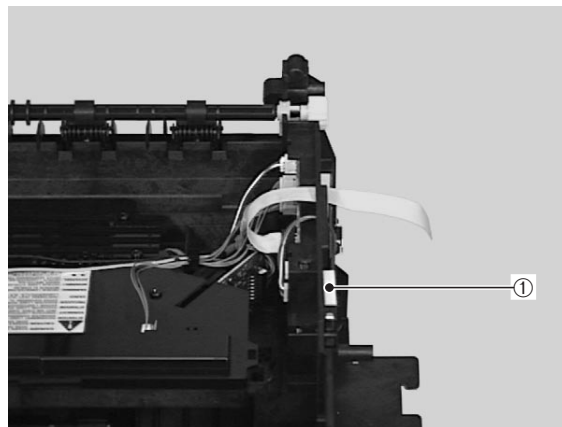
cially flat cable) securely.

**< Check after reassembly >**

After reassembly, make a test print to confirm that there is no image defects (white vertical lines) on the printed image.

**C. Intermediate PCB**

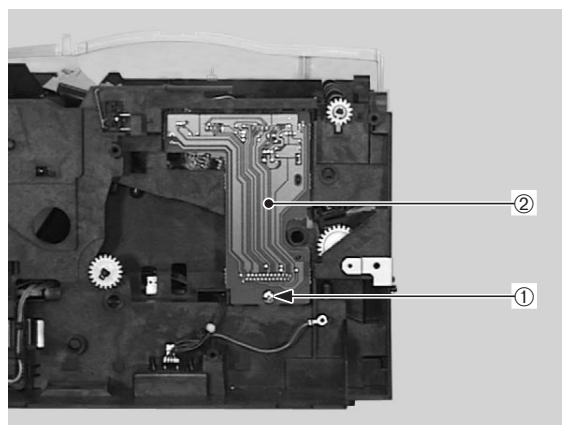
- 1) Remove the drive unit according to the steps 1) through 3) on page 3-7.
- 2) Disconnect the 3 connectors.



① Connectors

**Figure 3-8-5**

- 3) Remove the screw, disconnect the connector, and then remove the intermediate PCB.



① Screw

② Intermediate PCB

**Figure 3-8-6**

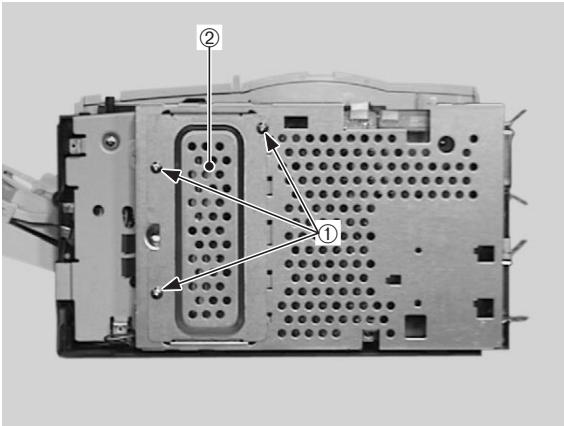
**< Note for reassembly >**

When installing the intermediate PCB, be sure to install the flat cable securely.



**D. Video Controller PCB**

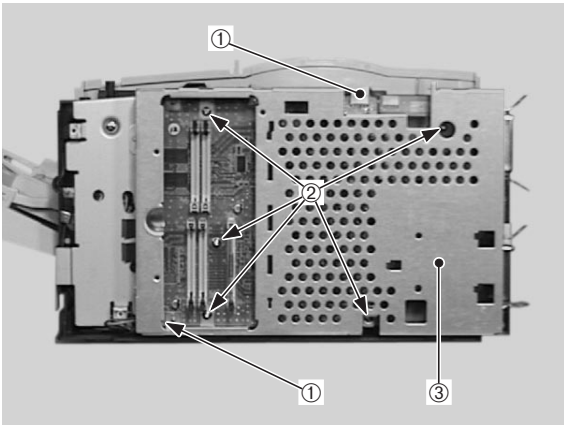
- 1) Remove the options such as RAM, DIMM, or ROM, if installed.
- 2) Remove the top cover unit and right cover.
- 3) Remove the 3 screws, and then the memory cover.



① Screws                      ② Memory cover

**Figure 3-8-7**

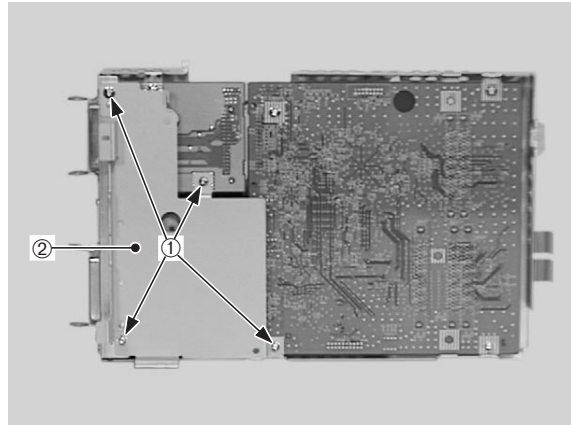
- 4) Disconnect the 2 connectors, remove the 5 screws, and then the video controller unit.



① Connectors  
 ② Screws  
 ③ Video controller PCB

**Figure 3-8-8**

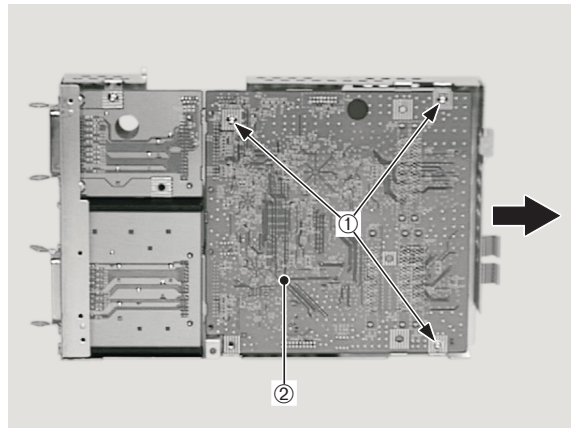
- 5) Remove the 4 screws, and then the video controller unit mounting plate.



① Screws  
 ② Video controller unit mounting plate

**Figure 3-8-9**

- 6) Remove the 3 screws. Move the video controller PCB to the direction of the arrow to remove the connector and then the video controller PCB.



① Screws  
 ② Video controller PCB

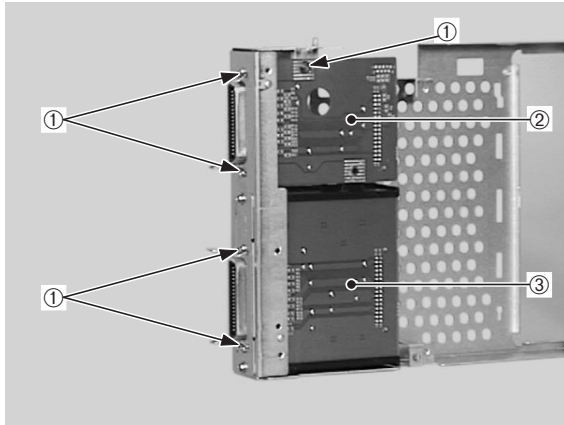
**Figure 3-8-10**

**< Note for reassembly >**

When installing the video controller unit, be sure to set the flat cable securely. If there are options removed, be sure to reinstall them to where they came from.

**E. Connector 1 PCB/Connector 2 PCB**

- 1) Remove the video controller PCB according to the video controller PCB removal steps.
- 2) Remove the 3 screws, and then the connector 1 PCB.
- 3) Remove the 2 screws, and then the connector 2 PCB.

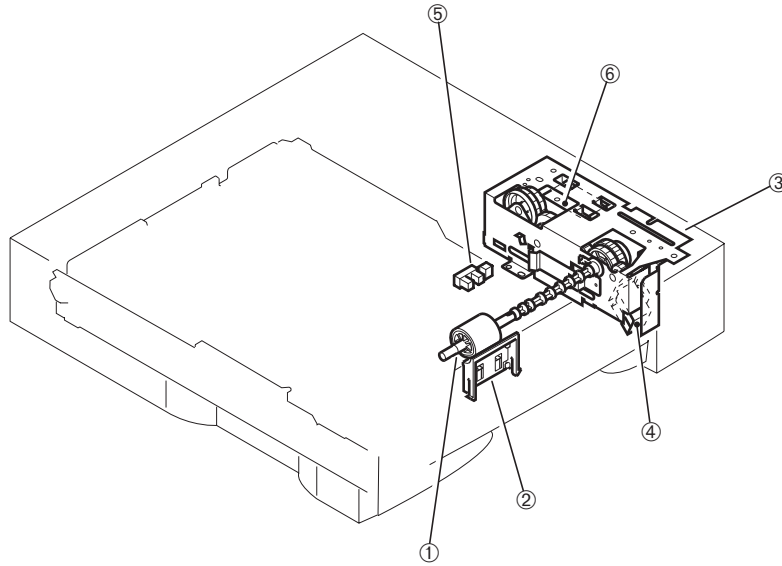


- ① Screws                      ② Connector 1 PCB  
③ Connector 2 PCB

**Figure 3-8-11**

## IX. PAPER FEEDER

### A. Locations



- ① Pick-up roller
- ③ Pick-up drive unit
- ⑤ Paper sensor

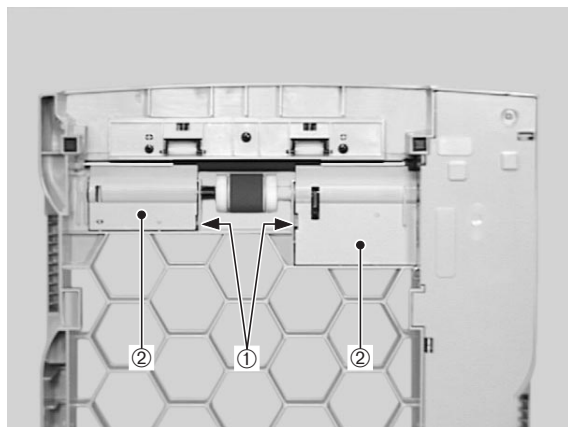
- ② Separation pad
- ④ Pick-up solenoid
- ⑥ Paper feeder PCB

**Figure 3-9-1**

**B. Disassembly and Reassembly**

**1. Removal of the pick-up roller**

- 1) Remove the cassette.
- 2) Place the paper feeder upside down.
- 3) Unhook the 2 claws, and then remove the 2 covers.



① Claws

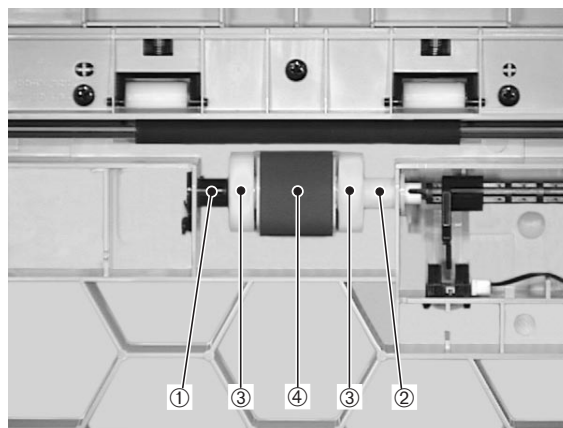
② Covers

**Figure 3-9-2**

**< Note for reassembly >**

When installing the right cover, be sure to install the sensor lever in the positioning guide securely.

- 4) Unhook the claw of the left bushing, and then rotate the bushing to remove.
- 5) Unhook the claw of the right bushing, and then rotate the bushing to remove. Move the bushing to the right, and remove the shaft of the cassette pick-up roller and then the roller.
- 6) Remove the 2 sub rollers from the pick-up roller.



① Right bushing

② Left bushing

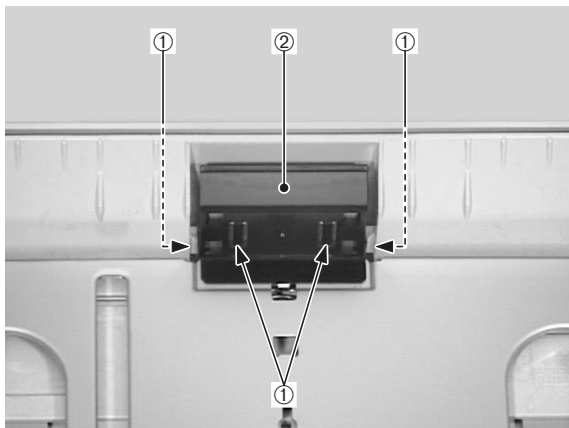
③ Sub rollers

④ Pick-up roller

**Figure 3-9-3**

**2. Removal of the separation pad**

- 1) Remove the cassette.
- 2) Lock the lifting plate by pushing it down.
- 3) Unhook the 4 claws, and then remove the separation pad.
- 4) Remove the spring from the pad.



① Claws                      ② Separation pad

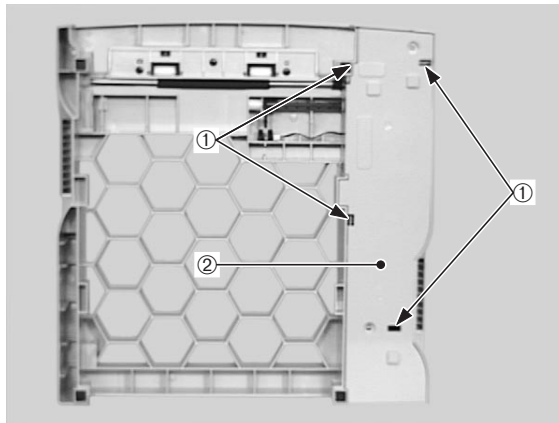
**Figure 3-9-4**

**< Note for reassembly >**

When installing the separation pad, be sure to set the spring securely.

**3. Removal of the pick-up drive unit**

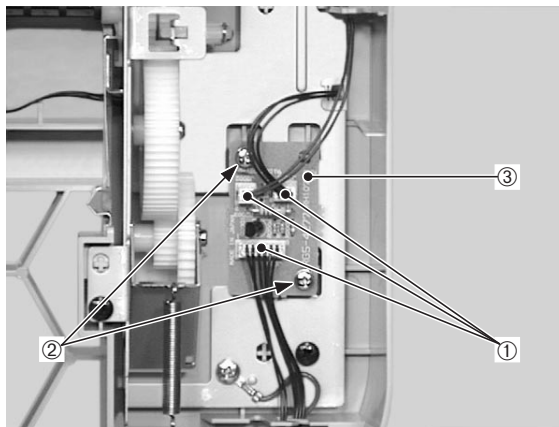
- 1) Remove the pick-up roller according to the steps 1) through 5) on page 3-29.
- 2) Unhook the 4 claws, and then remove the cover.



① Claws                      ② Cover

**Figure 3-9-5**

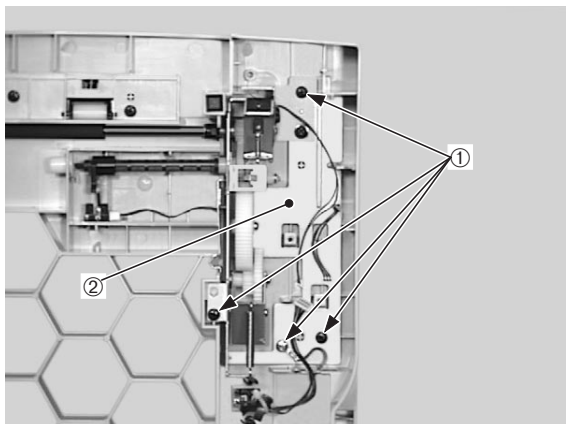
- 3) Disconnect the 3 connectors, remove the 2 screws, and then remove the paper feeder PCB.



① Connectors  
 ② Screws  
 ③ Paper feeder PCB

**Figure 3-9-6**

- 4) Remove the 4 screws and then the pick-up drive unit.



① Screws

② Pick-up drive unit

#### 4. Removal of pick-up solenoid

- 1) Remove the pick-up drive unit.
- 2) Remove the screw, and then the pick-up solenoid.

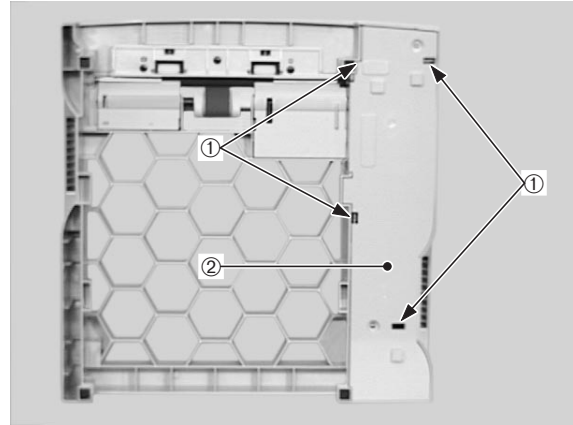
**Figure 3-9-7**

**5. Removal of the paper sensor**

- 1) Remove the cassette.
- 2) Place the paper feeder upside down.
- 3) Unhook the claw, and then remove the cover.
- 4) Disconnect the connector, unhook the 2 claws, and then remove the paper sensor.

**6. Removal of the paper feeder PCB**

- 1) Remove the cassette.
- 2) Place the paper feeder upside down.
- 3) Unhook the 4 claws, and then remove the cover.



① Claws                      ② Cover

**Figure 3-9-8**

- 4) Disconnect the 3 connectors, remove the 2 screws, and then the paper feeder PCB.



① Connectors  
② Screws  
③ Paper feeder PCB

**Figure 3-9-9**

# **CHAPTER 4**

## **TROUBLESHOOTING**

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## I. PREFACE

### A. Malfunction Diagnosis Flowchart

The malfunctions that occur in the printer fall into five main factors; “image defects,” “paper jams,” “paper transport troubleshooting,” “malfunction troubleshooting,” and “malfunction status troubleshooting.”

If a malfunction occurred in the printer, the service technician is to find the factor according to the malfunction diagnosis flowchart and to clear the problem following the action 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.
- Do not attempt to disassemble the laser/scanner unit as it cannot be adjusted in the field.

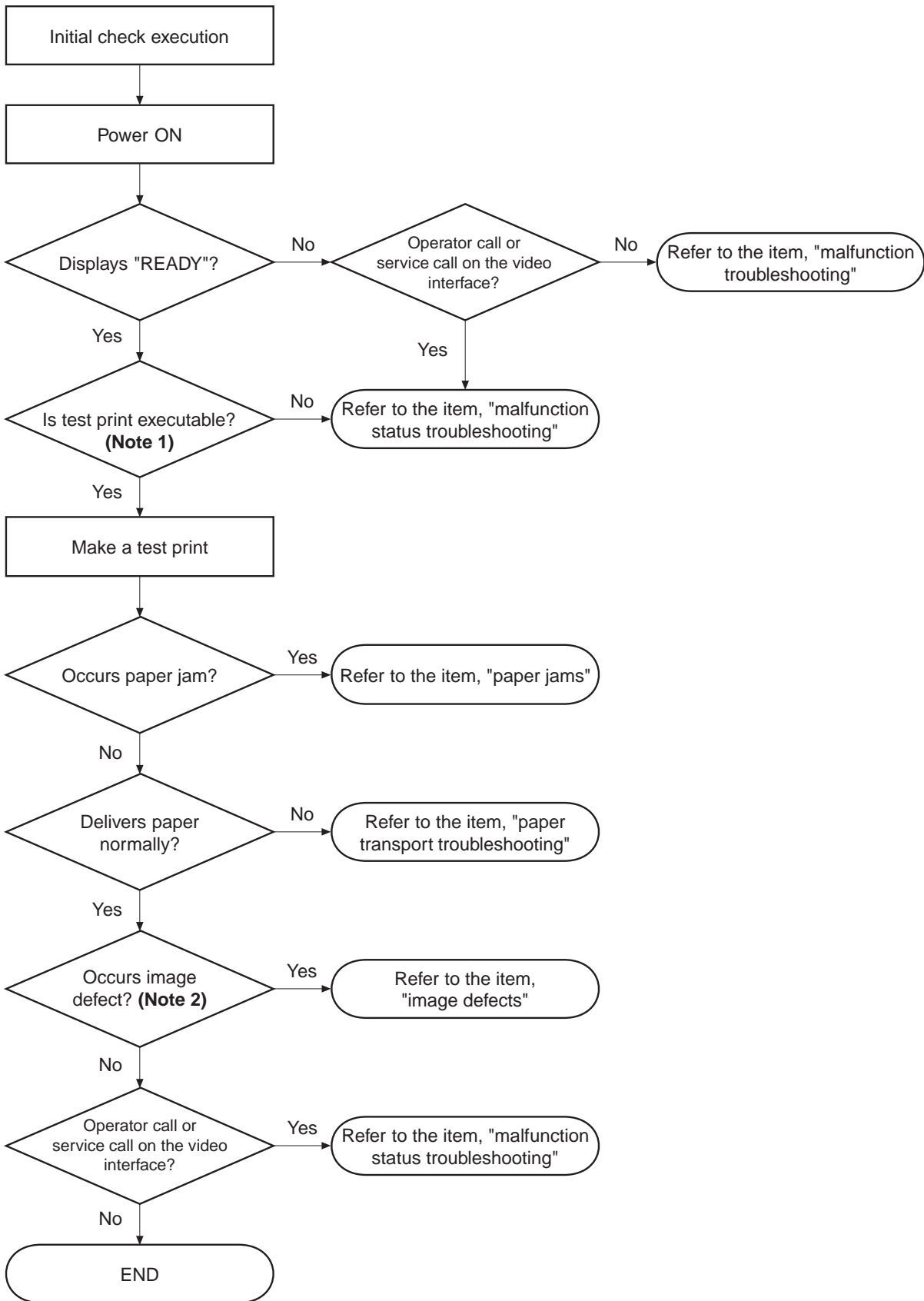


Figure 4-1-1

- 
- 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 defective part(s) from the output image. Then, find the defective part(s) according to the item, "image defects."
-

### **B. Initial Check**

Check the following items before making a diagnosis of 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 line 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 10°C and 32.5°C, and the relative humidity, between 20% and 80%.
- 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. Lights should not be placed especially on the multi-purpose tray side.
- f. A well-ventilated place.
- g. Make sure that the power plug is inserted to the printer and the outlet securely.

#### **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 pick-up source within the specified volume.
- b. The paper is set to the selected pick-up source correctly.
- c. The cassette is installed in the printer correctly.
- d. The size plate and the end plate (cassette only) are set correctly according to the paper size.

#### **4. EP-32 cartridge sets**

The cartridge is installed in the printer correctly contacting with the back of the slot firmly.

#### **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, reflecting mirror, lens, etc.) will result in light output images.
- b. As the photosensitive drum is cold, the resistance of the photoconductive layer is 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 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 acclimatize.

### C. Test Print

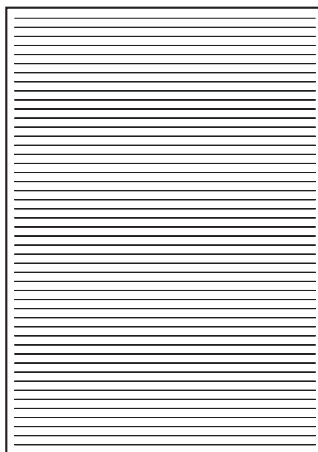
The test print is divided into two types: engine test print and controller test print.

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 pattern (horizontal lines) shown in the figure below.

A test pattern can be printed by pressing the test print switch on the back of the printer (refer to Figure 1-4-2) 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. Whether the paper is loaded or not is checked in the order of the built-in cassette, multi-purpose tray, and the paper feeder every test print operation, and the paper is picked-up from the pick-up source in which the presence of paper is detected first. Test print cannot be executed if none of the pick-up sources are loaded with paper.



**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 shown briefly on the display but is not printed. The page count prints in the TEST PRINT.
- **TEST PRINT**  
Makes 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 is 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 is installed. Prints the PS demonstration page.
- **PRINT PCL DEMO**  
Prints the PCL demonstration page.
- **CONTINUOUS TEST**  
Makes continuous Test Prints.
- **CLEANING PAGE**  
Refer to page 1-17 for the details.

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-1000 Printer Configuration Page

<p><b>PCL MENU</b>          RESOLUTION = 600          COPIES = 1          PAGESIZE = A4          ORIENTATION = PORTRAIT          FORM = GALNES          PITSRC = INTERNAL          FONTNUM = 0          PITCH = 12.00          PITCH = 10.00          SIMSET = ROMAN-8          AUTO OR = OFF          WIDE A4 = OFF          A4LTR OVERRIDE = OFF</p> <p><b>PS MENU</b>          RESOLUTION = 600          COPIES = 1          PRINT ERRS = OFF</p> <p><b>FEEDER MENU</b>          FEED = CASSETTE2          TRAY SWITCH = ON          MANUAL = OFF          MPT SIZE = A4          CASSETTE1 SIZE = A4          CASSETTE2 SIZE = A4</p>	<p><b>CONFIG MENU</b>          JAM RECOVERY = OFF          AUTOCONT = ON          DENSITY = 7          ECONOMY MODE = OFF          REFINE = ON</p> <p><b>PARALLEL1 MENU</b>          PERSONALITY = AUTO          BIJECTION = ON          I/O TIMEOUT = 15</p> <p><b>PARALLEL2 MENU</b>          PERSONALITY = AUTO          BIJECTION = ON          I/O TIMEOUT = 15</p> <p><b>TEST MENU</b>          SHOW PAGE COUNT          TEST PRINT          PRINT PS FONTS          PRINT PCL FONTS          PRINT PS DEMO          PRINT PCL DEMO          CONTINUOUS TEST          CLEANING PAGE</p>	<p><b>LANGUAGE MENU</b>          LANG = ENGLISH</p> <p><b>RESET MENU</b>          RESET = PRINTER          RESET = MENU</p> <p><b>INSTALLED OPTIONS</b>          CASSETTE2          PS</p> <p>TOTAL MEMORY = 4 MB</p> <p><b>PRINTER DETAILS</b>          CODE LEVELS          CTL 1.11 EU 11/10/99          ENGINE 66          PCL 1.4.10          PS 1.08          PAGE COUNT = 11</p>
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Laser Beam Printer Imprimante Laser Laser-Drucker  
Stampante Laser Impresora Láser

Printed on a Canon LBP-1000 Laser Beam Printer

# LBP-1000

**1200 x 1200 dpi**

**10 pages per minute**

**45 Scalable Fonts, Bar Codes**

**PCL 6 Compatible**

**100 Sheet Multi-Purpose Tray,  
250 Sheet Standard Cassette,  
50 Sheet Face-Up Output Tray,  
150 Sheet Face-Down Output Tray**

**Bi-Directional Centronics Parallel**

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Figure 4-1-3

## II. IMAGE DEFECTS

If the factor of the malfunction is identified as “image defects” by the malfunction diagnosis flow-chart (Figure 4-1-1), find out the cause of the failure according to the table below and clear the problem.

**Table 4-2-1**

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

### II-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-32 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 in the transfer charging roller contact on the engine controller PCB and in the transfer charging roller shaft contact.  
**Action:** Clean the contacts if dirty. If the problem 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.



## II-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 in the drum grounding contact pin of the drive unit and in the cartridge contact.  
**Action:** Clean the contacts if dirty. If the problem remains after cleaning, or parts (contact pin, etc) are deformed or damaged, replace it.
3. Poor contact in the primary bias contact on the engine controller PCB and in the cartridge contact.  
**Action:** Clean the contacts if dirty. If the problem remains after cleaning, or parts are deformed or damaged, replace it.
4. Defective laser/scanner unit  
**Action:** Replace the laser/scanner unit.
5. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

## II-3. Completely blank

### <Possible causes>

1. Damaged laser shutter open/close projection of the EP-32 cartridge  
**Action:** Replace the cartridge.
2. Laser shutter is malfunctioning or damaged.  
**Action:** If the laser shutter is not moving smoothly or damaged, replace the laser/scanner unit.
3. Poor contact in the developing bias contact on the engine controller PCB and in the cartridge contact.  
**Action:** Clean the contacts if dirty. If the problem remains after cleaning, or parts are deformed or damaged, replace them.
4. Defective intermediate PCB  
**Action:** Replace the intermediate PCB.
5. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

## II-4. All black

### <Possible causes>

1. Poor contact in the primary bias contact on the engine controller PCB and in the cartridge contact.  
**Action:** Clean the contacts if dirty. If the problem 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.

### II-5. Dots in vertical line

#### <Possible causes>

1. Dirty static charge eliminator

**Action:** Clean the eliminator with brush.

2. Poor contact in the static charge eliminator contact on the engine controller PCB and in the static charge eliminator contact.

**Action:** Clean the contacts if dirty. If the problem 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 in the transfer charging roller contact on the engine controller PCB and in the transfer charging roller shaft contact.

**Action:** Clean the contacts if dirty. If the problem remains after cleaning, or parts are deformed or damaged, replace them.

5. Defective engine controller PCB

**Action:** Replace the engine controller PCB.

### II-6. Dirt on back of paper

#### <Possible causes>

1. Dirty paper

**Action:** Replace the paper with new one. Advise the customer on how to store paper.

2. Periodic dirt (Registration roller, transfer charging roller, pressure roller)

**Action:** Identify and clean the dirty roller according to Table 4-2-1 on page 4-11. 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.

### II-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.

**II-8. Black horizontal lines****<Possible causes>**

1. Horizontal scar(s) on photosensitive drum  
**Action:** Replace the cartridge.
2. Dirty, deformed or worn fixing film unit  
**Action:** Replace the fixing film unit.

**II-9. Dirt****<Possible causes>**

1. Dirty paper  
**Action:** Replace the paper with new one. Advise the customer on how to store paper.
2. Periodic dirt (registration roller, fixing film unit, EP-32 cartridge)  
**Action:** Identify and clean the dirty part(s) according to Table 4-2-1 on page 4-11. If the dirt cannot be removed, replace the dirty part(s).
3. Dirty delivery roller  
**Action:** Clean the delivery roller.

**II-10. Blank spots****<Possible causes>**

1. Lack of toner  
**Action:** Remove the cartridge from the printer. Rock the cartridge in the way described in the chapter 1, and then install it back in the printer. If the problem persists, replace the cartridge.
2. Dirty or deformed transfer charging roller.  
**Action:** Replace the transfer charging roller.
3. Defective photosensitive drum or developing cylinder  
**Action:** Replace the cartridge.

**II-11. White vertical lines****<Possible causes>**

1. Lack of toner  
**Action:** Remove the cartridge from the printer. Rock the cartridge in the way described in the chapter 1, and then install it back in the printer. If the problem persists, replace the cartridge.
2. Circumferential scars on the photosensitive drum  
**Action:** Replace the cartridge.
3. Defective developing cylinder  
**Action:** Replace the cartridge.
4. Foreign materials are deposited on the laser outlet of the printer or the laser inlet of the cartridge.

**Action:** Remove the foreign materials.

5. Dirt or foreign materials on the fixing unit entrance guide.

**Action:** Clean the fixing unit entrance guide.

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

**Action:** Replace the fixing film unit.

7. Dirty mirror in the laser/scanner unit

**Action:** Replace the laser/scanner unit.

### II-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.

### II-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. Scar(s) or dent(s) on the pressure roller surface

**Action:** Replace the pressure roller.

4. Scar(s) 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.

### II-14. Image distortion

#### <Possible causes>

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

**Action:** Reconnect J801, J1706, and J1705 correctly.

2. Poor contact in the connector on the intermediate PCB

**Action:** Reconnect J1001 and J1009 correctly.

3. Poor contact in the connector on the engine controller PCB

**Action:** Reconnect J401 correctly.

4. Defective laser/scanner unit.

**Action:** Replace the laser/scanner unit.

## 5. 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
Feed roller	13.3	About 42			○	
Registration roller	13.95	About 44			○	
Primary charging roller	12	About 38	○	○		
Photosensitive drum	30	About 94	○	○		
Developing cylinder	16	About 42	○	○		
Transfer charging roller	14.6	About 46		○	○	
Fixing film unit	24	About 75	○	○		○
Pressure roller	20	About 63			○	○
Cassette pick-up roller	31	<b>Note</b>			○	
Multi-purpose tray pick-up roller	32	<b>Note</b>	○			

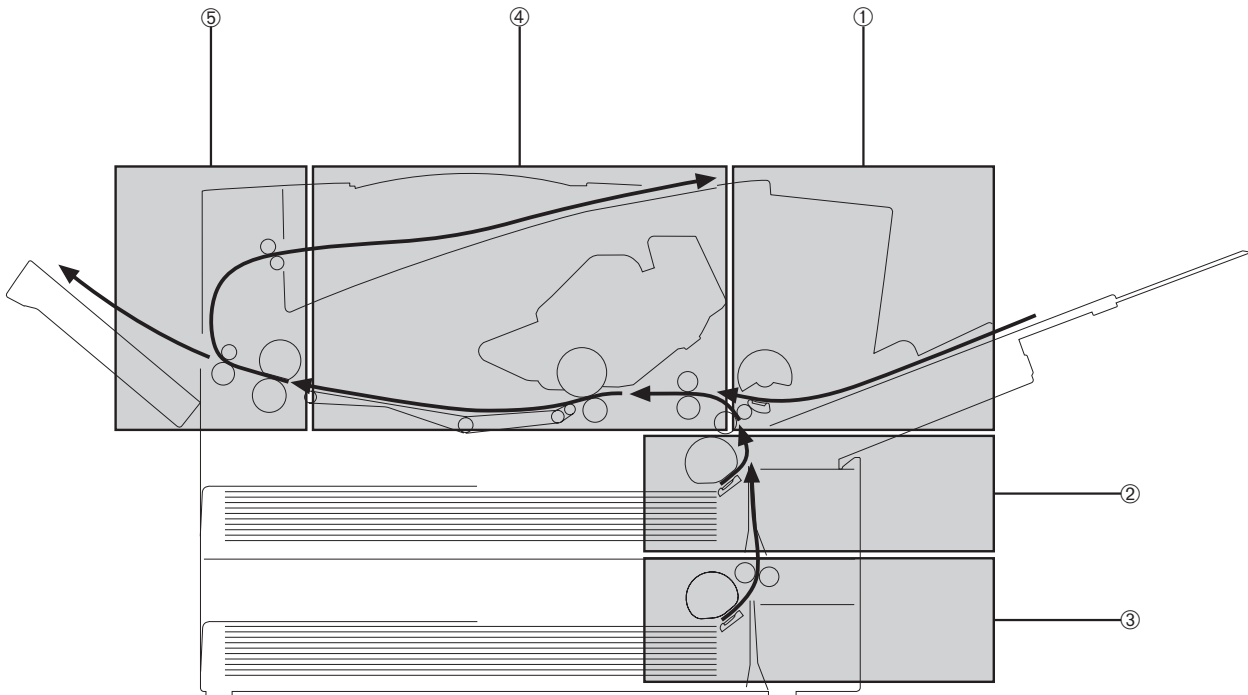
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**Note:** Appearance of dirt is not periodical. They appear only at the leading edge of the image.

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### III. PAPER JAMS TROUBLESHOOTING

Paper passes through five major sections of the printer.



**Figure 4-3-1**

- III-1: Multi-purpose tray pick-up block
- III-2: Cassette pick-up block
- III-3: Paper feeder pick-up block
- III-4: Transfer and feed block
- III-5: Fixing and delivery 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.

### III-1. Multi-purpose tray pick-up block

#### <Possible causes>

1. Defective video controller PCB  
**Action:** Make an engine test print from the Multi-purpose tray. If the printer feeds the paper normally, replace the video controller PCB.
2. Curled paper  
**Action:** Straighten the paper, and then instruct the user.
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. Spring of the tray is out of place or defective  
**Action:** Set the spring in the right position. Replace it if defective.
5. Worn or damaged tray cam  
**Action:** Replace the cam.
6. Damaged gear  
**Action:** Replace the gear.
7. Defective multi-purpose tray pick-up solenoid  
**Action:** Disconnect the multi-purpose tray pick-up solenoid connector J404 from the engine controller PCB. Measure the resistance between the cable side connector J404-1 and J404-2. If it is not about 95Ω, replace the multi-purpose tray pick-up solenoid.
8. Poor contact in the main motor drive signal line connector  
**Action:** Reconnect the main motor connector J1702 and the intermediate PCB connector J1007 correctly.
9. Defective main motor  
**Action:** Replace the main motor.
10. Poor contact in the engine controller PCB connector.  
**Action:** Reconnect the engine controller PCB connector J401 correctly.
11. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### III-2. Cassette pick-up block

#### <Possible causes>

1. Defective video controller PCB  
**Action:** Make an engine test print from the paper feeder. If the printer feeds the paper normally, replace the video controller PCB.
2. Dirty, worn, or deformed cassette pick-up roller  
**Action:** Clean the roller if dirty. Replace it if worn or deformed.
3. Damaged gear  
**Action:** Check the gears of the cassette pick-up unit and feed roller. Replace any damaged

gear(s).

4. Defective cassette pick-up solenoid  
**Action:** Disconnect the cassette pick-up solenoid connector J405 from the engine controller PCB. Measure the resistance between the cable side connector J405-1 and 405-2. If it is not about 95Ω, replace the cassette pick-up solenoid.
5. Poor contact in the main motor drive signal line connector  
**Action:** Reconnect the main motor connector J1702 and the intermediate PCB connector J1007 correctly.
6. Defective main motor  
**Action:** Replace the main motor.
7. Poor contact in the engine controller PCB connector  
**Action:** Reconnect the engine controller PCB connector J401 correctly.
8. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### III-3. Paper feeder pick-up block

#### <Possible causes>

1. Defective video controller PCB  
**Action:** Make an engine test print from the cassette. If the printer feeds the paper normally, replace the video controller PCB.
2. Dirty, worn, or deformed pick-up roller  
**Action:** Clean the pick-up roller if dirty. Replace it if worn or deformed.
3. Damaged gear  
**Action:** Check gears of the printer and the paper feeder. Replace any damaged gear(s).
4. Defective pick-up solenoid  
**Action:** Disconnect the pick-up solenoid connector J2002. Measure the resistance between the cable side connector J2002-1 and J2002-2. If it is not about 95Ω, replace the pick-up solenoid.
5. Poor contact in the main motor drive signal line connector.  
**Action:** Reconnect the main motor connector J1702 and the intermediate PCB connector J1007 correctly.
6. Defective main motor.  
**Action:** Replace the main motor.
7. Poor contact in the engine controller PCB connector  
**Action:** Reconnect the engine controller PCB connector J401 correctly.
8. Defective paper feeder PCB  
**Action:** Replace the paper feeder PCB.
9. Defective engine controller PCB



**Action:** Replace the engine controller PCB

#### III-4. Transfer and feed block

##### <Possible causes>

1. Dirty, worn or deformed registration roller  
**Action:** Clean the registration roller if dirty. Replace it if worn or deformed.
2. Dirty or worn registration shutter  
**Action:** Clean the registration shutter if dirty. Replace it if worn.
3. Registration shutter does not move smoothly, or the spring is out of place.  
**Action:** Adjust the shutter so that it moves smoothly. If the spring is out of place, set it in the right position or replace it with new one.
4. 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.
5. Transfer charging roller does not rotate smoothly.  
**Action:** Replace the bushing. Replace any worn gear(s).
6. Damaged feed belt  
**Action:** Replace the feed belt.
7. Damaged registration roller drive gear  
**Action:** Replace the gear.
8. Damaged feed belt drive gear  
**Action:** Replace the gear.
9. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

#### III-5. Fixing and delivery block

##### <Possible causes>

1. Pressure roller does not rotate smoothly.  
**Action:** Check the gears, and replace any worn or fractured gear(s).
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 or toner.  
**Action:** Clean the dirty areas.
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. 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 gear(s).

9. Worn delivery roller

**Action:** Replace the delivery roller.

10. Delivery roller does not rotate smoothly.

**Action:** Check the gears. Replace any worn or fractured gear(s).

## 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.

### IV-1. Multiple feed

#### <Possible causes>

1. Worn separation pad surface  
**Action:** Replace the separation pad.
2. Spring pushing the separation pad is defective.  
**Action:** Replace the spring.

### IV-2. Wrinkles/folded leading edge

#### <Possible causes>

1. Curled paper  
**Action:** Advise the user to straighten the paper.
2. After executing a test print, open the top cover before the paper enters the fixing unit. If the paper is wrinkled at this point, go to step 6).
3. Dirty fixing unit entrance guide  
**Action:** Clean the fixing unit entrance guide.
4. Dirty pressure roller  
**Action:** Clean the pressure roller.
5. Scarred or deformed fixing film unit  
**Action:** Replace the unit if scarred or deformed.
6. Worn or dirty registration shutter  
**Action:** Clean the registration shutter if dirty. Replace it if worn.
7. Paper dust or dirt is accumulated on the feed roller, registration roller, or feed guide.  
**Action:** Clean the dirty areas.
8. Scarred or dirty feed guide  
**Action:** Check the paper path. Replace any scarred or deformed guide(s).

### IV-3. Skew

#### <Possible causes>

1. Worn or dirty registration shutter  
**Action:** Clean the registration shutter if dirty. Replace it if worn.
2. Registration shutter does not move smoothly, or the spring is out of place.  
**Action:** Adjust the registration shutter so that it moves smoothly. If the spring is out of place, set it in the right position or replace it with new one.

## 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.

### V-1. No AC power

**<Possible causes>**

1. Blown fuse (FU201)

**Action:** Replace the fuse on the engine controller PCB.

2. Defective engine controller PCB

**Action:** Replace the engine controller PCB.

### V-2. No DC power

**<Possible causes>**

1. No AC power is supplied.

**Action:** Check according to “V-1. No AC power.”

2. Overcurrent/overvoltage detection circuit activated

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

3. Defective wiring, DC load, or engine controller PCB

**Action:** Turn the power OFF. Check the wiring and the DC loads ahead of the engine controller PCB. 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.

### VI-1. “5F-50 ERROR” (Fixing unit failure)

#### <Possible causes>

1. Shorted / broken thermistor  
**Action:** Turn the power OFF and remove the fixing unit from the printer. Measure the resistance between the fixing unit connector J301-1 (FSRTH) and J301-2 (GND). If the resistance is approximately from 350k $\Omega$  to 520k $\Omega$  (at the room temperatures of 20°C), replace the fixing film unit.
2. Broken heater wire / blown thermal fuse  
**Action:** If there is no continuity between the fixing unit connector J 303-1(ACH) and J303-2 (ACN) with the fixing unit removed from the printer, replace the fixing film unit.
3. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### VI-2. “5F-51 ERROR” (BD failure) “5F-52 ERROR” (Scanner unit failure)

#### <Possible causes>

1. Poor contact in laser/scanner unit connectors  
**Action:** Reconnect the BD PCB connector J1706, laser driver PCB connector J801, and scanner motor connector J1705.
2. Poor contact in intermediate PCB connectors  
**Action:** Reconnect the intermediate PCB connectors J1009 and J1001.
3. Defective laser/scanner unit  
**Action:** Replace the laser/scanner unit.
4. Defective intermediate PCB  
**Action:** Replace the intermediate PCB.
5. Poor contact in engine controller PCB connector  
**Action:** Reconnect the engine controller PCB connector J401 correctly.
6. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### VI-3. “5F-59 ERROR” (Cooling fan failure)

#### <Possible causes>

1. Poor contact in fan drive signal line connector  
**Action:** Reconnect the intermediate PCB connector J1005 correctly.
2. Defective fan motor  
**Action:** Disconnect the intermediate PCB connector J1005. Measure the voltage between

the intermediate PCB connector J1005-1 (/FANON) and J1005-3 (GND) immediately after power-ON. Replace the cooling fan, if the voltage changes from 0V to about 24V.

3. Poor contact in intermediate PCB connector

**Action:** Reconnect the intermediate connector J1001 and the engine controller PCB connector J401 correctly.

4. Defective intermediate PCB

**Action:** Replace the intermediate PCB.

5. Defective engine controller PCB

**Action:** Replace the engine controller PCB.

### VI-4. "6F-61 ERROR" (Resident ROM checksum error)

#### <Possible causes>

1. Defective video controller PCB

**Action:** Turn the power OFF and then ON again. If the problem remains after turning the power OFF and ON, replace the video controller PCB.

### VI-5. "6F-63 ERROR" (Resident DRAM error)

#### <Possible causes>

1. Defective video controller PCB

**Action:** Turn the power OFF and then ON again. If the problem remains after turning the power OFF and ON, replace the video controller PCB.

### VI-6. "6F-68 ERROR" (NVRAM (EEPROM) error)

#### <Possible causes>

1. Defective NVRAM (EEPROM)

**Action:** Perform a cold reset. If the problem remains after performing the cold reset, replace the NVRAM (EEPROM).

2. Defective video controller PCB

**Action:** Replace the video controller PCB.

### VI-7. "6F-7A ERROR" (SRAM in AIR chip error)

#### <Possible causes>

1. Defective video controller PCB

**Action:** Turn the power OFF and then ON again. If the problem remains after turning the power OFF and ON, replace the video controller PCB.

### VI-8. "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.

#### VI-9. "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.

#### VI-10. "OPTION ROM ERROR"

##### <Possible causes>

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

#### VI-11. Printer does not enter READY state because "Door open status" is output when the cover is closed.

##### <Possible causes>

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

#### VI-12. Printer does not enter READY state because "no cartridge status" is output when cartridge is installed.

##### <Possible causes>

1. Poor contact in the primary bias contract on the engine controller PCB and in the cartridge contact.  
**Action:** Clean the contacts if dirty. If the problem remains after cleaning, or parts are deformed or damaged, replace them.
2. Poor contact in the drum grounding contact pin of the drive unit and in the cartridge contact.  
**Action:** Clean the contacts if dirty. Replace the part (contact pin), if the problem remains after cleaning, or it is deformed or damaged.
3. Defective cartridge  
**Action:** Replace the cartridge.
4. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### **VI-13. Printer does not enter READY state because "jam status" is output when paper is not jammed.**

#### **<Possible causes>**

1. 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.
2. Poor contact in delivery sensor signal line connector  
**Action:** Reconnect the delivery sensor connector J1701 and the engine controller PCB connector J301 correctly.
3. Delivery sensor lever does not move smoothly, or is damaged.  
**Action:** Adjust the lever so that it moves smoothly. Replace it if damaged.
4. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### **VI-14. Printer does not enter READY state because "LOAD <SIZE> IN CASSETTE 1" is output when the specified size of paper is loaded in the CASSETTE 1.**

#### **<Possible causes>**

1. Paper sensor lever does not move smoothly, or is damaged.  
**Action:** Adjust the lever so that it moves smoothly. Replace it if damaged.
2. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### **VI-15. Printer does not enter READY state because "LOAD <SIZE> IN MPT" is output when the specified size of paper is loaded in the Multi-purpose tray.**

#### **<Possible causes>**

1. Paper sensor lever does not move smoothly, or is damaged.  
**Action:** Adjust the lever so that it moves smoothly. Replace it if damaged.
2. Defective Multi-purpose tray paper sensor.  
**Action:** Replace the Multi-purpose tray paper sensor.
3. Defective engine controller PCB  
**Action:** Replace the engine controller PCB.

### **VI-16. Printer does not enter READY state because "LOAD <SIZE> IN CASSETTE 2" is output when the specified size of paper is loaded in the paper feeder.**

#### **<Possible causes>**

1. Paper sensor lever does not move smoothly, or is damaged.  
**Action:** Adjust the lever so that it moves smoothly. Replace it if damaged.
2. Defective paper feeder paper sensor.  
**Action:** Replace the paper feeder paper sensor.
3. Defective paper feeder PCB  
**Action:** Replace the paper feeder PCB.



4. 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-32 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) Turn OFF the printer when the leading edge of the print emerges at the face-up tray. Open the top cover and take out the print 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): 6.0mm to 6.9mm
  - Difference between right/left side and center (b-a, c-a): 0.5mm or less
  - Difference between right side and left side ( $|b-c|$ ): 0.5mm or less

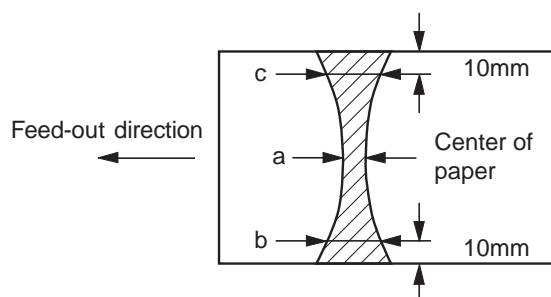


Figure 4-7-1



### B. Electrical Adjustment

- No electrical adjustment for this printer.

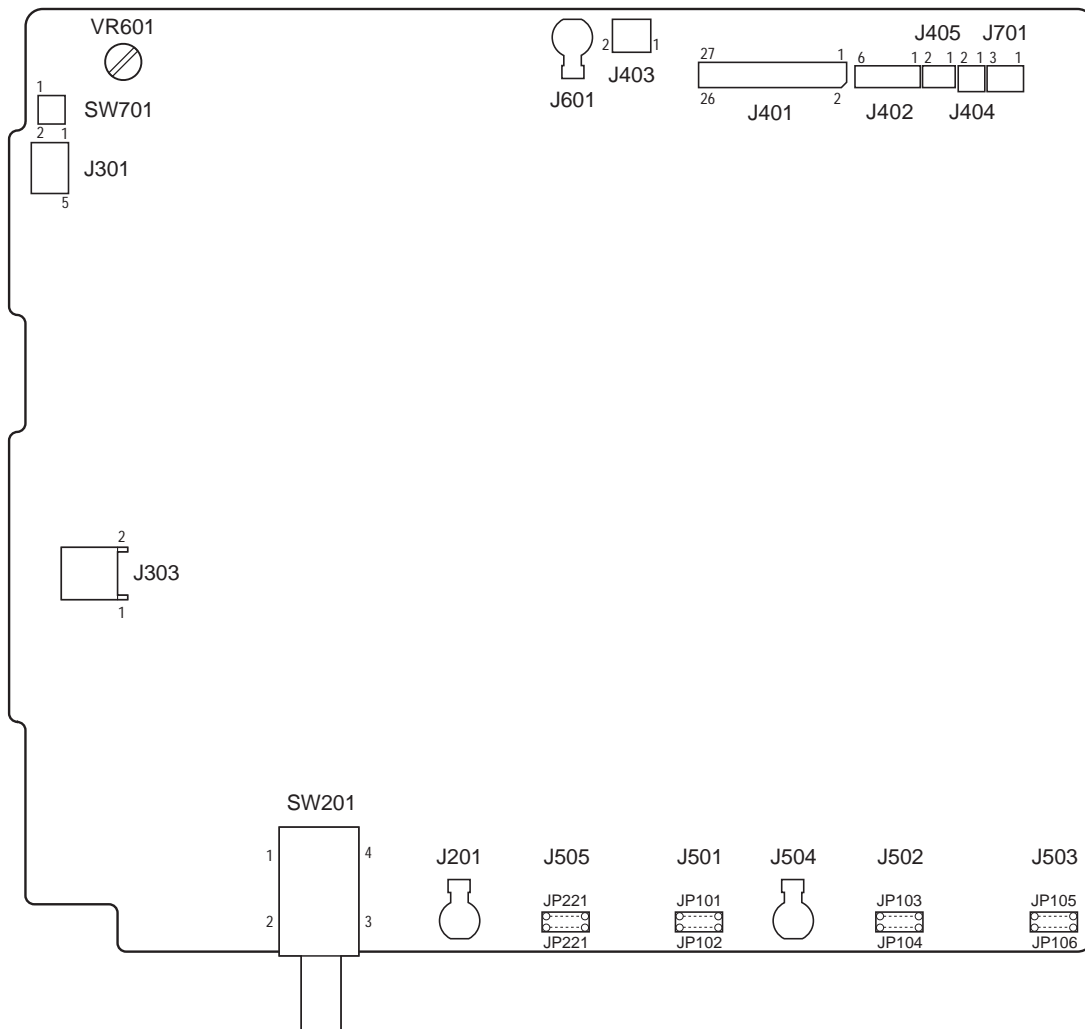
**C. Variable Resistors, LEDs, Test Pins, Jumpers and Switches on PCBs**

Only the variable resistors, LEDs, test pins, jumpers, and switches required for after-sales service in the field are listed below.

All other variable resistors, test pins, etc. are for the factory use only. The adjustment and check using these test pins, etc. require special tools, measuring instruments and high precision. Do not touch them in the field.

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

**1. Engine controller PCB**



**Figure 4-7-2**

**Figure 4-7-1**

SW No.	Function
SW201	Power switch
SW701	Test print switch

VR No.	Function
VR601	For factory use only

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---

## VIII. MAINTENANCE AND SERVICING

### A. Periodic Replacement Parts

- No parts 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

- No consumable parts in this printer.

---

**Note:** Consumable parts are expected to require replacement at least once during the warranty period of the printer, due to deterioration or damage. They can be used until they become defective.

---

### C. Periodic Service

- The printer has no parts that require periodic servicing.

### **D. Cleaning during a Service Visit**

Following the procedures below, clean the printer during service visit.

#### **1. Transfer charging roller**

As a general rule, the transfer charging roller is not to be touched or cleaned. If it is unavoidable, clean the roller with dry lint free paper (which produces little paper dust). Do not use water or solvent. Make sure not to contaminate the roller with solvent or oil.

#### **2. Multi-purpose tray pick-up roller, Cassette pick-up roller**

Clean with lint free paper.

#### **3. Separation pad**

Clean with lint free paper.

#### **4. Registration shutter**

Clean with lint free paper.

#### **5. Transfer guide unit**

Clean with soft and dry flannel cloth.

#### **6. Static charge eliminator**

Clean with brush.

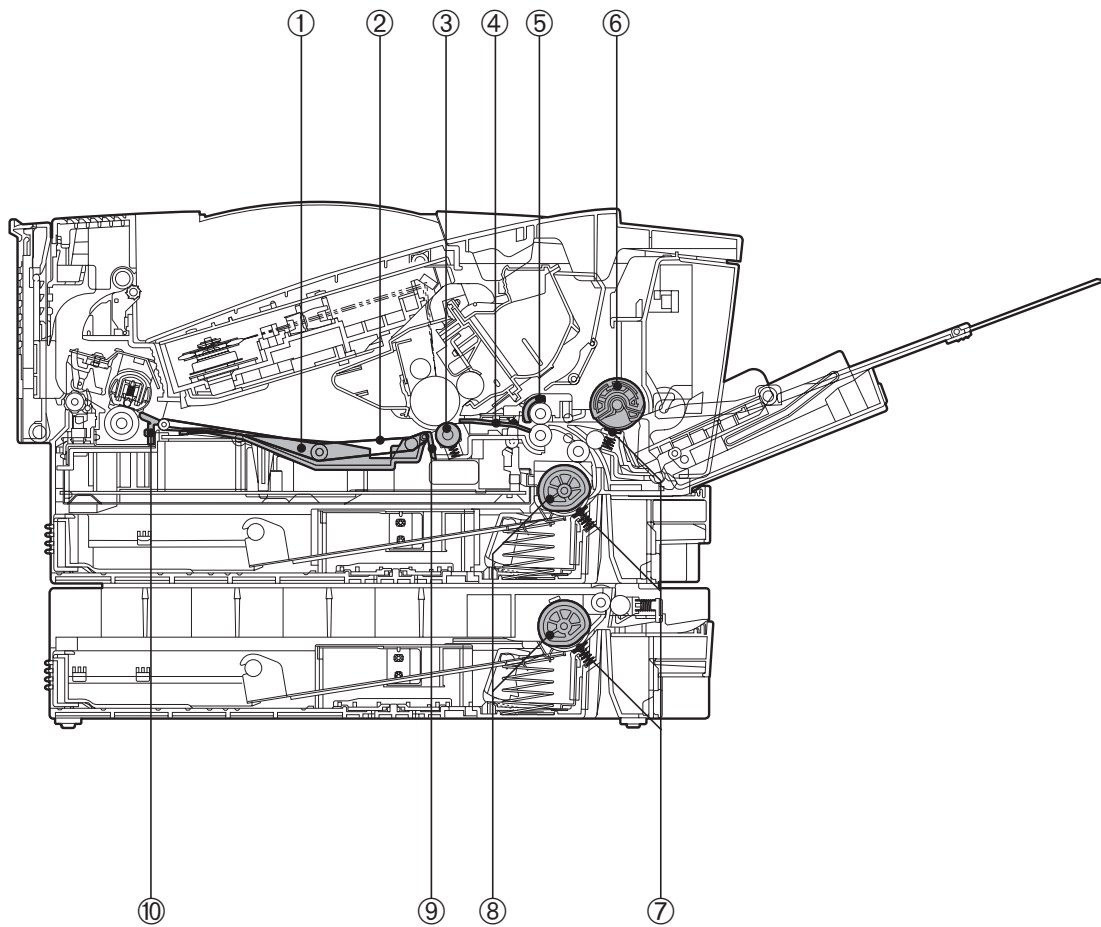
#### **7. Feed belt/feed guide unit**

Clean with lint free paper.

#### **8. Fixing unit entrance guide**

Clean with cloth moistened with MEK.



**Figure 4-8-1**

- |                             |                                      |
|-----------------------------|--------------------------------------|
| 1: Feed guide               | 6: Multi-purpose tray pick-up roller |
| 2: Feed belt                | 7: Separation pad                    |
| 3: Transfer charging roller | 8: Cassette pick-up roller           |
| 4: Transfer guide unit      | 9: Static charge eliminator          |
| 5: Registration shutter     | 10: Fixing unit entrance guide       |

**E. Standard Tools**

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

**Table 4-8-1**

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**

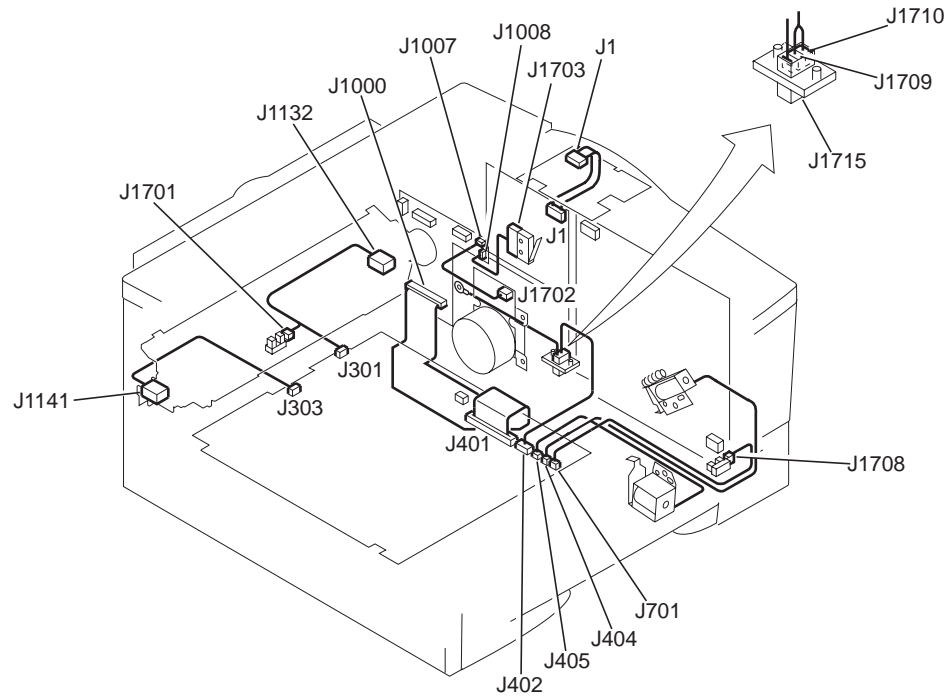
No special tools are required for this printer besides the standard tools.

**G. Solvents and Oil List**

**Table 4-8-2**

No.	Material name	Components	Use	Remarks
1	Alcohol: ethyl (pure or denatured) or isopropyl (pure or denatured)	C <sub>2</sub> H <sub>5</sub> OH, (CH <sub>3</sub> ) <sub>2</sub> CHOH	Cleaning: plastic, rubber	<ul style="list-style-type: none"> <li>• Purchase locally</li> <li>• Flammable: keep away from flame</li> </ul>
2	MEK (methyl ethyl ketone)	CH <sub>3</sub> CO-C <sub>2</sub> H <sub>5</sub>	Cleaning: oil and toner stains	<ul style="list-style-type: none"> <li>• Purchase locally</li> <li>• Highly flammable: keep away from flame</li> </ul>
3	Lubricating oil	Petroleum mineral oil	Apply between gear and shaft	<ul style="list-style-type: none"> <li>• Tool No. CK-8003 (100 ml bottle)</li> <li>• Tellus Oil 68 (Shell)</li> </ul>
4	Lubricating agent	Special oil Special solid lubricating material Lithium soap	Apply to gears	<ul style="list-style-type: none"> <li>• Tool No. HY9-0007 (20 g tube)</li> <li>• Molycoat EM-50L (Dow Coning)</li> </ul>

**IX. LOCATION OF CONNECTORS**



**Figure 4-9-1**

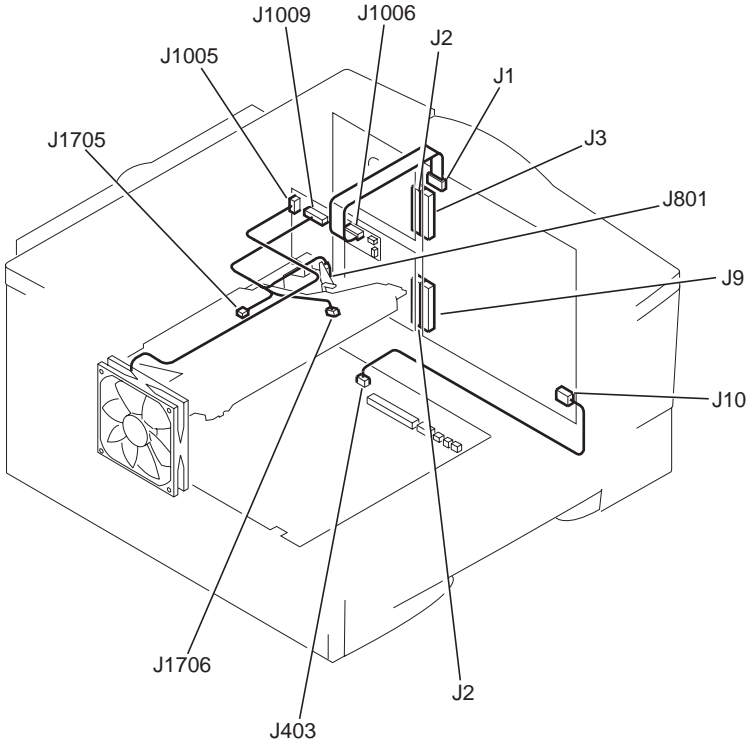


Figure 4-9-2

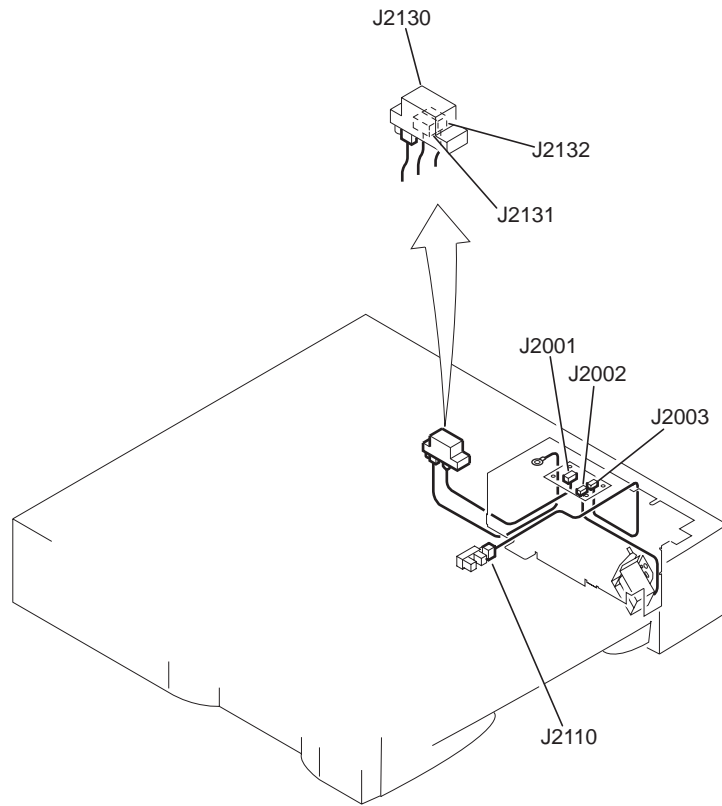


Figure 4-9-3





# **APPENDIX**

<b>I. GENERAL TIMING CHART .....</b>	<b>A-1</b>	<b>III. LIST OF SIGNALS .....</b>	<b>A-5</b>
<b>II. GENERAL CIRCUIT DIAGRAM...</b>	<b>A-3</b>	<b>IV. MESSAGES TABLE.....</b>	<b>A-11</b>



**I. GENERAL TIMING CHART**

• Timing chart for two consecutive prints on A4 paper

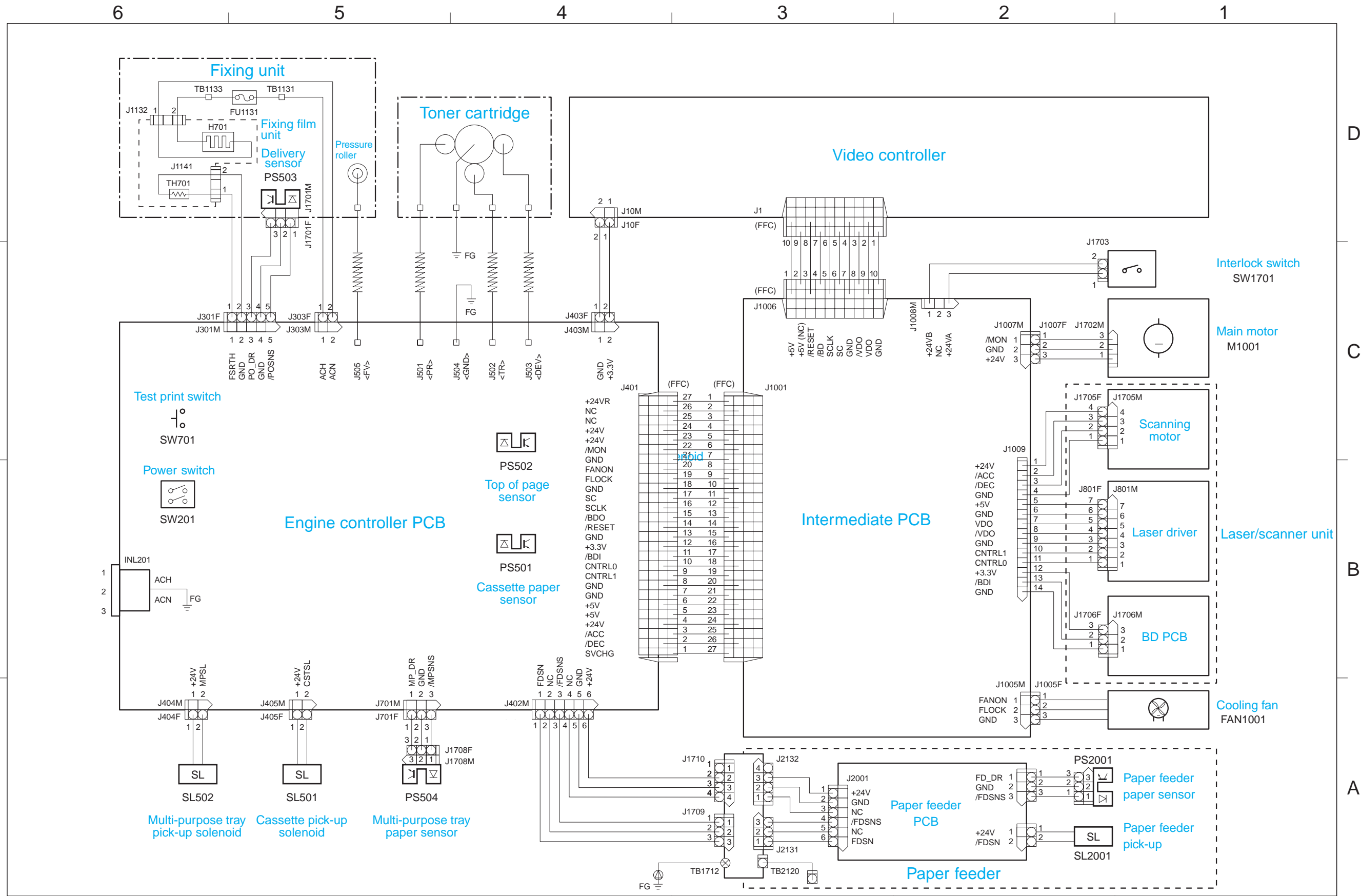
(Unit: Seconds)

Operation	WAIT	STBY	INTR	PRINT	LSTR	STBY
1 Print start command						
2 /VDO and VDO signals					→ 0.06	
3 Main motor (M1001)					← 1.86	
4 Cooling fan (FAN1001)	Full speed rotation	Note				← 30 → Note
5 Scanner motor			80% of normal scanner speed			
6 Cassette pick-up solenoid (SL501)			→ 0.6 →	← About 0.05 ← About 4 →	→ ← About 0.05	
7 Multi-purpose tray pick-up solenoid (SL502)			→ 1.1 →	← About 4.5 →		
8 Paper feeder pick-up solenoid (SL2001)				← About 2.6 →		
9 Top of page sensor (PS502)						
10 Primary voltage (AC)	← 2.0 →	← 4.0 →	60% of normal scanner speed		← 2.0 →	← About 1.67 →
11 Primary voltage (DC)					← 1.6 →	
12 Developing bias (AC)			← About 0.14 →	← About 0.27 →	← About 0.14 →	← About 0.27 →
13 Developing bias (DC)			← About 0.78 →		← About 0.26 →	
14 Transfer voltage (plus)			← About 0.77 →	← About 0.65 →	← About 0.77 →	← About 0.65 →
15 Transfer voltage (minus)		← 1.0 →		← About 0.74 →	← About 0.74 →	← About 1.23 →
16 Paper delivery sensor (PS503)						
17 Fixing heater	← 0.2 →		← 0.3 →			← 5 →
18	← Less than 0.5 →					

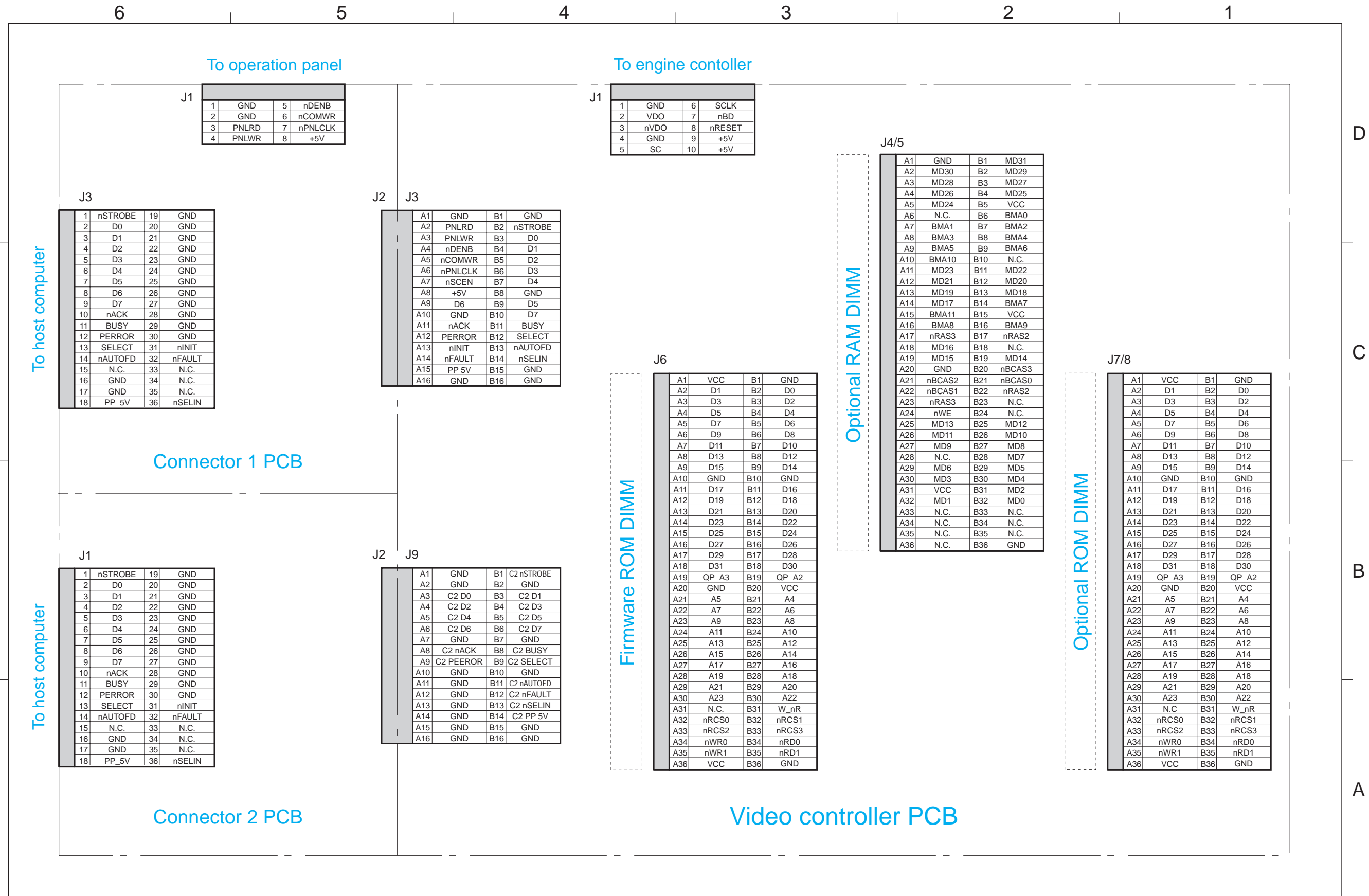
**Note:** In this period, the fan motor repeats full-speed rotation, half-speed rotation, and stop in that order.



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
INL201	1	ACH	I		AC power input
INL201	2	FG			
INL201	3	ACN	I		AC power input
J301	1	FSRTH	I	Analog	Thermistor signal
J301	2	GND			
J301	3	PO-DR	O		
J301	4	GND			
J301	5	/POSNS	I	L	Delivery detection signal
J303	1	ACH	O		
J303	2	ACN	O		
J401	1	SVCHG	O	H	Scanner motor power control signal
J401	2	/DEC	O	L	Scanner motor deceleration signal
J401	3	/ACC	O	L	Scanner motor acceleration signal
J401	4	+24V	O		
J401	5	+5V	O		
J401	6	+5V	O		
J401	7	GND			
J401	8	GND			
J401	9	CNTRL1	O	H	Laser control signal 1
J401	10	CNTRL0	O	H	Laser control signal 0
J401	11	/BDI	I	Pulse	BD input signal
J401	12	+3.3V	O		
J401	13	GND			
J401	14	/RESET	O	L	Reset signal
J401	15	/BDO	O	Pulse	Beam Detect signal
J401	16	SCLK	I	Pulse	Serial clock signal
J401	17	SC	I/O		Status/command signal
J401	18	GND			
J401	19	FLOCK	I	L	Fan lock detection signal
J401	20	FANON	O	L	Fan drive signal
J401	21	GND			
J401	22	/MON	O	L	Main motor drive signal
J401	23	+24V	O		
J401	24	+24V	O		
J401	25	NC			
J401	26	NC			
J401	27	+24VR	I		
J402	1	FDSN	O	H	Paper feeder pick-up solenoid drive signal
J402	2	NC			
J402	3	/FDSNS	I	L	Paper feeder paper detection signal
J402	4	NC			
J402	5	GND			
J402	6	+24V	O		

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Connector	Pin	Abbreviation	I/O	Logic	Signal name
J403	1	GND			
J403	2	+3.3V	O		
J404	1	+24V	O		
J404	2	MPSL	O	L	Multi-purpose tray pick-up solenoid drive signal
J405	1	+24V	O		
J405	2	CSTSL	O	L	Cassette pick-up solenoid drive signal
J701	1	MP_DR	O		
J701	2	GND			
J701	3	/MPSNS	I	L	Multi-purpose tray paper detection signal



**B. Input/output signals to/from intermediate PCB**

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J1001	1	+24VR	O		
J1001	2	NC			
J1001	3	NC			
J1001	4	+24V	I		
J1001	5	+24V	I		
J1001	6	/MON	I	L	Main motor drive signal
J1001	7	GND			
J1001	8	FANON	I	L	Fan drive signal
J1001	9	FLOCK	O	L	Fan lock detection signal
J1001	10	GND			
J1001	11	SC	I/O	H	Status/command signal
J1001	12	SCLK	O	Pulse	Serial clock signal
J1001	13	/BDO	I	Pulse	Beam Detect signal
J1001	14	/RESET	I	L	Reset signal
J1001	15	GND			
J1001	16	+3.3V	I		
J1001	17	/BDI	O	Pulse	BD output signal
J1001	18	CNTRL0	I	H	Laser control signal 0
J1001	19	CNTRL1	I	H	Laser control signal 1
J1001	20	GND			
J1001	21	GND			
J1001	22	+5V	I		
J1001	23	+5V	I		
J1001	24	+24V	I		
J1001	25	/ACC	I	L	Scanner motor acceleration signal
J1001	26	/DEC	I	L	Scanner motor deceleration signal
J1001	27	SVCHG	I	H	Scanner motor power control signal
J1005	1	FANON	O	L	Fan drive signal
J1005	2	FLOCK	I	L	Fan lock detection signal
J1005	3	GND			
J1006	1	+5V	O		
J1006	2	+5V	O		
J1006	3	/RESET	O	L	Reset signal
J1006	4	/BDO	O	Pulse	Beam Detect signal
J1006	5	SCLK	I	Pulse	Serial clock signal
J1006	6	SC	I/O	H	Status/command signal
J1006	7	GND			
J1006	8	/VDO	I	L	Video signal
J1006	9	VDO	I	H	Video signal
J1006	10	GND			
J1007	1	/MON	O	L	Main motor drive signal
J1007	2	GND			
J1007	3	+24V	O		
J1008	1	+24VB	I		
J1008	2				
J1008	3	+24VA	O		

## APPENDEX

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J1009	1	+24V	O		
J1009	2	/ACC	O	L	Scanner motor acceleration signal
J1009	3	/DEC	O	L	Scanner motor deceleration signal
J1009	4	GND			
J1009	5	+5V	O		
J1009	6	GND			
J1009	7	VDATA	O	H	Video signal
J1009	8	/VDATA	O	L	Video signal
J1009	9	GND			
J1009	10	CNTRL1	O	H	Laser control signal 1
J1009	11	CNTRLO	O	H	Laser control signal 0
J1009	12	+3.3V	O		
J1009	13	/BDI	I	Pulse	BD output signal
J1009	14	GND			

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

Connector	Pin	Abbreviation	I/O	Logic	Signal name
J2001	1	+24V	I		
J2001	2	GND			
J2001	3	NC			
J2001	4	/FDSNS	O	L	Paper feeder paper detection signal
J2001	5	NC			
J2001	6	FDSN	I	H	Paper feeder pick-up solenoid drive signal
J2002	1	+24V	O		
J2002	2	/FDSN	O	L	Paper feeder pick-up solenoid drive signal
J2003	1	FD_DR	O		
J2003	2	GND			
J2003	3	/FDSNS	I	L	Paper feeder paper detection signal

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## 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.
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.
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.
+ 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.
FLASH OVERFLOW	A memory overflow has occurred in the optional Flash ROM 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.	Press the Go key to take the printer back on-line. Format the Flash ROM or delete font and macro data to create more space.

<b>Message</b>	<b>Meaning</b>	<b>Action</b>
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-51 ERROR CALL FOR SERVICE	BD malfunction	
5F-52 ERROR CALL FOR SERVICE	Scanner unit malfunction	
5F-59 ERROR CALL FOR SERVICE	Cooling fan malfunction	
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	
PS OPTION ERROR	An optional ROM DIMM diagnostic error.	
PARALLEL1 INTERFACE ERROR	The parallel port is not communicating with the controller.	
PARALLEL2 INTERFACE ERROR	The parallel port is not communicating with the controller.	
OPTION RAM ERROR	Option DRAM DIMM diagnostic error. An option DRAM DIMM has failed the start-up diagnostic check.	
OPTION ROM ERROR	Option ROM DIMM diagnostic error. An option ROM DIMM has failed its startup diagnostic check.	
COLD RESET	Displays when the COLD RESET Power-On sequence is selected.	No action required although the printer will be reset to its factory defaults and any unique settings will have to be reset.
CONTEXT SAVE ADJUSTED	The context saving items (PCL SAVE or PS3 SAVE) in the MEMCONFIG MENU have been adjusted automatically by the printer operating 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	Press Go key to continue.

Message	Meaning	Action
	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.
LOAD <SIZE> IN <TRAY>	Load the specified tray with the correct paper size, according to the message. <paper source> CASSETTE1: The internal cassette CASSETTE2: The optional paper feeder MPT: The Multi-purpose tray ANY TRAY: Any tray that support Letter-, Legal-, A4-, A5-, Executive-, or B5-JIS-size paper.  <size> LETTER: Letter size paper LEGAL: Legal size paper A4: A4 size paper A5: A5 size paper EXEC: Executive size paper COM10: Commercial #10 envelope MONARCH: Monarch envelope DL: DL envelope C5: C5 envelope B5-JIS: B5-JIS size paper B5-ISO: B5-ISO envelope CUSTOM: Paper loaded from the MPT or manual feed Any: Unknown paper size	The specified paper source must be loaded with the requested paper size. To continue the print job, you may have to press Go key.  If the paper source runs out of paper during printing, reloading the paper source will allow the printer to continue printing.  For manual feed, you need to press Go key to continue printing.
LOAD <size> IN MANUAL	Load Multi-purpose tray with the specified paper.	Press the Go key to resume printing.
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 COMPRESSION	The printer is using MRT Compression, with the possibility of print quality deration (lossy compression)	No action required.
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	
PAGES: ####	This message is displayed when SHOW PAGE COUNT is selected in the TEST	No action required.

<b>Message</b>	<b>Meaning</b>	<b>Action</b>
PAGES: ####	MENU, where #### is the total number of pages.	No action required.
PAPER JAM	A paper jam has occurred in the printer.	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.	Inspect the tray or the cassette for mismatched paper and correct.
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.
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.



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