

# SERVICE MANUAL

**REVISION 1** 

# Canon

**DEC. 1997** 

RY8-1383-010

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CANON LBP-2460 REV.1 DEC. 1997 PRINTED IN JAPAN (IMPRIME AU JAPON)

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# SERVICE INFORMATION

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LBP-2460

NO.: RAD-12E-0001

DATE: DEC. 12,1997

y Kajihara

LOCATION SUBJECT

# **Revision of Service Manual**

Canon has published a revised version of LBP-2460 Service Manual (RY8-1383-000). Revision 1 (RY8-1383-010) includes supplementary materials as well as corrections, so please use it in place of the original.

RY8-1383-01Y

#### **PREFACE**

This Service Manual contains basic information required for after-sales service of the LBP-2460 laser beam printer (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 2,000-sheet paper deck, option controller, envelope feeder, and duplexing unit, which are prepared for the printer as options, are also described in this manual.

In this manual, the optional 2,000-sheet paper deck is simply called the paper deck.

This manual consists of the following chapters:

Chapter 1: Product information

Features, specifications, operation, 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

Maintenance and servicing, reference values and adjustments, troubleshooting procedures, lubricants, and solvents

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 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 9500/132 personal computer and output by an Apple LaserWriter 16/600 PS laser beam printer. All graphics were produced with Aldus FreeHand (J), and all documents and page layouts were created with QuarkXPress (J). The video images were captured with Canon Hi-8 8mm video camcorder and MASS microsystems Quickimage 24 video capture board, and modified with Adobe Photoshop™ (J).

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# **CHAPTER 1**

# **PRODUCT INFORMATION**

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#### I. FEATURES

#### 1. High-speed printing

The controller of this printer has equipped Intel i960HD processor that enables a print speed of up to 24 pages per minute. (A4-size paper, or letter size paper).

#### 2. Superior image quality

High resolution printing at 600 x 600 dpi (dots per inch) is further enhanced with AIR(Automatic Imaging Refinement) technology to smooth jagged edges, and the use of super fine toner.

#### 3. Auto-duplexing

The optional duplex unit enables the printer to conduct automatic duplexing.

#### 4. Large-volume continuous printing

By mounting the optional paper deck, the paper handling capacity is raised by 2,000 sheets (75g/m²). As a result, the upper/lower cassettes, multi-purpose tray, and paper deck together can accommodate a total of 3,100 sheets (75g/m²) for large-volume continuous printing.

#### 5. 5-way paper feeding (including options)

The addition of the optional paper deck and optional envelope feeder to the standard-equipped multi-purpose tray and upper/lower cassettes results in 5-way paper feeding capability.

#### 6. Memory saving technology

Memory reduction technology accomplishes 600 x 600 dpi printing with only 4 MB of memory. Complex data is compressed.

#### 7. Energy saving and ecology

The printer conserves electricity by automatically reducing power consumption when it remains idle for a specified length of time. The printer then returns to full power after a button of control pane is pressed or print job is started.

To save toner the economy mode can be selected to print rough drafts with less toner.

#### 8. Automatic interface switching

In addition to the standard-equipped bi-directional parallel interface (Centronics specifications), the printer has been equipped with expansion port which enables network board to be installed. And, data sent from the host computer is automatically switched among both interfaces no matter which interface port it enters.

#### 9. Automatic emulation switching

This printer supports Hewlett-Packard's enhanced PCL5 printer language. When the optional Canon Translator module A4(an add-in ROM) is installed, the printer also supports Adobe PostScript Level 2. The printer can sample the print data as it is received and then automatically switch between the PCL and PostScript personalities.

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## II. SPECIFICATIONS

A. Printer

1. Printer engine

Type Desktop page printer (console type when paper deck is installed)

Printing method Electrophotography

Printing speed (Note 1) About 24 pages/min. (A4)

About 13 pages/min. (A3)

First print time (**Note 2**) 18.9 sec. or less (A4)

Wait time (**Note 3**) 80 sec. or less (100V, 220V)

60 sec. or less (120V, 240V)

Scanning pitch

Horizontal 600 DPI Vertical 600 DPI

Image formation system

Laser Semiconductor laser

Scanning system Six-faced prism mirror scanning

Photosensitive

Drum OPC

Charging Roller charging Exposure Laser scanning system

Toner Magnetic single-component dry toner Development Toner projection development system

Toner supply By EP-W cartridge replacement (about 15,000 A4-sized prints; with

image density set in the middle and 4% dot density)

Transfer Roller transfer

Separation Curvature/discharge bias

Cleaning Blade

Fixing Heated rollers (500W x 2)

Paper pick-up Multi-purpose tray, upper cassette, lower cassette, envelope feeder

(option), paper deck (option)

Print paper Plain paper, coloured paper, labels, OHT, envelopes

Paper sizes

Multi-purpose tray 98.4mm (W) x 190.5mm (L) ~ 297mm (W) x 432mm (L) plain paper

(64g/m<sup>2</sup>~128g/m<sup>2</sup> recommended paper), above-mentioned paper

Upper cassette B4, A4, Legal, Letter-sized plain paper (64g/m<sup>2</sup> ~ 105g/m<sup>2</sup>

recommended paper), coloured paper

Lower cassette A3, B4, A4, Ledger, Legal, Letter-sized plain paper (64g/m<sup>2</sup> ~ 105g/m<sup>2</sup>

recommended paper), coloured paper

Multi-purpose tray

capacity 10mm stack (about 100 sheets of 75g/m² paper) Cassette capacity 50mm stack (about 500 sheets of 75g/m² paper)

Cassette types

Upper cassette Universal (accommodates B4, A4, Legal, Letter sizes)

Lower cassette Universal (accommodates A3, B4, A4, Ledger, Legal, Letter sizes)

Print delivery Face-down/face-up

Print tray capacity

Face-down About 500 sheets (75g/m² paper) Face-up About 100 sheets (75g/m² paper)

Duplexing

Auto-duplexing When duplex unit (option) is installed, and plain paper only  $(64g/m^2 \sim$ 

105g/m<sup>2</sup> recommended paper)

Manual duplexing Plain paper  $(64g/m^2 \sim 128g/m^2 \text{ recommended paper})$  on multi-purpose

(Note 4)

Environment

10 - 32.5°C Temperature Humidity 20 - 80% RH

Air pressure 746 - 1013hPa (560 - 760mmHg)

Power consumption Max. about 1.3kW or less (20°C room temperature, rated voltage)

Noise level (Officially

announced level based 6.5B or less (printing) Sound power level (1B=10dB)

5.2B or less (standby) on ISO 9296)

Sound pressure level 52dB or less (printing) (Bystander position) 38dB or less (standby)

Dimensions 566 (W) x 563.5 (D) x 540 (H) mm

Weight About 48kg (without EP-W cartridge), about 3kg (cartridge)

Line voltage

requirements  $100 - 120V (\pm 10\%), 50 - 60Hz(\pm 2Hz)$ 220 - 240V (-10% +6%),50 - 60Hz(±2Hz)

**Options** Duplex unit, paper deck, envelope feeder

**Notes:** 1. At a room temperature of 20°C with rated voltage input.

2. When the printer is in READY state at a room temperature of 20°C, the time from reception of the PRINT signal from the video controller until an A4-sized print is delivered.

3. At a room temperature of 20°C with rated voltage input, the time from turning ON the printer until the end of the WAIT period.

**4.** When manual duplexing, correct the curl of the print delivered in the face-down tray before setting it in the multi-purpose tray.

2. Video Controller

CPU RISC processor (Intel A80960HD-66 66MHz)

Memory (RAM) 4 MB (Expandable to 96 megabytes in total with optional RAM SIMM)

ROM DIMM Slots 2 RAM SIMM Slots 3

Host interface Standard: IEEE1284 compliant parallel

Option: Expansion interface (LocalTalk, Ethernet, Token Ring)

Translators Standard: Enhanced PCL5

Option: Adobe PostScript Level 2

Internal fonts 45 Scalable fonts (35 Intellifont typefaces, 10 TrueType typefaces)

6 Bitmap fonts

Scaler USFT (Universal Font Scaling Techology by Agfa, Miles Inc.)

<Internal fonts>
• Bit Map Fonts

#### **Table 1-2-1**

| Type face   | Pitch (CPI) | Size (Points) | Style   | Stroke<br>weight | Remarks   |
|-------------|-------------|---------------|---------|------------------|---|
| Lineprinter | 16.66       | 8.5           | Upright | Medium           | Separate internal fonts are provided for portrait landscape orientations. |

#### Scalable Fonts

**Table 1-2-2** 

|     |        | It is possible to print both               |
|-----|--------|--|
| Sca | alable | portrait<br>and landscape<br>orientations. |
|     |        |  |
|     |        |  |

Specifications are subject to change with product modification.

#### **B.** Options

#### 1. Envelope feeder (Envelope Feeder EF-9)

Feeding speed About 16 envelopes/min.

Envelope types COM-10, DL, Monarch, C5, B5 ISO-typed envelope (90g/m<sup>2</sup>

recommended paper)

Capacity 73mm stack or 100 envelopes Dimensions 368 (W) x 320 (D) x 140 (H) mm

Weight About 3kg

Power supply DC24V (supplied from the printer)

#### 2. Duplex unit (Duplex Unit TP-9)

Feeding speed About 19 sheets/min. (A4)

Paper types A3, A4, B4, B5 JIS, Ledger, Legal, Letter, Executive-sized plain paper

 $(64g/m^2 \sim 105g/m^2 \text{ recommended paper})$ 

Dimensions 379 (W) x 423 (D) x 82 (H) mm

Weight About 3kg

Power supply DC24V (supplied from the printer)

### 3. Paper deck (2,000 Sheet Paper Deck PD-9)

Feeding speed About 24 sheets/min. (A4), about 13 sheets/min. (A3)

Paper types A3, A4, B4, Ledger, Legal-sized plain paper (64g/m<sup>2</sup> ~ 105g/m<sup>2</sup>

recommended paper)

Capacity Stacking height of 200mm (accommodates about 2,000 sheets of 75g/m<sup>2</sup>

paper)

Power consumption Max. about 75W or less (20°C room temperature, rated voltage)

Dimensions 629 (W) x 520 (D) x 651 (H) mm

Weight About 30kg

Line voltage

requirements  $100 - 120V (\pm 10\%), 50 - 60Hz(\pm 2Hz)$ 

 $220 - 240V (-10\% + 6\%), 50 - 60Hz(\pm 2Hz)$ 

#### 4. Option controller

CPU NEC UPD784020GC-3B9

Memory (RAM) 512 bytes Frequency 25MHz

EPROM TEXAS INSTRUMENTS TMS27C512-12JL

Memory (ROM) 64Kbytes

SRAM SAMSUNG KM62256CLG-7L

Memory 32Kbytes

Specifications are subject to change with product modification.

## III. A SAFETY INFORMATION

#### A. Laser Safety

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

Since the laser beam can injure the eye if it strikes it, be sure not to disassemble the laser/scanner unit. It cannot be adjusted in the field, anyway.

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



**Figure 1-3-1** 

#### **B.** Toner Safety

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

If toner adheres to your skin or clothes, remove as much of it as possible with a dry tissue, 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  $(O_3)$  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.

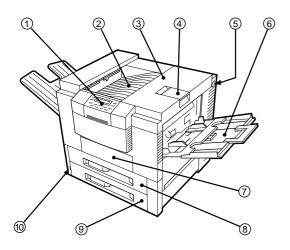
#### **D.** Power Supply Unit Safety

Care is needed as even though the printer switch may be OFF, there is a possibility that a current may still flow on the primary side. Be sure to remove the power plug before disassembly and assembly of this printer.

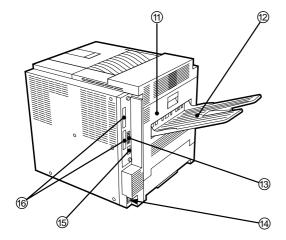
## IV. PARTS OF THE PRINTER

#### A. External Views

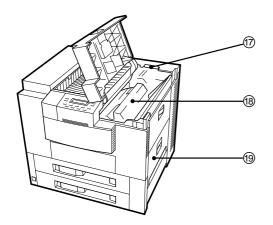
#### 1. Printer



**Figure 1-4-1** 



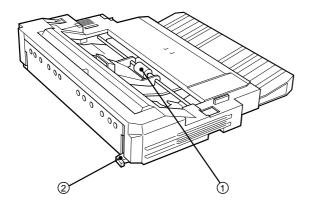
**Figure 1-4-2** 



**Figure 1-4-3** 

- 1: Operation panel unit
- 2: Face-down tray
- 3: Upper cover
- 4: Delivery stopper
- 5: Test print switch
- 6: Multi-purpose tray
- 7: Duplex unit door
- 8: Upper cassette
- 9: Lower cassette
- 10: Power switch
- 11: Delivery cover
- 12: Face-up tray
- 13: Parallel interface connector
- 14: Power receptacle
- 15: Connector for option interface (option)
- 16: Expansion board slots
- 17: Cleaning brush
- 18: EP-W cartridge
- 19: Pick-up unit door

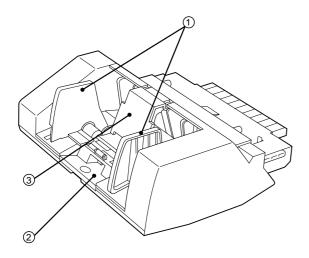
# 2. Duplex unit



**Figure 1-4-4** 

- Duplexing feed roller
   Duplex unit removal lever

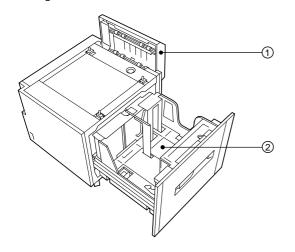
## 3. Envelope feeder



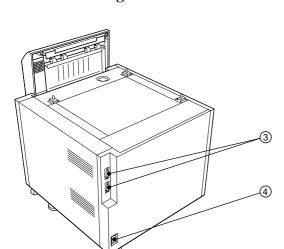
**Figure 1-4-5** 

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

# 4. Paper deck



**Figure 1-4-6** 

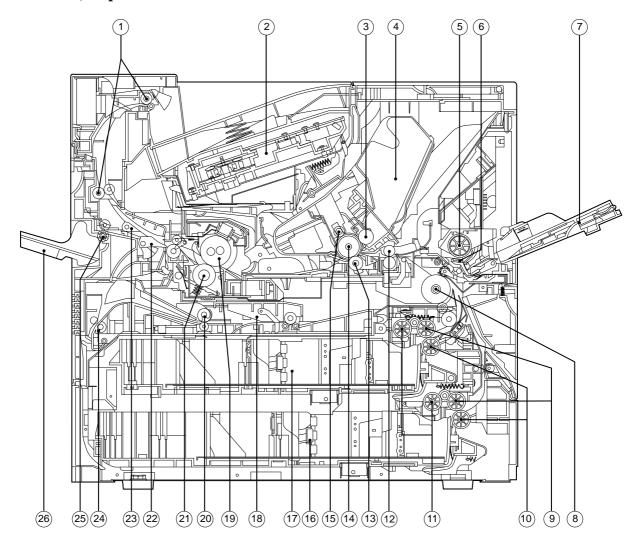


**Figure 1-4-7** 

- 1: Feed cover
- 2: Tray
- 3: Interface connectors
- 4: Power receptacle

#### **B.** Cross Sectional Views

#### 1. Printer, Duplex unit

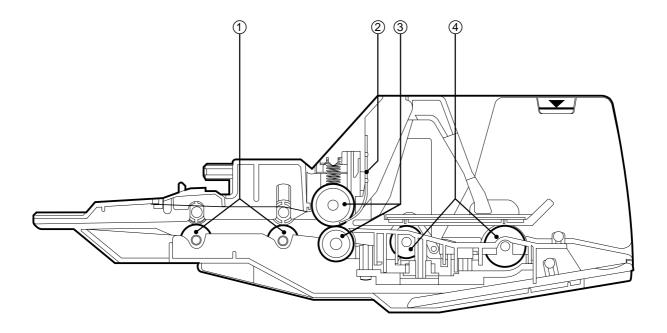


**Figure 1-4-8** 

- 1: Delivery roller
- 2: Laser/scanner unit
- 3: Developing cylinder
- 4: EP-W cartridge
- 5: Manual feeding pick-up roller
- 6: Separation pad
- 7: Multi-purpose tray
- 8: Feed roller 1
- 9: Feed roller 2
- 10: Separation roller
- 11: Pick-up roller
- 12: Registration roller
- 13: Transfer charging roller

- 14: Photosensitive drum
- 15: Primary charging roller
- 16: Lower cassette
- 17: Upper cassette
- 18: Duplexing unit (option)
- 19: Fixing upper roller
- 20: Duplex feed roller (Duplexing unit)
- 21: Fixing lower roller
- 22: Duplex deflector
- 23: Face-up deflector
- 24: Switchback roller (Duplexing unit)
- 25: Face-up delivery roller
- 26: Face-up tray

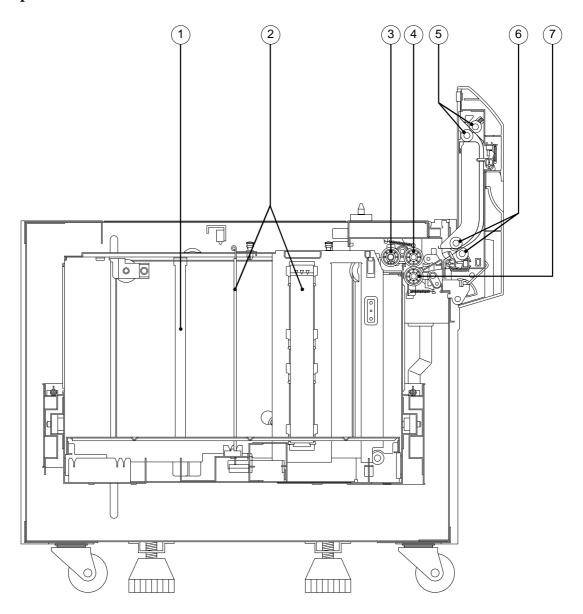
# 2. Envelope feeder



**Figure 1-4-9** 

- 1: Feed rollers
- 2: Separation guide3: Separation rollers
- 4: Pick-up rollers

# 3. Paper deck



**Figure 1-4-10** 

- 1: Deck
- 2: Paper guides3: Pick-up roller
- 4: Feed roller 1
- 5: Feed roller 2
- 6: Registration rollers7: Separation roller

## V. INSTALLATION

#### A. Notes

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 passes 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 conditions at the installation location.

#### 1. Power supply

Use the following power supplies:

• Line voltage (AC):  $100 - 120V \pm 10\%$ 

220 - 240V -10% +6%

• Power frequency: ±2Hz rated frequency

#### 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), without condensation

• Cool, well-ventilated space

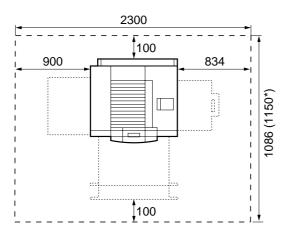
#### Do not install in the following locations:

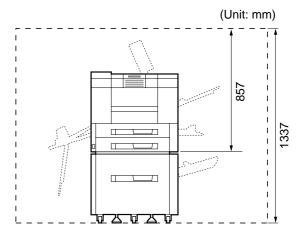
- Exposed to direct sunlight
- If you cannot avoid such a location, hang heavy curtains, etc., to shut out the direct sunlight.
- Near magnets and devices that emit a magnetic field
- Areas with vibration
- Dusty places
- · Near fire or water

#### 3. Installation space

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

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





\*When paper deck is installed to printer.

Required space surrounding the printer with the paper deck installed (option)

**Figure 1-5-1** 

#### C. Unpacking and Installation

Condensation will form on metal surfaces when brought into a warm room from the cold. Therefore, when moving the printer to a warm environment, leave it packed in its box for at least an hour to acclimatize to room temperature.

#### 1. Printer

- 1) Open the printer packaging.
- 2) Take out the accessories. Confirm that the power cord, cartridge, and face-up tray are included.
- 3) The printer weighs approx. 48kg, therefore 4 people may be needed to lift the printer and to move to the installation area.
- 4) Take the plastic bag off the printer and peel the tape off each part. Check that none of the covers were scratched or deformed during shipment.
- 5) Open the delivery cover, and remove the pressure release spacer from the fixing unit.
- 6) Open the upper cover, and remove the tape and the packing materials from inside the printer.
- 7) Pull the two cassettes out of the printer and remove the packaging from the cassette.

#### 2. Cartridge

- 1) Open the bag holding the cartridge and take out the cartridge.
- 2) Remove the tape and the black sheet from the printer.
- 3) Hold the cartridge on each side as shown in figure 1-5-7 and slowly rock it 5 to 6 times to evenly distribute the toner.
- 4) 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 and gently pull out the cylinder tape.
- 5) Open the upper cover of the printer, and load the cartridge with both hands. Slowly insert it until it firmly contacts with the back of the slot.

#### 3. Envelope feeder

- 1) Open the envelope feeder packaging.
- 2) Take off the plastic bag and peel the tape off.

  Check that none of the covers have been scratched or deformed during shipment.
- 3) Remove the packing from the envelope feeder.
- 4) Open the multi-purpose tray and remove the envelope feeder slot cover.
- 5) Holding the envelope feeder in both hands, install it into the printer.

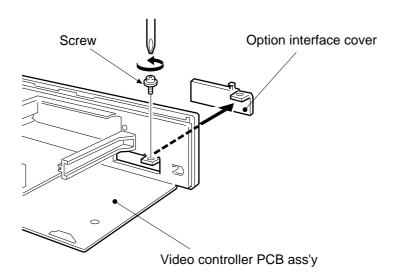
#### 4. Duplex unit

- 1) Open the duplex unit packaging.
- 2) Take off the plastic bag and peel the tape off.
- 3) Remove the packing from the duplex unit.
- 4) Open the delivery cover on the printer.
- 5) Holding the duplex unit in both hands, install it into the printer.

#### 5. Option controller

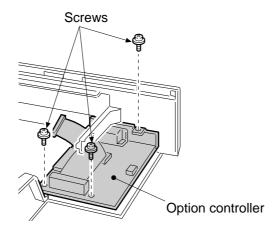
**Note:** Discharge electrical static from your body by touching the metal frame of the printer prior to installing the PCB in order to avoid causing damage by the difference in static charge at that time.

- 1) Open the option controller packaging.
- 2) Remove the plastic bag from the optional controller.
- 3) Loosen the 2 screws on the back of the printer and pull out the PCB.
- 4) Remove the screw holding the option interface cover of the PCB.



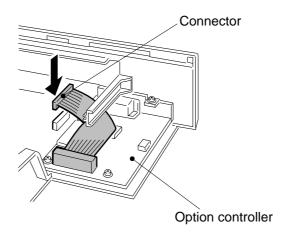
**Figure 1-5-2** 

- 5) Insert the option controller as shown below.
- 6) Set the option controller with the 3 supplied screws.



**Figure 1-5-3** 

7) Insert a connector.



**Figure 1-5-4** 

8) Insert the PCB to the printer and tighten the 2 screws.

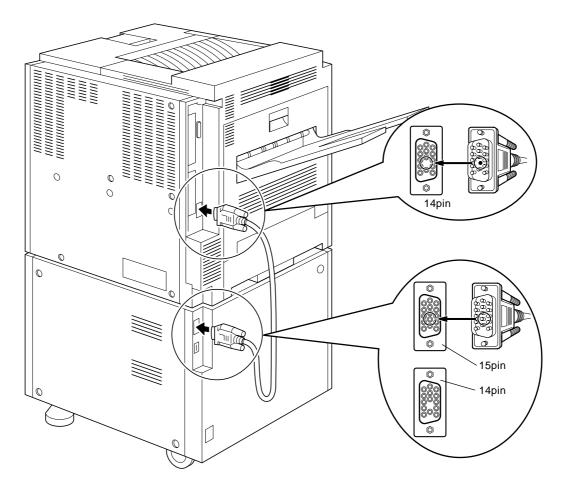
#### 6. Paper deck

#### a. Opening the packaging

- 1) Open the paper deck packaging and remove the box.
- 2) Take out the accessories. Confirm that the power cord, manuals and interface cable are included.
- 3) Remove the top pads (left/right) and remove the paper deck from the box.
- 4) Take off the plastic bag surrounding the paper deck and peel off the tape holding the various parts. Confirm that none of the covers were scratched or deformed during shipment.
- 5) Open the feed cover and remove the 2 spacers.
- 6) Open the deck and peel the tape off.
- 7) Peel off the tape holding the latch of the paper guide.

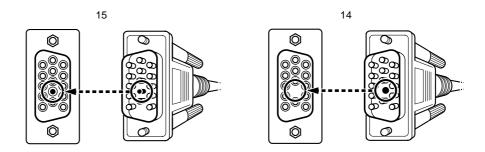
#### b. Installation

- 1) Carry the paper deck to the installation location and lock the casters.
- 2) Rotate the 4 adjusters to install it on the floor.
- 3) Open the feed cover.
- 4) Align the paper deck and the printer in the same direction, and have 4 people lift the printer. Lower the printer onto the paper deck while aligning the 3 locating pins on the paper deck.
- 5) Close the feed cover.
- 6) Connect the paper deck and the printer with an interface cable.



**Figure 1-5-5** 

**Note:** Be aware that connectors on the both ends of the interface connector differ in shape, 15-pin and 14-pin, as shown below.



**Figure 1-5-6** 

7) Plug the power cord into the paper deck and the outlet.

#### 7. Operation confirmation

- 1) Load paper in the lower cassette.
- 2) Insert the power plug into the outlet and the printer, then turn the power switch ON. After the printer enters STANDBY mode, press the test print switch to make a test print. Check that the density of the output image is correct
- 3) Clean around the printer and ensure that it is ready for use at anytime.

#### 8. Operation precautions

- 1) Turn on the power of external equipment then the printer. Turn the power off in the reverse sequence. If the power of external equipment is turned on/off while the printer is on, noise may be transmitted through the connection cable between the external equipment and the printer, and error may occur on the printer.
- 2) Turn off the power of both the printer and the external equipment before plugging/unplugging the connector between the two. Doing so while the power is on could cause malfunctions.
- 3) The power of the printer shall be turned off before attaching/removing the expansion RAM SIMM and expansion ROM DIMM (options).
- 4) Use a shielded cable for connecting the printer and the external equipment. Parallel interface cable shall be a maximum of 3 meters.

#### D. Storing, Handling the EP-W 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 Storage temperature and humidity conditions

| Normal (total storage time x 9/10) |                                    |      | 0 to 35°C                            |
|------------------------------------|------------------------------------|------|--------------------------------------|
| Temperature                        | Severe (total storage              | High | 35 to 40°C                           |
| Tel                                | time x 1/10)                       | Low  | −20 to 0°C                           |
| Temperature change (within         |                                    |      | 40°C →15°C                           |
|                                    | 3 minutes or so)                   |      | –20°C →25°C                          |
| Relative humidity                  | Normal (total storage time x 9/10) |      | 35 to 85% RH                         |
| ive hu                             | Severe (total storage              | High | 85 to 95% RH                         |
| Relat                              | time x 1/10)                       | Low  | 10 to 35% RH                         |
| Air pressure                       |                                    |      | 345 to 1013 hPa<br>(460 to 760 mmHg) |
|                                    | Total storage time                 |      | 2 years<br>6 months                  |

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

#### 2. After unsealing the box

As an organic photoconductor (OPC) is used in the photosensitive drum, it will deteriorate if exposed to strong light. As there is 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 aluminum bag.
- 2) Avoid locations exposed to direct sunlight, near windows, etc. Do not leave them in cars for any extended period of time as heat can damage the cartridges.
- 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.

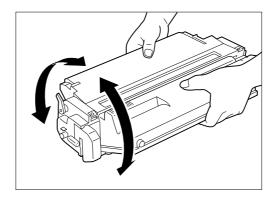
- 6) Do not leave cartridges near CRT displays, disk drives or floppy disks.
- 7) Store the cartridges out of reach of children.

#### b. Effective life

Cartridges are valid for 2.5 years following the date of manufacture, which is displayed in an abbreviated form on the cartridge. The cartridge life span (month, year) is also displayed on both the printer box and 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 valid period.

#### 3. Handling

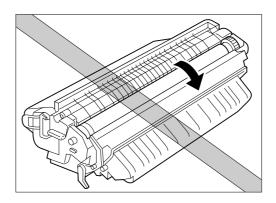
1) When loading a new cartridge into the printer, or when the toner in an already loaded cartridge hardens and blank spots appear on output images, hold the cartridge at each end as shown in the below figure and slowly rock it about 45Þ in each direction 5 to 6 times. This will evenly distribute the toner, and then reload it into the printer. Do not shake the cartridge in any other way, as toner may leak from the developing cylinder or the cleaning unit.



**Figure 1-5-7** 

To ensure that toner does not leak and dirty the images, be sure to print 3 to 5 pages of test patterns after loading the cartridge in the printer.

- 2) When transporting the printer, remove the cartridges. Either insert the cartridge in the aluminum bag or wrap it in a thick cloth to ensure light does not penetrate it.
- 3) Do not leave the cartridge near CRT displays, disk drives, or floppy disks. The magnetism generated by the cartridge may destroy their data.
- 4) As the photosensitive drum is sensitive to strong light, do not expose the cartridge to direct sunlight or strong light (1500 lux or more). If it is exposed to strong light, blank spots or black lines may appear on images.
  - Should this happen, temporarily turn OFF the printer. The distorted images such as blank spots or black lines are likely to disappear. However, if the drum was exposed to strong light for a long period of time, it is possible the black lines, etc., will remain.
- 5) Never open the photosensitive drum protective shutter by hand. Do not touch the drum surface with your bare hand. If you accidentally dirty the drum surface, wipe it with a flannel cloth and toner. Do not dry-wipe it or clean it with solvents.
- 6) Do not place the cartridge on its end or upside down. Always place it with the label side facing upward.
- 7) Do not disassemble the cartridge.



**Figure 1-5-8** 

**Note:** If light (1500 lux) is exposed to the drum for 5 minutes, and it is left in a dark area for 5 minutes, it will recover to a normal state and will be no effect on prints. However be sure to not expose it to direct sunlight. The strength of sunrays are about 10000 lux to 30000 lux

# VI. MAINTENANCE AND SERVICING BY THE CUSTOMER

The customer should do the following maintenance to maximize printer performance.

**Table 1-6-1** 

| Item                | Customer maintenance   |
|---------------------|--|
| Cartridge           | Rock the cartridge to redistribute toner. If necessary relace it.                    |
| Transfer guide area | When replacing the cartridge, clean the transfer guide area with the soft dry cloth. |
|                     | Transfer charging roller  Transfer guide (metal part)                                |
| Static charge       | When replacing the cartridge, clean the static charge eliminator with                |
| eliminator          | the green cleaning brush in the printer.   |
|                     | Transfer charging roller   |
|                     | Static charge eliminator   |

**Table 1-6-2** 

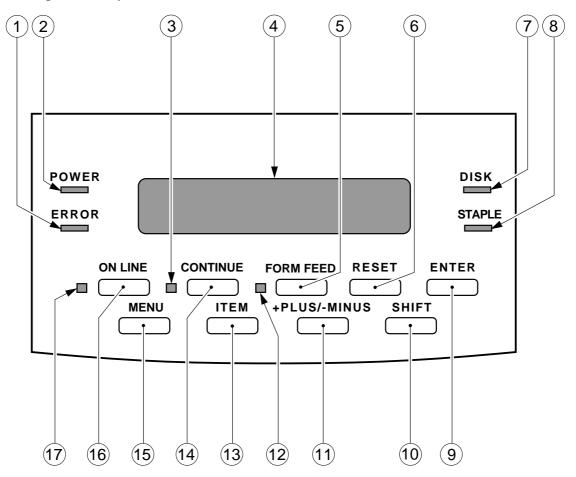
| Item                | Customer maintenance  |
|---------------------|---|
| Registration roller | When replacing the cartridge, clean the registration roller area with |
| area                | the soft dry cloth.   |
|                     |   |

# 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, eight indicator lights, and seven menu and operation keys.



**Figure 1-7-1** 

#### • ERROR indicator: 1

#### On:

An error has occurred and printing has stopped. Check the display for a message describing the problem.

#### Off:

Operation is normal and there is no error.

#### · POWER indicator: 2

#### On:

The printer is ready to print.

# Flashing:

The printer is warming up. Wait until the light stays on before you start printing operations.

#### Off:

The printer cannot print.

#### · CONTINUE indicator: 3

#### On:

Indicates the CONTINUE button may be pressed to exit current condition. For instance, if the message TONER LOW appears in the display panel, press CONTINUE to continue printing but be sure to change the toner as soon as possible.

#### Off:

Operation is normal.

# · Status indication display: 4

The two-line, 20-digit display tells you what is happening inside the printer and shows you the menus and settings which can be changed. The display keeps you informed about the printer's operation status, lets you make menu selections, warns you about problems and identifies errors.

#### · FORM FEED key: 5

Performs a FORM FEED and prints data remaining in the FORM printer. If the FORM FEED indicator is on, data remains in the printer (only with PCL). Press ON LINE to take the printer off-line. Press FORM FEED to print the remaining data.

### · RESET key: 6

Accesses the RESET menu so you can select RESET PRINTER or RESET MENU. If you choose RESET PRINTER all resources in the memory (soft fonts, macros, stored page data, and so on) are erased, but the menu items selected are unaffected. If you choose RESET MENU the factory default values are restored for most menu items.

#### · DISK indicator: 7

#### On:

The disk is being accessed (for fonts, etc.).

#### Off:

The disk is not being accessed.

#### · STAPLE indicator: 8

#### On:

Stapling has been selected for the current print job.

#### Off:

Stapling has not been selected.

### • ENTER key: 9

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

# · SHIFT key: 10

Press SHIFT and another key to access the alternate function of dual-function keys. The two functions on dual function keys are separated by a slash in the key name on the printer control panel.

# · +PLUS/-MINUS key: 11

With an item name displayed, press to +PLUS/-MINUS step through the item's values. Press and hold down SHIFT then press +PLUS/-MINUS to step through the values in reverse order. Some item have a large range of numbers from which to choose a value. For example, for COPIES you can set a value from 1 to 999. In this case, to rapidly step through the values, press and hold down +PLUS/-MINUS.

#### · FORM FEED indicator: 12

#### On

Indicates that a page is currently being composed in the printers memory. To print the page before it is completed, take the printer off-line and press the FORM FEED key.

#### Off:

No print data is currently stored in the printer's memory.

### · ITEM kev: 13

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.

#### · CONTINUE kev: 14

Restarts printing after the printer displays a message and halts printing. For most situations after you press CONTINUE, the message clears and printing resumes.

When the multi-purpose tray is used as a manual feed station (when MANUAL FEED=ON), you have to press the CONTINUE key every time you need to feed a single sheet of paper.

# · MENU key: 15

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.

# · ON LINE key: 16

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

#### · ON LINE indicator: 17

#### On:

The printer is on-line (power on, warmed up, and ready to receive data from the host computer for printing). Before you begin a print job, always check this indicator is on.

# Flashing:

The printer is processig a print job. Do not turn the power off, otherwize you may lose print data.

# Off:

The printer is off-line. You can now use the printer control panel keys to view and change settings. When off-line, the printer cannot accept data for printing.

# **B.** Operation Panel Menus

You can access the following menus though the operation panel:

- PCL MENU
- · PS MENU (Note 1)
- FEEDER MENU
- · CONFIG MENU
- MEMCONFIG MENU (Note 1)
- · PARALLEL MENU
- · LOCALTALK MENU (Note 2)
- ETHERNET MENU (Note 2)
- TOKEN RING MENU (Note 2)
- TEST MENU
- LANGUAGE MENU

**Notes: 1.** Menus that appear after the PostScript option has been installed.

**2.** Menus that appear after an option has been installed such as Network modules.

# 1. Accessing and selecting menu items

Follow these steps to access the menus and make selections:

- 1. Check the control panel and be sure the JOB indicator is off.
- 2. Press the ON LINE key to set the printer off-line. The ON LINE indicator goes off.
- 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 MENU key until you see the item.
- 5. Press the +PLUS/-MINUS key until you display the values you want to change.
- 6. If you want to change the setting, press the +PLUS/-MINUS key until the value you want is displayed. Then press the ENTER key.
- 7. Press the ON LINE key to set the printer on-line.

Table 1-7-1 list the Menu Operation Flow.

#### 2. Restoring the default settings

There are several types of default settings:

- 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.

#### 3. Resetting the default values

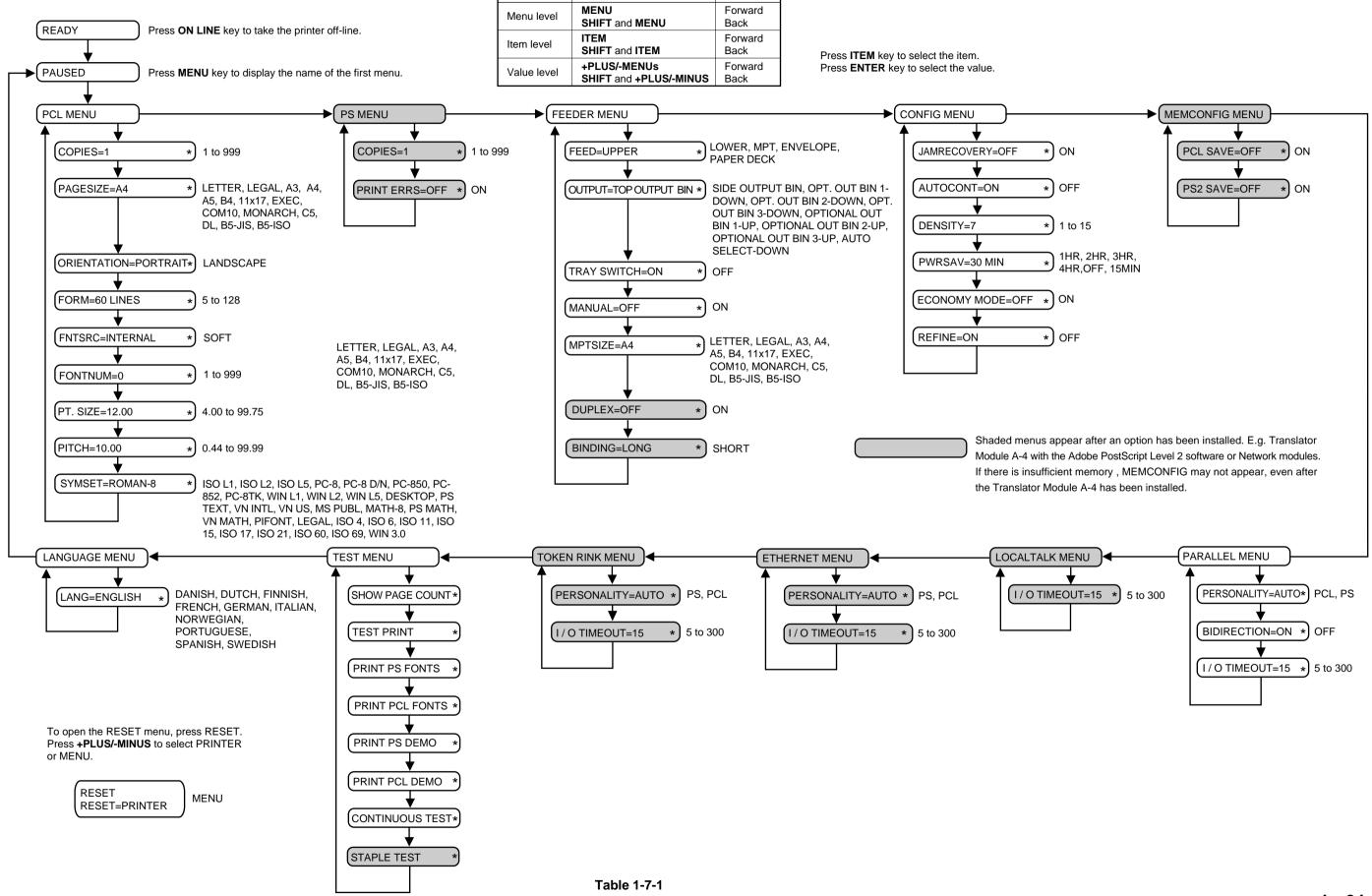
The printer can be reset in three ways:

■ The reset printer function clears the memory of all fonts, macros, and page information but does not affect the menu settings.

- The reset menu function performs a printer reset to clear all fonts, macros, and page information but returns some of the menu settings to their original factory defaults.
- A cold reset clears the memory and restores all menu settings to their factory settings with the exception of the page count value, multi-purpose tray page size, envelope feeder size, and display language.

To perform a cold reset, press and hold down the ON LINE key while you turn on the printer. The printer displays the message COLD RESET followed by WARMING UP. When the printer comes on-line, the factory default settings are restored.

# **Menus Operation Flow**



Press :

To move:

At:

# **CHAPTER 2**

# **OPERATION AND TIMING**

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

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

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

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

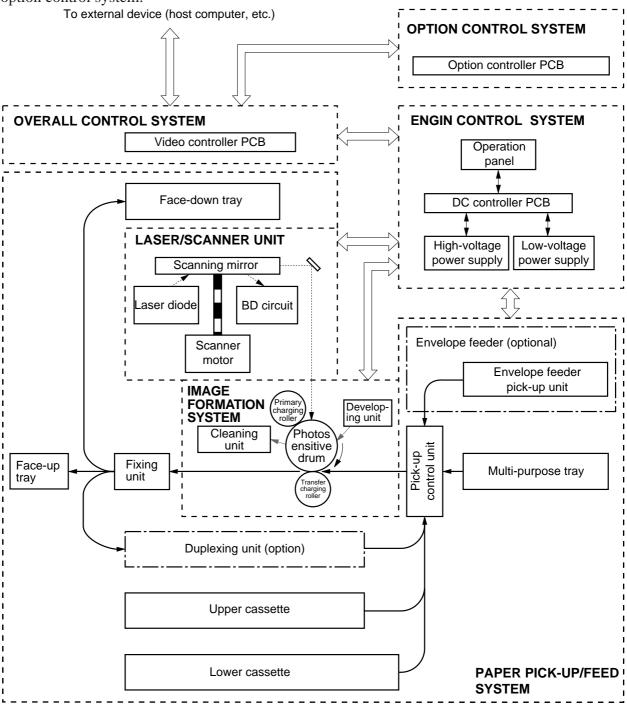
As it is assumed that no repair will be made to customer circuit boards, the explanation of board circuits is limited to an outline using block diagrams. So there are two types of circuit explanations; (1) everything from the sensor to the input sections of the major circuit boards, (2) everything from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

| I.   | BASIC OPERATION        | 2-1  | VI.   | OVERALL CONTROL SYSTEM | 2-60 |
|------|------------------------|------|-------|------------------------|------|
| II.  | ENGINE CONTROL SYSTEM  | 2-4  | VII.  | OPTION CONTROL SYSTEM  | 2-64 |
| III. | LASER/SCANNER SYSTEM   | 2-26 | VIII. | ENVELOPE FEEDER        | 2-67 |
| IV.  | IMAGE FORMATION SYSTEM | 2-32 | IX.   | DUPLEXING UNIT         | 2-71 |
| V.   | PICK-UP/FEED SYSTEM    | 2-42 | X.    | PAPER DECK             | 2-81 |

# I. BASIC OPERATION

#### A. Functions

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



**Figure 2-1-1** 

# **B.** Basic operation sequences

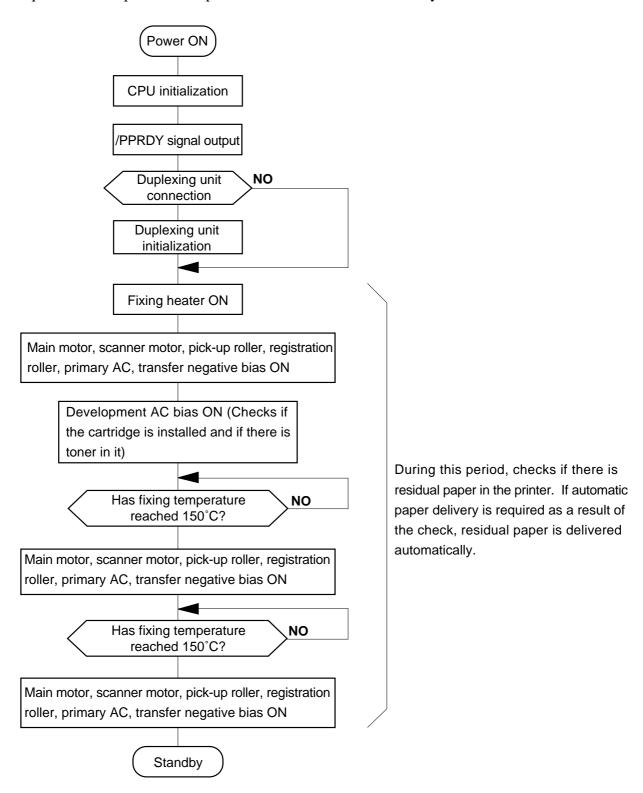
Operation sequences of the printer are controlled by the microcomputer on the DC controller PCB. Descriptions of each period from ON until the main motor stops are as shown below. See the appendix for timing chart.

**Table 2-1-1** 

|  | Period  | Purpose   | Remark  |
|--|---|---|---|
| WAIT<br>(WAIT<br>period)                 | From power-ON until the fixing roller temperature reaches 170°C. (Less than 80 sec.)  | Warms up the fixing rollers to put the printer in the standby mode. Cleans the transfer charging roller.                                    | During this period, the printer checks if the cartridge is installed and if there is toner in it.   |
| STBY<br>(STANDBY)                        | From the end of the WAIT period until a /PRNT signal is input from the video controller, or from the end of the LSTR period until a /PRNT signal is input from the video controller or until the power is switched OFF. | Maintains the printing temperature of the fixing roller so that the printer is ready to print.  | If the printer stays in the standby mode for longer than five hours, it drives the main motor for one second to rotate the fixing roller, to prevent it from deforming. |
| INTR<br>(INITIAL<br>ROTATIONS<br>period) | After the /PRNT signal has been input from the video controller until the scanner motor becomes ready (about 7 seconds).  | To stabilize the sensitivity of<br>the drum in preparation for<br>printing and to clean the<br>transfer charging roller.                    |   |
| PRINT (Print)                            | From the end of the INTR period until the primary DC voltage switches OFF.  | To form an image on the photosensitive drum according to the VDO signal input from the video controller and to transfer the image to paper. | During this period, the printer maintains the printing temperature of the fixing rollers.   |
| LSTR<br>(LAST<br>ROTATIONS<br>period)    | After the primary DC voltage turns OFF until the main motor stops.  | To deliver the final page and to clean the transfer charging roller.  | If a /PRNT signal is input<br>from the video controller,<br>the INITIAL ROTATIONS<br>period begins<br>immediately.  |

# C. Power on sequences

Sequences of the printer from power ON until it enters the standby mode are as shown below.



**Figure 2-1-2** 

# II. ENGINE CONTROL SYSTEM

# A. DC Controller circuit

#### 1. Outline

Operation sequences of the printer are controlled by the CPU of this circuit. When DC power is supplied from the power supply by turning ON the power switch of the printer and the printer enters the standby mode, the CPU outputs the signals that drive the loads such as laser diode, motors, and solenoids, based on the print start command and image data.

The layout of major ICs is shown by Figure 2-2-1, and block diagram, Figure 2-2-2.

# 2. Explanation of operations of each block

### a. CPU (IC201)

An 8-bit single chip microcomputer (HD6433388A79F) by Hitachi is used.

The CPU is a one-chip type in which ROM and RAM are built in, and controls the operation of the engine according to the control program stored in the ROM.

# b. Expansion I/O (IC203)

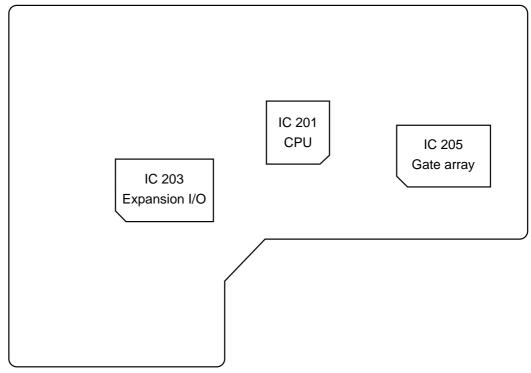
Its functions are to control:

- 1) each sensor,
- 2) each motor,
- 3) each solenoid, and
- 4) each clutch.

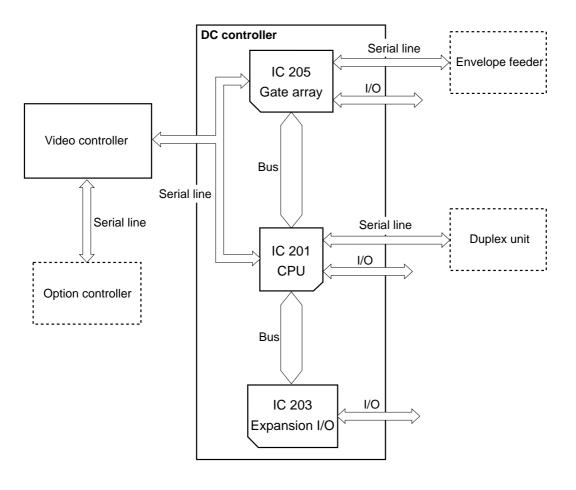
# c. Gate array (IC205)

Its functions are to:

- 1) control the laser/scanner,
- 2) control the video interface, and
- 3) communicate with the envelope feeder.

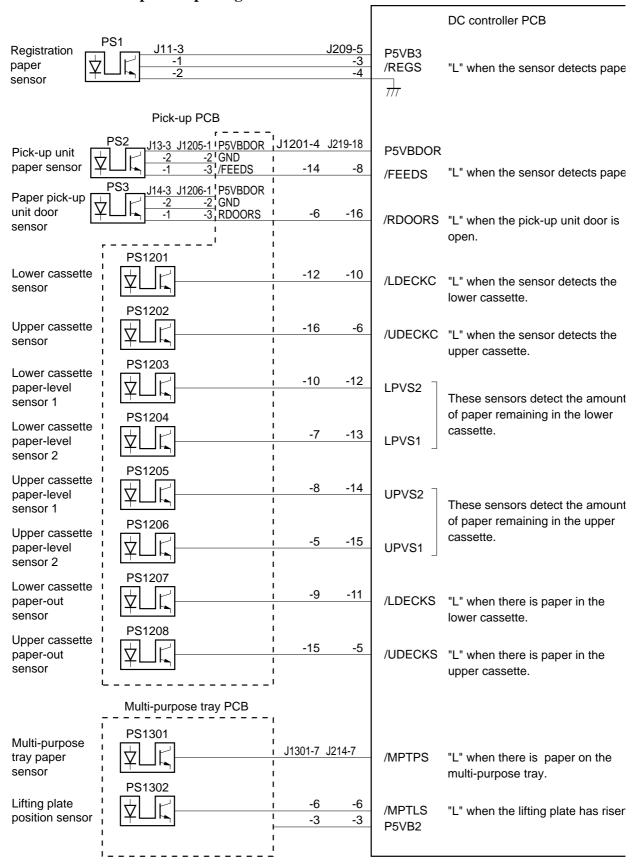


**Figure 2-2-1** 

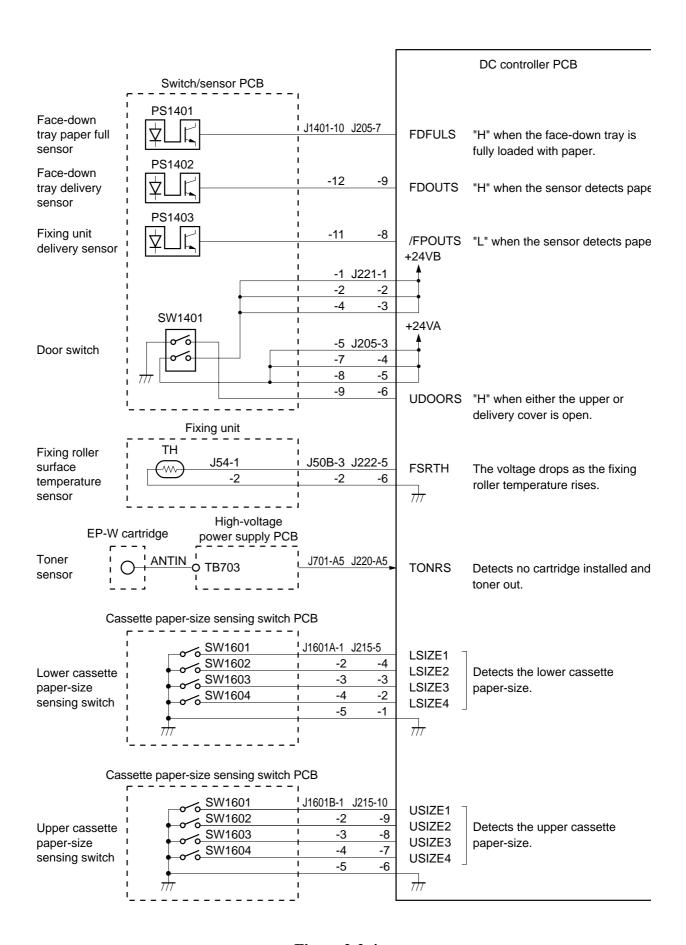


**Figure 2-2-2** 

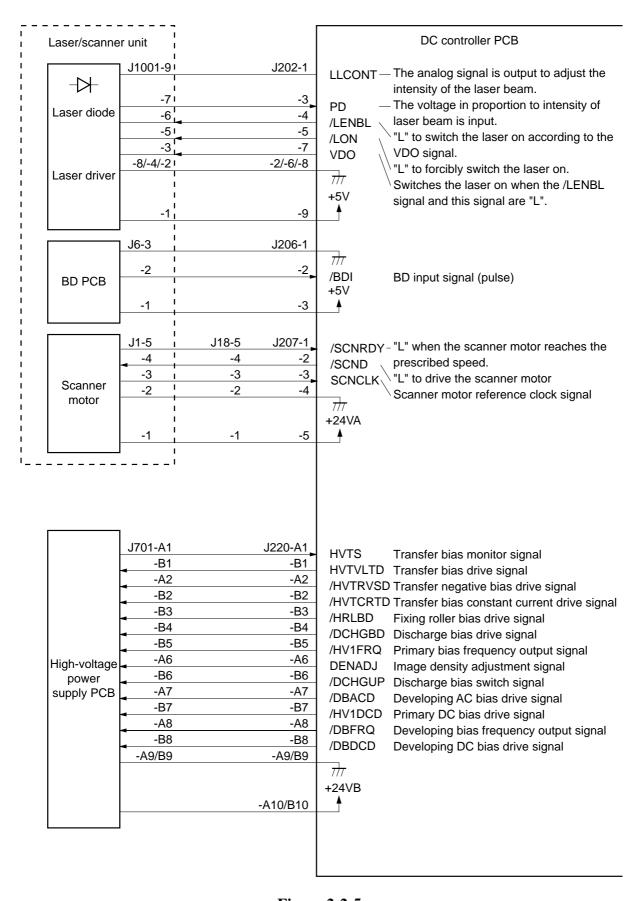
# 3. DC Controller Input/Output Signals



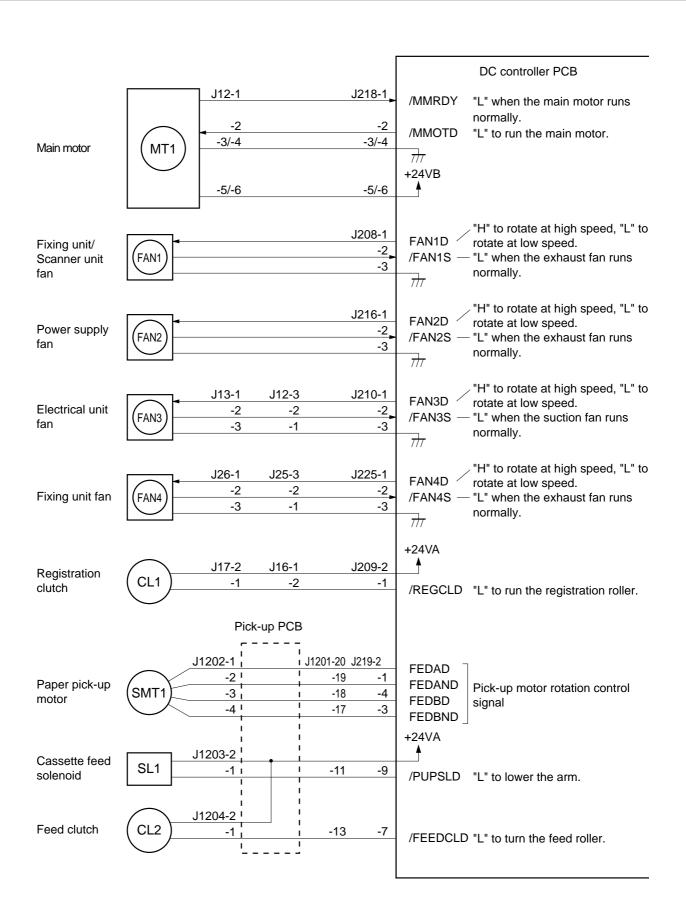
**Figure 2-2-3** 



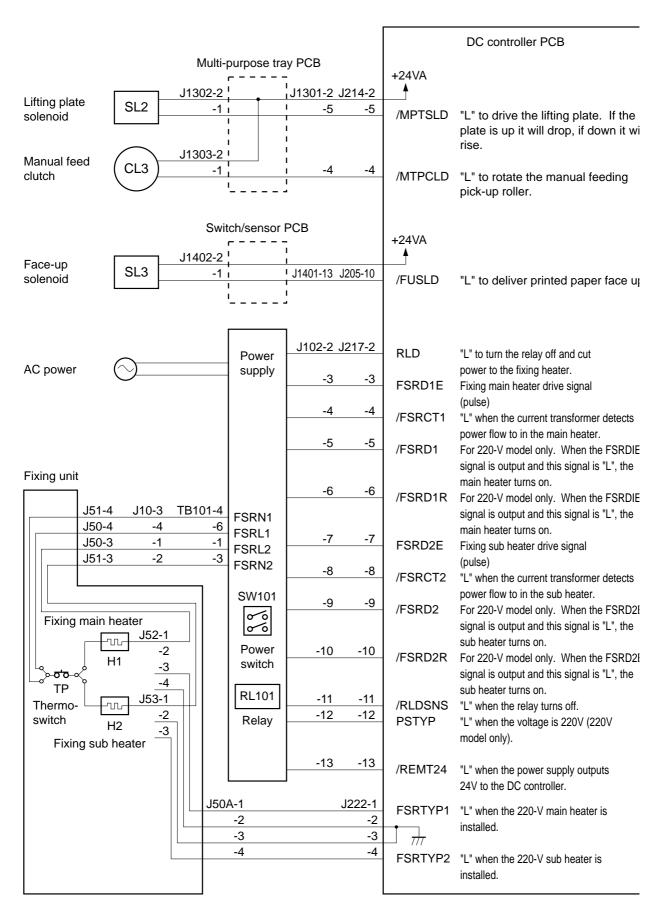
**Figure 2-2-4** 



**Figure 2-2-5** 



**Figure 2-2-6** 



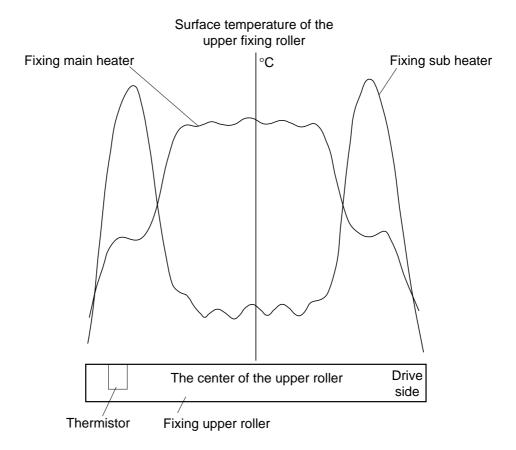
**Figure 2-2-7** 

### **B.** Fixing control

# 1. Fixing temperature control

The upper fixing roller contains two heaters: fixing main heater (H1: 500W) and fixing sub heater (H2: 500W). The fixing main heater heats the center of the upper roller, and the fixing sub heater heats both ends of the upper roller. The maximum power consumption is reduced by controlling the two heaters. Figure 2-2-8 shows the surface temperature distribution of the upper fixing roller.

The fixing roller heater for the 100V model of this printer is different from that to the 220V model.



**Figure 2-2-8** 

#### a. 100V model

The fixing temperature is detected by the thermistor (TH1) on the surface of the upper fixing roller. If the surface temperature rises, the TH1 resistance increases, and the voltage of the FIXING ROLLER TEMPERTURE SENSE signal (FSRTH) decreases.

Based on the FSRTH signal voltage, the microcomputer (CPU) on the DC controller controls the FIXING MAIN HEATER DRIVE signal (/FSRD1E) and FIXING SUB HEATER DRIVE signal (/FSRD2E) which maintain the surface temperature of the upper fixing roller at its correct value.

The CPU controls these signals according to the paper size, thickness, and the pick-up source. Table 2-2-1 lists the target temperatures of the upper fixing roller during waiting, standby, and printing.

**Table 2-2-1** 

|       |               |               | Target temperature (°C)         |  |  |
|-------|---------------|---------------|---------------------------------|--|--|
|       |               |               | Normal temper-<br>ature control | Initial warm-up temper-<br>ature control |  |
| WAIT  |               |               | 170                             | 180                                      |  |
| STBY  |               | 169 - 177     | 169 - 177                       |  |  |
|       | Cassette feed | A3/A4/B4 size | 190                             | 190                                      |  |
|       |               | Legal size    | 185                             | 185                                      |  |
| PRINT |               | Other size    | 180                             | 180                                      |  |
|       | Manual feed   |               | 190                             | 190                                      |  |

#### b. 220V model

The fixing temperature is detected by the thermistor (TH1) on the surface of the upper fixing roller. If the surface temperature rises, the TH1 resistance increases, and the voltage of the fixing roller temperature sense signal (FSRTH) decreases.

Based on the FSRTH signal voltage, the microcomputer (CPU) on the DC controller outputs the FIXING MAIN HEATER DRIVE signal (/FSRDIE) and then the FIXING SUB HEATER DRIVE signal (/FSRD2E).

When the FIXING MAIN HEATER DRIVE ENABLE signal (/FSRD1) or FIXING SUB HEATER DRIVE ENABLE signal (/FSRD2) is "L", the fixing roller heater drive circuit outputs the /FSRD1E or /FSRD2E signal to the fixing main heater or fixing sub heater.

The CPU controls these signals according to the paper size, thickness, and pick-up source. Table 2-2-1 lists the target temperatures of the upper fixing roller during waiting, standby, and printing.

#### 2. Protective function

The printer has a mechanism that check is that the rated voltage of the power supply matches the rated voltage of the fixing main heater and the fixing sub heater to prevent the installation of a wrong fixing unit. If they do not match, the DC controller regards them as different, stops the printer and reports it to the video controller.

The printer has three protection functions to prevent wrong activation of the fixing heater.

- The CPU monitors the thermistor voltage. If it is abnormal, the CPU identifies the fixing unit failure, and interrupts power to the fixing unit and reports it to the video controller.
- If the surface temperature of the upper fixing roller rises abnormally and the thermistor voltage falls below about 1.0V (230°C), the safety circuit in the power supply interrupts power to the fixing roller heater regardless of outputs from the CPU.
- If the surface temperature of the upper fixing roller rises abnormally and the thermoswitch temperature exceeds 200°C, the thermoswitch turns off and cuts power to the fixing roller heater.

### 3. Fixing unit failure detection

The CPU assumes a fixing unit failure in the following cases and reports it to the video controller.

# a. The rated voltage of the power supply is different to the rated voltage of the fixing roller heater.

The CPU checks the POWER SUPPLY TYPE SENSE signal (PSTYPE), FIXING MAIN HEATER TYPE SENSE signal (FSRTYP1), and FIXING SUB HEATER TYPE SENSE signal (FSRTYP2) when the power is turned ON, but finds that they do not match. For example, if a 100-V power supply is connected to a 220-V fixing unit, the CPU assumes that the rated voltage does not match.

#### b. Thermistor broken wire detection

The CPU detects that the thermistor voltage is 4.6V or more when the thermistor voltage detection mode (**note**) is in the error detection mode, after the fixing roller heater is activated.

#### c. Heater broken wire detection

The CPU detects even after the fixing roller heater has been activated, that the FIXING MAIN HEATER CURRENT SENSE signal (/FSRCT1) and FIXING SUB HEATER CURRENT SENSE signal (/FSRCT2) are "H".

#### d. Heater failure detection

The CPU detects that the FIXING MAIN HEATER TYPE SENSE signal (/FSRCT1) and FIXING SUB HEATER TYPE SENSE signal (/FSRCT2) are "L" when the power to the fixing roller heater is interrupted.

# e. Maximum temperature detection

The CPU detects that the thermistor detected temperature exceeds about 230°C during standby or printing.

#### f. Warmup error detection

The CPU detects this error if the fixing unit does not reach the target temperature (see table 2-2-1) within 180 seconds after warmup starts.

# g. Broken wire detection after the fixing unit is ready

The CPU detects whether the thermistor detected temperature is 150°C or less during standby or printing.

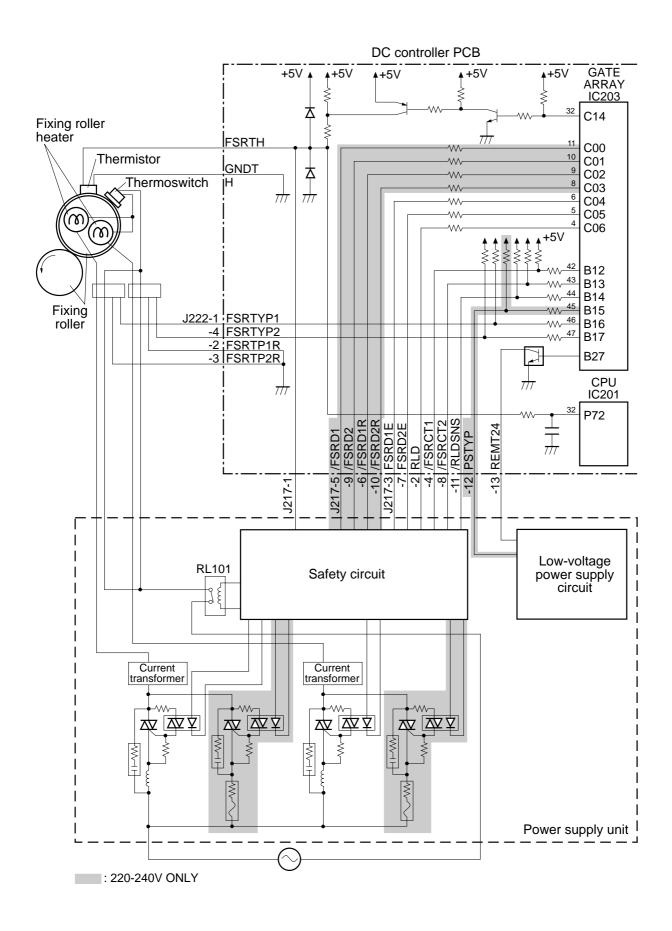
# h. Relay operation detection

The CPU monitors the relay detection signal (/RLDSNS) and detects that the relay has been cut by the operation of the safety circuit the power supply when the temperature of the thermistor exceeds 230°C.

**Note:** There are two thermistor voltage detection modes: error detection mode and normal mode. In the error detection mode, sensitivity in the initial range (low temperature range) is increased to improve detection accuracy. When the thermistor temperature exceeds 60°C, it changes to the normal mode.

If the CPU detects a fixing unit failure, it does the following:

- 1) Stops the fixing roller heater.
- 2) Sets the RELAY DRIVE signal (RLD) to "L", turns the relay in the power supply off to interrupt the power to the fixing roller heater.



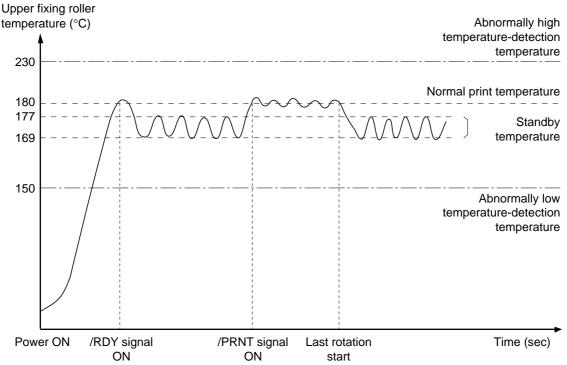
**Figure 2-2-9** 

3) Reports the fixing unit failure to the video controller.

# 4. Fixing roller heater start sequence

The sequence of operations from the power ON to the standby is as follows:

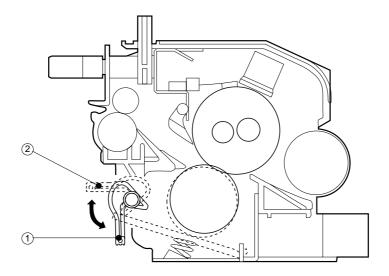
- 1) The CPU outputs the fixing sub heater drive signal and then the fixing main heater drive signal to prevent the surge current from increasing after the power is turned ON.
- 2) If the upper fixing roller temperature reaches 169 to 177°C (180°C for temperature adjustment in the morning), the CPU outputs the READY signal (/RDY) to the video controller. If this temperature is not reached within 180 seconds after the fixing roller heater turns on, the CPU assumes that a fixing unit failure has occurred.
- 3) After the /RDY signal is output, the CPU keeps the upper fixing roller temperature at 169 to 177°C until the PRINT signal (/PRNT) is sent from the video controller.



**Figure 2-2-10** 

# 5. Envelope position lever function

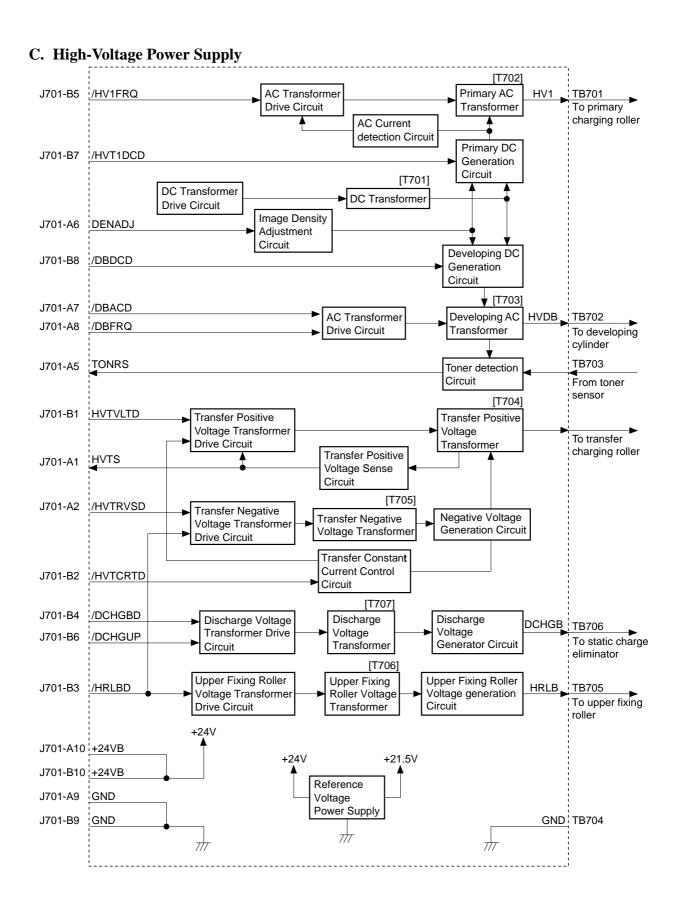
This printer can adjust the nip width in two steps by changing the spring pressure of the lower fixing roller. If an envelope wrinkles after it is printed, set the envelope position lever to the envelope position.



- ① Normal mode
- 2 Envelope mode

**Figure 2-2-11** 

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**Figure 2-2-12** 

#### 1. Outline

In response to the instruction from the microprocessor (CPU) on the DC controller PCB, the high-voltage power supply applies a voltage to the primary charging roller, developing cylinder, transfer charging roller, static charge eliminator, and upper fixing roller. It applies a voltage of DC voltage and AC voltage to the primary charging roller and developing cylinder, applies a positive or negative DC voltage to the transfer charging roller, and a negative DC voltage to the static charge eliminator and the upper fixing roller.

#### 2. Principle of operation

#### a. Primary charging roller voltage generation

When the /PRNT signal sent from the video controller becomes "L", initial rotation starts, the DC controller outputs the primary bias FREQUENCY OUTPUT signal (/HV1FRQ). The circuit then applies the primary AC bias to the primary charging roller. After the specified period of time has elapsed the PRIMARY DC BIAS DRIVE signal (/HV1DCD) goes "L" and the voltage superimposing primary AC bias onto primary DC 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 (DENADJ) sent from the DC controller.

#### b. Developing bias generation

When the DEVELOPING DC BIAS DRIVE signal (/DBDCD) from the DC controller becomes "L", a developing DC bias is applied to the developing cylinder.

When the VERTICAL SYNC signal (/VSYNC) is sent from the video controller, the DC controller outputs the DEVELOPING AC BIAS DRIVE signal (/DBACD) and DEVELOPING BIAS FREQUENCY OUTPUT signal (/DBFRQ). This circuit then applies the voltage superimposing developing DC bias and developing AC bias to the developing cylinder.

The developing DC bias changes according to the IMAGE DENSITY ADJUSTMENT signal (DENADJ), making the image density adjustable.

#### c. Transfer charging roller voltage generation

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

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

For the between-page bias, a positive low voltage is applied to the transfer charging roller at an appropriate timing so that the toner remaining on the photosensitive drum is not attracted to the transfer charging roller.

For print bias, a positive voltage is applied to the transfer charging roller in order to transfer the toner on the photosensitive drum surface to the paper.

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

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

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

# d. Generation of print voltage to the discharger

2 voltage loads, high and low output bias are applied to the discharger according to the various print sequences.

The discharger bias drive signal (/DCHGBD) output from the DC Controller is "L", and when the discharger bias switch signal (/DCHGUP) turns "H" the low output bias changes to "L" and

the circuit applies a high voltage output bias. The high voltage output bias is applied only at the trailing edge of a single side print and during the second side of a duplex print.

# e. Toner sensing/cartridge sensing

The EP-W cartridge has a toner sensor.

The DC controller detects the toner level and whether a cartridge is installed when the developing AC bias is applied to the developing cylinder by the DEVELOPING AC BIAS DRIVE signal by checking the TONER LEVEL signal (TONRS) voltage.

# **D.** Power Supply

#### 1. Outline

AC power is supplied to the low-voltage power supply when the main switch (SW101) is turned ON. The low-voltage power supply generates the required +24VDC and +5VD for the printer.

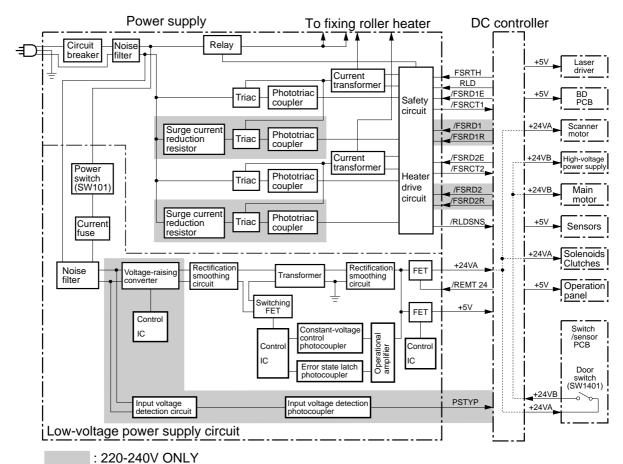
+24VDC is supplied to the high-voltage power supply PCB to drive the main motor, scanner motor, and fans. +5VDC is used for sensors and ICs on the DC controller PCB.

+24VDC is divided into +24VA which is normally supplied from the power supply and +24VB which is shut OFF when the door switch (SW1401) turns OFF when the upper or delivery covers are opened.

+5VDC is divided into +5V which is normally supplied to the ICs on the DC controller PCB from the power supply and +5V for power-saving mode (P5VB1, P5BV2, P5VB3, and P5VBDOR). Supply of +5V for the power-saving mode is stopped when the sleep command is received from the video controller. During standby mode and periods when printing is not possible (when /RDY signal is "H"), the +5V is supplied off and on.

The DC controller PCB generates +5VC and supplies it to the laser driver.

This is shown in the block diagram below.



\_....

**Figure 2-2-13** 

#### 2. Protective Function

If a short circuit or other problems on the load side cause an excessive current flow from the +24VDC or +5VDC power supplies, the excess-current protection system automatically shuts off the output voltage to protect the power supplies.

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

If excess-current flows through the AC line, the circuit breaker in the power supply turns OFF to cut off the output voltage.

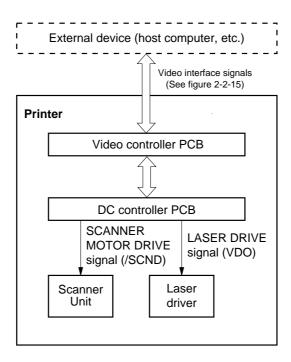
# E. Video Interface Control

# 1. Outline

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

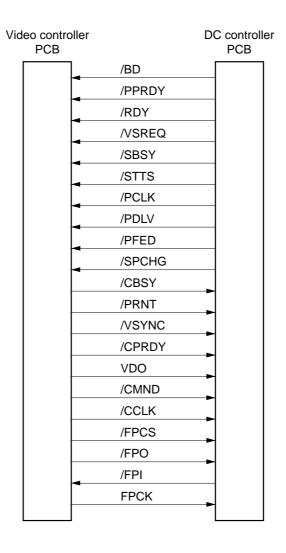
This section explains the kinds of interface signals exchanged between the printer and the video controller PCB, and gives information concerning the sequence of printer operation making use of interface signals.

# a. System block diagram



**Figure 2-2-14** 

# b. Video interface signals



**Figure 2-2-15** 

### 2. Operation

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

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

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

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

At the end of the INTR period, the DC controller sends the VERTICAL SYNC REQUEST signal (/VSREQ) to the video controller.

The video controller receives the /VSREQ signal, and sends the VERTICAL SYNC signal (/VSYNC) to the DC controller. When the /VSYNC signal is received, the print sequence is started.

The video controller sends the VIDEO signal (VDO) synchronized with the HORIZONTAL SYNC signal (/BD) and VERTICAL SYNC signal (/VSYNC) from the DC controller to the laser driver through the DC controller.

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

The laser beam is scanned repeatedly across the photosensitive drum with the scanning mirror to form the latent electrostatic image of the original image.

The latent electrostatic image on the photosensitive drum is transferred onto the paper in the electronic photographic process, and the paper is sent out through the face-down or face-up trays.

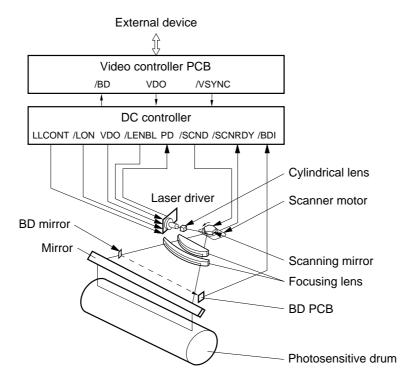
When a page is being printed, the DC controller checks for other /PRNT or /VSYNC signals from the video controller.

If none have arrived, the DC controller begins operation of the last rotations period (LSTR). At the end of this period, the printer enters standby (STBY) mode.

If other /PRNT or /VSYNC signals arrive-during printing, the print sequence continues. The last rotations operation is performed and the printer enters standby mode.

# III. LASER/SCANNER SYSTEM

#### A. Outline



**Figure 2-3-1** 

When the DC controller receives a print signal (/PRNT) from the video controller, the DC controller automatically stabilizes the intensity of the laser beam (automatic laser power control: See page 2-27). The DC controller then receives the VIDEO signal (VDO) from the video controller and sends it to the laser driver in the laser/scanner unit.

The laser driver turns the laser diode on and off according to the VDO signal and generates the modulated laser beam only when the VIDEO DATA ENABLE signal (/LENBL) from the DC controller is "L".

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

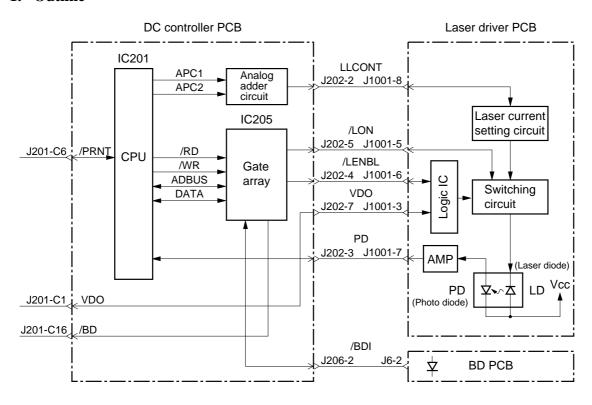
The beam reflected from the mirror is brought to a point of focus on the photosensitive drum by the focusing lens located after the scanning mirror.

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

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

# **B.** Laser Control Circuit

#### 1. Outline



**Figure 2-3-2** 

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

The VDO signal sent from the video controller to the DC controller is sent as is, to the switching circuit in the laser driver circuit.

The microprocessor (CPU: IC201) outputs the INTENSITY CONTROL signals (APC1, APC2) from DA output ports to the analog adder circuit according to the internal data. The output from analog adder circuit is sent to the laser current setting circuit in the laser driver as the LASER OUTPUT signal (LLCONT).

This analog adder circuit performs weighted addition for the APC1 signal and APC2 signal at a ratio of approximately 8:1. The CPU adjusts the value of the LLCONT signal by changing the APC1 signal for rough adjustment and APC2 signal for fine adjustment.

The output current of the laser current setting circuit is sent to the switching circuit and the laser diode is switched ON and OFF in response to the VDO signal when the VIDEO DATA ENABLE signal (/LENBL) (described later) is "L".

#### 2. Automatic laser emisison control

The CPU on the DC controller controls the intensity of the laser beam according to the APC1 signal (laser beam intensity rough adjustment signal) and APC2 signal (laser beam intensity fine adjustment signal). The analog adder circuit adds the APC1 and APC2 signals, generates a LASER OUTPUT signal (LLCONT), and outputs it to the laser current setting circuit in the laser driver.

The CPU performs the automatic laser power control (APC) to let the laser diode emit constant light, then adjusts the LLCONT signal.

This control is divided into initial APC and between-page APC.

### a. Initial APC

Initial APC is performed to increase the intensity of the laser beam from zero to near the target value during initial rotation, and to obtain the increase rate and between-page APC initial value.

After the CPU sets the FORCED LASER ON signal (/LON) to "L", the CPU changes the APC1 signal (rough adjustment) and lets the LLCONT signal gradually rise. As the laser current increases, the laser diode (LD) begins emitting light.

The intensity of the laser diode (LD) is detected by the photo diode (PD). After amplification, the output voltage is fed back to the CPU as the LASER BEAM INTENSITY DETECTION signal (PD).

The CPU ends initial APC when the input value of the PD signal was over the target value stored in the CPU.

## b. Between-page APC

Between-page APC is carried out for each page immediately before writing a VIDEO signal (VDO) onto the drum in order to obtain the target value based on the initial value, and the increase rate obtained by the initial APC.

The CPU sets the values of the initial APC as the initial values. It calculates the increase rate to obtain the target value, from the increase rate obtained from the initial APC, and determine the output values of the APC1 signal (for rough adjustment) and APC2 signal (for fine adjustment).

The CPU then sets the FORCED LASER ON signal (/LON) to "L", outputs the APC1 and APC2 signals, compares the input value of the PD signal with the target value, and optimizes the intensity of the laser beam.

### 3. Horizontal synchronization control

The gate array (IC205) generates an UNBLANKING signal based on the BD INPUT signal (/BDI) sent from the BD PCB of the laser/scanner unit.

IC205 sets the FORCIBLE LASER ON signal (/LON) to "L" in the unblanking period. When the /LON signal is "L", the laser driver turns the laser diode on.

The laser beam emitted from the /LON signal strikes the small fixed BD mirror located in the light path where the laser beam scanning starts, and inputs to the BD PCB in the laser/scanner unit.

The BD PCB detects the laser beam, generates a BD INPUT signal (/BDI), and sends it to the gate array on the DC controller PCB. The gate array generates the HORIZONTAL SYNCHRONIZATION signal (/BD) according to the /BDI signal and sends it to the video controller.

### 4. Laser diode emission control

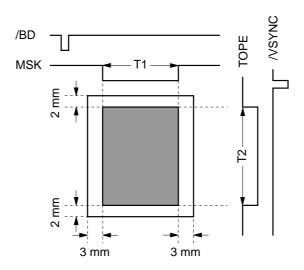
Laser diode emission is controlled by using the VIDEO signal (VDO) sent from the video controller to the printer and the paper size data.

The paper size data is supplied to the CPU from the cassette-size sensing switch for cassette feed and by the paper size specification command from the video controller for manual feed.

The VDO signal is sent from the DC controller to the laser driver.

The CPU sends data to the gate array (IC205) to generate the IMAGE TOP ERASE AND BOTTOM ERASE signal (TOPE) and HORIZONTAL IMAGE MASK signal (MSK) according to the paper size data from IC205. The TOPE and MSK are used by IC205 and are not output externally.

To inhibit the laser beam from writing on non-image area during the non-unblanking period, IC205 makes the VIDEO DATA ENABLE signal (/LENBL) "L" only when the TOPE and MSK signals are "L". The laser driver switches the laser ON when the /LENBL and VDO signals are "L".



**Figure 2-3-3** 

**Notes: 1.** Indicates the area where the laser beam writes on the drum.

- 2. If no paper size is specified by the paper size specification command from the video controller during manual feed, the printer does not recognize the paper width. So the T1 and T2 values are assumed to be UNIVERSAL size (297.0mm × 635.0mm), the maximum paper width for this printer.
- **3.** The CPU detects when the trailing edge of the paper passes through the registration paper sensor (PS1) determining the paper size of the loaded paper. The image is then masked according to the detected paper size.

# C. Scanning System

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

DC controller PCB +5V CPU (IC201) Gate array (IC205) ★ +24VA J207-5 J207-4 <u>4</u>0 7/7 X1I Gate array 7/7 interface bus **SCNCLK** J207-3 SCNCK +5V /PRNT <sub>64</sub> P10/A0 M2 J201-C6 /SCNRDY J207-1 NSRDY Scanner motor/ driver Extended I/O interface bus J207-2 /SCND Extended I/O (IC203)

**Figure 2-3-4** 

The scanner motor is a three-phase, eight-pole DC brushless motor with a HALL element. It forms a unit with the scanner driver, which controls the scanner motor rotation at a constant speed.

When the printer is turned ON, the oscillation frequency of the crystal oscillator (X202) is divided by the gate array (IC205), and the SCNCLK signal is sent to the scanner driver.

The /PRNT signal sent to the CPU (IC201) on the DC controller becomes "L", the CPU sets the /SCND signal to "L" through the extended I/O (IC203). When it goes "L", the scanner driver rotates the scanner motor using the SCNCLK signal. When the scanner motor reaches its prescribed speed, it sets the SCANNER MOTOR READY signal (/SCNRDY) signal to "L".

The CPU on the DC controller PCB monitors the /SCNRDY signal through the gate array to make sure that the scanner motor runs at the correct speed.

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

- a. When the /SCNRDY signal does not become "L" within 30 seconds from the scanner motor starting rotation.
- b. When the /SCNRDY signal goes "H" for 1.5 seconds from going "L."

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# 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.

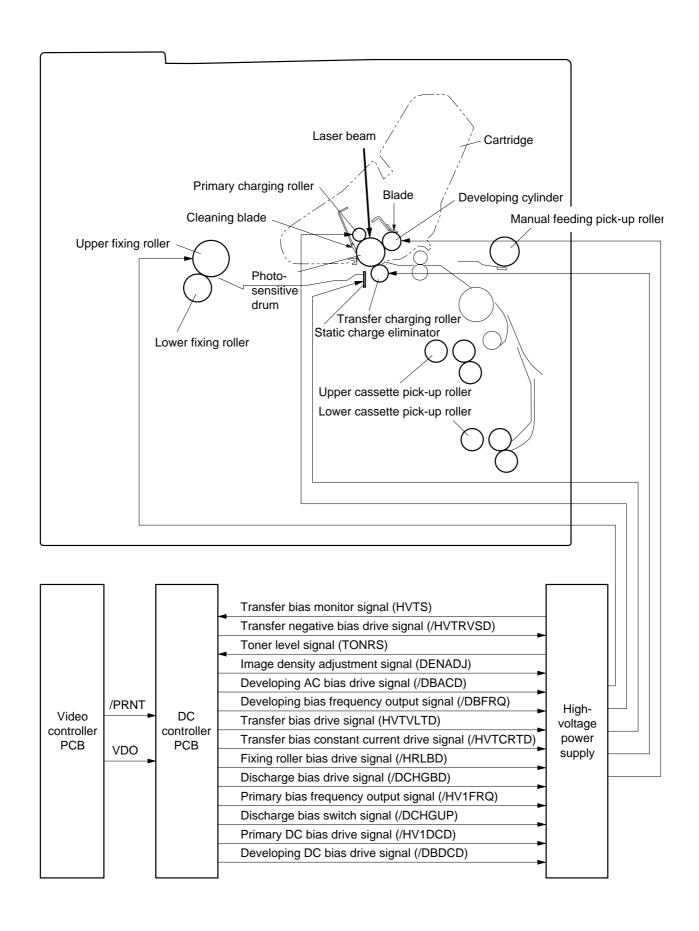
When the PRINT signal (/PRNT) is sent from the video controller to the DC controller, the DC controller drives the main motor to rotate the photosensitive drum with the laser diode, developing cylinder, primary charging roller, and transfer charging roller.

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

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

The cartridge has a toner sensor that detects whether there is enough toner remaining and whether the cartridge is installed.

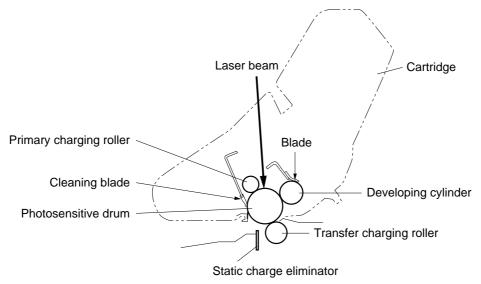
If the toner in the cartridge becomes lower than the prescribed level or there is no cartridge installed in the printer, the high-voltage power supply notifies the DC controller through the TONER LEVEL signal.



**Figure 2-4-1** 

# **B.** Printing Process

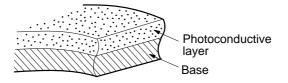
A major portion of the image formation system is contained with a cartridge as shown in Figure 2-4-2.



**Figure 2-4-2** 

This printer's cartridge has a seamless photosensitive drum with a two-layer surface shown in Figure 2-4-3.

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



**Figure 2-4-3** 

The printing process can be divided into five major stages.

# 1. Electrostatic latent image formation stage

Step 1 Primary charge (-)

Step 2 Scanning exposure

# 2. Developing stage

Step 3 Development

### 3. Transfer stage

Step 4 Transfer (+)

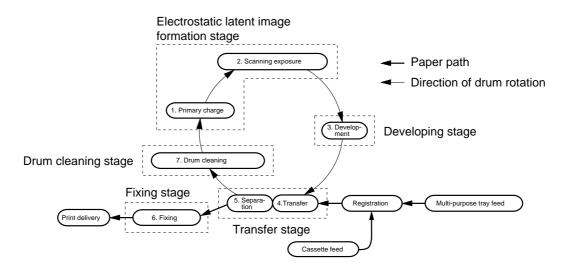
Step 5 Separation

#### 4. Fixing stage

Step 6 Fixing

# 5. Drum cleaning stage

Step 7 Drum cleaning



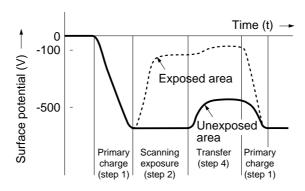
**Figure 2-4-4** 

# 1. Electrostatic latent image formation stage

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

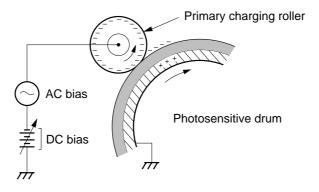
At the end of the stage, negative charges remain on the unexposed "dark" areas, where the laser beam struck (exposed) the drum surface.

This image of negative charges on the drum is invisible to the eye, so it is referred to as an called an "electrostatic latent image."



**Figure 2-4-5** 

# Step 1 Primary charge

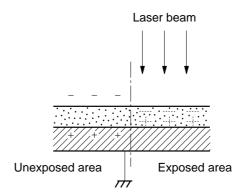


**Figure 2-4-6** 

For preparation of the latent image formation, a uniform negative potential is applied to the photosensitive drum surface. For primary charge, 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 has been applied to the primary charging roller to keep the potential on the drum's surface uniform. The DC bias is changed with the developing DC bias.

# **Step 2 Scanning exposure**



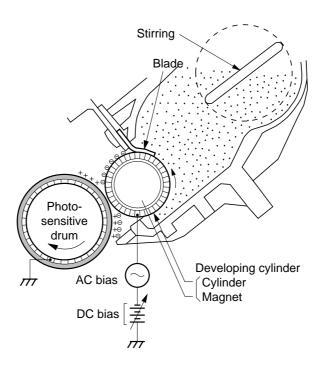
**Figure 2-4-7** 

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

#### 2. Development stage

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

# **Step 3 Development**



**Figure 2-4-8** 

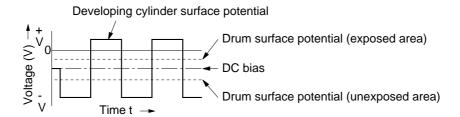
**Note:** Charges on the exposed area of the photosensitive drum are shown as positive in this figure. In actuality they are negative, but they are more positive than those on the developing cylinder.

As shown in Figure 2-4-8, the developing unit consists of a developing cylinder and a rubber blade. The developing cylinder rotates around a fixed internal 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 projects the toner particles to them.

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



**Figure 2-4-9** 

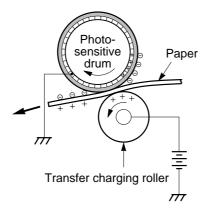
An AC bias is applied to the developing cylinder to help project the toner particles to the drum surface and improve the contrast of the printed image. The center voltage of the AC bias (1600 Vp-p) varies with the DC bias voltage. The change in the DC bias changes the potential difference between the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

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

#### 3. Transfer stage

In the transfer stage, the toner image is transferred from the drum surface to the paper.

### **Step 4 Transfer**



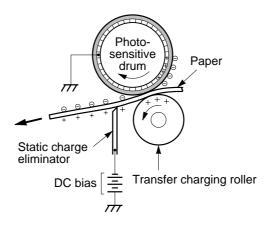
**Figure 2-4-10** 

A positive charge applied to the back of the paper attracts the negatively charged toner particles to the paper.

#### **Reference:**

If the image on the photosensitive drum is not completely transferred onto the paper due to jamming, etc., the toner may adhere to the transfer charging roller. The printer removes the toner from the transfer charging roller by switching the transfer voltage between positive and negative in the specified sequence. During wait mode, initial rotation, and last rotation, the printer sets the primary DC voltage to 0V to make the charge on the drum 0V. At the same time, the transfer voltage is set to negative to remove the toner with a negative charge from the transfer charging roller to the drum. The transfer charging roller is cleaned by removing the toner on its surface to the drum.

### **Step 5 Separation**



**Figure 2-4-11** 

The stiffness of the paper causes it to separate from the drum. Thin paper or curled sheets to be duplex printed may not separate, but remain wrapped around the drum. To prevent this, a negative bias is applied to the static charge eliminator to reduce electrostatic adhesion between the drum and paper and facilitate separation.

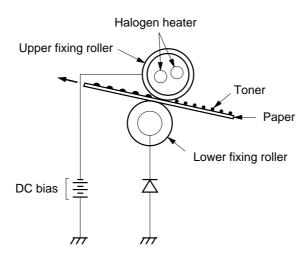
To stabilize the paper feed system and prevent droplets on the printed image at low temperature and humidity, the charge on the back of the paper is reduced by the static charge eliminator after transfer.

# 4. Fixing stage

The toner image transferred onto the paper in the transfer stage is held only by electrostatic attraction and a slight physical adhesion, so even a light touch will smear the image.

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

# **Step 6 Fixing**



**Figure 2-4-12** 

The upper and lower fixing roller surfaces are covered with teflon tubes with a very low adhesive property.

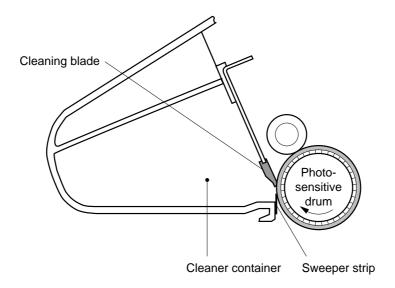
The negative DC bias is applied to the upper fixing roller to prevent the toner from adhering to the rollers.

# 5. Drum cleaning stage

In the transfer stage, not all the toner is transferred to the paper. Some remains on the photosensitive drum.

This residual toner is cleaned off in the drum cleaning stage 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 cleaning blade to clean the drum surface in preparation for the next print. The removed toner is collected in the cleaner container.

# V. PICK-UP/FEED SYSTEM

#### A. Outline

Presence of paper on the multi-purpose tray is detected by the multi-purpose tray paper sensor (PS1301), and presence of paper in the upper and lower cassettes is detected by the cassette paper-out sensor (PS1207 or PS1208).

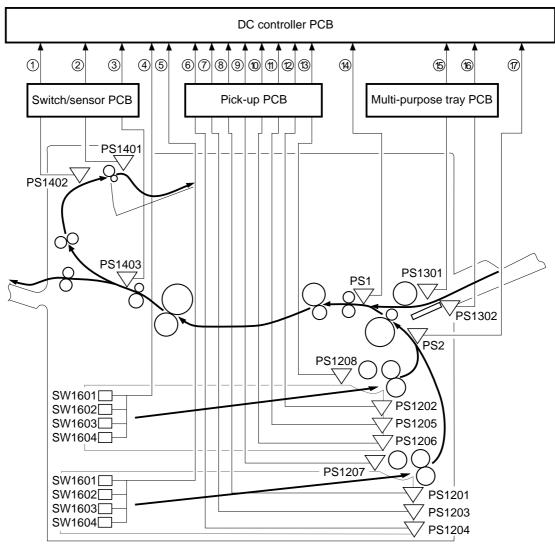
If the cassette pick-up motor (SMT1) in the paper pick-up unit rotates for cassette feeding, pick-up roller, feed roller 1, and separation roller turn to feed a sheet of paper into the printer.

If the manual feed clutch (CL3) in the manual feed pick-up unit engages for manual feeding, the manual feeding pick-up roller turns and feeds a sheet of paper from the multi-purpose tray into the printer.

The paper is controlled by the registration roller so that the leading edge of the toner image on the photosensitive drum matches the leading edge of the paper. The paper is fed, transferred, then separated from the drum, fed to the fixing unit, and delivered onto the face-up or face-down tray.

There are four photointerrupters (PS1, PS2, PS1402, and PS1403) on the paper path for sensing paper reaching or passing through each area.

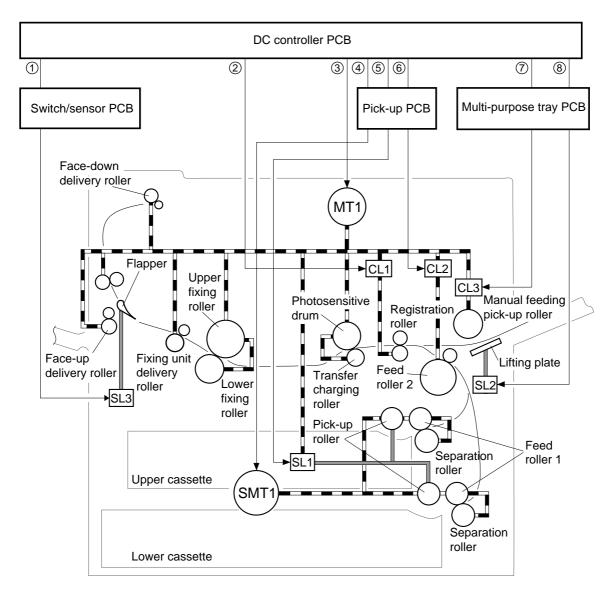
If the paper does not reach or clear each sensor within the pre-set time, the microprocessor on the DC controller assumes a paper jam has occurred and notifies the video controller.



- ①: FACE-DOWN TRAY DELIVERY SENSE signal (FDOUTS)
- ②: FACE-DOWN TRAY PAPER FULL SENSE signal (FDFULS)
- ③: FIXING UNIT DELIVERY SENSE signal (/FPOUTS)
- (4): UPPER CASSETTE PAPER-SIZE SENSE signal
- **⑤**: LOWER CASSETTE PAPER-SIZE SENSE signal
- 6: LOWER CASSETTE PAPER-LEVEL SENSE signal 1 (LPVS1)
- (7): LOWER CASSETTE PAPER-LEVEL SENSE signal 2 (LPVS2)
- (8): LOWER CASSETTE SENSE signal (/LDECKC)
- ①: UPPER CASSETTE PAPER-LEVEL SENSE signal 1 (UPVS1)
- (f): UPPER CASSETTE PAPER-LEVEL SENSE signal 2 (UPVS2)
- ②: UPPER CASSETTE SENSE signal (/UDECKC)
- ③: UPPER CASSETTE PAPER-OUT SENSE signal (/UDECKS)
- (REGS): REGISTRATION PAPER SENSE signal (REGS)
- (6): MULTI-PURPOSE TRAY PAPER SENSE signal (/MPTPS)
- (6): LIFTING PLATE SENSE signal (/MPTLS)
- (7): PICK-UP UNIT PAPER SENSE signal (/FEEDS)

- PS1: Registration paper sensor PS2: Pick-up unit paper sensor
- PS1201: Lower cassette sensor
- PS1202: Upper cassette sensor
- PS1203: Lower cassette paper-level sensor 1
- PS1204: Lower cassette paper-level sensor 2
- PS1205: Upper cassette paper-level sensor 1
- PS1206: Upper cassette paper-level sensor 2 PS1207: Lower cassette paper-out sensor
- PS1208: Upper cassette paper-out sensor
- PS1301: Multi-purpose tray paper sensor
- PS1302: Lifting plate position sensor
- PS1401: Face-down tray paper full sensor
- PS1402: Face-down tray delivery sensor
- PS1403: Fixing unit delivery sensor
- SW1601: Cassette paper-size sensing switch
- SW1602: Cassette paper-size sensing switch
- SW1603: Cassette paper-size sensing switch
- SW1604: Cassette paper-size sensing switch

**Figure 2-5-1** 



- ①: FACE-UP SOLENOID DRIVE signal (/FUSLD)
- 2: REGISTRATION CLUTCH DRIVE signal (/REGCLD)
- ③: MAIN MOTOR DRIVE signal (MMRDY)
- (4): PICK-UP MOTOR DRIVE signal
- ⑤: FEED CLUTCH DRIVE signal (/FEEDCLD)
- ⑥: CASSETTE PICK-UP SOLENOID DRIVE signal (/PUPSLD)
- ⑦: MANUAL FEED CLUTCH DRIVE signal (/MPTCLD)
- **®: LIFTING PLATE SOLENOID DRIVE signal (/MPTSLD)**

MT1: Main motor

SMT1: Cassette pick-up motor

SL1: Cassette pick-up solenoid

SL2: Lifting plate solenoid

SL3: Face-up solenoid

CL1: Registration clutch

CL2: Feed clutch

CL3: Manual feed clutch

**Figure 2-5-2** 

# **B.** Paper Pick-up Unit

#### 1. Cassette feed

Presence of the upper and lower cassettes is detected by the upper cassette sensor (PS1202) and lower cassette sensor (PS1201). The presence of paper is detected by the upper cassette paper-out sensor (PS1207) and lower cassette paper-out sensor (PS1208). The paper size is detected by the four upper and lower cassette paper-size sensing switches (SW1601 to SW1604) installed in the upper and lower cassettes. Table 2-5-1 lists combinations of cassette paper-size sensing switches.

The paper level in the upper cassette is detected by combinations of outputs from the upper cassette paper-level sensor 1 (PS1205) and upper cassette paper-level sensor 2 (PS1206). The paper level in the lower cassette is detected by combinations of outputs from the lower cassette paper-level sensor 1 (PS1203) and lower cassette paper-level sensor 2 (PS1204). Figure 2-5-3 shows combinations of PS1205, PS1203, PS1206, and PS1204.

When the video controller inputs the /PRNT signal into the printer, the cassette pick-up motor (SMT1) starts operation. The cassette pick-up motor is a stepping motor, when rotating clockwise, it drives the cassette pick-up roller, feed roller 1, and separation roller on the upper cassette to enable printer to feed paper from the upper cassette. When it rotates counter clockwise, it drives the cassette pick-up roller, feed roller 1, and separation roller on the lower cassette to enable the printer to feed paper from the lower cassette.

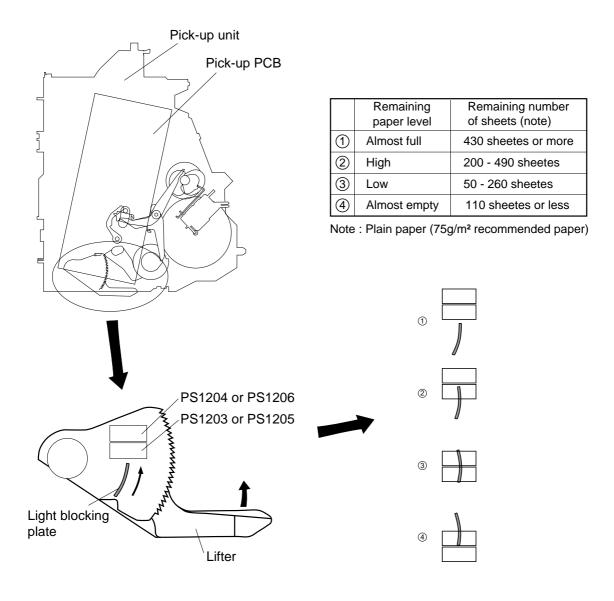
Following this, the cassette pick-up solenoid (SL1) turns on, the main motor then drives the cassette pick-up roller lowering cam to lower the cassette pick-up roller to the paper surface. Paper is fed by the rotating cassette pick-up roller.

The paper picked up by the cassette pick-up roller is fed into the printer by feed rollers 1 and 2. If more than one sheet is picked up, unnecessary sheets are discharged by the separation roller.

The paper passes through the pick-up unit paper sensor (PS2), the registration paper sensor (PS1) and then reaches the registration roller. The registration roller does not rotate, so the paper is stopped. The leading edge of the paper is looped to correct any skew. When the VERTICAL SYNC signal (/VSYNC) is received, the registration clutch (CL1) turns on and the paper is fed again.

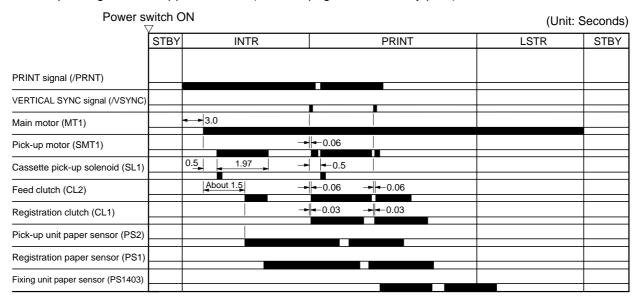
**Table 2-5-1** 

|            | Cassette paper-size sensing switch |        |        |        |
|------------|------------------------------------|--------|--------|--------|
| Paper size | SW1601                             | SW1602 | SW1603 | SW1604 |
| Ledger     | OFF                                | OFF    | OFF    | OFF    |
| A3         | OFF                                | ON     | OFF    | OFF    |
| B4         | ON                                 | OFF    | OFF    | OFF    |
| Legal      | ON                                 | ON     | OFF    | OFF    |
| Letter     | OFF                                | OFF    | OFF    | ON     |
| A4         | OFF                                | OFF    | ON     | OFF    |



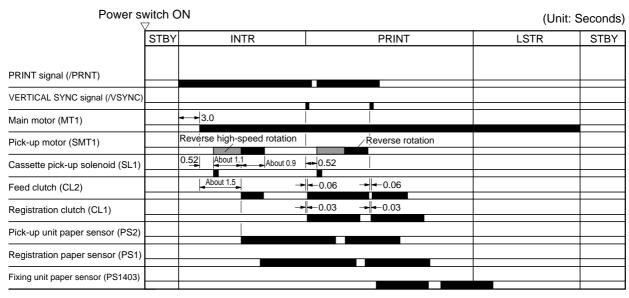
**Figure 2-5-3** 

• Pick-up timing from the upper cassette (A4 : tow pages continuously print)



**Figure 2-5-4** 

• Pick-up timing from the lower cassette (A4: tow pages continuously print)



**Figure 2-5-5** 

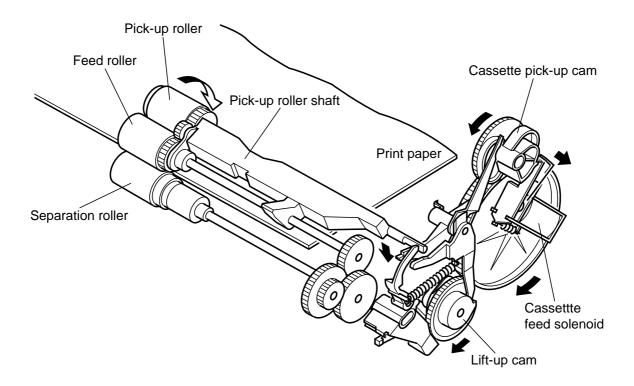
# a. Pick-up mechanism

The printer raises the lifter and lowers the cassette pick-up roller to the paper surface enabling it to pick up paper.

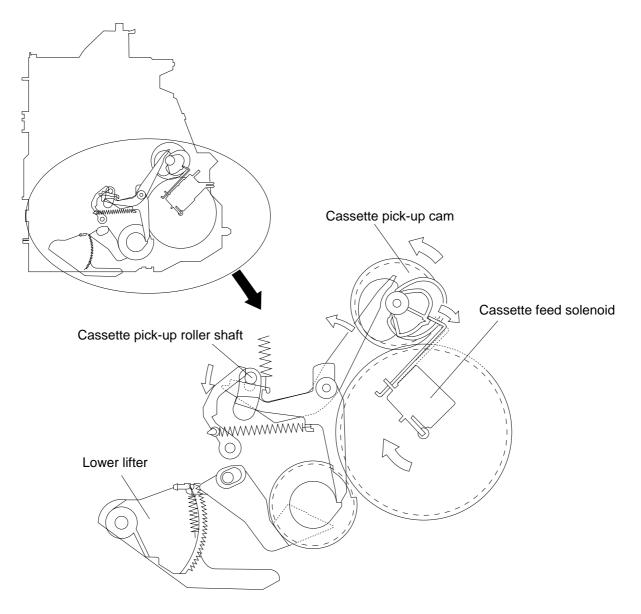
When either the upper or lower cassette is installed in the printer, the upper or lower lifter gear is engaged into drive gear, so that the lifter can be raised. The cassette pick-up roller shaft is unlocked so the pick-up roller can be lowered.

When the cassette feed solenoid (SL1) turns on, the main motor (MT1) drives the upper or lower lifter to raise the paper in the cassette. The MT1 power is transmitted to the cassette pick-up roller lowering cam in order to lower the cassette pick-up roller to the paper surface so that one sheet can be fed.

The lifter is not raised until the surface of the paper in the cassette drops to a certain level. When the paper surface reaches that certain level, the pick-up roller shaft moves down to release the cam and raise the lifter again.



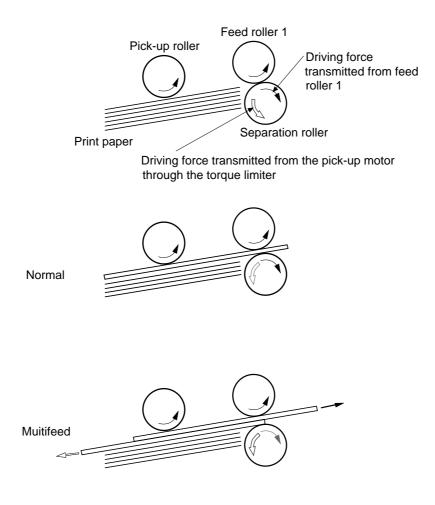
**Figure 2-5-6** 



**Figure 2-5-7** 

# b. Multi-feed prevention mechanism

When feeding from the cassette, the printer uses the separation roller to prevent multi-feeding. Normally, the separation roller is imparted with a rotational force opposite to that of the feed roller. However, since the separation roller is equipped with a torque limiter, it rotates with feed roller 1 by transmission of its rotational force via the transported paper. On the other hand, if multiple sheets of paper are picked up, the low friction force between the sheets of paper result in a weak rotational force being transmitted to the separation roller from feed roller 1. Consequently, the separation roller's own rotational force separates the extra sheet.



**Figure 2-5-8** 

# 2. Manual feed (multi-purpose tray)

The presence of paper on the multi-purpose tray is detected by the multi-purpose tray paper sensor (PS1301).

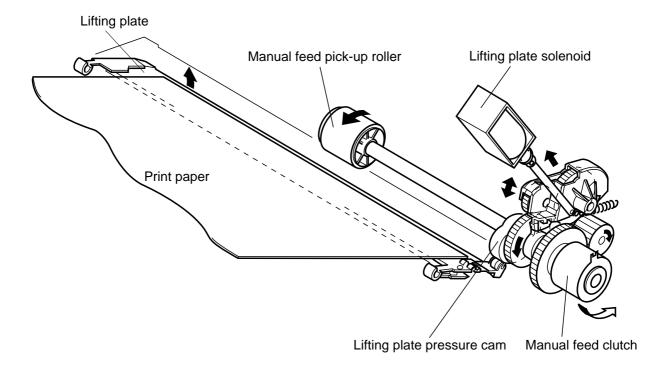
When the DC controller receives the /PRNT signal from the video controller, the lifting plate solenoid (SL2) turns on, the lifting plate is unlocked (the lifting plate rises), and the paper touches the pick-up roller.

The lifting plate position is detected by the lifting plate position sensor (PS1302). If the sensor detects that the lifting plate is up while waiting, SL2 is turned on to lower the lifting plate.

The manual feed clutch (CL3) turns on, and the main motor (MT1) power is transmitted to the manual feeding pick-up roller.

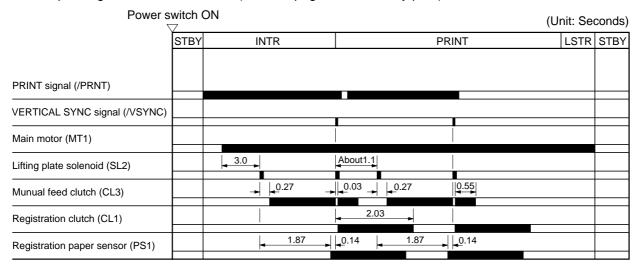
Paper pressed against the manual feeding pick-up roller by the lifting plate is picked up by the pick-up roller. Unnecessary sheets are removed by the separation pad, and one sheet is fed into the printer by feed roller 2. The subsequent operations are almost the same as for those of cassette feeding, except that SL2 is turned on again straight after the rotation of the registration roller to lower the lifting plate.

When SL2 is turned on to lower the lifting plate, but PS1302 does not go "L" after about 1.5 seconds, or if SL2 is turned on to raise the lifting plate, but PS1302 does not go "H" after about 1.0 seconds, a lifting plate failure is reported to the video controller.



**Figure 2-5-9** 

• Pick-up timing from the munual feed (A4: tow pages continuously print)

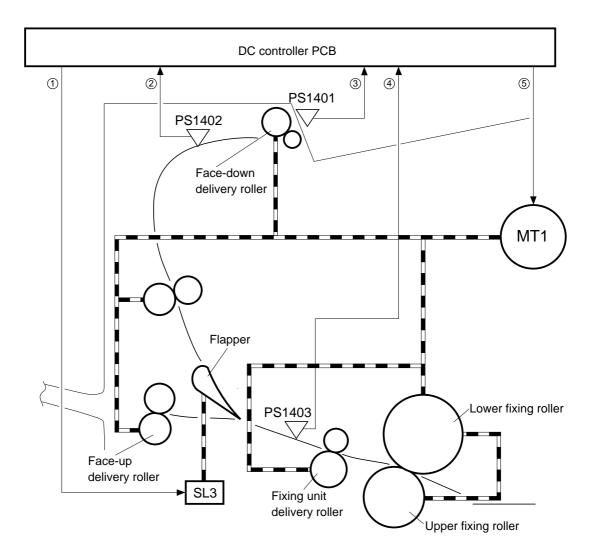


**Figure 2-5-10** 

# C. Fixing and Delivery Unit

The upper and lower rollers of the fixing unit, and the face-up and face-down delivery rollers are driven by the main motor (MT1).

The paper separated from the photosensitive drum is fed into the fixing unit, and sent from the fixing unit by the fixing roller and fixing unit delivery roller.



- ①: FACE-UP SOLENOID DRIVE signal (/FUSLD)
- ②: FACE-DOWN TRAY DELIVERY SENSE signal (FDOUTS)
- ③: FACE-DOWN TRAY PAPER FULL SENSE signal (FDFULS)
- 4: FIXING UNIT DELIVERY SENSE signal (/FPOUTS)
- (MMOTD) (MMOTD)

PS1401: Face-down tray paper full sensor

PS1402: Face-down tray delivery sensor

PS1403: Fixing unit delivery sensor

SL3: Face-up solenoid

MT1: Main motor

The paper sent from the fixing unit is detected by the fixing unit delivery sensor (PS1403).

**Figure 2-5-11** 

The printer switches between face-up and face-down tray delivery with the face-up deflector. When the FACE-UP SOLENOID DRIVE signal (/FUSLD) becomes "L", the face-up solenoid (SL3) moves the face-up deflector to the face-up tray and the paper is delivered through the face-up tray. If /FUSLD is "H", the paper is delivered through the face-down tray on the top of the printer.

The paper delivered through the face-down tray is detected by the face-down tray delivery sensor (PS1402). When the face-down tray becomes full, this is detected by the face-down tray paper full sensor (PS1401).

# D. Paper Jam Detection

The following paper sensors are provided to detect whether paper is present and whether the paper is fed normally.

- Registration paper sensor (PS1)
- Pick-up unit paper sensor (PS2)
- Fixing unit delivery sensor (PS1403)
- Face-down tray delivery sensor (PS1402)

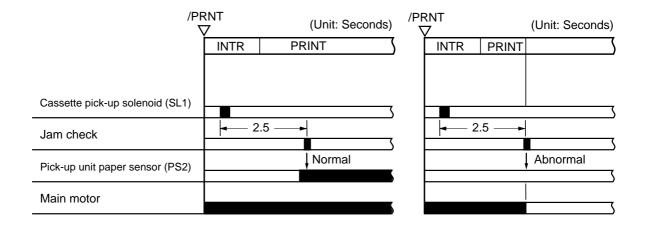
The microprocessor (CPU) determines whether paper is jammed by checking whether paper is present or absent at the sensors, at times stored in memory.

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

**Note:** T1, T2, and T3 times indicate the minimum and maximum sizes of paper.

# 1. Cassette pick-up delay jam

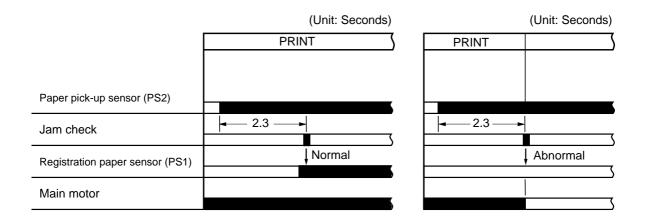
The CPU detects a cassette pick-up delay jam has occurred if the paper does not reach the pick-up unit paper sensor (PS2) within the prescribed time after the paper has been picked up.



**Figure 2-5-12** 

# 2. Pick-up unit delay jam

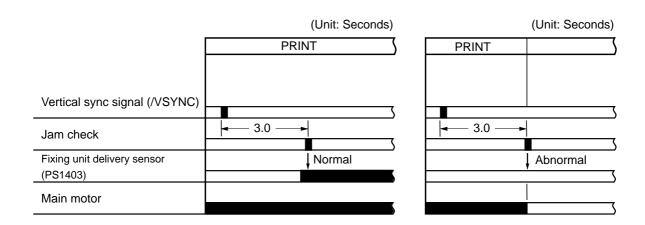
The CPU detects a pick-up unit delay jam has occurred if the paper has not reached the registration paper sensor (PS1) within the prescribed time after the paper has been picked up.



**Figure 2-5-13** 

# 3. Fixing unit delivery delay jam

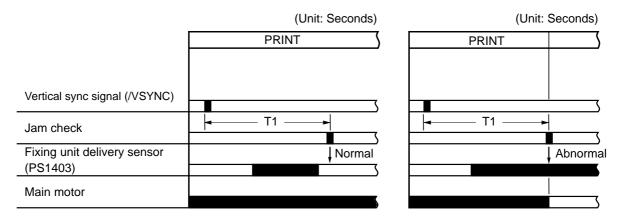
The CPU detects a face-down delivery delay jam has occurred if the paper has not reached the fixing unit delivery sensor (PS1403) within the prescribed time after the VERTICAL SYNC signal (/VSYNC) has been received.



**Figure 2-5-14** 

# 4. Fixing unit delivery stationary jam

The CPU detects a pick-up unit stationary jam has occurred if the paper has not passed through the fixing unit delivery sensor (PS1403) within the prescribed time after the VERTICAL SYNC signal (/VSYNC) has been received.

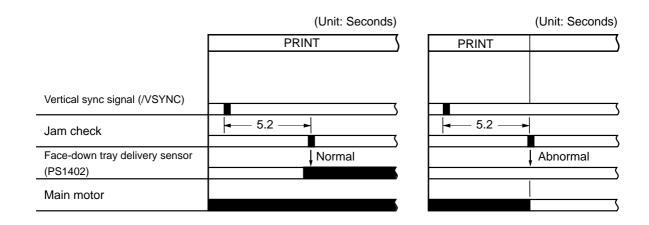


T1: 5.0 seconds (A4), 7.1 seconds (Ledger)

**Figure 2-5-15** 

# 5. Face-down delivery delay jam

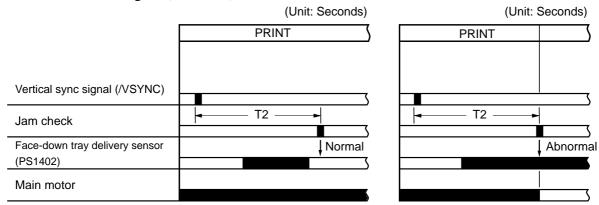
The CPU detects a face-down delivery delay jam has occurred if the paper has not reached the face-down tray delivery sensor (PS1402) within the prescribed time after the VERTICAL SYNC signal (/VSYNC) has been received.



**Figure 2-5-16** 

# 6. Face-down delivery stationary jam

The CPU detects a face-down delivery stationary jam has occurred if the paper has not passed through the face-down tray delivery sensor (PS1402) within the prescribed time after the VERTICAL SYNC signal (/VSYNC) has been received.



T2: 7.3 seconds (A4), 9.4 seconds (Ledger)

**Figure 2-5-17** 

### 7. Initial residual jam

- **a.** Turn the power ON, in the event that the fixing delivery paper sensor (PS1403) detects the presence of paper, the CPU assesses an initial residual jam.
- **b.** If the CPU has not received an automatic delivery command to automatically deliver paper from the printer within 3 minutes, it assesses an initial residual jam.
- c The CPU detects that an initial residual jam has occurred if one of the following sensors detects the presence of paper even after the printer has performed an automatic delivery of the relevant paper. After the power switch is turned ON and the fixing roller has reached its prescribed temperature (150°C), or the printer outputs the paper automatically.
  - Registration paper sensor (PS1)
  - Pick-up unit paper sensor (PS2)
  - Fixing unit delivery sensor (PS1403)
  - Face-down tray delivery sensor (PS1402)

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# VI. OVERALL CONTROL SYSTEM

#### A. Video Controller PCB

#### 1. Outline

The video controller PCB receives print data consisting of codes or image data from an external device (host computer, etc.) via the interface cable. The video controller PCB analyzes and processes the print data, including the items specified from the control panel, and converts it to dot data. The dot data is sent to the DC controller PCB to control laser diode emission. Figure 2-6-1 shows the layout of main ICs on the DC controller PCB, and Figure 2-6-2 is a block diagram.

### 2. Functions by block

# a. CPU (IC29)

The CPU is an Intel 32-bit RISC microprocessor (A80960HD-66). The CPU produces and analyzes the various interface data, creates image data and processes commands via ASIC according to the control program stored in the ROM.

### **b.** ASIC (IC21)

The ASIC contains a circuit which controls the LBP, and separately processes the ROM and RAM. ASIC controls the video controller according to the control program stored in the ROM. The main functions are:

- 1) Controls the reading and writing of data to and from the DRAM on the video controller and the expansion RAM SIMM.
- 2) Creates address information for accessing data from the ROM on the video controller and optional ROM DIMM.
- 3) Controls the video interface, expansion interface, and the standard-equipped bi-directional parallel interface (Centronics specifications).

#### c. AIR (IC10)

This ASIC has a built-in SRAM which contains a smoothing control circuit.

The main functions are;

- 1) Controls image smoothing.
- 2) Controls output of the video signal to the DC Controller.
- 3) Controls the operation panel interface.
- 4) Creates address information for accessing data from the EEPROM on the video controller.

# d. DRAM

The DRAM has a memory capacity of 4M and stores the following information.

- 1) Print data which is input from the external device (receive buffer).
- 2) Pattern data converted from code or image data (bit map memory).
- 3) Fonts processed within the video controller (font cache memory).

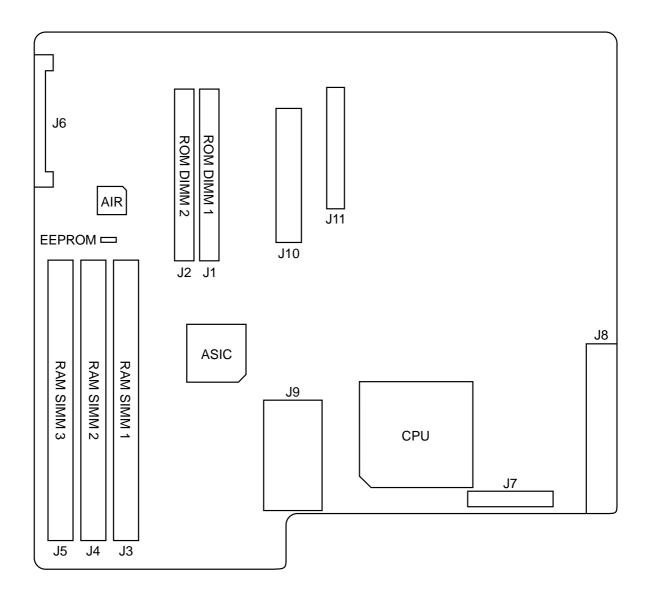
The memory can be expanded to a maximum of 96M bytes by installing 1, 2, 4, 8, 16, or 32M byte SIMMs in the three slots on the video controller PCB.

#### e. ROM DIMM

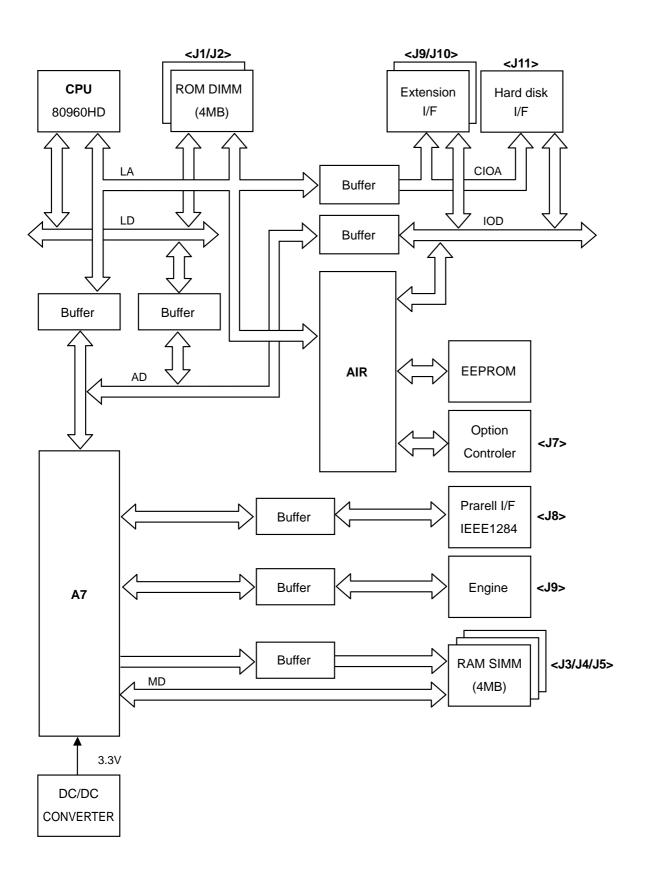
The 4MB ROM DIMM is installed in one of the two ROM DIMM slots, in which operation sequence control program of video controller circuit and fonts are stored. An optional ROM DIMM can be installed in the other slot.

#### f. EEPROM (IC11)

The EEPROM is used to store printer factory defaults and those values changed from the control panel across job boundary and power cycles of the engine.



**Figure 2-6-1** 



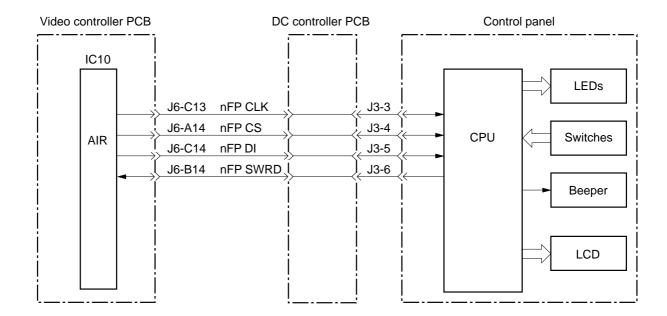
**Figure 2-6-2** 

#### **B.** Control Panel

#### 1. Outline

The control panel contains 7 LEDs, one LCD (liquid-crystal display), 9 switches, and one buzzer on the control panel. The control panel is connected to the video controller PCB, and has the following functions.

- a. Displays status and error messages on the LCD.
- b. Displays the printer operating status on the LEDs.
- c. Selects the printing environment, operating mode, utility, and paper source with switches.
- d. Sounds the buzzer if a switch input is ineffective or an error occurs.



**Figure 2-6-3** 

#### 2. Operation

The LEDs, LCD, and buzzer on the control panel are controlled by signals from the video controller. All signals generated by control panel switches are input to the video controller. Table 2-6-1 lists the input and output signals.

**Table 2-6-1** 

| Pin No. | Signal name | Meaning                           |  |
|---------|-------------|-----------------------------------|--|
| J3-1    | GND         | GND                               |  |
| J3-2    | +5V         | +5V                               |  |
| J3-3    | nFP CLK     | Front Panel CLocK                 |  |
| J3-4    | nFP CS      | Front Panel contoller Chip Select |  |
| J3-5    | nFP DI      | Front Panel serial input signal   |  |
| J3-6    | nFP SWRD    | Front Panel serial output signal  |  |

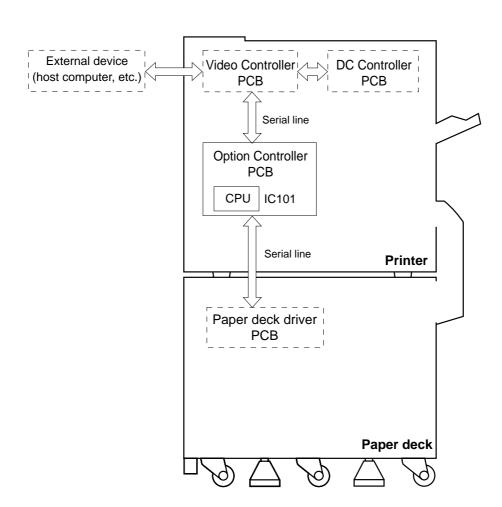
# VII. OPTION CONTROL SYSTEM

#### A. Option Controller

#### 1. Outline

To use the paper deck installed to the printer, the option controller needs to be attached to the printer. The option controller is a 16-bit microcomputer (CPU: IC101) that controls serial communication with the video controller and serial communication with the paper deck.

The option controller controls the paper deck according to the various commands and signals sent from the video controller and signals sent from the DC controller. Figure 2-7-2 shows a block diagram of option controller.



**Figure 2-7-1** 

# 2. Explanation of main ICs

## a. CPU (IC101)

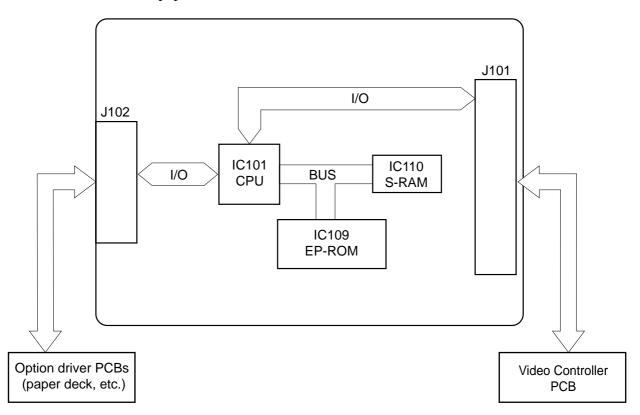
An NEC 1-chip microcomputer (UPD784020GC-3B9) is used. The CPU communicates with the video controller and controls the optional paper deck.

#### **b.** EP-ROM (IC109)

The EP-ROM has a memory capacity of 64K bytes, and contains the control program for the paper deck's operation.

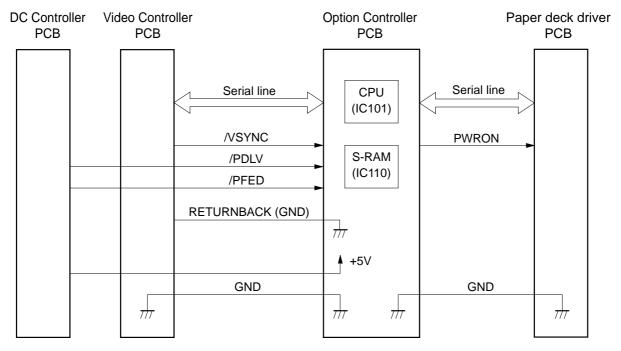
#### c. S-RAM (IC110)

The S-RAM has a memory capacity of 32K bytes, and contains the communication data with the video controller and the paper deck.



**Figure 2-7-2** 

## **B.** Operation Outline



**Figure 2-7-3** 

The video controller supplies a +5V power supply to the option controller when the printer power is turned ON, and communication between them commences after a specified period of time.

The video controller sends the status of pick-up source and paper size for each page printed to the option controller. The paper feeding condition of the paper deck is sent from the option controller back to the video controller.

The microcomputer (CPU) on the option controller sends a power ON (PWRON) signal to the paper deck, turning the paper deck's power ON. Following this, the option controller and the paper deck commence serial communication.

The option controller sends pick-up and delivery command data for each page printed to the paper deck based on data and the vertical synchronized signal (/VSYNC) from the video controller along with paper feed (/PFED) and paper delivery (/PDLV) signals output from the DC controller. The paper deck then returns its paper feed status back to the option controller.

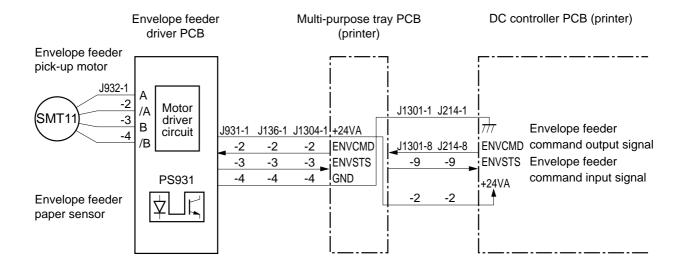
The S-RAM (IC110) constantly stores the latest 40 pages of communication data allowing the CPU to control the paper deck paper feed in real time for each page printed. The video controller monitors the paper feed status of the paper deck in real time by obtaining S-RAM information via the option controller interface.

# VIII. ENVELOPE FEEDER

## A. Outline of the Electrical System

The envelope feeder operation sequence is controlled by the DC controller in the printer. The DC controller outputs paper pick-up commands (1st start, 2nd start) to the envelope feeder driver at the appropriate timing via serial lines. The envelope feeder driver drives the motor according to these commands. The envelope feeder driver then notifies the DC controller of the envelope feeder's status.

The figure below outlines the flow of signals between the envelope feeder and the printer. The envelope feeder is supplied with +24VDC from the printer.



**Figure 2-8-1** 

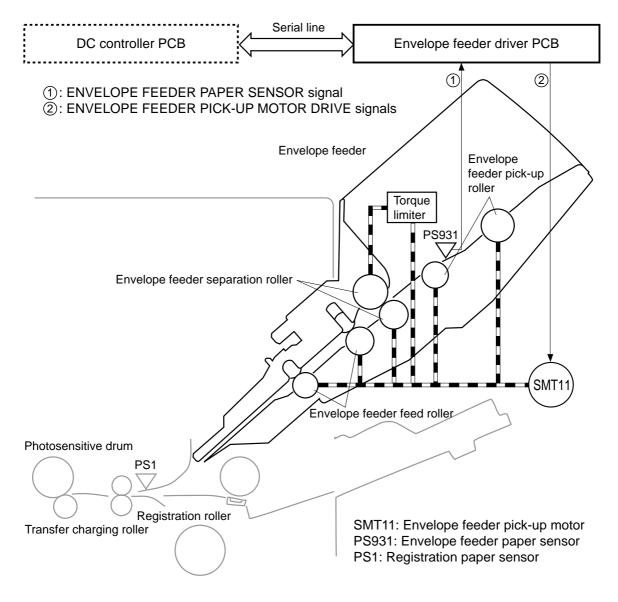
#### B. Paper Pick-up/Feed System

The envelope feeder motor is a stepping motor (SMT11) that rotates clockwise and counter-clock wise according to commands received from the envelope feeder driver.

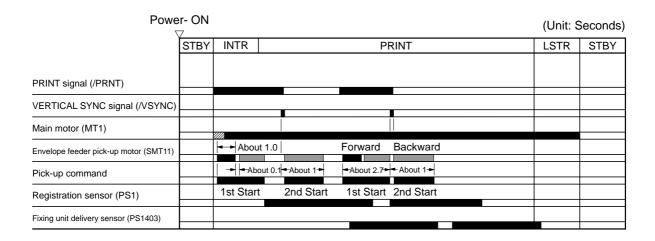
When the motor rotates clockwise, all rollers in the envelope feeder are rotated, however when rotated counter clock wise only the upper separation and feed rollers are rotated.

The envelope feeder driver rotates the pick-up motor for about 1.0 second after receiving the 1st start command from the DC controller. After 0.1 second, the motor is rotated counter-clock wise for about 1.9 seconds. This process picks-up and feeds the envelope into the printer.

The envelope is stopped when it is 16mm past the registration paper sensor (PS1). Following this, the envelope feeder driver rotates the motor counter-clock wise according to the 2nd start command received for about 1 second to feed the envelope again.



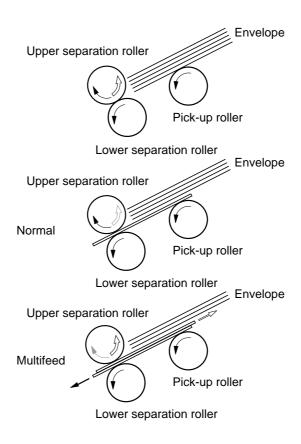
**Figure 2-8-2** 



**Figure 2-8-3** 

The upper separation roller is driven by the motor through a torque limiter.

In a normal situation, the upper separation roller imparts a rotational force in the same direction as the pick-up and lower separation roller (shown by the white arrow in top figure 2-8-4). However, the upper separation roller, envelope, and lower separation roller are all in contact with each other. Therefore, the upper separation roller is forced to rotate in the opposite direction (in the direction of the black arrows in middle figure of 2-8-4) through the movement of the envelope, which is driven by the lower separation roller.



**Figure 2-8-4** 

As the friction between envelopes is weak when ened two or more envelopes are fed simultaneously (multi-feed), the rotating force of the lower roller is not strong enough to keep the upper roller rotating in its original direction. The upper roller therefore rotates in the opposite direction to the pick-up direction (shown by white arrows in figure 2-8-4 below)

Any extra envelopes are returned to the feeder while only one is sent through into the printer.

## C. Paper Jam Detection

Paper jams are detected in the envelope feeder pick-up and feed path in the same fashion as in the main unit. (refer to pages 2-55 - 58 for details)

# IX. DUPLEXING UNIT

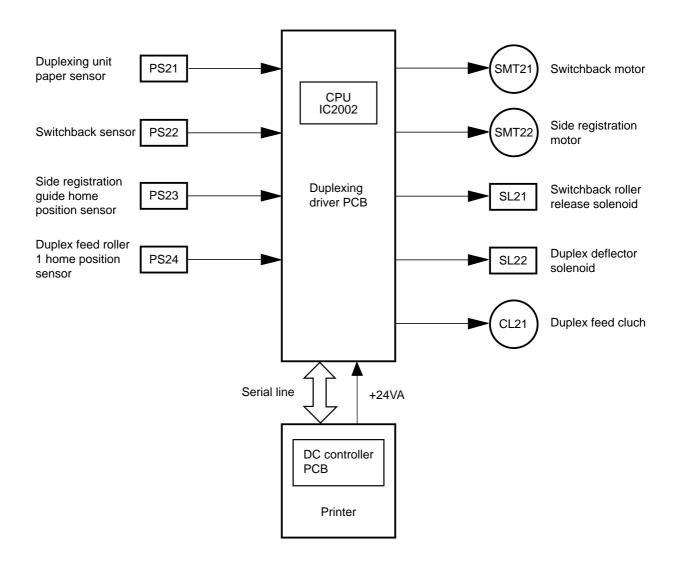
## A. Outline of the Electrical System

The operation sequences of the duplexing unit are controlled by the duplexing driver PCB. This PCB utilizes a 4 bit microcomputer (CPU, IC2002) to control the serial communication between the duplexing unit and the DC controller PCB in the printer.

The CPU drives the motors, solenoids and the clutch according to commands sent from the DC controller PCB to the duplexing unit and second-pass pick-up commands via serial communication.

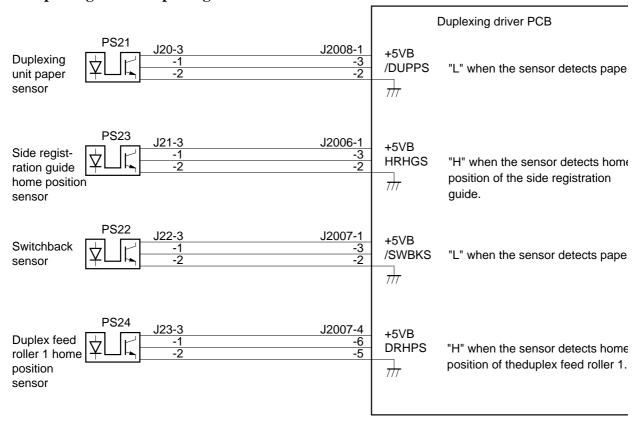
The duplexing unit is supplied with +24VDC from the printer. +5V is produced within the duplexing driver PCB for the ICs and sensors.

The flow of signals between the duplexing unit and the printer are outlined in the figure below.



**Figure 2-9-1** 

# **B.** Duplexing Driver Input Signals



**Figure 2-9-2** 

#### C. Duplexing Driver Output Signals **Duplexing driver PCB** +24VA J2009-2 Switchback SL21 -1 roller release /PRRESLD When "L", pressure is relased fror solenoid the switchback roller. J2002-2 Duplex deflector SL22 -1 solenoid /DUPSLD When "L", paper enters the duplexing unit. +24VA J2003-2 Duplex feed cluch /DUPCLD "L" to rotate the duplex feed roller. J2004-1 **SWBAD** -2 **SWBAND** Switchback SMT21 -3 Switchback motor control signal motor **SWBBD** -4 SWBBND J2005-1 **HRGCOMA** -2 **HRGCOMB** -3 **HRGAD** Side registration Side registration motor control (SMT22 -4 motor **HRGAND** signal -5 **HRGBD** -6 **HRGBND**

**Figure 2-9-3** 

## D. Paper Pick-up/Feed System

#### 1. Outline

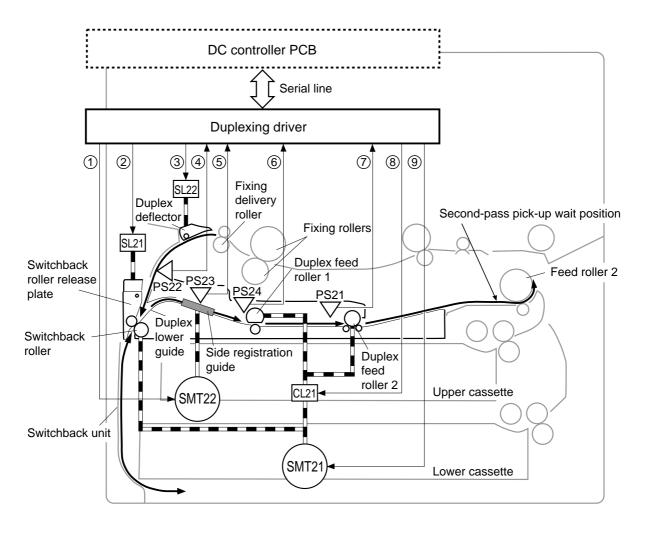
Paper is guided through the duplexing unit by the duplex deflector to the switchback unit.

The paper sent to the switchback unit is then fed back into the duplexing unit by reversing the direction of the paper feed of the switchback roller. Once in the duplexing unit the paper is aligned with the side registration guides and re-fed into the printer by the duplex feed rollers 1 and 2.

The switchback roller is rotated from the drive of the switchback motor (SMT21). The duplex feed clutch controls the drive of the switchback motor (SMT21) which rotates duplex feed rollers 1 and 2.

The switchback motor (SMT21) is a stepping motor, and can be rotated clock wise or counterclock wise according to signals sent from the CPU on the duplexing driver PCB.

The side registration guides are driven by the side registration motor (SMT22) which drives to suit the size of paper accordingly.



- (1): SIDE REGISTRATION MOTOR DRIVE signal
- ②: SWITCHBACK ROLLER RELEASE SOLENOID DRIVE signal (/PRRESLD)
- ③: DUPLEX DEFLECTOR SOLENOID DRIVE signal (/DUPSLD)
- (4): SWITCHBACK PAPER SENSOR signal (/DUPIDS)
- (5): SIDE REGISTRATION GUIDE HOME POSITION SENSOR signal (HRHGS)
- (a): DUPLEX FEED ROLLER 1 HOME POSITION SENSOR signal (DRHPS)
- (7): DUPLEXING UNIT PAPER SENSOR signal (/DUPPS)
- (8): DUPLEX FEED CLUTCH DRIVE signal (/DUPCLD)
- (9): SWITCHBACK MOTOR DRIVE signal

SMT21: Switchback motor

SMT22: Side registration motor

SL21: Switchback roller release solenoid

SL22: Duplex deflector solenoid

CL21: Duplex feed cluch

PS21: Duplexing unit paper sensor

PS22: Switchback sensor

PS23: Side registration guide home position sensor

PS24: Duplex feed roller 1 home position sensor

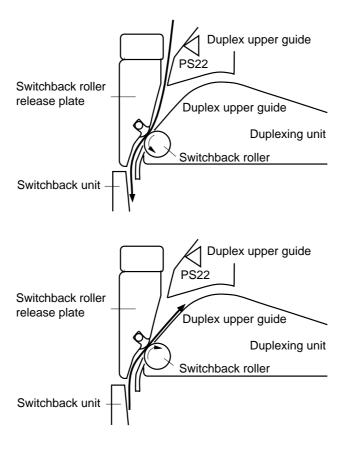
**Figure 2-9-4** 

#### 2. Switchback System

When the CPU receives commands sent from the printer to the duplexing unit, it turns the duplex deflector drive solenoid (SL22) ON, and the paper is sent into the duplexing unit.

When the leading edge of the paper is detected by the switchback paper sensor (PS22), the CPU rotates the switchback motor (SMT21) backwards (CCW) (\*note) to feed the paper into the switchback unit. Once the trailing edge is detected by sensor PS22, and after a specified period of time, the CPU rotates motor SMT21 forward (CW) into the standard feeding direction. Because the paper is fed along the duplex lower guide, it is sent into the duplex feed rollers side of the duplexing unit.

**Note:** When the size of paper being used is anything other than ledger, A3, B4 and legal, the distance between pages shortens. The CPU therefore drives SMT21 into high speed rotation after a set period of time to feed the paper into the switchback unit.



**Figure 2-9-5** 

#### 3. Side Registration Adjustment System

When duplex printing, the center of the horizontal scanning direction for the second time print is aligned with the center of the printable area on the drum with side registration adjustment. This adjustment is conducted directly after duplex feed roller 1 starts to rotate, to make sure that the edges of the page are aligned to the side registration guides.

The side registration guide home position sensor (PS23) detects whether or not the guides are in their home position.

When the power is turned ON, the CPU drives the side registration motor to return the guides back to their home position. If the guides are already in their home position when the power is turned ON, they are moved slightly, then returned to the home position.

When a print is sent to the duplexing unit with the switchback roller (rotating clock wise), the CPU turns ON the duplex feed clutch approx.0.6 second after activating the motor CW. The print is then fed until the duplex feed roller 1 home position is detected by its home position sensor (PS24). When detected, the CPU turns OFF CL21, and the paper is stopped. Following this, the CPU activates the switchback roller pressure release solenoid (SL21), releasing pressure from the roller. This completes preparation for the side registration adjustment operation.

The CPU drives the side registration motor (SMT22) at its specified pulse rate based on the paper size information received from the DC controller. The side registration guides are then moved according to the size of paper being used, and registration adjustment (\*note) takes place.

The side registration guides are returned to their home position at a set time after the print has been fed and the leading edge has been detected by the duplexing unit paper sensor (PS21). SMT22 is a stepping motor, enabling it to accurately control the movement of the side registration guides.

The CPU notifies the video controller via the DC controller of a side registration guide malfunction when the side registration guides take longer than the regulated maximum movement allowance after the home position detection begins.

**Note:** When the size of paper is anything other than A3, Ledger, A4 (landscape), Letter (landscape) or B4, the distance that the side registration guides move is lengthened. Therefore, the CPU drives SMT22 while the switch-back roller is rotating CCW, then moves the registration guide. When the paper size is A3, Ledger, A4 (landscape), Letter (landscape) or B4, at the point at which the CPU rotates the switch-back roller in a clockwise direction, it drives SMT22 and moves the side registration guides move quickly.

#### 4. Second Feed Pick-up System

On completion of the side registration adjustment, the CPU turns ON the duplex feed clutch (CL21). The CPU turns OFF CL21 approx. 1.0 second (1.9 seconds for wide and narrow paper types) after detecting the leading edge of the paper at the duplexing unit paper sensor (PS21). The CPU then stops the paper at the second-pass pick-up wait position and waits for second-pass pick-up command to be input from the printer.

On receival of these commands the CPU controls the feeding speed of the switchback motor (SMT21) according to the paper feed speed of the printer. Following this CL21 is turned ON and the paper is fed into the printer.

## E. Paper Jam Detection

The following paper sensors are installed to detect the presence of paper and that paper is being fed correctly.

- duplexing unit paper sensor (PS21)
- switchback paper sensor (PS22)

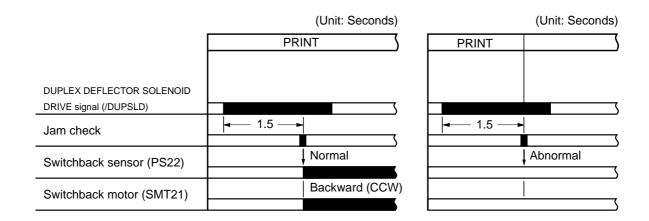
Jams are detected by the CPU on the duplexing driver PCB by determining whether or not paper is at the appropriate sensor at the correct pre-set timing.

When the CPU assesses that a jam has occurred, the duplex feeding process is stopped and the DC controller is notified of the jam.

**Note:** Times T1 and T2 indicate the smallest and largest paper sizes respectively.

#### 1. Switchback unit delay jam

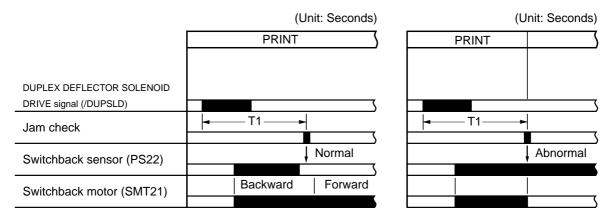
When the paper has not reached the switchback paper sensor (PS22) in the specified time after the duplexing pick-up process has begun, the CPU assesses that a switchback unit delay jam has occurred.



**Figure 2-9-6** 

#### 2. Switchback stationary jam

When the paper has not passed through the switchback paper sensor (PS22) in the specified time after the duplexing pick-up process has begun, the CPU assesses that a switchback unit stationary jam has occurred.

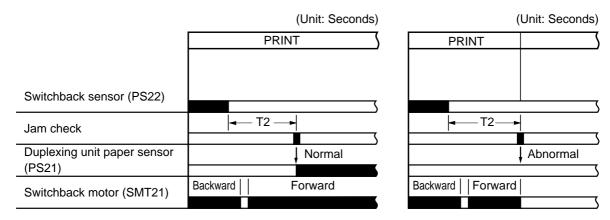


T1: About 3.7 seconds (A4), About 5.8 seconds (Ledger)

**Figure 2-9-7** 

## 3. Duplex feed unit delay jam

When the paper has not reached the duplexing unit paper sensor (PS21) after leaving the switchback paper sensor (PS22) in the specified time, the CPU assesses that a duplex feed unit delay jam has occurred.



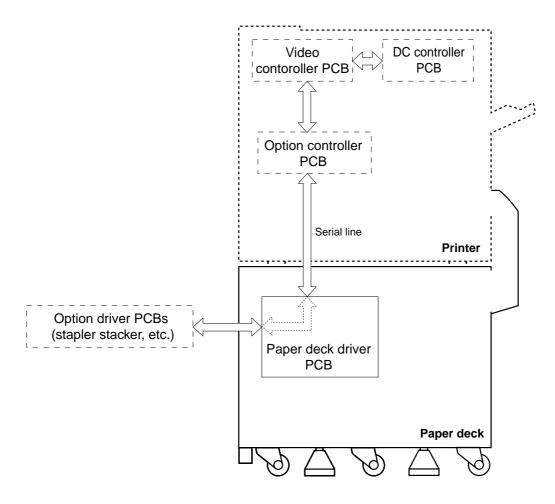
T2: About 2.4 seconds (A4), About 3.2 seconds (Ledger)

**Figure 2-9-8** 

# X. PAPER DECK

#### A. Outline

The paper deck sends the paper to the printer, which subsequently prints and delivers the paper. The printer is controlled by various commands sent from the video controller, whereas the paper deck is controlled by commands sent from the option controller. The option controller also controls the other options (stapler stacker, etc.) via the paper deck. The video controller controls the printer and the various options by controlling the DC controller and the option controller in the printer.



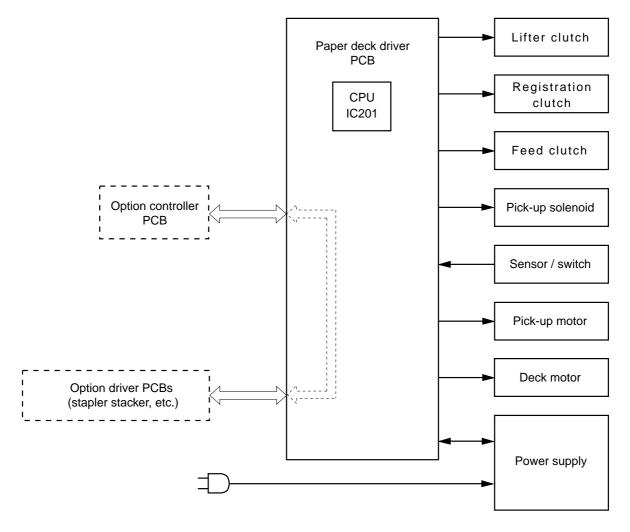
**Figure 2-10-1** 

#### **B.** Outline of the Electrical System

The paper deck operation sequence is controlled by the paper deck driver PCB. The 8 bit CPU (IC201) in the paper deck driver PCB controls the operation sequence and serial communication with the option controller PCB.

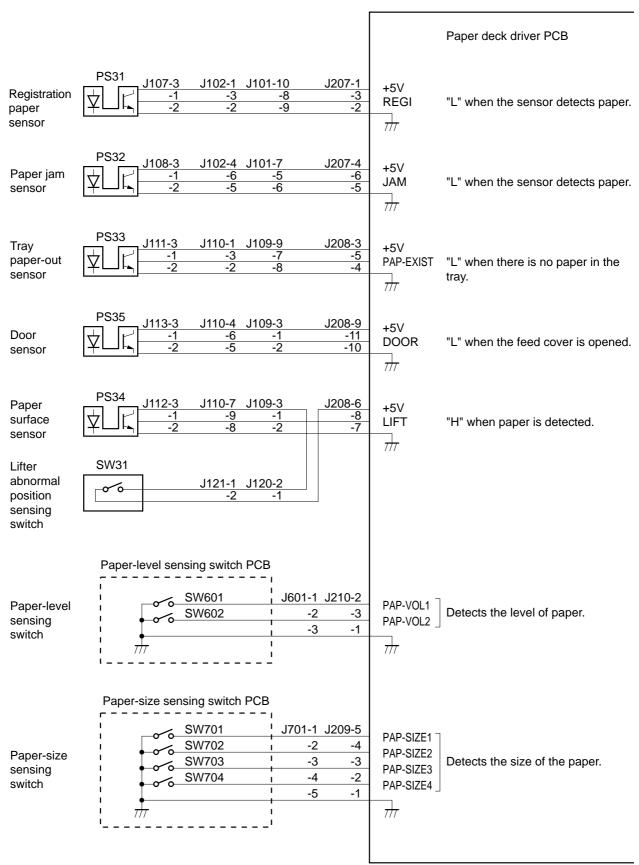
The paper deck driver drives the solenoid and motors etc. with commands sent by serial communication from the option controller. The paper deck driver also notifies the option controller by serial communication of the status of the various sensors and switches.

The diagram below outlines the flow of signals between the paper deck and the option controller.



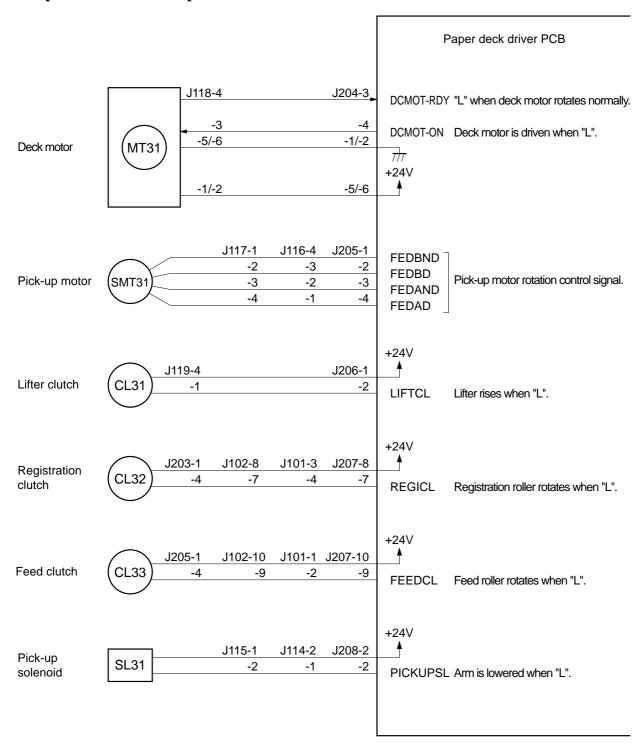
**Figure 2-10-2** 

# C. Paper Deck Driver Inputs



**Figure 2-10-3** 

# **D.** Paper Deck Driver Outputs



**Figure 2-10-4** 

## E. Pick-up/Feed System

#### 1. Outline

Presence of paper in the paper deck is detected by the tray paper-out sensor (PS33), and the remaining amount of paper is detected by outputs from the paper-level sensing switch 1 (SW601) and paper-level sensing switch 2 (SW602). The combination of the two paper-level sensing switches is shown in table 2-10-1.

The size of the paper is detected by a combination of 4 paper-size sensing switches (SW701 - 704), which are shown table 2-10-2.

After receiving a pick-up command from the option controller the paper deck driver rotates the pick-up motor (SMT31), and simultaneously turns the pick-up solenoid (SL31) ON. The pick-up roller, feed roller1 and the separation roller then rotate sending a sheet of paper.

The paper sent into the feed unit passes through the registration paper sensor (PS31) and stops momentarily at the registration roller. The registration clutch (CL32) is then turned ON, and the paper is sent through into the printer.

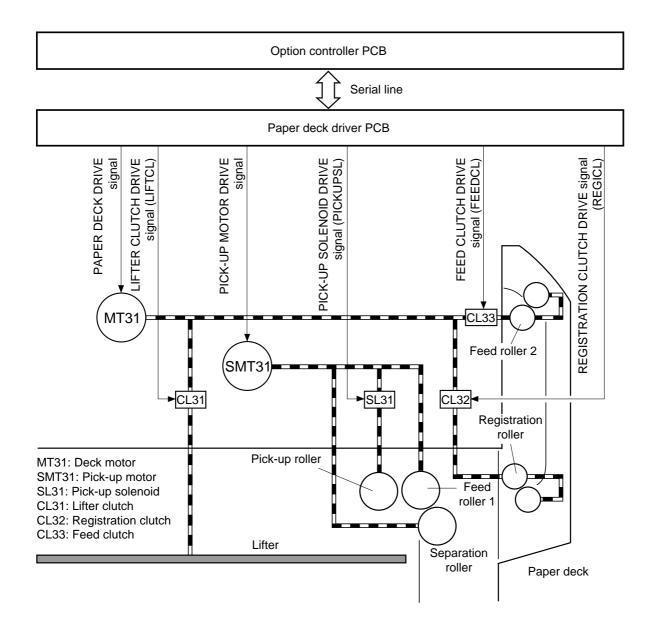
The two photointerrupters (PS31,PS32) in the feed path detect the paper as it reaches and passes through them. If the paper does not reach or pass through the various sensors in the designated time, the paper deck driver assesses a paper jam and notifies the option controller while stopping the operation.

Paper-size sensing switch Remaining Remaining paper % paper level SW601 SW602 ON ON Almost full 100 High **OFF** ON 75 OFF OFF Low 50 ON OFF Almost empty 25

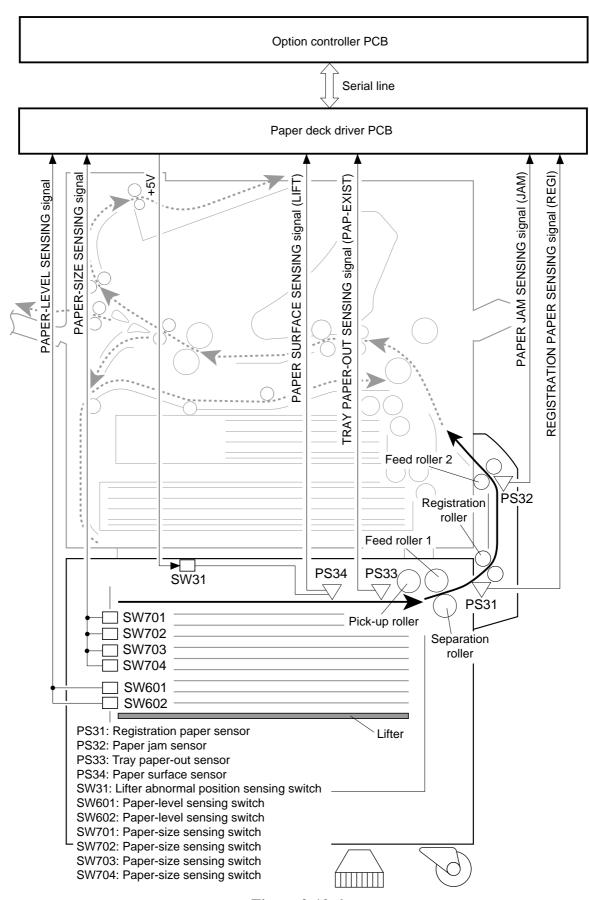
**Table 2-10-1** 

|            | Cassette-size sensing switch |       |       |       |
|------------|------------------------------|-------|-------|-------|
| Paper size | SW701                        | SW702 | SW703 | SW704 |
| Ledger     | OFF                          | ON    | OFF   | OFF   |
| A3         | ON                           | ON    | OFF   | OFF   |
| B4         | OFF                          | OFF   | ON    | OFF   |
| Legal      | OFF                          | ON    | ON    | OFF   |
| Letter     | OFF                          | ON    | OFF   | ON    |
| A4         | ON                           | ON    | OFF   | ON    |

**Table 2-10-2** 



**Figure 2-10-5** 



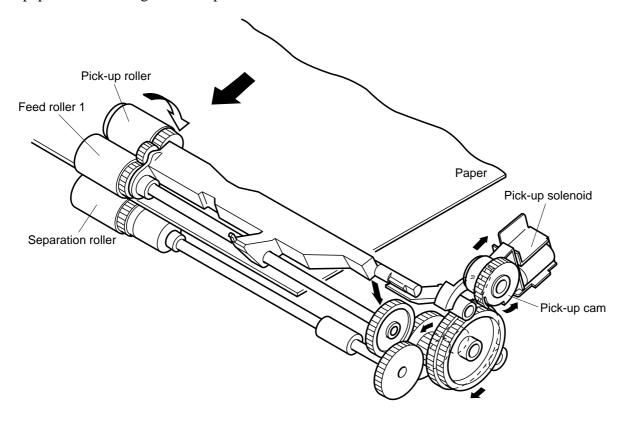
**Figure 2-10-6** 

#### 2. Pick-up/Feeding

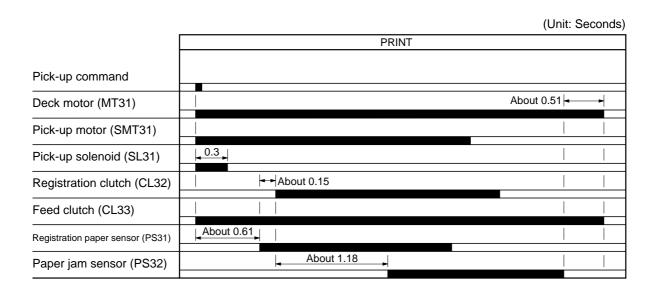
The paper deck driver drives the pick-up motor (SMT31) after receiving a pick-up command from the option controller. SMT31 rotates the pick-up, feed, and separation rollers. The paper deck driver simultaneously turns the feed clutch (CL33) and pick-up solenoid (SL31) ON, and rotates the pick-up cam. One sheet of paper is picked-up as the rotating pick-up roller is lowered to the paper surface.

After any excess pages have been separated by the separation roller, one sheet is sent into the feed unit with feed roller 1.

The paper reaches the registration roller after passing through the registration paper sensor (PS31). As the registration roller is not rotating, the paper stops momentarily and the leading edge is looped to straighten out any skew. The registration clutch (CL32) is then turned ON and the paper is sent through into the printer.



**Figure 2-10-7** 



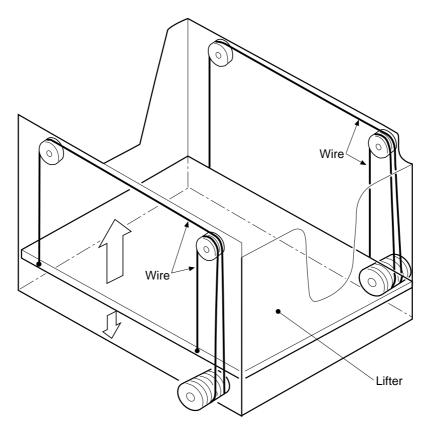
**Figure 2-10-8** 

#### 3. Lifter Operation

The lifter in the tray is strung by 4 wires. The wires are wound around the 4 pulleys when the deck motor is driven, to raise the lifter. When the tray is pulled out, the gear on the pulley and the motor gear are disengaged, and the lifter drops under its own weight.

The paper-size sensing switches (SW701 - 704) detect whether the tray is installed in the deck. Once the paper deck driver has detected that the tray is correctly installed, it turns the lifter clutch (CL31) ON. The lifter is raised until the paper surface sensor (PS34) turns "H". When the paper level has dropped and PS34 has turned to "L", the paper deck driver re-activates CL31 and raises the lifter until PS34 returns to "H".

If the lifter has not reached PS34 within the designated time after starting to rise, the paper deck driver assesses a lifter failure and notifies the option controller. When paper is loaded in the tray as shown in Figure 2-10-10, there is a possibility that the wires will break from the excess strain as the paper deck driver will try to raise the lifter until the paper is detected by PS32. To prevent this from happening, the lifter abnormal position sensing switch (SW31) has been installed. When SW31 goes ON due to detecting paper, the lifter is stopped in the same way as when PS34 turns to "H". A lifter failure is notified by the paper deck driver to the option controller.



**Figure 2-10-9** 

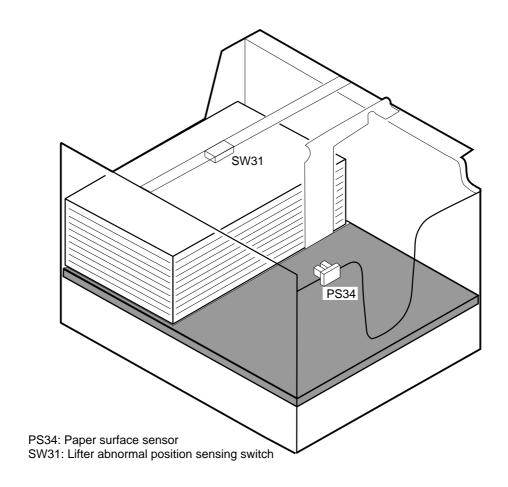


Figure 2-10-10

#### F. Paper Jam Detection

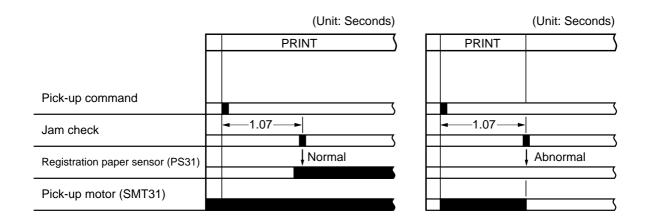
The following paper sensors are installed to detect the presence of paper and ensure that the paper is fed correctly.

- Registration paper sensor (PS31)
- Paper jam sensor (PS32)

The CPU determines whether or not a paper jam has occurred by monitoring the paper at each of the sensors according to the pre-set 'check timing' in the memory. When the CPU assesses that a jam has occurred, the feed operation to the printer is stopped, and notification of the jam is sent to the option controller.

#### 1. Pick-up delay jam

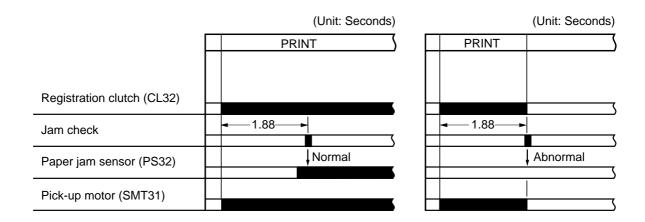
If the paper has not reached the registration sensor (PS31) in the designated time after receiving the pick-up command, the CPU assesses a pick-up delay jam.



**Figure 2-10-11** 

#### 2. Feed unit delay jam

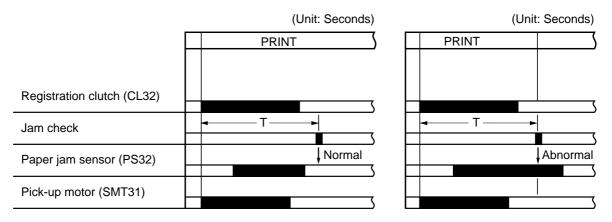
If the paper has not reached the paper jam sensor (PS32) in the designated time after the registration clutch (CL32) is driven, the CPU assesses a feed unit delay jam.



**Figure 2-10-12** 

## 3. Feed unit stationary jam

If the paper has not passed the paper jam sensor (PS32) in the designated time after the registration clutch (CL32) is driven, the CPU assesses a feed unit stationary jam.



T: 0.63 second (A4), 0.84 second (Ledger)

**Figure 2-10-13** 

#### G. Power Supply

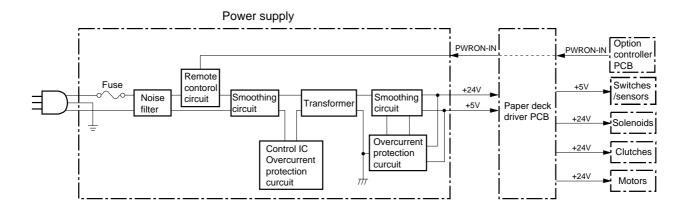
#### 1. Outline

This machine's power supply utilizes the remote switch method.

When the printer is turned ON, the printer outputs commands to the option controller through the video controller. The option controller outputs a POWER ON signal (PWRON-IN) to the power supply through the paper deck driver to turn the power ON. When PWRON-IN signal turns "H", the power supply circuit supplies the paper deck driver with +24V and +5V.

+24V is used to drive the deck motor, pick-up motor, clutch and solenoid etc., and +5V is for the sensors and ICs etc. on the paper deck driver PCB.

This is outlined in the block diagram below.



**Figure 2-10-14** 

#### 2. Protection System

On the various +24V and +5V power supply circuits is an overcurrent protection system which automatically cuts the output voltage protecting the circuits from being damaged in the event that overcurrent should flow due to some form of trouble or from one of the loads shorting. Therefore, when the overcurrent protection circuit is activated and DC voltage is not being output from the power supply circuit, after turning the printer power OFF and rectifying the problem, turn the power ON again.

# **CHAPTER 3**

# THE MECHANICAL SYSTEM

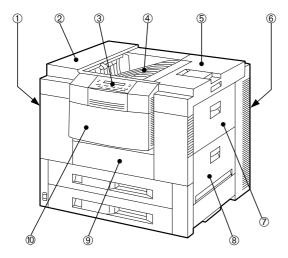
This chapter describes mechanical operation as well as disassembly and reassembly procedures of the printer. Note the following precautions during disassembly or reassembly.

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

| I.   | EXTERNALS              | 3-1  | VI.   | FIXING SYSTEM         | 3-24 |
|------|------------------------|------|-------|-----------------------|------|
| II.  | DRIVE SYSTEM           | 3-10 | VII.  | ELECTRONIC COMPONENTS | 3-32 |
| III. | PAPER TRANSPORT SYSTEM | 3-12 | VIII. | ENVELOPE FEEDER       | 3-39 |
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# I. EXTERNALS

#### A. External Covers



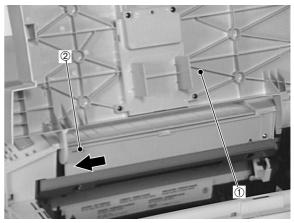
- ① Delivery cover unit
- 2 Upper cover unit
- ③ Operation panel unit
- Face-down tray
- ⑤ Upper cover
- 6 Rear cover
- Multi-purpose tray
- ® Pick-up unit door
- Duplexing unit door
- Front cover

**Figure 3-1-1** 

When cleaning, checking or repairing inside the printer, remove the necessary covers by following the procedures below.

# 1. Face-down tray

- 1) Open the upper cover.
- 2) Move the lock lever in the direction of the arrow.

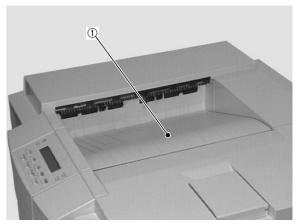


① Upper cover

2 Lock lever

**Figure 3-1-2** 

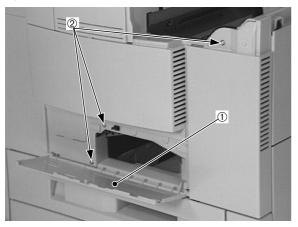
3) Close the upper cover and remove the face-down tray.



① Face-down tray

**Figure 3-1-3** 

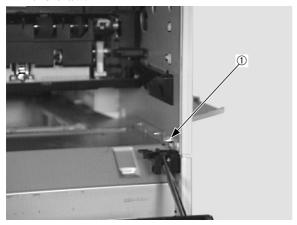
- 2. Front cover
- 1) Open the upper cover.
- 2) Open the duplexing unit door.
- 3) Remove the 3 screws.



- ① Duplexing unit door
- 2 Screws

**Figure 3-1-4** 

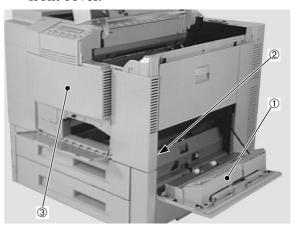
4) Open the delivery cover unit, and unclip the claw.



① Claw

**Figure 3-1-5** 

5) Open the pick-up unit door, and disconnect the claw and remove the front cover.

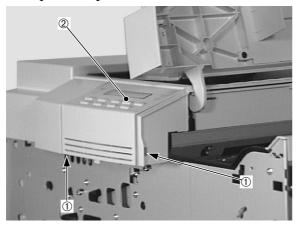


- ① Pick-up unit door
- 2 Claw
- 3 Front cover

**Figure 3-1-6** 

## 3. Upper cover unit

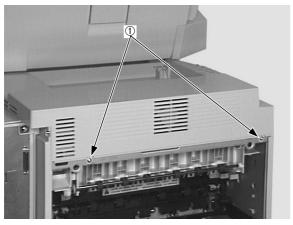
- 1) Remove the face-down tray.
- 2) Remove the front cover.
- 3) Remove the 2 claws, and then the operation panel unit.
- 4) Disconnect the connector from the operation panel unit.



- 1) Claws
- 2 Operation panel unit

**Figure 3-1-7** 

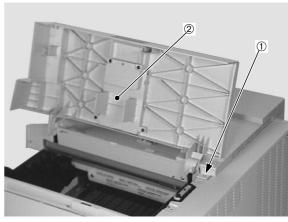
5) Remove the 2 screws.



① Screws

**Figure 3-1-8** 

6) Remove the screw, and then the upper cover unit.



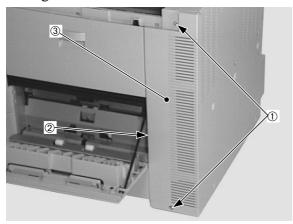
① Screw

2 Upper cover unit

**Figure 3-1-9** 

#### 4. Rear cover

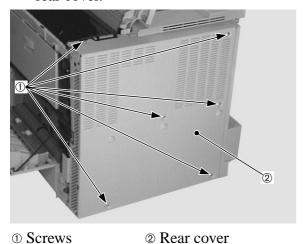
- 1) Open the upper cover.
- 2) Open the pick-up unit door.
- 3) Remove the 2 screws, the claw, and the right rear cover.



- ① Screws
- 2 Claw
- 3 Right rear cover

**Figure 3-1-10** 

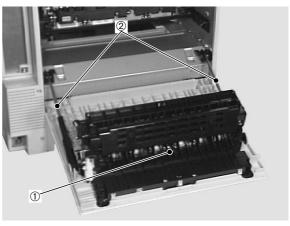
4) Remove the 6 screws and take off the rear cover.



**Figure 3-1-11** 

## 5. Delivery cover unit

- 1) Open the delivery cover unit.
- 2) Remove the 2 rods holding the delivery cover unit to the printer.
- 3) Slightly lift the delivery cover unit, pull out the right side first, then the left.



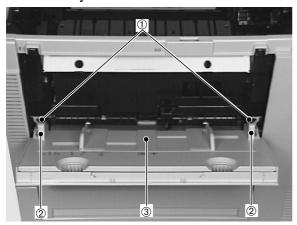
① Rods

2 Delivery cover unit

**Figure 3-1-12** 

## 6. Multi-purpose tray

- 1) Open the multi-purpose tray.
- 2) Remove the 2 stoppers.
- 3) Undo the 2 claws holding the multipurpose tray unit, and pull the tray out toward you.

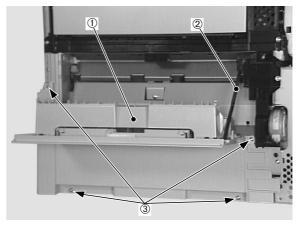


- ① Stoppers
- 2 Claws
- 3 Multi-purpose tray

**Figure 3-1-13** 

## 7. Right cover unit

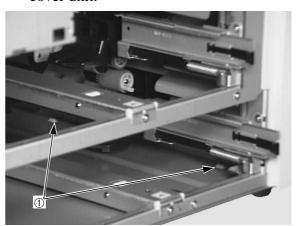
- 1) Remove the front cover.
- 2) Remove the right rear cover.
- 3) Remove the hinge from the right cover unit, and then the 4 screws.



- ① Right cover unit ② Hinge
- 3 Screws

**Figure 3-1-14** 

- 4) Remove the cassettes.
- 5) Remove the 2 claws, and then the right cover unit.

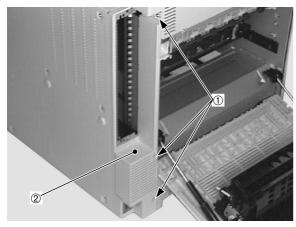


① Claws

**Figure 3-1-15** 

#### 8. Left rear cover

- 1) Open the delivery cover.
- 2) Remove the video controller PCB unit following the procedure on page 3-32.
- 3) Remove the 3 screws and the left rear cover.



① Screws

② Left rear cover

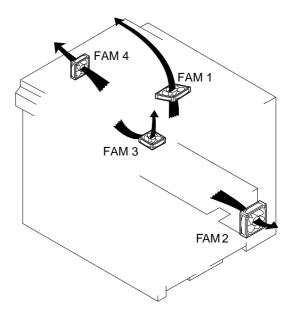
**Figure 3-1-16** 

#### **B.** Fans

#### 1. Summary

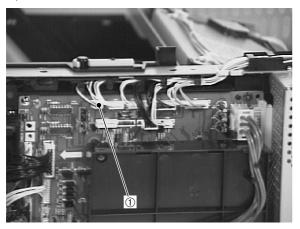
There are 4 fan motors installed to circulate air within the printer and prevent the internal temperature from rising.

- Fixing unit/scanner unit fan (FM1): Blows air from the fixing unit and the scanner unit vicinity.
- Power supply fan (FM2): Blows air from the power supply.
- Electrical unit fan (FM3): Intake fan for the video controller unit.
- Fixing unit fan (FM4): Blows air from the fixing unit vicinity.



**Figure 3-1-17** 

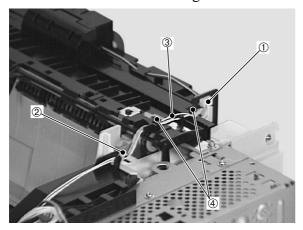
- 2. Removal from the printer
- a. Fixing unit/scanner unit fan (FM1)
- 1) Remove the right rear and rear covers.
- 2) Remove the upper cover unit.
- 3) Disconnect the connector.



① Connector

**Figure 3-1-18** 

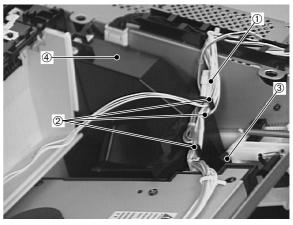
- 4) Disconnect the connector.
- 5) Remove the cable tie, and then remove the cable from the cable guide.



- 3 Cable
- 2 Cable tie

**Figure 3-1-19** 

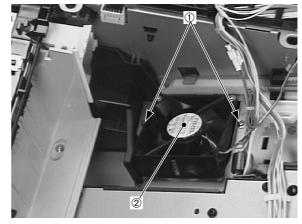
- 6) Remove the cable from the guide.
- 7) Unhook the claw, then remove the fan duct.



- ① Cables
- ② Cable guide
- 3 Claw
- Fan duct

**Figure 3-1-20** 

8) Remove the 2 screws, and then the fixing unit/scanner unit fan.

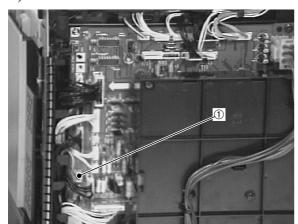


- ① Screws
- ② Fixing unit/scanner unit fan

**Figure 3-1-21** 

## b. Power supply fan (FM2)

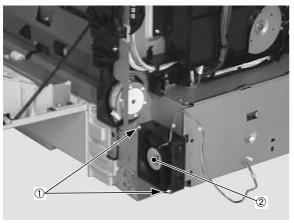
- 1) Remove the right rear and rear covers.
- 2) Disconnect the connector.



① Connector

**Figure 3-1-22** 

3) Remove the 2 screws, and then the power supply fan.



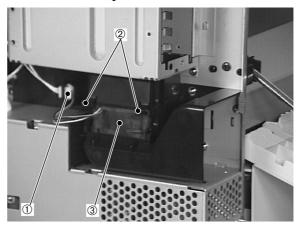
① Screws

2 Power supply fan

**Figure 3-1-23** 

#### c. Electrical unit fan (FM3)

- 1) Remove the right rear and rear covers.
- 2) Remove the left rear cover.
- 3) Undo the connector.
- 4) Pinch the 2 claws holding the electrical unit fan and pull out the fan.



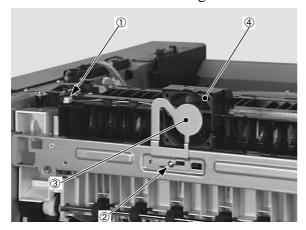
① Connector

2 Claws

3 Electrical unit fan

**Figure 3-1-24** 

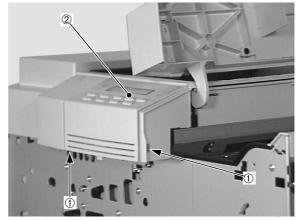
- d. Fixing unit fan (FM4)
- 1) Remove the upper cover unit.
- 2) Undo the connector.
- 3) Remove the screw, and then the fan grounding plate. Disconnect the 4 claws to remove the fixing unit fan.



- ① Connector
- 2 Screw
- 3 Fan grounding plate
- Fixing unit fan

**Figure 3-1-25** 

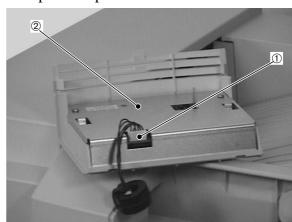
- C. Operation Panel Unit
- 1. Removal from the printer
- 1) Open the upper cover unit.
- 2) Remove the front cover.
- 3) Remove the 2 claws, and then the operation panel unit.



- 1 Claws
- 2 Operation panel unit

**Figure 3-1-26** 

4) Remove the connector, and then the operation panel unit.



- ① Connector
- ② Operation panel unit

**Figure 3-1-27** 

## II. DRIVE SYSTEM

#### A. Drive Unit

## 1. Removal from the printer

- 1) Remove the pick-up unit following steps 1-7 on Page 3-12.
- 2) Remove the screw, and then the cassette stay.

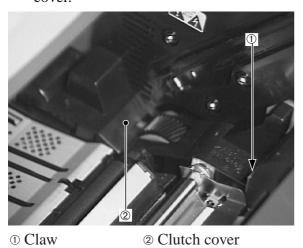


① Screw

② Cassette stay

**Figure 3-2-1** 

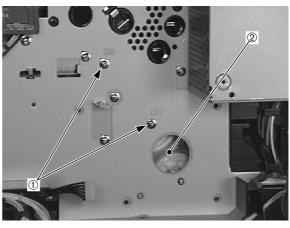
3) Disconnect the claw, and then the clutch cover.



**Figure 3-2-2** 

- 4) Remove the high-voltage power supply unit following steps 1-2 on Page 3-36.
- 5) Undo the connector, remove the 4 screws and then the main motor.

6) Remove the 2 screws and the drive unit.



① Screws

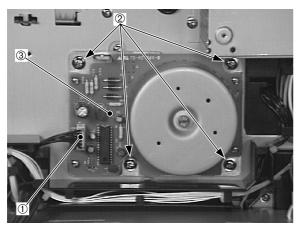
2 Drive unit

**Figure 3-2-3** 

## **B.** Main Motor

## 1. Removal from the printer

- 1) Remove the high-voltage power supply unit following steps 1-2 on Page 3-36.
- 2) Undo the connector, remove the 4 screws and then the main motor.



- ① Connector
- ② Screws
- 3 Main motor

**Figure 3-2-4** 

# III. PAPER TRANSPORT SYSTEM

#### A. Pick-up Unit

- 1. Removal from the printer
- 1) Pull out the upper and lower cassettes.
- 2) Perform steps 1-6 on Page 3-17 to remove the manual feed pick-up unit.
- 3) Remove the right cover.
- 4) Undo the connector.

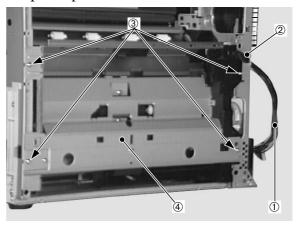


1 Connector

**Figure 3-3-1** 

- 5) Perform steps 1-2 on Page 3-20 to remove the pick-up, feed and separation rollers.
- 6) Remove the cable from the guide.

7) Remove the 4 screws, and take out the pick-up unit.

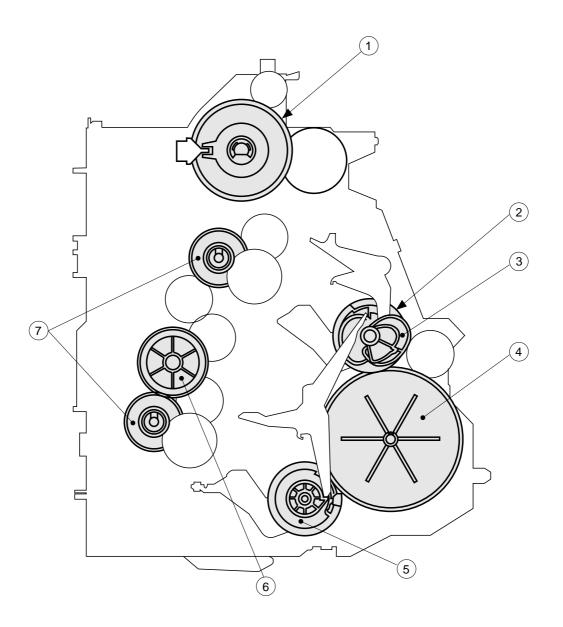


- ① Cable
- ② Cable guide
- 3 Screws
- Pick-up unit

**Figure 3-3-2** 

Note: 1. While replacing parts in the pick-up unit, to prevent grease from getting on the pick-up, feed and separation rollers, be sure to remove them before working on the unit. Take care not to get grease on the paper feed guide.

2. Be sure to grease the gears shown in figure 3-3-3 when exchanging, to prevent noise. The type of grease (do not use grease other than the specified type) and the method of application is explained below: Grease: Permalub SHV-2 Application method: Apply a small amount of grease to 3 or more continuous cogs on the gear.



**Figure 3-3-3** 

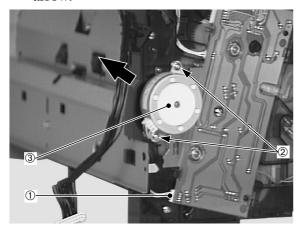
- ① 57T gear
- 2 Upper lift-up cam3 Pick-up cam4 100T gear

- Lower lift-up cam 31T/47T gear
- ② 20T/41T gear

## 2. Disassembly/reassembly

## a. Pick-up motor

- 1) Undo the connector.
- 2) Remove the 2 screws, and slide the pick-up motor out in the direction of the arrow.

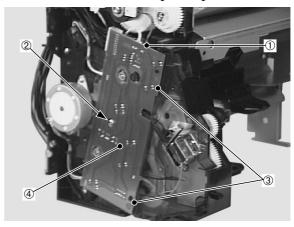


- ① Connector
- 2 Screws
- 3 Pick-up motor

**Figure 3-3-4** 

#### b. Feed clutch

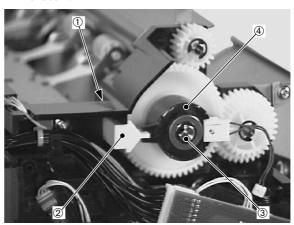
- 1) Disconnect the connector.
- 2) Remove the screw, and disconnect the 2 claws to remove the pick-up PCB.



- ① Connector
- 2 Screws
- 3 Claws
- Pick-up PCB

**Figure 3-3-5** 

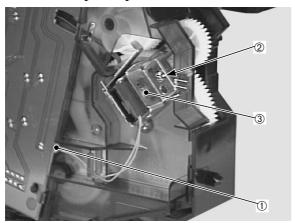
- 3) Undo the claw and remove the clutch fixing plate.
- 4) Remove the E-ring, and then the feed clutch.



- ① Claw
- 2 Clutch fixing plate
- 3 E-ring
- Feed clutch

**Figure 3-3-6** 

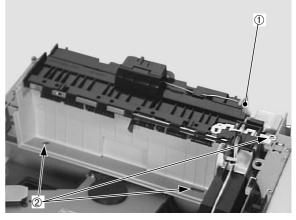
- c. Cassette pick-up solenoid
- 1) Disconnect the connector.
- 2) Remove the screw and take out the cassette pick-up solenoid.



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

**Figure 3-3-7** 

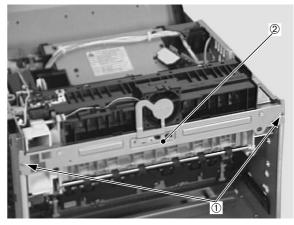
- **B.** Delivery Unit
- 1. Removal from the printer
- 1) Remove the upper cover unit.
- 2) Remove the front cover.
- 3) Remove the right rear and rear covers.
- 4) Open the delivery cover unit.
- 5) Remove the left rear cover.
- 6) Disconnect the connector and remove the 3 screws.



- ① Screws
- ② Connector

**Figure 3-3-8** 

- 7) Remove the 2 screws.
- 8) Slightly lift the delivery unit up then pull it out toward you.



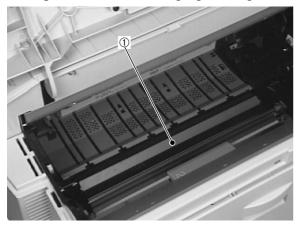
- ① Screws
- 2 Delivery unit

**Figure 3-3-9** 

#### C. Registration Roller Unit

#### 1. Removal from the printer

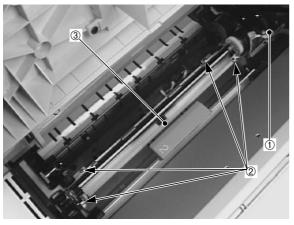
- 1) Open the upper cover.
- 2) Remove the clutch cover.
- 3) Open the transfer charging roller guide.



① Transfer charging roller guide

**Figure 3-3-10** 

- 4) Undo the connector.
- 5) Remove the 4 screws and take out the registration roller unit.



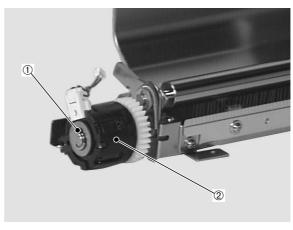
- ① Connector
- 2 Screws
- ③ Registration roller unit

**Figure 3-3-11** 

#### 2. Disassembly/reassembly

#### a. Registration clutch

1) Remove the E-ring and the registration clutch.



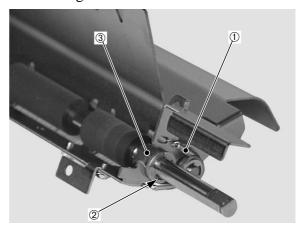
① E-ring

2 Registration clutch

**Figure 3-3-12** 

#### b. Registration lower roller

- 1) Remove the registration clutch.
- 2) Remove the spring, the E-ring and the bushing.

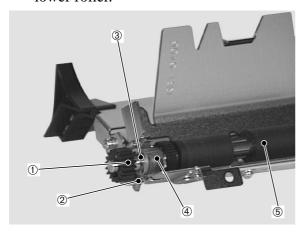


2 E-ring

3 Bushing

**Figure 3-3-13** 

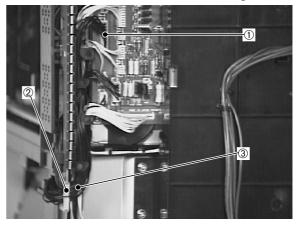
3) Remove the gear, the spring, the E-ring, the bushing, and then the registration lower roller.



- ① Gear
- 2 Spring
- 3 E-ring
- Bushing
- S Registration lower roller

**Figure 3-3-14** 

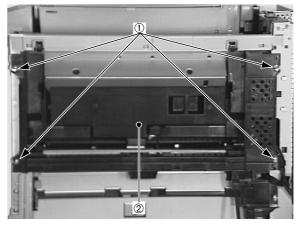
- D. Manual Feed Pick-up Unit
- 1. Removal from the printer
- 1) Remove the front cover.
- 2) Remove the rear cover.
- 3) Remove the multi-purpose tray.
- 4) Open the pick-up unit door.
- 5) Disconnect the connector, and then remove the cable from the cable guide.



- 3 Cable
- ② Cable guide

**Figure 3-3-15** 

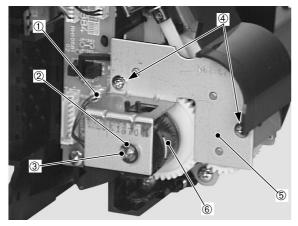
6) Remove the 4 screws, and then the manual feed pick-up unit.



- ① Screws
- 2 Manual feed pick-up unit

**Figure 3-3-16** 

- 2. Disassembly/reassembly
- a. Manual feed pick-up clutch
- 1) Disconnect the connector.
- 2) Remove the E-ring and the bushing.
- 3) Remove the 2 screws, then take out the drive side plate and the manual feed pick-up clutch.

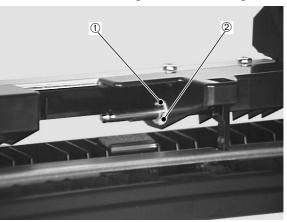


- ① Connector
- ② E-ring
- 3 Bushing
- **4** Screws
- ⑤ Drive side plate
- Manual feed pick-up clutch

**Figure 3-3-17** 

#### b. Lifting plate solenoid

- 1) Perform steps 1-3 on Page 3-19 to remove the manual feeding pick-up roller.
- 2) Remove the E-ring and the bushing.

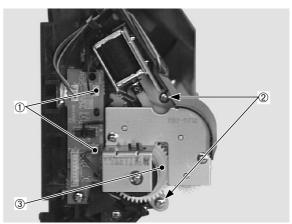


① E-ring

2 Bushing

**Figure 3-3-18** 

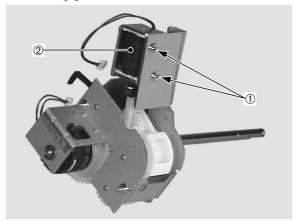
- 3) Disconnect the connector.
- 4) Remove the 2 screws, and then the manual feed drive unit.



- ① Connector
- ② Screws
- 3 Manual feed drive unit

**Figure 3-3-19** 

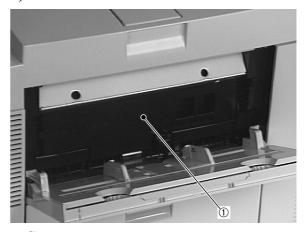
5) Remove the 2 screws, and then the lifting plate solenoid.



- ① Screws
- ② Lifting plate solenoid

**Figure 3-3-20** 

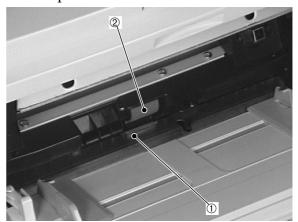
- E. Manual Feeding Pick-up Roller
- 1. Removal from the printer
- 1) Open the multi-purpose tray.
- 2) Remove the cover.



① Cover

**Figure 3-3-21** 

3) While pressing the lifting plate, grasp the manual feeding pick-up roller knob, and pull out the roller.



- ① Lifting plate
- ② Manual feeding pick-up roller

**Figure 3-3-22** 

#### F. Separation Pad

#### 1. Removal from the printer

- 1) Open the multi-purpose tray.
- 2) Remove the cover.
- 3) Remove the manual feeding pick-up roller.
- 4) Use a flat-bladed screwdriver to remove the separation pad.



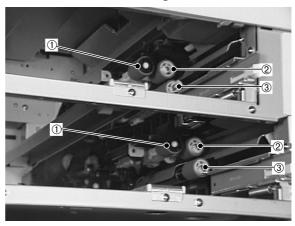
① Separation pad

**Figure 3-3-23** 

## G. Pick-up/Feed/Separation Rollers

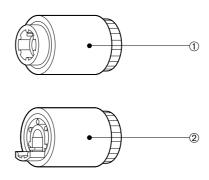
## 1. Removal from the printer

- 1) Pull out the upper and lower cassettes.
- 2) Grasp the knobs of each roller and pull the rollers out of the printer.



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

**Figure 3-3-24** 



- ① Pick-up roller
- ② Feed roller/Separation roller

**Figure 3-3-25** 

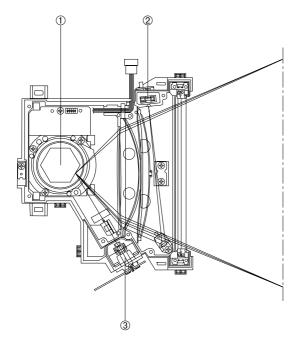
**Note:** Be sure to replace the feed roller and the separation roller together.

## IV. EXPOSURE SYSTEM

#### A. Laser/Scanner Unit

### 1. Configuration

The laser/scanner unit scans the laser beam across the photo-sensitive drum. The configuration of the laser/scanner unit is shown in the below figure.

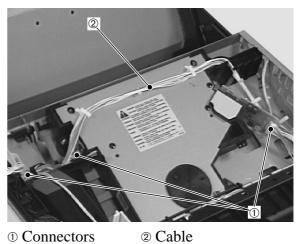


- ① Scanner unit
- ② BD PCB
- 3 Laser unit

**Figure 3-4-1** 

### 2. Removal from the printer

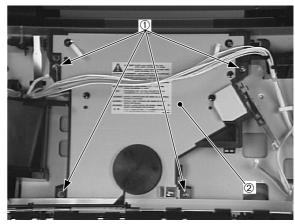
- 1) Remove the upper cover unit.
- 2) Disconnect the 3 connectors and the cable from the laser/scanner unit.



e Can

**Figure 3-4-2** 

3) Remove the 4 screws and the laser/scanner unit.



① Screws

2 Laser/scanner unit

**Figure 3-4-3** 

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

# V. ELECTROSTATIC IMAGING/DEVELOPING/CLEANING SYSTEM

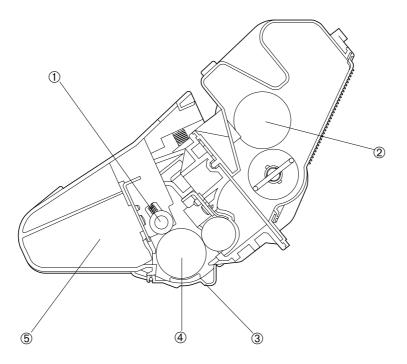
#### A. EP-W Cartridge

#### 1. Configuration

The EP-W cartridge is comprised of the photosensitive drum, primary charging roller, developing unit, cleaning unit, etc.

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

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



- ① Primary charging roller④ Photosensitive drum
- ② Developing unit
  - <sup>⑤</sup> Drum cleaning unit
- 3 Protective shield

**Figure 3-5-1** 

#### a. Drum Protective Shutter

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

#### 2. Photosensitive drum

As a general rule, do not touch the photosensitive drum with your hand nor clean it. However, if it becomes necessary to clean it, do so in the following way.

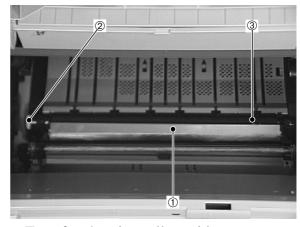
- 1) Open the upper cover to remove the EP-W cartridge.
- 2) Open the protective shutter.
- 3) Apply toner to a flannel cloth and clean the dirty drum surface.

**Notes: 1.** Rotate the drum in the same direction that it rotates during printing.

Do not rotate the drum in the opposite direction as the connection of the plate spring that applies developing bias to the developing cylinder will be damaged. Do not touch the photosensitive section of the drum.

- **2.** Do not use lint-free paper as it will scratch the drum.
  - Do not use solvents when cleaning.
- **3.** Clean the drum quickly as lengthy exposure to light can have adverse effects on print images.

- **B.** Transfer Charging Roller
- 1. Removal from the printer
- 1) Open the upper cover.
- 2) Open the transfer charging roller guide.
- 3) Pinch the gear, lift it slightly, and slide it to the left. Remove the transfer charging roller.



- ① Transfer charging roller guide
- ② Gear
- ③ Transfer charging roller

#### **Figure 3-5-2**

**Notes: 1.** Clean the transfer charging roller only when it becomes very dirty.

Be careful when cleaning not to touch the roller or get solvents or oil on it.

Clean it with dry lint-free paper (that does not produce paper dust). Do not use water or solvents.

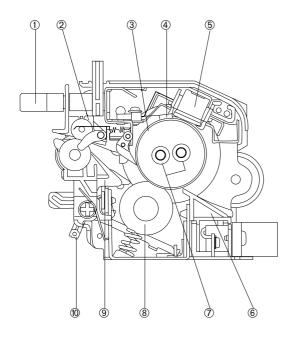
2. Replace the transfer charging roller when you cannot remove the paper dust, toner, etc. with the lint-free paper or when it has deformed.

## VI. FIXING SYSTEM

#### A. Fixing Unit

#### 1. Configuration

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

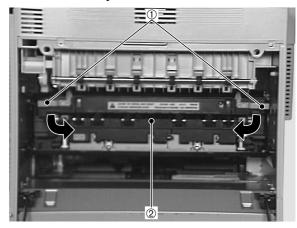


- ① Fixing unit fastening levers
- ② Separation upper guide
- ③ Fixing upper roller
- **4** Thermistor
- **5** Thermoswitch
- ® Fixing entrance guide
- Tixing heater
- ® Fixing lower roller
- Separation lower guide
- ® Envelope lever

**Figure 3-6-1** 

#### 2. Removal from the printer

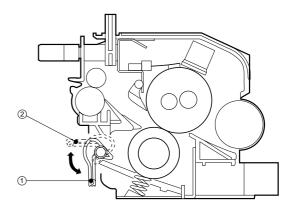
- 1) Open the delivery cover unit.
- 2) Move the 2 fastening levers of the fixing unit in the direction of the arrow, slightly lift the fixing unit, and pull it out toward you.



- ① Fixing unit fastening levers
- 2 Fixing unit

**Figure 3-6-2** 

**Note:** When replacing the fixing unit, be sure to confirm the location of the fixing unit envelope lever before replacement and then position it the same way after installing the new fixing unit.

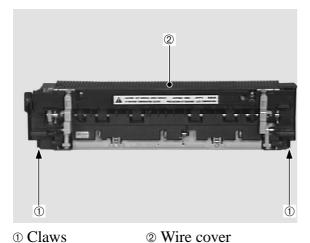


- ① Normal mode ② Envelope mode
  - **Figure 3-6-3**

## 3. Disassembly/reassembly

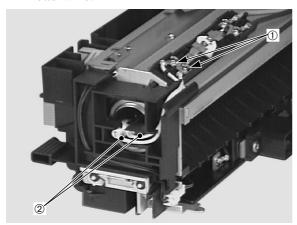
#### a. Fixing roller heater

1) Disconnect the 2 claws that hold the wire cover to the fixing unit, and then remove the wire cover.



**Figure 3-6-4** 

2) Remove the 2 screws and the fixing unit lead wire.

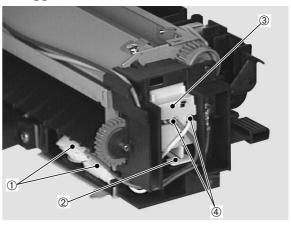


① Screws

2 Lead wire

**Figure 3-6-5** 

- 3) Take out the 2 connectors.
- 4) Disconnect the heater claw of the holder and remove the holder. Then, gently pull out the fixing heater from the fixing upper roller.

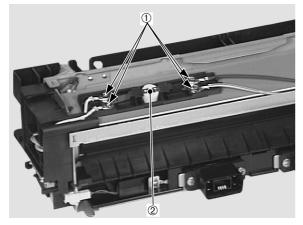


- ① Connectors
- 2 Claw
- 3 Heater holder
- Fixing heater

**Figure 3-6-6** 

#### b. Thermoswitch

- 1) Remove the wire cover.
- 2) Remove the 4 screws and then the lead wire and the thermoswitch.

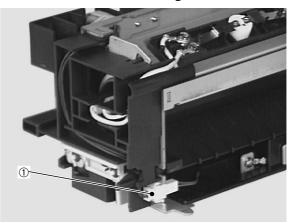


- ① Screws
- ② Thermoswitch

**Figure 3-6-7** 

#### c. Thermistor

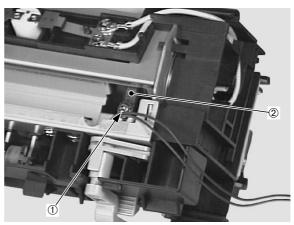
- 1) Remove the wire cover.
- 2) Disconnect the connector and remove the cable from the fixing left cover.



① Connector

**Figure 3-6-8** 

3) Remove the screw and the thermistor.



① Screw

2 Thermistor

**Figure 3-6-9** 

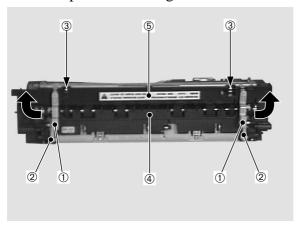
### <Note on reassembly>

When installing the thermistor, ensure that its detection surface is uniformly contacting the fixing upper roller surface.

If it is not making an uniform contact, check that the plate spring has not deformed.

#### d. Fixing upper roller

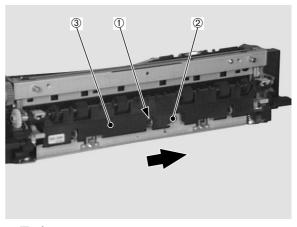
- 1) Hold up the left and right levers in the direction of the arrow.
- 2) Holdup the left and right envelope levers.
- 3) Remove the 2 screws then remove the separation upper guide while pulling out the separation lower guide.



- ① Fixing unit fastening levers
- 2 Envelope lever
- 3 Screws
- Separation lower guide
- Separation upper guide

**Figure 3-6-10** 

4) Remove the E-ring and the spring, then pull out the separation lower guide toward you and slide it off in the direction of the arrow.

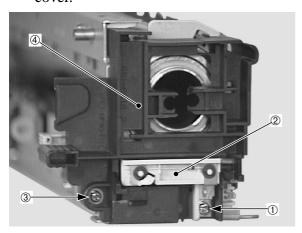


- ① E-ring
- ② Spring
- ③ Separation lower guide

## **Figure 3-6-11**

- 5) Remove the fixing roller heater following steps 1-4 on Page 3-25.
- 6) Remove the thermoswitch following steps 2 on Page 3-26.
- 7) Remove the thermistor following steps 2-3 on Page 3-26.
- 8) Remove the screws and diode holder.

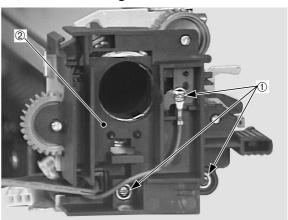
9) Remove the screws and the right fixing cover



- ① Screw
- ② Diode holder
- 3 Screw
- Right fixing cover

**Figure 3-6-12** 

- 10) Remove the 3 screws and the left fixing cover.
- 11) Remove the 4 gears.

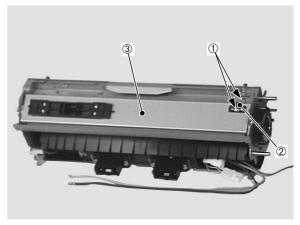


① Screws

② Left fixing cover

**Figure 3-6-13** 

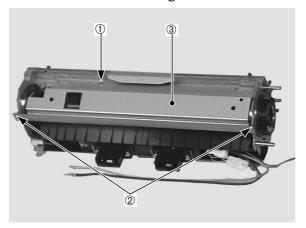
12) Remove the 2 screws, the grounding plate, and the thermoswitch stay.



- ① Screw
- 2 Grounding plate
- 3 Thermoswitch stay

**Figure 3-6-14** 

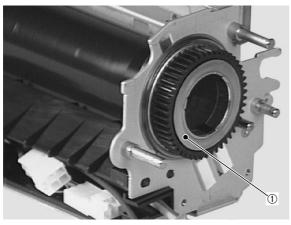
13) Remove the screw, undo the 2 claws, and take off the fixing roller cover.



- ① Screw
- 2 Claw
- 3 Fixing roller cover

**Figure 3-6-15** 

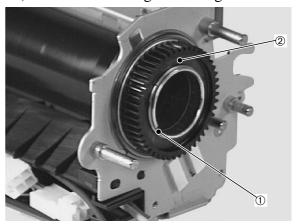
14) Remove the grounding ring.



① Grounding ring

**Figure 3-6-16** 

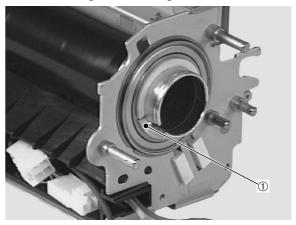
15) Remove the C-ring from the gear.



- ① C-ring
- 2 gear

**Figure 3-6-17** 

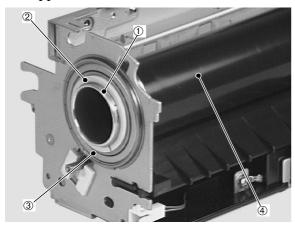
16) Removing the bushing.



① Bushing

**Figure 3-6-18** 

- 17) Remove the C-ring from the bushing.
- 18) Remove the bearing from the fixing upper roller.

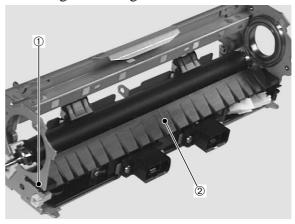


- ① C-ring
- 2 Bushing
- 3 Bearing
- Fixing upper roller

**Figure 3-6-19** 

## e. Fixing lower roller

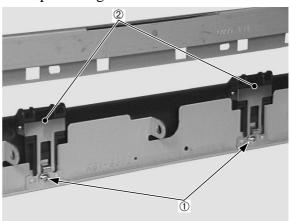
- 1) Remove the fixing upper roller following steps 1-18 from Page 3-27.
- 2) Disconnect the claw and remove the fixing entrance guide.



- ① Claw
- ② Fixing entrance guide

**Figure 3-6-20** 

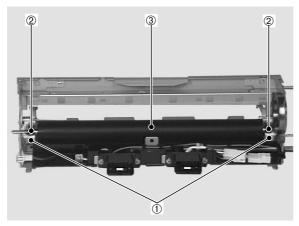
3) Remove the 2 screws and the 2 separation guides.



- ① Screws
- ② Separation guides

**Figure 3-6-21** 

- 4) Remove the fixing lower roller with its holder.
- 5) Remove the 2 holders and 2 bushings from the fixing lower roller.



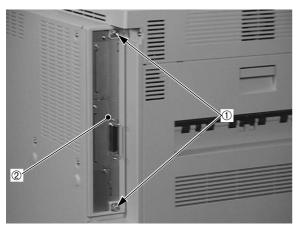
- ① Holders
- 2 Bushings
- 3 Fixing lower roller

**Figure 3-6-22** 

# VII. ELECTRONIC COMPONENTS

#### A. Video Controller PCB

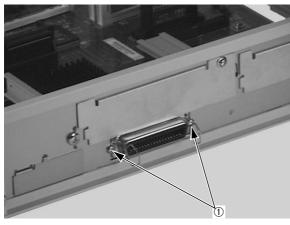
1) Remove the 2 screws, then pull out the video controller PCB unit.



- ① Screws
- 2 Video controller PCB unit

**Figure 3-7-1** 

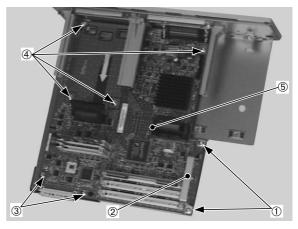
2) Remove the 2 screws.



① Screws

**Figure 3-7-2** 

- 3) Remove the 2 screws (M3), and then guide.
- 4) Remove the 2 screws (M4) and the 4 screws (M3), then take out the video controller PCB.



- ① Screws (M3)
- 2 Guide
- 3 Screws (M4)
- Screws (M3)
- **5** Video controller PCB

**Figure 3-7-3** 

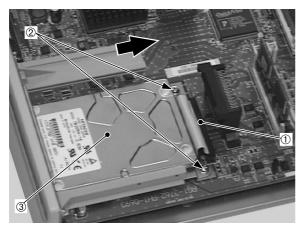
Notes: 1. When replacing the video controller PCB, be sure to remove the EEPROM from the old board and reinstall it onto the new board.

2. If you removed ROM DIMM or RAM SIMM when you repaced the video controller PCB, reinstall it on the new video controller PCB.

## B. Hard disk (optional)

## 1. Removal from the video controller PCB unit

- 1) Remove the video controller PCB unit.
- 2) Remove the connector.
- 3) Remove the 2 screws and slide the hard disk out in the direction of the arrow.

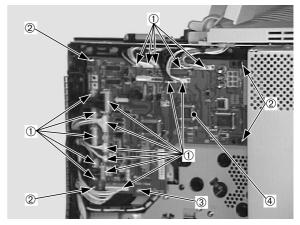


- ① Connector
- 2 Screws
- 3 Hard disk

**Figure 3-7-4** 

#### C. DC Controller PCB

- 1) Remove the high-voltage power supply unit following steps 1-2 on Page 3-36.
- 2) Disconnect the 18 connectors from the DC controller PCB.
- 3) Remove the 4 screws and the mount retainer, then take out the DC controller PCB.

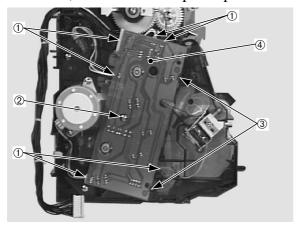


- ① Connectors
- 2 Screws
- 3 Mount retainer
- **4** DC controller PCB

**Figure 3-7-5** 

#### D. Pick-up PCB

- 1) Remove the pick-up unit following steps 1-7 on Page 3-12.
- 2) Disconnect the 6 connectors.
- 3) Remove the screw, disconnect the 2 claws, and take out the pick-up PCB.

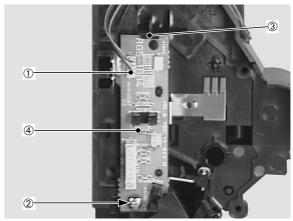


- ① Connectors
- ② Screw
- 3 Claw
- Pick-up PCB

**Figure 3-7-6** 

#### E. Multi-purpose Tray PCB

- 1) Remove the manual feed pick-up unit following steps 1-6 on Page 3-17.
- 2) Remove the manual feed drive unit following steps 1-4 on Page 3-18.
- 3) Disconnect the connector.
- 4) Remove the screw and disconnect the claw. Then take out the multi-purpose tray PCB.

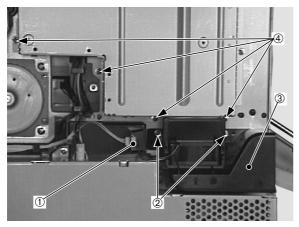


- ① Connector
- 2 Screw
- 3 Claw
- Multi-purpose tray PCB

**Figure 3-7-7** 

#### F. Switch/Sensor PCB

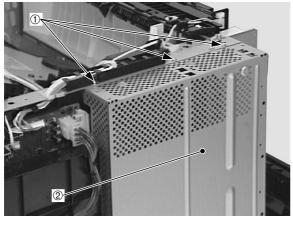
- 1) Remove the upper cover unit.
- 2) Remove the right rear and rear covers.
- 3) Remove the left rear cover.
- 4) Remove the connector, the 2 screws, and then the fan duct.
- 5) Remove the 4 screws.



- ① Connector
- 2 Screws
- 3 Fan duct
- **4** Screws

**Figure 3-7-8** 

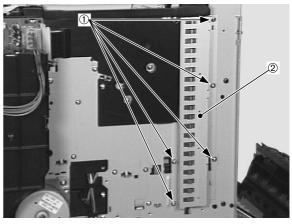
6) Remove the 3 screws and the shield cover.



- ① Screws
- ② Shield cover

**Figure 3-7-9** 

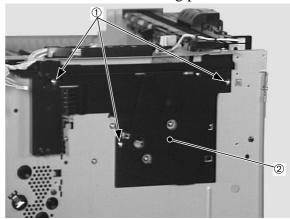
7) Remove the 5 screws and the shield plate.



- ① Screws
- 2 Shield plate

**Figure 3-7-10** 

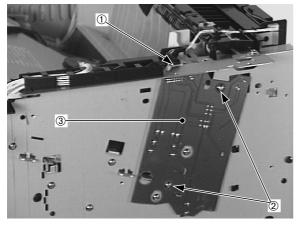
- 8) Remove the DC controller PCB following steps 1-3 on Page 3-33.
- 9) Remove the 3 screws and take out the DC controller mounting plate.



- ① Screws
- ② DC controller mounting plate

**Figure 3-7-11** 

10) Disconnect the connector, remove the 2 screws, and pull out the board. Disconnect the other connector and remove the switch/sensor PCB.

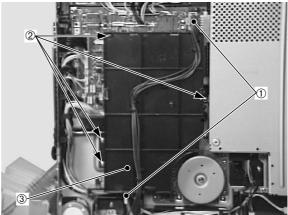


- ① Connectors
- 2 Screws
- 3 Switch/sensor PCB

**Figure 3-7-12** 

## G. High-voltage Power Supply PCB

- 1) Remove the right rear and rear covers.
- 2) Disconnect the 2 connectors, remove the 4 screws, then take out the high-voltage power supply unit.



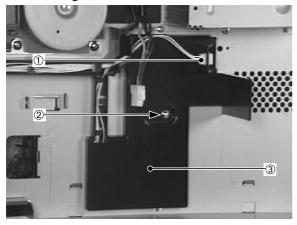
- ① Connectors
- ② Screws
- ③ High-voltage power supply unit

**Figure 3-7-13** 

3) Disconnect the 2 claws and remove the high-voltage power supply PCB.

## H. Cassette-size Sensing PCB

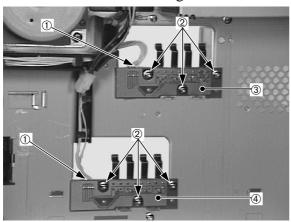
- 1) Remove the cassettes.
- 2) Remove the power supply following steps 1-6 on Page 3-37.
- 3) Disconnect the connector, remove the screw, then take out the cassette-size sensing cover.



- ① Connector
- 2 Screw
- ③ Cassette-size sensing cover

#### **Figure 3-7-14**

4) Disconnect the connector from each PCB, remove the 3 screws, then take out the cassette-size sensing PCBs.

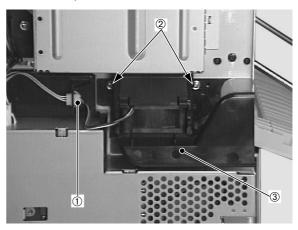


- ① Connectors
- 2 Screws
- ③ Upper-cassette-size sensing PCB

**Figure 3-7-15** 

## I. Power Supply

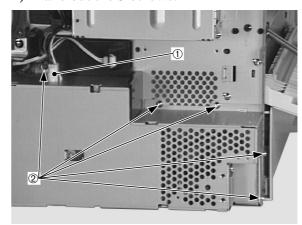
- 1) Remove the left rear and rear covers.
- 2) Disconnect the connector, remove the 2 screws, then take out the fan duct.



- 2 Screws
- 3 Fan duct

**Figure 3-7-16** 

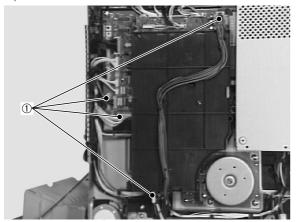
- 3) Remove the connector.
- 4) Take out the 5 screws.



- ① Connector
- 2 Screws

**Figure 3-7-17** 

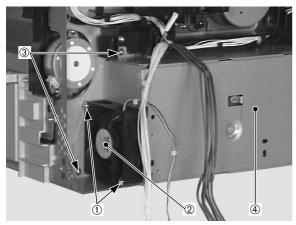
5) Remove the 4 connectors.



① Connectors

**Figure 3-7-18** 

- 6) Remove the 2 screws and the power supply unit fan.
- 7) Remove the 2 screws and take off the power supply unit.



- ① Screws
- 2 Power supply fan
- 3 Screws
- Power supply

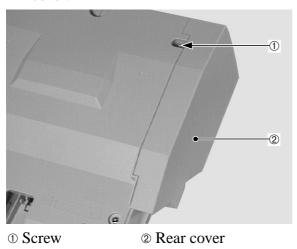
**Figure 3-7-19** 

# VIII. ENVELOPE FEEDER

# 1. Removal of the External Covers

#### a. Rear Cover

1) Remove the screw and take off the rear cover.

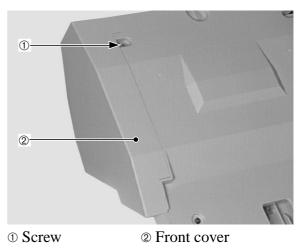


**Figure 3-8-1** 

Note: Before performing an operation check on the envelope feeder while the rear cover is off, be sure to either hold the bottom of the PCB with your hand or tape it to the frame.

# **b.** Front Cover

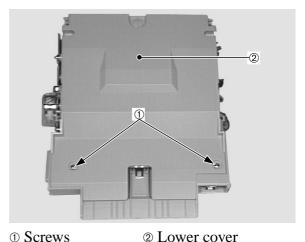
1) Remove the screw and take off the front cover.



**Figure 3-8-2** 

#### c. Lower Cover

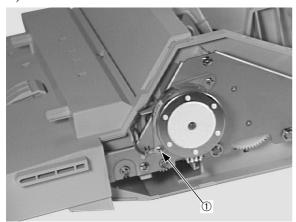
- 1) Remove the rear and front covers.
- 2) Remove the two screws and dislodge the lower cover.



**Figure 3-8-3** 

# d. Upper Cover

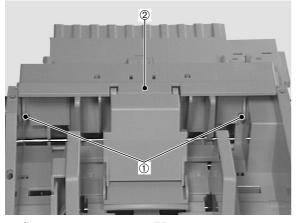
- 1) Remove the rear and front covers.
- 2) Remove the screw.



① Screw

**Figure 3-8-4** 

3) With a flat nosed screwdriver, unfasten the snaps on both sides. Remove the upper cover and spring.



① Snaps

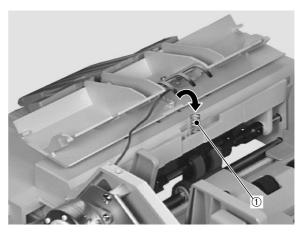
2 Upper cover

**Figure 3-8-5** 

**Notes: 1.** Ensure that the separation guide and upper cover are removed as one unit.

However, in the event that the separation guide has already been removed, be sure to follow the position adjustment directions (refer to page 4-10) when re-installing.

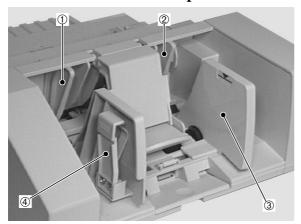
**2.** Check that the separation roller pressure spring is correctly installed when reassembling.



① Separation roller pressure spring

**Figure 3-8-6** 

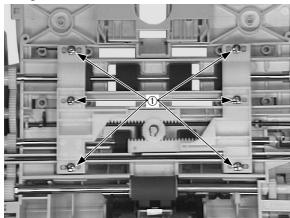
# 2. Removal of the Envelope Side Guides



- ① Left front guide
- 2 Left rear guide
- 3 Right rear guide
- 4 Right front guide

**Figure 3-8-7** 

- 1) Remove the rear, front, lower and upper covers.
- 2) Remove the 6 screws and take out the guides from underneath.

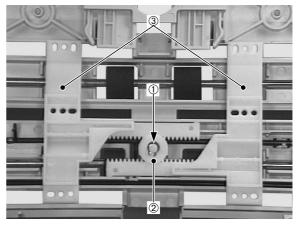


① Screws

**Figure 3-8-8** 

# 3. Removal of the Envelope Feeder Pickup Motor

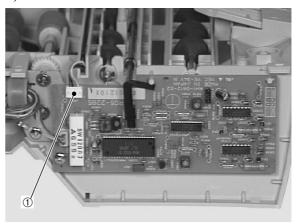
- 1) Remove the rear, front, lower and upper covers.
- 2) Remove the envelope side guides as shown in steps 1 and 2 of this page.
- 3) Remove the C-ring, the gear and the rack.



- ① C-ring
- 2 Gear
- 3 Rack

**Figure 3-8-9** 

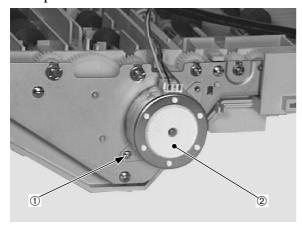
4) Remove the connector.



① Connector

**Figure 3-8-10** 

5) Remove the screw and take out the pickup motor.



① Screw

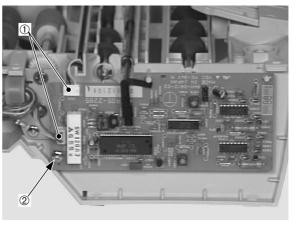
2 Pick-up motor

**Figure 3-8-11** 

**Note:** After fastening the guides to the rack, attach the gear by spreading the guides apart.

# 4. Removal of the Envelope Feeder Driver PCB

- 1) Remove the rear, front, lower and upper covers.
- 2) Remove the envelope guides.
- 3) Remove the 2 connectors and the screw.

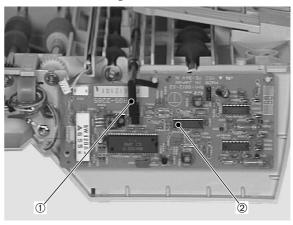


① Connectors

2 Screw

**Figure 3-8-12** 

4) After removing the sensor lever, take out the envelope feeder driver PCB.

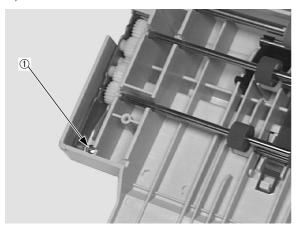


- ① Sensor lever
- ② Envelope feeder driver PCB

**Figure 3-8-13** 

# 5. Removal of the Drive Unit

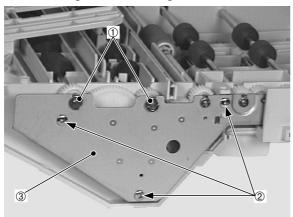
- 1) Remove the pick-up motor following steps 1 to 5 on page 3-40.
- 2) Remove the screw.



① Screw

**Figure 3-8-14** 

3) Remove the drive unit by taking off the 2 E-ring and removing the 3 screws.



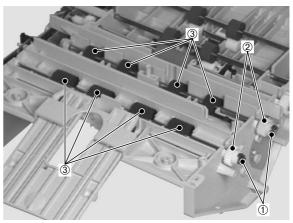
- ① E-rings
- 3 Drive unit

2 Screws

**Figure 3-8-15** 

# 6. Removal of the Envelope Feeder Pickup Roller

- 1) Follow steps 1 to 5 on page 3-40 and remove the pick-up motor.
- 2) Remove the drive unit.
- 3) Remove the 2 bushings and 2 screws, then take out the pick-up roller shaft.

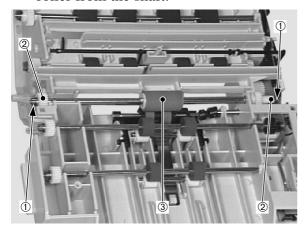


- ① Bushings
- 2 Gear
- 3 Pick-up roller

**Figure 3-8-16** 

4) Remove the 2 E-rings and 2 bushings, then take out the pick-up roller shaft.

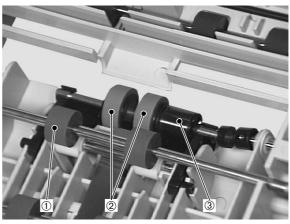
- 7. Removal of the Separation Lower Roller, Separation Upper Roller and Torque Limiter
- 1) Follow steps 1 to 5 on page 3-40 to remove the pick-up motor.
- 2) Remove the drive unit.
- 3) Remove the 2 E-rings and 2 bushings, then take out the separation lower roller shaft. Remove the separation lower roller from the shaft.



- ① E-rings
- 2 Bushings
- ③ Separation lower roller

**Figure 3-8-17** 

4) Remove the separation lower shaft from the guide. Then take the separation upper roller and torque limiter off the shaft.



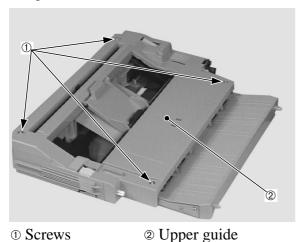
- ① Guide
- ② Separation upper roller
- 3 Torque limiter

**Figure 3-8-18** 

# IX. DUPLEXING UNIT

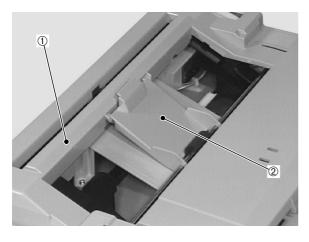
# 1. Removal of the Upper Guide

1) Remove the 4 screws, then the upper guide.



**Figure 3-9-1** 

When installing the upper guide, ensure that the guide is on the outside.



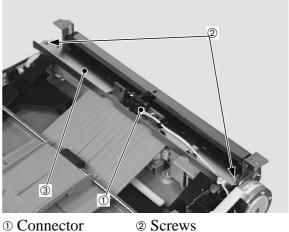
① Upper guide

2 Guide

**Figure 3-9-2** 

# 2. Removal of the Lower Guide

- 1) Remove the upper cover.
- 2) Remove the connector.
- 3) Take out the 2 screws, then the guide.

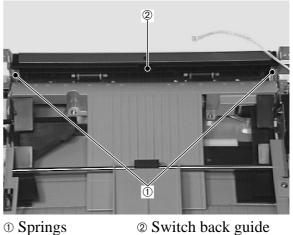


2 Screws

3 Guide

**Figure 3-9-3** 

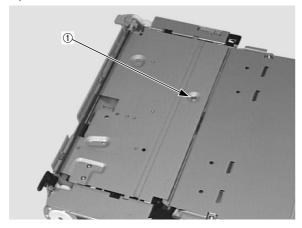
4) Remove the 2 springs, then the switch back guide.



2 Switch back guide

**Figure 3-9-4** 

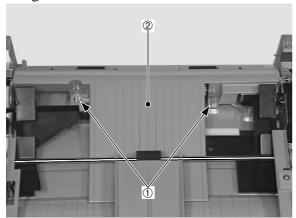
5) Remove the screw.



① Screw

**Figure 3-9-5** 

6) Remove the 2 screws, then the lower guide.



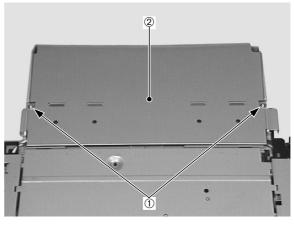
① Screws

2 Lower guide

**Figure 3-9-6** 

# 3. Removal of the Switchback Roller Release Solenoid

- 1) Remove the lower guide.
- 2) Take out the 2 screws, then the PCB cover.

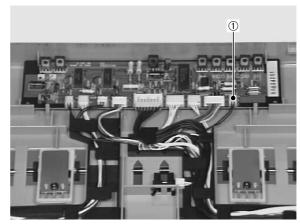


① Screws

② PCB cover

**Figure 3-9-7** 

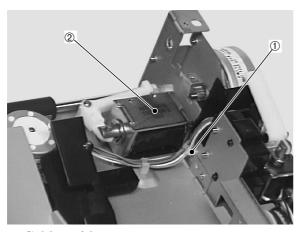
3) Remove the connector.



① Connector

**Figure 3-9-8** 

- 4) Remove the cable from it's holders.
- 5) Remove the 2 screws that hold the switchback roller release solenoid from underneath and take off the solenoid.

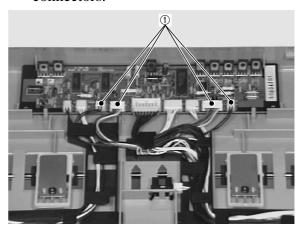


- ① Cable guide
- ② Switch-back roller release solenoid

**Figure 3-9-9** 

# 4. Removal of the Duplex Deflector Drive Solenoid

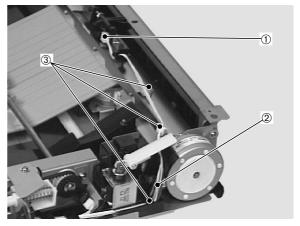
- 1) Remove the upper guide.
- 2) Remove the PCB cover, and the 4 connectors.



**① Connectors** 

**Figure 3-9-10** 

- 3) Remove the connector.
- 4) Remove the cable from the guide.

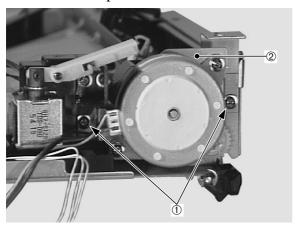


- ① Connector
- 2 Cable

3 Cable guide

**Figure 3-9-11** 

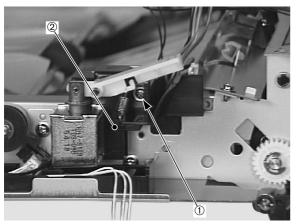
5) Remove the 2 screws, and take off the motor base plate.



- ① Screws
- 2 Motor base plate

**Figure 3-9-12** 

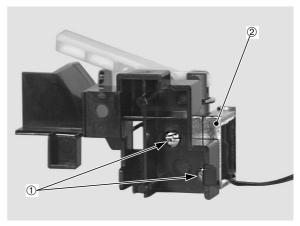
6) Remove the screw and take off the solenoid cover.



- ① Screw
- 2 Solenoid cover

**Figure 3-9-13** 

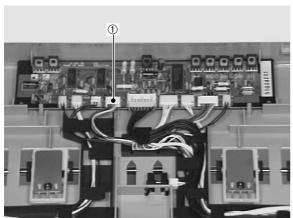
7) Remove the 2 screws and take off the duplex deflector drive solenoid.



- ① Screws
- ② Duplex deflector drive solenoid

**Figure 3-9-14** 

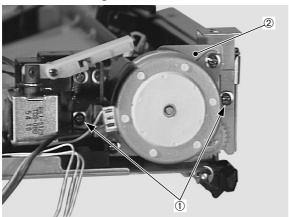
- 5. Removal of the Switch-back Motor
- 1) Remove the upper guide.
- 2) Take off the PCB cover and remove the connector.



① Connector

**Figure 3-9-15** 

3) Remove the 2 screws, and then the motor base plate.

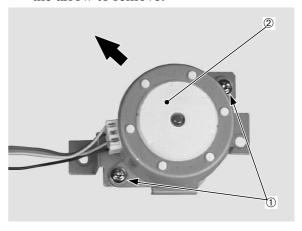


① Screws

2 Motor base plate

**Figure 3-9-16** 

4) Take out the 2 screws, then slide the switch-back motor in the direction of the arrow to remove.



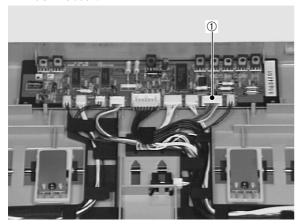
① Screws

2 Switch-back motor

**Figure 3-9-17** 

# 6. Removal of the Side Registration Motor

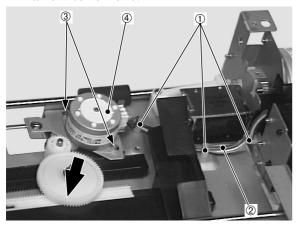
- 1) Remove the lower guide.
- 2) Take off the PCB cover, then remove the connector.



① Connector

**Figure 3-9-18** 

- 3) Undo the cable guides.
- 4) Take out the 2 screws and slide the side registration motor in the direction of the arrow to remove.

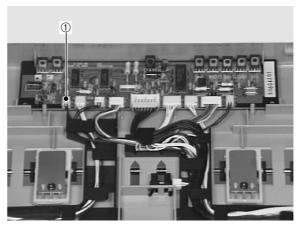


- ① Cable guides
- 2 Cable
- 3 Screws

**Figure 3-9-19** 

# 7. Removal of the Duplex Feed Clutch

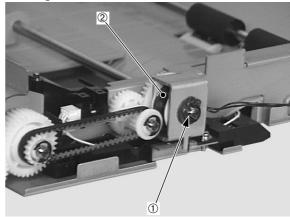
- 1) Remove the upper guide.
- 2) Take off the PCB cover and undo the connector.



① Connector

**Figure 3-9-20** 

3) Remove the C-ring and take out the duplex feed clutch.



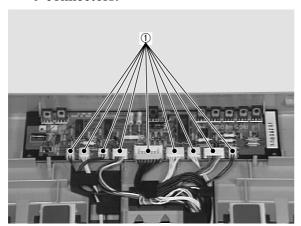
① C-ring

2 Duplex feed clutch

**Figure 3-9-21** 

# 8. Removal of the Duplexing Driver PCB

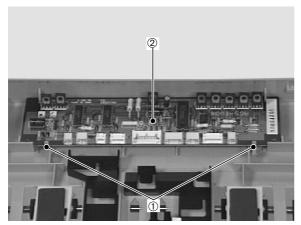
1) Take off the PCB cover, and remove the 9 connectors.



① Connectors

**Figure 3-9-22** 

2) Undo the 2 claws holding the PCB and remove the duplexing driver PCB.

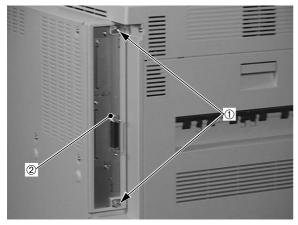


- 1 Claws
- ② Duplexing driver PCB

**Figure 3-9-23** 

# X. OPTION CONTROLLER

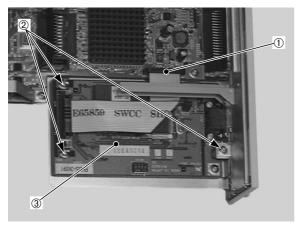
- 1. Removal from the printer
- 1) Turn OFF the printer.
- 2) Remove all the interface cables.
- 3) Loosen the 2 screws and pull out the video controller PCB unit.



- ① Screws
- ② Video controller PCB unit

**Figure 3-10-1** 

- 4) Remove the connector.
- 5) Remove the 3 screws and the option controller PCB.



- ① Connector
- 2 Screws
- ③ Option controller PCB

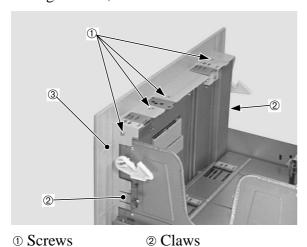
**Figure 3-10-2** 

# XI. PAPER DECK

### A. External Covers

### 1. Front cover

- 1) Pull out the tray.
- 2) Remove the paper guide.
- 3) Remove the 4 screws, undo the left and right claws, and take off the front cover.



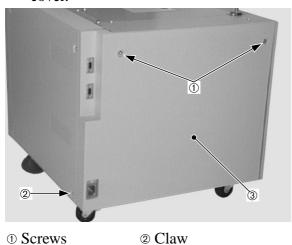
**Figure 3-11-1** 

# 2. Left cover

3 Left cover

3 Front cover

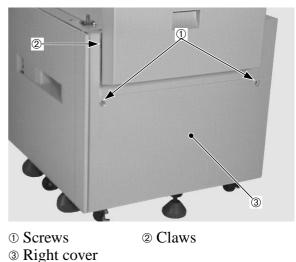
- 1) Remove the two screws.
- 2) Remove the claw, and take off the left cover.



**Figure 3-11-2** 

# 3. Right cover

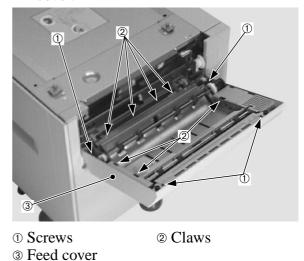
- 1) Remove the 2 screws.
- 2) Undo the claws, and remove the right cover.



**Figure 3-11-3** 

#### 4. Feed cover

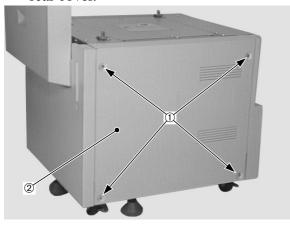
- 1) Remove the 4 screws.
- 2) Undo the 7 claws, and remove the feed cover.



**Figure 3-11-4** 

# 5. Rear cover

1) Remove the 4 screws, and take off the rear cover.



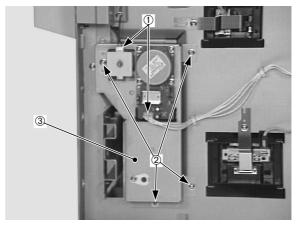
① Screws

2 Rear cover

**Figure 3-11-5** 

# **B.** Drive Unit

- 1. Removal from the main unit.
- 1) Remove the right and rear covers.
- 2) Pull out the tray.
- 3) Remove the 2 connectors and 4 screws then take out the drive unit.



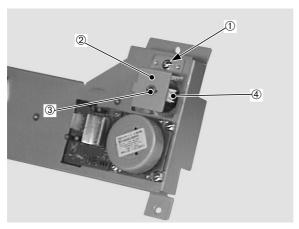
- ① Connectors
- ② Screws
- 3 Drive unit

**Figure 3-11-6** 

# 2. Disassembly/ assembly

# a. Lifter clutch

- 1) Remove the screw.
- 2) Remove the clutch cover and bushing, then take out the lifter clutch.



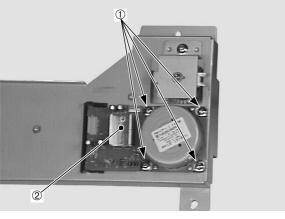
- ① Screw
- ② Clutch cover
- 3 Bushing
- Lifter clutch

**Figure 3-11-7** 

# b. Deck motor

# 1. Removal from the main unit

1) Remove the 4 screws, and take out the deck motor.



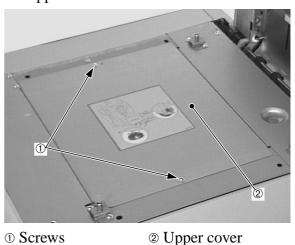
- ① Screws
- 2 Deck motor

**Figure 3-11-8** 

# C. Limit Switch

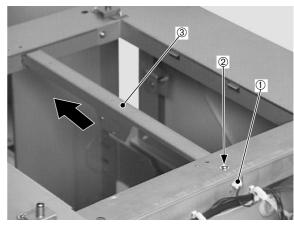
# 1. Removal from the main unit.

1) Remove the 2 screws, then take off the upper cover.



**Figure 3-11-9** 

- 2) Pull out the tray.
- 3) Remove the rear cover.
- 4) Remove the connector.
- 5) Take out the screw and slide the stay in direction of the arrow to remove.

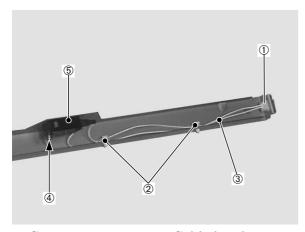


- ① Connector
- 3 Stay

② Screw

**Figure 3-11-10** 

- 6) Remove the connector from the stay, then take the cable out of the band.
- 7) Remove the screw, then take out the limit switch.

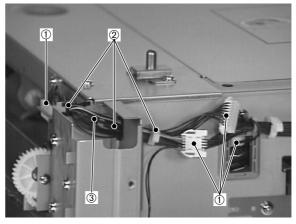


- ② Cable bands
- 3 Cable
- **4** Screw
- ⑤ Limit switch

**Figure 3-11-11** 

# D. Pick-up Unit

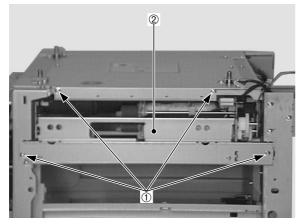
- 1. Removal from the main unit.
- 1) Remove the feed unit by following steps 1 to 3 on page 3-58.
- 2) Pull out the tray.
- 3) Remove the right and rear covers.
- 4) Remove the 4 connectors, then take the cable out of the bands.



- ① Connectors
- ② Cable bands
- 3 Cable

**Figure 3-11-12** 

5) Remove the 4 screws, then take out the pick-up unit.



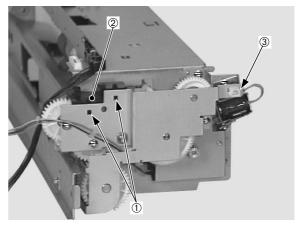
① Screws

2 Pick-up unit

**Figure 3-11-13** 

Note: When replacing the various parts of the pick-up unit, remove the pick-up, feed and separation rollers so not to get grease on them. Be careful also not to get grease on the paper feed guide.

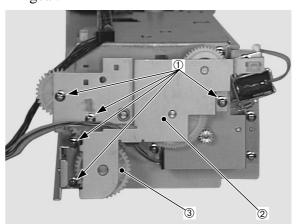
- 2. Disassembly/reassembly
- a. Pick-up solenoid
- 1) Undo the 2 claws and remove the gear cover.
- 2) Remove the connector.



- ① Claws
- ② Gear cover
- 3 Connector

**Figure 3-11-14** 

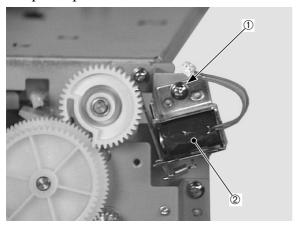
- 3) Remove the 5 screws.
- 4) Remove the gear side plate with the gear.



- ① Screws
- 2 Gear side plate
- 3 Gear

**Figure 3-11-15** 

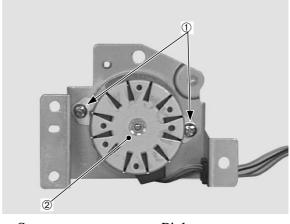
5) Remove the screw, then take out the pick-up solenoid.



① Screw

2 Pick-up solenoid

4) Remove the 2 screws and then the pickup motor.



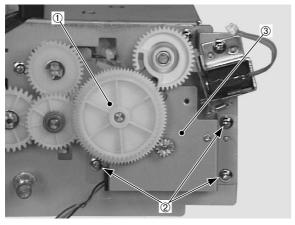
① Screws

2 Pick-up motor

**Figure 3-11-16** 

# b. Pick-up motor

- 1) Remove the gear side plate by following steps 1 to 4 on this page.
- 2) Remove the gear.
- 3) Remove the 3 screws, and take out the motor base plate.



① Gear

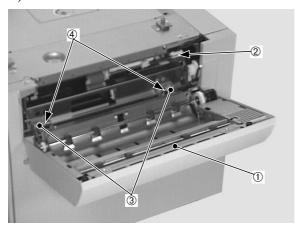
2 Screws

3 Motor base plate

**Figure 3-11-17** 

**Figure 3-11-18** 

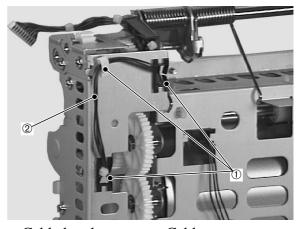
- E. Feed Unit
- 1. Removal from the main unit.
- 1) Drop the feed unit forward.
- 2) Remove the connector.
- 3) Rotate the feed spacer.
- 4) Remove the 2 screws then the feed unit.



- ① Feed unit
- ② Connector
- 3 Feed spacer
- **4** Screws

**Figure 3-11-19** 

- 2. Disassembly/reassembly
- a. Feed clutch
- 1) Remove the feed cover.
- 2) Remove the cable from the band.

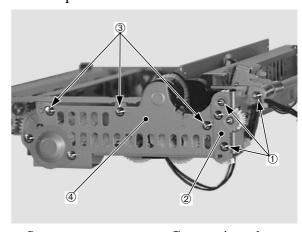


① Cable bands

2 Cable

**Figure 3-11-20** 

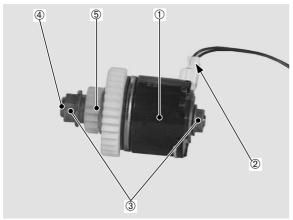
- 3) Remove the 3 screws and then the connecting plate.
- 4) Remove the 3 screws and then the gear side plate.



- ① Screws
- ② Connecting plate
- 3 Screws
- Gear side plate

**Figure 3-11-21** 

5) Remove the connector, 2 bushings, shaft, pin, and gear from the feed clutch.

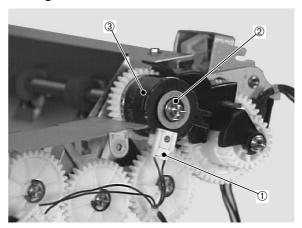


- ① Feed clutch
- 3 Bushings
- ⑤ Gear
- ② Connector
- Shaft

**Figure 3-11-22** 

# b. Registration clutch

- 1) Remove the gear side plate by following steps 1 to 4 on page 3-56.
- 2) Remove the connector.
- 3) Remove the E-ring and then the registration clutch.

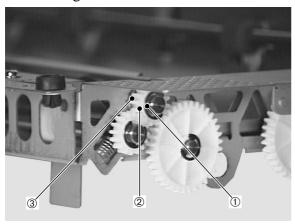


- ① Connector
- 2 E-ring
- 3 Registration clutch

**Figure 3-11-23** 

# c. Feed roller

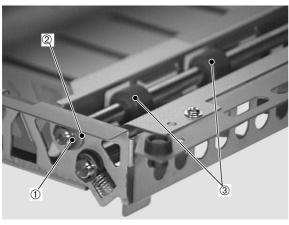
- 1) Remove the feed cluch by following steps 1 to 4 on page 3-58.
- 2) Remove the E-ring, gear, pin and bushing.



- ${} \\ \textcircled{1} \text{ E-ring}$
- 2 Gear
- 3 Bushing

3) Remove the E-ring and bushing then the feed roller.

**Figure 3-11-24** 

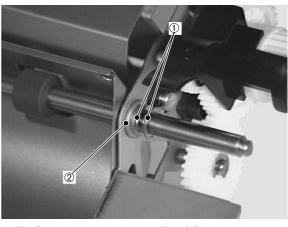


- ① E-ring
- 2 Bushing
- 3 Feed roller

**Figure 3-11-25** 

# d. Registration roller

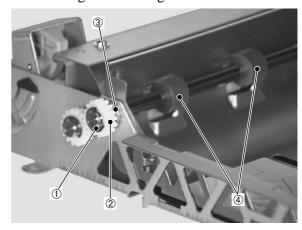
- 1) Remove the registration clutch by following steps 1 to 3 on page 3-59.
- 2) Remove the 2 E-rings and the bushing.



- ① E-rings
- 2 Bushing

**Figure 3-11-26** 

3) Remove the E-ring, gear, pin and bushing then the registration rollers.



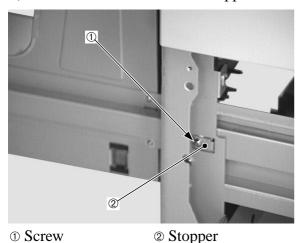
- ① E-ring
- 2 Gear
- 3 Bushing
- Registration rollers

**Figure 3-11-27** 

# F. Tray

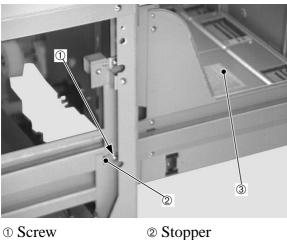
# 1. Removal from the main unit

- 1) Remove the front cover.
- 2) Remove the right and left covers.
- 3) Remove the screw and the stopper.



**Figure 3-11-28** 

4) Remove the screw and stopper then take out the tray.



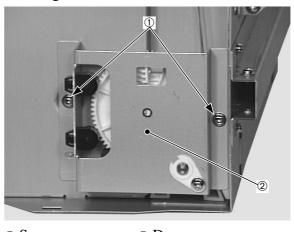
3 Tray

**Figure 3-11-29** 

# 2. Disassembly

# a. Lifter

1) Remove the 2 screws, the damper, then the gear.

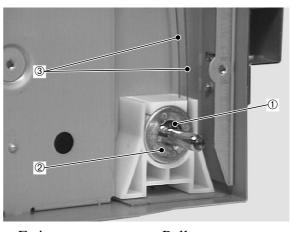


① Screws

2 Damper

**Figure 3-11-30** 

- 2) Remove the E-ring then the two pulleys.
- 3) Remove the wires from the pulleys.



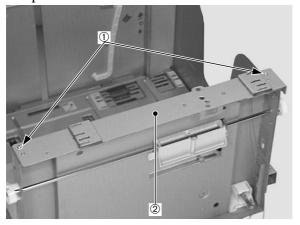
① E-ring

3 Wires

2 Pulleys

**Figure 3-11-31** 

4) Remove the 2 screws then the reference plate.

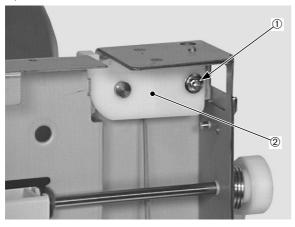


① Screws

2 Reference plate.

**Figure 3-11-32** 

5) Remove the screw then the wire cover.

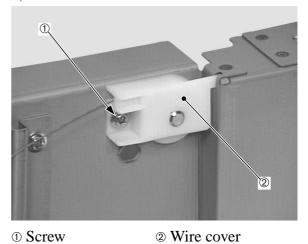


① Screw

② Wire cover

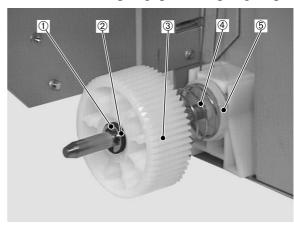
**Figure 3-11-33** 

6) Remove the screw then the wire cover.



**Figure 3-11-34** 

- 7) Remove the E-ring, the rubber ring then the gear.
- 8) Remove the spring, pin and spring stop.



① E-ring

3 Gear

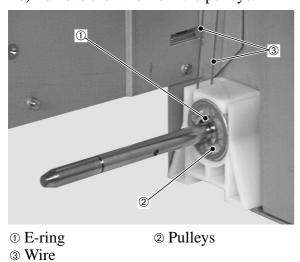
Spring stop

② Rubber ring

Spring

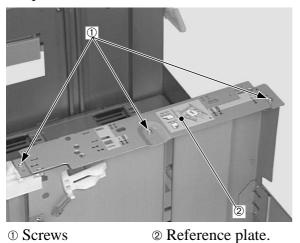
**Figure 3-11-35** 

9) Remove the E-ring and the 2 pulleys. 10) Remove the wire from the pulleys.



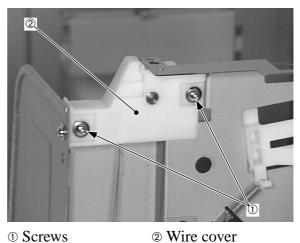
**Figure 3-11-36** 

11) Remove the 3 screws then the reference plate.



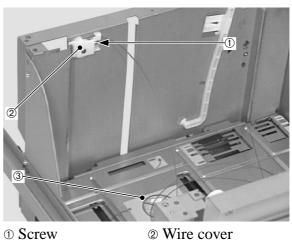
**Figure 3-11-37** 

12) Remove the 2 screws and the wire cover.



**Figure 3-11-38** 

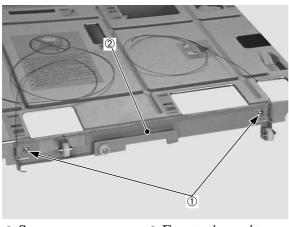
13) Remove the screw and the wire cover, then take out the tray.



3 Tray

**Figure 3-11-39** 

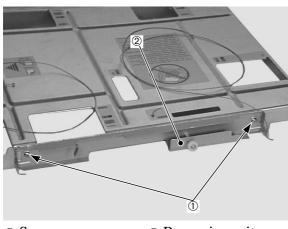
14) Remove the 2 screws from the tray, then remove either the front or rear wire units.



① Screws

2 Front wire unit

**Figure 3-11-40** 



① Screws

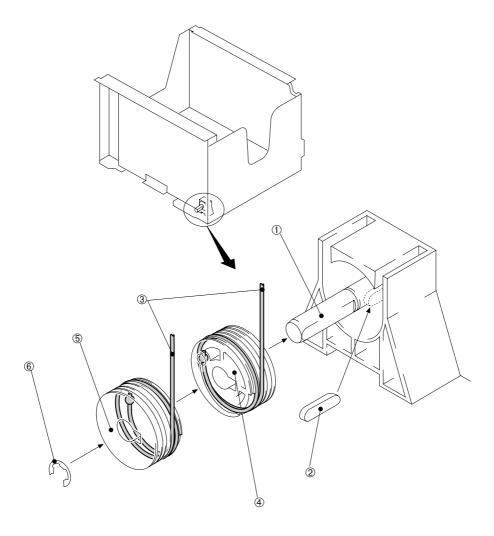
2 Rear wire unit

**Figure 3-11-41** 

# 3. Assembly

# a. Front wire

- 1) Insert the pulley alignment pin in the right side(looking from the front) of the shaft.
- 2) Wind the wire one and a half times starting from the second groove from the front of pulley 1 and insert it on to the shaft.
- 3) Wind the wire one and a half times starting from the second groove from the back of pulley 2 and insert it on to the shaft.
- 4) Secure the pulleys with the E-ring.

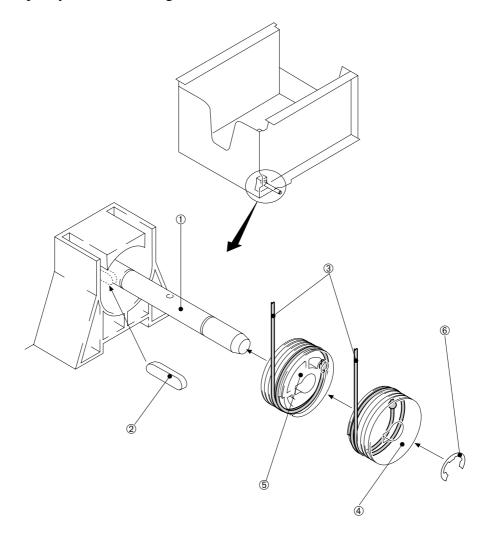


- ① Shaft
- 2 Pulley alignment pin
- 3 Wires
- Pulley 1
- ⑤ Pulley 2
- ® E-ring

**Figure 3-11-42** 

# b. Rear wire

- 1) Insert the pulley alignment pin in the left side(looking from the front) of the shaft.
- 2) Wind the wire one and a half times starting from the second groove from the front of pulley 2 and insert it on to the shaft.
- 3) Wind the wire one and a half times starting from the second groove from the back of pulley 1 and insert it on to the shaft.
- 4) Secure the pulleys with the E-ring.

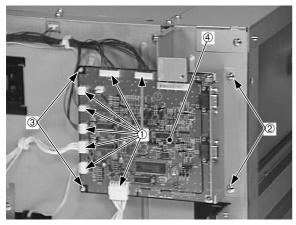


- ① Shaft
- 2 Pulley alignment pin
- 3 Wires
- 4 Pulley 2
- ⑤ Pulley 1
- ® E-ring

**Figure 3-11-43** 

# G. Paper Deck Driver PCB

- 1. Removal from the main unit.
- 1) Remove the left cover.
- 2) Remove the rear cover.
- 3) Take out the 8 connectors.
- 4) After removing the 2 screws and the 2 PCB holding pins take out the paper deck driver PCB.

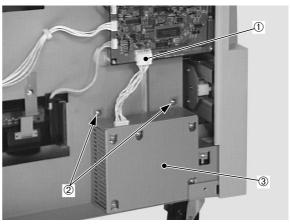


- **① Connectors**
- ② Screws
- 3 Holding pins
- Paper deck driver PCB

**Figure 3-11-44** 

# **H. Power Supply**

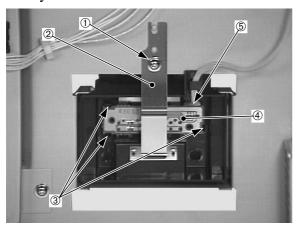
- 1. Removal from the main unit.
- 1) Take off the rear cover.
- 2) Remove the connector and 2 screws, then take out the power supply by slightly lifting its left side.



- ① Connector
- 2 Screws
- 3 Power supply

**Figure 3-11-45** 

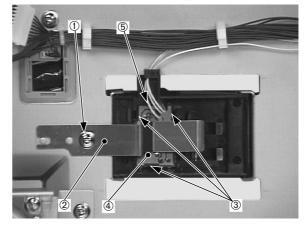
- I. Paper-size Sensing Switch PCB
- 1. Removal from the main unit.
- 1) Remove the rear cover.
- 2) Pull out the tray.
- 3) Remove the screw and the PCB base plate.
- 4) Undo the 3 claws, then remove the paper-size sensing switch PCB followed by the connector.



- ① Screw
- 2 PCB base plate
- 3 Claws
- Paper-size sensing switch PCB
- ⑤ Connector

**Figure 3-11-46** 

- J. Paper-level Sensing Switch PCB
- 1. Removal from the main unit.
- 1) Remove the rear cover.
- 2) Pull out the tray.
- 3) Remove the screw and then the PCB base plate.
- 4) Undo the 3 claws, then remove the paper-level sensing switch PCB followed by the connector.



- ① Screw
- ② PCB base plate
- 3 Claws
- Paper-level sensing switch PCB
- ⑤ Connector

**Figure 3-11-47** 

# **CHAPTER 4**

# **TROUBLESHOOTING**

| I.   | MAINTENANCE AND |      | VII. PAPER FEEDING |                                    |      |
|------|-----------------|------|--------------------|------------------------------------|------|
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| III. | MEASUREMENT AND |      |                    | PARTS/FUNCTION                     | 4-54 |
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# I. MAINTENANCE AND SERVICING

# A. Periodic Replacement Parts

None

**Note:** Periodic replacement parts are 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 system performance.) These parts should be replaced during a regular service visit closest to the end of the parts expected life.

# **B.** Expected Lives of Consumable Parts

The following table of consumables may require, over the warranty period of the printer. Replacement once or more due to deterioration or damage. The estimated life of consumable parts are shown by the number of prints made; these parts should be replaced when faulty.

**Table 4-1-1** 

Printer As of November, 1997

| No. | Part name                  | Part No.     | Qt'y | Expected life  | Remarks                           |
|-----|----------------------------|--------------|------|----------------|-----------------------------------|
| 1   | Manual feeding pick-up     | RB1-6730-000 | 1    | 200,000 prints | Replace the manual feeding        |
|     | roller                     |              |      |                | pick-up roller and separation     |
| 2   | Separation pad             | RF5-1455-000 | 1    | 200,000 prints | pad together.                     |
| 3   | Fixing unit                | RG5-1863-200 | 1    | 350,000 pages* | 100-120V                          |
|     |                            | RG5-1871-190 | 1    | 350,000 pages* | 220-240V                          |
| 4   | Transfer charging roller   | RF5-1412-000 | 1    | 350,000 pages* |                                   |
| 5   | Feed roller and separation | RF5-1834-000 | 4    | 350,000 prints | For both upper and lower rollers. |
|     | roller                     |              |      |                | Replace the feed rollers and      |
|     |                            |              |      |                | separation rollers together.      |
| 6   | Power supply fan and       | RH7-1266-000 | 2    | 25,000 hours   |                                   |
|     | fixing unit/scanner fan    |              |      |                |                                   |
| 7   | Electrical unit fan        | RH7-1271-000 | 1    | 25,000 hours   |                                   |
| 8   | Fixing unit fan            | RH7-1289-000 | 1    | 25,000 hours   |                                   |

<sup>\*: 2</sup> pages are counted as 1 print in case of duplexing.

# Paper Deck

| No. | Part name                         | Part No.     | Qt'y | Expected life  | Remarks   |
|-----|-----------------------------------|--------------|------|----------------|---|
| 1   | Feed roller and separation roller | RF5-1834-000 | 2    | 350,000 prints | Replace the feed rollers and separation rollers together. |

**Note:** The values above are only estimates based on part data, and are subject to change.

# C. Periodic Servicing Schedule

None

# **D.** Service Checkpoints

#### 1. Printer

# a. Cartridge

• Photosensitive drum

As a rule, do not touch or clean the drum. When cleaning is unavoidable, never use solvents. Do not expose to light. For details, see Chapter 3.

# b. Manual feeding pick-up roller, cassette pick-up roller, separation roller, and feed roller

Clean with lint-free paper, either dry or moistened with ethyl/isopropyl alcohol. Replace if badly worn.

# c. Separation pad

Clean with lint-free paper.

# d. Registration roller unit

Clean with lint-free paper. If badly contaminated, use it with ethyl/isopropyl alcohol for rubber parts and MEK(methyl ethyl ketone) for other parts. Avoid skew or paper jams caused by removal of the springs.

# e. Transfer guide unit

Clean with soft, dry flannel cloth.

# f. Transfer charging roller

Clean only when badly contaminated. Never use water or solvent. Do not touch the roller or allow any solvent or oil to deposit on the surface. For details, see Chapter 3.

# g. Static charge eliminator

Clean with brush.

# h. Feed guide unit

Clean with lint-free paper.

### i. Fixing unit

• Fixing entry guide

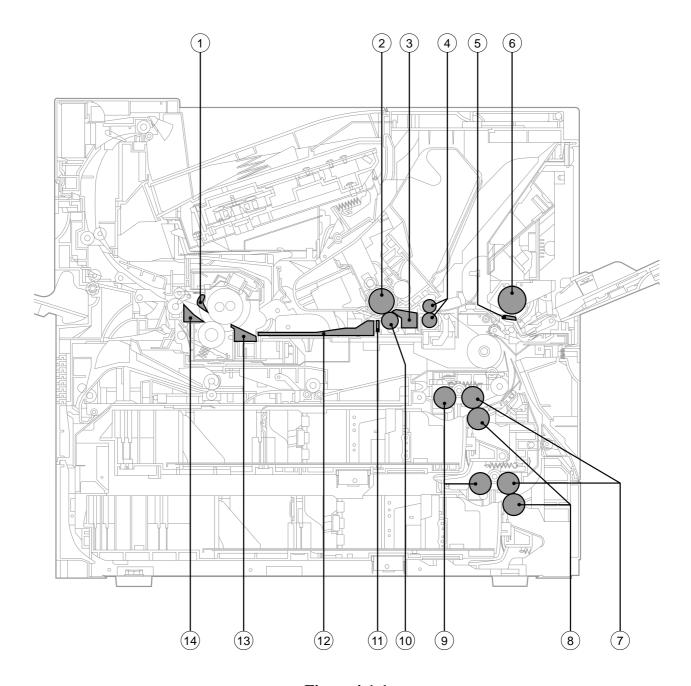
Clean with lint-free paper moistened with MEK.

• Fixing separation guide

Clean lightly with lint-free paper moistened with MEK, only to remove the toner deposit.

• Fixing separation claw

Clean lightly with lint-free paper moistened with MEK, only to remove the toner deposit.



**Figure 4-1-1** 

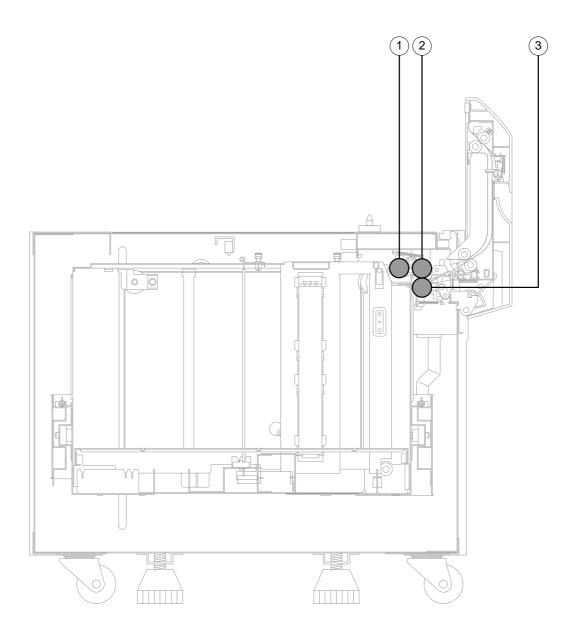
- 1: Fixing separation claw
- 2: Photosensitive drum
- 3: Transfer guide
- 4: Registration roller unit
- 5: Separation pad
- 6: Manual feeding pick-up roller
- 7: Feed roller

- 8: Separation roller
- 9: Pick-up roller
- 10: Transfer charging roller
- 11: Static charge eliminator
- 12: Feed guide
- 13: Fixing entry guide
- 14: Fixing separation guide

# 2. Paper deck (Option)

# a. Pick-up roller, separation roller, and feed roller

Clean with lint-free paper, either dry or moistened with ethyl/isopropyl alcohol. Replace if badly worn.



**Figure 4-1-2** 

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

# II. TOOLS

# A. Standard Tools

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

**Table 4-2-1** 

| 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  | Ø 1.5 (mm) x 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 |   |

#### **B.** Special Tools

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

**Table 4-2-2** 

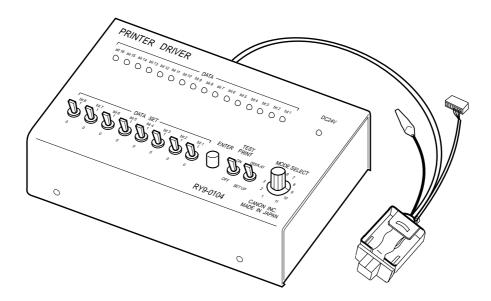
| No. | Tool name                | Tool No. | Shape          | RANK | Application/remarks   |
|-----|--------------------------|----------|----------------|------|---|
| 1   | Printer driver<br>tester | RY9-0104 | 33333333333333 | В    | Used for checking printer operations.                         |
| 2   | Thickness gauge          | RY9-0088 | 1.0            | A    | Used for installing the sepa-<br>ration guide of the optional |
| 3   | Thickness gauge          | QY9-0001 | 0.5            | A    | envelope feeder.  |

#### Note: Ranks

- A: Tools used for part replacements or adjustment of parts on-site.
- B: Tools used on-site and in regions.

  This category incudes tools for useful failure analysis, and tools which are difficult to carry around.
- C: Tools used in the workshop.
  This category mainly includes tools for PCB and unit repairs.

#### C. Special Tools Explanation Printer Driver Tester



**Figure 4-2-1** 

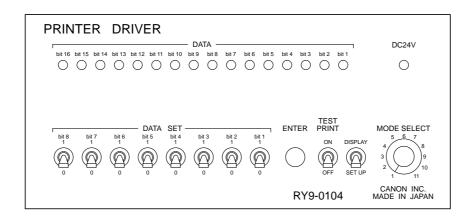
#### 1. Outline

The tester runs the printer independently to test printer operations. It has three uses which are outlined below;

- a. Commands the printer to print out solid black, horizontal lines, vertical lines and solid blank images. It can also select the pick-up and delivery trays.
- b. Monitors the status of the sensors, and forcibly operates the various solenoids and motors.
- c. In the event of a printer failure, the error information sent from the printer to the video controller (external device) can be displayed on the tester LED.

**Note:** This manual covers the basic operation of the printer driver tester. For a move defailed explanation please refer to the operation manual attached to the tester.

#### 2. Operation Panel



**Figure 4-2-2** 

#### **DATA LED**

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

#### **+24VA LED**

Lights up when +24VA is being supplied to the tester.

#### **TEST PRINT switch**

When set to "ON", test patterns set by the DATA SET are printed.

#### **MODE SELECT switch**

To select the various modes. See table 4-2-3.

#### **DISPLAY/SET UP switch**

Switches between DISPLAY and SET UP.

DISPLAY: Mode to display the status of the various sensors and loads sent from the printer with the DATA LED.

SET UP: Mode to set data with the DATA SET switch.

#### **DATA SET switch**

Sets the various data sent from the printer. See DATA SET in table 4-2-3.

#### **ENTER** switch

Inputs data set by the DATA SET switch.

**Table 4-2-3** 

| DISPLAY<br>/SET UP<br>Mode | DISPLAY (displays the status of the sensors and loads sent from the printer) | SET UP (sets up various data sent from the printer) |
|----------------------------|--|---|
| 1                          | Operator call/ service call  |   |
| 2                          | Service call/ misprint details/ warning                                      | Print density select                                |
| 3                          | Pick-up unit configuration/ select pick-up                                   | Ready inhibit/ forced laser emission/ sleep         |
|                            | unit/ pick-up unit paper-out   | setting   |
| 4                          | Sensor status  |   |
| 5                          | Select paper size/ select print density                                      | Multi-purpose tray paper size select                |
| 6                          |  |   |
| 7                          | Upper/ lower cassette paper size detection                                   |   |
|                            | data   |   |
| 8                          | Cause of paper jam/ fan malfunction details                                  | Test print paper pick-up/ delivery slot             |
|                            |  | allocation/ pattern setting                         |
| 9                          | Paper transportsystem electrical parts status                                | Paper transport system electrical parts drive 1     |
| 10                         | Motor status   | Paper transport system electrical parts drive 2     |
| 11                         |  | Paper transport system electrical parts drive 3     |

# 3. Connector Signal Chart

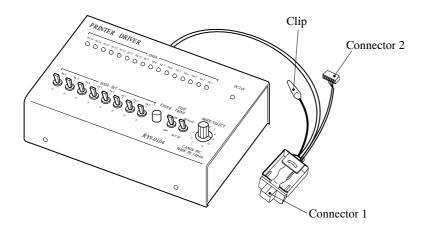
**Table 4-2-4** 

|         | Connector 1 |                      |         | Con         | nector 2             |
|---------|-------------|----------------------|---------|-------------|----------------------|
| Pin No. | Signal name | Function             | Pin No. | Signal name | Function             |
| J1-1    | +24VA       | +24VA                | J2-1    | N. C.       | Reserved             |
| J1-2    | IN          | Serial line (input)  | J2-2    | N. C.       | Reserved             |
| J1-3    | OUT         | Serial line (output) | J2-3    | N. C.       | Reserved             |
| J1-4    | GND         | GND                  | J2-4    | GND         | GND                  |
|         |             |                      | J2-5    | OUT         | Serial line (output) |
|         |             |                      | J2-6    | IN          | Serial line (input)  |
|         |             |                      | J2-7    | +24VA       | +24VA                |
|         |             |                      |         |             |                      |

#### 4. Operation Method

#### a. Preparation

- 1) Switch OFF the printer.
- 2) Connect the tester to the envelope feeder connector (J24) in the printer.
- 3) Turn ON the printer.
- 4) When the printer is in standby mode, start performing checks with the tester.

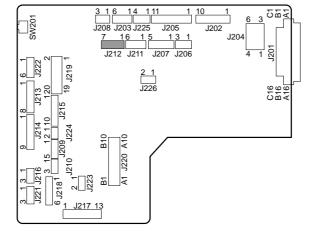


**Figure 4-2-3** 

**Note:** When operating the printer driver tester, electrostatic energy can cause operation failures. Therefore, when connecting the tester be sure to touch a metal part of the printer with your hand to discharge any electrostatic energy.

#### < Follow the procedure below when checking envelope feeder operations >

- 1) Turn the printer power OFF.
- 2) Remove the rear cover. (See Chap. 3 of the Service Manual.)
- 3) Connect the tester connector 2 to connector (J212) on the DC controller PCB.
- 4) Attach the clip to a metallic part of the printer.
- 5) Turn the printer power ON after installing the envelope feeder in the printer.
- 6) When the printer has entered standby mode, use the tester to check operations.



**Figure 4-2-4** 

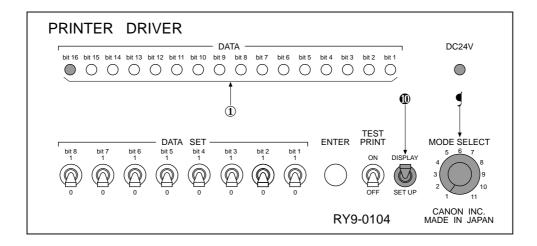
#### b. Confirming Printer Status

Select DISPLAY with the DISPLAY/SET UP switch, tests can be made with the DATA display (see table 4-2-3).

For example, when testing the contents of operator call/ service call, follow the directions below.

- 1) After the printer has entered standby mode, set the DISPLAY/SET UP switch to "DISPLAY".
- 2) Set the MODE SELECT to "1".
- 3) Look up the corresponding chart for the bit that is lit up by a DATA LED.

For example, when a fixing unit failure occurs, the LED of bit 16 will light up.



**Figure 4-2-5** 

**Table 4-2-5** 

#### Mode select 1

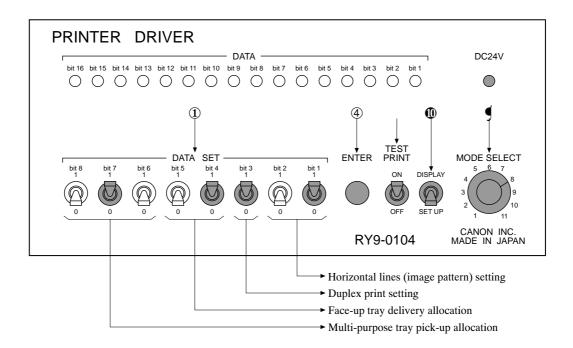
|        | bit | Display Content Details/ Set Up Content Details |
|--------|-----|---|
|        | 16  | Fixing unit malfunction                         |
|        | 15  | BD malfunction                                  |
|        | 14  | Laser malfunction                               |
|        | 13  | Main motor malfunction                          |
|        | 12  | Scanner motor malfunction                       |
| D      | 11  | Fan motor malfunction                           |
| I      | 10  | <del></del>                                     |
| S      | 9   | Lifting plate malfunction                       |
| P<br>L | 8   | Side registration guide malfunction             |
| Α      | 7   | <del></del>                                     |
| Y      | 6   | Misprint  |
|        | 5   | Cartridge-out                                   |
|        | 4   | Paper-out                                       |
|        | 3   | Door open                                       |
|        | 2   | Jam   |
|        | 1   | Printer ready                                   |
|        | 8   |   |
| S      | 7   |   |
| E      | 6   | <del></del>                                     |
| T      | 5   |   |
| U      | 4   |   |
| P      | 3   |   |
|        | 2   |   |
|        | 1   |   |

#### c. Itemize the Data Set

Select SET UP with the DISPLAY/SET UP switch. Various settings and commands can be made according to the DATA SET (see table 4-2-3).

For example, when commanding a test print pick-up, delivery tray allocation or pattern setting operation, follow the steps below by operating the the tester. (when you want to have paper picked-up from the multi-purpose tray, duplex-print a horizontal line test print pattern and deliver it through the face up tray.)

- 1) When the printer has entered standby mode, set the DISPLAY/SET UP switch on the tester to "SET UP".
- 2) Set the MODE SELECT to "8".
- 3) Set DATA SET switch bit 8 to 0, bit 7 to 1, bit 6 to 0, bit 5 to 0, bit 4 to 1, bit 3 to 1, bit 2 to 0 and bit 1 to 1 (see Table 4-2-6).
- 4) Press the ENTER switch.
- 5) By turning the TEST PRINT switch ON once, a test print can be made.



**Figure 4-2-6** 

**Notes: 1.** After setting a test print in this mode, the data will remain the same even if the test print is set in another mode.

- 2. By keeping the TEST PRINT switch "ON", continuous test prints will be made.
- 3. When setting the image pattern to "All black", do not make duplex prints.

**Table 4-2-6** 

#### Mode select 8

|   | bit  | Display content details         |  |  |  |  |
|---|------|---------------------------------|--|--|--|--|
| Ī | 16   | Initial residual jam            |  |  |  |  |
| ᆜ | <br> |                                 |  |  |  |  |
|   | 2    | Electrical unit fan malfunction |  |  |  |  |
|   | 1    | Fixing unit fan malfunction     |  |  |  |  |

#### SET UP

| Pic   | k-up slot | :     | Deliver | y slot | Print<br>mode | Image p | attern |                            |
|-------|-----------|-------|---------|--------|---------------|---------|--------|----------------------------|
| bit 8 | bit 7     | bit 6 | bit 5   | bit 4  | bit 3         | bit 2   | bit 1  |                            |
| 0     | 0         | 0     |         |        |               |         |        | Lower cassette pick-up     |
| 0     | 0         | 1     |         |        |               |         |        | Upper cassette pick-up     |
| 0     | 1         | 0     |         |        |               |         |        | Multi-purpose tray pick-up |
| 0     | 1         | 1     |         |        |               |         |        | Envelope feeder pick-up    |
|       |           |       | 0       | 0      |               |         |        | Face-down tray delivery    |
|       |           |       | 0       | 1      |               |         |        | Face-up tray delivery      |
|       |           |       |         |        | 0             |         |        | Single side print          |
|       |           |       |         |        | 1             |         |        | Duplex print               |
|       |           |       |         |        |               | 0       | 0      | Vertical lines             |
|       |           |       |         |        |               | 0       | 1      | Horizontal lines           |
|       |           |       |         |        |               | 1       | 0      | All-white                  |
|       |           |       |         |        |               | 1       | 1      | All-black                  |

#### Mode select 3

|          | bit                         | Display Content Details/ Set Up Content Details                         |  |  |  |  |  |
|----------|-----------------------------|---|--|--|--|--|--|
|          | 16                          | Lights when the upper cassette pick-up function is ready in the printer |  |  |  |  |  |
| <u> </u> |                             |   |  |  |  |  |  |
| 1        | 2                           | Lights when there envelopes are loaded in the envelope feeder.          |  |  |  |  |  |
|          | 1                           | Lights when paper present at the second-feed position                   |  |  |  |  |  |
|          | RDYINH set (Note 1)         |   |  |  |  |  |  |
| l        |                             |   |  |  |  |  |  |
| SET      | [7] 6 Forced laser emission |   |  |  |  |  |  |
|          | 5                           |   |  |  |  |  |  |
| ~        | 4                           |   |  |  |  |  |  |
|          | 3                           | Display panel light up test   |  |  |  |  |  |
|          | 2                           | Sleep mode (1: deep mode, 0: nap mode) (Note 2)                         |  |  |  |  |  |
|          | 1                           | Sleep set (Note 3)  |  |  |  |  |  |

#### **Table 4-2-7**

**Notes: 1.** When performing the ready inhibit setting, set MODE SELECT to "3" and turn on the printer while pressing the ENTER switch.

- 2. Deep mode halts all drives. (stop +24V supply) Nap mode halts all drives except the fan motor.
- **3.** The sleep mode setting can not be released. When releasing, turn the printer power ON/OFF again.

### III. MEASUREMENT AND ADJUSTMENT

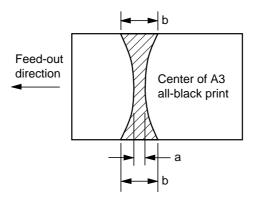
#### A. Mechanical Adjustment

#### 1. Checking the nip width of the fixing lower roller

The fixing unit is not designed to allow adjustment of the pressure (nip width). If the nip width is not correct, a fixing problem may occur.

Follow the procedure below to check the nip width.

- 1) Produce an all-black print using an EP-W cartridge, and take the print to the customer's premises. (Use the printer driver tester to output the all-black print.)
- 2) Put the all-black print in the lower cassette.
- 3) Press the TEST PRINT switch.
- 4) When the leading edge of the print emerges at the face-down tray, switch the printer OFF, wait for about 10 seconds, then switch the printer ON again. Deliver the paper from the printer.
- 5) Measure the width of the glossy band across the paper and check that it meets the requirements as shown in Figure 4-3-1.
  - Center (a):  $4.8 \pm 1.2 \text{ mm}$
  - Right and left sides (b):  $5.3 \pm 1.2$  mm

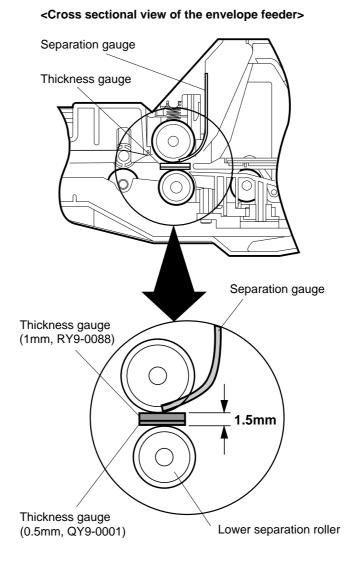


**Figure 4-3-1** 

# 2. Installing the separation guide of the envelope feeder (Adjusting the gap between the separation guide and the lower separation roller)

Under normal conditions, remove the separation guide along with the upper cover. If you removed just the separation guide or replaced a bent separation guide, adjust the gap as follows.

Install the separation guide 1.5 mm from the lower separation roller. Adjust its position by inserting the thickness gauges (1 mm and 0.5 mm) into the gap between the separation guide and the lower separation roller.



#### **Figure 4-3-2**

#### 3. Side Registration Adjustment of the Cassette

When the side registration of the cassette is not aligned, you need to make this adjustment.

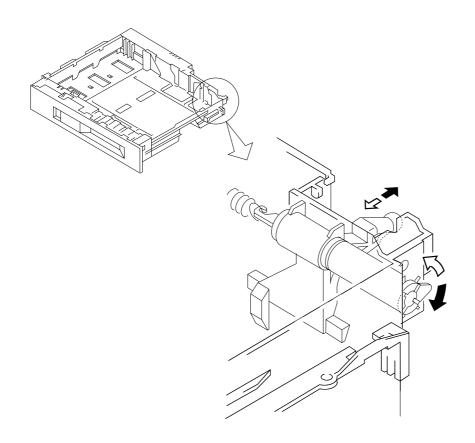
The side adjustment registration levers (see figure 4-3-3) in the upper and lower cassettes are adjusted in the factory. Therefore, there is no need to make any adjustments when installing the machine. However, in the event that either the upper or lower cassette needs replacing in the field, re-adjustment of the margins on left side is necessary. This procedure is outlined below.

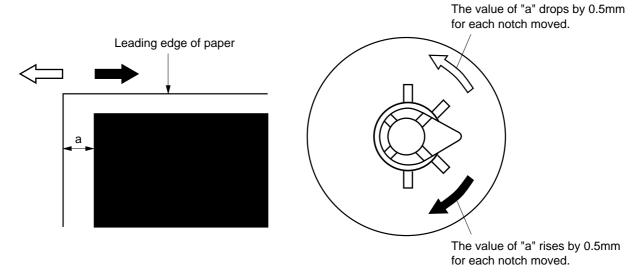
- 1) Load 20 30 sheets of paper into the cassette. Then, using the printer driver tester, print several pages of all-black or horizontal line test prints.
- 2) Measure the distance (a) between the left edge of the page to the edge of the printed pattern (see figure 4-3-3). Measure several test prints to find the average distance.
- 3) Move the side registration adjustment lever so that the distance measured in step 2) is 3.0mm. (one notch alters length (a) by 0.5mm)

  For example, if the average length of step 2) is 4.0mm, by moving the lever 2 steps clockwise the necessary adjustment of 1.0mm can be made.
- 4) Make several more test prints. Make sure that the margin on left side is 3.0mm by repeating

step 2) above.

If the margin needs further adjustment repeat steps 1) to 3) again.





**Figure 4-3-3** 

**B.** Electrical Adjustment
The printer does not require electrical adjustment in the field.

## IV. INITIAL CHECK

#### 1. Installation environment

Make sure that the printer conforms to the following environment standards:

- a. The power supply voltage is  $\pm 10\%$  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 faucets, kettles, humidifiers), cold spaces, near open flames, and dusty areas.
- e. Avoid sites exposed to direct sunlight. If unavoidable, advise the hanging of curtains.
- f. A well-ventilated place.

#### 2. Print paper checks

- a. Check that the recommended paper for this printer is being used.
- b. Check that the paper is not damp.Make a trial print with paper from a newly opened package, and check the results.

#### 3. EP-W cartridges

If blank spots appear on an output image, there is a chance that the toner is not even. Rock the toner cartridge as shown in Chap. 1 and make a print to check that it has evened out.

#### 4. Other

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 if immediately unpacked.

#### For example:

- a. Condensation in the optical system (Six-faced mirror, mirror, lens, etc.) will result in the output of light images.
- b. The photosensitive drum is cold, so resistance of the photoconductive layer will rise. This will lead to a loss of contrast.

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

If a packaged EP-W cartridge is opened soon after being moved from a cold room to a warm room, condensation will appear inside the cartridge; this can cause various image defects.

In such cases, 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.

## V. IMAGE DEFECTS

#### A. Test Print

This printer is capable of executing test prints of two types: engine test print and controller test prints.

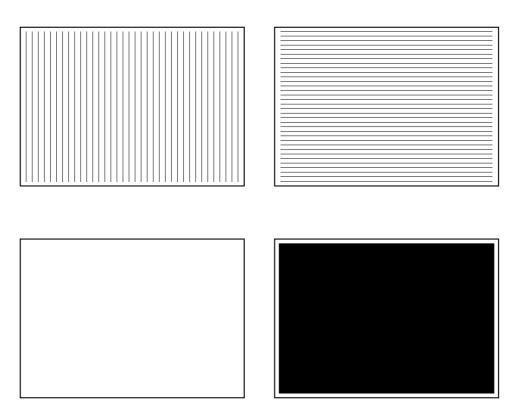
When an image defect appears, a test print can be made to identify the problem.

#### 1. Engine test print

Test print patterns of horizontal lines are printed in this test print. The test prints can be made by using the printer driver checker which can make all four test patterns (vertical lines, horizontal lines, solid black and solid white), or the test print switch located on the right side of the printer (see Figure 1-4-1).

One print of test pattern can be made by pressing the switch once when the power is turned ON and the "READY" appears on the display. If the switch is held down, test prints are made continuously.

Make sure that paper is loaded into the lower cassette before pressing the switch as this is where the paper is fed from.



**Figure 4-5-1** 

#### a. Test print procedures

- 1) Press the ON LINE key to set the printer off line.
- 2) Press the MENU key so that "TEST" appears on the display.3) Press the ITEM key so that "TEST PRINT" appears on the display. Then press the ENTER key to print a sheet of the pattern shown below.

# Canon Inc., LBP-2460 Printer **Configuration Page**

PCL MENU
COPIES = 1
PAGESIZE = A4
ORIENTATION = PORTRAIT
FORM = 60LINES
FNTSRC = INTERNAL
FONTNUM = 0
PT.SIZE = 12.00
PITCH = 10.00
SYMSET/ROMAN-8

FEEDER MENU FEEDE MENU
FEED = UPPER
OUTPUT = TOP OUTPUT BIN
TRAY SWITTCH = ON
MANUAL = OFF
MPTSIZE = A4
DUPLEX = OFF
BINDING = LONG

CONFIG MENU
JAMRECOVERY = OFF AUTOCONT = ON DENSITY = 7 PWRSAV = 30MIN ECONOMYMODE = OFF REFINE = ON FORMAT THE DISK

MEMCONFIG MENU PCLSAVE = OFF PS2SAVE = OFF

PARALLEL MENU
PERSONALITY= AUTO
BIDIRECTION= ON I/OTIME OUT= 15

LOCAL TALK MENU I/O TIME OUT= 15

ETHERNET MENU PERSONALITY= AUTO
I/OTIMEOUT= 15

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

RESET MENU/PRINTER
RESET = PRINTER
RESET = MENU

INSTALLED OPTIONS PAPER DECK LOCALTALK ETHERNET DISK

TOTAL MEMORY = 12MB

AUTOSENSED PAPER
UPPER = A4
LOWER = A4
PAPERDECK = A4 PRINTER DETAILS

CODE LEVELS CTL 2.17 PCL 1.3.1 PS 2.07 LT 1.21 EN 5.18 NG PAGE COUNT = 2

**Figure 4-5-2** 

# **B.** Examples of Image Defects (The paper is fed vertically.) I-1 Light I-2 Dark I-3 Completely blank I-4 All black I-5 Dots vertically in a line I-6 Dirt on back of I-7 Vertical streaks/lines paper I-9 Dirty I-8 Smudged horizontal bands I-10 Blank spots I-11 White vertical lines I-12 White horizontal lines I-13 Poor fixing I-14 Image distortion

**Figure 4-5-3** 

I-15 Sharp black horizontal lines (BD error/BD failure)

#### C. Image Defect Troubleshooting

#### I-1 Light

<Possible causes>

1. The image density is not adjusted correctly.

**Action:** Adjust the image density by operating the external device.

2. Lack of toner

**Action:** Replace the cartridge.

3. Open the upper cover and remove the EP-W cartridge while a print is being made. Open the drum protective shield of the EP-W cartridge and check the toner image on the photosensitive drum. If the toner image was not been transferred to the paper properly, go to step 4. If the toner image on the drum is faint, go to step 7.

Do not open the drum protective shield for more than 10 seconds.

4. Print paper

**Action:** Replace the print paper. Advise the customer how to store print paper.

5. The transfer charging roller contact of the high-voltage power supply is not making good a connection with the contact of the transfer charging roller shaft.

**Action:** If the contacts are dirty, clean them. If the problem continues after cleaning, or parts are deformed or damaged, replace them.

6. The transfer charging roller is deformed or has deteriorated.

**Action:** Replace the roller.

7. The high-voltage power supply PCB is defective.

**Action:** Replace the high-voltage power supply PCB.

8. The DC controller PCB is defective.

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

#### I-2 Dark

<Possible causes>

1. The image density is not adjusted correctly.

**Action:** Adjust the image density by operating the external device.

2. The drum grounding contact of the high-voltage power supply is not making a good connection with the cartridge contact.

**Action:** If the contacts are dirty, clean them. If the problem continues after cleaning, or parts are deformed or damaged, replace them.

3. The primary changing roller-bias contact of the high-voltage power supply is not making a good connection with the cartridge contact.

**Action:** If the contacts are dirty, clean them. If the problem continues after cleaning, or parts are deformed or damaged, replace them.

4. The high-voltage power supply PCB is defective.

**Action:** Replace the high-voltage power supply PCB.

5. The DC controller PCB is defective.

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

#### I-3 Completely blank

#### <Possible causes>

1. The projection for opening and closing the laser shutter of the EP-W cartridge is damaged. **Action:** Replace the cartridge.

2. The laser shutter arm or laser shutter is malfunctioning or damaged.

**Action:** If the laser shutter arm or laser shutter does not move smoothly, or parts are damaged, replace them.

3. The developing bias contact of the high-voltage power supply is not making a good connection with the cartridge contact.

**Action:** If the contacts are dirty, clean them. If the problem continues after cleaning, or parts are deformed or damaged, replace them.

4. The high-voltage power supply PCB is defective.

**Action:** Replace the high-voltage power supply PCB.

5. The DC controller PCB is defective.

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

#### I-4 All black

#### <Possible causes>

1. The primary changing roller-bias contact of the high-voltage power supply is not making a good connection with the cartridge contact.

**Action:** If the contacts are dirty, clean them. If the problem continues after cleaning, or parts are deformed or damaged, replace them.

2. The EP-W cartridge is defective.

**Action:** Replace the cartridge.

3. The high-voltage power supply PCB is defective.

**Action:** Replace the high-voltage power supply PCB.

4. The DC controller PCB is defective.

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

#### I-5 Dots vertically in a line

#### <Possible causes>

1. Static charge eliminator is dirty.

**Action:** Clean the static charge eliminator.

2. The static charge eliminator contact of the high-voltage power supply is not making a good connection with the static charge eliminator contact.

**Action:** If the contacts are dirty, clean them. If the problem continues after cleaning, or parts are deformed or damaged, replace them.

3. The transfer charging roller is deformed or has deteriorated.

**Action:** Replace the roller.

4. The high-voltage power supply PCB is defective.

**Action:** Replace the high-voltage power supply PCB.

#### I-6 Dirt on back of paper

#### <Possible causes>

1. Periodical stain (pick-up roller, transfer charging roller, fixing lower roller)

**Action:** Clean dirty rollers as shown in Table 4-5-1 on page 4-27. If they cannot be cleaned, replace them.

2. The transfer guide or fixing entry guide is dirty.

**Action:** Clean dirty parts.

#### I-7 Vertical streaks/lines

#### <Possible causes>

1. The photosensitive drum is damaged peripherally.

**Action:** Replace the cartridge.

2. The fixing entry guide is dirty.

**Action:** Clean the fixing entry guide.

3. The fixing upper roller is scratched.

**Action:** Remove the cause of the damage and replace the roller.

#### I-8 Smudged horizontal bands

#### <Possible causes>

1. The EP-W cartridge is defective.

**Action:** Replace the cartridge.

2. The fixing upper roller is dirty, deformed, or worn.

**Action:** Replace the fixing upper roller.

#### I-9 Dirty

#### <Possible causes>

1. The print paper is dirty.

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

2. Periodical stain (separation roller, transfer charging roller, fixing upper roller, EP-W cartridge)

**Action:** Clean dirty rollers as shown in Table 4-5-1 on page 4-27. If they cannot be cleaned, replace them.

#### I-10 Blank spots

#### <Possible causes>

1. The recommended paper is not being used.

**Action:** Replace the paper with the recommended paper. Advise the customer to use the recommended paper.

2. The paper is damp.

Action: Replace the paper. Instruct the customer to wrap and store print paper correctly.

3. The transfer charging roller is dirty or deformed.

**Action:** Replace the roller.

4. The EP-W cartridge is defective.

**Action:** Replace the cartridge.

#### I-11 White vertical lines

#### <Possible causes>

1. Lack of toner

**Action:** Take out the cartridge, rock it as shown in Chapter 1 to distribute the toner evenly, then reinstall it. If the problem continues, replace the cartridge.

2. The photosensitive drum is scratched.

**Action:** Replace the cartridge.

3. Foreign matter is on the laser outlet of the printer or the laser inlet of the cartridge.

**Action:** Remove the foreign matter.

4. The fixing entry guide is dirty or a foreign object is on it.

**Action:** Clean the fixing entry guide.

5. The fixing upper roller surface is damaged or dented.

**Action:** Replace the fixing upper roller.

6. The mirror in the laser/scanner unit is dirty.

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

#### I-12 White horizontal lines

#### <Possible causes>

1. The EP-W cartridge or fixing upper roller is defective.

**Action:** Replace the cartridge or the fixing upper roller as shown in Table 4-5-1 on page 4-27.

#### I-13 Poor fixing

#### <Possible causes>

1. The envelope position lever of the fixing unit is raised.

**Action:** Push down the lever.

2. The fixing roller surface is damaged or dented.

**Action:** Replace the roller.

3. The fixing lower roller is dirty.

**Action:** Clean the roller. If it cannot be cleaned, replace the roller.

4. The nip width of the fixing unit is not correct.

**Action:** Replace the fixing unit.

5. The thermistor has deteriorated.

**Action:** Replace the thermistor.

#### **I-14 Distortion**

#### <Possible causes>

1. Connectors on the DC controller PCB are loose.

Action: Reconnect the J202, J206, and J207 connectors properly.

2. The laser/scanner unit connectors are loose.

Action: Reconnect J1001, J1 and J6.

3. The laser/scanner unit is faulty.

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

4. The DC controller PCB is defective.

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

#### I-15 Sharp black horizontal lines (BD error/BD failure)

<Possible causes>/actions>

Same as I-14.

**Table 4-5-1**Periods of appearance of dirt, blank spots on images

|                          | Diameter (mm)    | Period on image (mm) | Phenomenon |            |                       |             |  |
|--------------------------|------------------|----------------------|------------|------------|-----------------------|-------------|--|
| Problem location         | Diameter (IIIII) |                      | Dirt       | Blank spot | Dirt on back of paper | Poor fixing |  |
| Transfer charging roller | 17.9             | About 56             |            | 0          | 0                     | 0           |  |
| Fixing upper roller      | 40               | About 126            | 0          | 0          |                       | 0           |  |
| Fixing lower roller      | 30               | About 94             |            |            | 0                     | 0           |  |
| Pick-up roller           | 24               | About 75             |            |            | 0                     |             |  |
| Feed roller              | 24               | About 75             |            |            | 0                     |             |  |
| Separation roller        | 24               | About 75             | 0          |            |                       |             |  |
| Photosensitive drum      | 30               | About 93             | 0          | 0          |                       |             |  |
| Developing cylinder      | 20               | About 75             | 0          | 0          |                       |             |  |
| Primary charging roller  | 14               | About 44             | 0          | 0          |                       |             |  |

# VI. MALFUNCTION TROUBLESHOOTING

The printer driver tester is necessary for executing the malfunction troubleshooting outlined in this section. It is used to monitor failures of the printer, sensor and actuator operations. When performing the corrective actions described below, the following precautions should be taken;

- when measuring the voltage at a specified terminal of a connector, check that the connector is not causing a faulty connection.
- before handling PCBs, be sure to touch a metal part of the printer to discharge static energy, as it can cause damage to the PCBs.
- the laser/scanner unit cannot be adjusted in the field, so do not attempt to disassemble it.

  Prepare the printer driver tester for executing the troubleshooting malfunctions described in this section.

# A. Messages Table

| Message                         | Meaning   | Action   |
|---------------------------------|---|--|
| + FORMAT DISK/<br>- IGNORE DISK | Either a request has been made to format the disk or the printer has determined that the disk needs formatting(Engin a new unformatted disk is installed when power up).  | press - to ignore the disk. For new/unformatted disk: If press-to ignore disk, the printer goes to "READY". Any attempt to write to the disk will be flushed since the disk has not  |
| + REALLY                        |   | been formatted   |
| FORMAT<br>- IGNORE DISK         | the operator is being asked to verify the disk<br>formatting is really wanted. This is in<br>response to the foregoing message.   | to be formatted or press - to skip<br>formatting the disk. This<br>message will not display for<br>new/unformatted disk(eg. The<br>disk is to be formatted for the 1st   |
| START DISK TEST                 | Start testing the hard disk   | Press ENTER to start disk testing. NOTE: this operation will cause the disk to format when press enter to end test. If the printer is powered off during the disk test, the message + FORMAT DISK - IGNORE DISK will appear when the printer is powered on |
| ENTER ENDS<br>TEST              | Stop testing the hard disk  | Press ENTER to end disk testing. NOTE: The disk will be formatted and the printer will reboot automatically when press ENTER to end disk test  |
| DISK ALMOST<br>FULL             | Warning message when the Disk is 70+% full.   |  |
| DISK FULL                       | Disk is 95% full. The printer goes offline (also at power up with a "disk full" installed). If AUTO CONT is ON, the printer will resume back online after 10 seconds. If continue to send files to the disk that larger than the 5% left on the disk, the files will be flushed or printed out as text. | or format the disk to clear the<br>message. The message doesn't<br>clear with power cycle or COLD<br>RESET. This message has lower   |
| READY<br>#OF###                 | Mopier is activated. ### is the total mopier count. # is the increment count up to ###.   | No action required. This   |

| Message                 | Meaning   | Action  |
|-------------------------|---|---|
|                         | Mopier is only available when the hard disk is installed                | displayed for the duration of the printer's processing time. @PJL RDYMSG DISPLAY will have higher priority than "# OF ###" message. |
| TONER LOW               | Toner is low.   | Replace the toner cartridge as soon as possible. The printer will continue to operate, but the images will degrade.                 |
| TONER CART<br>MISSING   | Toner Cartridge is missing.   | Add toner cartridge.  |
| PRINTER OPEN            | TOP, right or left (side) cover is open.                                | Close all cover doors.  |
| STACKER                 | stapler stacker top or front (spapler door)                             | Close all cover doors.  |
| COVER OPEN              | cover is open.  |   |
| COVER OPEN              | Paper deck feed cover is open.  | Close the feed cover.   |
| LOAD <size> IN</size>   | Load the specified tray with paper size.                                | The specified tray must be  |
| <tray></tray>           |   | loaded with the specified paper   |
|                         | trays:  | size. Depending upon  |
|                         | UPPER - The 500 sheet upper cassette.                                   | cirumstances, the CONINUE   |
|                         | LOWER - The 500 sheet lower cassette.                                   | key may be required to continue   |
|                         | PAPER DECK - The 2,000 sheet paper                                      | the job.  |
|                         | deck.   | If the prinetr is printing and a  |
|                         | MPT - The MP tray on the printer.                                       | tray runs out of paper, for   |
|                         | ENVELOPE - The optional envelope  | instance, simply loading the  |
|                         | feeder.   | tray and closing it will cause the  |
|                         |   | printer to continue normally. If,   |
|                         | size:   | however, the printer does not   |
|                         | LETTER - Letter size paper.   | contain the required paper and it   |
|                         | LEGAL - Legal size paper.   | must be loaded into the   |
|                         | 11X17 - Ledger size paper.  | specified tray, the CONTINUE  |
|                         | A3 - A3 size paper.   | key must be pressed to resume   |
|                         | A4 - A4 size paper.<br>A5 - A5 size paper.                              | printing. In the case of manual feed (discussed following), the   |
|                         | 11x17 - 11in. x 17in. size paper.                                       | CONTINUE key must always  |
|                         | EXEC - Executive size paper.  | be pressed.   |
|                         | C-10 - Commercial # 10 envelope.  | be pressed.   |
|                         | MONARCH - Monarch envelope.   |   |
|                         | DL - DL envelope.   |   |
|                         | C5 - C5 envelope.   |   |
|                         | B5-JIS - B5 size paper.   |   |
|                         | B5-ISO - B5 envelope.   |   |
|                         | B4 - B4 size paper.   |   |
| LOAD <size> IN</size>   | CUSTOM - Custom paper size  | Press the CONTINUE key to   |
| MANUAL                  | Any - Unknown size paper.   | resume printing.  |
| UPPER TRAY IN<br>MOTION | Load Manual tray with paper size. Like "Load" but for manual feed only. | No Action Required.   |
| LOWER TRAY IN           | The paper tray is repositioning the stack                               | No Action Required.   |
| MOTION                  | after new paper was loaded.   | 1   |
| PAPER DECK              | The paper tray is repositioning the stack                               | No Action Required.   |
| TRAY                    |   | _   |

| Message                 | Meaning   | Action  |
|-------------------------|---|---|
|                         |   |   |
| IN MOTION               | after new paper was loaded.                               |   |
| OUTPUT FULL             | The specified output bin is full.                         | Remove the paper from the tray.               |
| CHECK BIN 1             |   |   |
| OUTPUT FULL             | The specified output bin is full.                         | Remove the paper from the tray.               |
| CHECK BIN 2             | TO 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1                  | D 1 6 1                                       |
| OUTPUT FULL             | The specified output bin is full.                         | Remove the paper from the tray.               |
| CHECK BIN 3             |   | D (1  |
| OUTPUT FULL             | The specified output face-down tray is full.              | Remove the paper from the                     |
| STD. TRAY LOWER MISSING | The level assette is not in the minter on is              | face-down tray.  Reinsert the lower cassette. |
| LOWER MISSING           | The lower cassette is not in the printer or is            | Remsert the lower cassette.                   |
| UPPER MISSING           | not correctly positioned.                                 | Daingaut the summer exceptts                  |
| UPPER MISSING           | The upper cassette is not in the printer or is            | Reinsert the upper cassette.                  |
| PAPER DECK              | not correctly positioned.  The specified Tray is missing. | Reinsert the tray.                            |
| MISSING                 | The specified Tray is missing.                            | Remsert the tray.                             |
| DUPLEX OPTION           | The duplexing unit has been removed or is                 | Reinsert the duplexing unit into              |
| ERROR                   | no longer properly seated.                                | the printer.                                  |
| ENVELOPE                | The envelope feeder has been removed or is                | Reinsert the envelope feeder                  |
| OPTION ERROR            | no longer properly seated.                                | into the printer.                             |
| PAPER DECK              | The paper deck has been removed or is no                  | Reconnect the paper deck to the               |
| OPTION ERROR            | longer properly connected.                                | printer.                                      |
| STACKER OPTION          | The Stapler Stacker has been removed or is                | Re-connect the Stapler Stacker                |
| ERROR                   | no longer properly connected.                             | to the printer.                               |
| CHECK INPUT             | A paper jam occured near the input tray.                  | Check the area specified.                     |
| TRAY                    | puper juin occured near the input tray.                   | Sheek the area specified.                     |
| OPEN FRONT              | A paper jam occured near the front cover.                 | Check the area specified.                     |
| COVER                   | F - F J   | Section and the section of                    |
| OPEN LEFT               | A paper jam occured near the left cover.                  | Check the area specified.                     |
| COVER                   |   | 1   |
| OPEN RIGHT              | A paper jam occured near the right cover.                 | Check the area specified.                     |
| COVER                   |   |   |
| OPEN TOP COVER          | A paper jam occured near the upper cover.                 | Check the area specified.                     |
| 1 PAPER JAM             | Paper jam has occurred somewhere in the                   | Remove the jammed paper from                  |
|                         | paper path.   | the paper path. The upper cover               |
|                         |   | must be opened and closed to                  |
|                         |   | resume. printing.                             |
| 2 PAPER JAM             | Paper jam has occurred in the input paper                 | Remove the jammed paper from                  |
|                         | path.   | the paper path. The upper cover               |
|                         |   | must be opened and closed to                  |
|                         |   | resume. printing.                             |
| 3 PAPER JAM             | Paper jam has occurred in the input paper                 | Remove the jammed paper from                  |
|                         | path.   | the paper path. The upper cover               |
|                         |   | must be opened and closed to                  |
|                         |   | resume. printing.                             |
| 4 PAPER JAM             | Paper jam has occurred in the fixing unit                 |   |
|                         | area.   | the paper path. The upper cover               |
|                         |   | must be opened and closed to                  |
|                         |   | resume. printing.                             |
| 5 PAPER JAM             | Paper jam has occurred in the fixing unit                 | Remove the jammed paper from                  |

| Message                               | Meaning   | Action  |
|---------------------------------------|---|---|
|                                       | area.   | the paper path. The upper cover must be opened and closed to resume. printing.  |
| 6 PAPER JAM                           | Paper jam has occurred near the face-down tray. | Remove the jammed paper from<br>the paper path. The upper cover<br>must be opened and closed to<br>resume. printing.                          |
| 7 PAPER JAM                           | Paper jam has occurred near the face-down tray. | Remove the jammed paper from the paper path. The upper cover must be opened and closed to resume. printing.                                   |
| 8 PAPER JAM                           | Paper jam has occurred in the fixing unit area. |   |
| 9 PAPER JAM                           | Paper jam has occurred near the duplexing unit. | Remove the jammed paper from the paper path. The upper cover must be opened and closed to resume. printing.                                   |
| 10 PAPER JAM                          | Paper jam has occurred near the duplexing unit. | Remove the jammed paper from the paper path. The upper cover must be opened and closed to resume. printing.                                   |
| 11 PAPER JAM                          | Paper jam has occurred in the duplexing unit.   | Remove the jammed paper from<br>the paper path. The upper cover<br>must be opened and closed to<br>resume. printing.                          |
| 12 PAPER JAM                          | Paper jam has occurred in the duplexing unit.   | Remove the jammed paper from<br>the paper path. The upper cover<br>must be opened and closed to<br>resume. printing.                          |
| 13.1 PAPER JAM<br>CHECK PAPER<br>DECK | Paper jam has occured in the Paper Deck.        | Check the Paper Deck. Remove<br>the jammed paper from the<br>paper path. The upper cover<br>must be opened and closed to<br>resume. printing. |
| 13.2 PAPER JAM<br>CHECK PAPER<br>DECK | Paper jam has occured in the Paper Deck.        | Check the Paper Deck. Remove<br>the jammed paper from the<br>paper path. The upper cover<br>must be opened and closed to<br>resume. printing. |
| 13.3 PAPER JAM<br>CHECK PAPER<br>DECK | Paper jam has occured in the Paper Deck.        | Check the Paper Deck. Remove<br>the jammed paper from the<br>paper path. The upper cover<br>must be opened and closed to<br>resume. printing. |
| 14.1 PAPER JAM<br>OPEN RIGHT<br>COVER | Paper jam has occured in the feed cover.        | Check the Paper Deck. Remove<br>the jammed paper from the<br>paper path. The upper cover  |

| Message                                   | Meaning  | Action   |
|---|--|--|
|   |  | must be opened and closed to resume. printing.   |
| 14.2 PAPER JAM<br>OPEN RIGHT<br>COVER     | Paper jam has occured in the feed cover.   | Check the Paper Deck. Remove<br>the jammed paper from the<br>paper path. The upper cover<br>must be opened and closed to<br>resume. printing.  |
| 14.3 PAPER JAM<br>OPEN RIGHT<br>COVER     | Paper jam has occured in the feed cover.   | Check the Paper Deck. Remove<br>the jammed paper from the<br>paper path. The upper cover<br>must be opened and closed to<br>resume. printing.  |
| OPTIONS<br>CONTROLLER                     | Option controller error with paper deck.   | Reconnect the paper deck to the printer.   |
| DUPLEX COVER<br>OPEN                      | The delivery cover is open.  | Close the cover.   |
| OPT CONTROLLER<br>ERROR                   | There is a problem with the Option Controller  | -  |
| OPT CONTROLLER<br>COMMUNICATIONS<br>ERROR | There is a problem with the Option Controller  | Replace the option controller.   |
| MEMORY<br>OVERFLOW                        | Memory overflow. The printer received more data than it can fit into its available memory. This can happen if too many soft fonts, macros, or graphics which are too complex are received. | The job will resume after 10 seconds if AUTOCONT is ON. Otherwise press the CONTINUE key to resume printing. Check the page that ejects since the could not be processed as requested. Also simplify the job or add additional memory. |
| ERROR DISK CALL<br>FOR SERVICE            | Hard Drive Failure - Read Error -  | Replace the hard disk.   |
| MEMORY ALLOC<br>ERROR                     | GRS has been unable to allocate the memory it needs.   | The job will resume after 10 seconds if AUTOCONT is ON. Otherwise press the CONTINUE key to resume printing. Check the page that ejects since the could not be processed as requested.   |
| 1 NETWORK<br>OPTION ERROR                 | Bad NIC in slot 1.   | Replace the NIC.   |
| 2 NETWORK<br>OPTION ERROR                 | Bad NIC in slot 2.   | Replace the NIC.   |
| 43 PS OPTION<br>ERROR                     | Option PS ROM (DIMM) diagnostic error.   | An option ROM has failed its startup checksum and needs to be replaced.  |
| EXP I/O ERROR:<br>##                      | LocalTalk error, where ## is the number.  00 Shared Memory test error  01 CRC receive error  02 Receive over-run error   | These are problems with the 8051 (LocalTalk) card. These errors will be displayed and the printer will halt.   |

| M               | Maritan  | A . 42   |
|-----------------|--|--|
| Message         | Meaning  | Action   |
|                 | 03 Not at end of frame error   |  |
|                 | 04 LocalTalk network siways busy   | Replace the LocalTalk card.  |
|                 | 05 LocalTalk excess collision error  | Party and party and a  |
|                 | 06 LocalTalk excess defers error   |  |
|                 | 07 LocalTalk unidentified cntl LLAP type   |  |
|                 | 08 Receive Msg length error  |  |
|                 | 10 8751 Internal RAM error   |  |
|                 | 11 Cannot acquire a node ID  |  |
|                 | 12 Aborted during a receive  |  |
| NETWORK         | Tow network cards of the same type are   | Remove one of the network  |
| OPTION ERROR    | installed in printer.  | cards.   |
| ETHERNET        | The Ethernet card is not communicating   | Replace the Card.  |
| OPTION ERROR    | with the controller.   |  |
| LOCALTALK       | The Ethernet card is not communicating   | Replace the Card.  |
| OPTION ERROR    | with the controller.   | replace the Card.  |
| TOKEN RING      | The Ethernet card is not communicating   | Replace the Card.  |
| OPTION ERROR    | with the controller.   | Traplace are Gura.   |
| 10 ERROR CALL   | Unknown Fuser Error.   | See M-1 to 3 of pages 4-40 to 41   |
| FOR SERVICE     | Chanown I aser Entor.  | see with to sof pages it to to if  |
| 10.1 ERROR CALL | Abnormally low fuser temperature.  | See M-2 of page 4-40   |
| FOR SERVICE     | Tionormany low ruser temperature.  | See W 2 of page 4 40   |
| 10.2 ERROR CALL | Fuser warm up time out.  |  |
| FOR SERVICE     | ruser warm up time out.  |  |
| 10.3 ERROR CALL | Fuser overheating.   | See M-1 of page 4-40   |
| FOR SERVICE     |  | See Will of page 1 10  |
| 10.4 ERROR CALL | Fuser Error.   | See M-3 of page 4-41   |
| FOR SERVICE     | Tuber Error.   | See in 5 of page 1 11  |
| 11 ERROR CALL   | Unknown Scanner Error.   | See M-5 of page 4-41   |
| FOR SERVICE     |  | The state of the s |
| 11.1 ERROR CALL | Scanner start up failure.  |  |
| FOR SERVICE     | The state of the s |  |
| 11.2 ERROR CALL | Scanner rotation failure.  |  |
| FOR SERVICE     |  |  |
| 11.3 ERROR CALL | Scanner Beam failure.  | See M-4 of page 4-41   |
| FOR SERVICE     |  | 1.0  |
| 11.4 ERROR CALL | Laser Beam failure.  |  |
| FOR SERVICE     |  |  |
| 12 ERROR CALL   | Unknown Motor Error.   | See M-6 of page 4-42   |
| FOR SERVICE     |  | 1.0  |
| 12.1 ERROR CALL | Motor start up failure.  |  |
| FOR SERVICE     | The same of the sa |  |
| 12.2 ERROR CALL | Motor rotation failure.  | 1  |
| FOR SERVICE     |  |  |
| 13.1 ERROR CALL | Fan motor 1 failure.   | See M-7 of page 4-42   |
| FOR SERVICE     |  |  |
| 13.2 ERROR CALL | Fan motor 2 failure.   | See M-8 of page 4-42   |
| FOR SERVICE     |  |  |
| 13.3 ERROR FAN  | Fan motor 3 failure.   | See M-9 of page 4-43   |
| 3 CALL FOR      |  | 10.  |
|                 |  |  |

| Message             | Meaning  | Action                               |
|---------------------|--|--------------------------------------|
| SERVICE             |  |                                      |
| 13.4 ERROR FAN      | Fan motor 4 failure.   | See M-10 of page 4-43                |
| 4 CALL FOR          |  |                                      |
| SERVICE             |  |                                      |
| 14.1 ERROR AUX      | Lifter mechanism for the Aux Tray has  | See M-11 of page 4-43                |
| TRAY CALL FOR       | failed.  |                                      |
| SERVICE             |  |                                      |
| CHECK INPUT         | A paper jam occured near the input tray.   | Check the area specified.            |
| AREA                |  | _                                    |
| OPEN TOP COVER      | A paper jam occured near the top cover.  | Check the area specified.            |
| CHECK OUTPUT        | A paper jam occured at the stapler stacker   | Check the area specified.            |
| BINS                | output bins.   |                                      |
| 15.1 STACKER        | Jam at input paper sensor-Initial Jam  | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 15.2 STACKER        | Jam at input paper sensor-Stay Jam   | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 15.3 STACKER        | Jam at input paper sensor-Delay Jam  | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 15.4 STACKER        | Jam at input paper sensor-Early Jam  | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 16.1 STACKER        | Reversing unit paper sensor-Initial Jam  | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 16.2 STACKER        | Reversing unit paper sensor-Stay Jam   | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 16.3 STACKER        | Reversing unit paper sensor-Delay Jam  | Remove jammed paper and              |
| JAM                 |  | close cover.                         |
| 16.4 STACKER        | Reversing unit paper sensor-Early Jam  | Remove jammed paper and              |
| JAM<br>17.1 STACKED | Town of Addison was a second Toda's Line   | close cover.                         |
| 17.1 STACKER        | Jam at delivery paper sensor-Initial Jam   | Remove jammed paper and              |
| JAM<br>17.2 STACKER | Iom of delivery names cancer Ctay Iom  | close cover.                         |
| JAM                 | Jam at delivery paper sensor-Stay Jam  | Remove jammed paper and close cover. |
| 17.3 STACKER        | Jam at delivery paper sensor-Delay Jam   | Remove jammed paper and              |
| JAM                 | Jam at derivery paper sensor-Deray Jam   | close cover.                         |
| 17.4 STACKER        | Jam at delivery paper sensor-Early Jam   | Remove jammed paper and              |
| JAM                 | Jam at derivery paper sensor-Larry Jam   | close cover.                         |
| 18.1 STACKER        | Jam at Staple tray sensor-Initial  | Remove jammed paper and              |
| JAM                 | vani at stapie tray sonsor initial   | close cover.                         |
| 18.2 STACKER        | Jam at Staple tray sensor-Stay   | Remove jammed paper and              |
| JAM                 | vani at stapie tray sonsor stay  | close cover.                         |
| 18.3 STACKER        | Jam at Staple tray sensor-Delay  | Remove jammed paper and              |
| JAM                 | The state of the s | close cover.                         |
| STAPLE JAM OPEN     | Jam near the stapler   | Clear jam                            |
| STAPLER COVER       | _  |                                      |
| LOAD & TEST         | Staples low/empty and/or perform STAPLE  | Load staples. After loading new      |
| STAPLES             | TEST from the TEST MENU  | staples cartridge, the "LOAD &       |
|                     |  | TEST STAPLES" message will           |
|                     |  | remain on the UI until STAPLE        |
|                     |  | TEST is performed. STAPLE            |
|                     |  |                                      |

| Message                                   | Meaning                                    | Action   |
|---|--|--|
|   |  | TEST must be executed every time the staples cartridge is removed or reinstalled (regardless if the staple cartridge is full or not). The printer will not staple jobs correctly if STAPLE TEST is not executed. |
| 15.1 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of paper delivery motor        | See service manual of stapler stacker.   |
| 15.2 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of stapler shift motor         | See service manual of stapler stacker.   |
| 15.3 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of staple motor                | See service manual of stapler stacker.   |
| 15.4 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of alignment plate shift motor | See service manual of stapler stacker.   |
| 15.5 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of tray unit elevation motor   | See service manual of stapler stacker.   |
| 15.6 ERROR<br>STACKER CALL<br>FOR SERVICE | Overheating of the tray unit elevation     | See service manual of stapler stacker.   |
| 16.1 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of shutter                     | See service manual of stapler stacker.   |
| 16.2 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of swing-guide                 | See service manual of stapler stacker.   |
| 17.1 ERROR<br>STACKER CALL<br>FOR SERVICE | Malfunction of distance detecting sensor   | See service manual of stapler stacker.   |
| 18.1 ERROR<br>PAPER DECK                  | Malfunction of paper deck feed motor       | See M-20 of 4-44.  |
| 18.2 ERROR<br>PAPER DECK                  | Malfunction of paper deck lifter           | See M-16 of 4-42.  |
| 61 ERROR CALL<br>FOR SERVICE              | Resident ROM checksum error.               | Turn the power OFF, then turn it ON again. If it does not remedy the problem, replace the resident ROM.  |
| 62 ERROR CALL<br>FOR SERVICE              | Resident DRAM error.                       | Turn the power OFF, then turn it ON again. If it does not remedy the problem, replace the resident DRAM.   |

| Message                      | Meaning   | Action   |
|------------------------------|---|--|
| 63 ERROR CALL<br>FOR SERVICE | NVRAM (EEPROM) error.   | Turn the power OFF, then turn it ON again. If it does not remedy the problem, replace the resident NVRAM.  |
| 64 ERROR CALL<br>FOR SERVICE | SRAM in AIR chip error.   | Replace the video controller PCB.  |
| 32 DISK ERROR                | Hard Drive Failure - Write Error -  | Replace the hard disk.   |
| 33 DISK ERROR                | Hard Drive Failure - Read Failure -   | Replace the hard disk.   |
| COLD RESET                   | Displays when the COLD RESET (letter or A4) 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.   |
| COLD RESET A4                | Displays when Factory Reset - A4 Power-on sequence is selected.   | No action required.  |
| COLD RESET LTR               | Displays when Factory Reset - LTR Power-<br>on sequence is selected.  | No action required.  |
| CONTEXT SAVE                 | Context Saving mechanism modified by OS.  | Press CONTINUE key to  |
| ADJUSTED                     | Displayed when printer powered on with  | continue.  |
|                              | context saving enabled, but due to manual   |  |
|                              | recofiguration, there is not enough memory to support it.   |  |
| CONTEXT SAVE<br>CHANGE       | Context Saving mechanism modified by USER. Displayed when going online after modifying context saving.  | Press CONTINUE and printer will reboot to enable its new state.  |
| RESET TO SAVE                | RESET verification prompt. This message will appear 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 the reset 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 ONLINE and the current job will resume where it left off. The menu items changed will not take effect until the next end of job. |
| DSK FMT<br>RESTART           | The operator has formatted the disk and the operation has completed. The system will now restart.   | No action required.  |
| FLUSHING                     | A Reset operation has been performed by<br>the Operator in the middle of a job. The<br>current job is being flushed.  | The job that has been flushed will have to be resubmitted.   |
| FORMATTING                   | This message displays when the disk is being formatted.   | No action required.  |
| I/O INITIALIZING             | This message displays when one of the PSIO cards is being initialized.  | No action required.  |
| INSTALL UPPER.               | This message may display if the upper tray is missing.  | Install the upper tray.  |
| KEY NOT VALID                | Displays when a key is pressed that is not  | Press the correct button to  |

| Message                                  | Meaning  | Action  |
|--|--|---|
|  | enabled at this time.  | complete the current function.                      |
| LOCALTALK<br>INITIALIZING                | LocalTalk is initializing.   | No action required.                                 |
| MPT TRAY JAM<br>CLEAR PAPER<br>PATH      | A paper jam has occurred in the MP tray.   | Clear the paper path.                               |
| MRT<br>COMPRESSION                       | Printer has invoked MRT Compression because the page was too complex.  | No action required.                                 |
| OPEN FRONT<br>COVER CLEAR<br>PAPER PATH  | A paper jam has occurred.  | Take the action specified on the second line.       |
| OPEN FRONT<br>COVER REMOVE<br>JAM SHEET  | A paper jam has occurred.  | Take the action specified on the second line.       |
| OPEN OFFSET<br>DOOR CLEAR<br>PAPER PATH  | A paper jam has occurred.  | Take the action specified on the second line.       |
| OPEN REAR<br>COVER CLEAR<br>PAPER PATH   | A paper jam has occurred.  | Take the action specified on the second line.       |
| OPERATION<br>CHECK                       | This is the Control Panel Diagnostic Mode.   | Factory Usage Only. See section on diagnostics.     |
| PAGES: ####                              | Displays under TEST when SHOW PAGE COUNT is selected. #### is number of pages.   | No action required.                                 |
| PANEL CHECK                              | Displays during a panel check function.  | Proceed with the panel check function.              |
| PANEL CHECK<br>DONE                      | Displays when panel check function is complete.  | Power cycle printer.                                |
| WRONG PAPER<br>SIZE                      | A paper size mismatch has occurred. More than one paper size has been found in the same tray.  | Inspect the trays for mismatched paper and correct. |
| PAUSED<br>PRINTING                       | Printer is OFFLINE.  Usually displayed when printing an item form the TEST MENU, or when attempting to go offline while the printer is busy. | Press ONLINE.                                       |
| READY REMOVE DUPLXUNIT CLEAR PAPER PATH  | Printer is ready to receive data and print.  A paper jam or misfeed has occurred in or near the unit specified                               | No action required.  Take the action specified.     |
| REMOVE ENV<br>FEEDER OPEN<br>FRONT COVER | A paper jam or misfeed has occurred in or near the unit specified  | Take the action specified.                          |
| REMOVE JAM<br>ENVEL                      | A paper jam or misfeed has occurred in or near the unit specified  | Take the action specified.                          |
| REMOVE<br>PRINTCART CLEAR<br>PAPER PATH  | A paper jam or misfeed has occurred in or near the unit specified  | Take the action specified.                          |
| REMOVE                                   | A paper jam or misfeed has occurred in or  | Take the action specified.                          |

| Message                       | Meaning  | Action   |
|-------------------------------|--|--|
| PRINTCART CLEAR<br>PAPER PATH | near the unit specified                              |  |
| RESETTING<br>PRINTER          | Displays when TEST/RESET PRINTER item is selected.   | No action required.                                      |
| RESTORING<br>DEFAULTS         | Displays when TEST/FACTORY DEFALTS item is selected. | No action required.                                      |
| SRAM ERROR<br>CALL SERVICE    | The AIR Chip has failed.                             | Replace the video controller PCB.                        |
| WARNING UP                    | Printer is warming up.                               | Wait until the printer has warmed up and displays READY. |
|                               |  |  |
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|                               |  |  |

## **B.** Malfunction Troubleshooting

## **M-1 Fixing Unit Failure (Abnormal Temperature)**

<Possible causes>

1. The thermistor has shorted.

Action: Turn the power OFF and remove the fixing unit. Measure the resistance between the fixing unit connector J50B-2 (FSRTH) and J50B-3 (GNDTH). The connector J50B is the lower terminal of the left connector. If the resistance is  $1k\Omega$  or less, check the wiring from connector J222 on the DC controller PCB to the thermistor. If it is normal, replace the thermistor.

2. The fixing unit drive circuit in the power supply is defective.

**Action:** Replace the power supply.

3. The DC controller PCB is defective.

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

## M-2 Fixing Unit Failure (abnormal Warm-up failure/abnormal low temperature)

<Possible causes>

1. The thermistor is dirty.

**Action:** If the thermistor contact area of the fixing upper roller is dirty, clean it.

2. The thermistor is not installed correctly.

**Action:** If the thermistor is not evenly contacting the fixing upper roller, re-install the thermistor correctly.

3. The thermistor wire is broken.

**Action:** Turn the power OFF and remove the fixing unit. Measure the resistance between the fixing unit connector J50B-2 (FSRTH) and J50B-3 (GNDTH). If the resistance is not between 150k $\Omega$  and 290k $\Omega$  (normal temperature), check the wiring from connector J222 on the DC controller PCB to the thermistor. If it is normal, replace the thermistor.

4. The main heater wire is broken.

**Action:** Remove the fixing unit. If there is no continuity between the fixing unit connector J50-3 (FSRN1: the upper right terminal of the left connector) and J51-4 (FSRN2: the upper right terminal of the right connector), replace the main heater.

5. The sub heater wire is broken.

**Action:** Remove the fixing unit. If there is no continuity between the fixing unit connector J50-4 (FSRL1: the lower right terminal of the left connector) and J51-3 (FSRL2: the lower right terminal of the right connector), replace the sub heater.

6. The thermoswitch is open.

**Action:** Remove the fixing unit and wiring cover. If there is no continuity between thermoswitch connectors, replace the thermoswitch.

7. The DC controller PCB is defective.

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

## M-3 Fixing unit failure (wrong type)

#### <Possible causes>

1. The rated voltage of the fixing unit does not match the power supply voltage.

**Action:** Replace the fixing unit.

2. The type detection circuit in the power supply is defective.

**Action:** Replace the power supply.

3. The DC controller PCB is defective.

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

#### M-4 BD/Laser Malfunction

#### <Possible causes>

1. Condensation

**Action:** Leave the printer running for 10 to 20 minutes.

2. The BD signal line connector is loose.

Action: Reconnect connector J6 on the BD PCB and J206 on the DC controller PCB.

3. The laser drive signal line connectors are loose.

**Action:** Reconnect connector J1001 on the laser driver PCB, and connector J202 on the DC controller PCB.

4. The laser/scanner unit is defective. (The BD signal is not output correctly.)

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

5. The DC controller PCB is defective.

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

#### M-5 Scanner Motor Malfunction

#### <Possible causes>

1. The scanner motor drive line connectors are loose.

**Action:** Reconnect connector J1 on the scanner driver PCB, terminal connector J18, and connector J207 on the DC controller PCB.

2. The scanner motor driver is defective.

**Action:** Use the printer driver tester to rotate the scanner motor. If it does not rotate, replace the laser/scanner unit.

3. The DC controller PCB is defective.

## M-6 Faulty Main Motor

<Possible causes>

1. The main motor drive line connectors are loose.

**Action:** Reconnect connector J12 of the main motor and connector J218 on the DC controller PCB.

2. The door switch in the switch/sensor PCB is defective.

**Action:** Remove connectors J205 and J221 on the DC controller PCB. If J205-3 (+24V) and J221-1 (+24VB) on the cable side do not conduct when the door switch (SW1401) is on, replace the switch/sensor PCB.

3. The main motor is defective.

Action: Use the printer driver tester to rotate the main motor. If it does not rotate, replace it.

4. The DC controller PCB is defective.

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

#### M-7 Fixing Unit/Scanner Fan (FM1) Failure

<Possible causes>

1. The FM1 drive signal line connector is loose.

Action: Reconnect connector J208 on the DC controller PCB.

2. The fixing unit/scanner fan is defective.

**Action:** Disconnect connector J208 on the DC controller PCB. Turn the power switch ON and measure the voltage between connector J208-1 (FAN1D) and J208-3 (GND) on the DC controller PCB. If the voltage changes from 0 to more than 18V, replace the fixing unit/scanner fan.

3. The DC controller PCB is defective.

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

#### M-8 Power Supply Fan (FM2) Failure

<Possible causes>

1. The FM2 drive signal line connector is loose.

**Action:** Reconnect connector J216 on the DC controller PCB.

2. The power supply fan is defective.

**Action:** Disconnect connector J216 on the DC controller PCB. Turn the power switch ON and measure the voltage between connector J216-1 (FAN2D) and J216-3 (GND) on the DC controller PCB. If the voltage changes from 0 to more than 18V, replace the power supply fan.

3. The DC controller PCB is defective.

#### M-9 Electrical Unit Fan (FM3) Failure

#### <Possible causes>

1. The FM3 drive signal line connector is loose.

Action: Reconnect connector J210 on the DC controller PCB and connectors J12 and J13.

2. The electrical unit fan is defective.

**Action:** Disconnect connector J210 on the DC controller PCB. Turn the power switch ON and measure the voltage between connector J210-1 (FAN3D) and J210-3 (GND) on the DC controller PCB. If the voltage changes from 0 to more than 18V, replace the electrical unit fan.

3. The DC controller PCB is defective.

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

#### M-10 Fixing Unit Fan (FM4) Failure

#### <Possible causes>

1. The FM4 drive signal line connector is loose.

Action: Reconnect connector J225 on the DC controller PCB and connectors J25 and J26.

2. The fixing unit fan is defective.

**Action:** Disconnect connector J225 on the DC controller PCB. Turn the power switch ON and measure the voltage between connector J225-1 (FAN4D) and J225-3 (GND) on the DC controller PCB. If the voltage changes from 0 to more than 18V, replace the fixing unit fan.

3. The DC controller PCB is defective.

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

#### M-11 Lifting Plate Failure

#### <Possible causes>

1. Lifting plate drive unit parts are damaged.

**Action:** Replace any damage parts.

2. The lifting plate position sensor is defective.

**Action:** Check the sensor state using the printer driver tester. If it is defective, replace the multi-purpose tray PCB.

3. The lifting plate solenoid is defective.

**Action:** Disconnect lifting plate solenoid connector J1302. Measure the resistance between connectors J1302-1 and J1302-2 on the cable side. If it is not about  $100\Omega$ , replace the lifting plate solenoid.

4. The DC controller PCB is defective.

## M-12 Horizontal Registration Guide Failure (When the Duplexing Unit is Installed)

<Possible causes>

1. The horizontal registration guide home position sensor signal line and horizontal registration motor drive signal line connectors are loose.

Action: Reconnect connectors J2005 and J2006 on the duplexing driver PCB.

2. Gears are damaged.

Action: Replace any damaged gears.

3. The horizontal registration guide home position sensor is defective.

**Action:** Check the sensor state using the printer driver tester. If it is defective, replace the sensor.

4. The horizontal registration motor is defective.

**Action:** Replace the horizontal registration motor.

5. The duplexing driver PCB is defective.

**Action:** Replace the duplexing driver PCB.

#### M-13 No AC Power Input (printer)

<Possible causes>

1. The correct voltage is not present at the outlet.

**Action:** Inform the customer that the correct line voltage is not available at the outlet.

2. The power cord is not firmly plugged into the printer, the paper deck, and the outlet.

**Action:** Push the power plugs in firmly.

3. The circuit breaker is off.

**Action:** Remove the power supply. Press the circuit breaker button to set the circuit breaker ON.

Turn the circuit breaker on 30 seconds after it is turned on.

Before plugging the power cord into the outlet, turn the power switch ON and check the AC line circuit short and the circuit breaker states (continuity and contact resistance) using a multimeter.

4. The power switch is defective.

**Action:** Remove the power supply. Measure the resistance between the two terminals of the power switch by applying the tester probes to the terminals. The resistance must be zero V when the power is turned ON, and  $\infty\Omega$  when the switch is turned OFF. Otherwise, replace the power supply.

5. The AC power line is defective.

Action: Replace the power supply.

#### M-14 No Power Input (paper deck)

<Possible causes>

1. The correct voltage is not present at the outlet.

**Action:** Inform the customer that the correct line voltage is not available at the outlet.

2. The power plug is not firmly plugged into the printer, the paper deck or the outlet.

**Action:** Push the power plugs in firmly.

3. A poor connection in the interface connector, power ON signal not being input.

Action: Reconnect the interface connector.

4. The power ON signal is not being output.

**Action:** Turn the printer power switch ON. Measure the voltage between jumper connectors JP201-1 (PWRON-IN) and JP201-1 (GND) on the paper deck driver PCB. If the value is not about 5V, replace the option controller PCB. If this does not rectify the situation, replace the video controller PCB.

5. Blown fuse.

**Action:** Remove the power supply and replace the fuse.

6. The overcurrent/overvoltage detection circuit has been activated.

**Action:** If turning the power switch ON/OFF does not rectify the situation, investigate the cause of the overcurrent/overvoltage detection circuit being activated. Be sure to turn the power OFF for 2 minutes then turn it ON again.

7. Faulty power supply.

**Action:** Turn the printer power switch OFF and remove connector J203 from the paper deck driver PCB. Plug the power cable into the power supply and turn the printer power ON. Then measure the DC power supply through connector J203. While doing this be careful not to short it. If the correct voltage is not being output, replace the power supply.

8. Cable, DC load and paper deck driver PCB

**Action:** Turn OFF the printer power switch, and check the lines and DC loads from the paper deck driver PCB. If there are no problems with either of them, replace the paper deck driver PCB.

#### M-15 No DC Power Input

<Possible causes>

1. The AC power is not present.

**Action:** Make a check using the steps of M-13 "No AC Power Input (printer)".

2. The overcurrent/overvoltage detection circuit is active.

**Action:** If the problem is not rectified when the power switch is turned OFF and ON again, find the cause of activation of the overcurrent/overvoltage detection circuit of the power supply. Turn the power switch OFF for 2 minutes then turn it ON again.

3. The fuse has blown.

**Action:** Remove the power supply and replace the fuse.

4. The power supply is defective.

**Action:** Turn the power switch OFF and remove connector J204 from the DC controller PCB. Plug the power cable and turn the power switch ON. Measure the DC power

supply output of the connector J204. Do not short the connector. If the correct value is not output, replace the power supply.

5. Wiring, DC load, DC controller PCB

**Action:** Turn the power switch OFF. Check the wiring from the DC controller PCB and the DC load. If they are normal, replace the DC controller PCB.

#### M-16 Lifting Plate not rising (paper deck)

#### <Possible causes>

1. The tray is not correctly installed.

**Action:** Reload the tray.

2. The paper size detection lever is not being pressed as the paper guides are not properly inserted.

**Action:** Insert the paper guides correctly.

3. The side and end guides are not installed in the correct paper size slots. (For example, the side guide is in the B4 or legal slot, whereas the end guide in the letter or A4 position.

Action: Insert the width and trailing edge guides properly

4. Cut wire.

**Action:** Replace the wire.

5. Damaged gear

**Action:** Check the gears, and replace if damaged.

6. Defective lifter clutch

Action: Remove connector J119 from the lifter clutch. Measure the resistance between connectors J119-1 and J119-4 on the clutch side. Replace the lifter clutch if the resistance is not about  $155\Omega$ .

7. Faulty lifter abnormal position sensing switch

Action: Remove connector J121 from the lifter abnormal position sensing switch. Measure the resistance between connectors J121-1 and J121-2 on the switch side. Replace the switch if the resistance is  $\infty\Omega$ .

8. Defective sensor lever

Action: Adjust the lever so it moves smoothly. Replace if damaged.

9. Defective paper surface sensor

**Action:** Pull the tray half way out and lower it. Turn the printer power ON. Measure the voltage between connectors J208-8 (LIFT) and J208-10 (GND) on the paper deck driver PCB. Replace the sensor if the voltage is about 5V.

10. Defective paper-size sensing switch PCB

**Action:** Replace the paper-size sensing switch PCB.

11. Defective paper deck driver PCB

**Action:** Replace the paper deck driver PCB.

## M-17 No Paper Pick-Up from Multi-purpose Tray

<Possible causes>

1. Video controller PCB is defective.

**Action:** Make a test print from the multi-purpose tray using the printer driver tester. If the paper is picked up correctly, replace the video controller PCB.

2. Gears are damaged.

**Action:** Remove the manual feed pick-up unit and check the gears. Replace any damaged gears.

3. The manual feed clutch is defective.

**Action:** Remove the manual feed pick-up unit and disconnect manual feed clutch connector J1303 from the multi-purpose tray PCB. Measure the resistance between connectors J1303-1 and J1303-2 on the cable side. If it is not about 155, replace the manual feed clutch.

4. The multi-purpose tray PCB is defective.

**Action:** Replace the multi-purpose tray PCB.

5. The DC controller PCB is defective.

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

## M-18 No Paper Pick-Up from Upper or Lower Cassette

<Possible causes>

1. Video controller PCB is defective.

**Action:** Use the printer driver tester to make a test print from the cassette with a paper pickup failure. If the paper is picked up correctly from the cassette, replace the video controller PCB.

2. Pick-up drive unit is damaged.

**Action:** Remove the pick-up unit and replace any damaged parts.

3. The pick-up motor is defective.

**Action:** Use the printer driver tester to rotate the paper pick-up motor. If it does not rotate, replace it.

4. The cassette pick-up solenoid is defective.

**Action:** Remove the pick-up unit, and disconnect cassette pick-up solenoid connector J1203 from the pick-up PCB. Measure the resistance between connectors J1203-1 and J1203-2 on the cable side. If it is not about 190, replace the cassette pick-up solenoid.

5. The pick-up PCB is defective.

**Action:** Replace the pick-up PCB.

6. The DC controller PCB is defective.

## M-19 No Paper Pick-Up from Envelope feeder

<Possible causes>

1. Video controller PCB is defective.

**Action:** Use the printer driver tester to make a test print from the envelope feeder. If the envelope is picked up correctly from the envelope feeder, replace the video controller PCB.

2. Gears are damaged.

**Action:** Remove the envelope feeder and check the gears. Replace any damaged gears.

3. The envelope feeder pick-up motor is defective.

**Action:** Use the printer driver tester to rotate the envelope feeder pick-up motor. If it does not rotate, replace it.

4. The envelope feeder driver PCB is defective.

**Action:** Replace the envelope feeder driver PCB.

5. The DC controller PCB is defective.

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

## M-20 No Paper Pick-Up from Paper deck

<Possible causes>

1. Damaged part in the paper pick-up drive unit.

**Action:** Remove the pick-up unit and replace any damaged parts.

2. Faulty pick-up solenoid

**Action:** Remove pick-up solenoid connector J115. Measure the resistance between connectors J115-1 and J115-2 on the cable side. If it is not about 190, replace the pick-up solenoid.

3. Defective pick-up motor

**Action:** Load one sheet of paper into the paper deck. Then after shorting jumpers JP201-2 (TEST-1) and JP201-1 (GND) on the paper deck driver PCB, turn the printer power switch ON. If the pick-up motor does not rotate at that time, replace the motor.

4. Defective paper deck driver PCB

**Action:** Replace the paper deck driver PCB.

5. Defective option controller PCB.

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

6. Defective video controller PCB.

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

#### M-21 Registration Roller not rotating (printer)

<Possible causes>

1. Gears are damaged.

**Action:** Replace any damaged gears.

2. The registration clutch is defective.

**Action:** Disconnect registration clutch connector J17. Measure the resistance between connectors J17-1 and J17-2 on the cable side. If it is not about 210, replace the

registration clutch.

3. The DC controller PCB is defective.

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

## M-22 Registration Roller not rotating (paper deck)

<Possible causes>

1. Gears are damaged.

Action: Replace any damaged gears.

2. Defective registration clutch.

**Action:** Remove connector J102. Measure the resistance between connectors J102-7 and J102-8 on the clutch side. If it is not about 210, replace the registration clutch.

3. Defective paper deck driver PCB

**Action:** Replace the paper deck driver PCB.

### M-23 Poor Output from the High-Voltage Power Supply

<Possible causes>

1. A terminal of the high-voltage contacts is dirty or burnt out.

**Action:** Clean the terminals of the high-voltage contact. Replace if is burnt out.

2. The high-voltage power supply PCB is defective.

**Action:** Replace the high-voltage power supply PCB.

3. The DC controller PCB is defective.

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

## M-24 Feed Roller not rotating (paper deck)

<Possible causes>

1. Gears are damaged.

Action: Replace any damaged gears.

2. Defective feed clutch.

**Action:** Remove connector J102. Measure the resistance between connectors J102-9 and J102-10 on the clutch side. If it is not about 210, replace the feed clutch.

3. Defective paper deck driver PCB

**Action:** Replace the paper deck driver PCB.

#### M-25 Faulty Deck Motor (paper deck)

#### <Possible causes>

1. Poor contact in the deck motor drive signal line connector

**Action:** Reconnect deck motor connector J118 and connector J204 on the paper deck driver PCB.

## 2. Faulty deck motor

**Action:** Measure the voltage between connectors J204-4 (DCMOT-ON) and J204-2 (GND) on the paper deck driver PCB. Pull out the tray, when pushed back in, if the measured value changes from 5V to 0V, replace the deck motor.

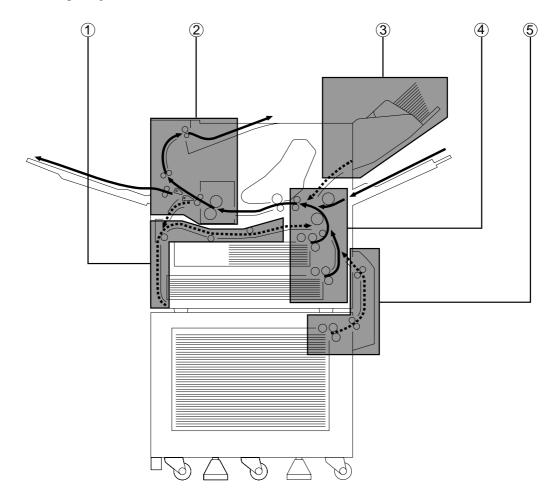
3. Defective paper deck driver PCB

Action: Replace the paper deck driver PCB.

# VII. PAPER FEEDING TROUBLESHOOTING

## A. Paper Jams

Paper in the printer passes through five major units: (1) duplexing unit, (2) fixing and delivery unit, (3) envelope feeder unit, (4) pick-up unit, and (5) paper deck unit. The following explains troubleshooting for jams in each of these units.



**Figure 4-7-1** 

- 1. Duplexing unit
- 2. Fixing and delivery unit
- 3. Envelope feeder unit
- 4. Pick-up unit
- 5. Paper deck unit

#### J-1 Pick-up unit

#### <Possible causes>

1. The recommended paper is not being used or the paper is curled or wrinkled.

**Action:** Replace the paper. Advise the customer to use recommended paper and on how to store paper.

- 2. If jams occur in the manual feed pick-up unit, perform step 6 and subsequent steps.
- 3. If jams occur in the cassette paper pick-up unit, perform step 9 and subsequent steps.
- 4. The registration clutch does not work properly.

Action: Check using the steps of M-21 "Registration Roller not rotating (printer)".

5. The registration roller is worn, deformed, or dirty.

**Action:** Clean the registration roller if it is dirty. Replace if worn or deformed.

6. Too much paper on the multi-purpose tray

**Action:** Advise the customer not to over load the tray with paper.

7. The manual feeding pick-up roller is worn, deformed, or dirty.

**Action:** Clean the manual feeding pick-up roller if it is dirty. Replace if worn or deformed.

8. The pick-up roller does not rotate when a print is being made.

Action: Make a check using the steps of M-17 "No Paper Pick-up from Multi-purpose Tray".

9. The cassette is not positioned correctly.

**Action:** Re-position the cassette properly.

10. The print paper is bent.

**Action:** Replace the paper.

11. Too much paper in the cassette

**Action:** Advise the customer not to are load the cassette with paper.

12. The cassette pick-up roller, separation roller, or feed roller is worn or deformed.

**Action:** Replace if worn or deformed. Replace the separation roller and the feed roller together.

13. The cassette pick-up roller does not rotate when a print is being made.

**Action:** Make a check using the steps of M-18 "No Paper Pick-up from Upper or Lower Cassette".

#### J-2 Fixing and delivery unit

#### <Possible causes>

1. Paper longer than the paper length set by the user was loaded during manual feeding. **Action:** Advise the user to replace it with the set paper size.

2. The fixing roller does not rotate smoothly.

Action: Check whether any gears are worn or missing.

3. The fixing entrance guide is dirty, damaged, or clogged with toner.

Action: Clean the guide.

4. The fixing separation guide is dirty, damaged, or clogged with toner.

**Action:** Clean the guide.

5. The fixing separation claw is worn or damaged.

**Action:** Replace the claw.

6. The upper or fixing lower roller is deformed or damaged.

**Action:** Replace deformed or damaged rollers.

7. The nip width of the fixing lower unit is not correct.

**Action:** Replace the fixing unit.

8. The fixing unit delivery sensor arm does not move smoothly or is damaged.

**Action:** Adjust the arm so that it moves smoothly. If it is damaged, replace it.

9. The fixing unit delivery roller is worn.

**Action:** Replace the fixing unit delivery roller.

10. The fixing unit delivery roller does not rotate smoothly.

**Action:** Check whether any gears are worn or missing.

11. The face-down delivery roller does not rotate smoothly.

**Action:** Check whether any gears are worn or missing.

#### **J-3 Duplexing Unit**

#### <Possible causes>

1. Foreign matter is adhering to the feed guide or it is burred.

**Action:** Remove any foreign matter. If the guide is burred, replace it.

2. The switchback roller, feed roller, or duplex feed roller is worn or deformed.

**Action:** Replace worn or deformed rollers.

3. Paper dust or dirt is adhering to rollers.

**Action:** Remove the paper dust or dirt.

4. Gears are worn or damaged.

Action: Replace any worn or damaged gears.

5. Sensor arms do not move smoothly or are damaged.

**Action:** Adjust the arm so that they move smoothly. If damaged, replace them.

6. Duplexing unit sensors are defective.

Action: Check the state of each sensor using the printer driver tester. Replace any defective

sensors.

## J-4 Envelope Feeder

#### <Possible causes>

1. The recommended envelopes are not being used.

**Action:** Advise the customer to use the recommended envelopes.

2. Too many envelopes in the envelope feeder

**Action:** Tell the customer not to over load the envelope feeder with envelopes.

3. The envelope guide is pressing against the envelopes.

**Action:** Advise the customer not to set the envelope guide too close to the envelopes.

4. Envelope feeder rollers are worn or deformed.

Action: Replace any worn or deformed envelope feeder rollers.

5. The envelope feeder roller does not rotate when a print is being made.

**Action:** Make a check using the steps of M-19 "No Paper Pick-up from Envelope Feeder".

## J-5 Paper Deck

#### <Possible causes>

1. Paper is not correctly loaded in the paper deck.

**Action:** Reload correctly.

2. The side and end guides are not inserted correctly. (For example, when feeding A4 size paper, if the end paper guide has not been inserted the paper deck presumes that A3 paper is to be fed, causing a paper jam due to a difference in timing.

**Action:** Insert the guides correctly.

3. Paper is folded.

**Action:** Replace the paper.

4. More paper than the specified amount is loaded in the paper deck.

**Action:** Advise the customer to load the correct amount of paper.

5. Pick-up, separation or feed roller worn or deformed.

**Action:** Replace if worn or deformed. Be sure to replace the separation and feed rollers together.

6. Paper deck pick-up roller not rotating during printing.

Action: Check according to instructions in M-20 "No paper pick-up form Paper Deck".

## **B.** Incomplete Paper Feed

## **T-1 Multiple Paper Feed**

#### <Possible causes>

1. The recommended paper is not being used.

**Action:** Replace the paper. Advise the customer to use the recommended paper.

- 2. If this problem occurs with the multi-purpose tray, perform step 5 and subsequent steps.
- 3. The separation roller is worn or deformed.

**Action:** Replace the separation roller.

4. The spring is defective.

**Action:** Replace the spring that pulls the separation roller.

5. The separation pad surface is worn.

**Action:** Replace the separation pad.

6. The spring is defective.

**Action:** Replace the spring of the separation pad.

#### **T-2 Wrinkles**

#### <Possible causes>

1. The recommended paper is not being used.

**Action:** Replace the paper. Advise the customer to use the recommended paper.

2. The paper is damp.

**Action:** Advise the customer on how to store paper to prevent it from dampening.

3. The separation roller is worn or deformed.

**Action:** Open the upper cover before a sheet of paper enters the fixing unit. If there are wrinkles on the paper at this point or the paper is skewed, check the pick-up unit.

4. The fixing entrance guide is dirty.

Action: Clean the guide.

5. The fixing lower roller is dirty.

**Action:** Replace the fixing lower roller.

6. The fixing roller is deformed or worn.

**Action:** Replace the worn or deformed roller.

#### T-3 Bent leading edge

#### <Possible causes>

1. The recommended paper is not being used. The paper is curled or wrinkled.

**Action:** Replace the paper. Advise the customer to use the recommended paper and on how to store paper.

2. Too much paper loaded in the paper feed slot

**Action:** Advise the customer not to over load the paper feed slot with paper.

3. The paper guide is worn or deformed.

**Action:** Check the paper feed path, and replace the guide if it is damaged or deformed.

## **T-4 Skewing**

#### <Possible causes>

1. The recommended paper is not being used.

**Action:** Replace the paper. Advise the customer to use the recommended paper.

2. Too much paper on the paper feed slot

**Action:** Tell the customer not to over load the paper feed slot with paper.

3. The print paper is not loaded correctly.

**Action:** Load it correctly so that it is aligned with the guide edge of the multi-purpose tray.

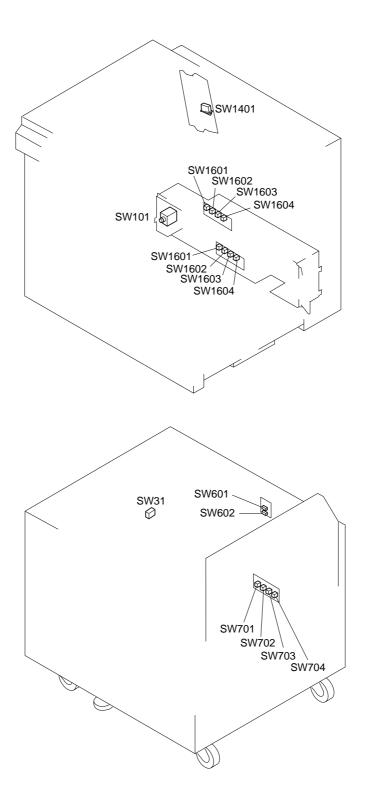
4. Paper dust or dirt is adhering to the registration rollers or the feed guide.

**Action:** Remove the paper dust or dirt.

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# VIII. LOCATION OF ELECTRICAL PARTS/FUNCTION

## A. Switches

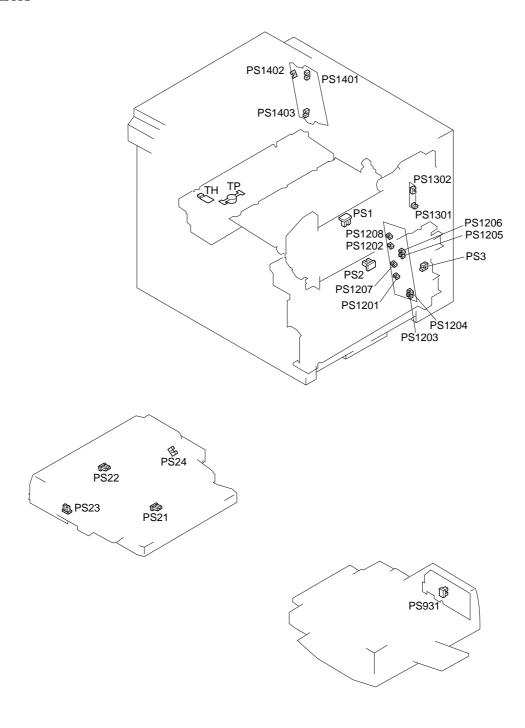


**Figure 4-8-1** 

**Table 4-8-1** 

| Symbol | Name   | Code   | Role   |
|--------|--------|--------|--|
|        | Switch | SW101  | Power switch   |
| _~~~   |        | SW1401 | Door switch  |
|        |        | SW1601 | Lower cassette-size sensing switch                   |
|        |        | SW1602 | Lower cassette-size sensing switch                   |
|        |        | SW1603 | Lower cassette-size sensing switch                   |
|        |        | SW1604 | Lower cassette-size sensing switch                   |
|        |        | SW1601 | Upper cassette-size sensing switch                   |
|        |        | SW1602 | Upper cassette-size sensing switch                   |
|        |        | SW1603 | Upper cassette-size sensing switch                   |
|        |        | SW1604 | Upper cassette-size sensing switch                   |
|        |        | SW31   | Lifter abnormal position sensing switch (paper deck) |
|        |        | SW601  | Paper-level sensing switch (paper deck)              |
|        |        | SW602  | Paper-level sensing switch (paper deck)              |
|        |        | SW701  | Paper-size sensing switch (paper deck)               |
|        |        | SW702  | Paper-size sensing switch (paper deck)               |
|        |        | SW703  | Paper-size sensing switch (paper deck)               |
|        |        | SW704  | Paper-size sensing switch (paper deck)               |

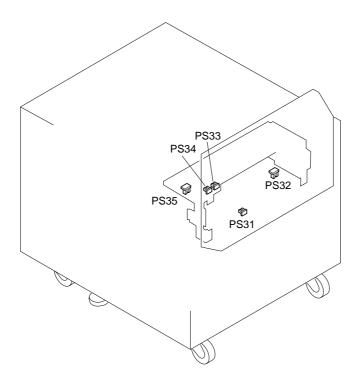
## **B.** Sensors



**Figure 4-8-2** 

**Table 4-8-2** 

| Symbol | Name             | Code   | Role  |
|--------|------------------|--------|---|
|        | Photointerrupter | PS1    | Registration paper sensor                                     |
|        |                  | PS2    | Pick-up unit paper sensor                                     |
|        |                  | PS3    | Right door sensor   |
|        |                  | PS1201 | Lower cassette sensor   |
|        |                  | PS1202 | Upper cassette sensor   |
|        |                  | PS1203 | Lower cassette paper-level sensor 1                           |
|        |                  | PS1204 | Lower cassette paper-level sensor 2                           |
|        |                  | PS1205 | Upper cassette paper-level sensor 1                           |
|        |                  | PS1206 | Upper cassette paper-level sensor 2                           |
|        |                  | PS1207 | Lower cassette paper-out sensor                               |
|        |                  | PS1208 | Upper cassette paper-out sensor                               |
|        |                  | PS1301 | Multi-purpose tray paper sensor                               |
|        |                  | PS1302 | Lifting plate position sensor                                 |
|        |                  | PS1401 | Face-down tray paper full sensor                              |
|        |                  | PS1402 | Face-down tray delivery sensor                                |
|        |                  | PS1403 | Fixing unit delivery sensor                                   |
|        |                  | PS21   | Duplexing unit paper sensor (duplexing unit)                  |
|        |                  | PS22   | Switchback sensor (duplexing unit)                            |
|        |                  | PS23   | Side registration guide home position sensor (duplexing unit) |
|        |                  | PS24   | Duplex feed roller 1 home position sensor (duplexing unit)    |
|        |                  | PS931  | Envelope feeder paper sensor (envelope feeder)                |
|        | Thermistor       | TH     | Detects the fixing upper roller surface temperature.          |
| 0'0    | Thermoswitch     | TP     | Detects the fixing upper roller abnormal temperature.         |

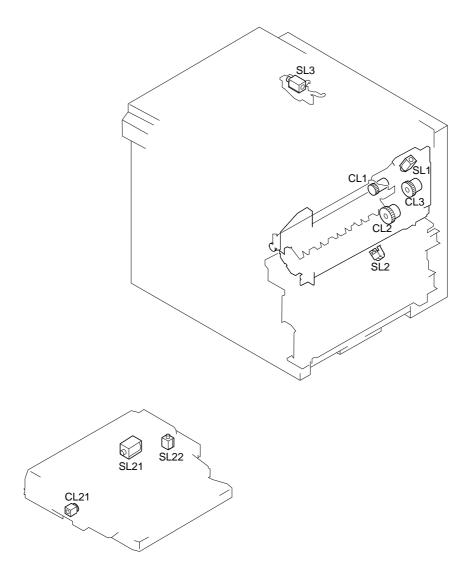


**Figure 4-8-3** 

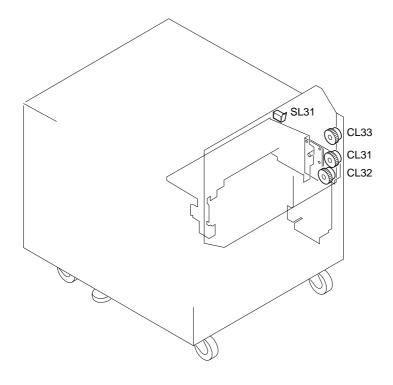
**Table 4-8-3** 

| Symbol | Name              | Code | Role                                   |
|--------|-------------------|------|--|
|        | Photointerrrupter | PS31 | Registration paper sensor (paper deck) |
| ¥L     |                   | PS32 | Paper jam sensor (paper deck)          |
|        |                   | PS33 | Tray paper-out sensor (paper deck)     |
|        |                   | PS34 | Paper surface sensor (paper deck)      |
|        |                   | PS35 | Door sensor (paper deck)               |

# C. Clutches and Solenoids



**Figure 4-8-4** 

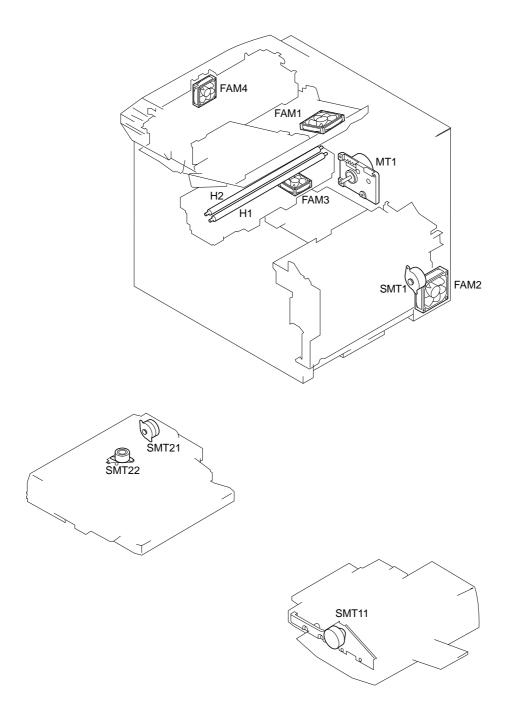


**Figure 4-8-5** 

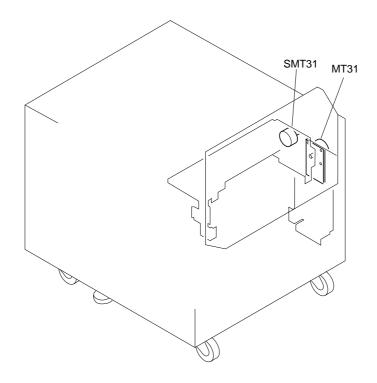
**Table 4-8-4** 

| Symbol | Name     | Code | Role  |
|--------|----------|------|---|
|        | Clutch   | CL1  | Registration clutch                                 |
| (CL)   |          | CL2  | Feed clutch   |
|        |          | CL3  | Manual feed clutch                                  |
|        |          | CL21 | Duplex feed clutch (duplexing unit)                 |
|        |          | CL31 | Lifter clutch (paper deck)                          |
|        |          | CL32 | Registration clutch (paper deck)                    |
|        |          | CL33 | Feed clutch (paper deck)                            |
|        |          |      |   |
|        | Solenoid | SL1  | Cassette pick-up solenoid                           |
|        |          | SL2  | Lifting plate solenoid                              |
|        |          | SL3  | Face-up solenoid                                    |
|        |          | SL21 | Switchback roller release solenoid (duplexing unit) |
|        |          | SL22 | Duplex deflector drive solenoid (duplexing unit)    |
|        |          | SL31 | Pick-up solenoid (paper deck)                       |

# **D.** Motor and Others



**Figure 4-8-6** 

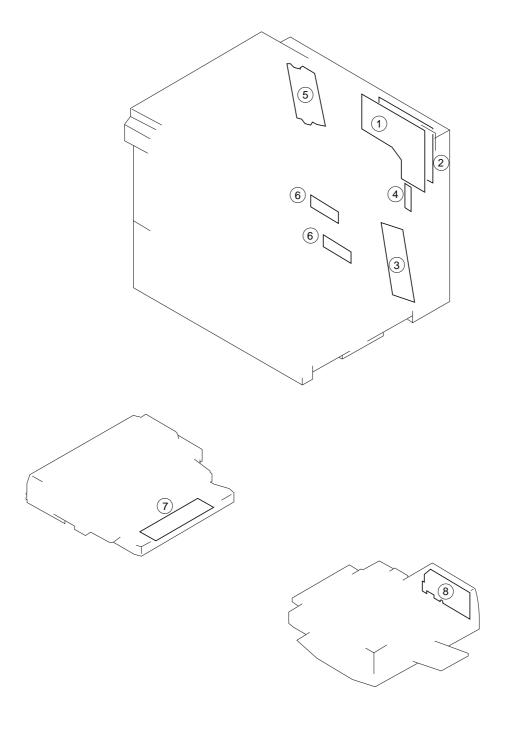


**Figure 4-8-7** 

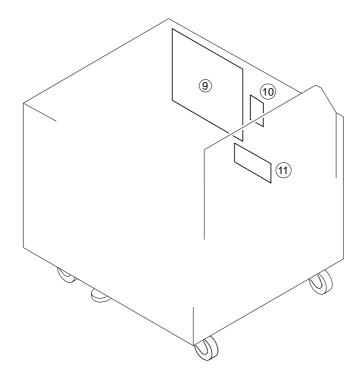
**Table 4-8-5** 

| Symbol             | Name          | Code  | Role  |
|--------------------|---------------|-------|---|
|                    | Motor         | MT1   | Main motor                                      |
| $\left( M \right)$ |               | SMT1  | Pick-up motor                                   |
|                    |               | SMT11 | Envelope feeder pick-up motor (envelope feeder) |
|                    |               | SMT21 | Switchback motor (duplexing unit)               |
|                    |               | SMT22 | Side registration motor (duplexing unit)        |
|                    |               | SMT31 | Pick-up motor (paper deck)                      |
|                    |               | MT31  | Deck motor (paper deck)                         |
|                    |               |       |   |
|                    | Fan motor     | FAM1  | Fixing unit/Scanner unit fan                    |
|                    |               | FAM2  | Power supply fan                                |
|                    |               | FAM3  | Electrical unit fan                             |
|                    |               | FAM4  | Fixing unit fan                                 |
|                    |               |       |   |
|                    | Fixing heater | H1    | Fixing main heater                              |
|                    |               | H2    | Fixing sub heater                               |

# E. PC Boards



**Figure 4-8-8** 

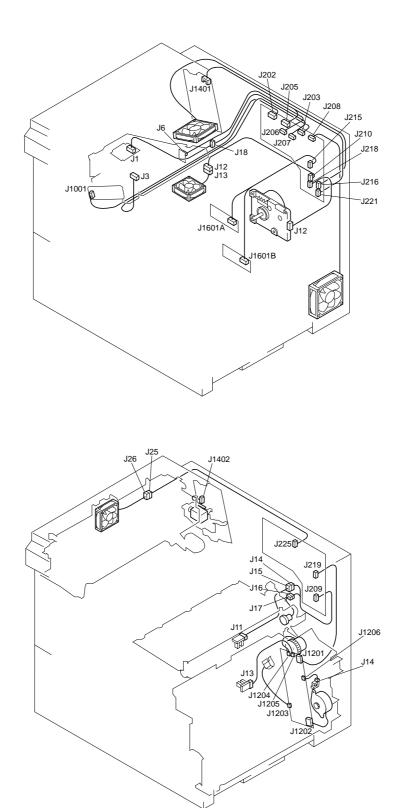


**Figure 4-8-9** 

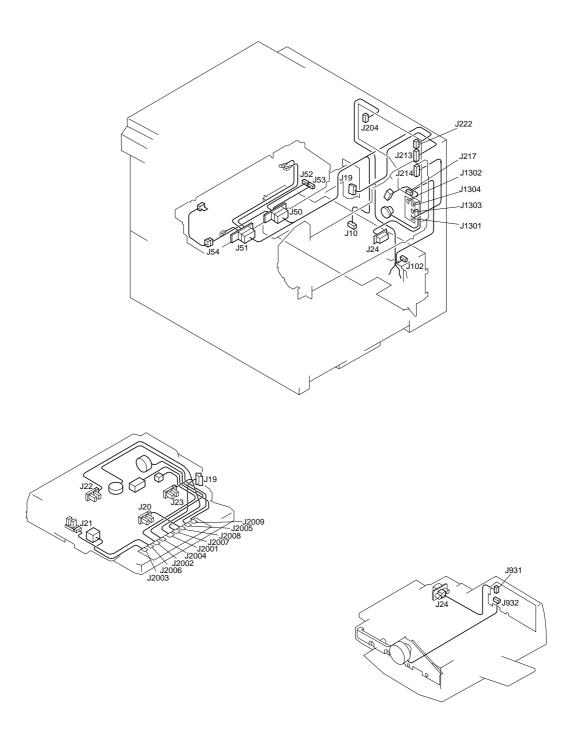
**Table 4-8-6** 

| No. | Name                           | Function  |
|-----|--------------------------------|---|
| 1   | DC controller PCB              | Controls print sequence                                 |
| 2   | High-voltage power supply PCB  | Outputs primary, developing, transfer and separation    |
|     |                                | voltages (bias) according to the print sequence.        |
| 3   | Pick-up PCB                    | Relays signals between sensors, loads and the DC        |
|     |                                | controller PCB.   |
| 4   | Multi-purpose tray PCB         | Relays signals between sensors, loads and the DC        |
|     |                                | controller PCB.   |
| 5   | Switch/sensor PCB              | Relays signals between sensors, loads and the DC        |
|     |                                | controller PCB.   |
| 6   | Cassette size detection PCB    | Cassette size detection                                 |
| 7   | Duplexing driver PCB           | Controls loads in the duplexing unit and sensors.       |
| 8   | Envelope feeder driver PCB     | Controls the envelope feeder motor and sensors.         |
| 9   | Paper deck driver PCB          | Controls of motors, solenoid and clutches and detection |
|     |                                | inside thepaper deck.                                   |
| 10  | Paper-level sensing switch PCB | Paper level detection (paper deck)                      |
| 11  | Paper-size sensing switch PCB  | Paper size detection (paper deck)                       |

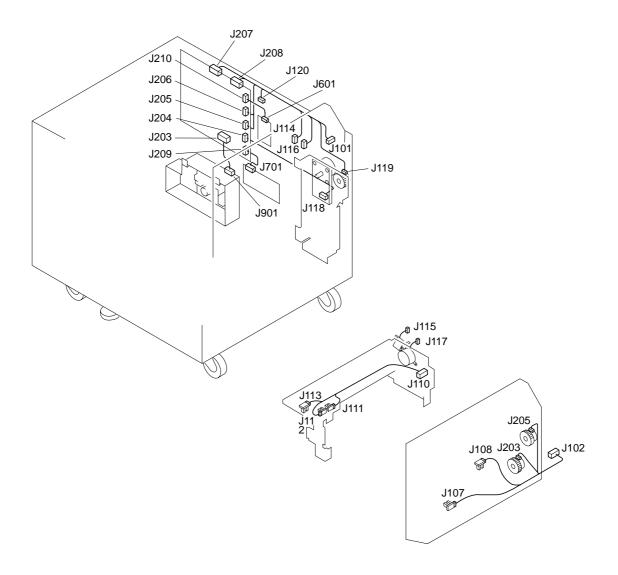
# F. Connectors



**Figure 4-8-10** 



**Figure 4-8-11** 



**Figure 4-8-12** 

# IX. VARIABLE RESISTORS, LEDS, TEST PINS, JUMPERS, AND SWITCHES ON PC BOARDS

Variable resistors (VRs), LED indicators, test pins, jumpers, and switches required in after-sales service are listed below.

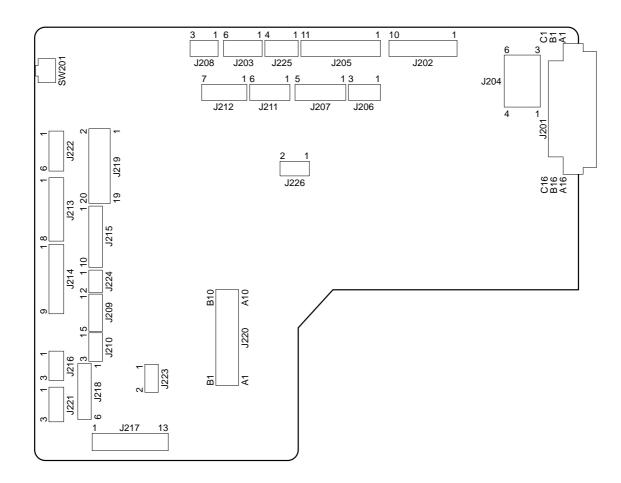
Any variable resistors, test pins, etc. not listed below are for factory use. They require special tools and measuring instruments, and must be set with high precision. Do not touch them during after-sales service.

**Notes: 1.** Some LEDs receive leakage current during normal operation, causing a dim glow even when they should be OFF.

**2.** Potentiometers which may be adjusted in after-sales service are marked ............ Potentiometers which may not be adjusted in after-sales service are marked ......



#### A. DC Controller PCB

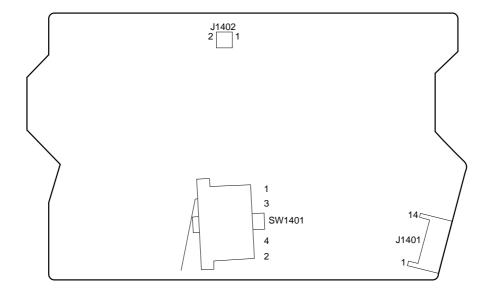


**Figure 4-9-1** 

**Table 4-9-1** 

| SW No. | Function          |  |
|--------|-------------------|--|
| SW201  | Test print switch |  |

# B. Switch/Sensor PCB

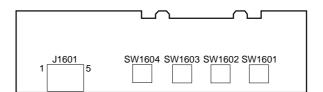


**Figure 4-9-2** 

**Table 4-9-2** 

| SW No. |             | Function |
|--------|-------------|----------|
| SW1401 | Door switch |          |

# C. Cassette Paper-size Sensing Switch PCB

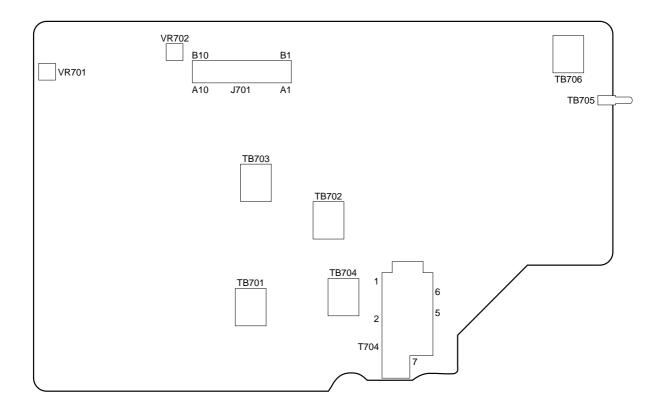


**Figure 4-9-3** 

**Table 4-9-3** 

| SW No. | Function   |
|--------|--|
| SW1601 |  |
| SW1602 | Cassette paper-size sensing switch (See table 2-5-1 of page 2-45.) |
| SW1603 |  |
| SW1604 | , ,  |

# D. High-voltage Power Supply PCB

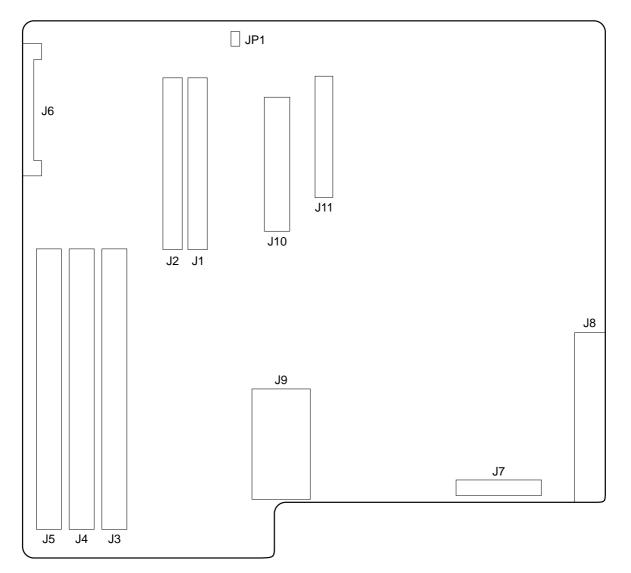


**Figure 4-9-4** 

**Table 4-9-4** 

| VR No. | Function        |  |  |  |
|--------|-----------------|--|--|--|
| VR701  | For factory use |  |  |  |
| VR702  | For factory use |  |  |  |

## E. Video Controller PCB

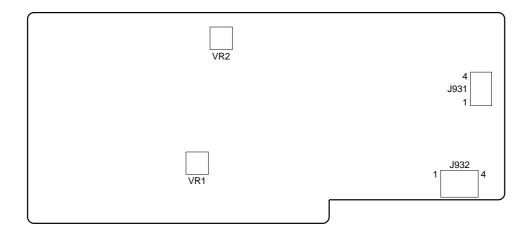


**Figure 4-9-5** 

**Table 4-9-5** 

| JP No. | Function        |  |  |  |
|--------|-----------------|--|--|--|
| JP1    | For factory use |  |  |  |

# F. Envelope Feeder Driver PCB

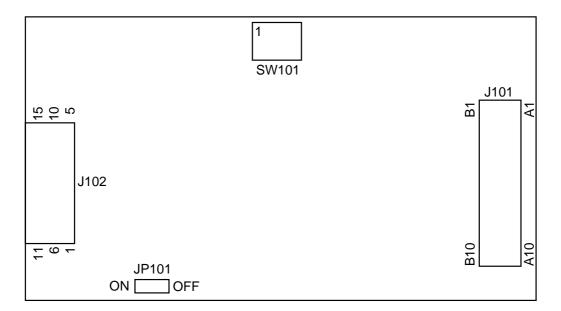


**Figure 4-9-6** 

**Table 4-9-6** 

| VR No. | Function        |  |  |  |
|--------|-----------------|--|--|--|
| VR1    | For factory use |  |  |  |
| VR2    |                 |  |  |  |

# **G.** Option Controller PCB



**Figure 4-9-7** 

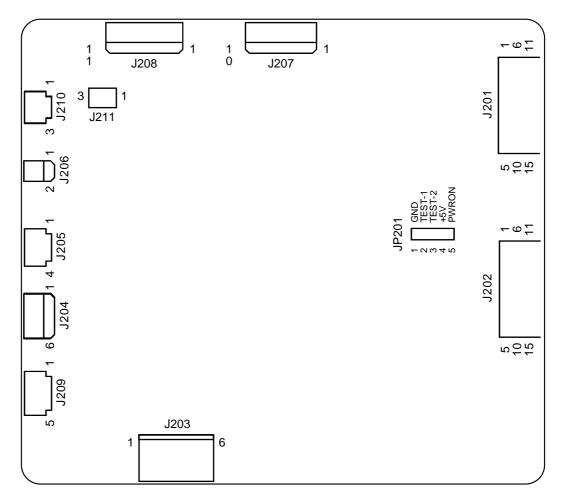
**Table 4-9-7** 

| SW No. | Function        |  |  |  |
|--------|-----------------|--|--|--|
| SW101  | For factory use |  |  |  |

**Table 4-9-8** 

| JP No. | Function        |  |  |  |
|--------|-----------------|--|--|--|
| JP101  | For factory use |  |  |  |

#### H. Paper Deck Driver PCB



**Figure 4-9-8** 

**Table 4-9-9** 

| Jumper No. | Function                               |  |  |  |
|------------|--|--|--|--|
| JP201-1    | GND                                    |  |  |  |
| -2         | TEST-1: Jumper to enter the test mode. |  |  |  |
| -3         | TEST-2: reserved                       |  |  |  |
| -4         | +5V                                    |  |  |  |
| -5         | PWRON-IN signal                        |  |  |  |

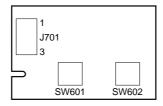
After shorting out TEST-1 and GND, and turning ON the printer, test mode is entered. Once in test mode, the paper pick-up operation runs continuously as long as TEST-1 and GND are shorted and paper is loaded. If TEST-1 and GND are opened the test mode is canceled, stopping the paper pick-up operation. To re-enter the test mode and continue the pick-up process, short TEST-1 and GND again.

**Notes: 1.** Even though the paper deck enters test mode and runs the pick-up operation, the printer does not operate. Therefore, if paper is picked-up and fed into the printer

itself, a jam will occur. For this reason it is important that care is taken while operating the test mode to only load one sheet of paper at a time in the tray. If multiple sheets are loaded in the tray, the paper deck will continuously feed paper into the printer until running out causing a paper jam.

- **2.** Test mode will not be entered if the power is turned ON before shorting TEST-1 and GND.
- 3. Test-1 must be left open.

## I. Paper-level Sensing Switch PCB

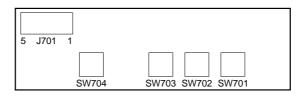


**Figure 4-9-9** 

**Table 4-9-10** 

| SW No. | Function                         |
|--------|----------------------------------|
| SW601  | Paper level sensing switch       |
| SW602  | (See table 2-10-1 of page 2-87.) |

## J. Paper-size Sensing Switch PCB



**Figure 4-9-10** 

**Table 4-9-11** 

| SW No. | Function                         |
|--------|----------------------------------|
| SW701  |                                  |
| SW702  | Paper-size sensing switch        |
| SW703  | (See table 2-10-2 of page 2-87.) |
| SW704  |                                  |

# X. LIST OF LUBRICANTS, CLEANERS

#### **Table 4-10-1**

| No. | Material name   | Components  | Use  | Remarks   |
|-----|---|---|--|---|
| 1   | Alcohol: ethyl<br>(pure or<br>denatured) or<br>isopropyl (pure or<br>denatured) | С <sub>2</sub> Н <sub>5</sub> ОН,<br>(СН <sub>3</sub> ) <sub>2</sub> СНОН | Cleaning: plastic, rubber, external parts      | Purchase locally     Flammable: keep away from flame        |
| 2   | MEK (methyl ethyl ketone)   | CH <sub>3</sub> CO-C <sub>2</sub> H <sub>5</sub>                          | Cleaning: oil and toner stains                 | Purchase locally     Highly flammable: keep away from flame |
| 3   | Lubricating oil   | Petroleum mineral oil   | Apply between gear and shaft                   | • Tool No. CK-8003<br>(100 ml bottle)                       |
| 4   | Lubricating agent   | Special oil Special solid lubricating material Lithium soap               | Apply to gears                                 | • Tool No. HY9-0007<br>(20 g tube)                          |
| 5   | Lubricating agent   | Lithium oil   | Apply to gears of the pick-up unit             | • Tool No. CK-8005<br>(40 g bottle)                         |
| 6   | Lubricating agent   | Synthetic oil<br>Special thickener  | Apply to gears of the manual feed pick-up unit | • Tool No. CK-8004<br>(40 g bottle)                         |

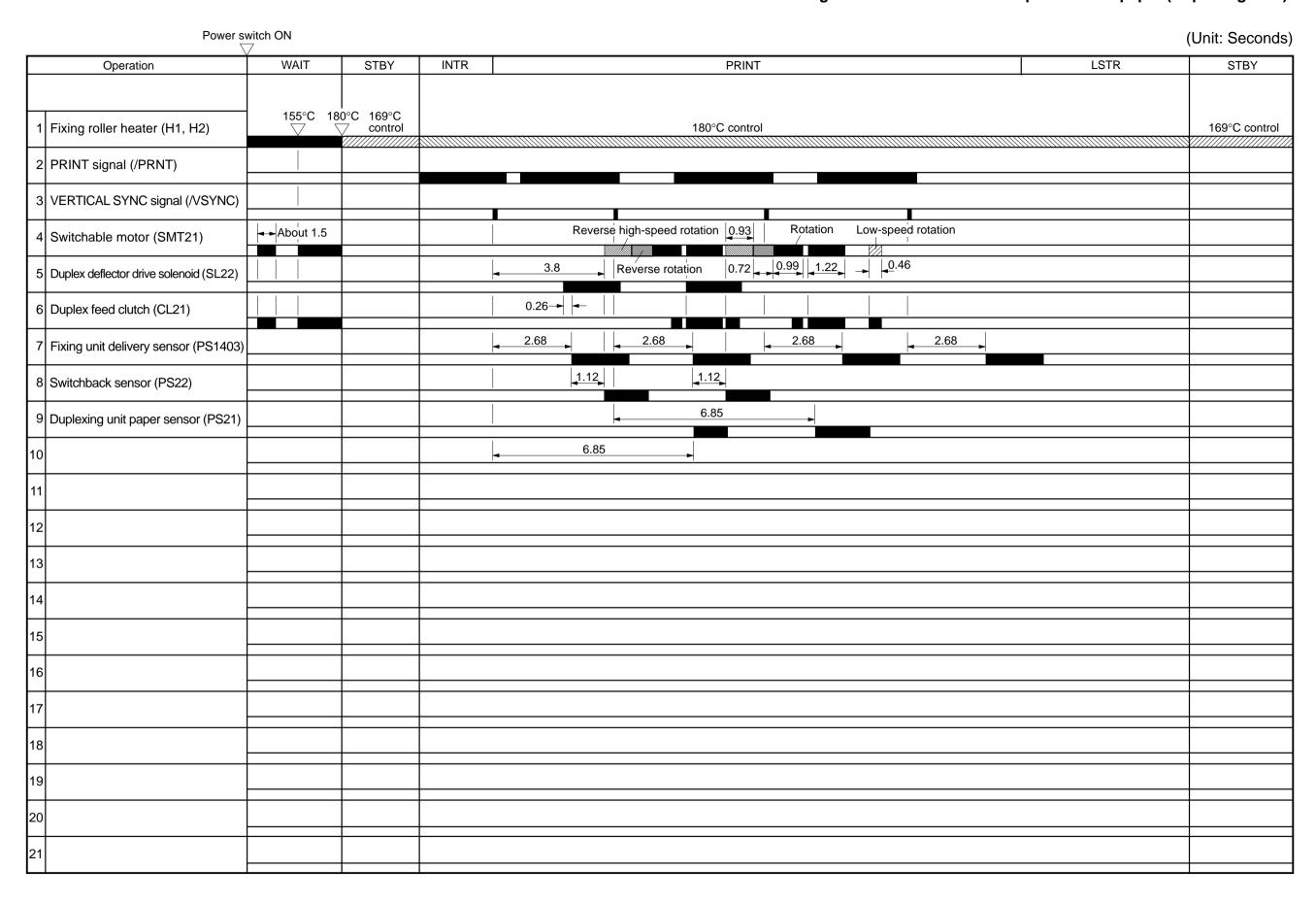
# **APPENDIX**

| I. GI | ENERAL TIMING CHART | A-1 | III. | LIST OF SIGNALS | <b>A-</b> ′ | 7 |
|-------|---------------------|-----|------|-----------------|-------------|---|
|-------|---------------------|-----|------|-----------------|-------------|---|

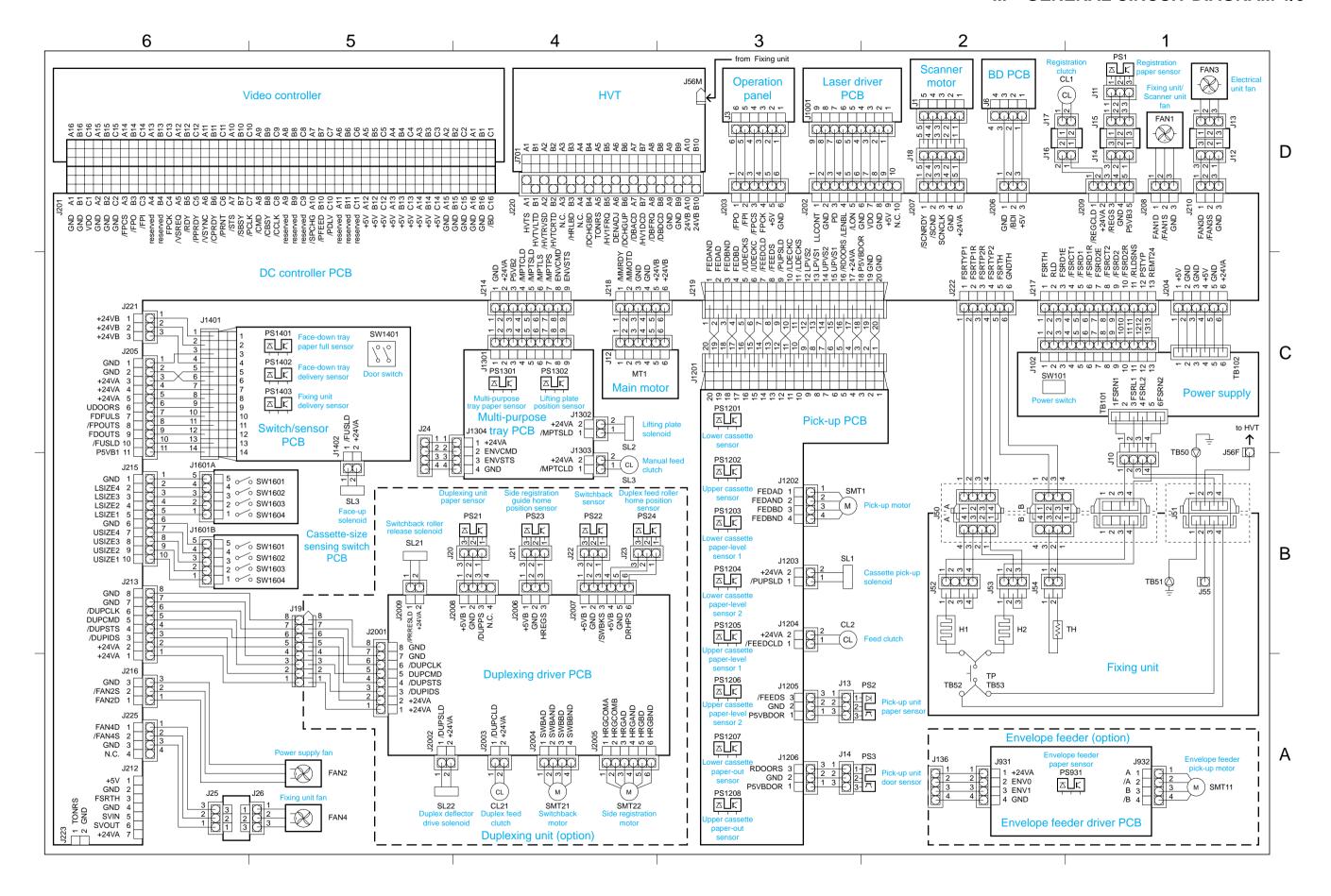
#### I. GENERAL TIMING CHART-1/2

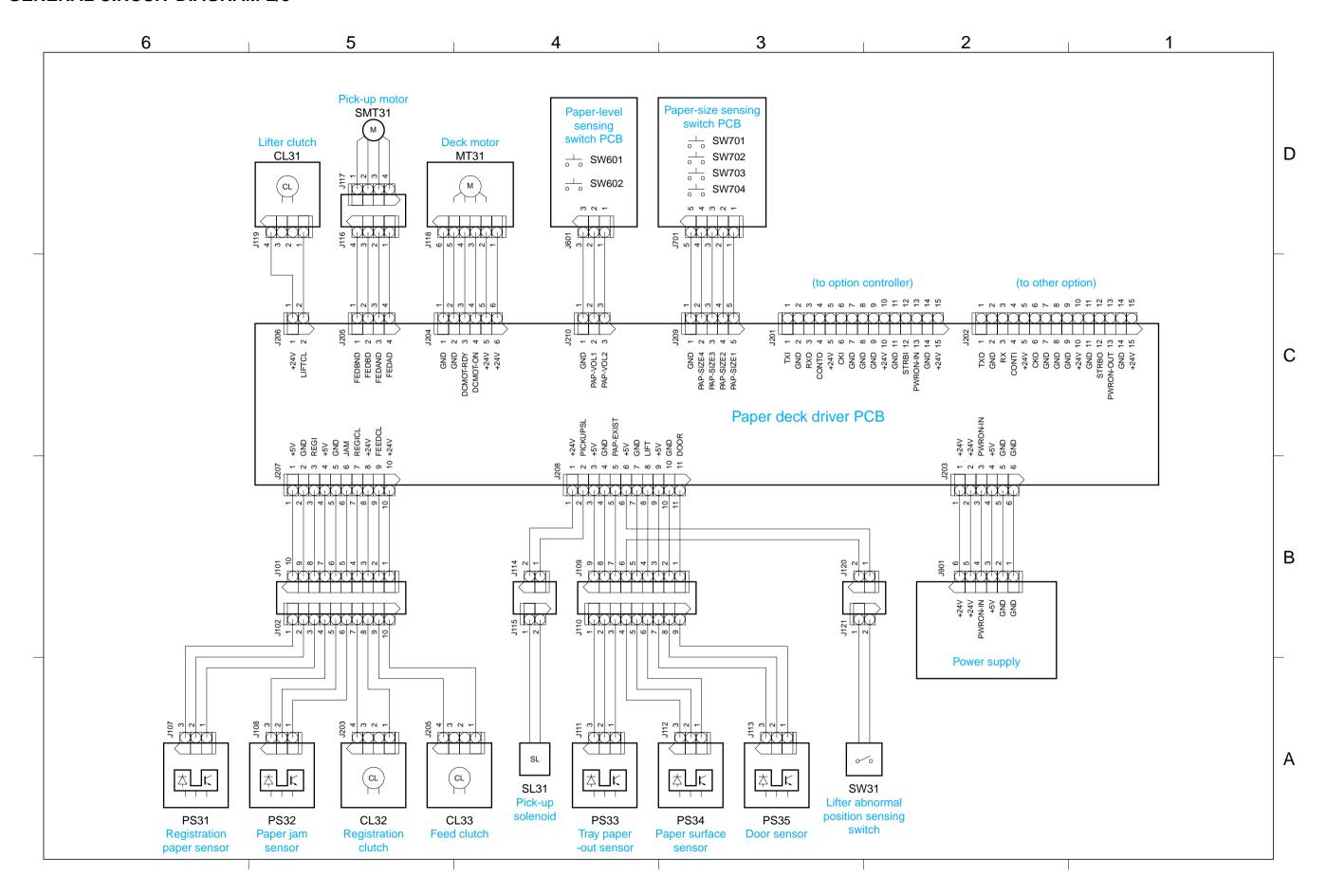
#### • Timing chart for two consecutive prints on A4 paper (Lower cassette feed - face-down tray delivery)

Power switch ON (Unit: Seconds) Operation WAIT STBY INTR PRINT STBY LSTR 169°C 180°C 169°C 150°C control control 180°C control 169°C control 1 Fixing roller heater (H1, H2) About 30.0 Low-speed rotation 2 Fan (FM1, FM2, FM3, FM4) High-speed rotation Low-speed rotation 3 PRINT signal (/PRNT) 4 VERTICAL SYNC signal (/VSYNC) 3.0 About 1.5 5 Main motor (MT1) 0.52 About 1.1 6 Pick-up motor (SMT1) High-speed rotation Rotation 7 Cassette pick-up solenoid (SL1) → 0.06 → 0.06 8 Feed clutch (CL2) → 0.03 → 0.03 9 Registration clutch (CL1) 10 Pick-up unit paper sensor (PS2) 0.75 11 Registration paper sensor (PS1) 12 Fixing unit delivery sensor (PS1403) 13 Face-down tray delivery sensor (PS1402) → 0.1 0.99 1.09 14 Primary voltage (AC) 0.99 15 Primary voltage (DC) → 0.1 → 0.1 16 Developing bias (AC) 1.39 17 Developing bias (DC) 1.6 Print bias 0.41 0.41 0.49 18 Transfer voltage Negative bias Between-page bias Between-page bias Print bias Negative bias 19 Static charge eliminator bias → -0.1 20 Upper fixing roller bias High-voltage bias 21 Laser diode

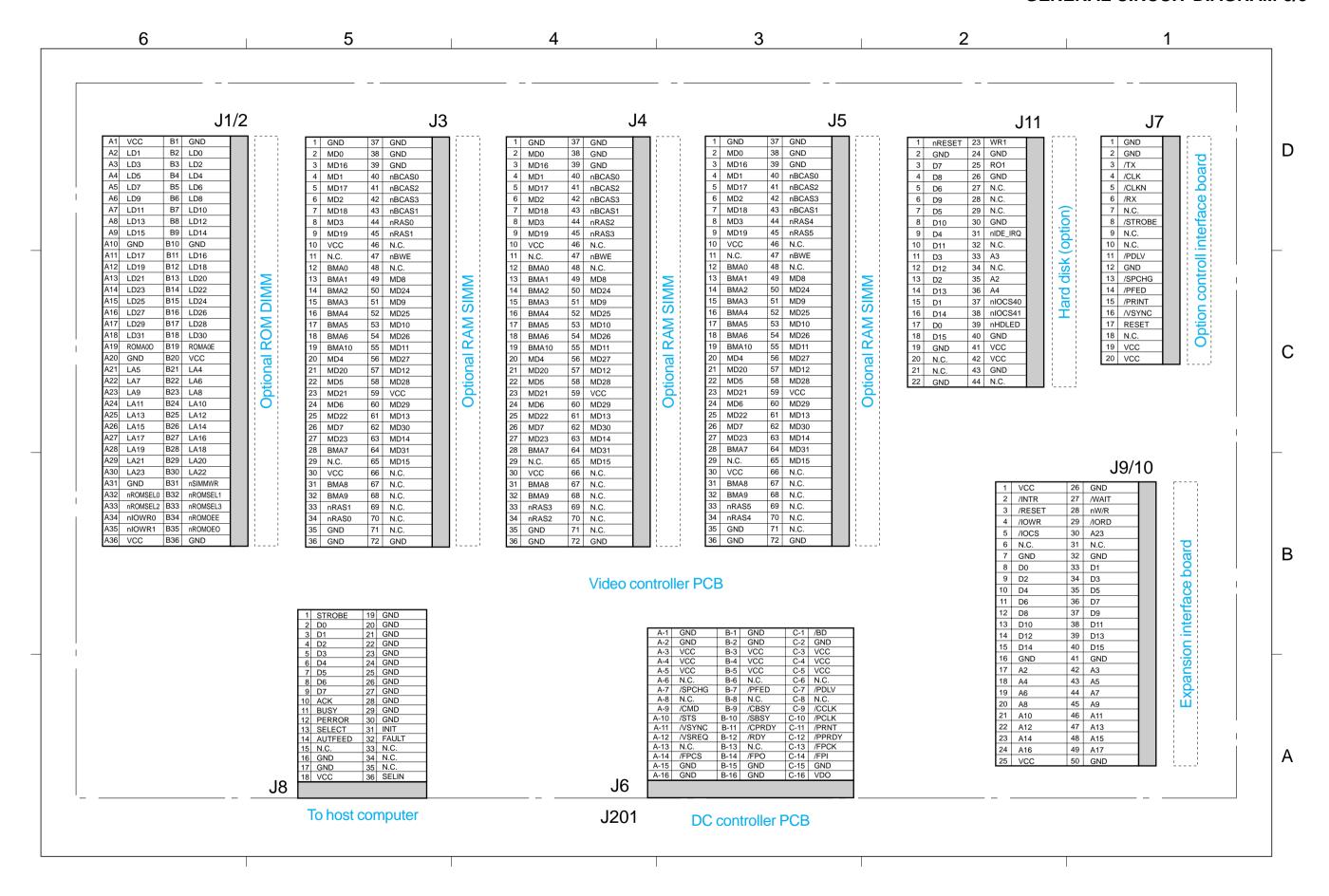


#### II. GENERAL CIRCUIT DIAGRAM-1/3





#### **GENERAL CIRCUIT DIAGRAM-3/3**



# III. LIST OF SIGNALS

#### A. Input/output signals to DC controller PCB

| Connector | Pin | Abbreviation | I/O | Logic | Signal name                               |
|-----------|-----|--------------|-----|-------|---|
| J201      | A1  | GND          |     |       |   |
|           | A2  | GND          |     |       |   |
|           | A3  | /FPCS        | I   | L     | FRONT PANEL CONTROLLER CHIP SELECT signal |
|           | A4  | Reservrd     |     |       |   |
|           | A5  | /VSREQ       | О   | L     | VSYNC REQUEST signal                      |
|           | A6  | /VSYNC       | I   | L     | VERTICAL SYNC signal                      |
|           | A7  | /STS         | О   | L     | STATUS signal                             |
|           | A8  | /CMD         | I   | L     | COMMAND signal                            |
|           | A9  | Reserved     |     |       |   |
|           | A10 | /SPCHG       | О   | L     | SPEED CHANGE signal                       |
|           | A11 | Reserved     |     |       |   |
|           | A12 | +5V          | О   |       |   |
|           | A13 | +5V          | О   |       |   |
|           | A14 | +5V          | О   |       |   |
|           | A15 | GND          |     |       |   |
|           | A16 | GND          |     |       |   |
|           | B1  | GND          |     |       |   |
|           | B2  | GND          |     |       |   |
|           | В3  | /FPO         | I   | L     | FRONT PANEL SERIAL OUTPUT signal          |
|           | B4  | Reserved     |     |       |   |
|           | B5  | /RDY         | О   | L     | READY signal                              |
|           | В6  | /CPRDY       | I   | L     | CONTROLLER POWER READY signal             |
|           | В7  | /SBSY        | О   | L     | STATUS BUSY signal                        |
|           | В8  | /CBSY        | I   | L     | COMMAND BUSY signal                       |
|           | В9  | Reserved     |     |       |   |
|           | B10 | /PFEED       | О   | L     | PAPER FEED signal                         |
|           | B11 | Reserved     |     |       |   |
|           | B12 | +5V          | О   |       |   |
|           | B13 | +5V          | О   |       |   |
|           | B14 | +5V          | О   |       |   |
|           | B15 | GND          |     |       |   |
|           | B16 | GND          |     |       |   |
|           | C1  | VDO          | I   | Н     | VIDEO signal                              |
|           | C2  | GND          |     |       |   |
|           | C3  | /FPI         | О   | L     | FRONT PANEL SERIAL INPUT signal           |
|           | C4  | FPCK         | I   | Н     | FRONT PANEL SERIAL CLOCK signal           |
|           | C5  | /PPRDY       | I   | L     | PRINTER POWER READY signal                |
|           | C6  | /PRNT        | I   | L     | PRINT signal                              |
|           | C7  | /PCLK        | О   | L     | PRINTER CLOCK signal                      |
|           | C8  | /CCLK        | I   | L     | CONTROLLER CLOCK signal                   |
|           | C9  | Reserved     |     |       |   |
|           | C10 | /PDLV        | О   | L     | PAPER DELIVERY signal                     |
|           | C11 | Reserved     |     |       |   |
|           | C12 | +5V          | О   |       |   |
|           | C13 | +5V          | О   |       |   |
|           |     |              |     |       |   |

| Connector | Pin | Abbreviation  | I/O | Logic | Signal name                               |
|-----------|-----|---------------|-----|-------|---|
| J201      | C14 | +5V           | О   |       |   |
|           | C15 | GND           |     |       |   |
|           | C16 | /BD           | О   | L     | BEAM DETECTION signal                     |
| J202      | 1   | LLCONT        | О   |       | LASER OUTPUT signal                       |
|           | 2   | GND           |     |       |   |
|           | 3   | PD            | I   |       | PHOTO DETECTION signal                    |
|           | 4   | /LENBL        | О   | L     | VIDEO DATA ENABLE signal                  |
|           | 5   | /LON          | О   | L     | FORCED LASER ON signal                    |
|           | 6   | GND           |     |       |   |
|           | 7   | VDO           | О   | Н     | VIDEO signal                              |
|           | 8   | GND           |     |       |   |
|           | 9   | +5V           | О   |       |   |
|           | 10  | N.C.          |     |       |   |
| J203      | 1   | /FPO          | О   | L     | FRONT PANEL SERIAL OUTPUT signal          |
|           | 2   | /FPI          | I   | L     | FRONT PANEL SERIAL INPUT signal           |
|           | 3   | /FPCS         | О   | L     | FRONT PANEL CONTROLLER CHIP SELECT signal |
|           | 4   | FPCK          | О   |       | FRONT PANEL SERIAL CLOCK signal           |
|           | 5   | +5V           | О   |       |   |
|           | 6   | GND           |     |       |   |
| J204      | 1   | +5V           | I   |       |   |
|           | 2   | GND           |     |       |   |
|           | 3   | GND           |     |       |   |
|           | 4   | +5V           | I   |       |   |
|           | 5   | GND           |     |       |   |
|           | 6   | +24VA         | I   |       |   |
| J205      | 1   | GND           |     |       |   |
|           | 2   | GND           |     |       |   |
|           | 3   | +24VA         | О   |       |   |
|           | 4   | +24VA         | О   |       |   |
|           | 5   | +24VA         | О   |       |   |
|           | 6   | UDOORS        | I   | H     | UPPER DOOR OPEN SENSE signal              |
|           | 7   | FDFULS        | I   | H     | FACE-DOWN TRAY PAPER FULL SENSE signal    |
|           | 8   | /FPOUTS       | I   | L     | FIXING UNIT DELIVERY SENSE signal         |
|           | 9   | FDOUTS        | I   | H     | FACE-DOWN TRAY DELIVERY SENSE signal      |
|           | 10  | /FUSLD        | 0   | L     | FACE-UP SOLENOID DRIVE signal             |
| 120 -     | 11  | P5VB1         | О   |       |   |
| J206      | 1   | GND           |     |       | DE AM DETECTION INDUST.                   |
|           | 2   | /BDI          | I   | L     | BEAM DETECTION INPUT signal               |
| 1007      | 3   | +5V           | 0   |       | GCANDIED MOTOR DE 4 DV.                   |
| J207      | 1   | /SCNRDY       | I   | L     | SCANNER MOTOR READY signal                |
|           | 2   | /SCND         | 0   | L     | SCANNER MOTOR CONTOL OF OCK signal        |
|           | 3   | SCNCLK        | О   | Н     | SCANNER MOTOR CONTOL CLOCK signal         |
|           | 4   | GND           |     |       |   |
| 1200      | 5   | +24VA         | 0   | 11    | EAN MOTOR 1 DRIVE signal                  |
| J208      | 1   | FAN1D         | 0   | H     | FAN MOTOR 1 DRIVE signal                  |
|           | 2   | /FAN1S<br>GND | I   | L     | FAN MOTOR 1 ROTATING DETECTION signal     |
| J209      | 3   | /REGCLD       | 0   | L     | DECISTRATION OF LITCH DRIVE signal        |
| J209      | 2   | +24VA         | 0   | L     | REGISTRATION CLUTCH DRIVE signal          |
|           | 2   | +24 V A       |     |       |   |
|           |     | <u> </u>      | 1   | 1     |   |

| Connector | Pin | Abbreviation | I/O | Logic | Signal name  |
|-----------|-----|--------------|-----|-------|--|
| J209      | 3   | /REGS        | I   | L     | REGISTRATION PAPER SENSE signal                          |
|           | 4   | GND          |     |       |  |
|           | 5   | P5VB3        | О   |       |  |
| J210      | 1   | FAN3D        | О   | Н     | FAN MOTOR 3 DRIVE signal                                 |
|           | 2   | /FAN3S       | I   | L     | FAN MOTOR 3 ROTATING DETECTION signal                    |
|           | 3   | GND          |     |       |  |
| J212      | 1   | +5V          | О   |       |  |
|           | 2   | GND          |     |       |  |
|           | 3   | FSRTH        | I   |       | FIXING ROLLER TEMPERATURE SENSE signal                   |
|           | 4   | GND          |     |       |  |
|           | 5   | SVIN         | I   |       | SERVICE STATUS signal                                    |
|           | 6   | SVOUT        | О   |       | SERVICE COMMAND signal                                   |
|           | 7   | +24VA        | О   |       |  |
| J213      | 1   | +24VA        | О   |       |  |
|           | 2   | +24VA        | О   |       |  |
|           | 3   | /DUPIDS      | I   | L     | DUPLEXING UNIT SENSE signal                              |
|           | 4   | /DUPSTS      | I   | L     | DUPLEXING UNIT STATUS signal                             |
|           | 5   | DUPCMD       | О   | Н     | DUPLEXING UNIT COMMAND signal                            |
|           | 6   | /DUPCLK      | О   | L     | SERIAL CLOCK   |
|           | 7   | GND          |     |       |  |
|           | 8   | GND          |     |       |  |
| J214      | 1   | GND          |     |       |  |
|           | 2   | +24VA        | О   |       |  |
|           | 3   | P5VB2        | О   |       |  |
|           | 4   | /MPTCLD      | О   | L     | MANUAL FEED CLUTCH DRIVE signal                          |
|           | 5   | /MPTSLD      | О   | L     | LIFTING PLATE SOLENOID DRIVE signal                      |
|           | 6   | /MPTLS       | I   | L     | LIFTING PLATE SENSE signal                               |
|           | 7   | /MPTPS       | I   | L     | MULTI-PURPOSE TRAY PAPER SENSE signal                    |
|           | 8   | ENVCMD       | О   |       | ENVELOPE FEEDER COMMAND signal                           |
|           | 9   | ENVSTS       | I   |       | ENVELOPE FEEDER STATUS signal                            |
| J215      | 1   | GND          |     |       |  |
|           | 2   | LSIZE4       | I   | L     | LOWER CASSETTE PAPER SIZE SENSE signal                   |
|           | 3   | LSIZE3       | I   | L     | LOWER CASSETTE PAPER SIZE SENSE signal                   |
|           | 4   | LSIZE2       | I   | L     | LOWER CASSETTE PAPER SIZE SENSE signal                   |
|           | 5   | LSIZE1       | I   | L     | LOWER CASSETTE PAPER SIZE SENSE signal                   |
|           | 6   | GND          |     |       |  |
|           | 7   | USIZE4       | I   | L     | UPPER CASSETTE PAPER SIZE SENSE signal                   |
|           | 8   | USIZE3       | I   | L     | UPPER CASSETTE PAPER SIZE SENSE signal                   |
|           | 9   | USIZE2       | I   | L     | UPPER CASSETTE PAPER SIZE SENSE signal                   |
|           | 10  | USIZE1       | I   | L     | UPPER CASSETTE PAPER SIZE SENSE signal                   |
| J216      | 1   | FAN2D        | О   | Н     | FAN MOTOR 2 DRIVE signal                                 |
|           | 2   | /FAN2S       | I   | L     | FAN MOTOR 2 ROTATING DETECTION signal                    |
|           | 3   | GND          |     |       |  |
| J217      | 1   | FSRTH        | I   |       | FIXING ROLLER TEMPERATURE SENSE signal                   |
|           | 2   | RLD          | О   | Н     | RELAY DRIVE signal                                       |
|           | 3   | FSRD1E       | О   |       | FIXING MAIN HEATER DRIVE signal                          |
|           | 4   | /FSRCT1      | I   | L     | FIXING MAIN HEATER TYPE SENSE signal                     |
|           | 5   | /FSRD1       | О   | L     | FIXING MAIN HEATER DRIVE ENABLE signal                   |
|           | 6   | /FSRD1R      | О   | L     | FIXING MAIN HEATER DRIVE ENABLE signal (200V model only) |
|           |     |              |     |       |  |

| Connector | Pin | Abbreviation | I/O | Logic | Signal name   |
|-----------|-----|--------------|-----|-------|---|
| J217      | 7   | FSRD2E       | О   |       | FIXING SUB HEATER DRIVE signal                          |
|           | 8   | /FSRCT2      | I   | L     | FIXING SUB HEATER TYPE SENSE signal                     |
|           | 9   | /FSRD2       | О   | L     | FIXING SUB HEATER DRIVE ENABLE signal                   |
|           | 10  | /FSRD2R      | О   | L     | FIXING SUB HEATER DRIVE ENABLE signal (200V model only) |
|           | 11  | /RLDSNS      | I   | L     | RELAY DETECTION SENSE signal                            |
|           | 12  | PSTYP        | I   |       | POWER SUPPLY TYPE SENSE signal                          |
|           | 13  | /REMT24      | О   | L     | 24V DRIVE signal  |
| J218      | 1   | /MMRDY       | I   | L     | MAIN MOTOR READY signal                                 |
|           | 2   | /MMOTD       | О   | L     | MAIN MOTOR DRIVE signal                                 |
|           | 3   | GND          |     |       |   |
|           | 4   | GND          |     |       |   |
|           | 5   | +24VB        | О   |       |   |
|           | 6   | +24VB        | О   |       |   |
| J219      | 1   | FEDAND       | О   |       | PICK-UP MOTOR CONTROL signal                            |
|           | 2   | FEDAD        | О   |       | PICK-UP MOTOR CONTROL signal                            |
|           | 3   | FEDBND       | О   |       | PICK-UP MOTOR CONTROL signal                            |
|           | 4   | FEDBD        | О   |       | PICK-UP MOTOR CONTROL signal                            |
|           | 5   | /UDECKS      | I   | L     | UPPER CASSETTE PAPER-OUT SENSE signal                   |
|           | 6   | /UDECKC      | I   | L     | UPPER CASSETTE SENSE signal                             |
|           | 7   | /FEEDCLD     | О   | L     | FEED CLUTCH DRIVE signal                                |
|           | 8   | /FEEDS       | I   | L     | PICK-UP UNIT PAPER SENSE signal                         |
|           | 9   | /PUPSLD      | О   | L     | CASSETTE PICK-UP SOLENOID DRIVE signal                  |
|           | 10  | /LDECKC      | I   | L     | LOWER CASSETTE PAPER-OUT SENSE signal                   |
|           | 11  | /LDECKS      | I   | L     | LOWER CASSETTE SENSE signal                             |
|           | 12  | LPVS2        | I   |       | LOWER CASSETTE PAPER-LEVEL SENSE signal 2               |
|           | 13  | LPVS1        | I   |       | LOWER CASSETTE PAPER-LEVEL SENSE signal 1               |
|           | 14  | UPVS2        | I   |       | UPPER CASSETTE PAPER-LEVEL SENSE signal 2               |
|           | 15  | UPVS1        | I   |       | UPPER CASSETTE PAPER-LEVEL SENSE signal 1               |
|           | 16  | /RDOORS      | I   | L     | RIGHT DOOR OPEN SENSE signal                            |
|           | 17  | +24VA        | О   |       |   |
|           | 18  | P5VBDOR      | О   |       |   |
|           | 19  | GND          |     |       |   |
|           | 20  | GND          |     |       |   |
| J220      | A1  | HVTS         | I   |       | TRANSFER BIAS MONITOR signal                            |
|           | A2  | /HVTRVSD     | О   | L     | TRANSFER NEGATIVE BIAS DRIVE signal                     |
|           | A3  | N.C.         |     |       |   |
|           | A4  | N.C.         |     |       |   |
|           | A5  | TONRS        | I   |       | TONER LEVEL signal                                      |
|           | A6  | DENADJ       | О   |       | IMAGE DENSITY ADJUSTMENT signal                         |
|           | A7  | /DBACD       | О   | L     | DEVELOPING AC BIAS DRIVE signal                         |
|           | A8  | /DBFRQ       | О   | L     | DEVELOPING BIAS FREQUENCY OUTPUT signal                 |
|           | A9  | GND          |     |       | -   |
|           | A10 | +24VB        | О   |       |   |
|           | B1  | HVTVLTD      | О   | T     | TRANSFER BIAS DRIVE signal                              |
|           | B2  | /HVTCRTD     | О   | L     | TRANSFER BIAS CONSTANT CURRENT DRIVE signal             |
|           | В3  | /HRLBD       | О   | L     | FIXING ROLLER BIAS DRIVE signal                         |
|           | B4  | /DCHGBD      | О   | L     | DISCHARGE BIAS DRIVE signal                             |
|           | В5  | /HV1FRQ      | О   | L     | PRIMARY BIAS FREQUENCY OUTPUT signal                    |
|           | В6  | /DCHGUP      | O   | L     | DISCHARGE BIAS SWITCH signal                            |
|           |     |              |     |       |   |

| Connector | Pin | Abbreviation | I/O | Logic | Signal name                            |
|-----------|-----|--------------|-----|-------|--|
| J220      | B7  | /HV1DCD      | О   | L     | PRIMARY DC BIAS DRIVE signal           |
|           | B8  | /DBDCD       | О   | L     | DEVELOPING DC BIAS DRIVE signal        |
|           | B9  | GND          |     |       |  |
|           | B10 | +24VB        | О   |       |  |
| J221      | 1   | +24VB        | I   |       |  |
|           | 2   | +24VB        | I   |       |  |
|           | 3   | +24VB        | I   |       |  |
| J222      | 1   | FSRTYP1      | I   |       | FIXING MAIN HEATER TYPE SENSE signal   |
|           | 2   | FSRTP1R      |     |       |  |
|           | 3   | FSRTP2R      |     |       |  |
|           | 4   | FSRTYP2      | I   |       | FIXING SUB HEATER TYPE SENSE signal    |
|           | 5   | FSRTH        | I   |       | FIXING ROLLER TEMPERATURE SENSE signal |
|           | 6   | GND          |     |       |  |
| J223      | 1   | TONRS        | I   |       | TONER LEVEL signal                     |
|           | 2   | GND          |     |       |  |
| J225      | 1   | FAN4D        | О   | Н     | FAN MOTOR 4 DRIVE signal               |
|           | 2   | /FAN4S       | I   | L     | FAN MOTOR 4 ROTATING DETECTION signal  |
|           | 3   | GND          |     |       |  |
|           | 4   | N.C.         |     |       |  |
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#### B. Input/output signals to option controller PCB

| Connector | Pin | Abbreviation    | I/O | Logic | Signal name                  |
|-----------|-----|-----------------|-----|-------|------------------------------|
| J101      | A1  | +5V             |     |       |                              |
|           | A2  | RESET           | I   |       | RESET signal (unused)        |
|           | A3  | /PRINT          | I   | L     | PRINT signal (unused)        |
|           | A4  | /SPCHG          | I   | L     | SPEED CHANGE signal (unused) |
|           | A5  | /PDLV           | I   | L     | PAPER DELIVERY signal        |
|           | A6  | /undetermined 1 | I   |       | For expansion                |
|           | A7  | N.C.            |     |       |                              |
|           | A8  | /CKEN           | I   | L     | COMMUNICATION READY signal   |
|           | A9  | /TX             | I   | L     | SERIAL IN signal             |
|           | A10 | GND             |     |       |                              |
| [         | B1  | +5V             |     |       |                              |
|           | B2  | N.C.            |     |       |                              |
|           | В3  | /VSYNC          | I   | L     | VERTICAL SYNC signal         |
|           | B4  | /PFED           | I   | L     | PAPER FEED signal            |
|           | B5  | GND             |     |       |                              |
|           | В6  | /undetermined 2 | I   | L     | For expansion                |
|           | В7  | /STROBE         |     | L     | STROBE signal                |
|           | В8  | /RX             | О   | L     | SERIAL OUT signal            |
|           | В9  | /CLK            | О   | L     | SYNCHRONIZED CLOCK signal    |
|           | B10 | GND             |     |       | C                            |
| J102      | 1   | /TX             | О   | L     | SERIAL OUT signal            |
|           | 2   | GND             |     |       | -                            |
|           | 3   | /RX             | I   | L     | SERIAL IN signal             |
|           | 4   | /TERMINATE      | I   | L     | COMMUNICATION READY signal   |
|           | 5   | N.C.            |     |       | Č                            |
|           | 6   | /CLOCK          | I   | L     | SYNCHRONIZED CLOCK signal    |
|           | 7   | GND             |     |       | Ç                            |
|           | 8   | GND             |     |       |                              |
|           | 9   | GND (KEY)       |     |       | Mis-insertion prevention     |
|           | 10  | N.C.            |     |       | •                            |
|           | 11  | GND             |     |       |                              |
|           | 12  | /STROBE         | О   | L     | STROBE signal                |
|           | 13  | PWRON           | О   | L     | POWER ON signal              |
|           | 14  | GND             |     |       |                              |
|           | 15  | N.C.            |     |       |                              |
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#### C. Input/output signals to paper deck driver PCB

| Connector | Pin | Abbreviation | I/O | Logic | Signal name                  |
|-----------|-----|--------------|-----|-------|------------------------------|
| J201      | 1   | TXI          | I   | L     | SERIAL IN signal             |
|           | 2   | GND          |     |       |                              |
|           | 3   | RXO          | О   | L     | SERIAL OUT signal            |
|           | 4   | CONTO        | О   | L     | Communication ready signal   |
|           | 5   | +24V         |     |       |                              |
|           | 6   | CKI          | I   | L     | SYNCHRONOUS CLOCK signal     |
|           | 7   | GND          |     |       |                              |
|           | 8   | GND          |     |       |                              |
|           | 9   | GND          |     |       |                              |
|           | 10  | +24V         |     |       |                              |
|           | 11  | GND          |     |       |                              |
|           | 12  | STRBI        | I   | L     | STROBE signal                |
|           | 13  | PWRON-IN     | I   | L     | POWER ON signal              |
|           | 14  | GND          |     |       |                              |
|           | 15  | +24V         |     |       |                              |
| J202      | 1   | TXO          | О   | L     | SERIAL OUT signal            |
|           | 2   | GND          |     |       |                              |
|           | 3   | RXI          | I   | L     | SERIAL IN signal             |
|           | 4   | CONTI        | I   | L     | Communication ready signal   |
|           | 5   | +24V         |     |       |                              |
|           | 6   | CKO          | I   | L     | SYNCHRONOUS CLOCK signal     |
|           | 7   | GND          |     |       |                              |
|           | 8   | GND          |     |       |                              |
|           | 9   | GND          |     |       |                              |
|           | 10  | +24V         |     |       |                              |
|           | 11  | GND          |     |       |                              |
|           | 12  | STRBO        | О   | L     | STROBE signal                |
|           | 13  | PWRON-OUT    | О   | L     | POWER ON signal              |
|           | 14  | GND          |     |       |                              |
|           | 15  | +24V         |     |       |                              |
| J203      | 1   | +24V         | I   |       |                              |
|           | 2   | +24V         | I   |       |                              |
|           | 3   | PWRON-IN     | О   | L     | POWER ON signal              |
|           | 4   | +5V          | I   |       |                              |
|           | 5   | GND          |     |       |                              |
|           | 6   | GND          |     |       |                              |
| J204      | 1   | GND          |     |       |                              |
|           | 2   | GND          |     |       |                              |
|           | 3   | DCMOT-RDY    | I   | L     | DECK MOTOR READY signal      |
|           | 4   | DCMOT-ON     | О   | L     | DECK MOTOR DRIVE signal      |
|           | 5   | +24V         | О   |       |                              |
|           | 6   | +24V         | О   |       |                              |
| J205      | 1   | FEDBND       | О   |       | PICK-UP MOTOR CONTROL signal |
|           | 2   | FEDBD        | О   |       | PICK-UP MOTOR CONTROL signal |
|           | 3   | FEDAND       | О   |       | PICK-UP MOTOR CONTROL signal |
|           | 4   | FEDAD        | О   |       | PICK-UP MOTOR CONTROL signal |
| J206      | 1   | +24V         | О   |       |                              |
|           |     |              |     |       |                              |

| Connector | Pin | Abbreviation | I/O | Logic | Signal name  |
|-----------|-----|--------------|-----|-------|--|
|           | 2   | LIFTCL       | 0   | L     | LIFTER CLUTCH DRIVE signal   |
| J207      | 1   | +5V          | 0   |       |  |
| 0207      | 2   | GND          |     |       |  |
|           | 3   | REGI         | I   | L     | REGISTRATION PAPER SENSE signal  |
|           | 4   | +5V          | 0   | _     | 3  |
|           | 5   | GND          |     |       |  |
|           | 6   | JAM          | I   | L     | PAPER JAM SENSE signal   |
|           | 7   | REGICL       | 0   |       | REGISTRATION CLUTCH DRIVE signal   |
|           | 8   | +24V         | 0   |       | THE GIRTH THE STATE OF THE STAT |
|           | 9   | FEEDCL       | 0   | L     | FEED CLUTCH DRIVE signal   |
|           | 10  | +24V         | 0   | _     |  |
| J208      | 1   | +24V         | 0   |       |  |
| 0200      | 2   | PICKUPSL     | 0   | L     | PICK-UP SOLENOID DRIVE signal  |
|           | 3   | +5V          | 0   |       | Tien of bozzitoż zin z sigum.  |
|           | 4   | GND          |     |       |  |
|           | 5   | PAP-EXIST    | I   | L     | TRAY PAPER-OUT SENSE signal  |
|           | 6   | +5V          | 0   |       | The Date of        |
|           | 7   | GND          |     |       |  |
|           | 8   | LIFT         | I   | Н     | PAPER SURFACE SENSE signal   |
|           | 9   | +5V          | 0   | 11    | THE EN SOM FIELD SERVICE SIGNAL  |
|           | 10  | GND          |     |       |  |
|           | 11  | DOOR         | I   | L     | DOOR OPEN SENSE signal   |
| J209      | 1   | GND          | 1   | L     | DOOK OF ERV SERVE SIGNAL   |
| 3207      | 2   | PAP-SIZE4    | I   | L     | PAPER SIZE SENSE signal 4  |
|           | 3   | PAP-SIZE3    | I   | L     | PAPER SIZE SENSE signal 3  |
|           | 4   | PAP-SIZE2    | I   | L     | PAPER SIZE SENSE signal 2  |
|           | 5   | PAP-SIZE1    | I   | L     | PAPER SIZE SENSE signal 1  |
| J210      | 1   | GND          | 1   | L     | 174 EK SIZE SENSE signal 1   |
| 3210      | 2   | PAP-VOL1     | I   |       | PAPER-LEVEL SENSE signal 1   |
|           | 3   | PAP-VOL2     | I   |       | PAPER-LEVEL SENSE signal 2   |
|           |     | 7711 (022    | 1   |       | THE ER EL VEL GELVOL SIGNAL 2  |
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