

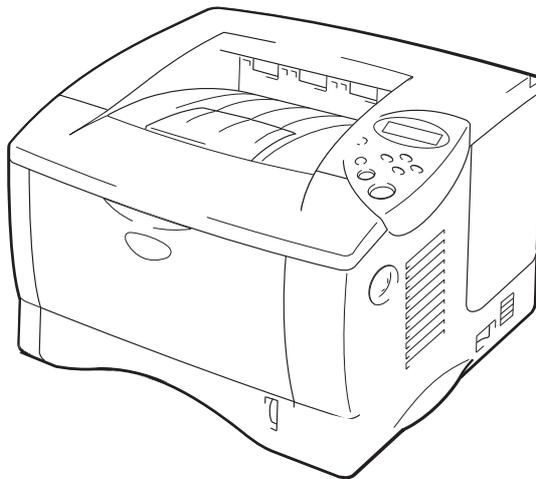


# Brother Laser Printer **SERVICE MANUAL**

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**MODEL: HL-1850/1870N**



Read this manual thoroughly before maintenance work.

Keep this manual in a convenient place for quick and easy reference at all times.

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## PREFACE

This service manual contains basic information required for after-sales service of the laser printer (hereinafter referred to as "this machine" or "the printer"). This information is vital to the service technician to maintain the high printing quality and performance of the printer.

This service manual covers the **HL-1850/1870N** printers.

This manual consists of the following chapters:

**CHAPTER 1: GENERAL**

Features, specifications, etc.

**CHAPTER 2: INSTALLATION AND BASIC OPERATION**

Installation conditions, Installation procedures, basic operation of the printer etc.

**CHAPTER 3: THEORY OF OPERATION**

Basic operation of the mechanical system, the electrical system and the electrical circuits and their timing information.

**CHAPTER 4: DISASSEMBLY AND RE-ASSEMBLY**

Procedures for disassembling and re-assembling the mechanical system.

**CHAPTER 5: PERIODIC MAINTENANCE**

Periodical replacements parts, consumable parts, etc.

**CHAPTER 6: TROUBLESHOOTING**

Reference values and adjustments, troubleshooting image defects, troubleshooting malfunctions, etc.

**CHAPTER 7: HIDDEN FUNCTIONS**

Professional menu mode and Service menu mode, etc.

**APPENDICES:** Serial No. descriptions, Drum life & page counter, Diameter / circumference of rollers, Connection diagrams, PCB circuit diagrams, etc.

Information in this manual is subject to change due to improvement or redesign of the product. All relevant information in such cases will be supplied in service information bulletins (Technical Information).

A thorough understanding of this printer, based on information in this service manual and service information bulletins, is required for maintaining its print quality performance and for improving the practical ability to find the cause of problems.

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## INDEX

## REGULATION

### LASER SAFETY (110 - 120V MODEL ONLY)

This printer is certified as a Class I laser product under the US Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer does not produce hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within the protective housing and external covers, the laser beam cannot escape from the machine during any phase of user operation.

### FDA REGULATIONS (110 - 120V MODEL ONLY)

The US Food and Drug Administration (FDA) has implemented regulations for laser products manufactured on and after August 2, 1976. Compliance is mandatory for products marketed in the United States. One of the following labels on the back of the printer indicates compliance with the FDA regulations and must be attached to laser products marketed in the United States.

The label for Japanese manufactured products

MANUFACTURED: BROTHER INDUSTRIES, LTD.  15-1, Naeshiro-cho, Mizuho-ku, Nagoya 467-8561, Japan. This product complies with FDA radiation performance standards, 21 CFR Subchapter J.	K
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The label for Chinese manufactured products

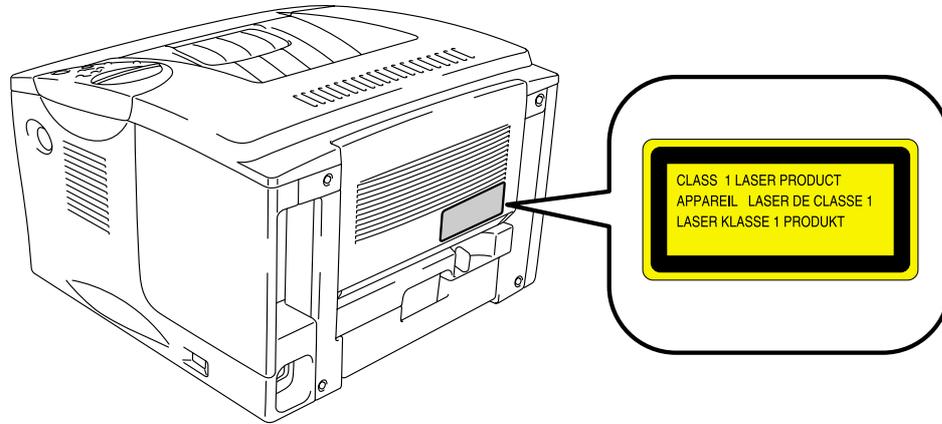
MANUFACTURED: BROTHER Corporation (Asia) Ltd. Shenzen Buji Nan Ling Factory  Gold Garden Ind., Nan Ling Village, Buji, Rong Gang, Shenzen, CHINA This product complies with FDA radiation performance standards, 21 CFR Subchapter J.	C
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### Caution

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

**IEC 825 (220-240V MODEL ONLY)**

This printer is a Class I laser product as defined in IEC 825 specifications. The label shown below is attached in countries where required.



This printer has a laser diode which emits invisible laser radiation in the Laser Unit. The Laser Unit should not be opened without disconnecting the two connectors connected with the AC power supply and laser unit. Since the variable resistor in the laser unit is adjusted in accordance with the standards, never touch it.

**Caution**

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

**For Finland and Sweden****LUOKAN 1 LASERLAITE****KLASS 1 LASER APPARAT**

Varoitus! Laitteen käyttäminen muulla kuin tässä käyttöohjeessa mainitulla tavalla saattaa altistaa käyttäjän turvallisuusluokan 1 ylittävälle näkymättömälle lasersäteilylle.

Varning – Om apparaten används på annat sätt än i denna Bruksanvisning specificerats, kan användaren utsättas för osynlig laserstrålning, som överskrider gränsen för laserklass 1.

## SAFETY INFORMATION

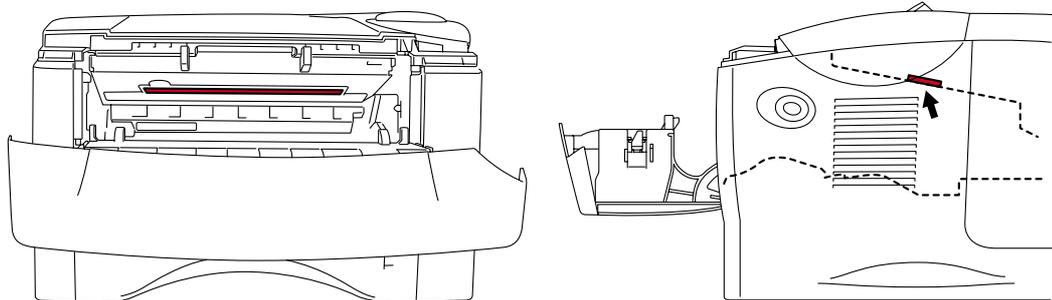
### CAUTION FOR LASER PRODUCT (WARNHINWEIS FÜR LASER DRUCKER)

**CAUTION:** When the machine during servicing is operated with the cover open, the regulations of VBG 93 and the performance instructions for VBG 93 are valid.

**CAUTION:** In case of any trouble with the laser unit, replace the laser unit itself. To prevent direct exposure to the laser beam, do not try to open the enclosure of the laser unit.

**ACHTUNG:** Im Falle von Störungen der Lasereinheit muß diese ersetzt werden. Das Gehäuse der Lasereinheit darf nicht geöffnet werden, da sonst Laserstrahlen austreten können.

<Location of the laser beam window>



### ADDITIONAL INFORMATION

When servicing the optical system of the printer, be careful not to place a screwdriver or other reflective object in the path of the laser beam. Be sure to take off any personal accessories such as watches and rings before working on the printer. A reflected beam, though invisible, can permanently damage the eyes.

Since the beam is invisible, the following caution label is attached on the laser unit.

<b>CAUTION</b>	INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCK DEFEATED. AVOID DIRECT EXPOSURE TO BEAM. CLASS 3B LASER PRODUCT.
<b>ADVARSEL</b>	USYNLIG LASER STRÅLING NÅR KABINETLÅGET STÅR ÅBENT. UNGDÅ DIREKTE UDSÆTTELSE FOR STRÅLING. KLASSE 3B LASER.
<b>VARNING</b>	OSYNLIG LASERSTRÅLNING NÅR DENNA DEL ÄR ÖPPNAD OCH SPÄRRAR ÄR URKOPPLADE. STRÅLEN ÄR FARLIG. KLASSE 3B LASER APPARAT.
<b>VARO!</b>	AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN. LUOKAN 3B LASERLAITE.
<b>ADVARSEL</b>	USYNLIG LASERSTRÅLING UINNÅ DIREKTE KONTAKT MED LASERENHETEN NÅR TOPPDEKSELET ER ÅPENT. KLASSE 3B LASERPRODUKT.
<b>ATTENTION</b>	RADIATIONS LASER INVISIBLES QUANDOUVERT ET VERROUILLAGE ENLEVÉ. ÉVITER EXPOSITIONS DIRECTES AU FAISCEAU. PRODUIT LASER CLASSE 3B.
<b>VORSICHT</b>	UNSICHTBARE LASERSTRÄHLUNG WENN ABDECKUNG GEÖFFNET UND SICHERHEITSPERRREGELUNG ÜBERBRÜCKT. NICHT DEM STRAHL AUSSETZEN. SICHERHEITSKLASSE 3B.
<b>ATENCIÓN</b>	RADIACIÓN LASER INVISIBLE CUANDO SE ABRE LA TAPA Y EL INTERRUPTOR INTERNO ESTÁ ATASCADO. EVITE LA EXPOSICIÓN DIRECTA DE LOS OJOS. PRODUCTO LASER CLASE 3B.



## DEFINITIONS OF WARNINGS, CAUTIONS AND NOTES

The following conventions are used in this service manual:



*Indicates warnings that must be observed to prevent possible personal injury.*



*Indicates cautions that must be observed to service the printer properly or prevent damage to the printer.*

### NOTE:

*Indicates notes and useful tips to remember when servicing the printer.*

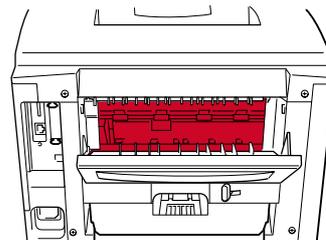
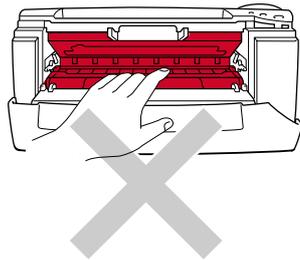
\*\*Listed below are the various kinds of “WARNING” messages included in this manual.



*Always turn off the power switch and unplug the power cord from the power outlet before accessing any parts inside the printer.*



*Some parts inside the printer are extremely hot immediately after the printer is used. When opening the front cover or rear cover to access any parts inside the printer, never touch the red colored parts shown in the following figures.*



*If you analyze malfunctions with the power plug inserted into the power outlet, special caution should be exercised even if the power switch is OFF because it is a single pole switch.*



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## CHAPTER 1 GENERAL

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### 1. FEATURES

---

This printer has the following features;

#### **High Resolution and Fast Print Speed**

True 600 x 600 dots / true 300 x 300 dots per inch (dpi) and 2400 x 600 dots per inch (dpi) for graphics with microfine toner and up to 18 pages per minutes (ppm) print speed for A4 and 19 pages per minutes (ppm) print speed for Letter paper.

#### **Versatile Paper Handling**

The printer loads paper automatically from the paper cassette. The paper cassette can hold A4, letter, B5 (ISO), B5 (JIS), A5, B6 (ISO), A6, Executive and Legal sizes of paper. The manual feed slot allows manual paper loading sheet by sheet so you can use a variety of types and sizes of paper.

#### **Front Operation**

Basic operation of the printer can be controlled from the control panel.

#### **Enhanced Printing Performance and User-Friendly Operation for Windows®**

The dedicated printer driver for Microsoft® Windows® 95/98/Me, Windows® NT 4.0 and Windows® 2000/XP are available on the CD-ROM supplied with your printer. You can easily install them into your Windows® system using our installer program. The driver supports our unique compression mode to enhance printing speed in Windows® applications and allows you to choose various printer settings including toner save mode, custom paper size, sleep mode, gray scale adjustment, resolution, water mark and many layout functions. You can easily setup these print options through the Printer Setup Menu.

#### **Printer Status Monitor with Bi-directional Parallel Interface**

The printer driver can monitor the status of your printer using bi-directional parallel communications. IEEE-1284 bi-directional parallel printer cable is recommended.

The printer status monitor program can show the current status of your printer. When printing, the animated dialog box appears on your computer screen to show the current printing process. If an error occurs, a dialog box will appear to let you know what to correct. If you have turned on the interactive Help (Windows® 95/98 only) you can get visual guidance on your PC screen on the actions in the event of certain printer errors.

#### **Quick Print Setup**

The Quick Print Setup is a convenient utility to allow you to make changes to frequently used driver settings easily without having to open the printer properties selection box every time. It is launched automatically when this printer driver is selected. You can change the settings by clicking on the icon with the right mouse button.

#### **Enhanced Memory Management**

The printer provides its own data compression technology in its printer hardware and the supplied printer driver software, which can automatically compress graphic data and font data efficiently into the printer's memory. You can avoid memory errors and print most full page 600 dpi graphic and text data, including large fonts, with the standard printer memory.

### **USB Interface (for Windows® 98 / 2000/XP, iMac and Power Macintosh)**

The printer can be connected using the Universal Serial Bus (USB) interface to a PC or Mac which has a USB interface. Drivers that allow you to use the USB port are provided on the CD-ROM supplied with the printer.

### **Popular Printer Emulation Support**

These printers support the following printer emulation modes;

HP LaserJet (PCL6), PostScript® Level 3 language emulation (Brother BR-Script Level 3), Epson FX-850 and IBM Proprinter XL.

When you use DOS application software or Windows® version 3.0 or earlier, you can use any of these emulations to operate the HL-1850/1870N printers. The printers also support auto-emulation switching between HP, Brother BR-Script 3 and Epson or HP, BR-Script 3 and IBM. If you want to set the printer emulation, you can do it using the Remote Printer Console Program.

### **High Resolution Control & Advanced Photoscale Technology**

High Resolution Control (HRC) technology provides clear and crisp printouts. Use this function to get smooth text print quality.

Advanced Photoscale Technology (APT) enables the printer to print graphics in 256 greyscales, producing nearly photographic quality. Use this function when you want to print photographic images.

### **Environment-Friendly**

<Economy Printing Mode>

This feature will cut your printing cost by saving toner. It is useful for obtaining draft copies for proof-reading. You can select the 50% toner saving economy mode through the Windows® printer driver supplied with your printer.

<Sleep Mode (Power Save Mode)>

Sleep mode automatically reduces power consumption when the printer is not in use for a certain period of time. The printer consumes less than 12W when in sleep mode.

<Low Running Cost>

Since the toner cartridge is separate from the drum unit, you need to replace only the toner cartridge after printing around 6,500 pages at 5% coverage for A4 paper for the standard cartridge, which is both cost effective and ecologically friendly.

### **Bar Code Print**

The printer can print the following 11 types of bar codes;

- Code 39
- US-PostNet
- EAN-8
- Code 128
- ISBN
- EAN-13
- Interleaved 2 of 5
- UPC-A
- EAN-128
- Codabar
- UPC-E

### **Network Feature (for HL-1870N only)**

The Brother printer has built in multi protocol network capability as standard. This allows multiple host computers to share the printer on a 10/100Mbit Ethernet network. Any users can print their jobs as if the printer was directly connected to their computer. Users on Windows® 95/98/Me, Windows® NT, Windows® 2000/XP, UNIX, Novell, Apple Macintosh, LAN server and OS/2 Warp server computer simultaneously can access this printer. For further information, see the Network User's Guide supplied with the printer.

## 2. OVERVIEW

### <Front View>

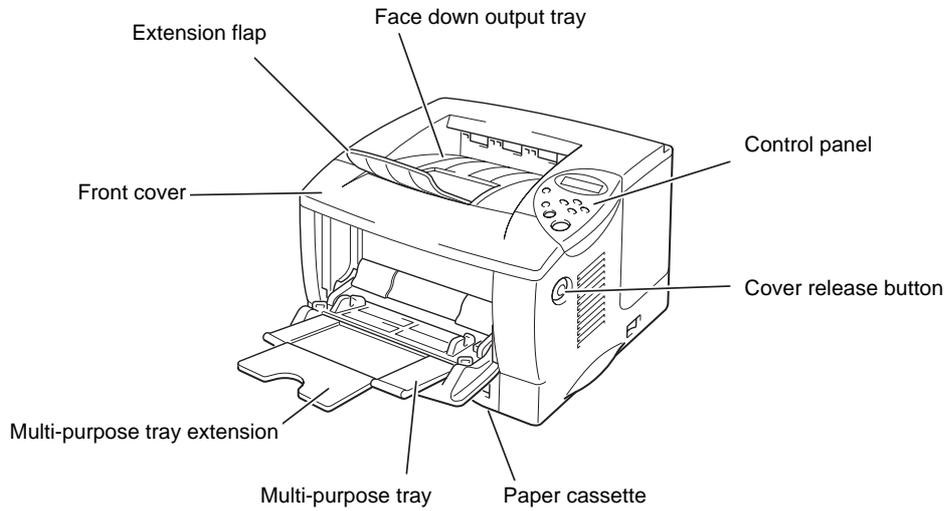


Fig. 1-1

### <Rear View>

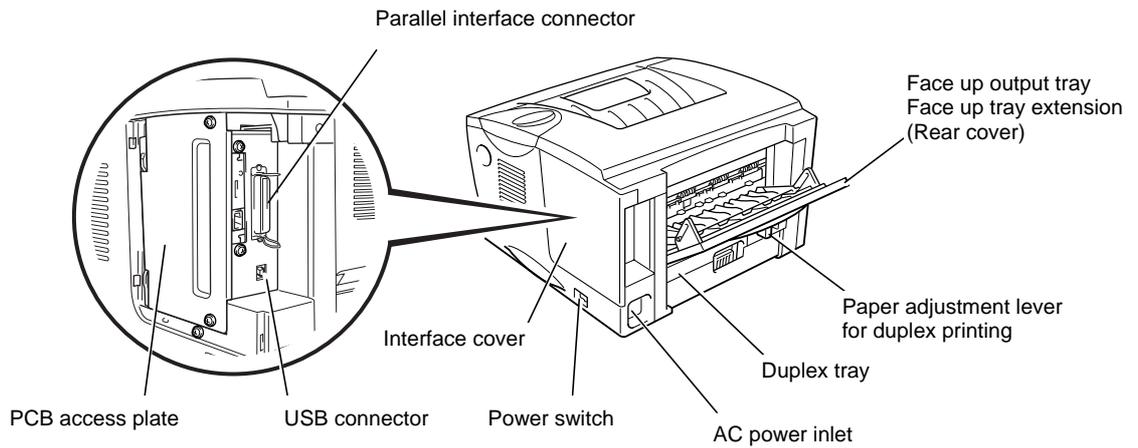


Fig. 1-2

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### 3. SPECIFICATIONS

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#### 3.1 Printing

Print method	Electrophotography by semiconductor laser beam scanning
Laser	Wavelength: 780 nm Output: 5mW max
Resolution	HQ1200 (for Windows® 95/98/Me, WindowsNT® 4.0, Windows® 2000/XP, and Mac OS) 600 dpi (for Windows® 95/98/Me, WindowsNT® 4.0, Windows® 2000/XP, DOS and Mac OS) 300 dpi (for Windows® 95/98/Me, WindowsNT® 4.0, Windows® 2000/XP, and Mac OS)
Print quality	Normal printing mode Economy printing mode (up to 25% and 50% toner saving)
Print speed	Normal: Up to 18 pages/minute (A4) UP to 19 pages/minute (Letter-size paper) Duplex printing: Up to 8.5 pages/minute* (when loading A4 or Letter-size paper from the standard paper cassette.)
Warm-up	Max. 20 seconds at 23°C (73.4°F)
First print	Max. 12 seconds (when loading A4 or Letter-size paper from the standard paper cassette.)
Print media	Toner cartridge Life expectancy: 6,500 pages/cartridge (when printing A4 or Letter-size paper at 5% print coverage)
Developer	Drum unit Life expectancy: 20,000 pages/drum unit

**\*NOTE:**

*Print speed varies depending on the paper size or media type. For details, refer to [APPENDIX 16 'PRINT SPEEDS WITH VARIOUS SETTINGS'](#).*

### 3.2 Functions

CPU	Fujitsu MB86834 100MHz
Emulation	Brother Printing Solution for Windows® Automatic emulation selection among HP LaserJet (PCL level 6), Brother BR-Script Level 3, EPSON FX-850 or IBM Proprinter XL
Printer driver	<PCL Driver> Windows® 95/98/Me, Windows® NT 4.0, Windows® 2000/XP driver, supporting Brother Native Compression mode <PS Driver> PPD file driver for Windows® 95/98/Me, Windows NT® 4.0, Windows® 2000/XP driver and Macintosh driver <Others> <ul style="list-style-type: none"> <li>• iMac, Power Macintosh with USB printer driver</li> <li>• Optional Macintosh driver available for System 6.0.7 or higher</li> </ul>
Interface	<ul style="list-style-type: none"> <li>• Bi-directional parallel</li> <li>• Universal Serial Bus (USB)</li> <li>• 10/100 BaseTX Ethernet network interface (optional for HL-1850)</li> <li>• Optional IrDA</li> </ul>
Memory	HL1850: 16 Mbytes HL1870N: 32 Mbytes Expandable up to 136 Mbytes for HL1850 and 144 Mbytes for HL1870N by installing an industry standard DIMM*
Control Panel	<ul style="list-style-type: none"> <li>• Display LCD: 1 line, 16 digit, 3 color LED: 1 LED</li> <li>• Buttons 7 keys</li> </ul>
Diagnostics	Self-diagnostic program

**\*NOTE:**

*The DIMM must have the following specifications;*

*Type: 100 pin  
Access time: 60 nsec - 80 nsec  
Capacity: 16, 32, 64, 128 Mbyte  
Height: 35.0 mm (1.38 inches) or less  
Output: 32 bit or 36 bit (independent of parity)*

### 3.3 Electrical and Mechanical

Power source	U.S.A. and Canada: AC 110 to 120V, 50 Hz/60 Hz Europe and Australia: AC 220 to 240V, 50 Hz/60 Hz
Power consumption	Printing (average): 410 W or less Standing by: 70 W or less Sleep*: 9 W or less (for HL-1850) 10 W or less (for HL-1870N)
Noise	Printing: 50dB A or less Standing by: 30dB A or less
Temperature	Operating: 10 to 32.5°C (50 to 90.5°F) Non operating: 0 to 40°C (38 to 104°F) Storage: -20 to 40°C (-4 to 104°F)
Humidity	Operating: 20 to 80% (non condensing) Storage: 10 to 85% (non condensing)
Dimensions (W x D x H)	425 x 424 x 275 mm (16.7 x 16.7 x 10.8 inches)  A4 lower paper cassette installed: 425 x 424 x 384 mm (16.7 x 16.7 x 15.1 inches)
Weight	Approx. 14.5 kg (32.2 lb.) including the drum unit. Approx. 18.7 kg (41.6 lb.) including the drum unit and the optional lower tray unit.

**\*NOTE:**

- *The power consumption figure quoted for sleep mode is when the fan has stopped.*

### 3.4 Network

Type / Speed	10/100 Base TX Ethernet Automatic negotiation
Protocols	TCP/IP (RARP, BOOTP, DHCP, NetBIOS, WINS, LPR/LPD, Port9100, POP3/SMTP, SMB, User definable port, IPP, FTP, TELNET, SNMP, HTTP, TFTP), Netware IPX/SPX (Bindery and NDS), Appletalk, DLC/LLC, NetBEUI, DEC LAT, Banyan VINES
Management	<ul style="list-style-type: none"> <li>• Web Based Management (HTTPD)</li> <li>• BRAdmin Professional (using TCP/IP protocol and IPX/SPX)</li> <li>• SNMP, MIB II as well as Brother private MIB</li> <li>• TELNET command console (NIC only)</li> <li>• HP JetAdmin compatible</li> <li>• BRCONFIG DOS Utility (NIC only, needs Netware network)</li> <li>• Front Panel Configuration (if the printer has LCD panel)</li> </ul>
Firmware update	Flash ROM based for Network module <ul style="list-style-type: none"> <li>• Can be upgraded using TFTP</li> <li>• Can be upgraded using IPX/SPX</li> <li>• Easy upgrade using Brother BRAdmin utility</li> </ul>
Supplied software	<ul style="list-style-type: none"> <li>• BRAdmin Professional management utility (for Windows® 95/98, Windows®NT 4.0/Windows® 2000/XP)</li> <li>• Port driver for Windows® 95/98, Windows®NT 4.0/Windows® 2000/XP <ul style="list-style-type: none"> <li>LPR port driver (for Windows® 95/98 only)</li> <li>NetBIOS port driver</li> <li>SMTP port driver</li> </ul> </li> </ul>

### 3.5 Paper

#### 3.5.1 Feedable paper

(1) Paper type

Paper type	Upper paper tray	Multi-purpose tray	Optional lower tray	Duplex printing	Select the paper type from the printer driver
<b>Plain paper</b> 60 g/m <sup>2</sup> to 105 g/m <sup>2</sup> (16 to 28 lbs.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Plain paper
<b>Recycled paper</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Plain paper
<b>Bond paper</b>		<input type="radio"/>			Bond paper
<b>Thick paper</b> 105 g/m <sup>2</sup> to 161 g/m <sup>2</sup> (28 to 43 lbs.)		<input type="radio"/>			Thick paper or thicker paper
<b>Transparency</b>	<input type="radio"/> Up to 10 sheets	<input type="radio"/> Only A4 or Letter size			Transparencies
<b>Label</b>		<input type="radio"/> Only A4 or Letter size			Plain paper
<b>Envelope</b>		<input type="radio"/>			Envelopes or Env.Tick or Env.Thin
<b>Card</b>		<input type="radio"/>			Thick paper or thicker paper

(2) Paper size

	Upper paper tray	Multi-purpose tray	Optional lower tray	Duplex printing
<b>Paper size</b>	A4, Letter, Legal, 8.5x13 in., B5 (JIS), B5 (ISO), Executive, A5, A6, B6	Width: 70 to 216 mm (2.75 to 8.5 in.)  Length: 116 to 356 mm (4.57 to 14.0 in.)	A4, Letter, Legal, B5 (JIS), B5 (ISO), Executive, A5	A4, Letter, Legal

(3) Other paper specifications

<Paper cassette>

	Cut sheet
<b>Basis weight</b>	60 to 105 g/m <sup>2</sup> (16 to 28 lb.)
<b>Caliper</b>	0.08 to 0.13 mm (0.003 to 0.005 in.)

<b>Moisture content</b>	4% to 6% by weight
-------------------------	--------------------

<Multi-purpose tray>

	<b>Cut sheet</b>	<b>Envelope</b>
<b>Basis weight</b>	60 to 161 g/m <sup>2</sup> (16 to 43 lb.)	75 to 90 g/m <sup>2</sup> (20 to 24 lb.) single thickness
<b>Caliper</b>	0.08 to 0.2 mm (0.003 to 0.008 in.)	0.084 to 0.14 mm (0.003 to 0.005 in.) single thickness
<b>Moisture content</b>	4% to 6% by weight	4% to 6% by weight

(4) Recommended paper

	<b>Europe</b>	<b>USA</b>
<b>Plain paper</b>	Xerox Premier 80 g/m <sup>2</sup> Xerox Business 80 g/m <sup>2</sup> IGEPA X-Press 80 g/m <sup>2</sup>	Xerox 4200DP 20 lb Champion Paper One 20 lb Hammermill Laser Paper 24 lb
<b>Recycled paper</b>	Steinbis Recycling Copy 80 g/m <sup>2</sup>	
<b>Transparency</b>	3M CG3300	3M CG 3300
<b>Label</b>	Avery laser label L7163	Avery laser label #5160

**! CAUTION:**

*When you are choosing print media, be sure to follow the information given below to prevent any paper jams, print quality problems or printer damage;*

- *It is recommended to use long-grained paper for the best print quality. If short-grained paper is being used, it might be the cause of paper jams.*
- *Use neutral paper. Do not use acid paper to avoid any damage to the drum unit.*
- *Avoid using coated paper such as vinyl coated paper.*
- *Avoid using preprinted or highly textured paper.*
- *It is recommended to use labels or transparencies which are designed for use in laser printers.*
- *Avoid feeding labels with the carrier sheet exposed, or the printer will be damaged.*
- *Before loading paper with holes such as organizer sheets, be sure to fan the stack well.*
- *Do not use organizer sheets that are stuck together. The glue that is used might caused damaged to the printer.*
- *When printing on the back of pre-printed paper, if the paper is curled, be sure to straighten the paper as much as possible.*
- *Different types of paper should not be loaded at the same time in the paper cassette to avoid any paper jams or misfeeds.*

**3.5.2 Paper cassette capacity**

	<b>Upper paper tray</b>	<b>Multi-purpose tray</b>	<b>Optional lower tray</b>
<b>Paper Capacity</b>	250 sheet (80 g/m <sup>2</sup> or 20 lbs.)	100 sheets (80 g/m <sup>2</sup> or 20 lbs.) Legal: 30 8.5x13 in.: 30 Label stock: 10	250 sheets (80 g/m <sup>2</sup> or 20 lbs.)

**3.5.3 Print delivery**

- (1) Face down output tray  
capacity: Maximum 150 sheets (80 g/m<sup>2</sup>)  
face down only
- (2) Face up output tray  
capacity: Maximum 50 sheets (80 g/m<sup>2</sup>)  
face up only

*NOTE:*

*Face-down: Delivery with the printed face of the paper downwards.*

*Face-up: Delivery with the printed face of the paper upwards.*

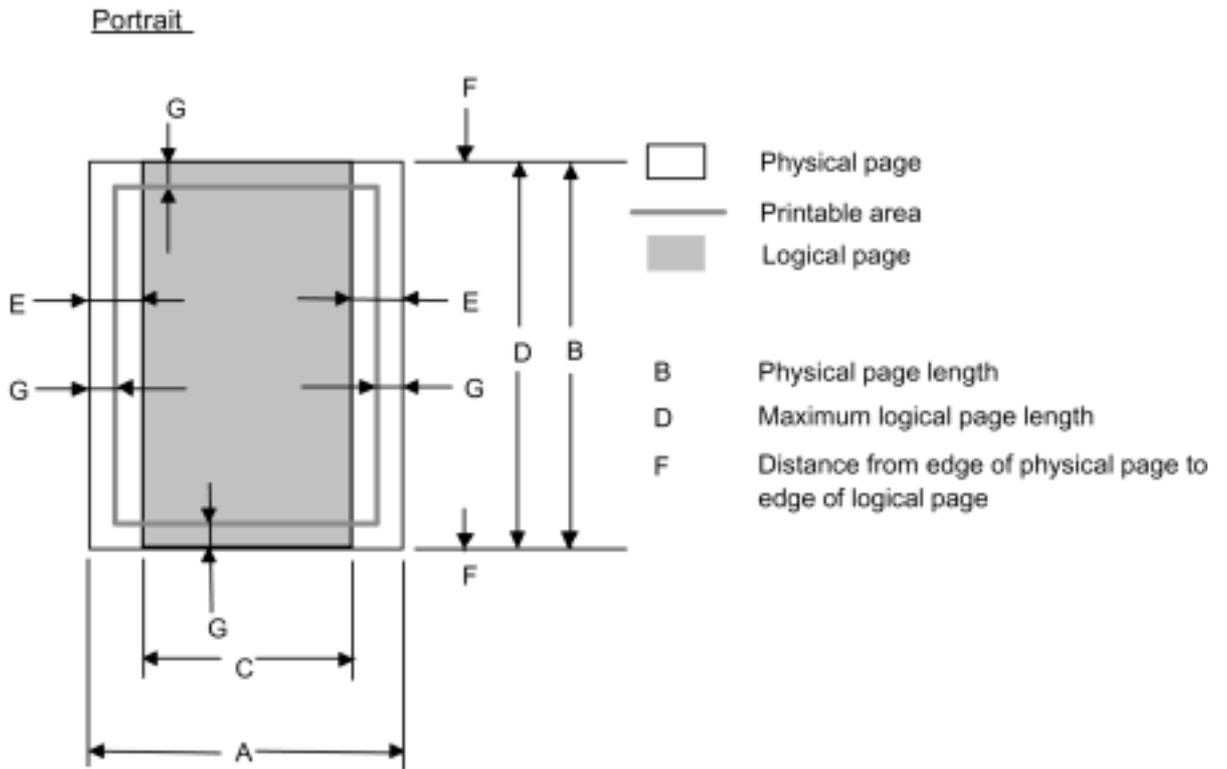
- (3) We recommend the following print methods (output tray) for each paper media type.

<b>Media type</b>	<b>Paper output</b>	
	<b>Face down</b>	<b>Face up</b>
<b>Plain paper</b>	○	○
<b>Thick paper</b>		○
<b>Recycled paper</b>	○	○
<b>Transparency</b>	○	
<b>Label</b>		○
<b>Envelope</b>		○
<b>Card</b>		○

**3.6 Printable Area**

**3.6.1 PCL5e/EPSON/IBM emulation**

The figure below shows the printable area each emulation guarantees when printing on Portrait and Landscape.



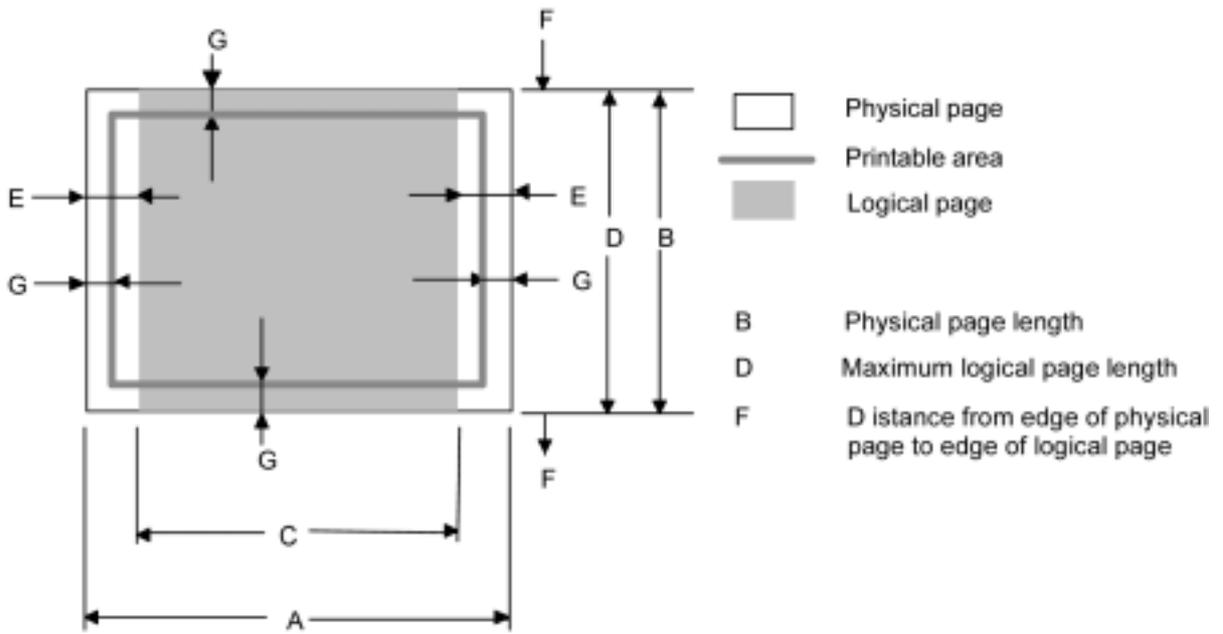
The table below shows the printable areas when printing on Portrait for each paper size.

Size	A	B	C	D	E	F	G
<b>Letter</b>	215.9 mm 8.5" (2,550 dots)	279.4 mm 11.0" (3,300 dots)	203.2 mm 8.0" (2,400 dots)	279.4 mm 11.0" (3,300 dots)	6.35 mm 0.25" (75 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>Legal</b>	215.9 mm 8.5" (2,550 dots)	355.6 mm 14.0" (4,200 dots)	203.2 mm 8.0" (2,400 dots)	355.6 mm 14.0" (4,200 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>Executive</b>	184.15 mm 7.25" (2,175 dots)	266.7 mm 10.5" (3,150 dots)	175.7 mm 6.92" (2,025 dots)	266.7 mm 10.5" (3,150 dots)	6.35 mm 0.25" (75 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>A 4</b>	210.0 mm 8.27" (2,480 dots)	297.0 mm 11.69" (3,507 dots)	198.0 mm 7.79" (2,338 dots)	297.0 mm 11.69" (3,507 dots)	6.01 mm 0.24" (71 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>A 5</b>	148.5 mm 5.85" (1,754 dots)	210.0 mm 8.27" (2,480 dots)	136.5 mm 5.37" (1,612 dots)	210.0 mm 8.27" (2,480 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>A 6</b>	105.0 mm 4.13" (1,240 dots)	148.5 mm 5.85" (1,754 dots)	93.0 mm 3.66" (1,098 dots)	148.5 mm 5.85" (1,754 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>B 5 (JIS)</b>	182.0 mm 7.1" (2,130 dots)	257.0 mm 10.11" (3,033 dots)	170.0 mm 6.69" (2,007 dots)	257.0 mm 10.11" (3,033 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>B 5 (ISO)</b>	176.0 mm 6.93" (2,078 dots)	250.0 mm 9.84" (2,952 dots)	164.0 mm 6.46" (1,936 dots)	250.0 mm 9.84" (2,952 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>B 6</b>	125.0 mm 4.92" (1,476 dots)	176.0 mm 6.93" (2,078 dots)	164.0 mm 4.44" (1,334 dots)	176.0 mm 6.93" (2,078 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>COM10</b>	104.78 mm 4.125" (1,237 dots)	241.3 mm 9.5" (2,850 dots)	92.11 mm 3.63" (1,087 dots)	241.3 mm 9.5" (2,850 dots)	6.35 mm 0.25" (75 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>MONARCH</b>	98.43 mm 3.875" (1,162 dots)	190.5 mm 7.5" (2,250 dots)	85.7 mm 3.37" (1,012 dots)	190.5 mm 7.5" (2,250 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>C 5</b>	162.0 mm 6.38" (1,913 dots)	229.0 mm 9.01" (2,704 dots)	150.0 mm 5.9" (1,771 dots)	229.0 mm 9.01" (2,704 dots)	6.01 mm 0.24" (71 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>DL</b>	110.0 mm 4.33" (1,299 dots)	220.0 mm 8.66" (2,598 dots)	98.0 mm 3.86" (1,157 dots)	220.0 mm 8.66" (2,598 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)

**NOTE:**

- The paper sizes indicated here should confirm to the nominal dimensions specified by JIS except B5 (ISO).
- The dot size is based on 300 dpi resolution.

Landscape



The table below shows the printable areas when printing on Landscape for each paper size.

Size	A	B	C	D	E	F	G
<b>Letter</b>	279.4 mm 11.0" (3,300 dots)	215.9 mm 8.5" (2,550 dots)	269.3 mm 10.6" (3,180 dots)	215.9 mm 8.5" (2,550 dots)	5.0 mm 0.2" (60 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>Legal</b>	355.6 mm 14.0" (4,200 dots)	215.9 mm 8.5" (2,550 dots)	345.5 mm 13.6" (4,080 dots)	215.9 mm 8.5" (2,550 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>Executive</b>	266.7 mm 10.5" (3,150 dots)	184.15 mm 7.25" (2,175 dots)	256.6 mm 10.1" (3,030 dots)	184.15 mm 7.25" (2,175 dots)	5.0 mm 0.2" (60 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>A 4</b>	297.0 mm 11.69" (3,507 dots)	210.0 mm 8.27" (2,480 dots)	287.0 mm 11.2" (3,389 dots)	210.0 mm 8.27" (2,480 dots)	4.8 mm 0.19" (59 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>A 5</b>	210.0 mm 8.27" (2,480 dots)	148.5 mm 5.85" (1,754 dots)	200.0mm 7.87" (2,362 dots)	148.5 mm 5.85" (1,754 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>A 6</b>	148.5 mm 5.85" (1,754 dots)	105.0 mm 4.13" (1,240 dots)	138.5 mm 5.45" (1,636 dots)	105.0 mm 4.13" (1,240 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>B 5 (JIS)</b>	257.0 mm 10.11" (3,033 dots)	182.0 mm 7.1" (2,130 dots)	247.0 mm 9.72" (2,916 dots)	182.0 mm 7.1" (2,130 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>B 5 (ISO)</b>	250.0 mm 9.84" (2,952 dots)	176.0 mm 6.93" (2,078 dots)	240.0 mm 9.44" (2,834 dots)	176.0 mm 6.93" (2,078 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>B 6</b>	176.0 mm 6.93" (2,078 dots)	125.0 mm 4.92" (1,476 dots)	166.4 mm 6.55" (1,960 dots)	125.0 mm 4.92" (1,476 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>COM10</b>	241.3 mm 9.5" (2,850 dots)	104.78 mm 4.125" (1,237 dots)	231.1 mm 9.1" (2,730 dots)	104.78 mm 4.125" (1,237 dots)	5.0 mm 0.2" (60 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>MONARCH</b>	190.5 mm 7.5" (2,250 dots)	98.43 mm 3.875" (1,162 dots)	180.4 mm 7.1" (2,130 dots)	98.43 mm 3.875" (1,162 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)
<b>C 5</b>	229 mm 9.01" (2,704 dots)	162 mm 6.38" (1,913 dots)	219.0 mm 8.62" (2,586 dots)	162 mm 6.38" (1,913 dots)	4.8 mm 0.19" (59 dots)	0 mm	4.2 mm 0.16" (50 dots)
<b>DL</b>	220 mm 8.66" (2,598 dots)	110 mm 4.33" (1,299 dots)	210.0 mm 8.26" (2,480 dots)	110 mm 4.33" (1,299 dots)	↑	0 mm	4.2 mm 0.16" (50 dots)

**NOTE:**

- The paper sizes indicated here should confirm to the nominal dimensions specified by JIS except B5 (ISO).
- The dot size is based on 300 dpi resolution.

### 3.6.2 PCL6/BR-Script3 emulation

You can not print within 4.2 mm (50dots in 300 dpi mode) on all four sides of the paper.

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## CHAPTER 2 INSTALLATION AND BASIC OPERATION

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### 1. CONDITIONS REQUIRED FOR INSTALLATION

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#### 1.1 Power Supply

- The source voltage must stay within  $\pm 10\%$  of the rated voltage shown on the rating plate.
- The power cord, including extensions, should not exceed 5 meters (16.5 feet).
- Do not share the same power circuit with other high-power appliances, particularly an air conditioner, copier or shredder. If it is unavoidable that you must use the printer with these appliances, it is recommended that you use an isolation transformer or a high-frequency noise filter.
- Use a voltage regulator if the power source is not stable.

#### 1.2 Environment

- The printer should be installed near a power outlet, which is easily accessible.
- The room temperature is maintained between 10°C and 32.5°C. The relative humidity is maintained between 20% and 80%.
- The printer should be used in a well ventilated room.
- Place the printer on a flat, horizontal surface.
- Keep the printer clean. Do not place the printer in a dusty place.
- Do not place the printer where the ventilation hole of the printer is blocked. Keep approximately 100 mm (4 inches) between the ventilation hole and the wall.
- Do not place the printer where it is exposed to direct sunlight. Use a blind or a heavy curtain to protect the printer from direct sunlight when the printer is unavoidably set up near a window.
- Do not place the printer near devices that contain magnets or generate magnetic fields.
- Do not subject the printer to strong physical shocks or vibrations.
- Do not expose the printer to open flames or salty or corrosive gasses.
- Do not place objects on top of the printer.
- Do not place the printer near an air conditioner.
- Keep the printer horizontal when carrying.
- Do not cover the slots in the side cover.

#### 1.3 System Requirements for Brother Printer Solution for Windows®

Check the following system requirements to setup and operate the printer using Brother Printing Solution for Windows®:

Operating system	Computer / Processor	Memory
Windows® 95	486DX / 66MHz or higher processor	24MB
Windows® 98	Pentium 150MHz or higher processor	32MB
Windows® Me	Pentium 150MHz or higher processor	32MB
Windows® NT 4.0	Pentium 150MHz or higher processor	24MB
Windows® 2000/XP	Pentium 133MHz or higher processor	64MB

## 2. UNPACKING

When unpacking the printer, check to see that all of the following components are included in the carton.

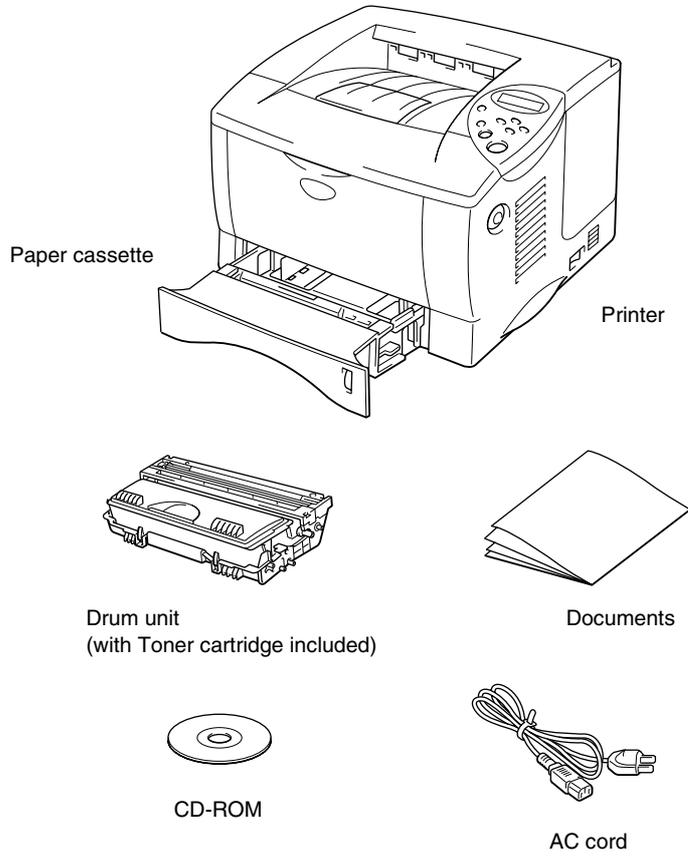


Fig. 2-1

**NOTE:**  
*Components may vary depending on the country.*

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## 3. INSTALL THE PRINTER

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You need to implement hardware setup and driver installation to use the printer.

Firstly, identify the Operating System on your computer. (Windows® 95/98/Me, Windows NT® 4.0, Windows® 2000/XP and Macintosh) Then, purchase the appropriate interface cable (Parallel, USB or Network) for your computer. Most existing parallel cables support bi-directional communication, but some might have an incompatible pin assignment or may not be IEEE 1284-compliant.

The installation programs for the hardware setup and driver installation are contained on the supplied CD-ROM.

### 3.1 For All Users

#### *For Windows® users*

Turn on the PC power. Insert the supplied CD-ROM into the CD-ROM drive. The opening screen will appear automatically

**NOTE:**

*If the opening screen does not appear; click **Start** and select **Run**. Then, enter the CD-drive letter and type \START.EXE (for example: D:\START.EXE).*

Select the language you want.

The main menu screen appears.

Click the Initial Setup icon. You can view the Initial Setup instructions.

#### *For Macintosh users*

(1) Turn on the Macintosh. Insert the CD-ROM into the CD-ROM drive.

(2) Click the Initial Setup & Maintenance Tutorial icon.

Select the language you want.

Click the Initial Setup icon. You can view the Initial Setup instructions.

### 3.1.1 Install the drum unit assembly

(1) Press the cover release button, and then open the front cover.

Unpack the drum unit assembly. Rock it from side to side 5 or 6 times to distribute the toner evenly inside the assembly.

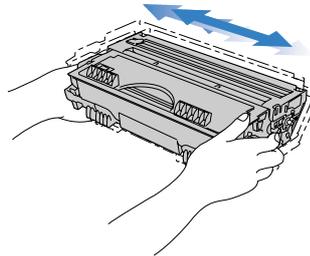


Fig. 2-2

Install the drum unit assembly into the printer.

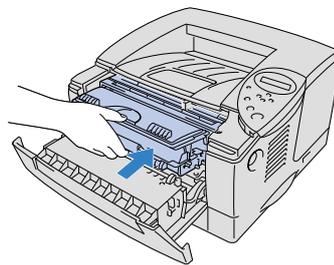


Fig. 2-3

Close the front cover.

### 3.1.2 Load paper into the paper cassette

(1) Pull the paper cassette completely out of the printer.

While pressing the paper guide release lever, slide the adjusters to fit the paper size. Check that they locate correctly into the slots.

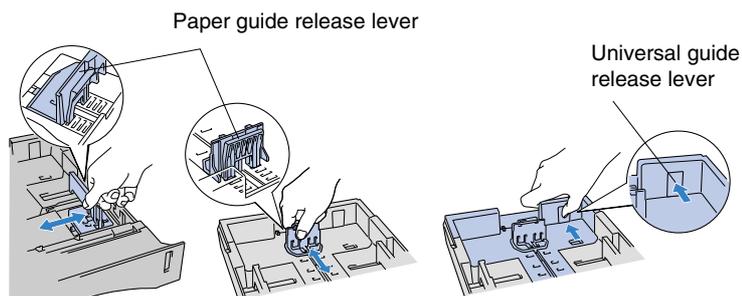


Fig. 2-4

**NOTE:**

*For Legal or 8.5 x 13 in. paper, press the universal guide release lever to extend the rear of the Paper cassette.*

Load paper into the paper cassette. Check that the paper is flat in the tray and below the maximum paper mark.

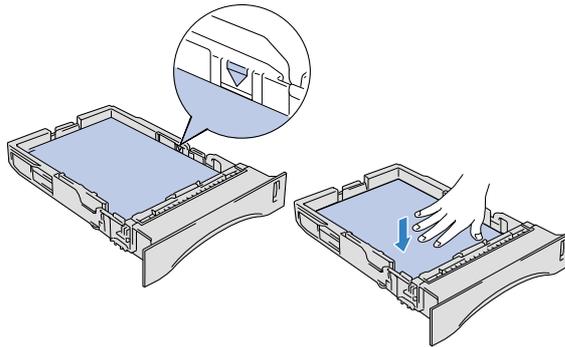


Fig. 2-5

Re-install the paper cassette into the printer.

### 3.1.3 Print a test page

- (1) Make sure the printer power switch is off. Connect the AC power cord to the printer. Do not connect the interface cable.

Plug the AC power cord into an AC outlet. Turn the power switch on.

After the printer has finished warming up, the READY message appears.

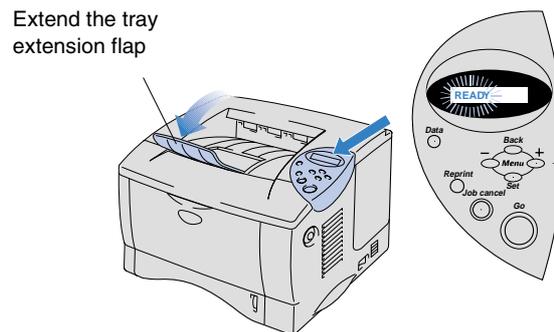


Fig. 2-6

Press the Go switch. The printer prints a test page. Check that the test page printed correctly.

Follows the instructions for your operating system and interface cable type.

### 3.2 For Windows® Users

Connect the printer to the PC & install the driver

#### ***For parallel interface cable users***

- (1) Click “Connect the Interface cable and install the printer driver / utilities”.
- (2) Select the parallel interface cable.
- (3) Turn the printer power switch off.

Connect the interface cable to your PC, then connect it to the printer.  
Turn the printer power switch on.

*NOTE:*

*If “Add New Hardware Wizard” appears, click the **Cancel** button.*

Click the **Next** button.

Click the **Finish** button. The setup is now complete.

#### ***For USB interface cable users***

Start installing the driver before connecting the USB interface cable to the printer. If it has been already connected, remove it.

*NOTE:*

*When the “Add New Hardware Wizard” appears on the PC, click the **Cancel** button.*

- (1) Click “Connect the interface cable and install the printer driver / utilities”.
- (2) Select the USB cable.

Click the **Next** button, and then click the **OK** button.

Make sure the printer power switch is on.

Connect the USB interface cable to the PC, and then connect it to the printer.

*NOTE:*

*If “The file brUSGcfg.exe on Brother USB Printer class...” message appears, click the **Browse...** button, and then select the **CD-ROM** drive. Select the **DRIVER\WIN98MEUSB** directory, and then click the **OK** button.*

Restart the computer.

**For Windows® 98/Me users: The setup is now complete.**

**For Windows® 2000/XP users: Follow the instructions below for setting the PC printer port.**

For Windows® 2000/XP users only

Click **Start**, **Setting** and then **Printers**.



**Fig. 2-7**

Select the Brother HL-1850/1870N series (copy2) icon.



**Fig. 2-8**

Click on the **File** menu, and then select **Set** as Default printer. The setup is now complete.

### ***For network users***

- For connecting the printer to a network, it is recommended to contact the system administrator prior to installation.
- For the administrator: Configure the printer referring to the following instructions.
- For installing the driver on the PC, refer to the following instructions once the administrator has configured the printer.

#### 1. For the administrator

##### **Install the BRAdmin Professional Configuration utility**

The BRAdmin Professional software provides sophisticated network and printer management capabilities for Brother and non-Brother products. By identifying potential problems before they arise, and by addressing important IT requirements such as streamlined printer configuration, mass configuration and enterprise-wide upgrades, the BRAdmin Professional software plays an important role in printer network management.

- (1) Insert the CD-ROM.
- (2) Select the appropriate language.
- (3) Click the **Install Software** icon.
- (4) Select BRAdmin Professional. Install the BRAdmin Professional utility referring to the on-screen instructions.

**Driver Deployment Wizard: Useful utility for peer-to-peer users**

Use the Brother Driver Deployment Wizard software to automate the installation of Brother networked printers in a TCP/IP environment. The Wizard can create an Executable file that can be sent to other network users, when run, the Executable file installs the appropriate printer driver and network printing software.

To access the Driver Deployment Wizard:

- (1) Insert the CD-ROM supplied with the printer.
- (2) Click the **Install Software** icon and select the Driver Deployment Wizard.

2. Installing the driver

- (1) Click the “Connect the interface cable and install the printer driver / utilities”.

Select the **Network interface**.

Turn the printer power switch off.

Connect the cable to your printer, and then connect it to a free port on your hub.

Turn the printer power switch on.

Click the **Next** button.

Select the **Network shared printer** or the **Brother peer-to-peer network printer**, and then click the **Next** button.

Select the network connection style and follow the instructions below:

3. For Network shared printer users

**Select the appropriate printer Queue or ‘Sharename’**

- (1) Select the current printer’s queue, and then click the **OK** button.

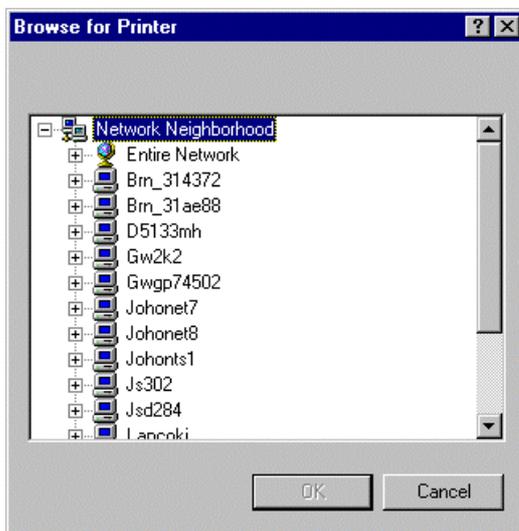


Fig. 2-9

- (2) Once the appropriate queue is specified, the printer driver will be installed.
- (3) The setup is now completed.

#### 4. For Brother Peer-to-Peer network printer users (LPR-recommended Peer-to-Peer printing method)

##### Configuring the LPR port

<For Windows® 95/98/Me users>

- (1) Select “LPR (Recommended)” and then click the **Next** button.
- (2) Enter a unique port name (ex. BLP1), and then click the **OK** button.
- (3) Specify the printer’s IP address (or click the **Browse** button to see a list of printers), and click the **OK** button.

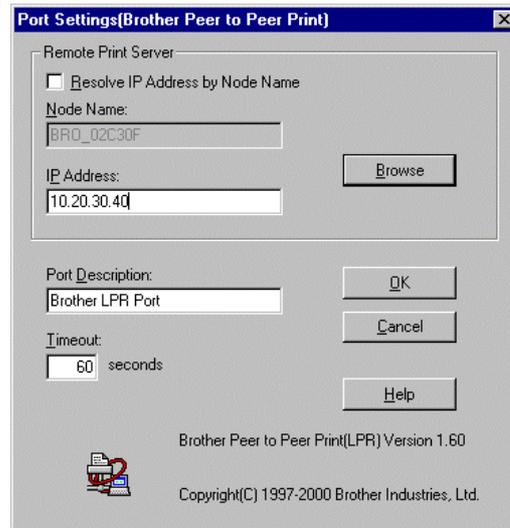


Fig. 2-10

- (4) Click the **Finish** button and restart the PC. After the PC has restarted, setup is complete.

<For Windows NT® 4.0/ Windows ® 2000/XP users>

- (1) Select “LPR (Recommended)”, and then click the **Next** button.

##### NOTE:

*If the following screen appears, insert the Windows NT® 4.0 CD-ROM into the CD-ROM drive.*

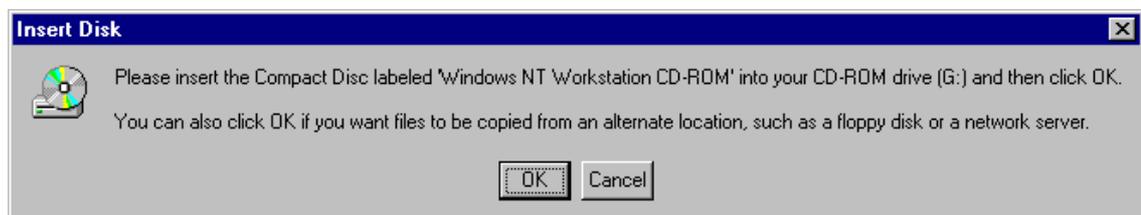


Fig. 2-11

- (2) Click the **Next** button.
- (3) Enter the printer’s IP address and the port name **BINARY\_P1**, then click the **Next** button.
- (4) Click the **Finish** button and restart the PC. After your PC has restarted, setup is complete.

5. For Brother Peer-to-Peer network printer users (NetBIOS)

**Configuring the NetBIOS port**

- (1) Select NetBIOS, and click the **Next** button.
- (2) Enter a unique port name (ex. **BNT1**), and then click the OK button.
- (3) Enter the path name (or click the Browse button to see a list of printer's), and then click the **OK** button.
- (4) Click the Finish button and restart your PC. After the PC has restarted, setup is complete.

**3.3 For Macintosh Users**

***For USB interface cable users***

**Connect the printer to the Macintosh and install the BR-Script PPD File**

- (1) Click "Connect the interface cable & Install the driver/utility."
- (2) Make sure the printer power switch is **ON**.
- (3) Connect the USB interface cable to the Macintosh®, and then connect it to the printer.
- (4) Follow the instructions on the screen.
- (5) Open the Macintosh HD icon.
- (6) **For Mac® OS 8.6 to 9.04 Users;** Open the Apple Extras folder.  
Open the Apple LaserWriter Software folder.  
**For Mac® OS 9.1 to 9.2 Users;** Open the Applications.( Mac® OS 9) folder.  
Open the Utilities folder.
- (7) Open the Desktop Printer Utility icon.
- (8) Select Printer (USB), and then click the OK button.
- (9) Click the Change...button in PostScript™ Printer Description (PPD) file. Select Brother HL-1850/1870N series, and then click the Select button.
- (10)Click the Change...button in USB Printer Selection. Select HL-1850/1870N series, and then click the OK button.
- (11)Click the Create...button.
- (12)Enter your printer name (HL-1850/1870N series), and then click the Save button.
- (13)Select **Quit** from the File menu.

***For network users*****Connect the printer to the Macintosh & install the BR-Script PPD file**

- (1) Double click the **BR-Script PPD Installer** icon and then follow the instructions on the screen.
- (2) Turn the printer power switch off.
- (3) Connect the cable to the printer, and then connect it to a free port on the hub.
- (4) Turn the printer power switch on.
- (5) Open the **Chooser** from the Apple Menu on the Macintosh.
- (6) Click the LaserWriter8 \* icon (If you need to change the network zone, select which zone you want to use from the AppleTalk® zones list).

**NOTE:**

*In the Chooser the name **BRN\_XXXXXX\_P1\_AT** is appeared, where "XXXXXX" is the last six digits of the Ethernet address. See Chapter 7 of the Network User's Guide for more information.*

- (7) Click on the appropriate printer server and close the Chooser. The setup is now complete.

\* If the Apple LaserWriter8 driver is not already installed on your system, you can download it from <http://www.apple.com>.

## 4. PRINTING METHODS

The printer provides two types of printing method; printing from the paper cassette and printing from the multi-purpose tray.

### 4.1 Printing from the Paper Cassette

You can load plain paper, recycled paper or transparencies into the paper cassette. If paper is loaded into the paper cassette, the printer automatically feeds paper sheet by sheet and ejects the printed page into the output tray.

For the details on cassette loading, refer to [subsection 3.1.2 'Load paper into the paper cassette' in this chapter](#) and [subsection 3.5 'Paper' in CHAPTER 1](#).

### 4.2 Printing from Multi-purpose Tray

You can feed bond paper, thick paper, labels, envelopes or cards as well as plain paper, recycled paper or transparencies into the multi-purpose tray. (For details on feedable paper, see [subsection 3.5 'Paper' in CHAPTER 1](#).)

**NOTE:**

- For correct printing, the same paper size must be selected from within the software application as the paper in the tray.
- If the application software does not support paper size selection in its print menu, you can change the paper size on the printer's control panel under the PAPER menu. For more information, see [subsection 5. "CONTROL PANEL OPERATION" in this Chapter](#).

When using the multi-purpose tray, follow the steps below;

- (1) Open the multi-purpose tray.

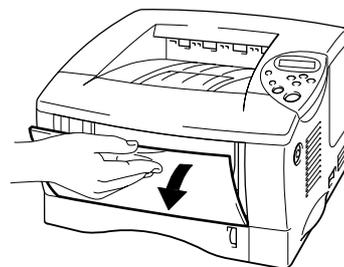


Fig. 2-12

- (2) Unfold the multi-purpose tray extension.

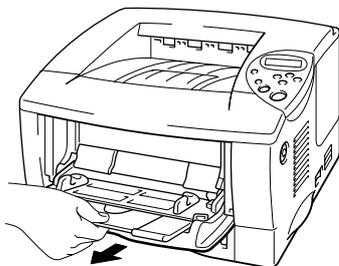


Fig. 2-13

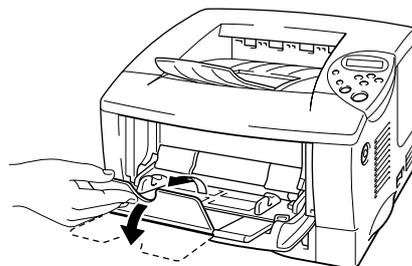


Fig. 2-14

- (3) Place paper in the multi-purpose tray so it touches the back of the tray and remains below the limit mark.

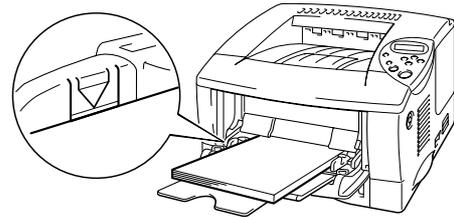


Fig. 2-15

**NOTE:**

*Note the following when placing paper on the multi-purpose tray:*

- *If the paper to be printed on weighs more than 135 g/m<sup>2</sup> (36 lbs), use the face up output tray.*
- *Insert the leading edge of the paper first and push it gently into the tray.*
- *If pre-printed paper is used in the multi-purpose tray, the paper should be inserted top edge first with the printed side face up.*

- (4) Press and slide the paper width adjuster to fit the paper.

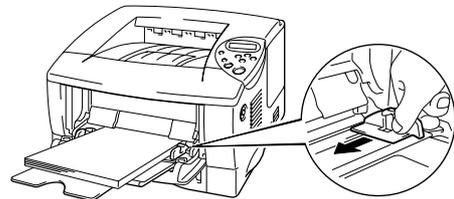


Fig. 2-16

- (5) Use the face down output tray for printing on transparencies.

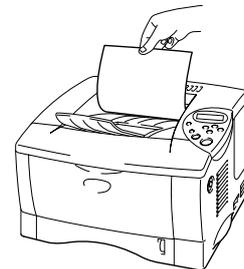


Fig. 2-17

- (6) Change the settings in the printer driver properties tab.

### 4.2.1 Printing on envelopes (Face up printing)

Use of any of the envelopes listed below may cause damage to the printer. Such damage is not covered under any warranty or service agreement.

- Envelopes that are damaged, curled, wrinkled, or irregularly shaped
- Envelopes that are extremely shiny or highly textured
- Envelopes with clasps, snaps or tie strings
- Envelopes with self-adhesive closures
- Envelopes of baggy construction
- Envelopes that are not sharply creased
- Embossed envelopes
- Envelopes that were previously printed by a laser printer
- Envelopes that are pre-printed on the inside
- Envelopes that cannot be arranged uniformly when placed in a pile
- Envelopes constructed with paper that exceeds the paper weight specifications for the printer.
- Poorly manufactured envelopes with edges that are not straight or consistently square.
- Envelopes with transparent windows, holes, cutouts or perforations.

**NOTE:**

- Before printing envelopes, fan the stack well to avoid paper jams and misfeeds.
- Do not load different types of paper at the same time in the paper tray because it may cause paper jams or misfeeds.
- Do not print envelopes using duplex printing.
- If the application software does not support paper size selection in its print menu, you can change the paper size on the printer's control panel under the **PAPER** menu. For more information, see [subsection 5. "CONTROL PANEL OPERATION" in this Chapter](#).

When printing on envelopes, follow the steps below;

- (1) Open the multi-purpose tray.
- (2) Unfold the multi-purpose tray extension.
- (3) Open the face up output tray.

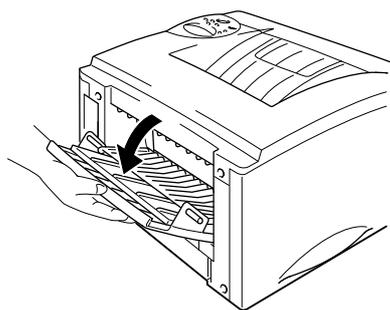


Fig. 2-18

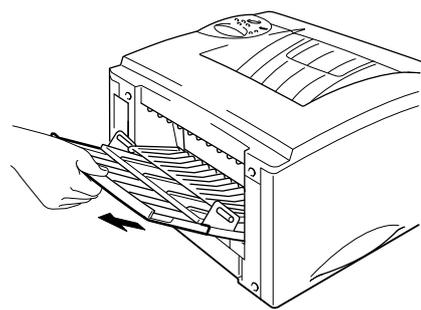


Fig. 2-19

- (4) Place envelopes in the multi-purpose tray so they touch the back of the tray and remain below the limit mark.

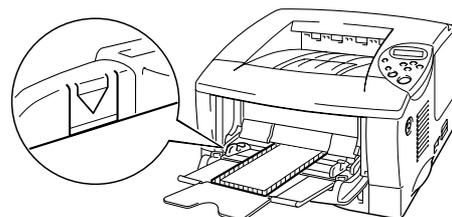


Fig. 2-20

**NOTE:**

Note the following when placing paper on the multi-purpose tray:

- Insert the leading edge of the paper first and push it gently into the tray.
- The top of the paper stack must be under the guides that are on both sides of tray. The maximum thickness is 11 mm (or 0.43 inch).
- The printed side must be face up.

- (5) Press and slide the paper width adjuster to fit the envelope size.

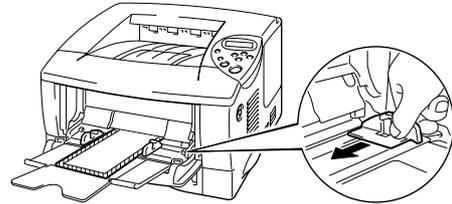


Fig. 2-21

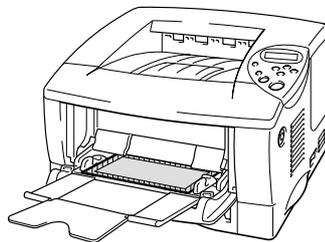
**NOTE:**

- Make sure that neatly stacked envelopes are correctly seated in the multi-purpose tray otherwise envelopes may not be fed correctly, resulting in skewed printouts or paper jams.
- When printing, the inside tray automatically rises to feed envelopes into the printer.

- (6) Change the settings in the printer driver **Property** tab.

**NOTE;**

- If DL size double-flap envelopes were creased after they have been printed, put in new DL size double-flap envelopes sideways, and print again.



#### 4.2.2 Printing on label, transparency, etc.

Use of any of the types of paper listed below may cause damage to your printer. Such damage is not covered under any warranty or service agreement.

- Envelopes that are damaged, curled, wrinkled, or irregularly shaped

**NOTE:**

- Before using paper with holes, such as organizer sheets, make sure to fan the stack well to avoid paper jams and misfeeds.
- Do not use paper with perforations at the edges.
- Do not place the punch hole near the actuator (paper sensor).
- Do not use organizer sheets that are stuck together. The glue that is used might cause damage to the printer.
- Do not load different types of paper at the same time in the paper tray because it may cause paper jams or misfeeds.



**CAUTION:**

*Do not touch transparencies that have just been printed because they are very **HOT**.*

When printing on labels or transparencies, follow the steps below;

- (1) Open the multi-purpose tray.
- (2) Unfold the multi-purpose tray extension.

For printing on labels, open the face up output tray. When printing on transparencies, print to the face down output tray.

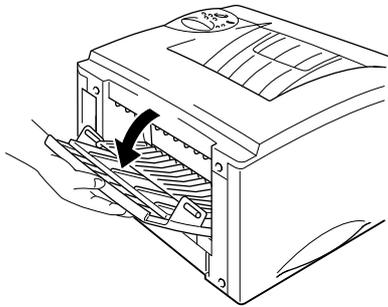


Fig. 2-22

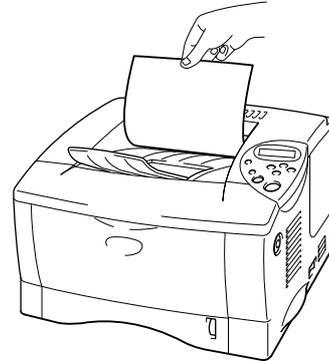


Fig. 2-23

- (3) Place paper in the multi-purpose tray so it touches the back of the tray and remains below the limit mark.

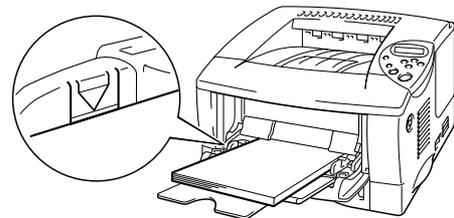


Fig. 2-24

**NOTE:**

*Note the following when placing paper in the multi-purpose tray:*

- *If paper to be printed on weighs more than 135 g/m<sup>2</sup> (36 lbs), use the face up output tray.*
- *Insert the leading edge of the paper first and push it gently into the tray.*
- *The printed side must be face up.*

- (4) Press and slide the paper width adjuster to fit the paper.

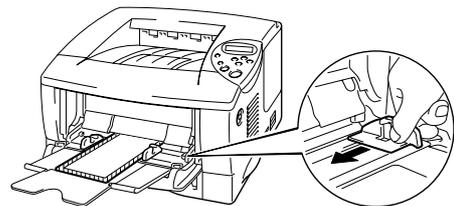


Fig. 2-25

- (5) Change the settings in the printer driver **Property** tab.

### 4.3 Printing to the Face up Output Tray (Face up Printing)

When the face up output tray is open, the printer has a straight paper path from the paper cassette or multi-purpose tray to the rear of the printer. Use this output method when printing on special media that is thick or should not be bent, such as heavy paper, labels, transparencies, card stock or envelopes.

When printing to the face up output tray, follow the steps below;

- (1) Open the face up output tray.
- (2) Unfold the face up output tray extension.
- (3) Place the paper into the paper cassette or multi-purpose tray.

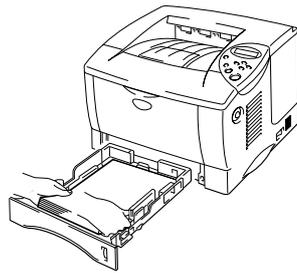


Fig. 2-26

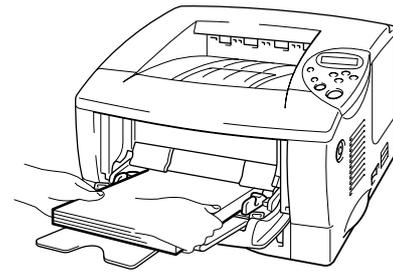


Fig. 2-27

- (4) After the printer ejects all the printed pages, remove them and close the face up output tray.

### 4.4 Printing on Both Sides of the Paper (Duplex Printing)

The supplied printer drivers for Windows® 95/98/Me, Windows® NT 4.0, Windows® 2000/XP supports automatic duplex printing.

#### **Guidelines for duplex printing:**

- If the paper is thin, it may wrinkle.
- If paper is curled, straighten it, and then place it in the paper cassette.
- Use A4, Letter or Legal size plain paper (60 to 105 g/m<sup>2</sup> or 16 to 28 lb.). Do not use bond paper.
- If the paper is not feeding correctly, it may be curled. Remove the paper and straighten it.

When printing on both sides of the paper, follow the steps below;

- (1) Load paper into the paper cassette or multi-purpose tray
- (2) When using A4 or Letter size paper, set the paper adjustment lever for duplex printing to match the paper size.

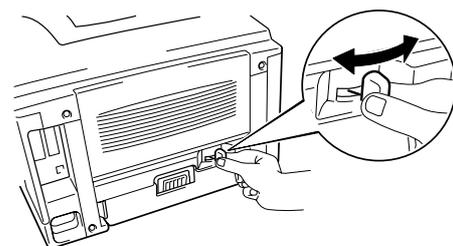


Fig. 2-28

**NOTE:**

*If the paper adjustment lever for duplex printing is not correctly set for the paper size, paper jams may occur and the printing will be out of position on the paper.*

- (3) Open the **Property** tab in the printer driver. Select the duplex printing mode in the **Paper** tab, and then click the **OK** button. The printer will print on both sides of the paper automatically.

#### 4.5 Manual Feed

If paper is placed in the multi-purpose tray when the setting MANUAL FEED = ON has been set in PAPER mode using the control panel, the printer will load paper only from the multi-purpose tray.

*NOTE:*

*Note the following when feeding paper manually:*

- *If the application software supports a manual feed selection in the print menu, it can be selected in that software. The software command setting overrides the control panel's setting. It will not be necessary to set MANUAL FEED in PAPER mode.*
- *If pre-printed paper is used in the multi-purpose tray, the paper should be inserted top edge first with the pre-printed side face up.*

#### 4.6 Printing side of duplex printing

Since the standard delivery tray is a face down tray, when duplex printing is carried out, an even-numbered page is printed first, then the odd numbered page, so that the page order in the output tray is correct.

If single side printing is done in normal mode, paper is drawn from an input tray, and it naturally prints and discharges a face down page.

If single side printing of 1-page of data is done in duplex mode, printing is done by feeding paper from an input tray, passing it through the duplex unit and then printing the first side.

### Control Panel Operation

There are one LED and 7 switches on the control panel. The LED and LCD display indicate the printer status, and pressing the switches enables several functions in the printer.

The display also shows the current printer status. When you use the control panel switches, the display will change.

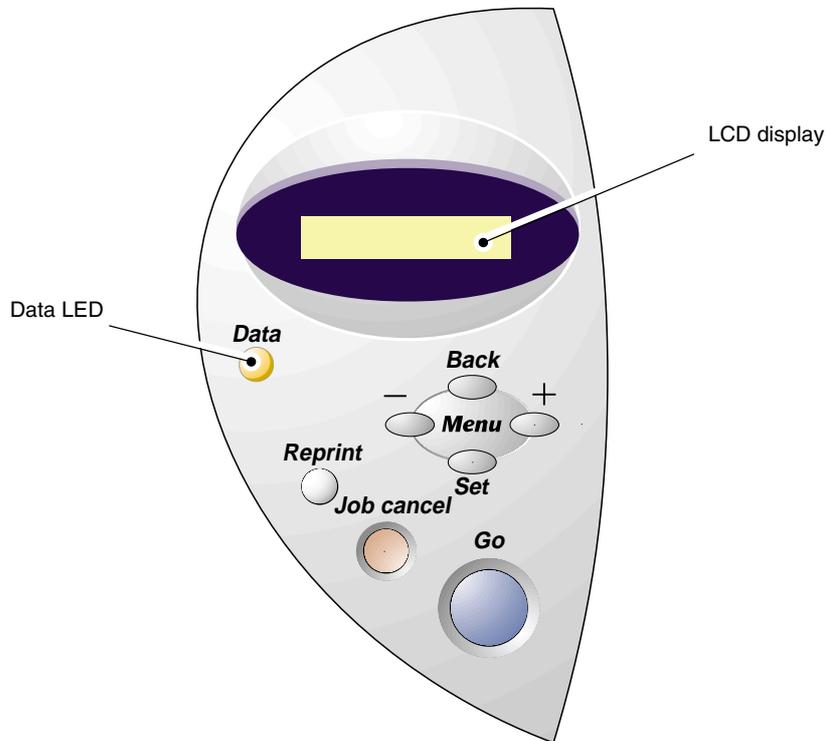


Fig. 2-29

### 5.1 Data LED Indications

The Data LED indicates with orange lamp the current status of the printer.

LED	Printer status
On	Data remains in the printer buffer.
Blinking	Receiving or processing data.
Off	No remaining data.

## 5.2 Panel Switches Functions

You can control the basic printer operations and change various printer settings with 7 control panel switches (**Go**, **Job Cancel**, **Reprint**, **+**, **-**, **Set**, **Back**).

Key	Function
<b>Go</b>	Exit from the control panel menu. Reprint settings and Error messages. Pause / Continue printing.
<b>Job Cancel</b>	Stop and cancel the printer operation in progress.
<b>Reprint</b>	Select the reprint menu. (1-999)
<b>+</b>	Move forward and backward through menus.
<b>-</b>	Move forward and backward through selectable options.
<b>Set</b>	Select the control panel menu. Set the selected menus and settings.
<b>Back</b>	Go back one level in the menu structure.

### 5.2.1 Go switch

The panel indications can be changed from the current status (MENU, ERROR and REPRINT settings) by pressing the **Go** switch once. For ERROR indications, the panel changes only when the error is cleared.

You can PAUSE printing with the **Go** switch. Pressing the **Go** switch again restarts the print job and clears the PAUSE. During PAUSE, the printer is in the off-line state.

**NOTE:**

*If you do not wish to print the remaining data when the printer is in PAUSE, you can cancel the job by pressing **Job Cancel** switch. Press the **Go** switch to clear the PAUSE and return the printer to the "Ready" state.*

### 5.2.2 Job Cancel switch

You can cancel the processing or printing of data with the **Job Cancel** switch. When the printer is still receiving data or the printer is in an error state, the display shows "NO DATA!!!" and you cannot cancel the job.

The display shows "JOB CANCELLIG" until canceling is completed. After canceling the job, the printer returns to the "READY" state.

### 5.2.3 Reprint switch

If you want to reprint a document that has just been printed, you can reprint it by pressing the **Reprint** switch. Also, if you have created a document that you wish to share with colleagues, simply spool the document to a non-secure area of the printer.

This document can then be re-printed by anyone who is on the network or at the printer control panel.

You can use the reprint function when the printer is **READY** or in the settings menu.

When you want to print **SECURE** data, we recommend **RAM** enhancement to enable the reprint using **RAM** function.

When you use **RAM** to reprint:

- i) Press the **Set** switch on the control panel to exit from the **READY** status and select **RAMDISK SIZE** in the **SETUP** mode.
- ii) The default **RAM** size is **0MB**. Press the **+** switch to increase the reprint **RAM** size in **1MB** steps.

**NOTE:**

- *When you increase the **RAM** size to use for secure printing, the work area of the printer is decreased and the printer performance will reduce. Ensure that you reset the **RAMDISKSIZE** to **0MB** when you have finished using secure printing.*
- *When you store the data in **RAM**, the data is deleted when the printer power is turned off.*
- *We also recommend adding additional **RAM** when you want to secure print a large amount of data.*

(1) Reprinting the last job

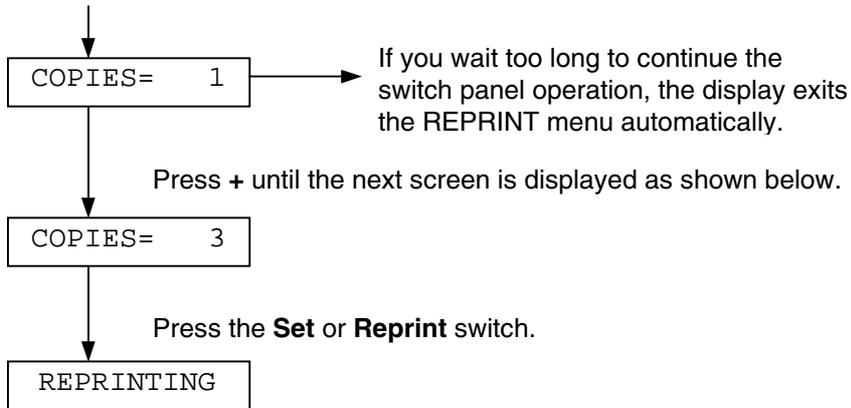
You can reprint the last print job without sending it from the computer again.

**NOTE:**

- *When **REPRINT** is set to **Off** using the control panel and you press the **Reprint** switch, the LCD briefly shows "**NO DATA STORED.**"*
- *If you want to cancel reprinting, press the **Job Cancel** switch.*
- *If the printer does not have enough memory to spool the print job, it prints only the last page.*
- *Pressing the **-** or **+** switch makes the number of reprint copies decrease or increase. You can select between **COPIES= 1** and **COPIES=999**.*

**Reprint the last job 3 times**

1. Set the REPRINT menu ON with SETUP mode using the control panel
2. Press the **Reprint** switch.



**NOTE:**

If you want to reprint the data and have pressed the **Go** switch, the display shows “PRESS SET TO PRINT”. Press **Set** to start the reprint job or press the **Go** switch to cancel the reprint job.

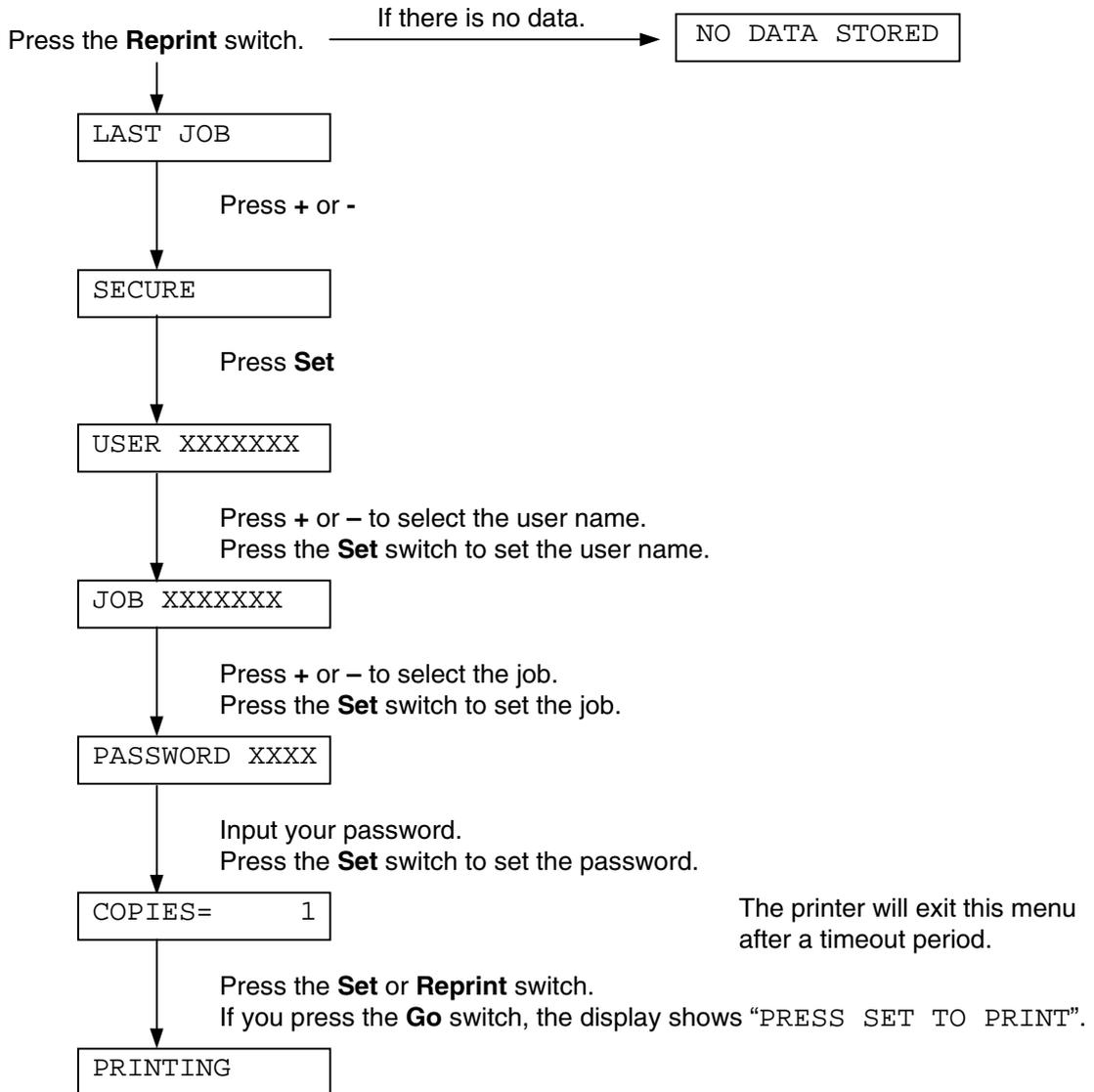
(2) Printing SECURE data

Secure documents are password protected and only those people that know the password will be able to print the document. The printer will not print the document when you have sent it for printing, to print the document you must use the control panel of the printer or connect to the printer using a web browser.

When you want to delete the spooled data, you can carry out this operation on the control panel or in the web based management software.

**NOTE:**

- If there is data in the job information that cannot be displayed on the LCD, the display shows “?”.
- You can also reprint the job using the supplied printer driver.

**Operations for printing secure data****When there is no reprint data in memory**

If the printer does not have any data in buffer memory and you press the **Reprint** switch, the LCD briefly shows "NO DATA STORED."

**When you want to delete the job**

Select the 'DELETE STORAGE' menu under the SETUP menu of the control panel. Select the user name and the job to delete (you need to input the password to delete secure data).

**When you cancel the reprinting job**

Pressing the **Job Cancel** switch allows you to cancel the reprint job. The **Job Cancel** switch also allows you to cancel a paused reprint job.

#### 5.2.4 + & - switch

If you press the + or – switch when the printer is in the on-line state (READY), it turns off-line and the LCD displays the menu.

(1) To display menus in the current mode

If you press the + or – switch when the printer is in the on-line state (READY), it goes off-line and the LCD displays the current mode.

You can enter other menus in the current mode by pressing the + or – switch. Pressing the + or – switch allows you to scroll forward or backward through the menus and settings on the display. Press or hold the switch until the display shows the desired item.

(8) To set numbers

There are two ways to input numbers. You can use the + or – switch to scroll up or down to set them one at a time, or you can enter them. If you hold down the + or – switch, the display scrolls up or down faster.

#### 5.2.5 Set switch

If you press the **Set** switch when the printer is in the on-line state (READY), it goes off-line and the LCD displays the current mode.

Pressing the **Set** switch allows you to set the selected menu or the default number. After changing the menu or the number, an asterisk appears briefly on the right and the mode returns to the previous menu.

#### 5.2.6 Back switch

If you press the **Back** switch when the printer is in the on-line state (READY), it goes off-line and the LCD goes to the menu display.

Pressing the Back switch allows you to return to the previous level from the current menu level. The Back switch also allows you to select the next digit while inputting numbers. When the leftmost digit is selected, the Back switch allows you to go up one level in the menu. When a menu or number without an asterisk (Set switch not pressed) is selected, the Back switch allows you to return to the previous menu level with the original setting unchanged.

*NOTE:*

*When you press the Set switch to select a setting, an asterisk appears briefly at the end of the display. Since the asterisk indicates the selection, you can easily find the current setting as you scroll through the display.*

### 5.3 LCD Display

The display shows the current printer status. When you use the control panel switches, the display will change.

When you take the printer off-line, the display changes to show the selected emulation.

If any problems occur, the display shows the corresponding operator call, error, or service call message to prompt you to take an action. For more information about these messages, see [CHAPTER 6 'TROUBLESHOOTING'](#).

### 5.3.1 Backlights

The backlight of the LCD shows the current printer status with the different colors and the light indications (on, off and blinking).

<b>Signal</b>	<b>Status</b>
<b>Off</b>	The printer is in sleep status.
<b>Green (General)</b>	Warming up
	Ready to print
	Printing
<b>Red (Error)</b>	A problem has occurred with the printer.
<b>Orange (Setting)</b>	Setting menu
	Setting reprint times
	Pause

**5.3.2 Printer status messages**

The following table shows the printer status messages that are displayed during normal operation:

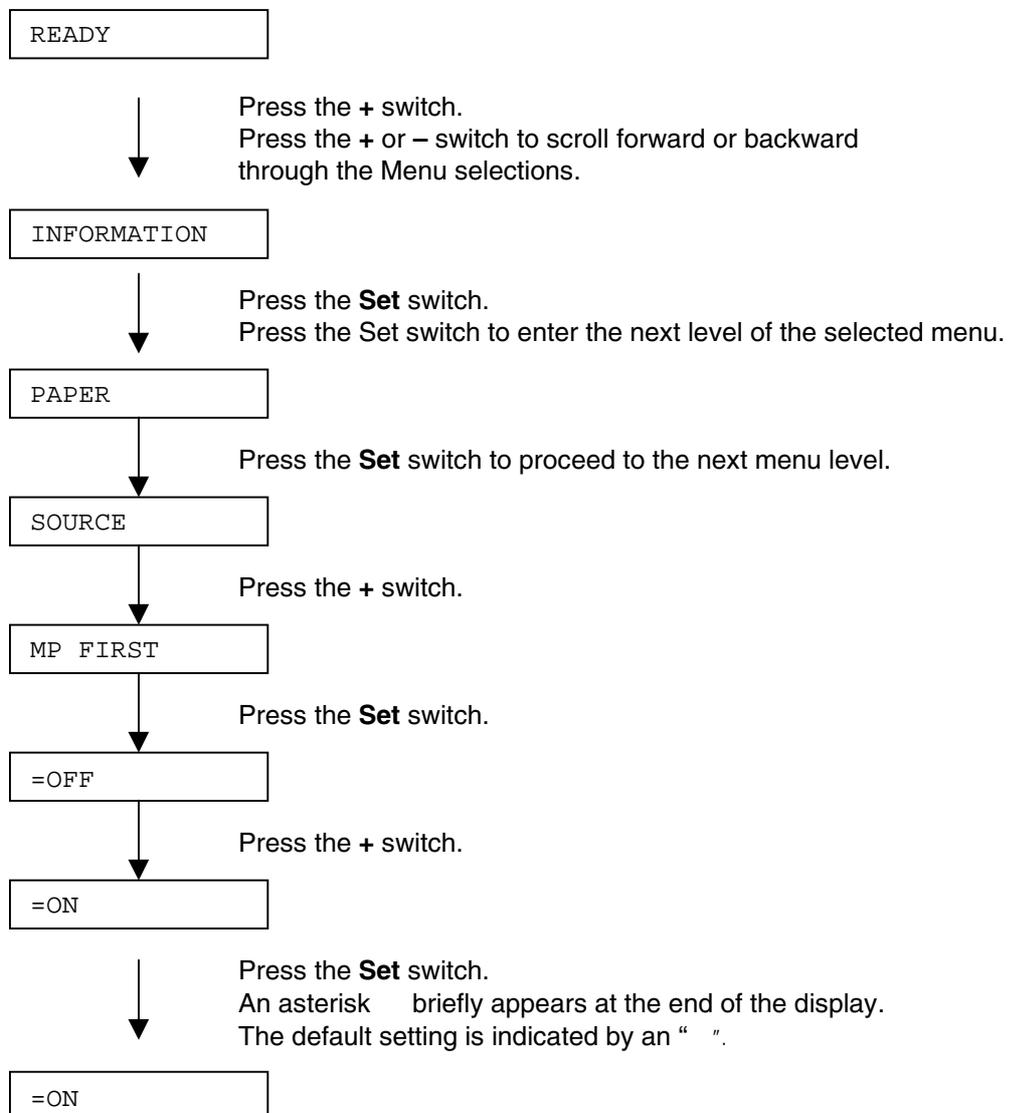
<b>Printer Status Message</b>	<b>Meaning</b>
<b>READY</b>	Ready to print.
<b>PROCESSING</b>	Busy processing data.
<b>SLEEP</b>	In sleep status (power save mode).
<b>PRINTING</b>	Printing.
<b>SELF TEST</b>	Performing self-diagnostics.
<b>PAUSE</b>	The printer has suspended feeding forms. Pressing the Go switch resumes form feed.
<b>NOW INITIALIZING</b>	The printer is setting up.
<b>WARMING UP</b>	The printer is warming up.
<b>MEMORY SIZE=XX MB</b>	This printer has XX MB memory.
<b>JOB CANCELING</b>	Canceling the job.
<b>RESOLUTION ADAPT</b>	Printing with reduced resolution.
<b>PRESS SET TO PRINT</b>	Press the Set switch to start printing.
<b>RESET TO FACTORY SETTING</b>	The printer setting returns to the factory setting.

## 5.4 How to Use the Control Panel

The followings are the basic steps when operating the switches; **Menu**, **+**, **-**, **Set**, and **Back**.

- If no control panel operations are performed for 30 seconds, the LCD automatically returns to READY.
- When pressing the **Set** switch to select a setting, an asterisk briefly appears at the end of display. After that, the display returns to the previous menu level.
- After changing the status or number, pressing the **Back** switch before pressing the **Set** switch will cause the display to return to the previous menu with the original setting unchanged.
- Numbers can be input by scrolling through the available range (000 to 999) or by setting digits one at a time. When setting digits one at a time, the blinking digit is the changeable digit.
- An example for operation: When turning the 'MP FIRST' setting on

Choose this setting to load paper from the multi-purpose tray first.



## 5.5 Control Panel Setting Menu

There are 8 modes. For more information about the selections available for each mode, refer to the pages listed below.

### INFORMATION:

For more information, see [subsection 5.5.1 'INFORMATION'](#) in this Chapter.

### PAPER:

For more information, see [subsection 5.5.2 'PAPER'](#) in this Chapter.

### QUALITY:

For more information, see [subsection 5.5.3 'QUALITY'](#) in this Chapter.

### SETUP:

For more information, see [subsection 5.5.4 'SET UP'](#) in this Chapter.

### PRINT MENU:

For more information, see [subsection 5.5.5 'PRINT MENU'](#) in this Chapter.

### NETWORK:

For more information, see [subsection 5.5.6 'NETWORK'](#) in this Chapter.

### INTERFACE:

For more information, see [subsection 5.5.7 'INTERFACE'](#) in this Chapter.

### RESET MENU:

For more information, see [subsection 5.5.8 'RESET MENU'](#) in this Chapter.

## 5.5.1 Information

Setting Menu	Description	
PRINT SETTINGS	Print the configuration page.	
PRINT TEST	Print the test page.	
PRINT DEMO	Print the demonstration.	
PRINT FILE LIST	Print the file list.	
PRINT FONTS	Print the font list and samples.	
	Sub-setting Menu	Description
VERSION	SER.NO=#####	Printer serial number
	ROM VER=####	ROM firmware version (only network users)
	ROM DATE ##/##/##	ROM date (only network users)
	NET VER=####	Network firmware version
	NET DATE ##/##/##	Network date
	RAM SIZE=###MB	The size of memory in this printer.
MAINTENANCE	PAGE COUNTER	=#####
	REMAIN DRUM	=#####
	REMAIN PF KIT1	=#####
	REMAIN PF KIT2	=#####
	REMAIN FUSER	=#####
	REMAIN LASER	=#####

## 5.5.2 Paper

Setting Menu	Description
SOURCE	=AUTO / MP TRAY / TRAY1 / TRAY2 *
TRAY PRIORITY	=MP>T1>T2 / T1>T2>MP
MP FIRST	=OFF / ON Feed paper from the MP tray first.
MP SIZE	=ANY / LETTER / LEGAL / A4 / ...
MANUAL FEED	=OFF / ON
TRAY1 SIZE	=ANY / LETTER / LEGAL / A4 / ...
TRAY2 SIZE	=ANY / LETTER / LEGAL / A4 / ...
DUPLEX	=OFF / ON (LONG BIND) / ON (SHORT BIND)

\* MP TRAY = Multi-purpose tray, TRAY1 = Upper paper tray, TRAY2 = Optional lower tray

5.5.3 Quality

Setting Menu	Description
RESOLUTION	=300 / 600 / HQ1200 You can choose a print resolution of 300, 600 or HQ1200.
HRC	=OFF / LIGHT / MEDIUM/DARK HRC: High Resolution Control offers improved print quality of characters and graphics that conventional laser printers cannot attain with a resolution of 300 or 600 dpi.
TONER SAVE	=OFF / ON
DENSITY	=-6:0:6 Increase or decrease the print density.

5.5.4 Setup

Setting Menu	Description	
LANGUAGE	=ENGLISH / FRANÇAIS / ...	
LCD DENSITY	=0 / 1 / 2	
POWER SAVE TIME	=1 to 99 MIN.	
AUTO CONTINUE	=OFF / ON	
LOCK PANEL	=OFF / ON Turn on / off lock panel function.	
	PASS NO.=###	
REPRINT	=ON / OFF	
PAGE PROTECTION	PROTECT = AUTO	AUTO, OFF, LETTER, A4 OR LEGAL
EMULATION	=AUTO (EPSON) / AUTO (IBM) / HP LASERJET / ...	
KEEP PCL	=OFF / ON	
RAMDISK SIZE	=0 / 1 / 2 ... MB	RESTART?
DELETE STORAGE	Delete the internal flash memory print data.	
	Sub-setting Menu	Description
	SECURE FILE	Select the user name, job name and password.
	DATA ID	=####
	MACRO ID	=####
	FONT ID	=####
	FORMAT	OK?

## 5.5.5 Print menu

Setting Menu	Description	
<b>MEDIA TYPE</b>	=PLAIN PAPER / TRANSPARENCIES / THIN PAPER / THICK PAPER / THICKER PAPER / BOND PAPER / ENVELOPES / ENV.THICK / ENV.THIN	
<b>PAPER</b>	Set cup sheet paper size to Letter, Legal, A4, A5, A6, B5, B6, Executive, COM10, Monarch, C5 and DL...	
<b>COPIES</b>	=1 to 999 Shows the number of printed pages.	
<b>ORIENTATION</b>	=PORTRAIT / LANDSCAPE This printer can print pages in portrait or landscape orientation.	
<b>PRINT POSITION</b>	This printer can be adjusted to correct the page format.	
	Sub-setting Menu	Description
	<b>X OFFSET=0</b>	Move the print start position (at the upper left corner of pages) horizontally up to -500 (left) to +500 (right) dots in 300 dpi units.
<b>Y OFFSET=0</b>	Move the print start position (at the upper left corner of pages) vertically up to -500 (up) to +500 (down) dots in 300 dpi units.	
<b>AUTO FF=OFF</b>	=OFF / 1:5:99 (sec) Allows you to print the remaining data without pressing the <b>Go</b> switch.	
<b>FF SURPRESS</b>	=OFF / ON Turn on / off the form feed suppress function.	
<b>HP LASERJET</b>	<b>FONT NO.</b>	=I0000:?????
	<b>FONT PITCH/POINT</b>	=????.??
	<b>SYMBOL/ CHARACTER SET</b>	PC-8 / ... Set the symbol set or the character set.
	<b>TABLE PRINT</b>	Print code table
	<b>AUTO LF=OFF</b>	=OFF / ON ON: CR→CR+LF, OFF: CR→CR
	<b>AUTO CR=OFF</b>	=OFF / ON ON: LF→LF+CR, FF+CR, OR VT→VT+CR OFF: OF→OF, FF→FF, OR VT→VT
	<b>AUTO WRAP=OFF</b>	=OFF / ON Line feed and carriage return occur when the printer reaches the right margin.
	2-33	

	<b>AUTO SKIP=ON</b>	=OFF / ON Line feed and carriage return occur when the printer position reaches the bottom margin.
--	---------------------	-------------------------------------------------------------------------------------------------------

Setting Menu	Description	
<b>HP LASERJET</b>	<b>LEFT MARGIN</b>	=#### Set the left margin at column 0 to 126 columns at 10 cpi.
	<b>RIGHT MARGIN</b>	=#### Set the right margin at column 10 to 136 columns at 10 cpi.
	<b>TOP MARGIN</b>	=#### Set the top margin at a distance from the top edge of the paper: 0, 0.33, 0.5, 1.0, 1.5 or 2.0" Factory setting=0.5
	<b>BOTTOM MARGIN</b>	=#### Set the bottom margin at a distance from the bottom edge of the paper: 0, 0.33, 0.5, 1.0, 1.5 or 2.0" Factory setting: 0.33 (None-HP), 0.5 (HP)
	<b>LINES</b>	=#### Set the number of lines per page from 5 to 128 lines.
<b>EPSON FX-850</b>	<b>FONT NO.</b>	=I0000:?????
	<b>FONT PITCH/ POINT</b>	=????.??
	<b>SYMBOL/ CHARACTER SET</b>	PC-8 / ... Set the symbol set or the character set.
	<b>TABLE PRINT</b>	Print code table.
	<b>AUTO LF=OFF</b>	=OFF / ON ON: CR→CR+LF OFF: CR→CR
	<b>AUTO MASK</b>	=OFF / ON
	<b>LEFT MARGIN</b>	=#### Set the left margin at column 0 to 126 columns at 10 cpi.
	<b>RIGHT MARARGIN</b>	=#### Set the right margin at column 10 to 136 columns at 10 cpi.
<b>TOP MARGIN</b>	=#### Set the top margin a distance from the top edge of the paper: 0, 0.33, 0.5, 1.0, 1.5 or 2.0" Factory setting=0.33	

<b>BOTTOM MARGIN</b>	=#### Set the bottom margin a distance from the top edge of the paper: 0, 0.33, 0.5, 1.0, 1.5 or 2.0" Factory setting=0.33
<b>LINES</b>	=#### Set the number of lines per page from 5 to 128 lines.

Setting Menu	Description	
IBM PROPRINTER	FONT NO.	=I0000:?????
	FONT PITCH/ POINT	=????.??
	SYMBOL/ CHARACTER SET	PC-8 / ... Set the symbol set or the character set.
	TABLE PRINT	Print code table.
	AUTO LF=OFF	=OFF / ON ON: CR→CR+LF OFF: CR→CR
	AUTO CR=OFF	=OFF / ON
	LEFT MARGIN	=#### Set the left margin at column 0 to 126 columns at 10 cpi.
	RIGHT MARARGIN	=#### Set the right margin at column 10 to 136 columns at 10 cpi.
	TOP MARGIN	=#### Set the top margin a distance from the top edge of the paper: 0, 0.33, 0.5, 1.0, 1.5 or 2.0" Factory setting=0.33
	BOTTOM MARGIN	=#### Set the bottom margin a distance from the top edge of the paper: 0, 0.33, 0.5, 1.0, 1.5 or 2.0" Factory setting=0.33
LINES	=#### Set the number of lines per page from 5 to 128 lines.	
BR-SCRIPT	ERROR PRINT	=OFF / ON
	APT	=OFF / ON APT: Advanced Photoscale Technology offers photographic fine grayscale on graphics. APT setting is available only at 600 dpi.

## 5.5.6 Network

Setting Menu	Description	
TCP/IP	<b>Sub-setting Menu</b>	<b>Description</b>
	TCP/IP ENABLE	=ON / OFF
	IP ADDRESS=	###, ###, ###, ###
	SUBNET MASK=	###, ###, ###, ###
	GATEWAY=	###, ###, ###, ###
	IP BOOT TRIES	=#
	IP METHOD	=AUTO / STATIC / RARP / BOOTP / DHCP
NETWARE	NETWARE ENABLE	=ON / OFF
	NET FRAME	=AUTO / 8023 / ENET / 8022 / SNAP
APPLETALK	=ON / OFF	
NETBEUI	=ON / OFF	
DLC/LLC	=ON / OFF	
BANYAN	=ON / OFF	
LAT	=ON / OFF	
NETBIOS/IP	=ON / OFF	
ENET	=ATUO / 100B-FD / 100B-HD / 10B-FD / 10B-HD	

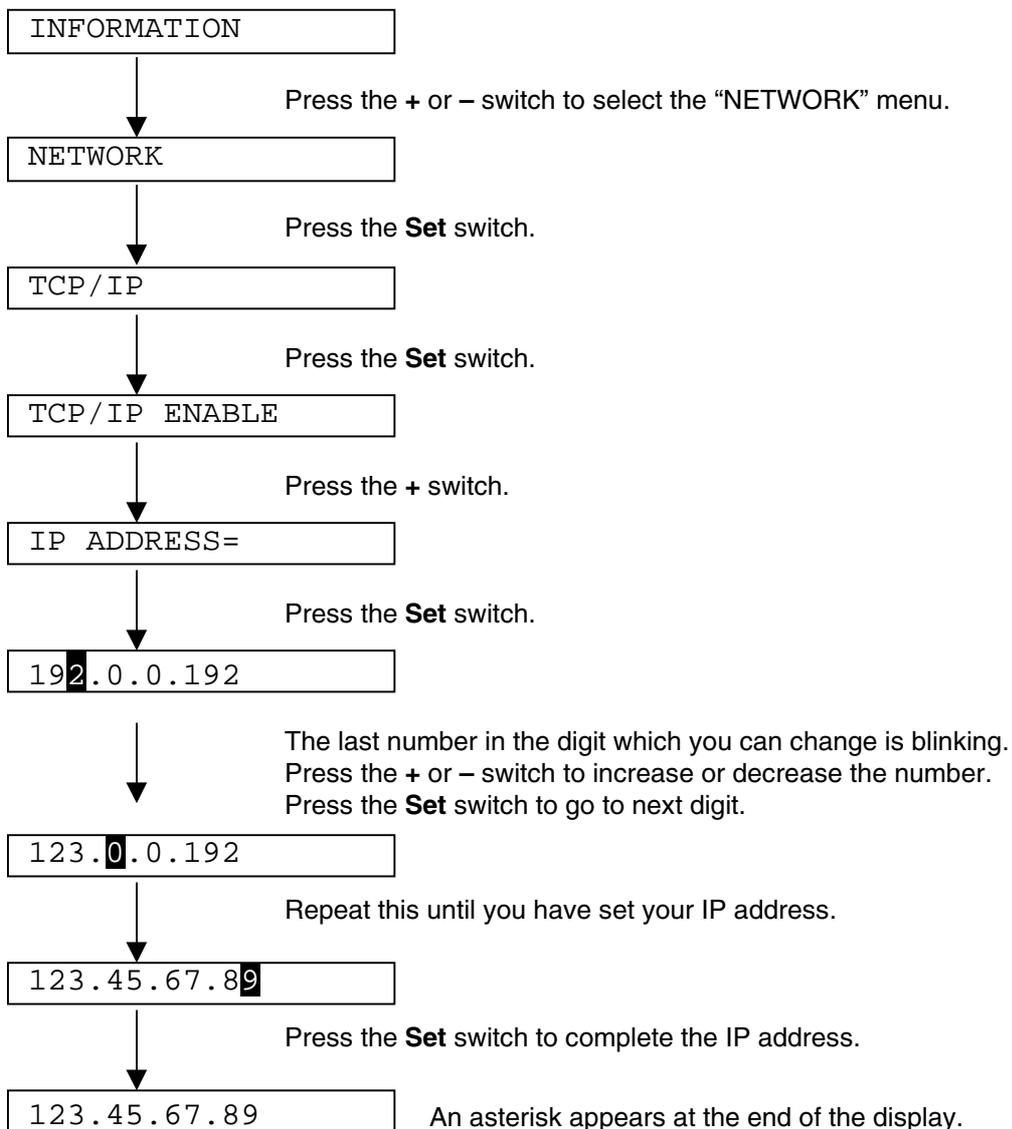
## 5.5.7 Interface

Setting Menu	Description	
AUTO IF TIME	= 1:5:99 (SEC) You must set the timeout period for the auto interface selection.	
INPUT BUFFER	= Level 1:5:15 Increase or decrease the input buffer capacity.	RESTART PRINTER?
PARALLEL	When using the parallel interface	
	<b>Sub-setting Menu</b>	<b>Description</b>
	HIGH SPEED	=ON / OFF Turns the high speed parallel communications ON / OFF.
	BI-DIR=ON/OFF	=ON / OFF Turns the bi-directional parallel communications ON / OFF.

5.5.8 Reset menu

Setting Menu	Description
RESET PRINTER	Resets the printer and restores all printer settings – including command settings – to settings you have previously made with the control panel switches.
FACTORY RESET	Resets the printer and restores all printer settings – including command settings – to the factory settings. See <a href="#">subsection 5.5.11 'List of factory settings' in this Chapter</a> .

5.5.9 Set IP address



### 5.5.10 About emulation modes

This printer has the following emulation modes.

#### HP LaserJet Mode

The HP LaserJet mode (or HP mode) is the emulation mode in which this printer emulates the Hewlett-Packard LaserJet laser printer. Many software applications support this type of laser printer. Using this mode will allow your printer to operate at its optimum performance with those applications.

#### BR-Script 3 Mode

BR-Script is an original page description language and a PostScript language emulation interpreter. This printer supports level 3. The BR-Script interpreter of this printer enables full and satisfactory control of text and graphics on pages.

See the following commercial manuals for more technical information about PostScript commands.

- Adobe Systems Incorporated. PostScript Language Reference Manual, 2nd Edition. Menlo Park: Addison-Wesley Publishing Company, Inc., 1990.
- Adobe Systems Incorporated. PostScript Language Program Design. Menlo Park: Addison-Wesley Publishing Company, Inc., 1988.
- Adobe Systems Incorporated. PostScript Language Reference Manual. Menlo Park: Addison-Wesley Publishing Company, Inc., 1985.
- Adobe Systems Incorporated. PostScript Language Tutorial and Cookbook. Menlo Park: Addison-Wesley Publishing Company, Inc., 1985.
- Adobe Systems Incorporated. PostScript Language Reference Manual, third Edition. Addison-Wesley Longman, Inc., 1999.

#### EPSON FX-850 and IBM Proprinter XL Mode

The EPSON FX-850 and IBM Proprinter XL modes are the emulation modes that this printer emulates to meet the industry-standard for dot matrix printers of their respective manufactures. Some applications support these dot matrix printer emulations. Use these emulation modes for optimum performance when printing from those types of applications.

### 5.5.11 List of factory settings

The following table shows the initial factory default settings.

#### NOTE:

- *The settings are subject to the emulation mode. Effective modes are indicated in parentheses in the following table.*
- *The following settings cannot be restored to the factory settings with the RESET menu in the "FACTORY SETTINGS" mode: INTERFACE MODE, HRC SETTING, PAGE PROTECTION, SCALABLE FONT, LOCK PANEL, PAGE COUNTER and local language for display messages.*
- *The COPY setting is always restored to the factory setting when the printer is turned off and on again.*
- *It is not possible to reset NETWORK setting on the Control panel. If you wish to reset the print server back to its default factory settings (resetting all information such as the*

password and IP address information) hold down the Network Test Button of the Network board (NC-4100h) for more than 5 seconds.

Mode	Menu	Factory Setting
PAPER	SOURCE	=AUTO
	TRAY PRIORITY	=MP>T1>T2
	MP FIRST	=OFF
	MP SIZE	=A4 / LTR
	MANUAL FEED	=OFF
	TRAY1 SIZE	=ANY
	TRAY2 SIZE	=ANY
	DUPLEX	=OFF
QUALITY	RESOLUTION	=600
	HRC	=MEDIUM
	TONER SAVE	=OFF
	DENSITY	=0
SETUP	LANGUAGE	=ENGLISH
	LCD DENSITY	=0
	POWER SAVE TIME	=5 MIN
	AUTO CONTINUE	=OFF
	LOCK PANEL	=OFF
	REPRINT	=ON
	EMULATION	=AUTO (EPSON)
	KEEP PCL	=OFF
PRINT MENU	MEDIA TYPE	=PLAIN PAPER
	PAPER	=A4 / LETTER
	COPIES	=1
	ORIENTATION	=PORTRAIT
	PRINT POSITION	X OFFSET=0 Y OFFSET=0
	AUTO FF TIME	=5
	FF SUPPRESS	=OFF

Mode	Menu	Factory Setting
PRINT MENU	HP LASER JET	FONT NO.=59
		FONT PITCH / POINT=10.00 / 12.00
		SYMBOL / CHARACTER SET=PC8
		AUTO LF=OFF
		AUTO CR=OFF
		AUTO WRAP=OFF
		AUTO SKI=ON
		LEFT MARGIN=####
		RIGHT MARGIN=####
		TOP MARGIN=####
		BOTTOM MARGIN=####
	LINES=####	
	EPSON FX-850	FONT NO.=59
		FONT PITCH / POINT=10.00 / 12.00
		SYMBOL / CHARACTER SET =US ASCII
		AUTO LF=OFF
		AUTO MASK=OFF
		LEFT MARGIN=####
		RIGHT MARGIN=####
		TOP MARGIN=####
		BOTTOM MARGIN=####
		LINES=####
		IBM PROPRINTER
	FONT PITCH / POINT=10.00 / 12.00	
	SYMBOL / CHARACTER SET =PC8	
	AUTO LF=OFF	
	AUTO CR=OFF	
	LEFT MARGIN=####	
	RIGHT MARGIN=####	
	TOP MARGIN=####	
	BOTTOM MARGIN=####	
	LINES=####	
	BR-SCRIPT	
APT=OFF		

<b>Mode</b>	<b>Menu</b>	<b>Factory Setting</b>
<b>NETWORK</b>	<b>TCP/IP</b>	TCP/IP ENABLE=ON
		IP METHOD=AUTO
		IP ADDRESS=192.0.0.192
		SUBNET MASK=0.0.0.0
		GATEWAY=0.0.0.0
		IP BOOT TRIES=3
		IP METHOD=AUTO
	<b>NETWARE</b>	NETWARE ENABLE=ON
		NEE FRAME=AUTO
	<b>APPLETALK</b>	=ON
	<b>NETBEUI</b>	=ON
	<b>DLC/LLC</b>	=ON
	<b>BANYAN</b>	=ON
	<b>LAT</b>	=ON
	<b>NETBIOS/IP</b>	=ON
<b>ENET</b>	=AUTO	

## 5.6 Other Control Features

The printer has the following useful features;

### 5.6.1 Sleep mode

When the printer does not receive data for a certain period of time (timeout), it enters sleep mode. The default timeout is 5 minutes and it is automatically adjusted to the most suitable time-out setting depending on the frequency of your printer use (Intelligent Sleep Mode).

While the printer is in sleep mode, the data LED and the LCD back light are off and it is as if they were turned off, but the printer can still receive data from the computer. Receiving a print file or document automatically wakes up the printer to start printing. Pressing any switch on the control panel also wakes up the printer.

#### NOTE:

- *When the printer goes into sleep mode, the fan will not stop until the printer engine has cooled down. The fan running time varies depending on the sleep mode timeout because the fan running conditions are defined as follows;*
  - 1) *The fan runs for 10 minutes whenever printing finishes.*
  - 2) *The fan runs while the printer is in ready status.*
  - 3) *The fan runs for at least 5 minutes after the printer goes into sleep mode.*

*(EX: If the timeout is 5 minutes, the fan will be running for 5 minutes after the printer goes into sleep mode.)*
- *Sleep mode allows the print engine to cool, so the temperature of the room and how long the printer has been in sleep mode affects the warm-up time. This warm-up time can take up to 45 seconds. The LCD back light turns green with the “WARMING UP” message on the display to indicate that the printer is warming up.*

### 5.6.2 Inspection mode

The printer incorporates various inspection modes. The printer enters into each inspection mode by panel switch operation.

For details on inspection mode, see [section 9. 'INSPECTION MODE' in CHAPTER 6](#).

## NETWORK BOARD OPERATION

Installing the network board enables you to use the printer in the TCP/IP, IPX/SPX, AppleTalk, DLC/LLC, Banyan VINES, DEC LAT and NetBEUI environments. Also, useful utilities such as BR-Admin32 and network printing software for the administrator are included. For more information about set up, see [section 3. 'INSTALL THE PRINTER' in this Chapter](#).

### 6.1 Installing the Network Board

- (1) Turn off the printer power, and then unplug the power cord. Disconnect the interface cable (printer cable) from the printer.
- (2) Open the interface cover.

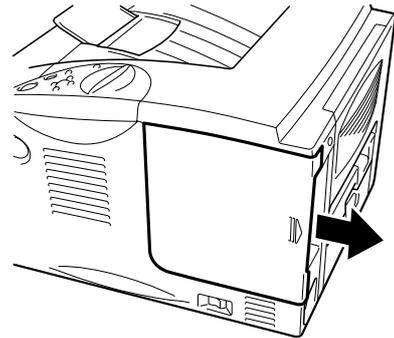


Fig. 2-30

- (3) Unscrew the two screws that secure the PCB access plate. Remove the plate.

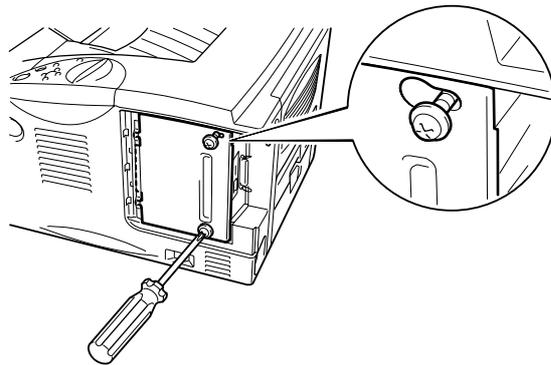


Fig. 2-31

- (4) Remove the two screws securing the network board cover plate and remove the plate.
- (5) Unpack the network board.

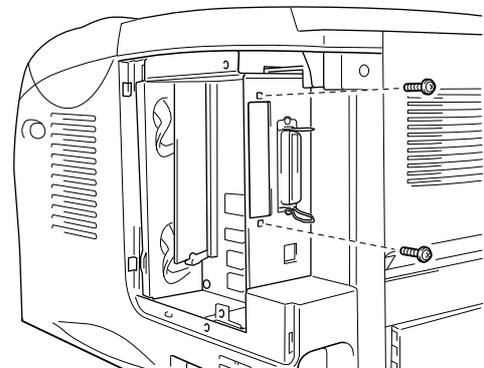


Fig. 2-32

- (6) Insert the network board connector into the PCB connector, and then secure it with the two screws removed in (4).

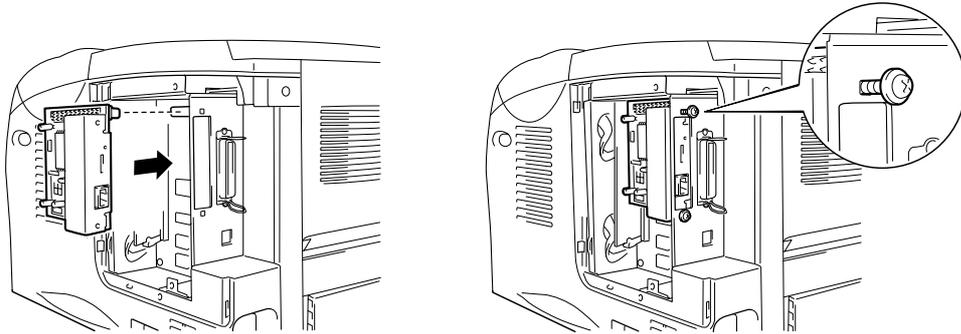


Fig. 2-33

- (7) Re-install the PCB access plate, and then secure it with the two screws removed in (3).
- (8) Close the interface cover.
- (9) Plug the power cord into the AC outlet, and then turn on the power switch.

**Print configuration page**

Press the network test button for less than 5 seconds to print a configuration page.

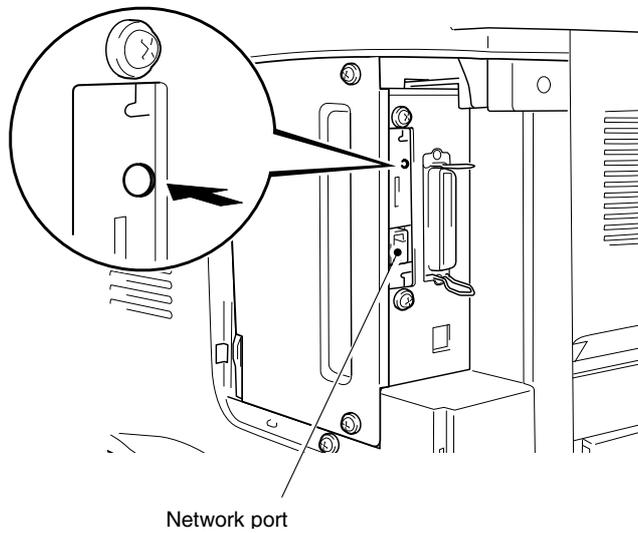


Fig. 2-34

## 6.2 Functions

### 6.2.1 LED functions

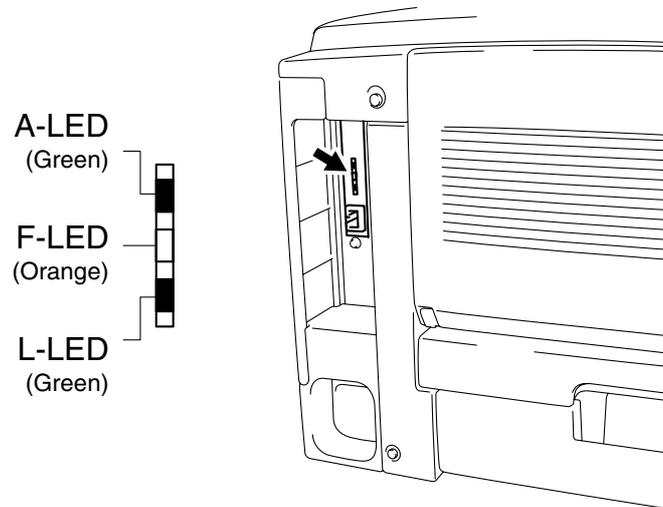


Fig. 2-35

#### **L-LED (Green): Link activity**

This LED is on if there is a valid connection to the network (either 10BaseT or 100BaseTX). It is off if no network is detected.

#### **F-LED (Orange): Fast Ethernet**

This LED will be on if the print server is connected to a 100BaseTX Fast Ethernet network. It is off if the print server is connected to a 10BaseT network.

#### **A-LED (Green): Transmission activity**

This LED will blink as the print server receives or transmits data.

### 6.2.2 Factory default setting

If you wish to reset the print server back to its default factory settings (resetting all information such as the password and IP address information), hold down the Network Test button for more than 5 seconds.



# CHAPTER 3 THEORY OF OPERATION

## 1. ELECTRONICS

### 1.1 General Block Diagram

- HL-1850**
- HL-1870N**

Fig. 3-1 shows a general block diagram of the HL-1850 and the HL-1870N printers.

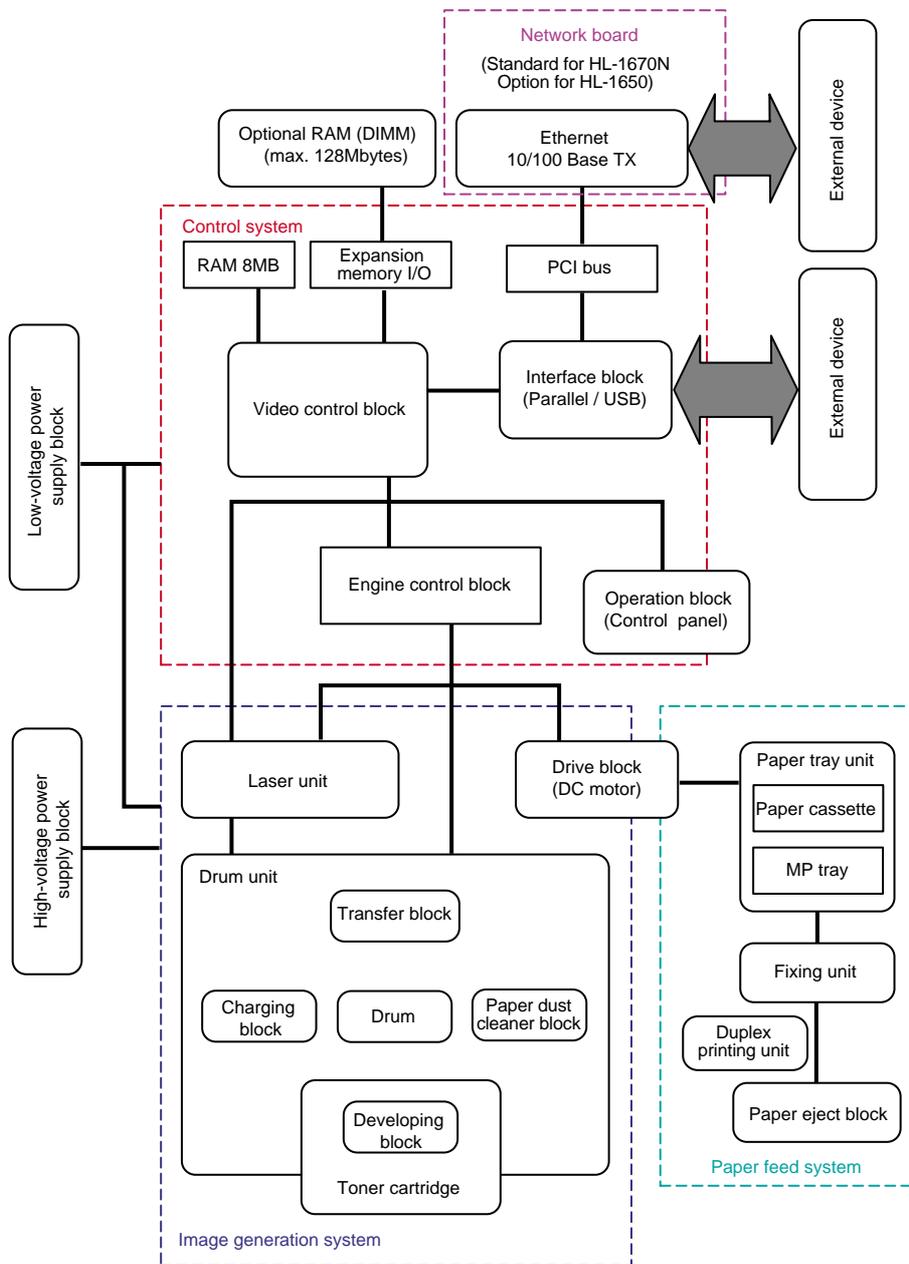


Fig. 3-1

### 1.2 Main PCB Block Diagram

- HL-1850
- HL-1870N

Fig. 3-2 shows the block diagram of the main PCB of the HL-1850 and the HL-1870N printers.

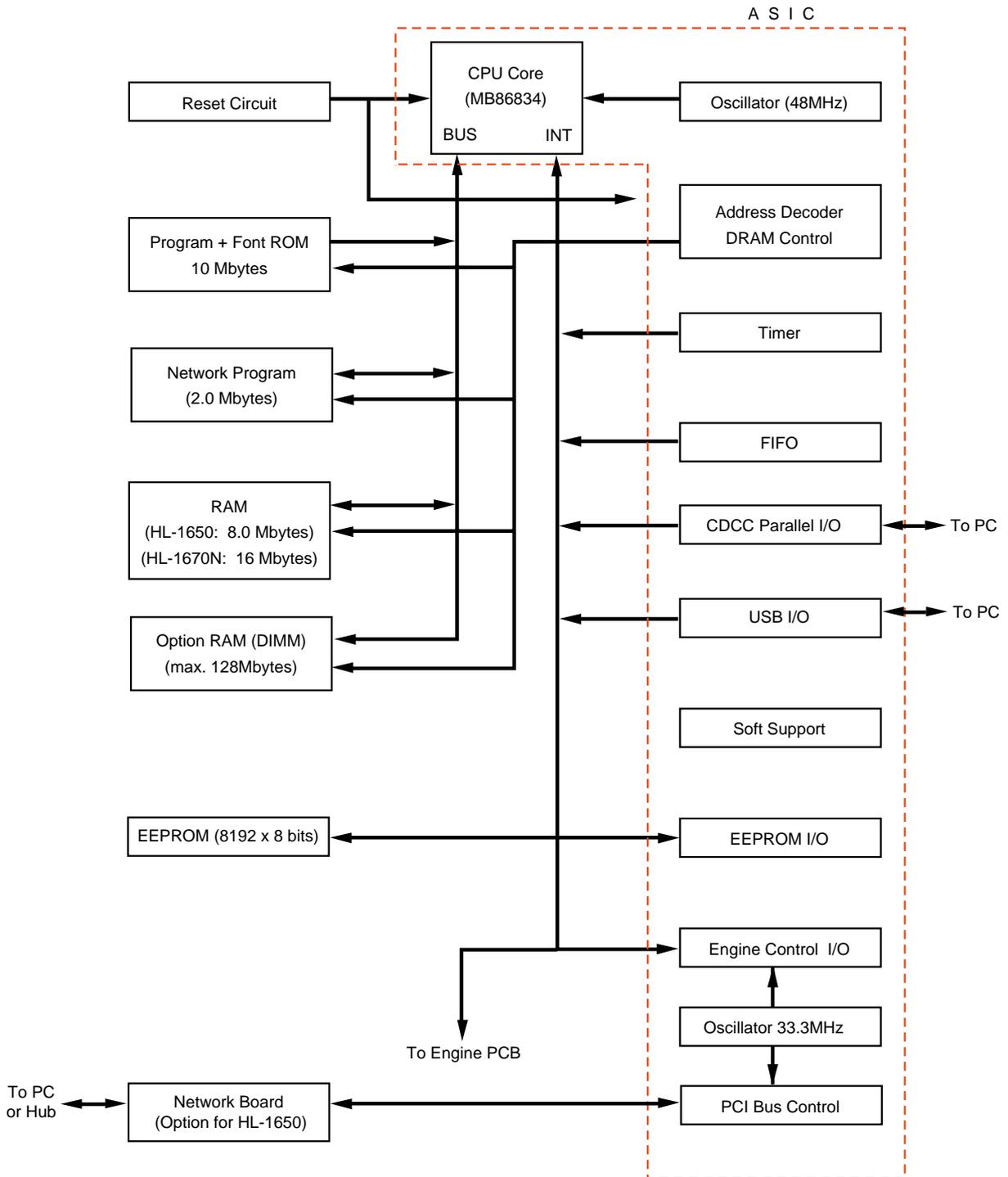


Fig. 3-2

### 1.3 Main PCB

For the entire circuit diagram of the main PCB, see **APPENDIX 2. to 7. 'MAIN PCB CIRCUIT DIAGRAM, HL-1850/1870N** in this manual.

#### 1.3.1 ASIC

HL-1850

HL-1870N

A Fujitsu 32bit RISC CPU, MB86834 (SPARC lite) is built in the ASIC. While the CPU is driven with a clock frequency of 48 MHz in the user logic block, it itself runs at 96 MHz, which is generated by multiplying the source clock by two.

The functions of the interface block communication with external devices are described below;

##### (1) IEEE1284

Stores the data received from the PC into DRAM as controlled by the DMA controller. It is applicable to both normal receiving and bi-directional communication (nibble mode, byte mode, ECP mode).

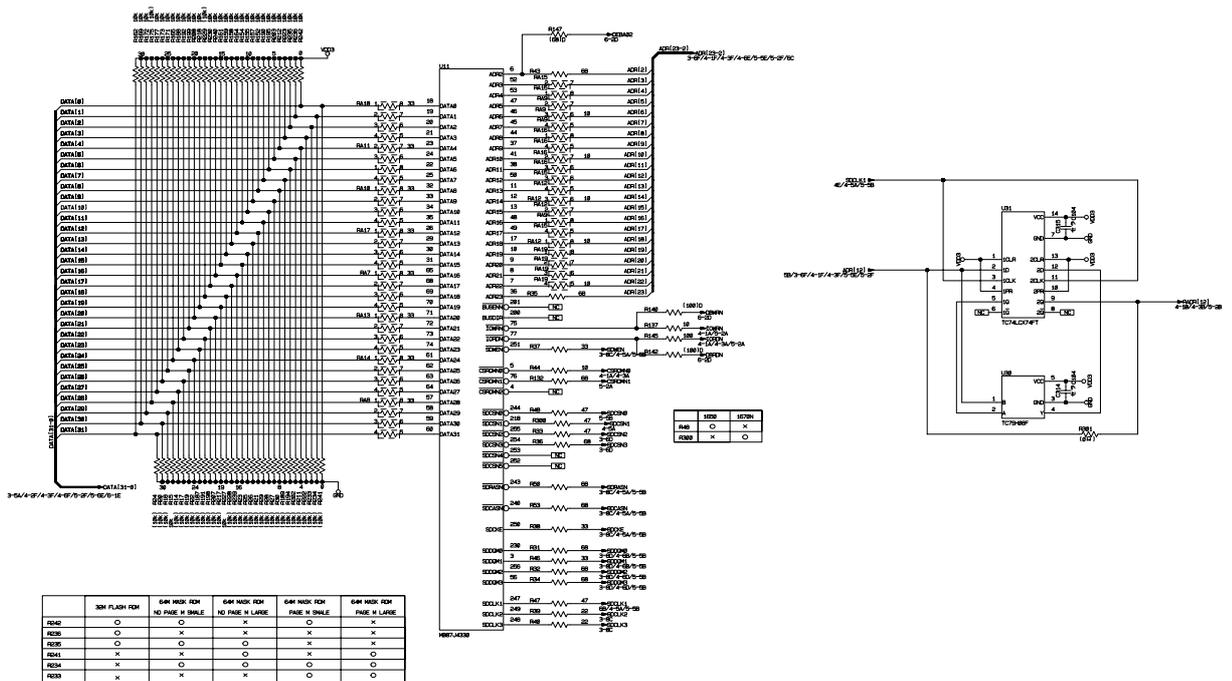


Fig. 3-3

(2) USB interface

Stores the data received from the PC into DRAM as controlled by the DMA controller. The transmission speed is 12Mbps.

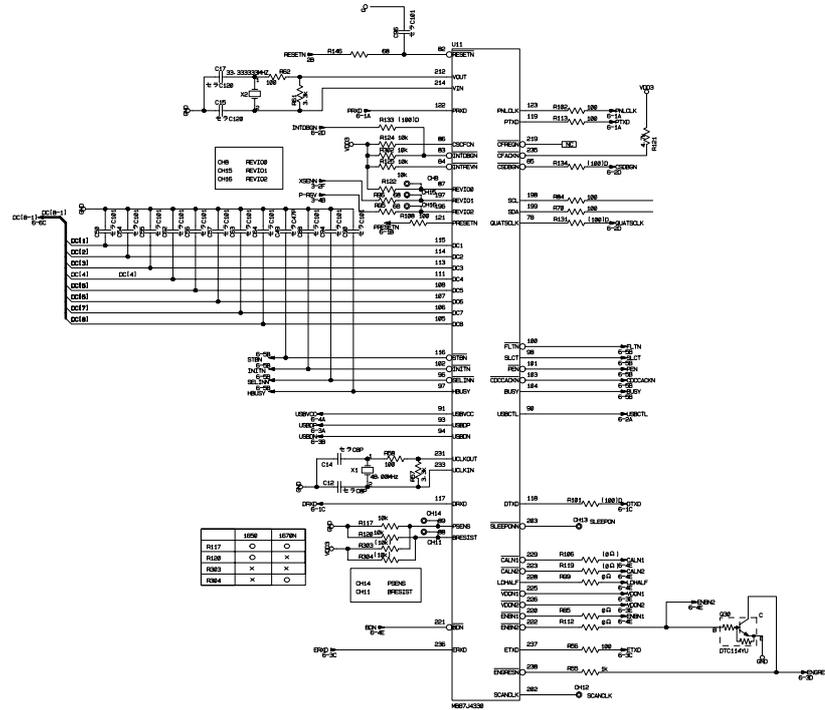
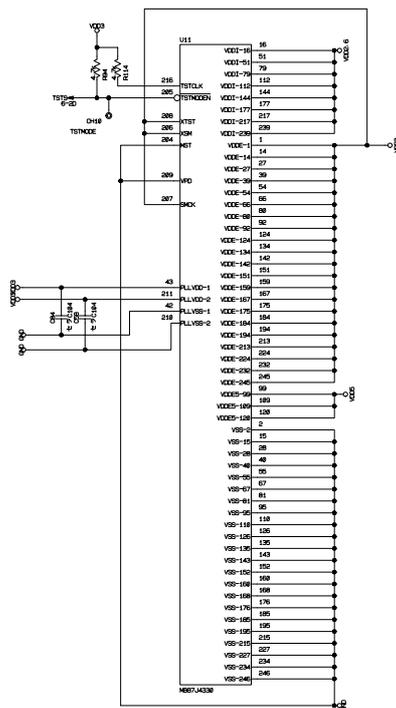


Fig. 3-4

(3) Engine GA transfer circuit

Communicates with the engine GA by a full-duplex synchronous serial method. The communication speed is 520Kbps.



**Fig. 3-5**

1.3.2 ROM

HL-1850

HL-1870N

Two 64 Mbits ROMs (x 16 bit) are fitted.

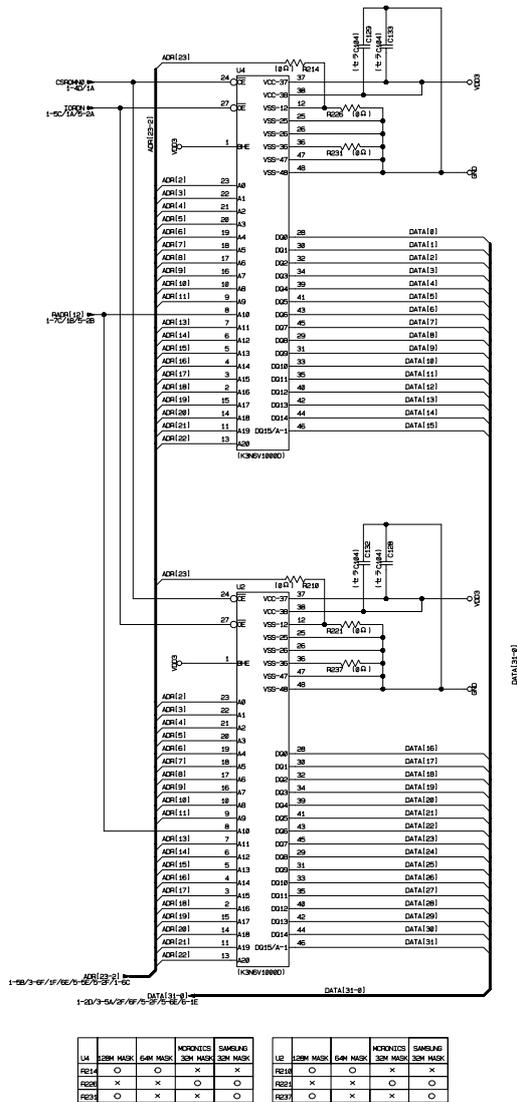
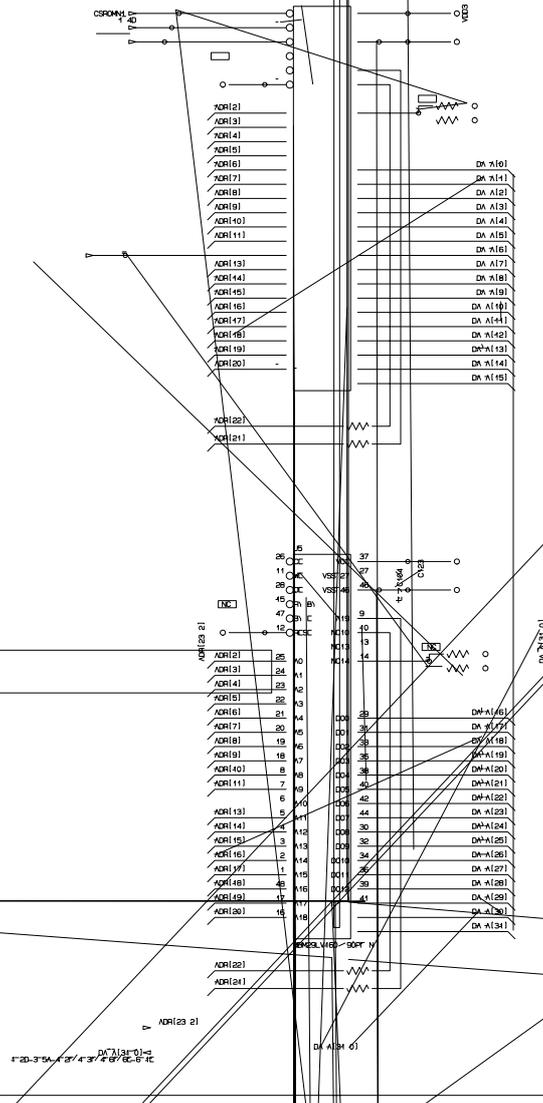


Fig. 3-6

### 1.3.3 Flash ROM



Two 8 Mbits flash ROMs (x 16 bit) are fitted.



1.3.4 SDRAM

**HL-1850**

A 64M-bit SDRAM (x 32 bits) is used as the RAM.

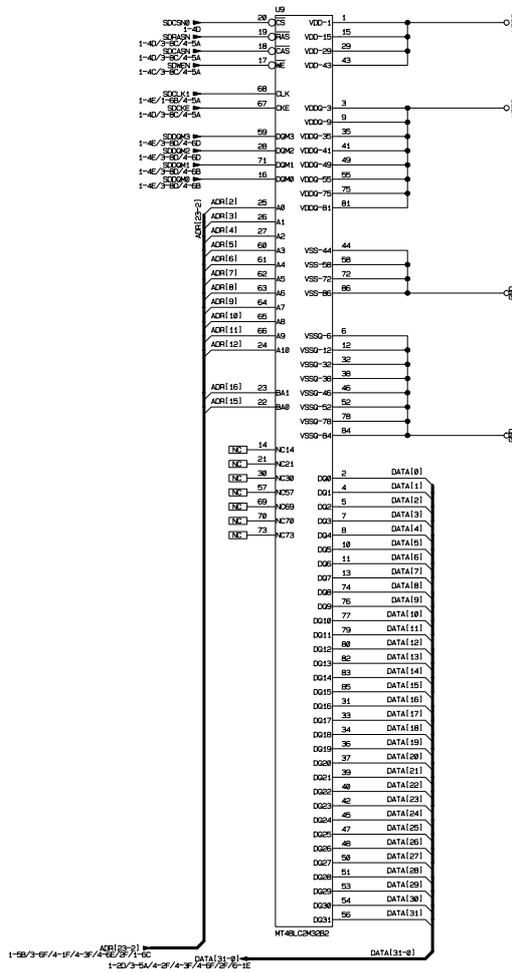
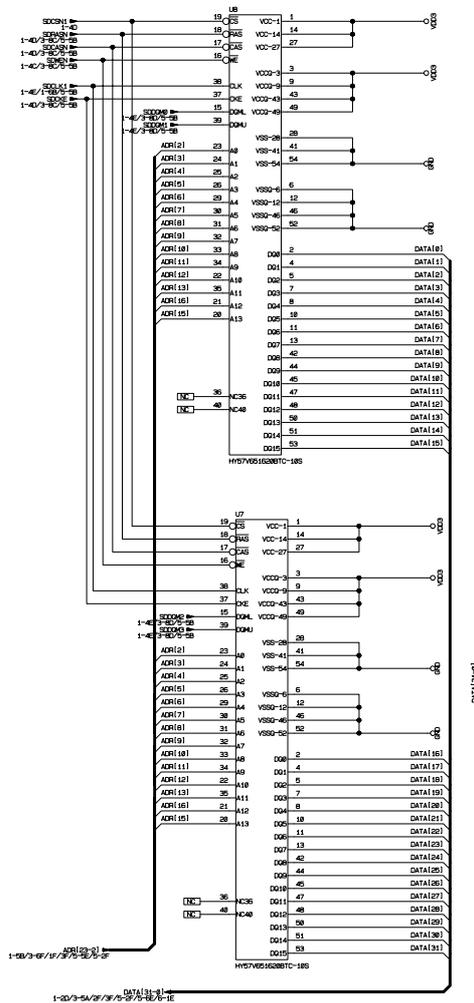


Fig. 3-8

**HL-1870N**

Two 64M-bit SDRAMs (x 16 bits) are used as the RAM.

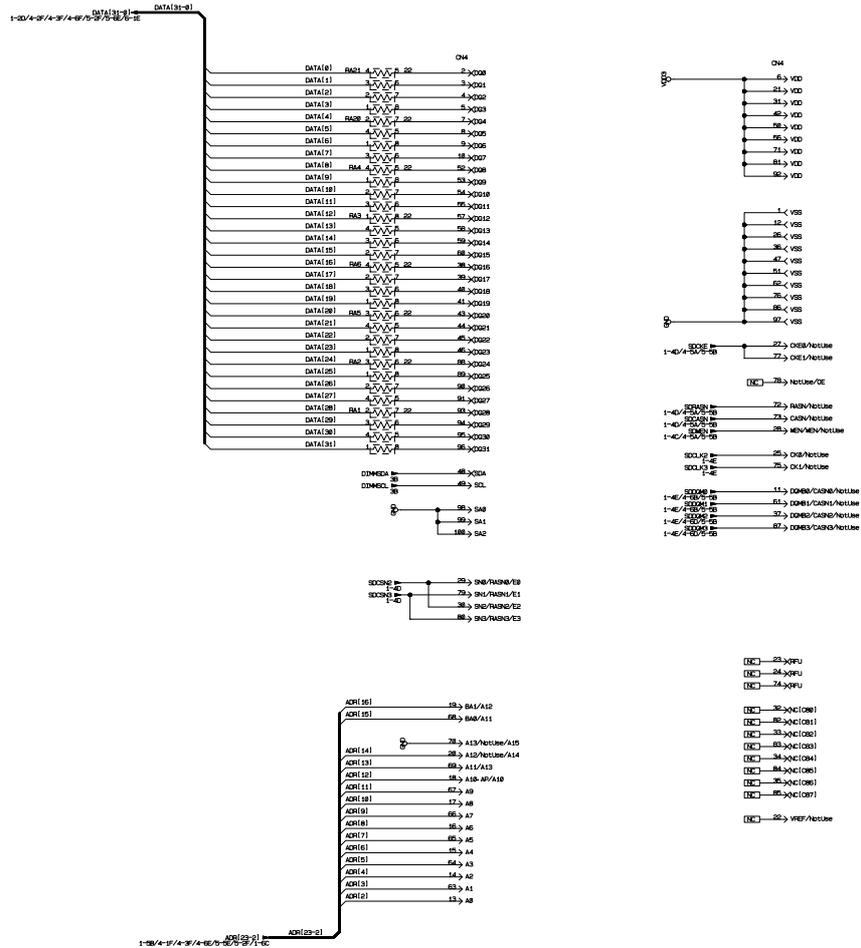


1.3.5 Optional RAM

HL-1850

HL-1870N

A 32bit (100 pin) DIMM can be fitted as optional RAM. The main PCB has one slot and the capacity of DIMM can be from 16 Mbyte to 128 Mbytes.



1.3.6 PCI bus

HL-1850

HL-1870N

The interface of the PCI bus is PCI specification revision 2.2 compliant.

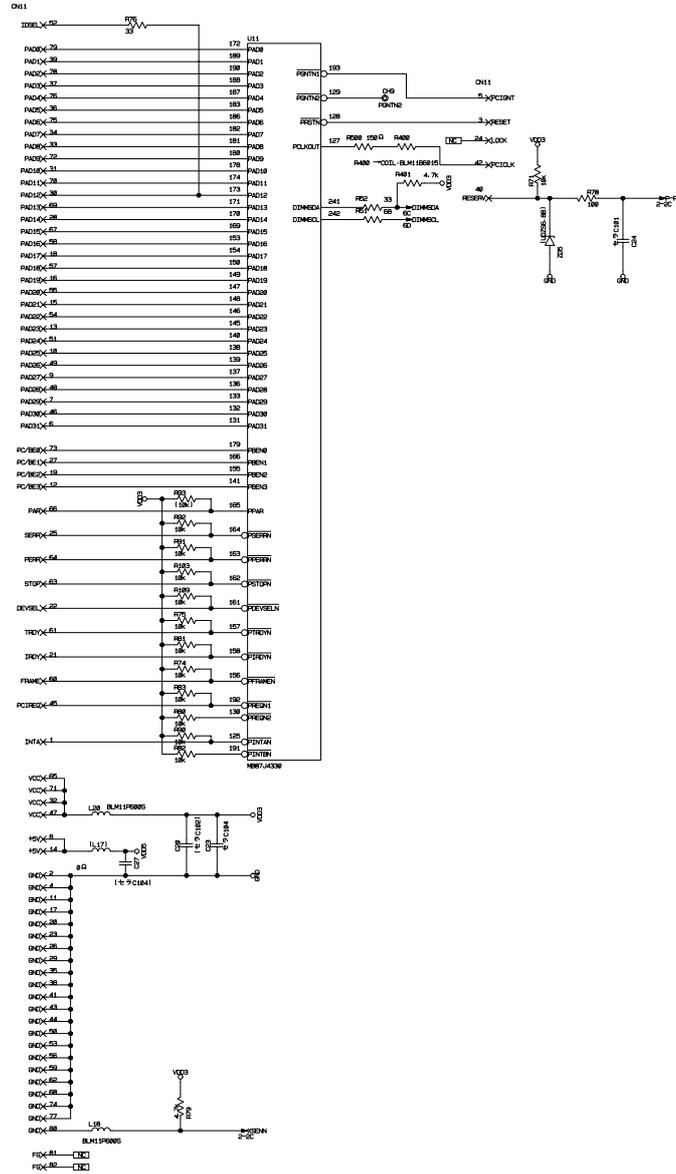


Fig. 3-11

1.3.7 EEPROM

HL-1850

HL-1870N

The EEPROM is M24C64 type of two-wire method with a 8192 x 8 bits configuration.

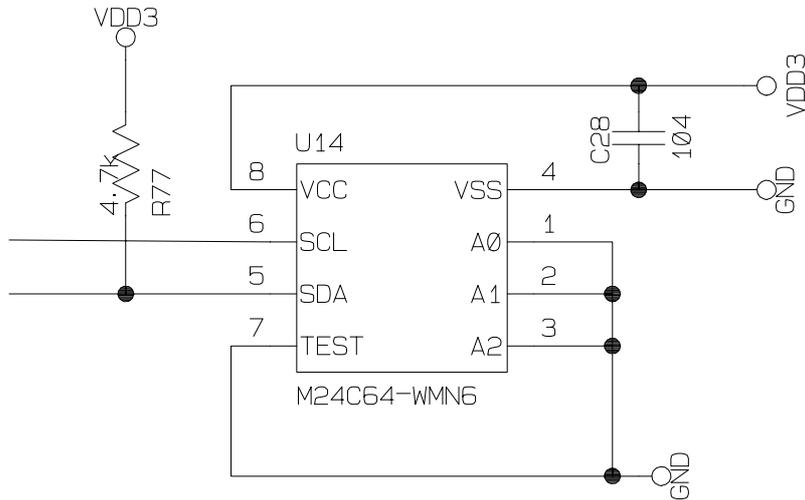


Fig. 3-12

1.3.8 Reset circuit

HL-1850

HL-1870N

The reset IC is a S-80928ANMP. The reset voltage is 2.7V (typ.) and the LOW period of reset is 260ms (typ.)

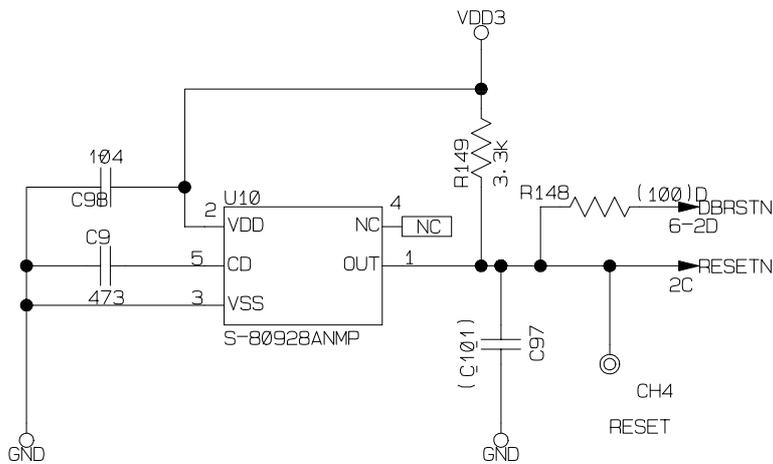


Fig. 3-13

1.3.9 Engine I/O

HL-1850

HL-1870N

Fig. 3-19 shows the engine interface circuit. The interface with the engine PCB is by full-duplex synchronous serial method.

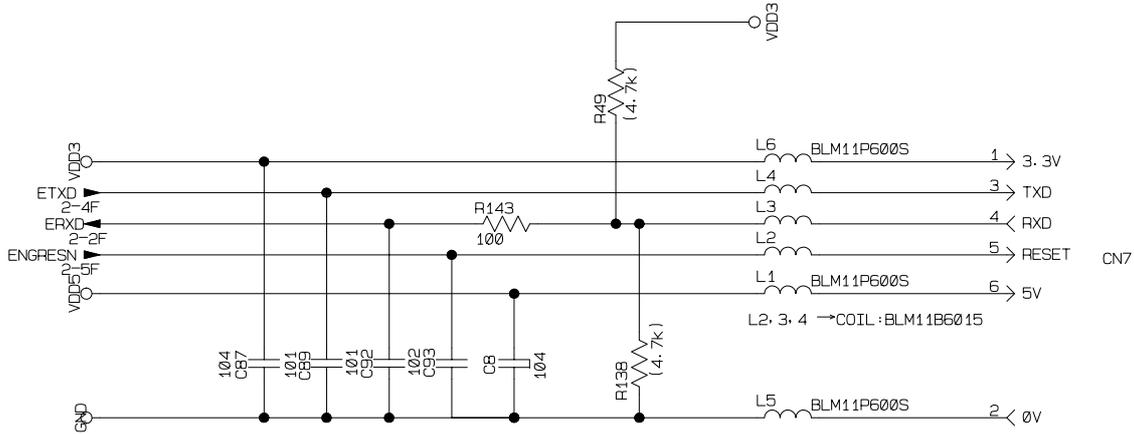


Fig. 3-14

1.3.10 Panel I/O

HL-1850

HL-1870N

Fig. 3-15 shows the panel interface circuit. The interface with the panel PCB is by full-duplex synchronous serial method.

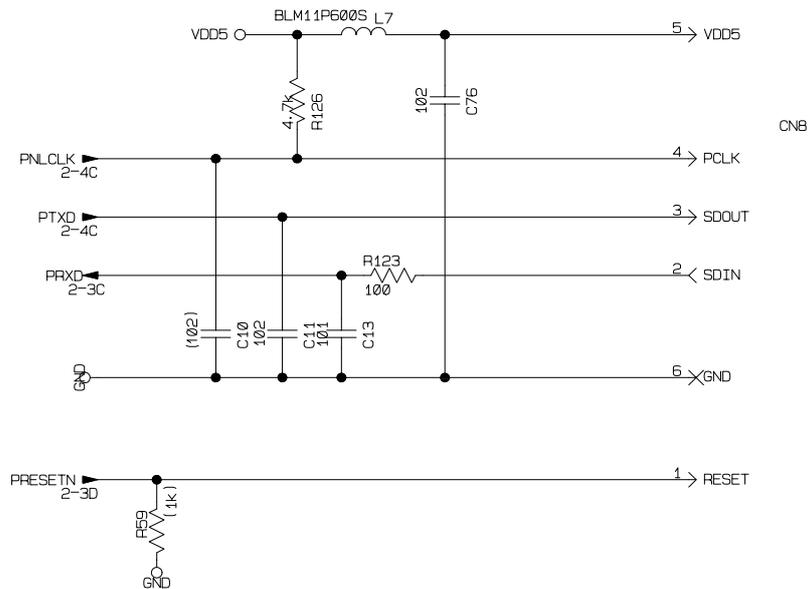


Fig. 3-15

## 1.4 Engine PCB

The gate array which transforms the serial signal from the main PCB into the parallel signal is mounted on the engine PCB.

The engine PCB controls the following parts by using the transferred signal data;

- Main motor
- Fan motor
- Thermistor
- Polygon motor
- Solenoid
- High-voltage power supply
- Toner sensor
- Cover sensor
- Front registration sensor
- Rear registration sensor
- Upper cassette sensor
- Lower cassette sensor
- Upper paper exit sensor
- Lower paper exit sensor
- Duplex tray sensor
- Duplex lever sensor
- Duplex cover sensor
- Lower cassette exit sensor
- Paper eject sensor
- Fixing unit cover sensor
- Multi-purpose tray paper exit sensor

For the circuit diagram of the engine PCB, see [APPENDIX 8. and 9. 'ENGINE PCB CIRCUIT DIAGRAM, HL-1850/1870N'](#) in this manual.

## 1.5 BR-net PCB

The BR-net PCB is connected to the ASIC mounted on the main PCB through the PCI bus.

The Ethernet controller, AM79C973AKC is mounted on the BR-net PCB. The controller incorporates the 10/100 Mbps physical interface which conforms to IEEE 802.3 and is connected with the external Ethernet through the RJ-45 connector.

For the circuit diagram of the BR-net PCB, see [APPENDIX 10. 'NETWORK BOARD PCB CIRCUIT DIAGRAM, HL-1850/1870N'](#) in this manual.

## 1.6 Power Supply

### 1.6.1 Low-voltage power supply

The power supply uses a switching regulation system to generate the regulated DC power (+3.3V, +7V [non regulated] and +24V), which are converted from the AC line.

The regulated output and the production code of each power supply are listed below;

Regulated Output	Production Code
+3.3V / 1.0A	100V: MPW1860
+7V / 0.7A	200V: MPW1760
+24V / 3.0A	

For the circuit diagram of the low-voltage power supply PCB, see [APPENDIX 11. or 12. 'LOW-VOLTAGE POWER SUPPLY PCB CIRCUIT DIAGRAM'](#) in this manual.

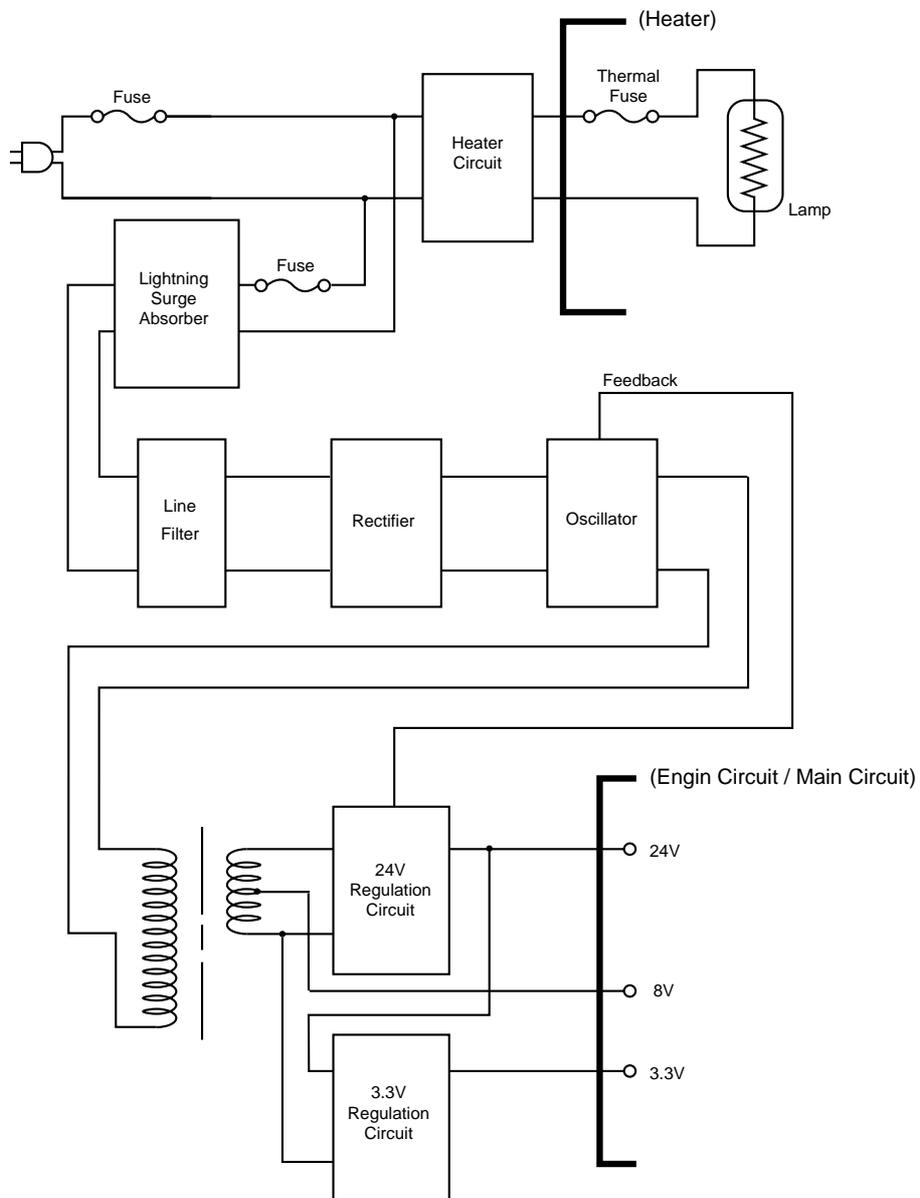


Fig. 3-16

### 1.6.2 High-voltage power supply

The high-voltage power supply generates and outputs the voltages and currents for the charging, development and transfer functions.

For the circuit diagram of the high-voltage power supply PCB, see **APPENDIX 13. 'HIGH-VOLTAGE POWER SUPPLY PCB CIRCUIT DIAGRAM'** in this manual.

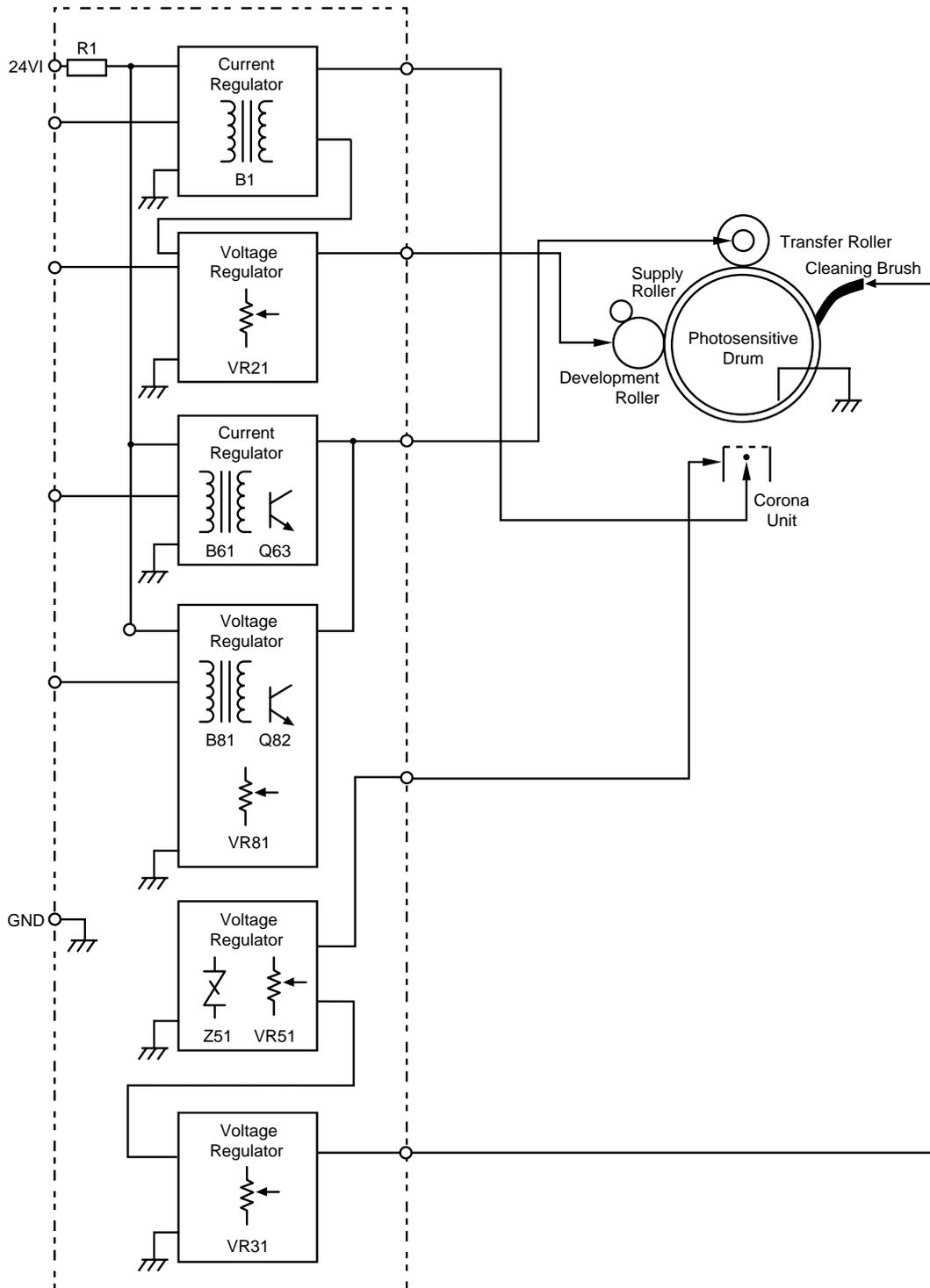


Fig. 3-17

## 2. MECHANICS

### 2.1 Overview of Printing Mechanism

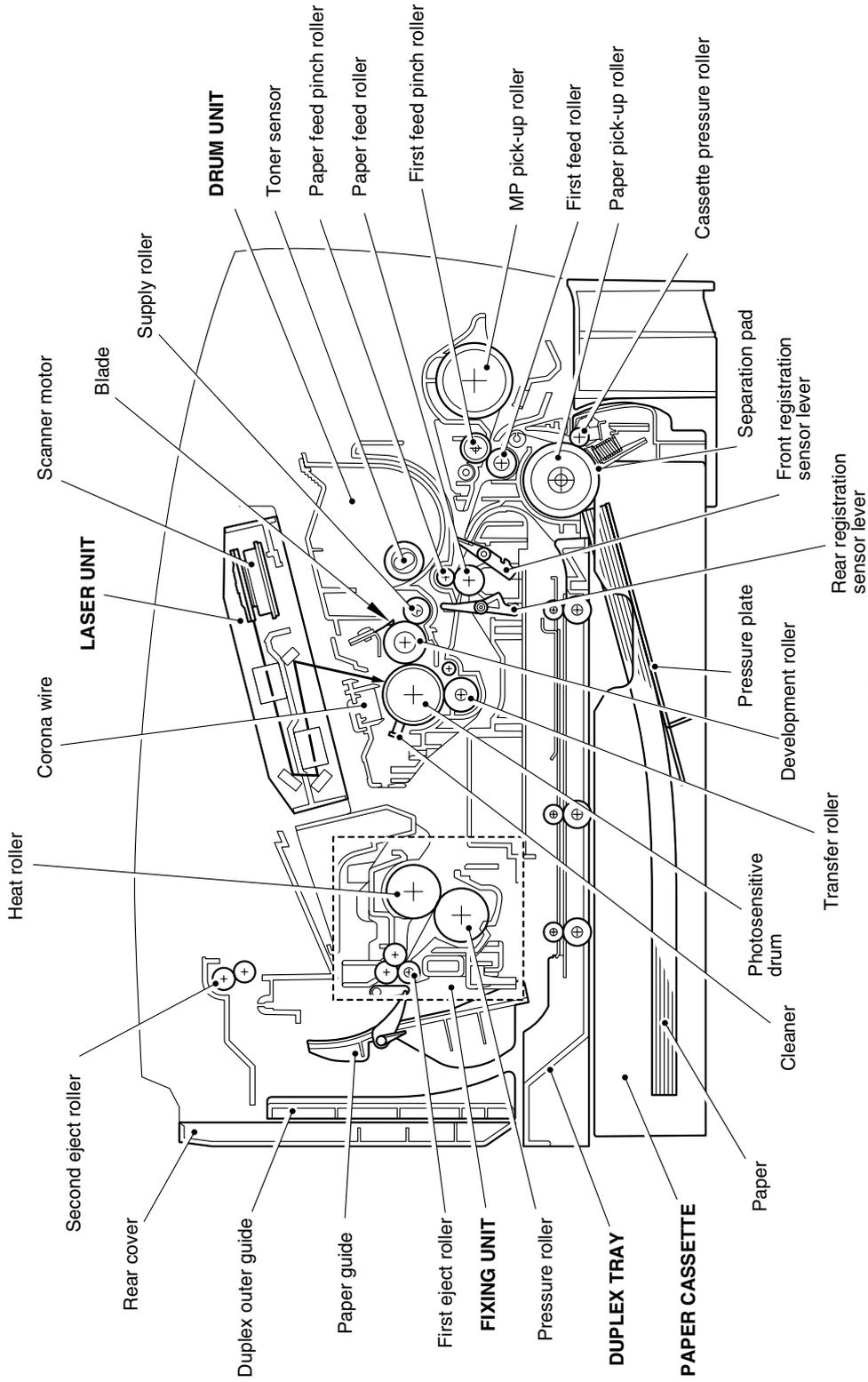


Fig. 3-18

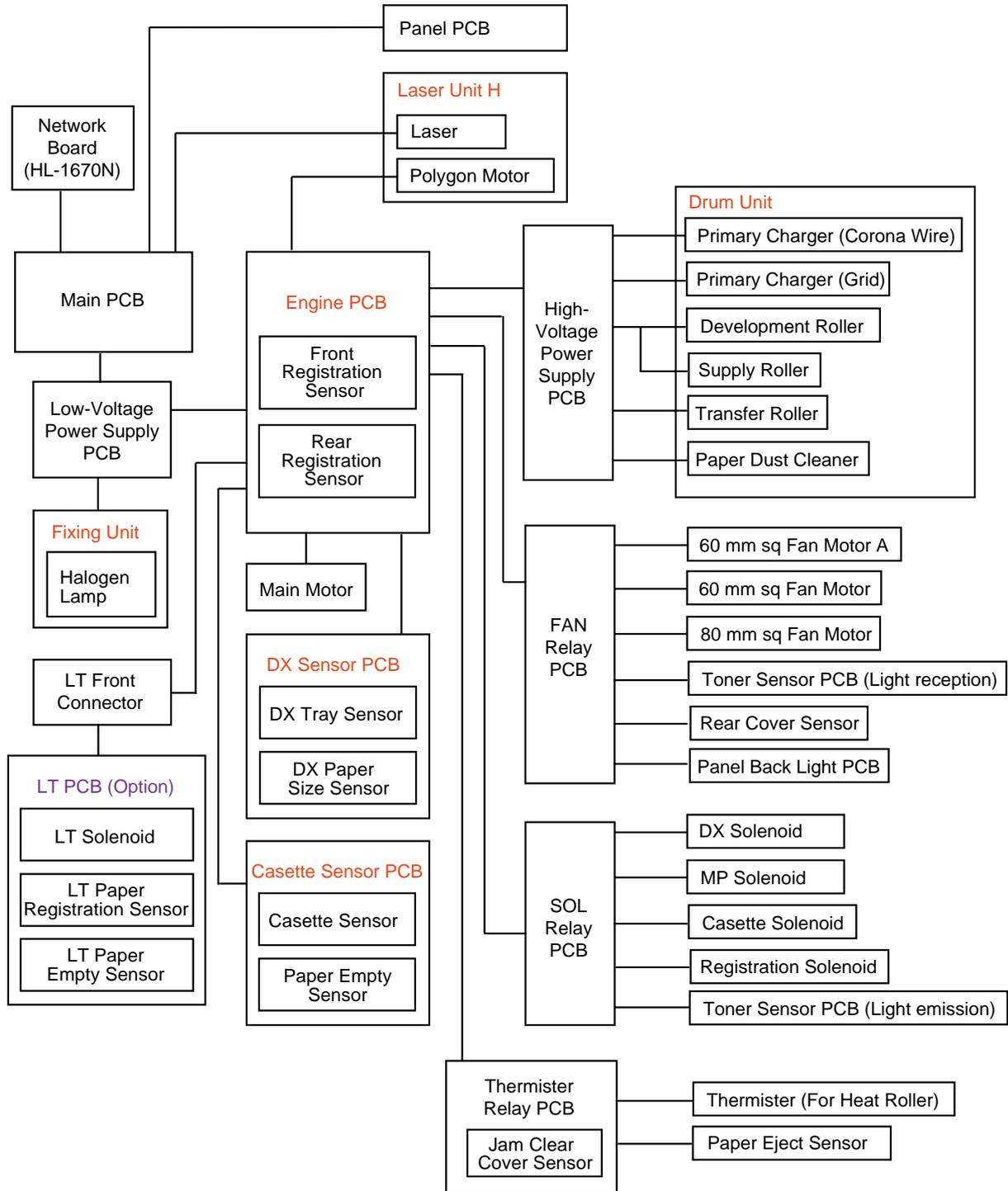


Fig. 3-19

## 2.2 Paper Transfer

### 2.2.1 Paper supply

The paper pick-up roller picks up one sheet of paper from the paper cassette every time it is rotated and feeds it to the paper feed roller.

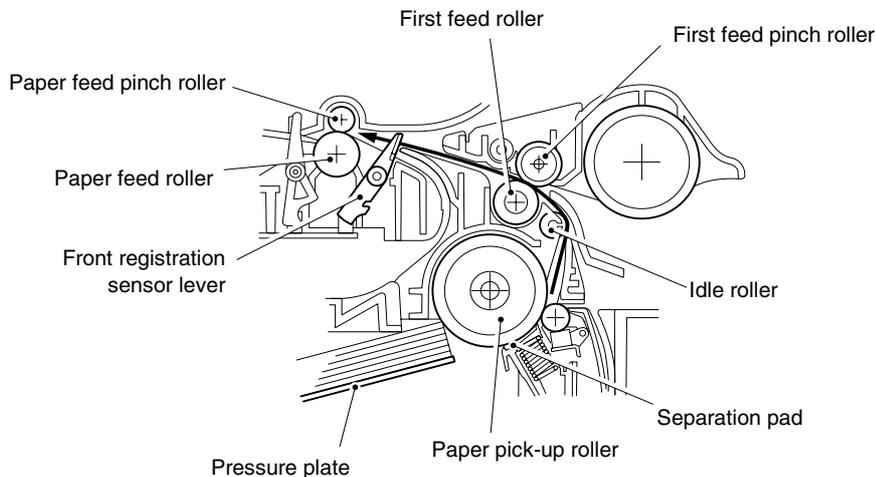


Fig. 3-20

The paper is gripped between the paper pick-up roller and the separation pad and separated into individual sheets.

The pick-up roller is directly connected to the clutch mechanism, whose rotation is stopped by the stopper arm. When the pick-up solenoid is activated, the clutch mechanism is engaged by the solenoid action and the paper pick-up roller is driven. The paper drawn out of the tray by the pick-up roller pushes against the front registration sensor lever and the paper top position/absence of paper is detected by sensing the motion of the lever.

### 2.2.2 Paper registration

After the paper top position is detected by the front registration sensor, the paper, separated into individual sheets by the paper pick-up roller, is fed further for a specified time, and the paper top position reaches the paper feed roller so that the paper skew is adjusted. Then, the solenoid is turned off, the paper feed roller starts turning, and the paper is fed to the transfer block in the drum unit.

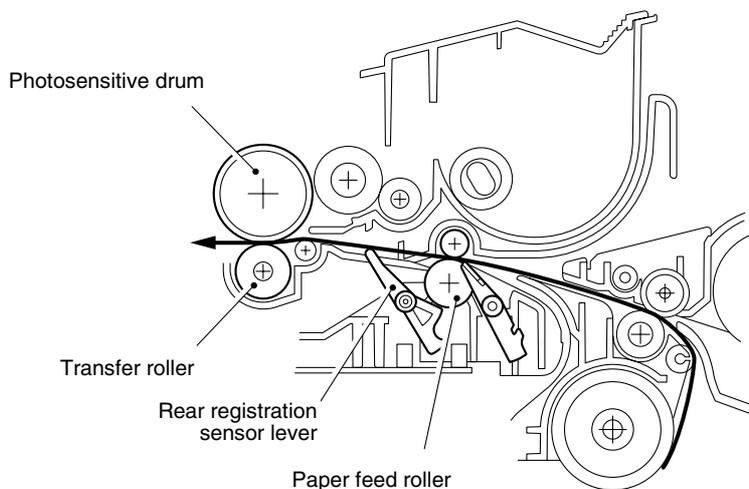


Fig. 3-21

The rear registration sensor in the path from the feed roller to the transfer roller controls the first print position on the paper.

**2.2.3 Paper eject**

After the printing image on the photosensitive drum is transferred onto the paper, the paper is fed to the fixing unit to fix unfixed toner onto the paper.

Afterwards, the paper is ejected from the fixing unit by the first eject roller in the fixing unit. The eject sensor lever detects whether the paper is ejected correctly or not.

After the paper exits from the first eject roller, the paper is turned by the rear cover and ejected face down into the top output tray through the second eject roller. If the rear cover is open, the paper is ejected face up straight to the printer rear (straight paper path).

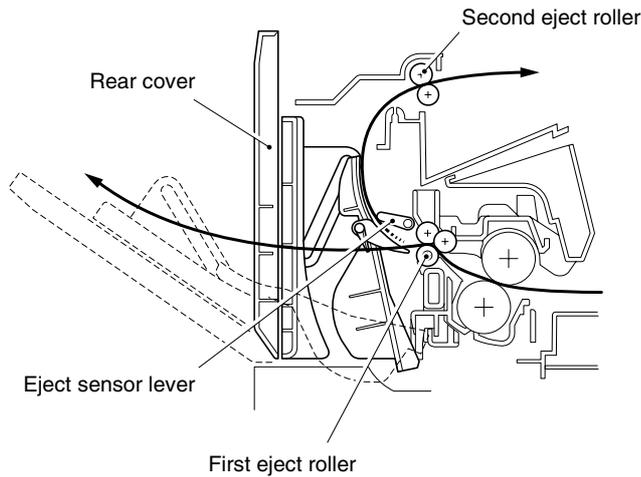


Fig. 3-22

**2.2.4 Duplex printing**

After the paper exits from the second eject roller with the front of sheet printed, the second eject roller rotates conversely and feeds the paper to the duplex tray, where the paper skew is adjusted.

Afterwards, the paper is ejected from the duplex tray to the path through the paper feed roller and the transfer roller to the transfer block in the drum unit again for process of printing on the back of sheet.

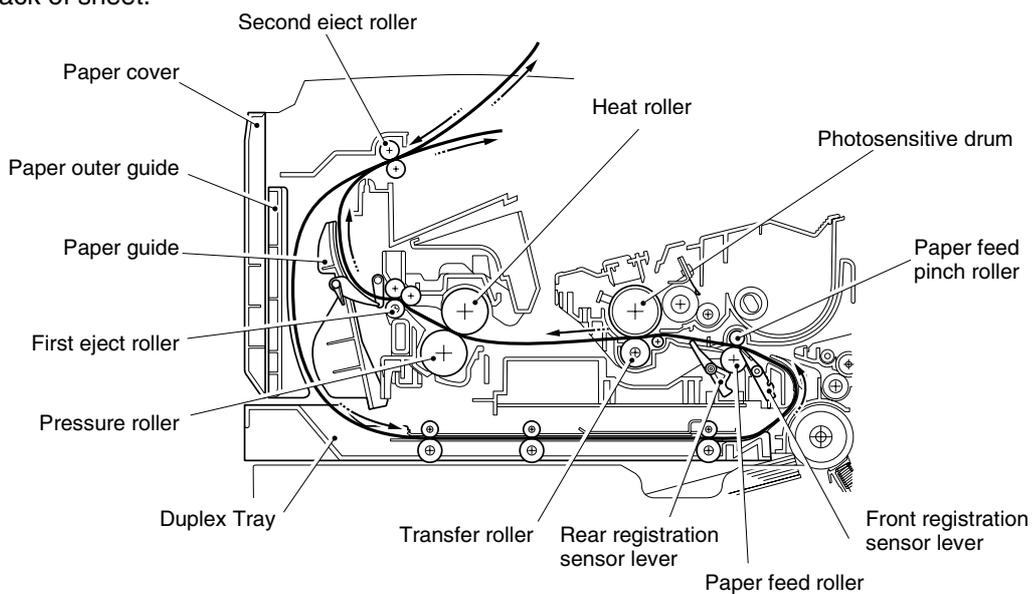


Fig. 3-23

## 2.3 Sensors

### 2.3.1 Cover sensors

Detect opening and closing of the front cover.

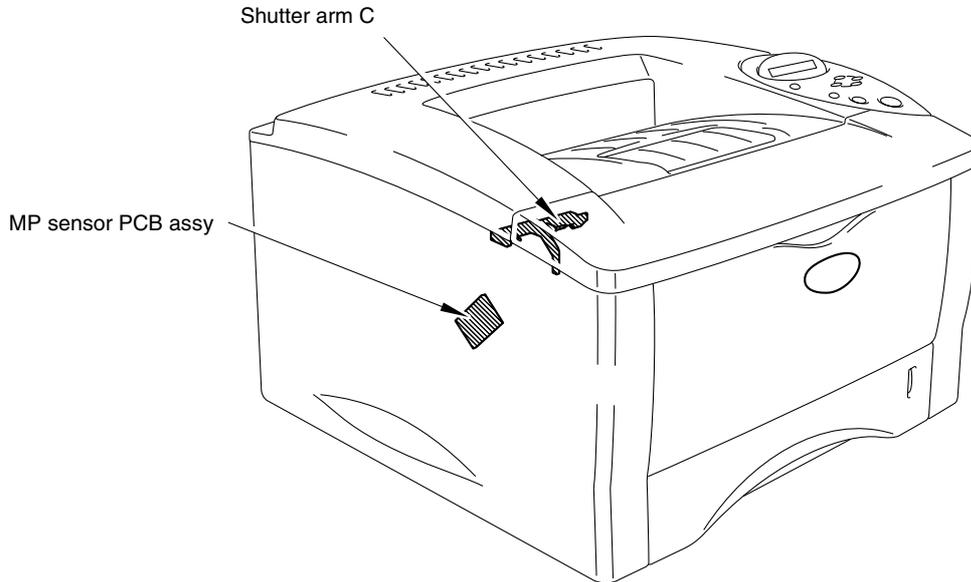


Fig. 3-24

### 2.3.2 Toner sensors

Detects if there is toner in the toner cartridge. The toner sensor at the left side emits light through the window on the left side of the toner cartridge, then the toner sensor at the right side receives it when the toner is low. They also detect whether or not the drum unit is installed. (The toner cartridge is installed in the drum unit.)

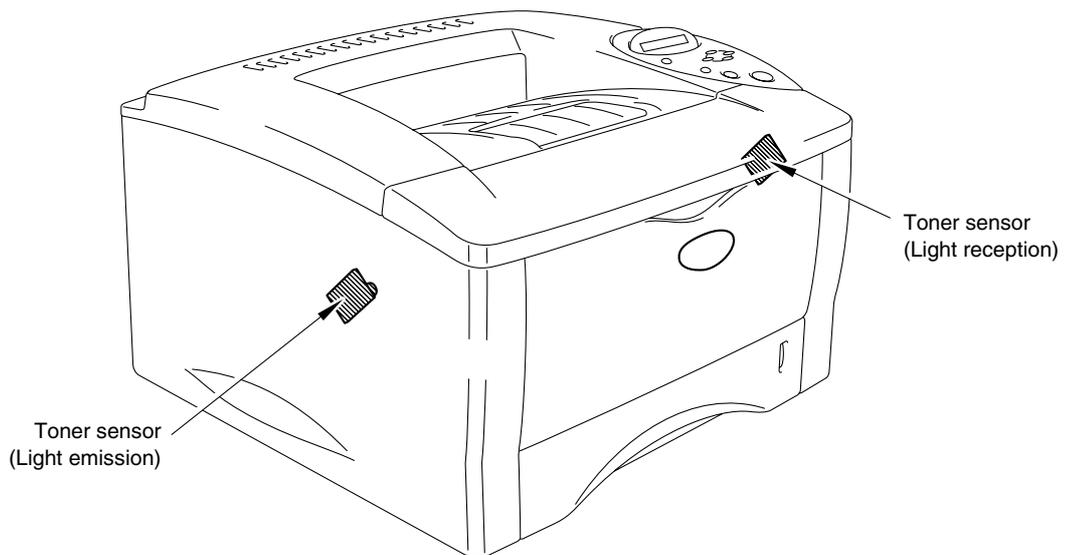


Fig. 3-25



### 2.3.3 DX tray sensor / DX paper size sensor

The DX tray sensor detects if the DX tray is installed, and the DX tray size sensor detects if the correct size of paper is selected.

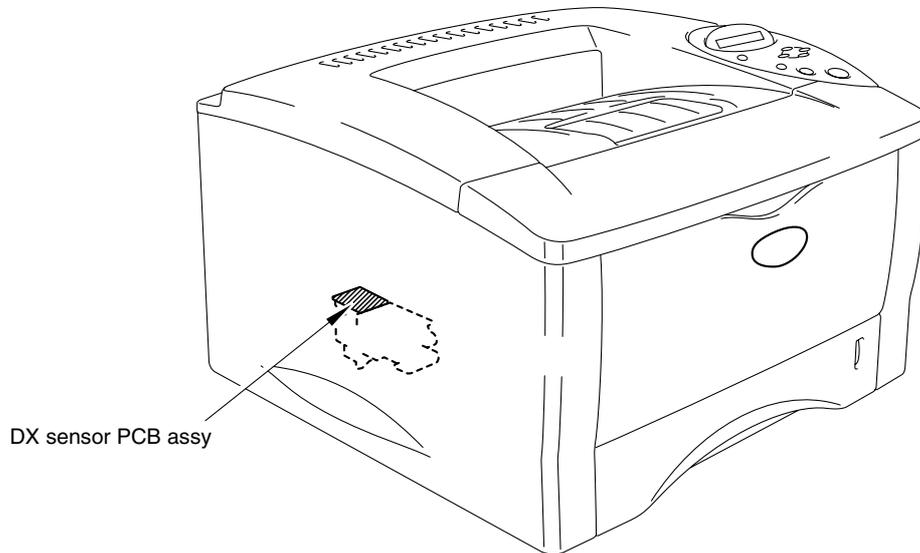


Fig. 3-26

### 2.3.4 Rear cover sensor

Detects opening and closing of the rear cover. It also detects an error if the rear cover is open when duplex printing is selected.

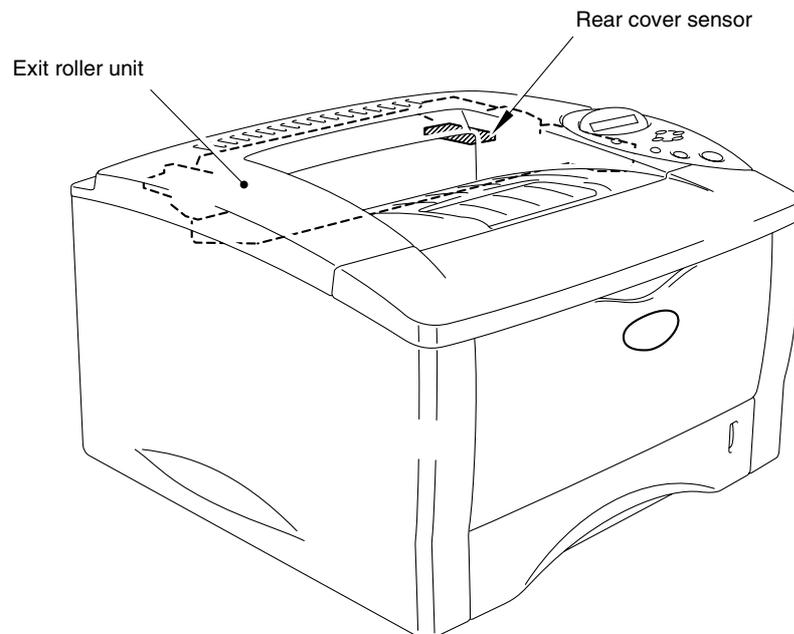


Fig. 3-27

**2.3.5 Cassette sensor / Paper empty sensor**

Detect if the paper cassette is installed. They also detect if there is paper in the paper cassette.

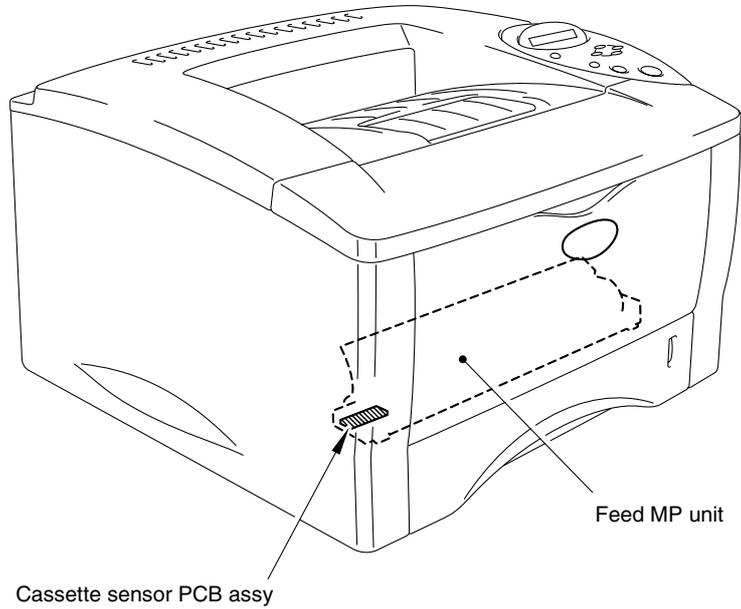


Fig. 3-28

**2.3.6 Paper eject sensor**

Detects if paper is ejected from the fixing unit.

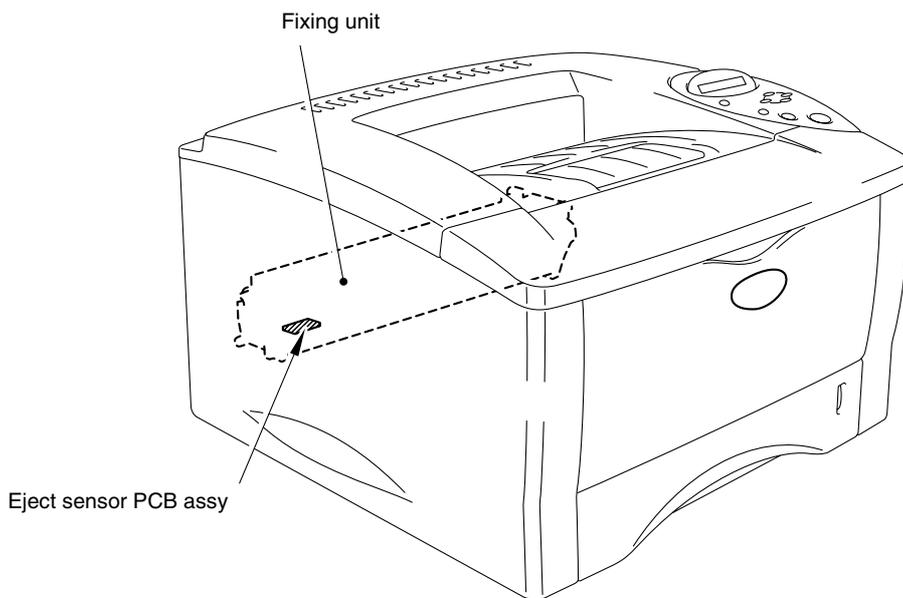


Fig. 3-29

## 2.4 Drum Unit

### 2.4.1 Photosensitive drum

Generates the latent electrostatic image and develops the image on the drum surface.

### 2.4.2 Primary charger

Forms a uniform charge on the drum surface.

- (1) Corona wire  
Generates the ion charge on the drum.
- (2) Grid  
Spreads the ion charge evenly over the drum surface.

### 2.4.3 Transfer roller

Transfers the toner image to the paper from the drum surface.

### 2.4.4 Cleaner

Removes the paper dust or dirt on the surface of the photosensitive drum.

## 2.5 Toner Cartridge

Develops the electrostatic latent image on the photosensitive drum with toner and forms the visible image.

## 2.6 Print Process

### 2.6.1 Charging

The drum is charged to approximately 870V by an ion charge which is generated by the primary charger. The charge is generated by ionization of the corona wire, which has a DC bias from the high-voltage power supply applied to it. The flow of the ion charge is controlled by the grid to ensure it is distributed evenly on the drum surface. The aluminum drum sleeve in the photosensitive drum is grounded.

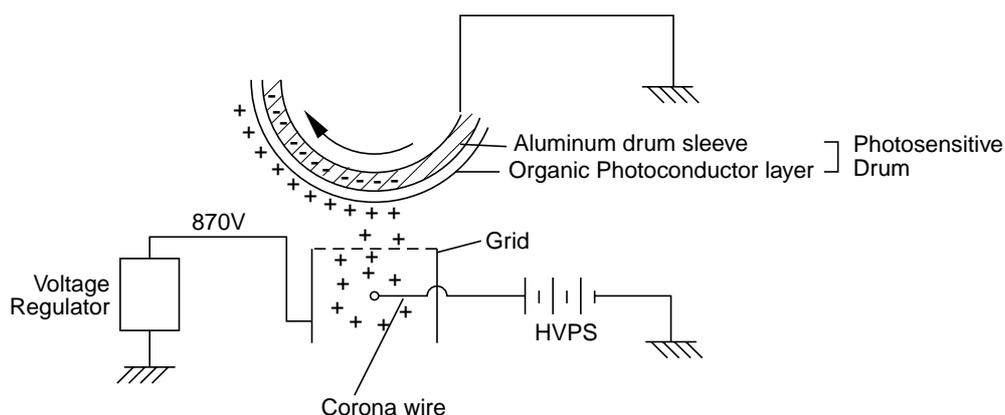
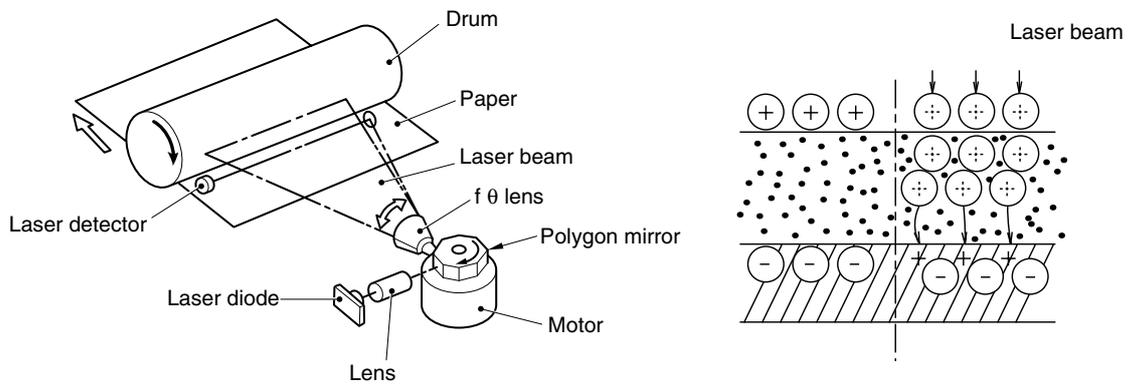


Fig. 3-30

The primary charge uses a corona wire, but since the drum is positively charged, only less than 1/10 of the usual quantity of ozone is generated compared with the negatively charged drum. The level of ozone expelled from the printer is therefore not harmful to the human body. Applicable safety standards have been complied with.

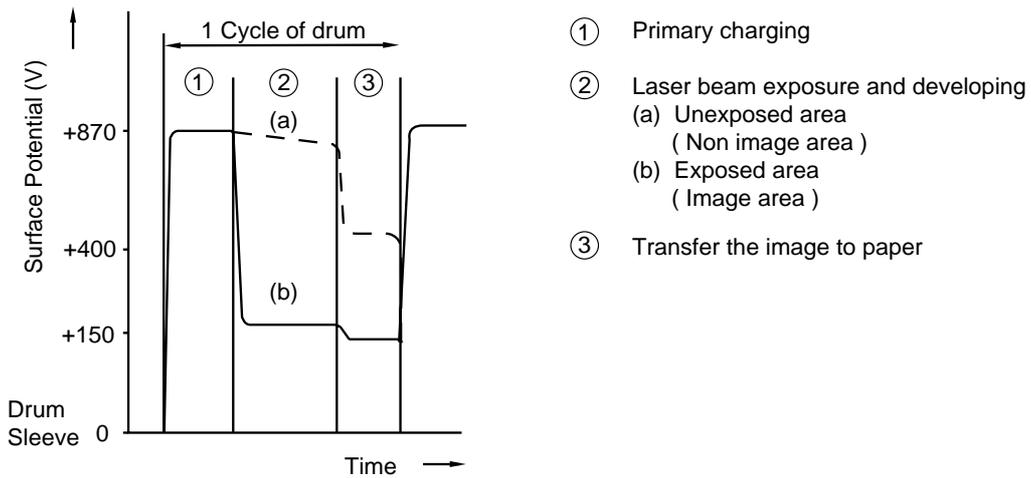
**2.6.2 Exposure stage**

After the drum is positively charged, it is exposed to the light emitted from the laser unit.



**Fig. 3-31**

The area exposed to the laser beam is the image to be printed. The surface potential of the exposed area is reduced, forming the electrostatic image to be printed.



**Fig. 3-32**

### 2.6.3 Developing

Developing causes the toner to be attracted to the electrostatic image on the drum so as to transform it into a visible image.

The developer consists of a non-magnetic toner. The development roller is made of conductive rubber and the supply roller (which is also made of conductive sponge) rotate against each other. The toner is charged and carried from the supply roller to the development roller. The toner adheres to the development roller and is conveyed to the photosensitive drum at an even thickness controlled by the blade. The toner is nipped between the development roller and the drum and developed onto the latent image on the drum. The electrostatic field between the drum and the development roller, which is DC-biased from the high-voltage power supply, creates the electrostatic potential to attract toner particles from the development roller to the latent image area on the drum surface.

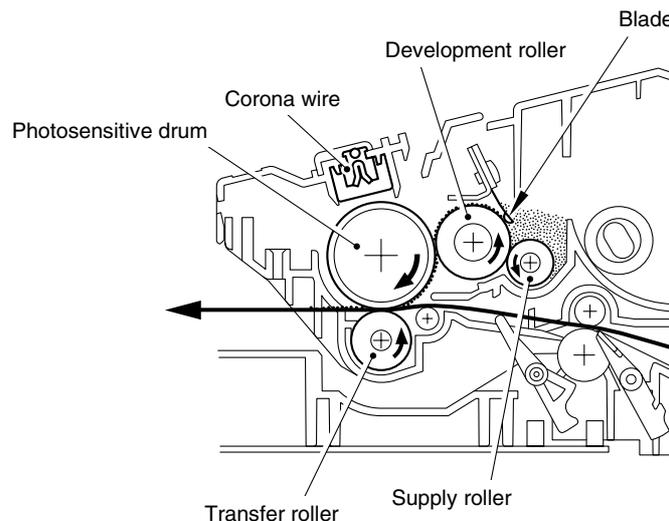


Fig. 3-33

### 2.6.4 Transfer

#### (1) Transfer process

After the drum has been charged and exposed, and has received a developed image, the toner formed is transferred onto the paper by applying a negative charge to the back of the paper. The negative charge applied to the paper causes the positively charged toner to leave the drum, and adhere to the paper. As a result, the image is visible on the paper.

#### (2) Cleaning process of transfer roller

If the toner is not transferred onto the paper perfectly it is possible that there may be residual toner on the drum which will adhere to the transfer roller. The transfer voltage changes to a positive voltage during non-printing rotation of the drum. Therefore the transfer roller is cleaned by returning the positively charged toner adhering to the transfer roller onto the photo-conductive drum.

### 2.6.5 Fixing stage

The image transferred to the paper by static electricity is fixed by heat and pressure when passing through the heat roller and the pressure roller in the fixing unit. The thermistor keeps the surface temperature of the heat roller constant by detecting the surface temperature of the heat roller and turning on or off the halogen heater lamp.

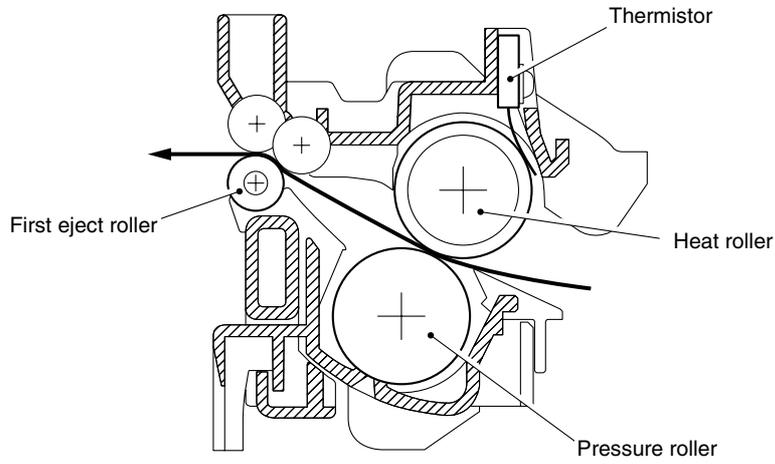


Fig. 3-34

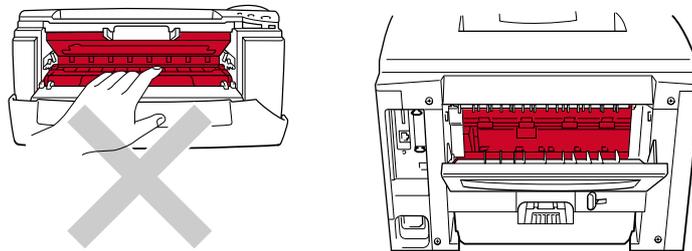
## CHAPTER 4 DISASSEMBLY AND RE-ASSEMBLY

### 1. SAFETY PRECAUTIONS

To avoid creating secondary problems by mishandling, follow the warnings and precautions below during maintenance work.

#### WARNING

- (1) **Always turn off the power switch and unplug the power cord from the power outlet before accessing any parts inside the printer.**
- (2) **Some parts inside the printer are extremely hot immediately after the printer is used. When opening the front cover or rear cover to access any parts inside the printer, never touch the red colored parts shown in the following figures.**

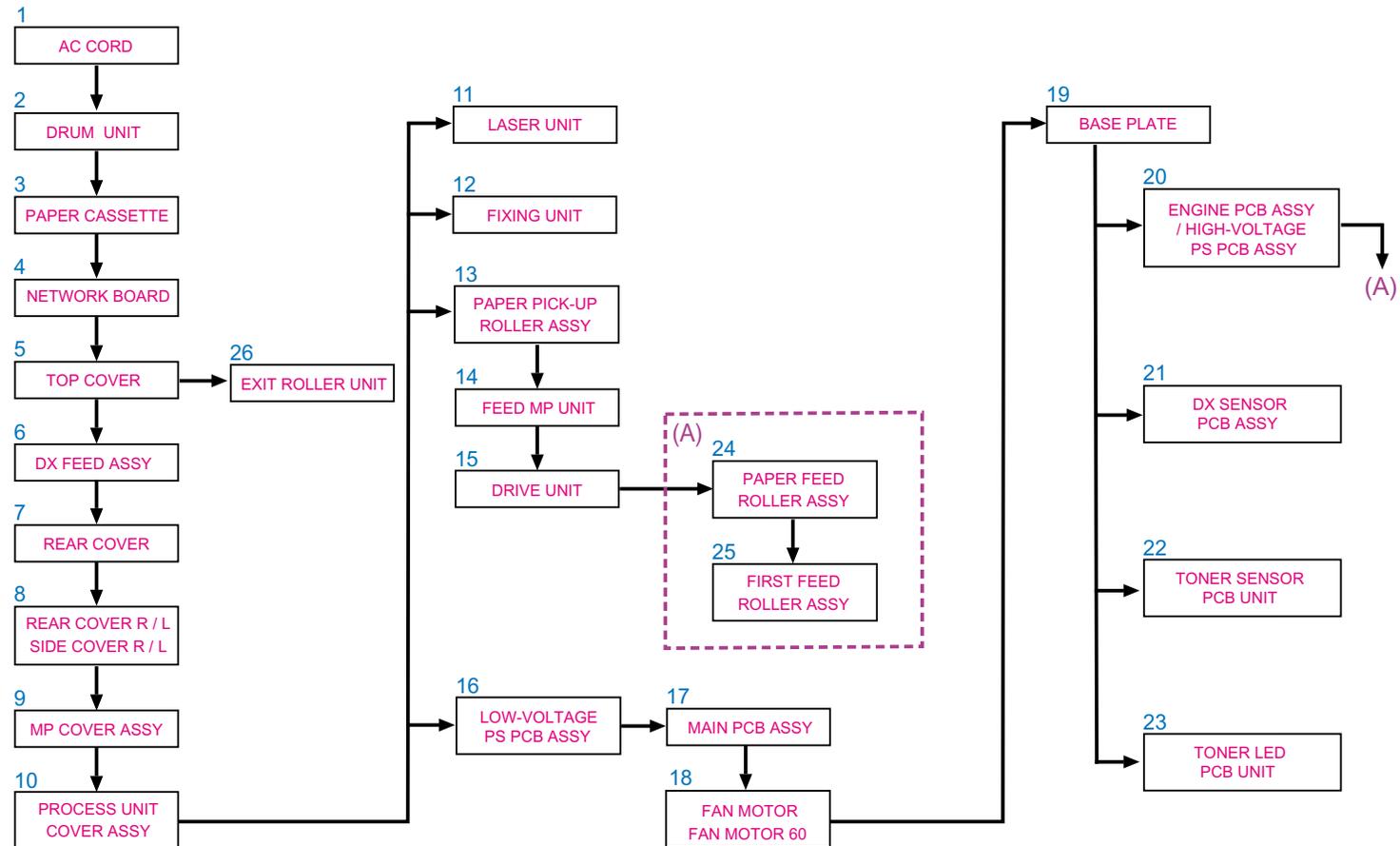


#### CAUTION:

- (1) Be careful not to lose screws, washers, or other parts removed.
- (2) Be sure to apply grease to the gears and applicable positions specified in this chapter.
- (3) When using soldering irons or other heat-generating tools, take care not to accidentally damage parts such as wires, PCBs and covers.
- (4) Before handling any PCBs, touch a metal portion of the equipment to discharge any static electricity charge on your body, or the electronic parts or components may be damaged.
- (5) When transporting PCBs, be sure to wrap them in the correct protective packaging.
- (6) Be sure to replace self-tapping screws correctly, if removed. Unless otherwise specified, tighten screws to the following torque values.
  - TAPTITE, BIND or CUP B
    - M3: 70N • cm
    - M4: 80N • cm
  - TAPTITE, CUP S
    - M3: 80N • cm
  - SCREW
    - M3: 70N • cm
    - M4: 80N • cm
- (7) When connecting or disconnecting cable connectors, hold the connector body, not the cables. If the connector has a lock, release the connector lock first to release it.
- (8) After a repair, check not only the repaired portion but also all connectors. Also check that other related portions are functioning properly before operational checks.



## 2. DISASSEMBLY FLOW



### 3. DISASSEMBLY PROCEDURE

**NOTE:**

Refer to the subsection "3.27 Harness Winding Form" in this Chapter when re-assembling printer parts.

#### 3.1 AC Cord

- (1) Disconnect the AC cord from the printer AC inlet.

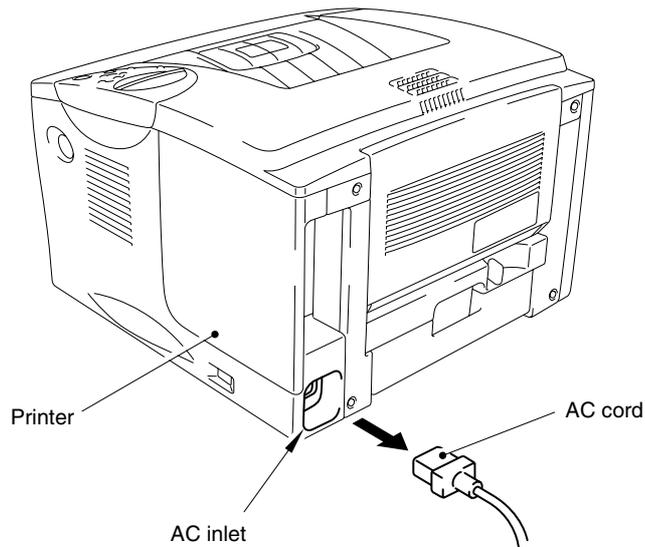


Fig. 4-1

#### 3.2 Drum Unit

- (1) Press the cover release button, and open the process unit cover ASSY and remove the drum unit from the printer.

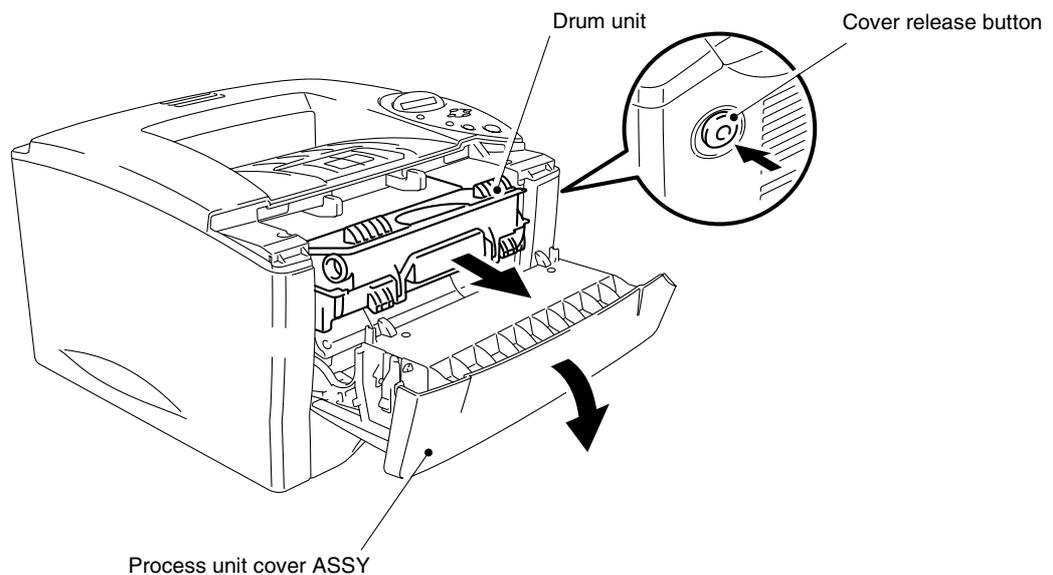


Fig. 4-2

### 3.3 Paper Cassette

- (1) Close the MP cover and pull out the paper cassette from the printer and remove the paper from the cassette.

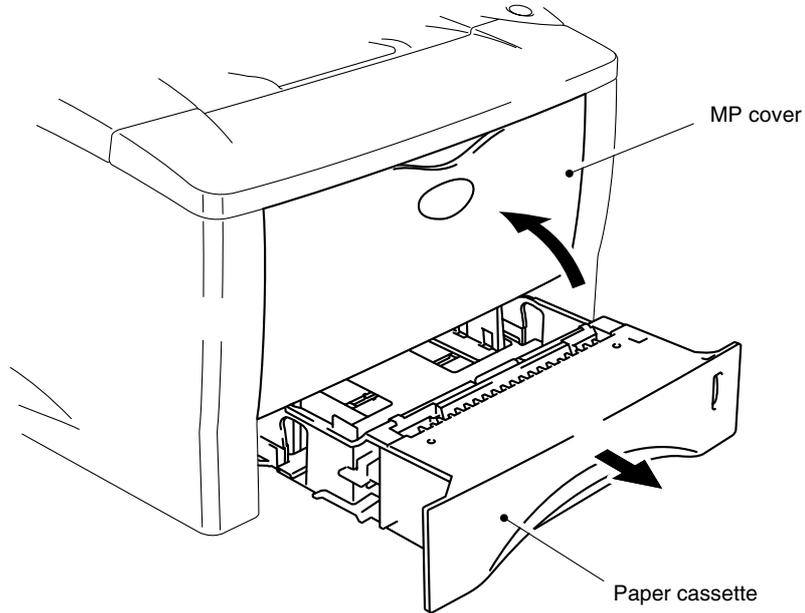


Fig. 4-3

- (2) Remove the pad holder ZLh ASSY JPN by pulling it upwards, then remove the separation pad spring 350 from the paper cassette.

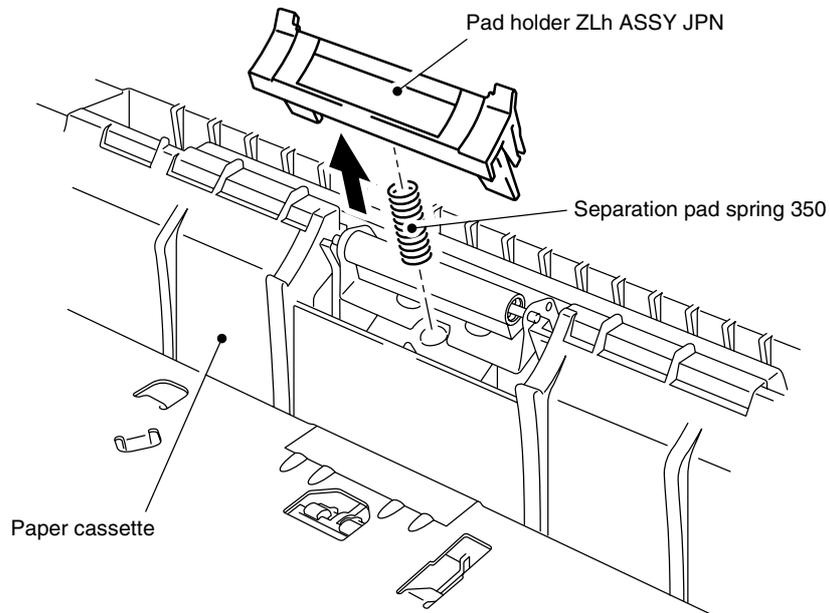
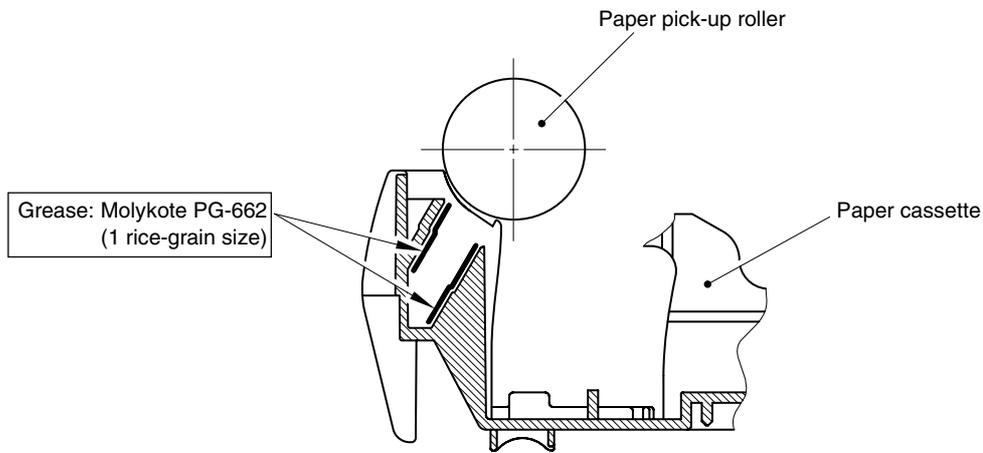


Fig. 4-4

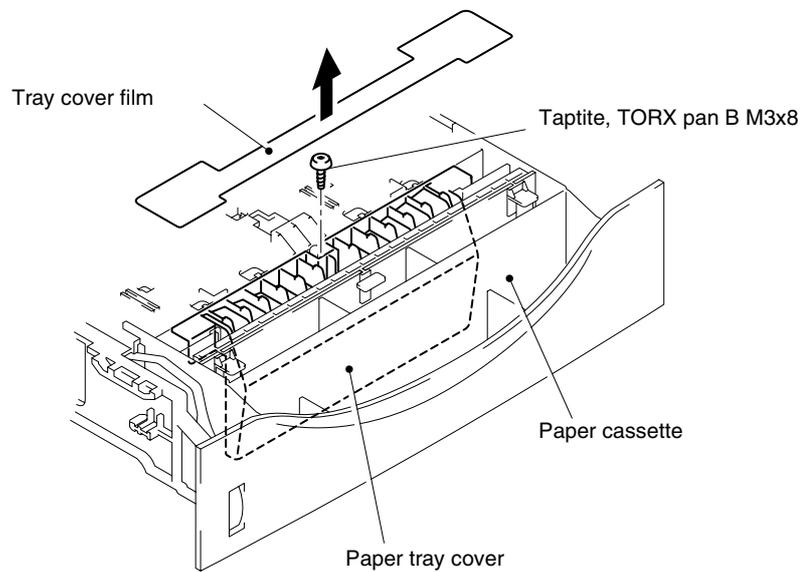
**NOTE:**

*When replacing/re-assembling the pad holder ZLh ASSY, remove the old grease and apply a suitable amount of grease referring to the figure below;*



**Fig. 4-5**

- (3) Turn the paper cassette upside down, then remove the tray cover film by peeling it carefully from the underside of the cassette.
- (4) Remove the TORX pan B M3x8 Taptite screw and remove the paper tray cover from the front of the cassette.



**Fig. 4-6**

**NOTE:**

- *The cover film must not be reused after it has been removed. Always replace it with a new one.*
- *The screw securing the paper cassette cover indicated RED in the figure above is very special. When disassembling/re-assembling the screw, you need a special screw driver. Refer to the parts reference list.*

- (5) Keeping the paper cassette upside down, release the pressure roller holder assembly from the cassette by releasing the metal mounting plate from the plastic retaining boss. Use a flat screwdriver to press the metal plate forwards until it clears the boss and then remove the pressure roller holder assembly downwards from the cassette.
- (6) Remove the cassette pressure roller from the assembly, then remove the pressure roller shaft from the pressure roller collar.
- (7) Remove the sponge holder ASSY from the holder. The two sponge holder springs will also come off.

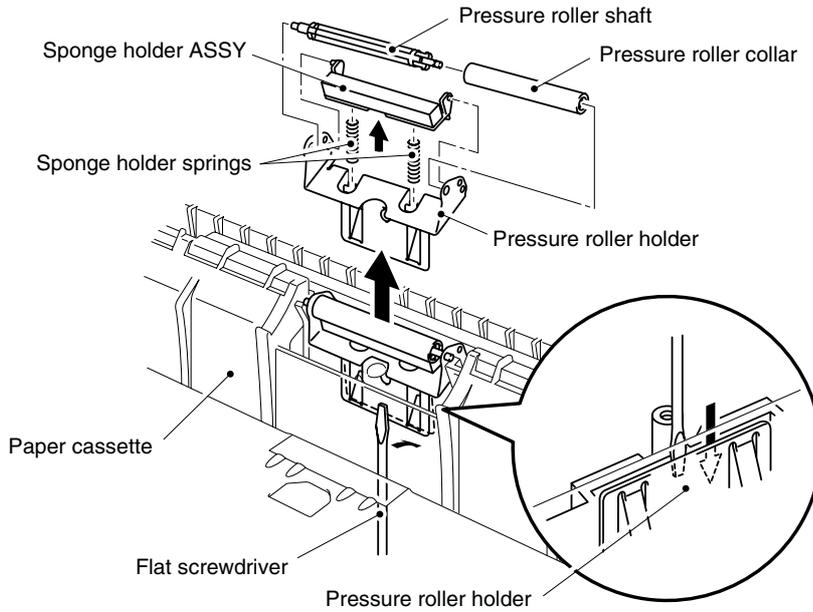


Fig. 4-7

- (8) Keeping the paper cassette upside down, remove the two cup B M2.6x5 Taptite screws.
- (9) Unhook the catches of each side guide, then press the lock lever towards the front of the cassette to release the pressure plate.

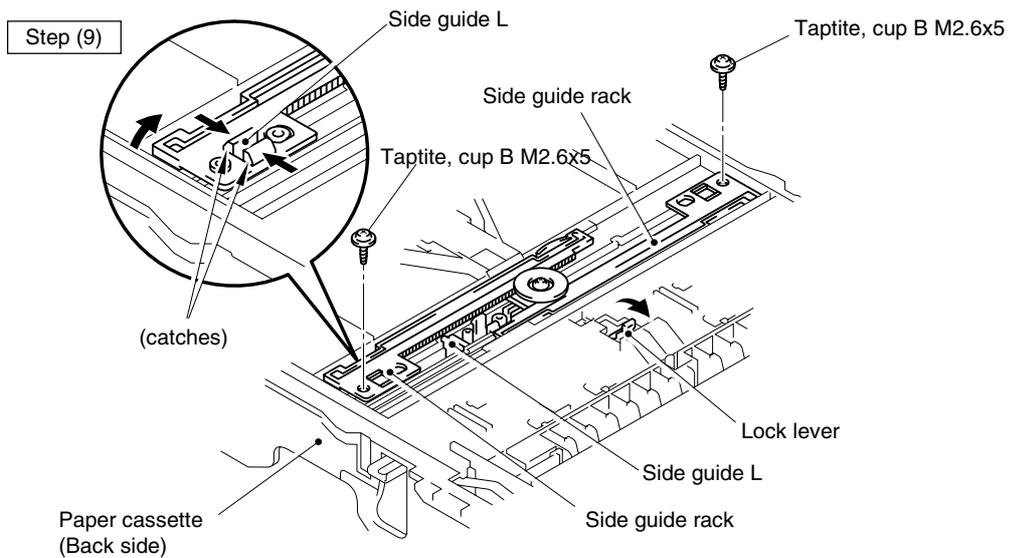


Fig. 4-8

- (10) Turn the cassette the correct way up and slide the two paper guides to the center of the cassette.
- (11) Remove the side guides Right and Left from the paper cassette.

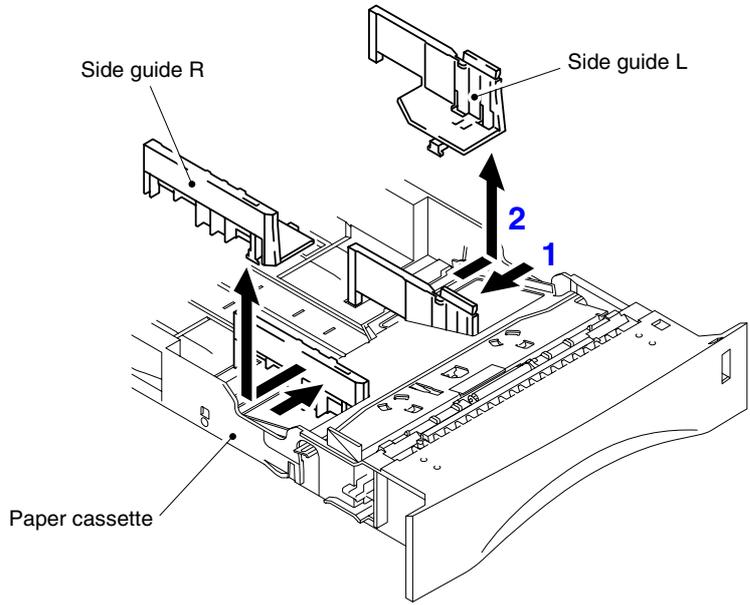


Fig. 4-9

- (12) Unhook the two catches (A) of the pressure plate while pulling the plastic frame outwards, then unhook the other two catches (B) of the plate while pulling the plastic frame outwards to remove the pressure plate ASSY.
- (13) Unhook the pressure plate spring from the plastic hook to remove the two pressure plate springs.

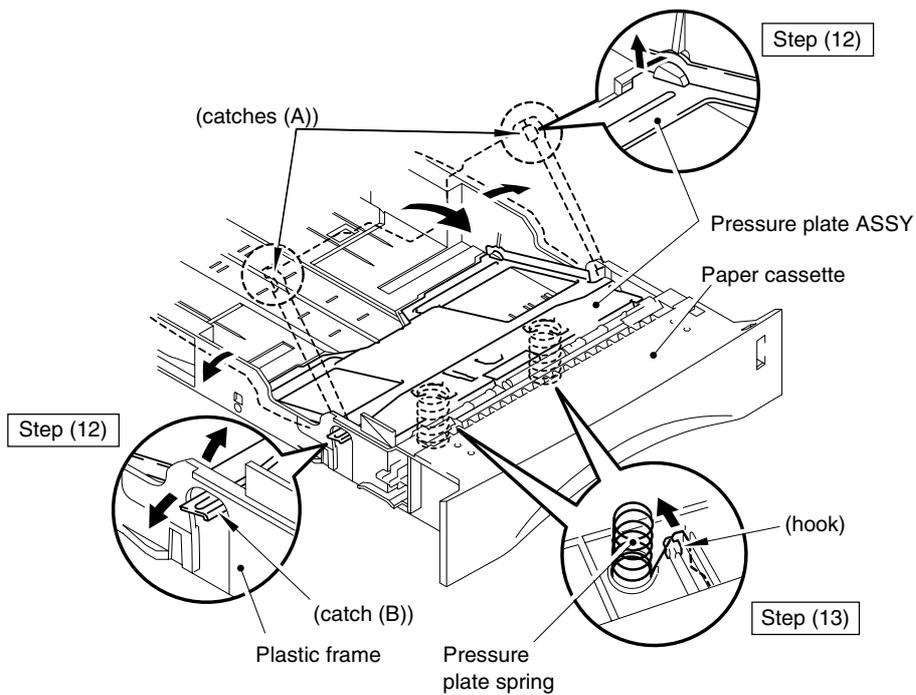


Fig. 4-10

**NOTE:**

When re-assembling the pressure plate ASSY, ensure that the paper indicator arm is under the pressure plate.

**CAUTION:**

When unhooking the catches to remove the pressure plate, do not bend the pressure plate, gently ease the plastic cover. If the pressure plate is deformed, paper feeding problems may occur.

(14) Remove the release lever extension spring.

(15) Unhook the two catches and rotate the lock lever to remove it downwards from the cassette.

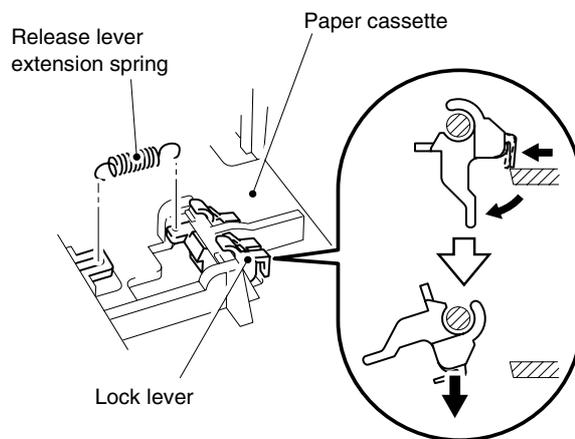


Fig. 4-11

**NOTE:**

When re-assembling the lock lever, insert it upwards from underneath the cassette and rotate it until the two catches lock into place..

(16) Slide the rear paper guide fully forwards in the cassette and remove it from the slot.

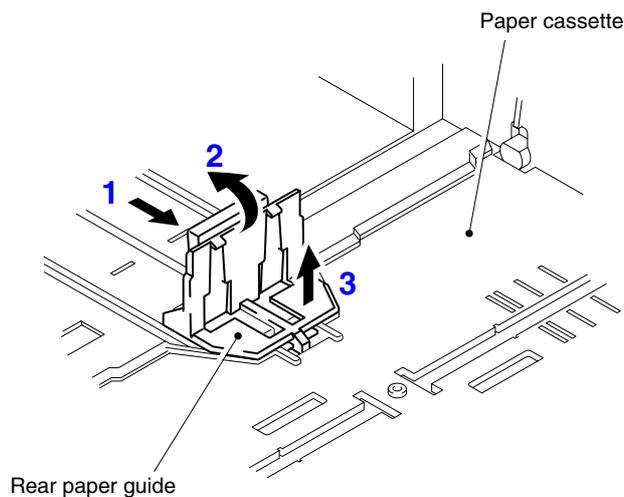


Fig. 4-12

- (17) Turn the cassette upside down and remove the one cup B M3x8 Taptite screw to remove the side guide gear. Then remove the one friction spring.
- (18) Remove the two side guide racks.
- (19) Remove the paper indicator.

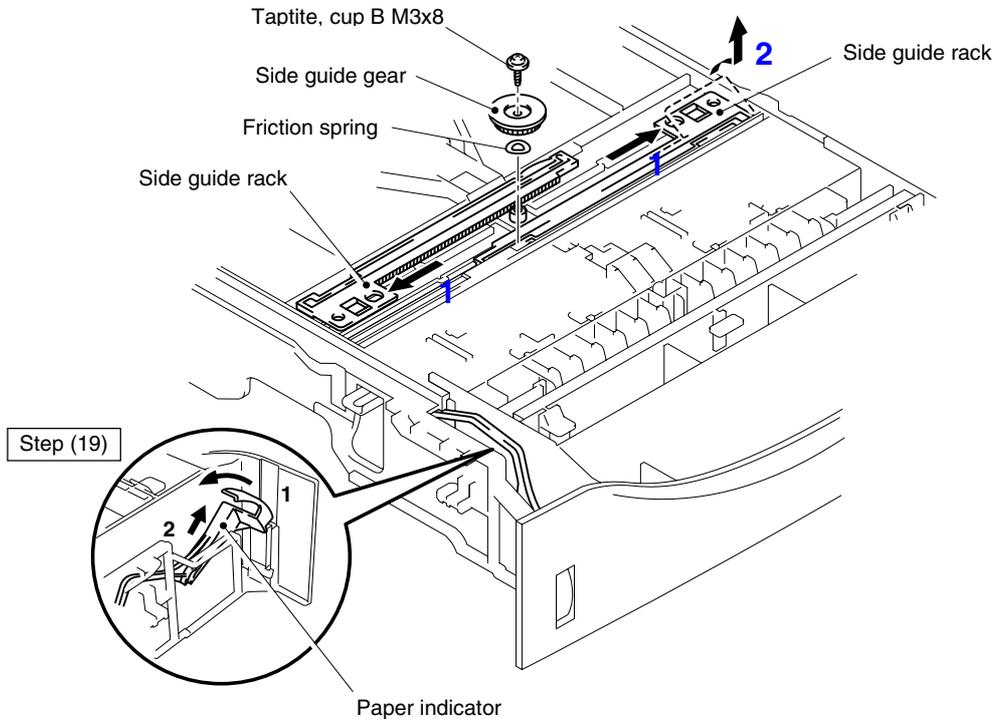


Fig. 4-13

NOTE:

- When re-assembling the side guide racks, they should both be aligned so that the wide end of the racks are in line with the inside edge of the paper guide release slots in the cassette before refitting the spring and gear.
- When replacing/re-assembling the paper cassette, remove the old grease and apply a suitable amount of grease onto both sides of the paper cassette referring to the figure below;

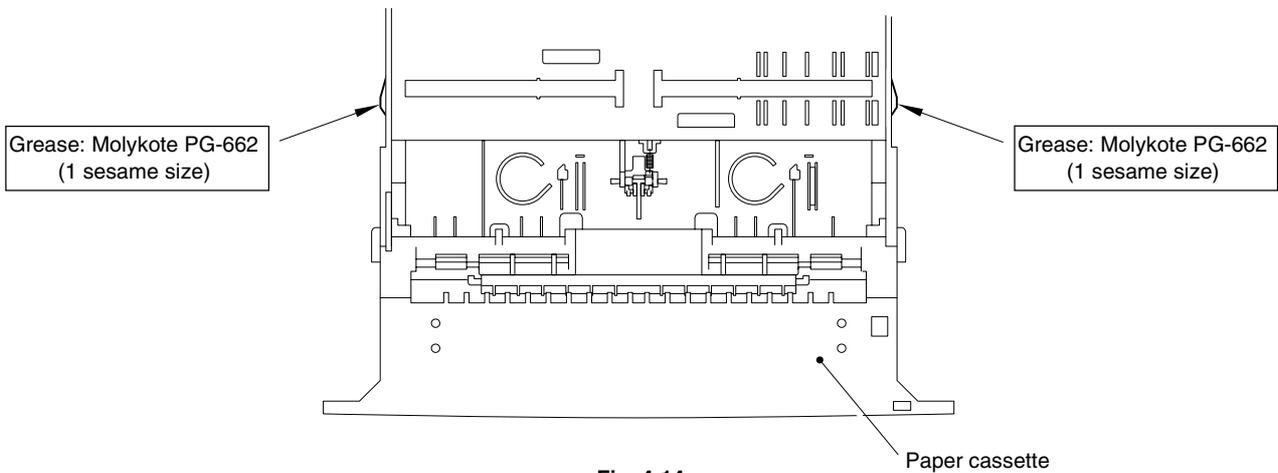


Fig. 4-14

- (20) Remove the pan B M3x8 Taptite screw to remove the tray lock lever from the paper cassette.
- (21) Unhook the four catches to remove the paper tray rear from the paper cassette.

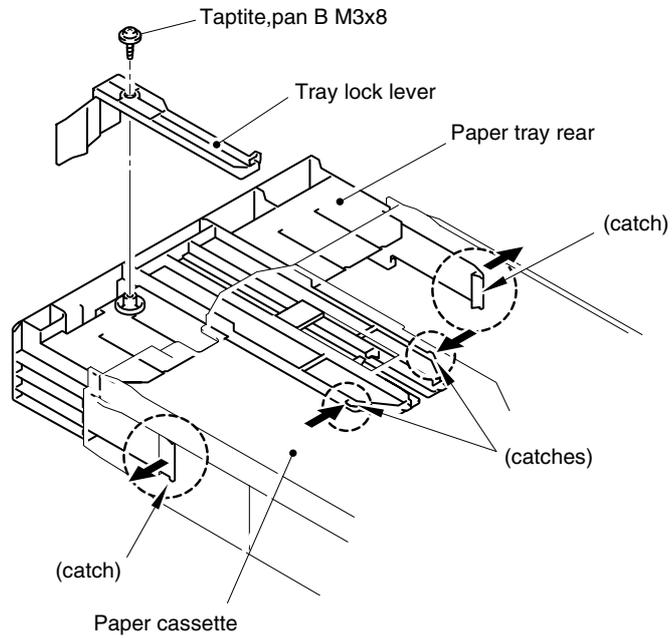


Fig. 4-15

### 3.4 Network Board (For HL-1870N only)

- (1) Open the access cover by sliding it to the backward.
- (2) Loosen the two bind S M3x8 Taptite screws to remove the PCB access plate.

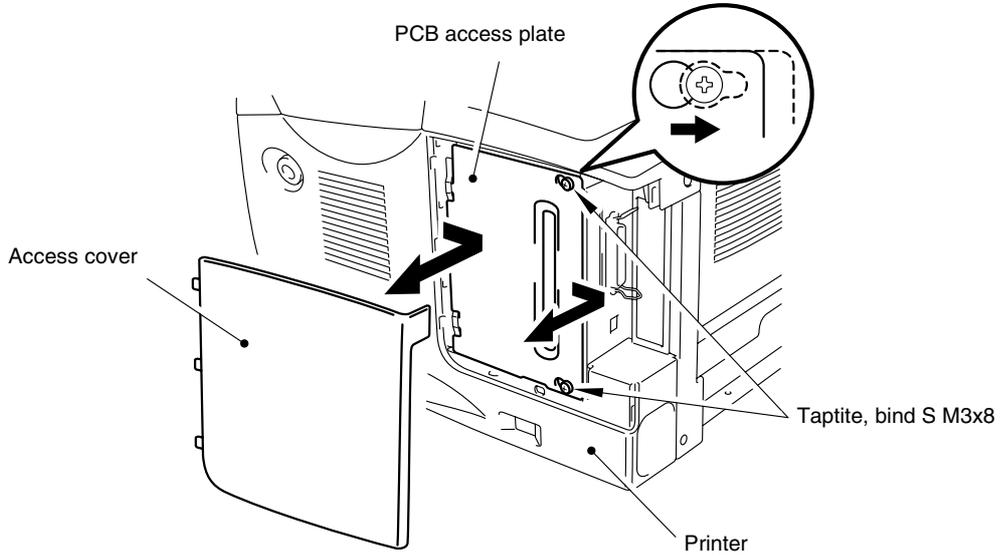


Fig. 4-16

- (3) Remove the two bind S M3x8 Taptite screws to remove the network board cover plate.
- (4) Disconnect the connector connected with the main PCB and remove the network board.

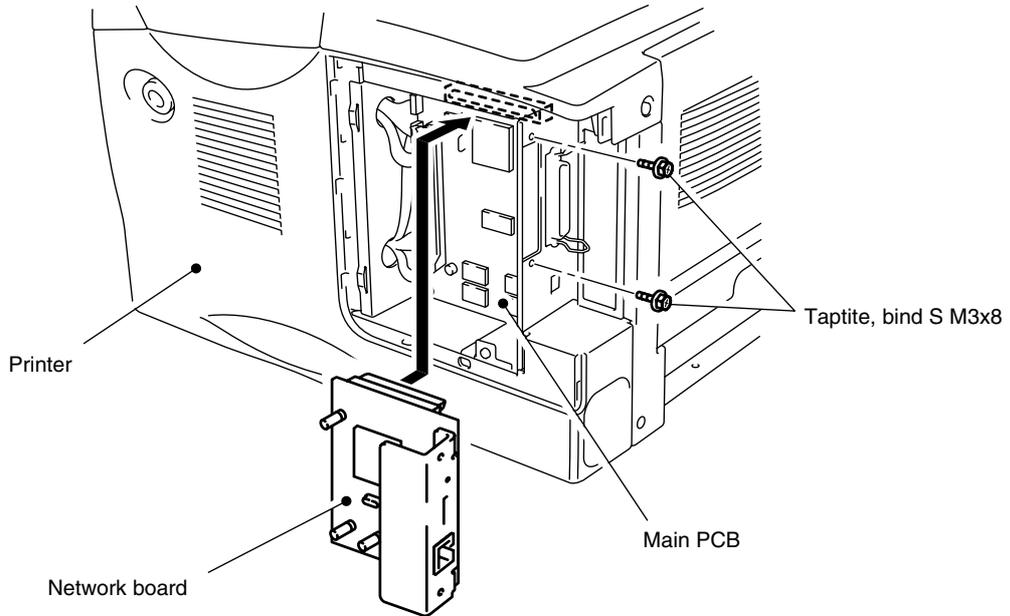


Fig. 4-17

### 3.5 Top Cover

- (1) Open the Process unit cover ASSY.
- (2) Remove the four shoulder screws from the side cover R and L.
- (3) Open the rear cover and disconnect the two harnesses for the panel PCB ASSY.
- (4) Remove the top cover from the printer.

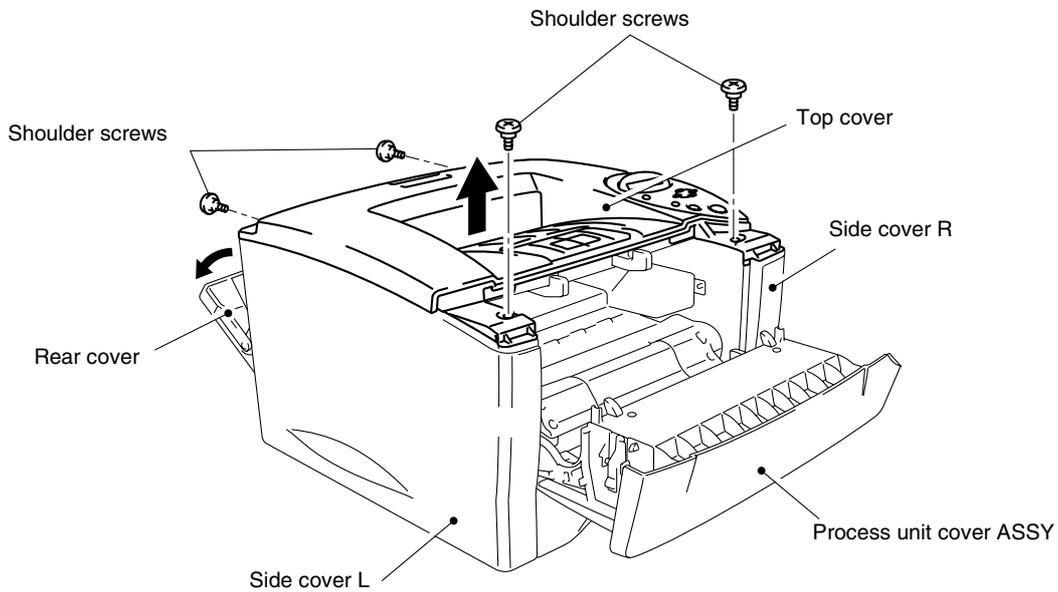


Fig. 4-18

- (5) Remove the paper stopper and the paper stopper S from the top cover.

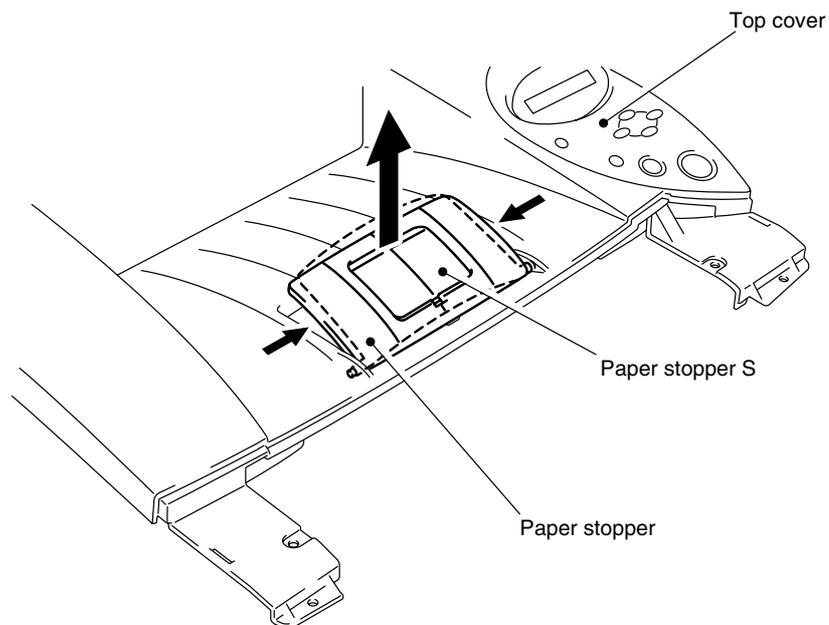


Fig. 4-19

- (6) Turn the top cover upside down and remove the three cup B M3x8 Taptite screws from the top cover.
- (7) Turn the top cover the correct way up to remove the panel cover ASSY from the top cover.

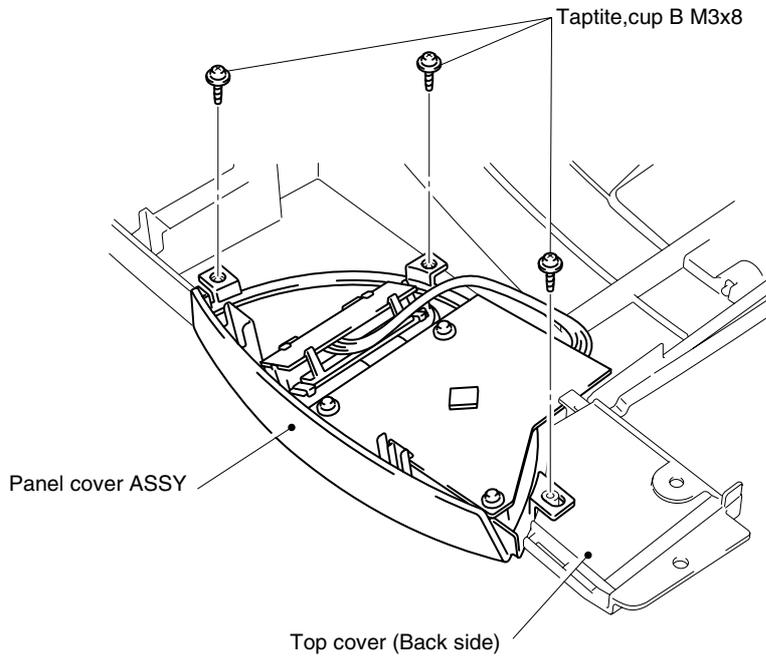


Fig. 4-20

- (8) Disconnect the connector and the harness connected with the panel PCB ASSY.
- (9) Remove the three cup B M3x10 Taptite screws to remove the panel PCB ASSY from the panel cover ASSY.

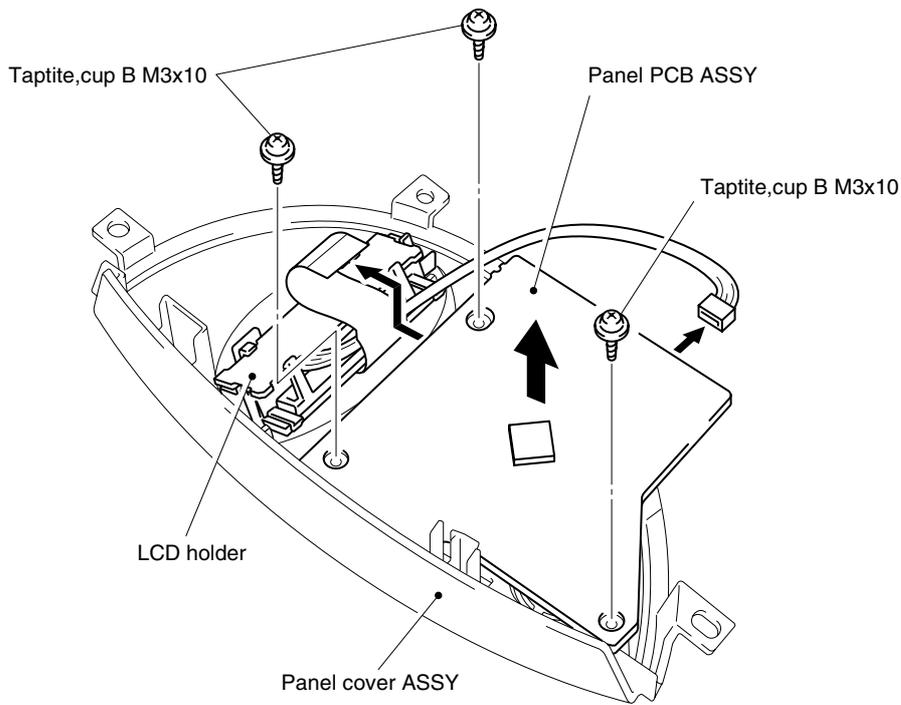


Fig. 4-21

- (10) Remove the LCD holder from the panel cover ASSY and remove the back light PCB ASSY by releasing two hooks from ASSY.
- (11) Remove the LCD from the panel PCB ASSY by releasing two hooks and then remove the diffusion film from the ASSY.

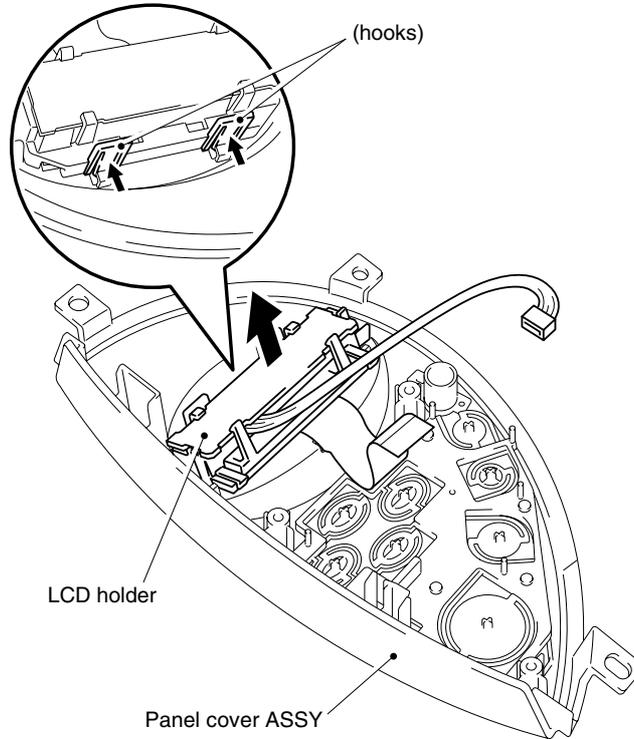


Fig. 4-22

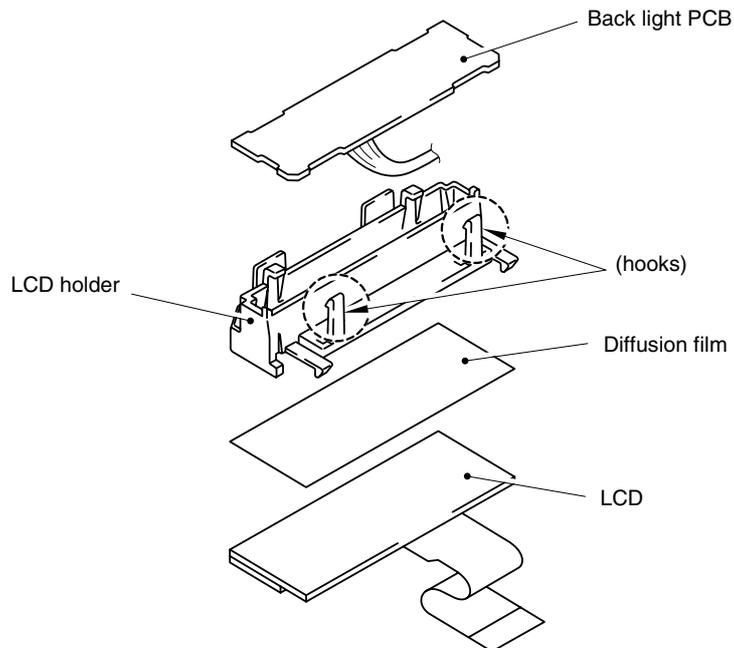


Fig. 4-23

(12) Remove the panel light guide, and then remove the key from the panel cover.

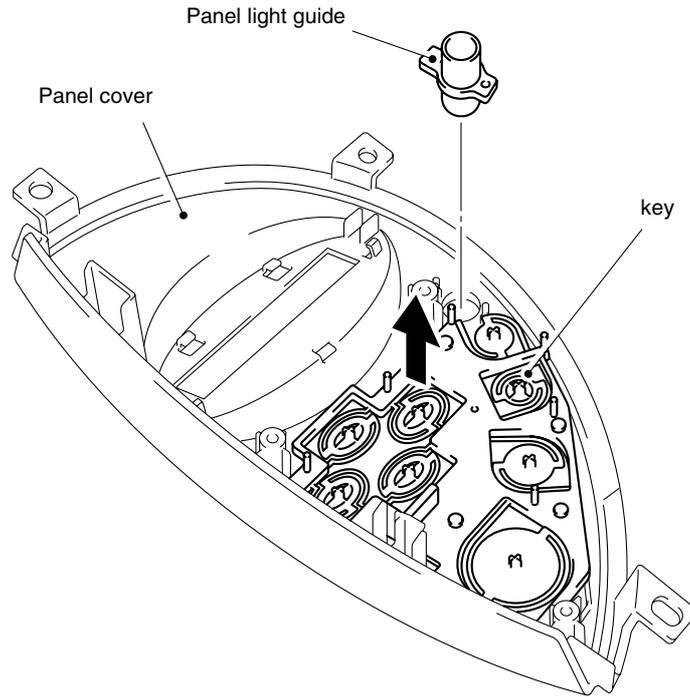


Fig. 4-24

(13) Remove the key top A and the key top B from the key.

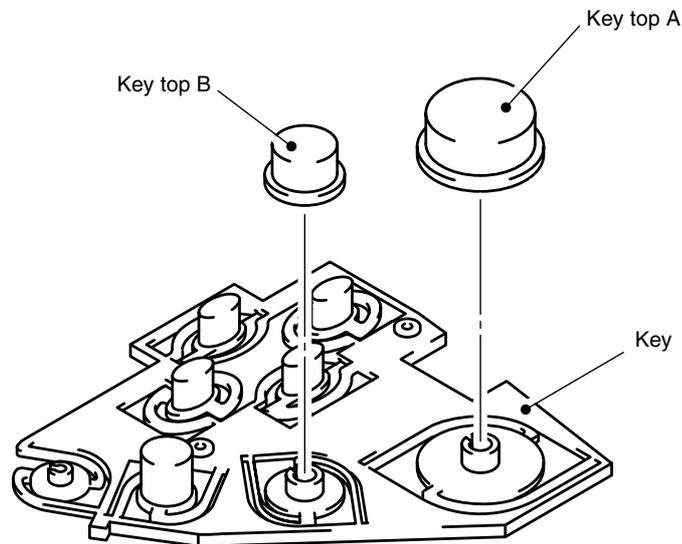


Fig. 4-25

### 3.6 DX Feed ASSY

- (1) Close the rear cover and remove the DX feed ASSY from the printer.

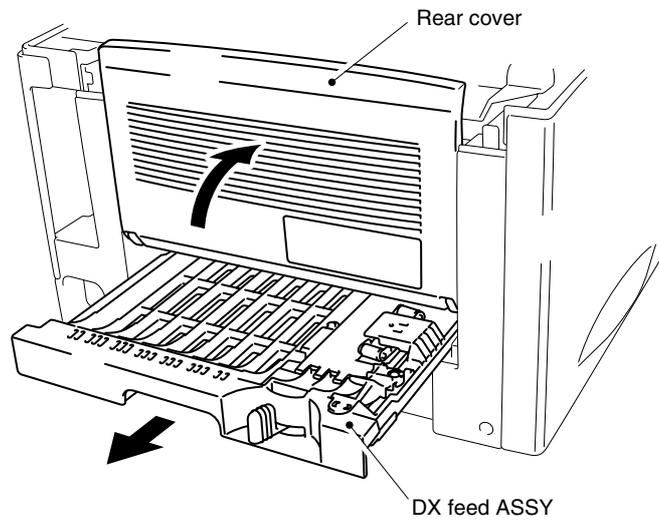


Fig. 4-26

- (2) Remove the bind M3x4 screw to remove the ground wire cover and the ground wire from the paper guide upper ASSY, and then remove the ground wire from the ground wire cover.
- (3) Remove the bind B M3x7.5 Taptite shoulder screw, the washer and the bind B M3x8 Taptite screw to remove the paper guide upper ASSY from the DX feed ASSY.

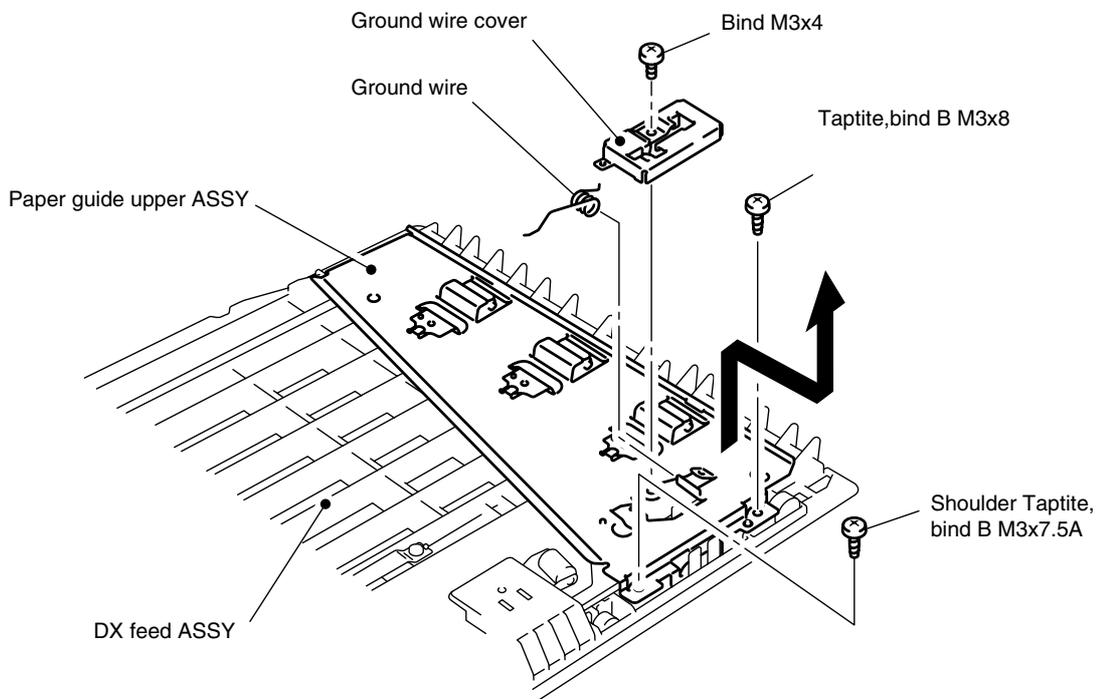


Fig. 4-27

- (4) Remove the roller holder using a pair of tweezers from the paper guide upper ASSY while pushing the pressure roller slightly down to assist the roller holder being released.

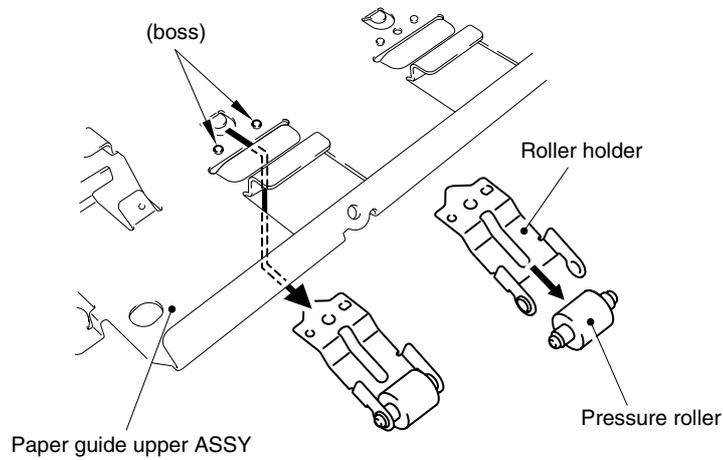


Fig. 4-28

- (5) Turn the DX feed ASSY upside down and remove the bind B M3x5 Taptite screw from the DX feed ASSY.
- (6) Turn the DX feed ASSY the correct way up and remove the side regist roller holder and the pressure rollers using a pair of tweezers by releasing the boss from the left guide plate ASSY. Remove the two pressure rollers from the side regist roller holder.

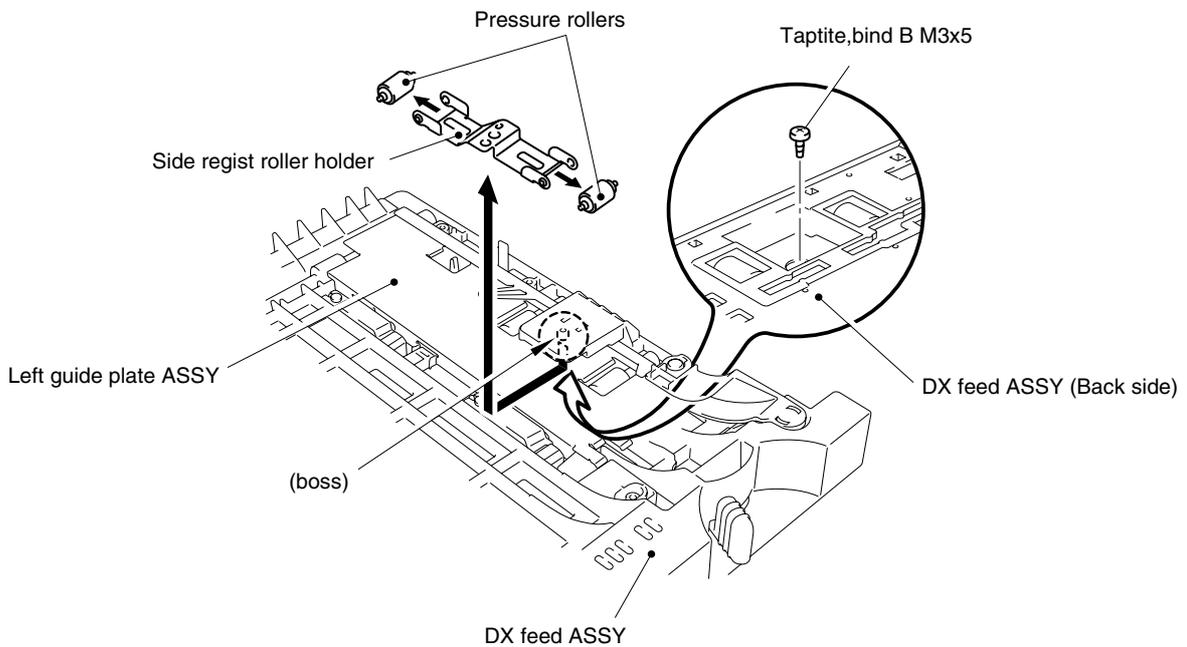
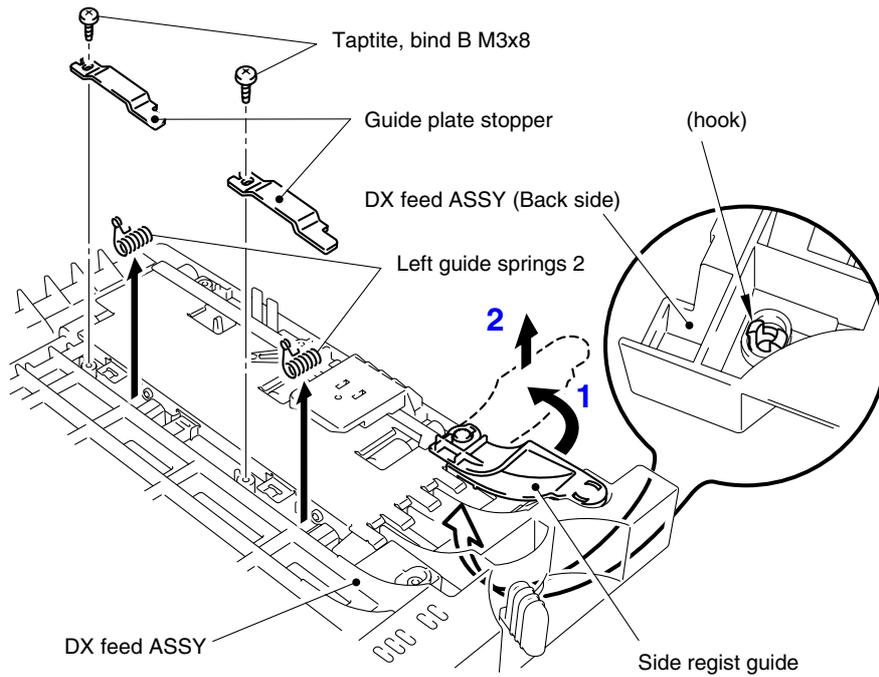


Fig. 4-29

- (7) Remove the bind B M3x8 Taptite screw from the guide plate stopper and remove the left guide spring 2.
- (8) Remove the side regist guide from the DX feed ASSY by releasing the hook at the bottom side of the ASSY using a pair of long nose pliers.

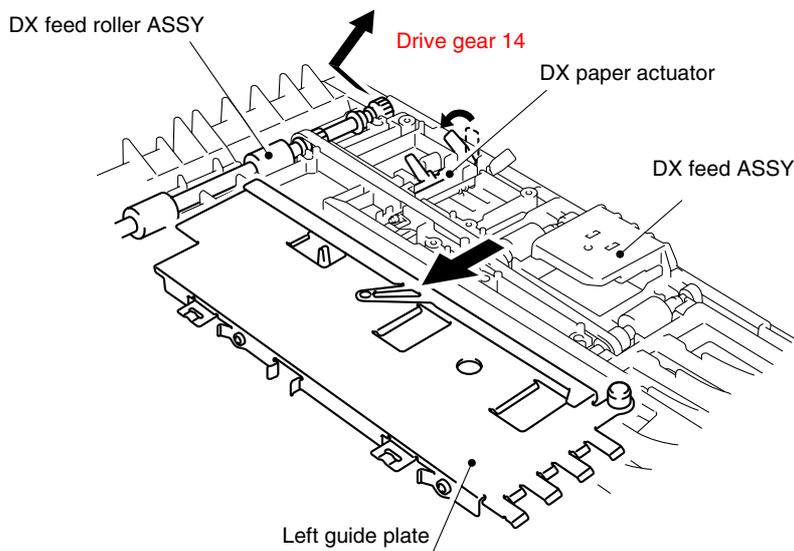
**NOTE:**

“ERROR 41” may occur if the left guide springs are not fitted correctly. See [subsection 2.2 ‘Service Calls’](#) in [CHAPTER 6](#) for more information on “ERROR 41”.



**Fig. 4-30**

- (9) Remove the left guide plate from the DX feed ASSY while pushing down the DX paper actuator forward and then release the Drive gear 14 to remove the DX feed roller ASSY.



- (10) Fig. 4-31 Remove the side register roller from the DX feed ASSY and then remove the T-belt B40S2M142 and the T-belt B40S2M224.

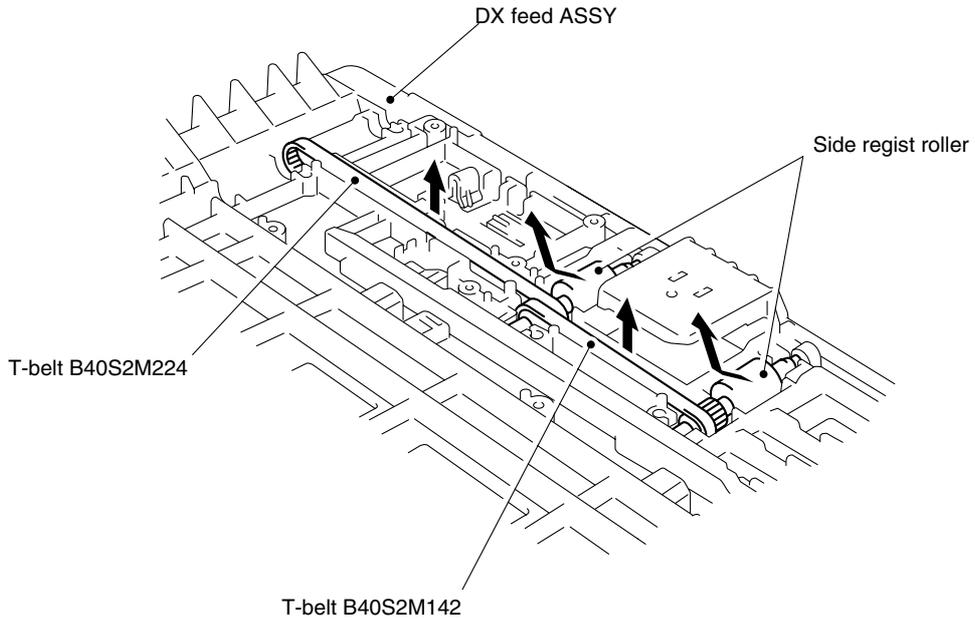


Fig. 4-32

- (11) Remove the DX paper actuator and the guide actuator from the DX feed ASSY, and then remove the paper actuator spring and the guide actuator spring from the each actuator.

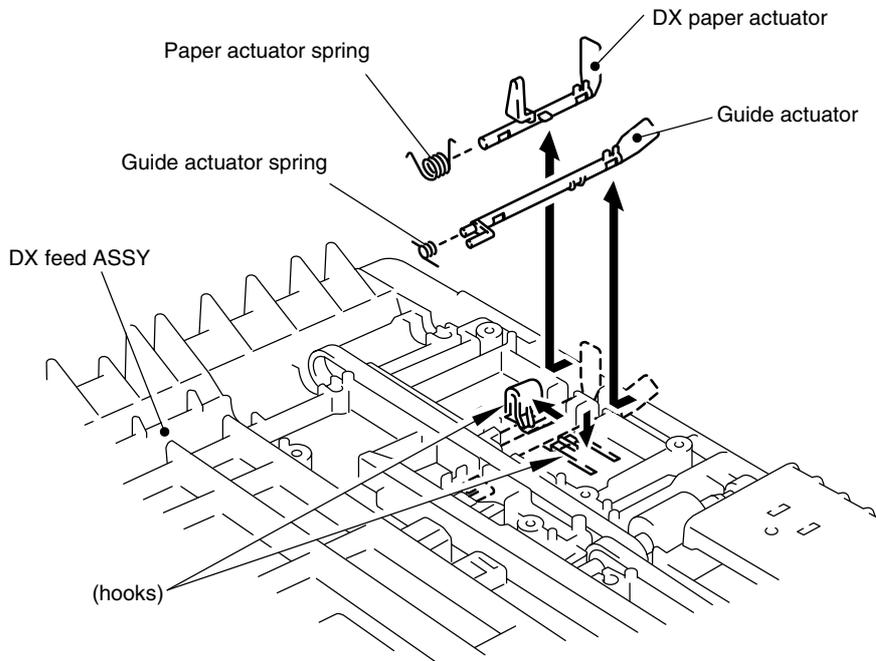


Fig. 4-33

### 3.7 Rear Cover

- (1) Open the rear cover.
- (2) Release the hooks on the right and left sides of the DX rear chute to release the DX outer chute ASSY from the rear cover.

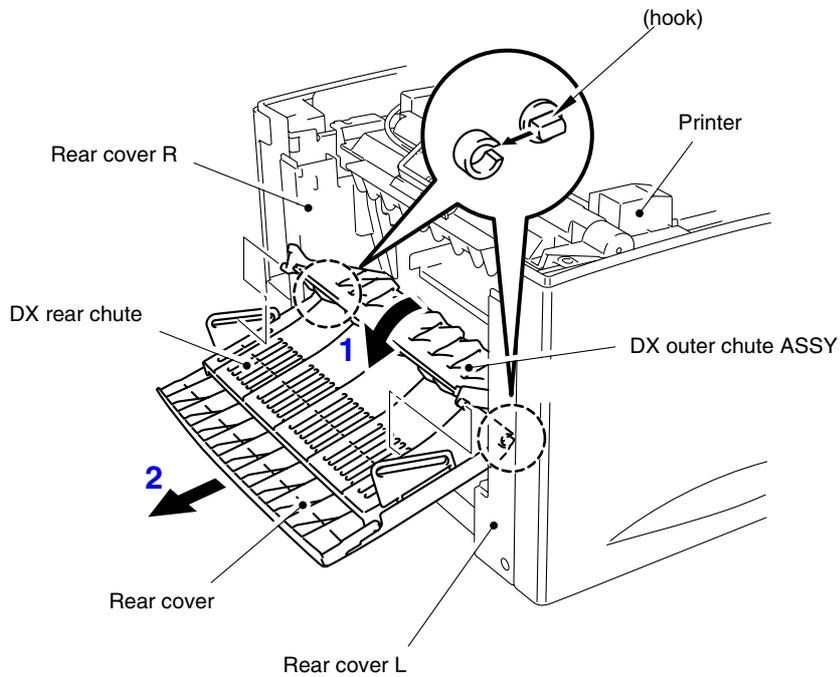


Fig. 4-34

- (3) Remove the DX outer chute ASSY from the printer by releasing the hooks at the right and left sides of the printer.

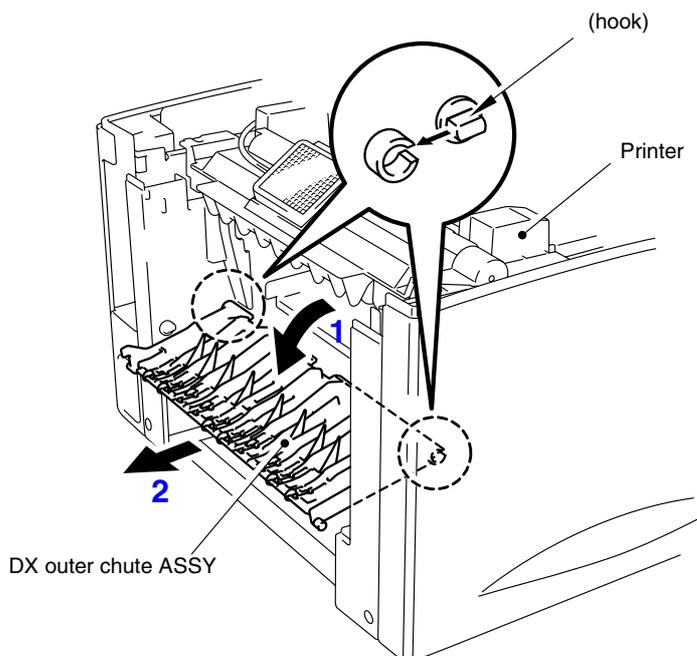


Fig. 4-35

- (4) Remove the flap 2 spring from the flap 2 and then remove the flap 2 from the DX outer chute.

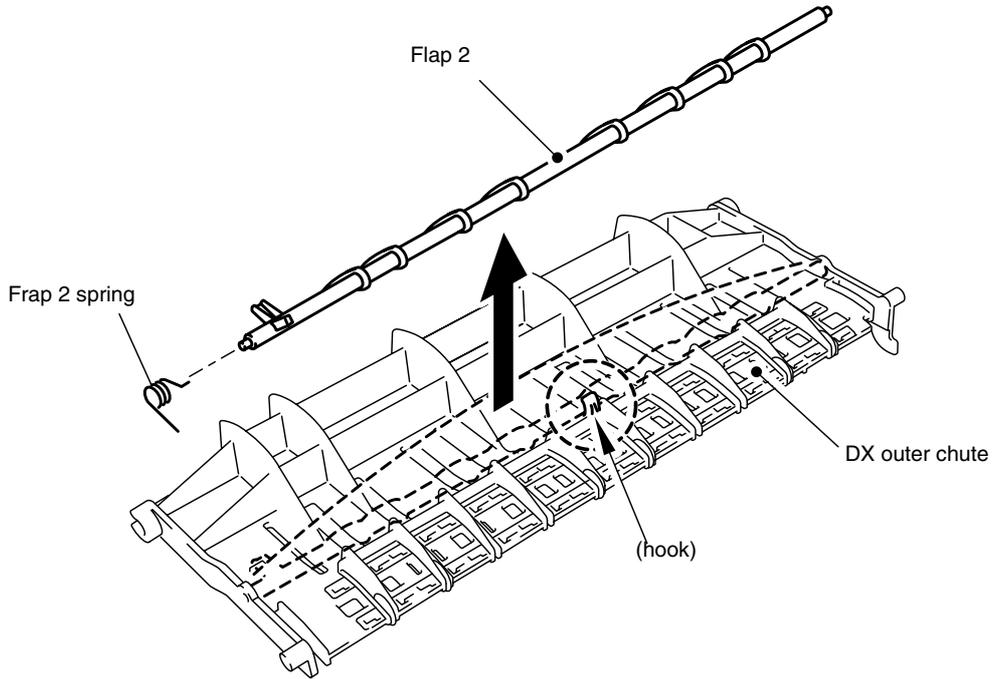


Fig. 4-36

- (5) Remove rear cover from the printer by releasing the hooks at the right and left sides of the printer and then remove the DX rear chute from the rear cover C.

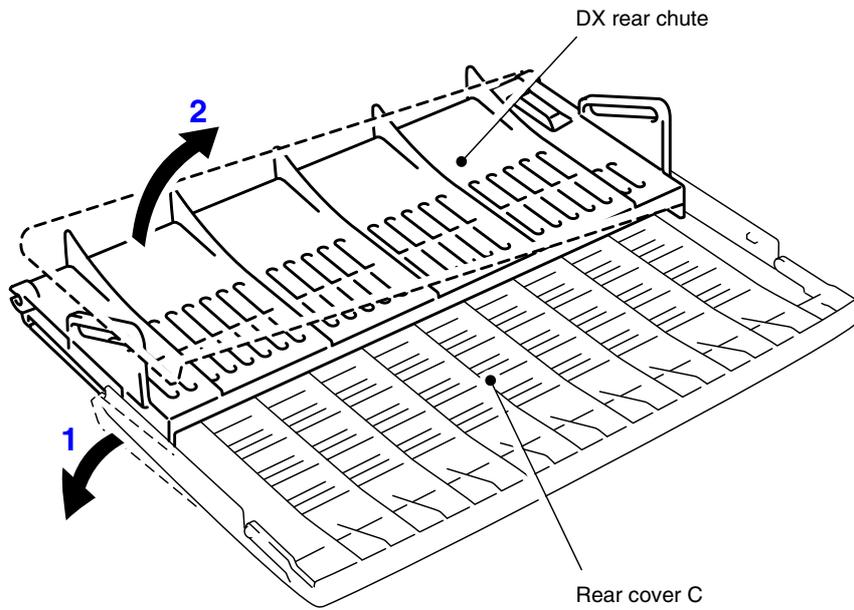


Fig. 4-37

### 3.8 Rear Cover R & L / Side Cover R & L

- (1) Remove the two shoulder screws to remove the rear cover R and rear cover L from the printer.

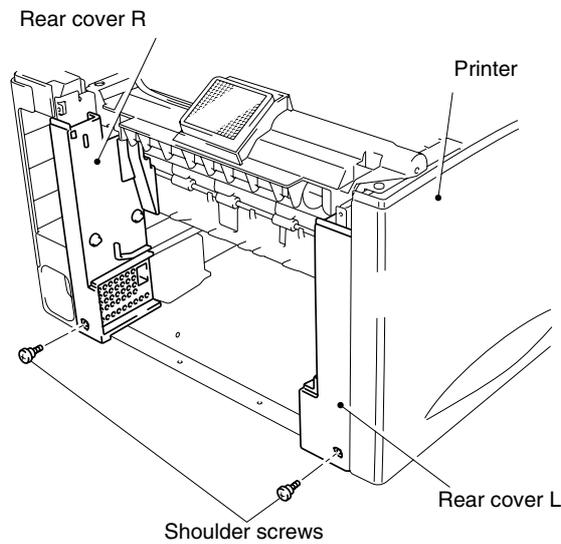
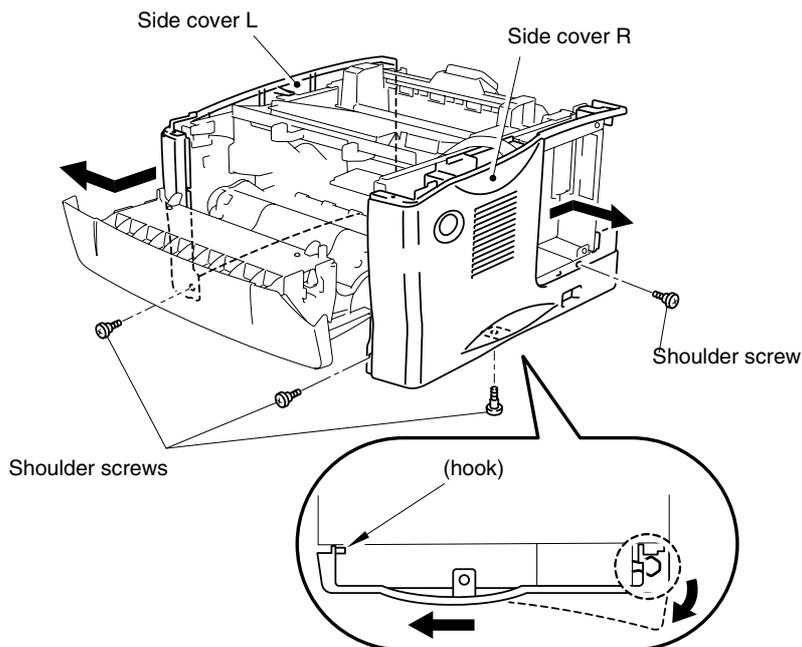


Fig. 4-38

- (2) Remove the three shoulder screws at the side and the back of the side cover R.
- (3) Hold slightly up the back side of the side cover R while releasing the hook and remove the side cover R from the printer while pulling outward, taking care not to break the cover.
- (4) Remove the shoulder screw to remove the side cover L from the printer by releasing the hook at the bottom of the cover.

**! CAUTION:**

*Use caution not to bend the hooks of the interface when handling the side cover R.*



**Fig. 4-39**

### 3.9 MP Cover ASSY

- (1) Open the MP cover ASSY. Remove the MP paper guide 1 ASSY from the front cover by releasing two hooks and pulling slightly upward.

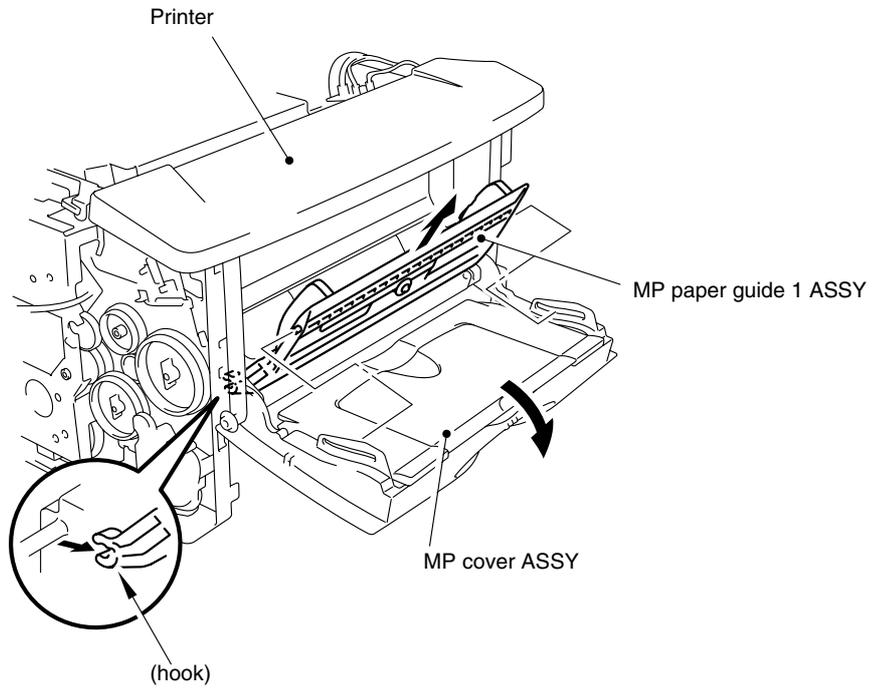


Fig. 4-40

- (2) Remove the cup B M3x6 Taptite screw to remove the side guide gear from the MP paper guide 1 ASSY.
- (3) Remove the MP side guide R and MP side guide L from the ASSY.

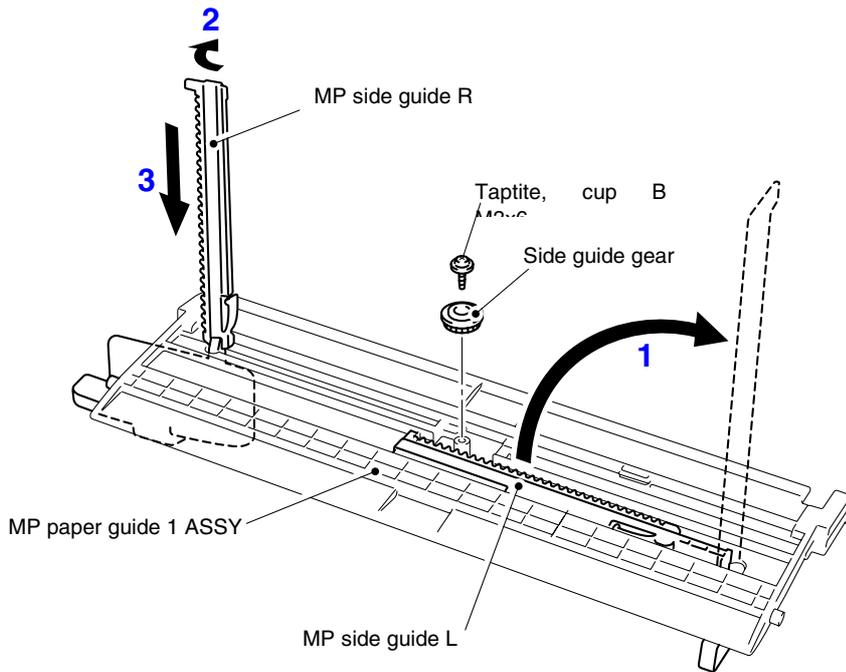


Fig. 4-41

- (4) Remove the MP cover ASSY from the printer.

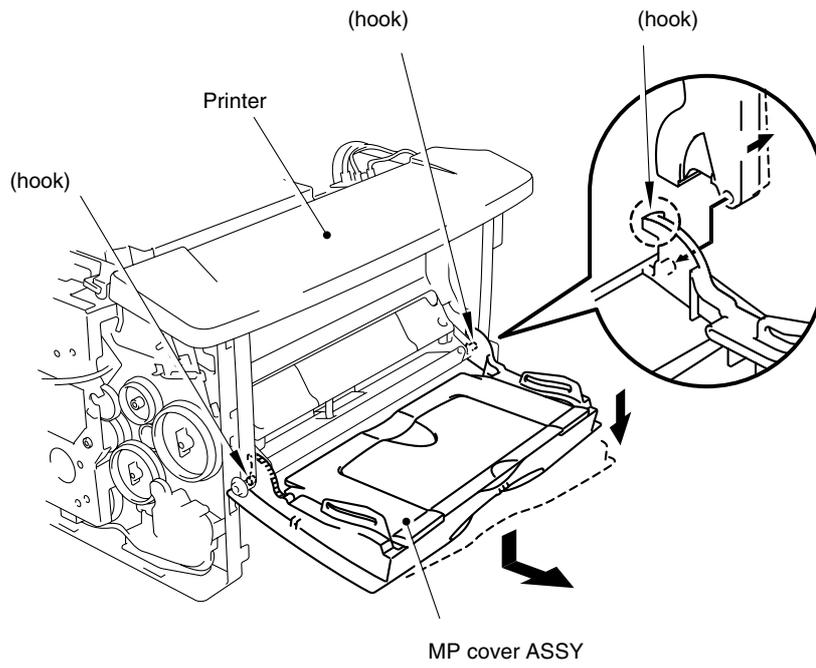


Fig. 4-42

- (5) Remove the MP side guide 2 from the MP cover and then MP side guide 3 from the MP side guide 2.

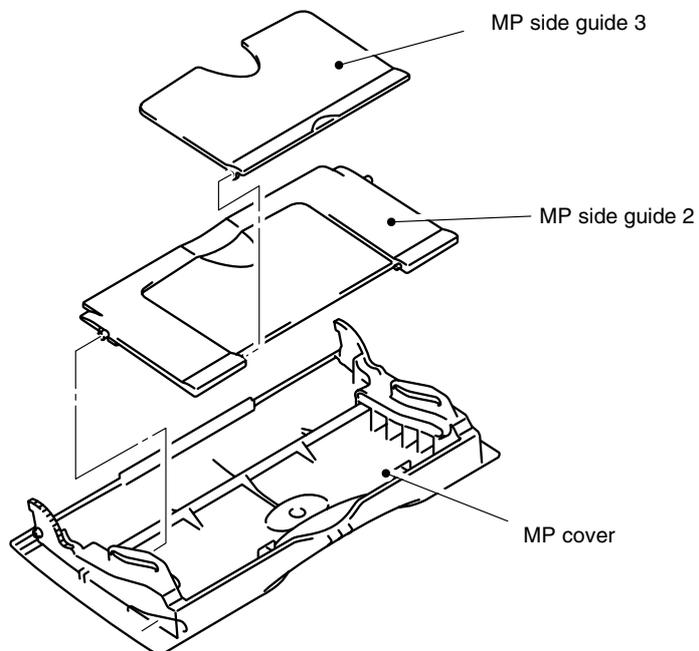


Fig. 4-43

### 3.10 Process Unit Cover ASSY

- (1) Release the hooks while pushing the process unit cover ASSY slightly inward to remove the cover by pulling it forward.

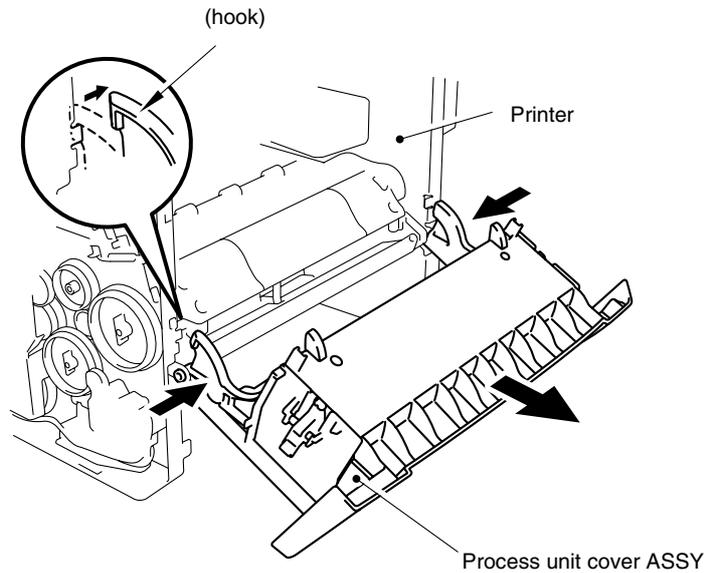


Fig. 4-44

- (2) Remove the two cup B M3x8 Taptite screws to remove the process unit cover from the process unit cover ASSY.
- (3) Remove the lock lever spring from the process unit cover ASSY and then the P cover lock lever R and P cover lock lever L from the cover.

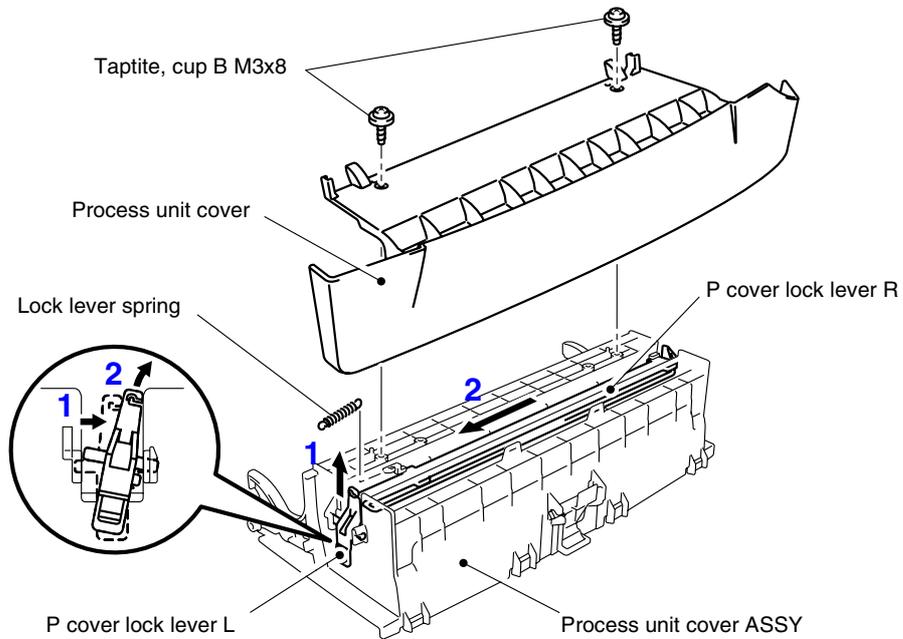


Fig. 4-45

### 3.11 Laser Unit

- (1) Loosen the cup S tite 3x6 screw to release the fan relay PCB ASSY and the harness on the fan relay PCB ASSY from the main unit.

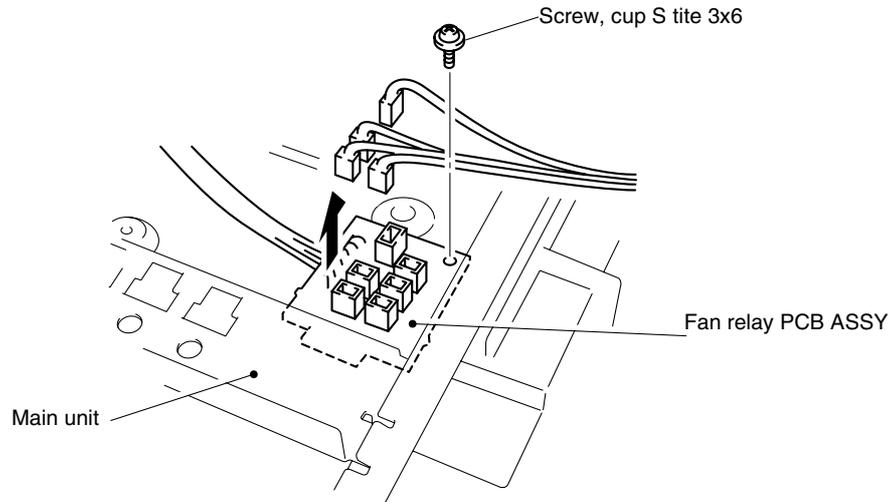


Fig. 4-46

- (2) Remove the three cup S M3x16 Taptite screws.
- (3) Push the P harness cover to the right to release it from the hook and remove the P harness cover.
- (4) Disconnect the LD harness and the polygon motor connector.
- (5) Taking care not to touch the lens and mirror, remove the laser unit.

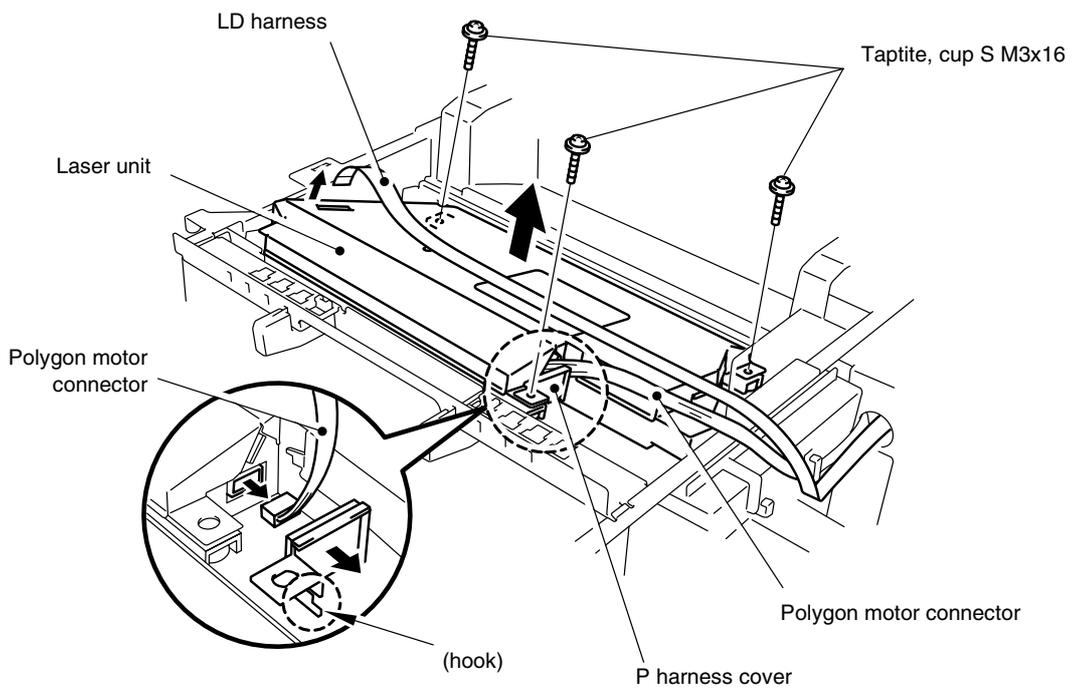


Fig. 4-47

**CAUTION:**

- Never touch the reflect mirror and lens inside the laser unit. If there is any dirt or dust on the mirror or lens, blow it off using an air gun.
- Never touch the scanner window on the printer body. If there is any dirt or dust on the window, blow it off using an air gun. If cleaning the underside of the scanner window, wipe off dirt or dust with soft clean paper. Refer to [subsection 3.3 'Cleaning the Scanner Window'](#) in CHAPTER 5.

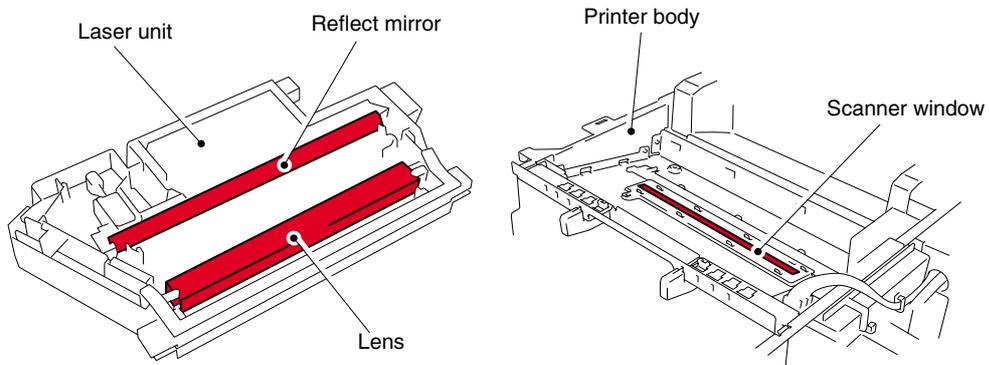


Fig. 4-48

### 3.12 Fixing Unit

- (1) Place the main frame on its base so that the rear side is facing you.
- (2) Disconnect the two connectors of the heater harness and release the harness from the hooks on the right side of the fixing unit.
- (3) Remove the shoulder screw and the cup S M3x8 Taptite screw securing the fixing unit.
- (4) Remove the fixing unit from the main frame.

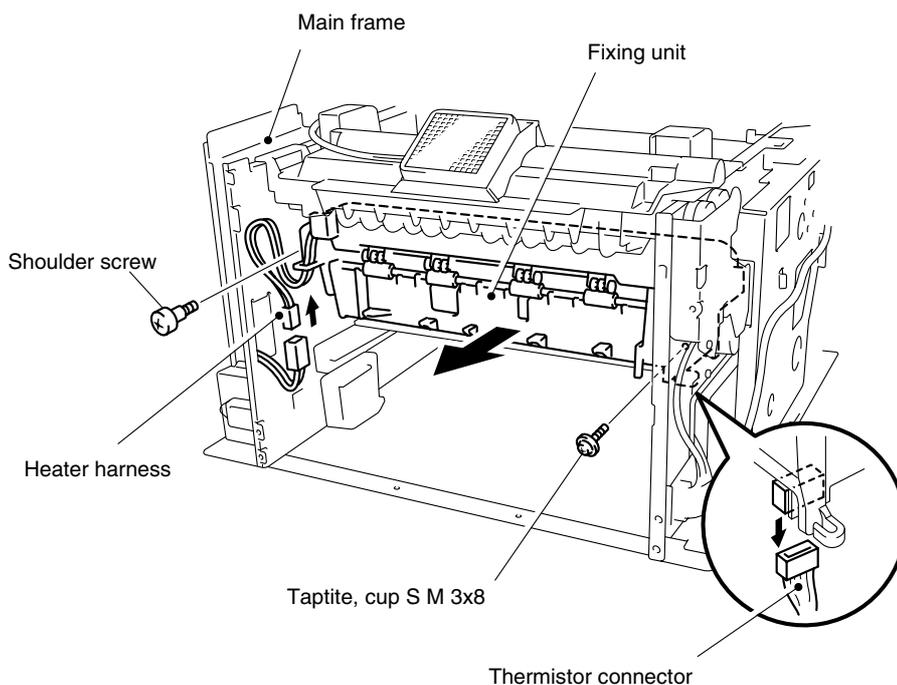


Fig. 4-49

- (5) Remove the three bind B tite 3x10 screws to remove the FU front paper guide from the fixing unit .

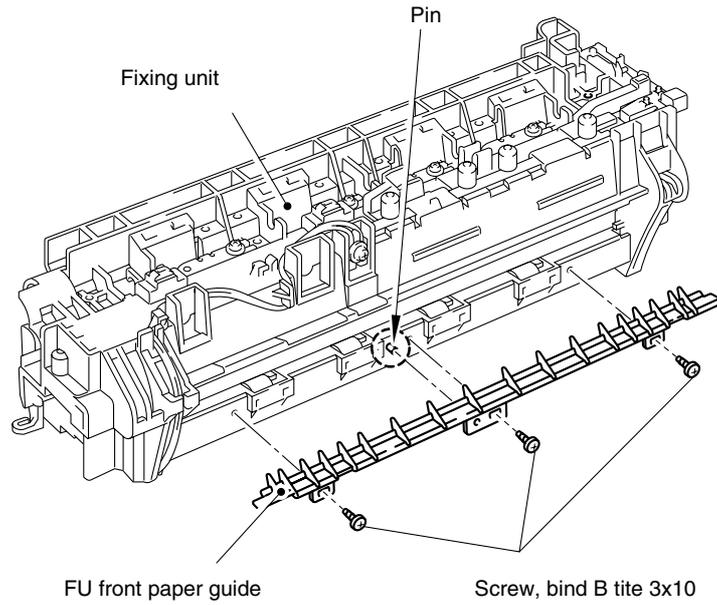


Fig. 4-50

- (6) Remove the two cup B M3x20 Taptite screws from the top of the fixing unit frame.
- (7) Release the thermistor harness from the hooks.

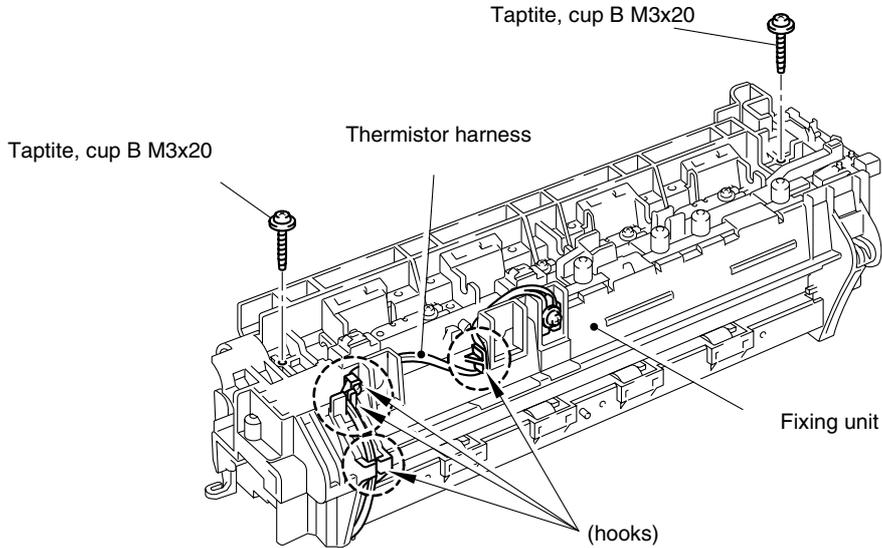


Fig. 4-51

- (8) Remove the FU frame upper from the FU frame lower by releasing hooks as shown in the figure below.

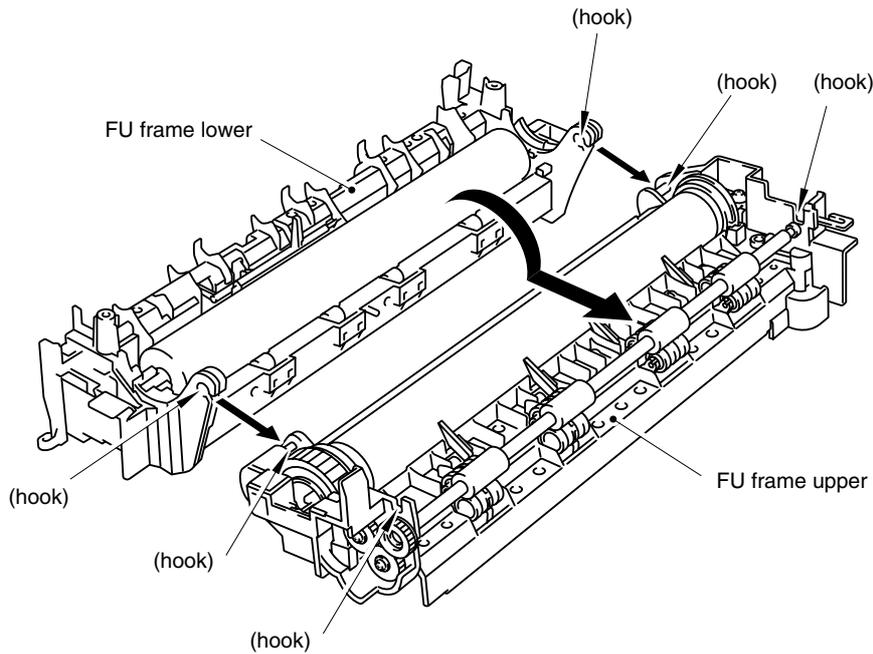


Fig. 4-52

- (9) Remove the one pan B M3x10 Taptite screw securing the halogen lamp connector plate at the drive unit side of the FU frame upper and then loosen the pan (washer) M2.6x6 screw at the other side.
- (10) Disconnect the halogen lamp connector from the FU frame upper.
- (11) Lift the right hand end of the heat roller 25 HE and remove the halogen heater lamp from the heat roller 25 HE.

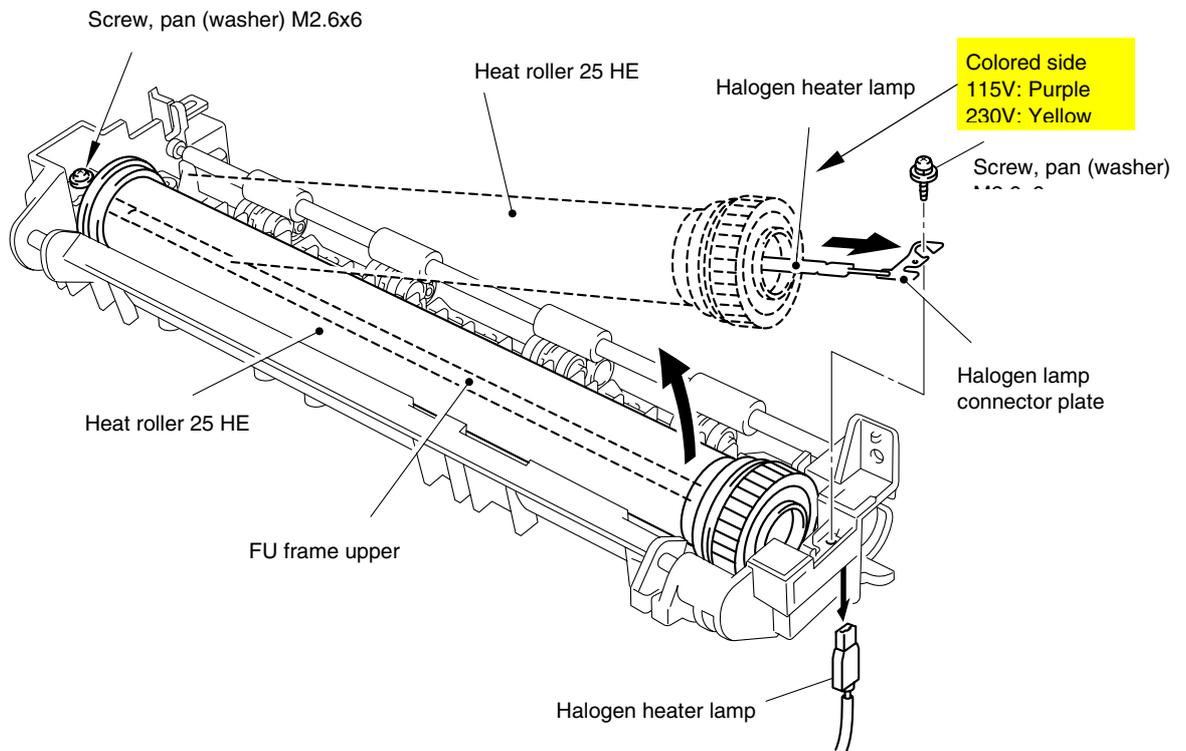


Fig. 4-53

**NOTE:**

*When re-assembling the halogen heater lamp, ensure that the direction of the halogen heater lamp is correct referring to the figure above.*

**! CAUTION:**

- Never touch the surface of the halogen heater lamp.
- When securing the screw to assemble the halogen lamp connector plate, ensure you use the plastic jig as shown in the figure below to avoid damaging the edge of the halogen heater lamp.

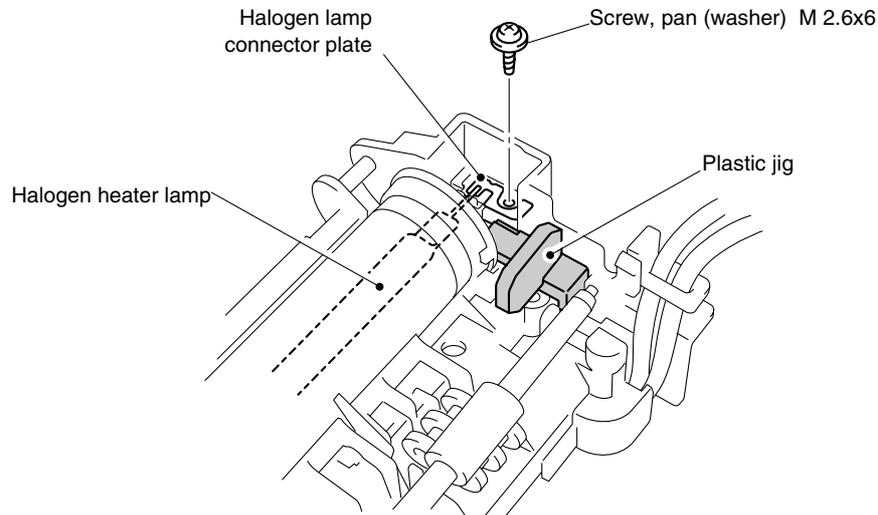


Fig. 4-54

(12) Lift and remove the heat roller 25 HE. The HR gear 34 HE will also come off.

(13) Remove the HR bearing 25 from the left hand end of the heat roller 25. To remove the HR bearing 25 at the gear side, first remove the two washers, then remove the bearing.

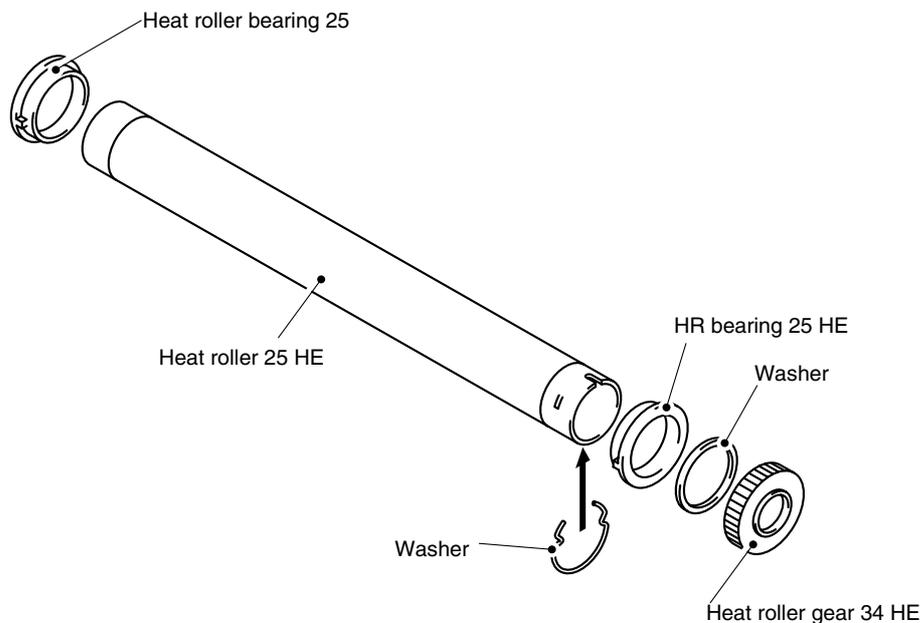


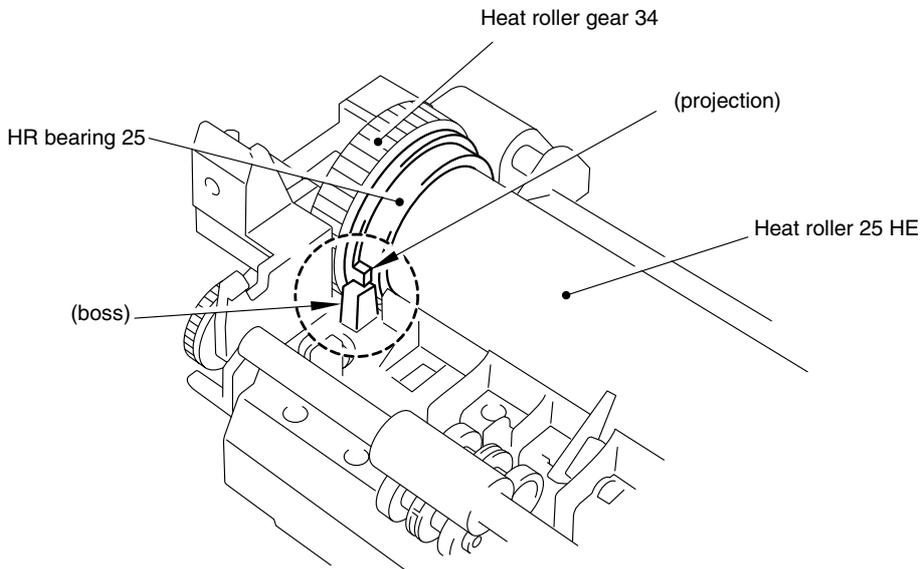
Fig. 4-55

**! CAUTION:**

*Never touch the surface of the heat roller.*

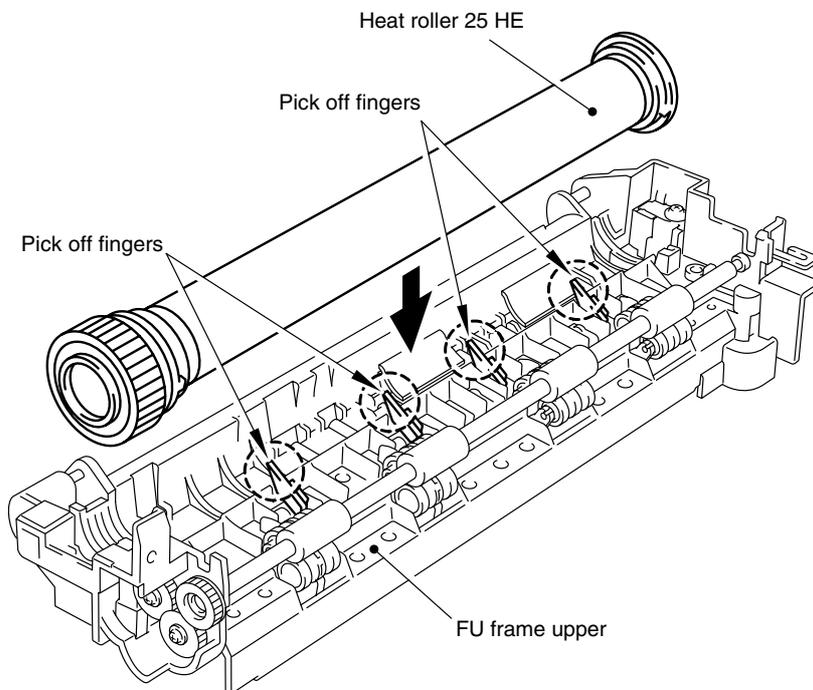
**NOTE:**

- When re-assembling the heat roller 25 HE to the FU frame upper, place the two projections at the right hand side of the roller onto the bosses on the frame as shown in the figure below.



**Fig. 4-56**

- When re-assembling the heat roller 25 HE to the FU frame upper, ensure you do not damage the heat roller 25 HE with the four pick off fingers on the FU frame upper.



**Fig. 4-57**

- (14) Remove the pressure roller 25 from the FU frame lower by gently levering the right hand side upwards to release it from the PR bearing and then sliding it to the right to remove it.
- (15) Remove the five cleaner pinch roller ASSY complete with the pick off finger cleaner spring and the thermistor cleaner spring for each from the FU frame lower by lifting it upwards until the spring releases from the cover.
- (16) Remove the pick off finger cleaner spring and the thermistor cleaner spring from the each cleaner pinch roller ASSY.

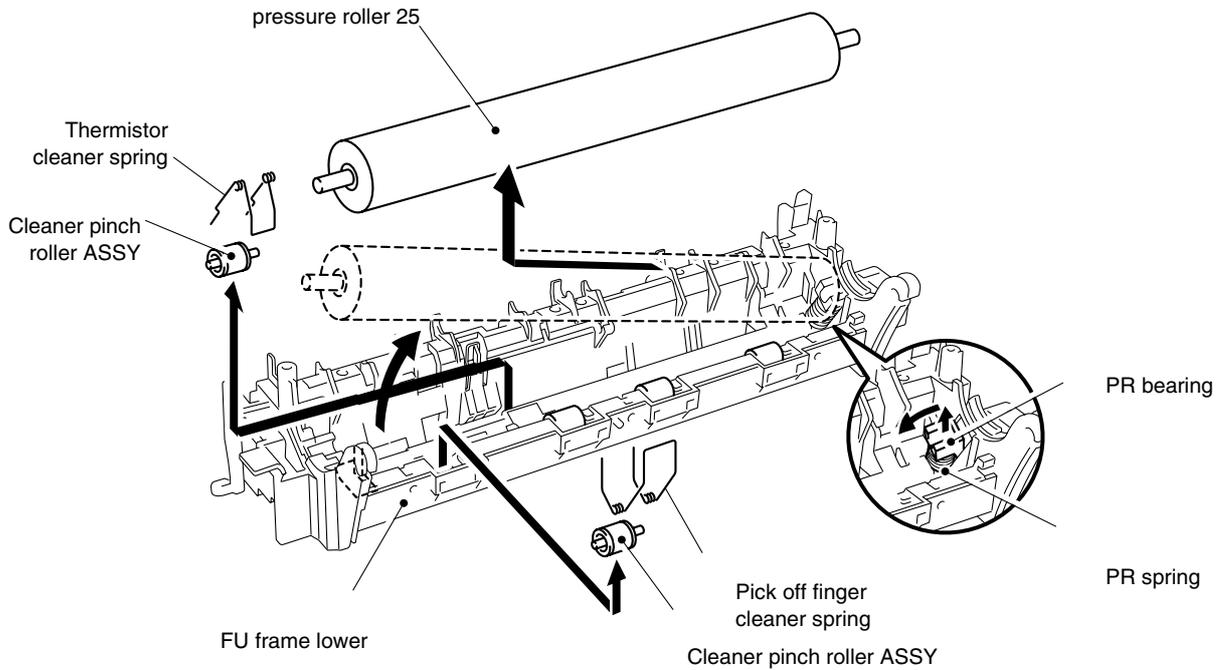


Fig. 4-59

**NOTE:**

- When re-assembling the cleaner pinch roller ASSY complete with the cleaner spring onto the FU frame lower, ensure the direction of the roller is correct referring to the figure above.
- Ensure that the both springs are seated correctly in the locating channel and does not protrude from either end.
- Ensure also that the proper spring is fixed to the each cleaner pinch roller ASSY because the both springs are NOT identical with each other.

- (17) Remove the bind B tite 3x10 screw to remove the eject sensor PCB ASSY.
- (18) Disconnect the connector for the thermistor relay PCB ASSY.
- (19) Remove the bind B tite 3x10 screw to remove the thermistor relay PCB ASSY from the FU frame lower.

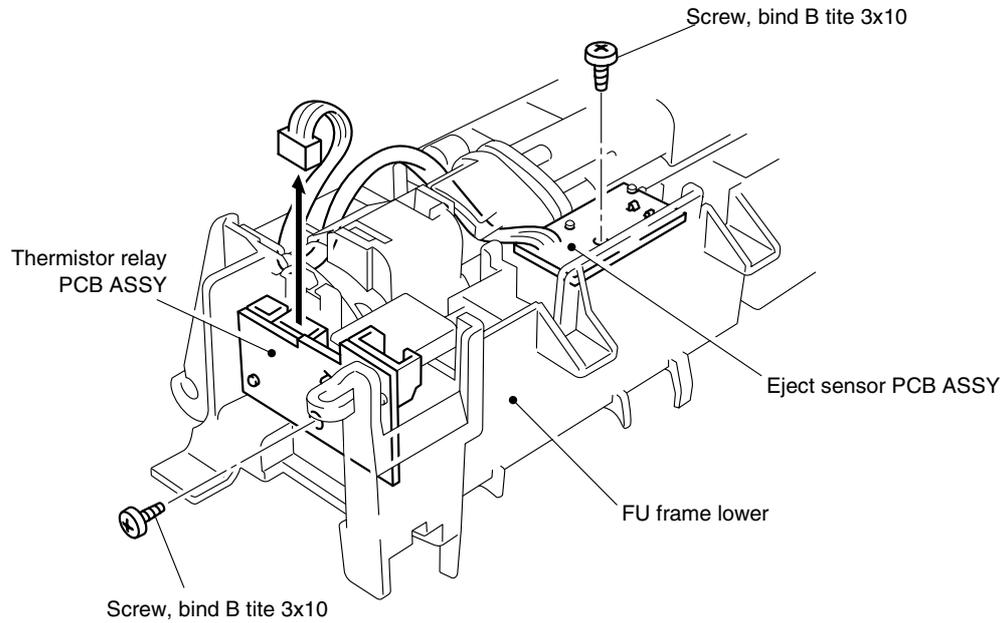


Fig. 4-60

- (21) Release the paper eject actuator from the hook on the FU frame lower, and then slide the paper eject actuator to the right direction to remove the paper eject actuator and the eject actuator spring from the FU frame lower.

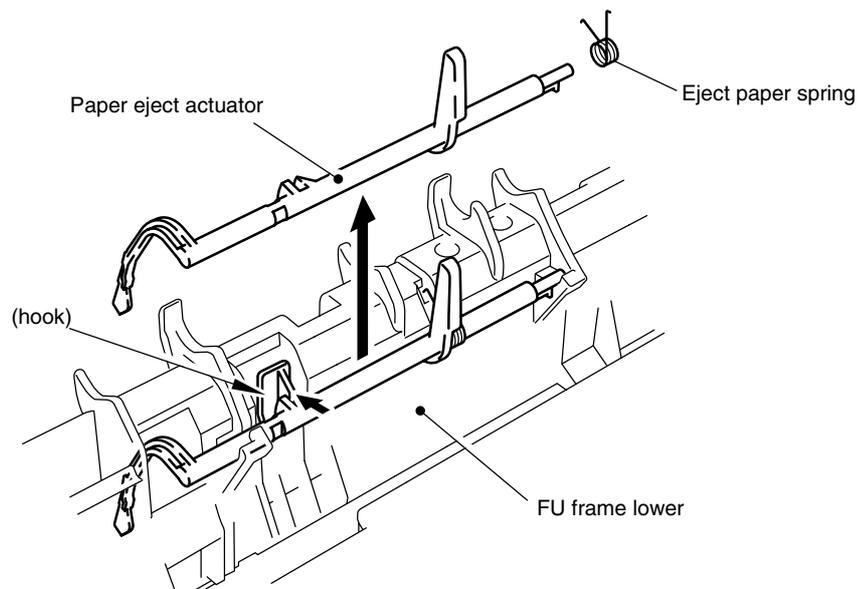
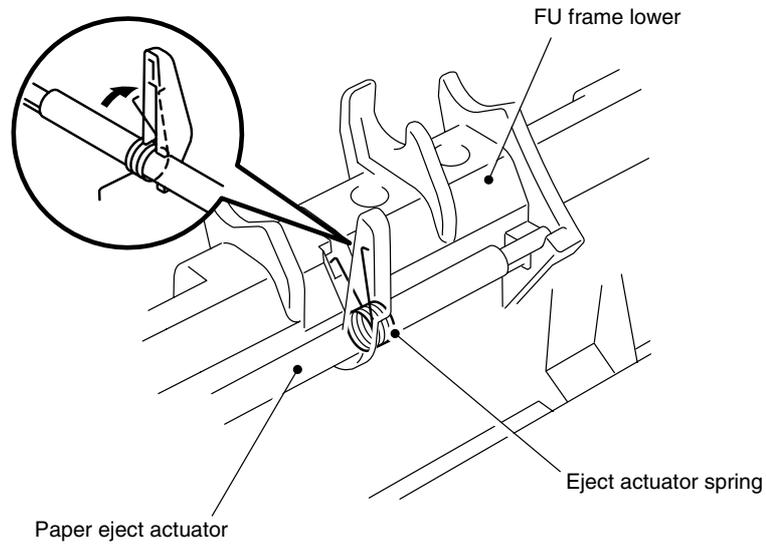


Fig. 4-61

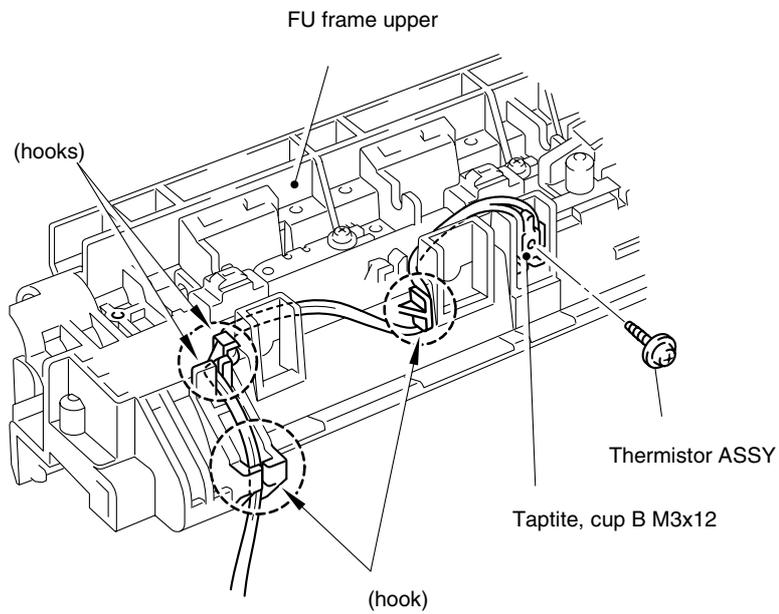
**NOTE:**

When re-assembling the paper eject actuator and the eject actuator spring to the FU frame lower, ensure the paper eject actuator is seated correctly in the locating channel referring to the figure below;



**Fig. 4-62**

(22) Release the thermistor harness from the hooks on the FU frame upper and then remove the one cup B M3x12 Taptite screw and remove the thermistor ASSY.



**Fig. 4-63**

**NOTE:**

When re-assembling the thermistor to the FU frame upper, ensure the direction of the thermistor is correct referring to the figure below;

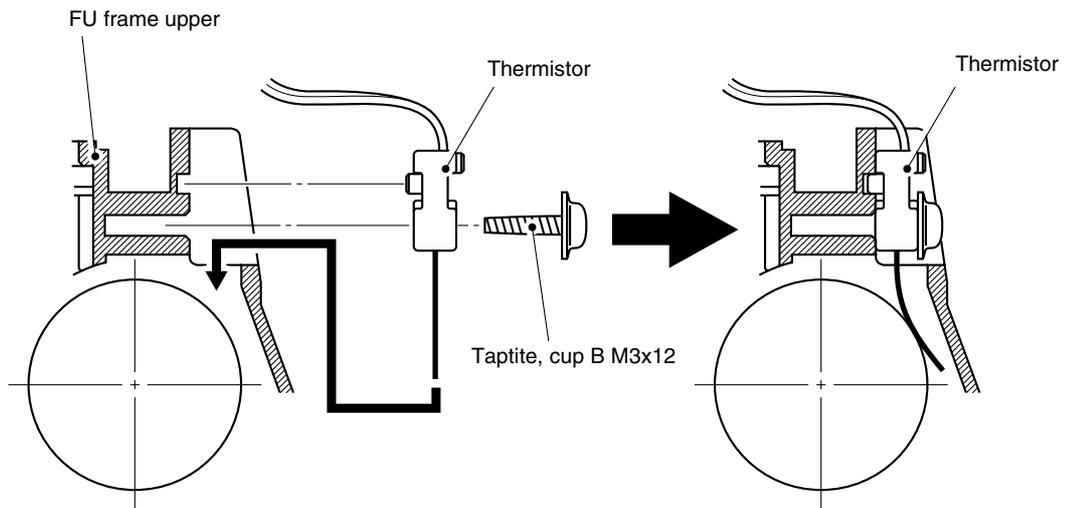


Fig. 4-64

(23) Remove the B 2.6x10 Taptite screw to remove the idle gear 13H. Hold slightly up the right end of the eject roller and then remove the left end of the roller from the hook first, then remove the eject roller from the FU frame upper.

**NOTE:**

When removing the left end of the eject roller, align the protrusion of the hook of the frame with the concave part of the roller, and then pull the roller through underneath the protrusion.

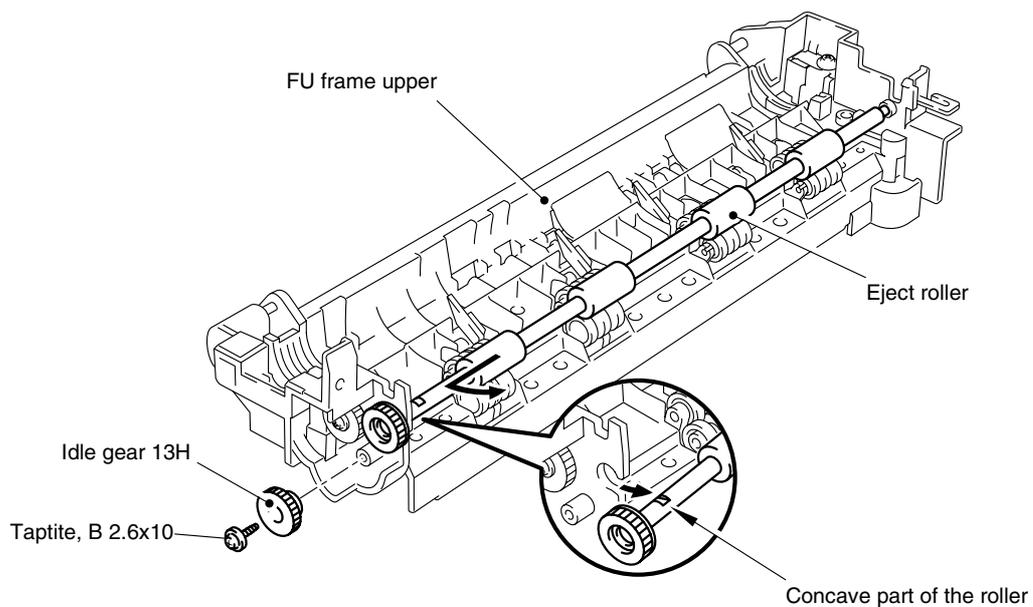


Fig. 4-65

- (24) Remove the eject pinch roller F (8pcs.) with the eject pinch roller holder R (2pcs.) and the eject pinch roller holder L (2pcs.) from the FU frame upper, and then remove the eject pinch spring (4pcs.).

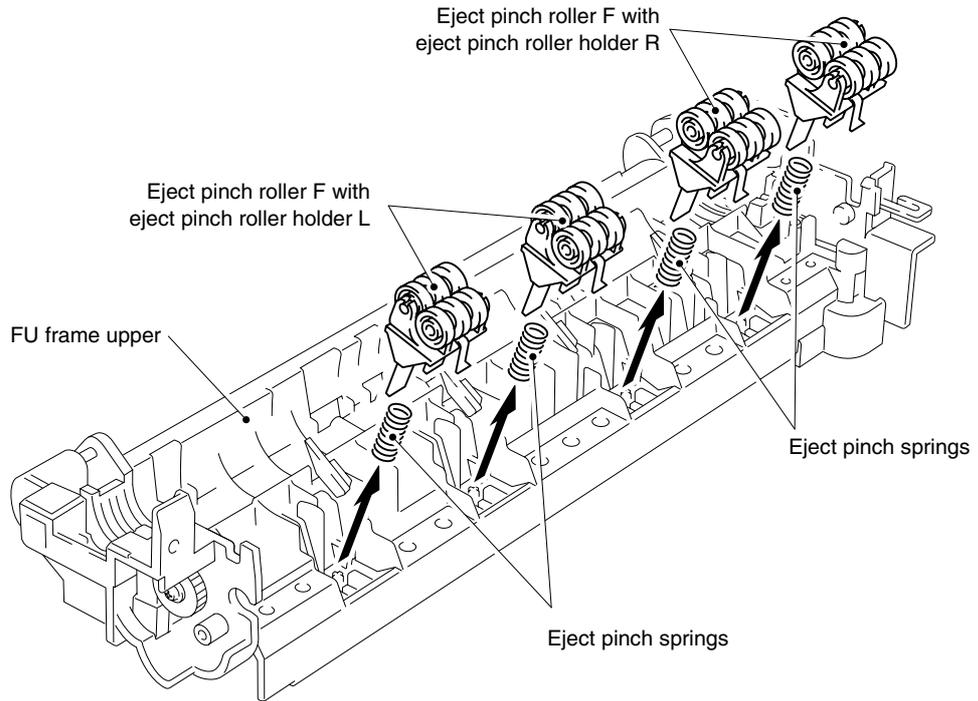


Fig. 4-66

- (25) Remove the four eject pinch roller F from the two eject pinch roller holder R and the four eject pinch roller F from the two eject pinch roller holder L.

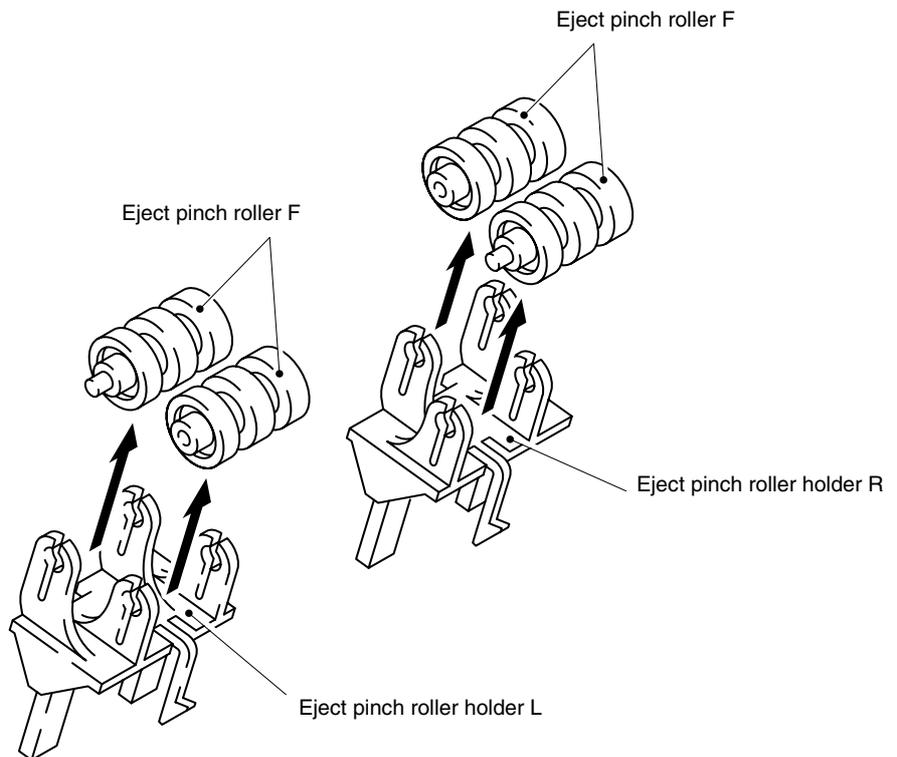


Fig. 4-67



(26) Release the harness from the hooks on the FU frame upper. Turn the frame up-side down. Remove the cup B M3x6 Taptite screw to remove the pick off finger holder plate and then remove the pick off finger using a piece of tweezers.

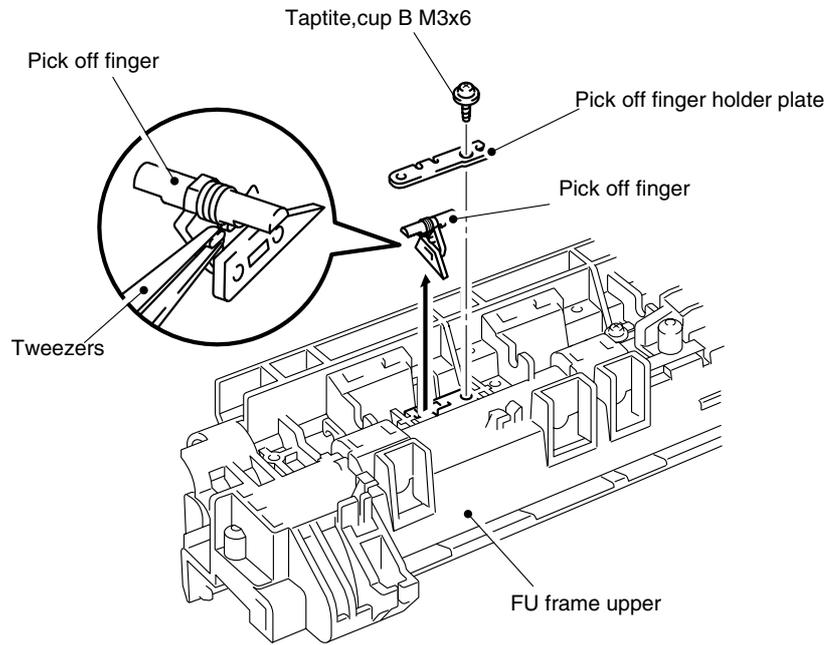


Fig. 4-68

### 3.13 Paper Pick-up Roller ASSY

**NOTE:**

*Be sure to remove all the covers before removing the paper pick-up roller ASSY.*

- (1) Place the main frame upside down.
- (2) Remove the bearing R from the front chute ASSY.
- (3) Shift the paper pick-up roller ASSY with two roller collars to the left (the bearing R side) to release from the paper pick-up roller shaft.
- (4) Remove the paper pick-up roller ASSY and the roller collars from the front chute ASSY.
- (5) Remove the bearing L from the front chute ASSY.

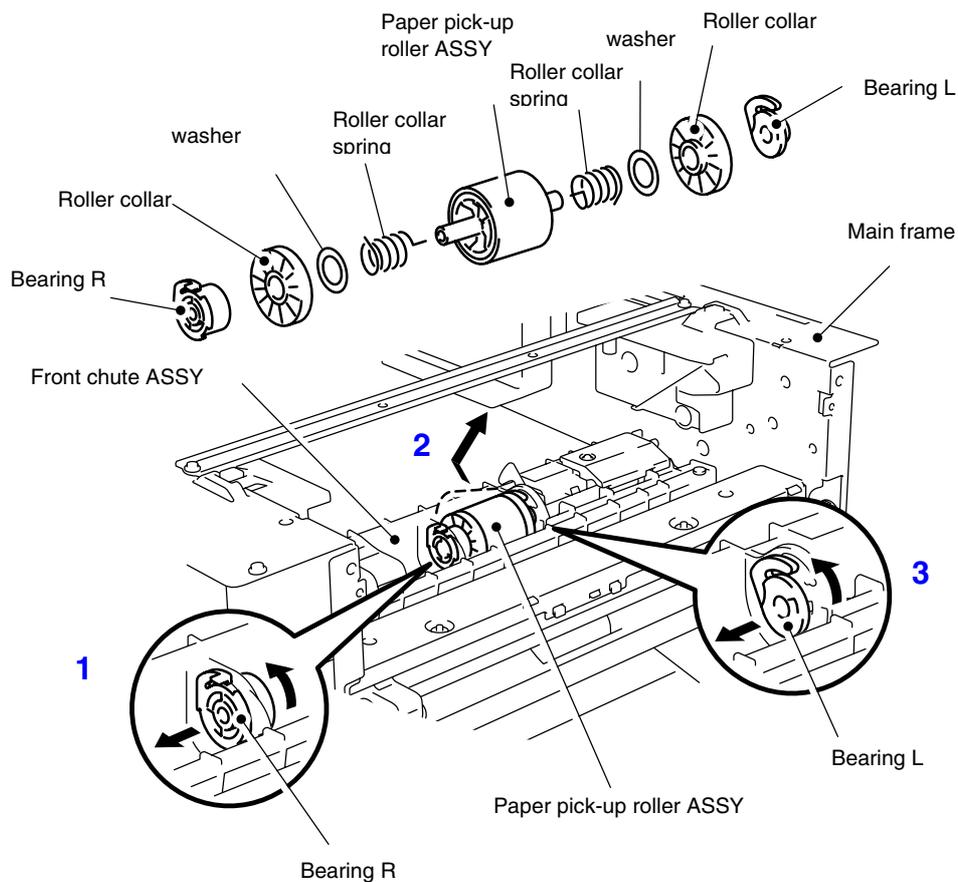


Fig. 4-69

### 3.14 Feed MP Unit

- (1) Turn the main frame the right way up.
- (2) Open the MP roller cover.
- (2) Remove the bearing R from the MP chute ASSY.
- (3) Shift the paper pick-up roller ASSY with two roller collars to the left (the bearing R side) to release from the MP paper pick-up roller shaft.
- (4) Remove the paper pick-up roller ASSY and the roller collars from the MP chute ASSY.
- (5) Remove the bearing L from the MP chute ASSY.

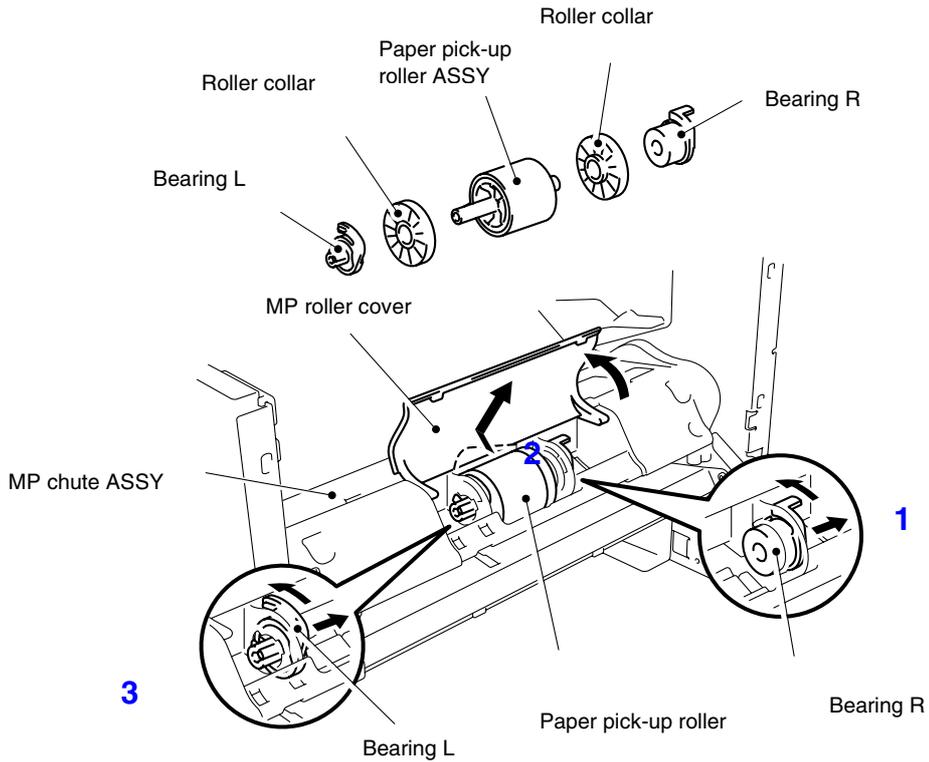


Fig. 4-70

- (6) Remove the separation plate ASSY.
- (7) Remove the two MP pressure spring 25.
- (8) Remove the two bind B tite 3x10 screws from the MP chute cover.
- (9) Release the two bosses at the both ends of the MP pressure plate ASSY using a flat screwdriver, and then remove it from the main frame.

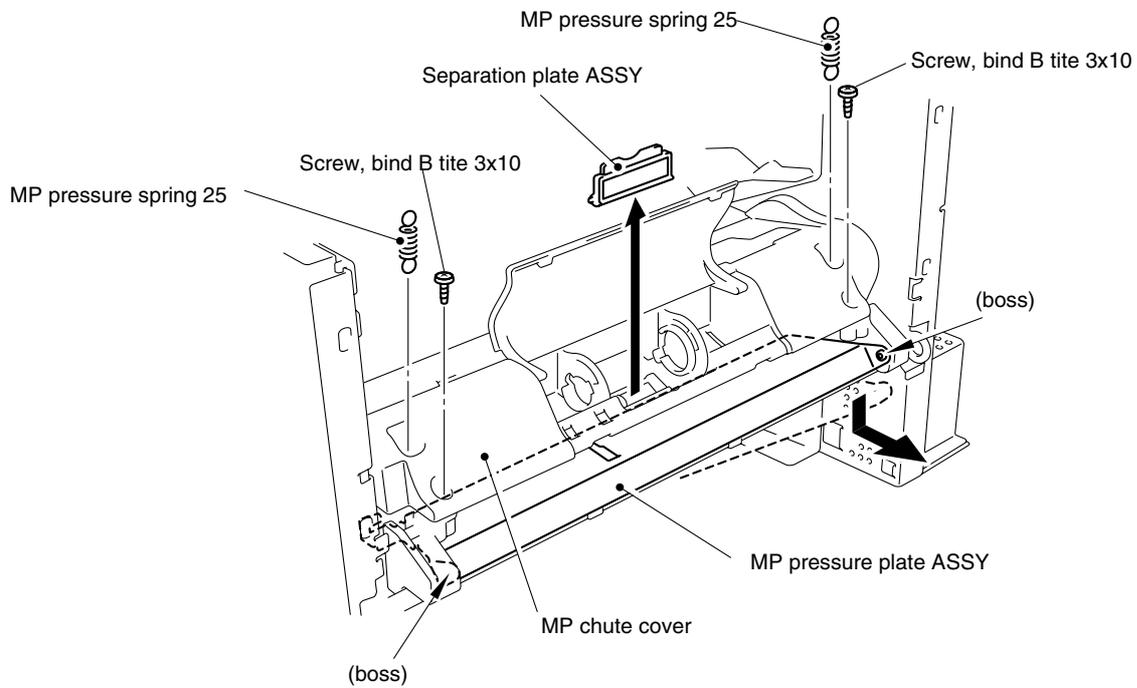


Fig. 4-71

### 3.15 Drive Unit

- (1) Place the printer body carefully on its left hand side so that the drive unit is at the top.
- (2) Remove the three cup S tite 3x6 screws securing the reversing drive frame unit.
- (3) Disconnect the harness connector and remove the bind M3x4 screw to remove the reversing switch solenoid from the reversing drive frame unit.

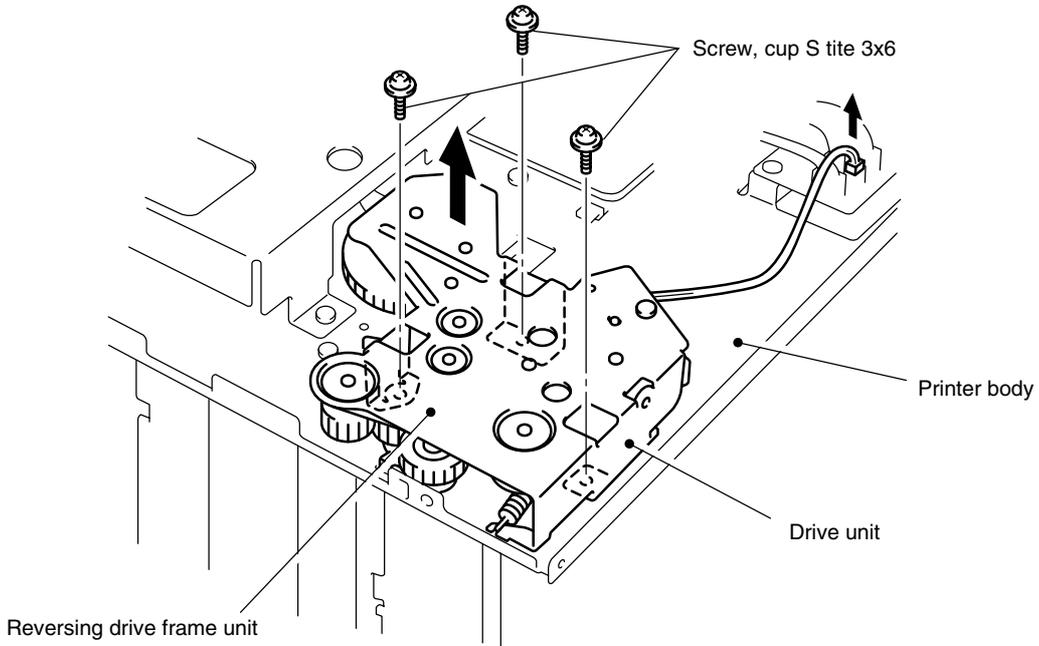


Fig. 4-72

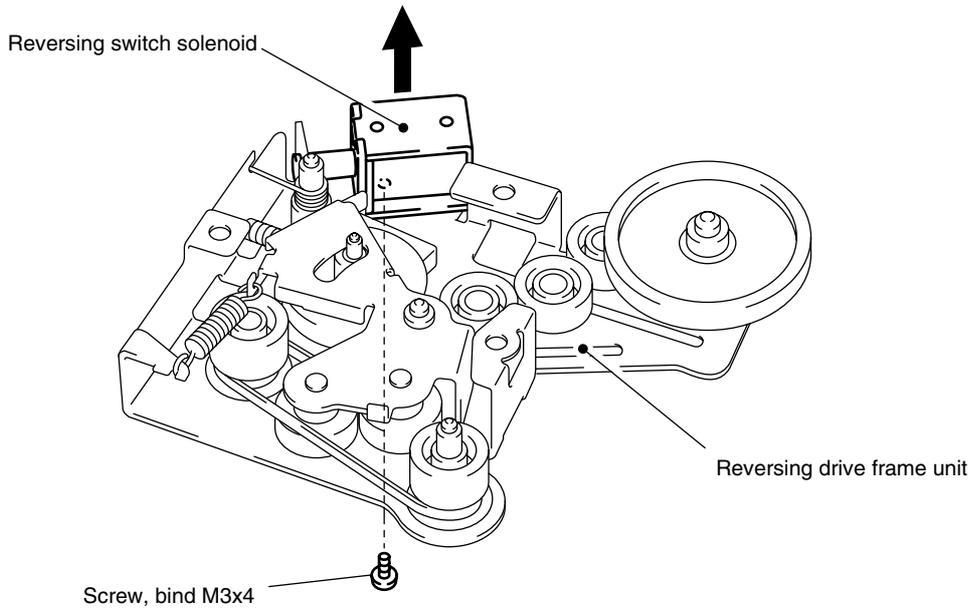


Fig. 4-73

- (4) Release the hook of the gear to remove the switch arm ASSY and then remove the T-belt by releasing the hook of the two gears.

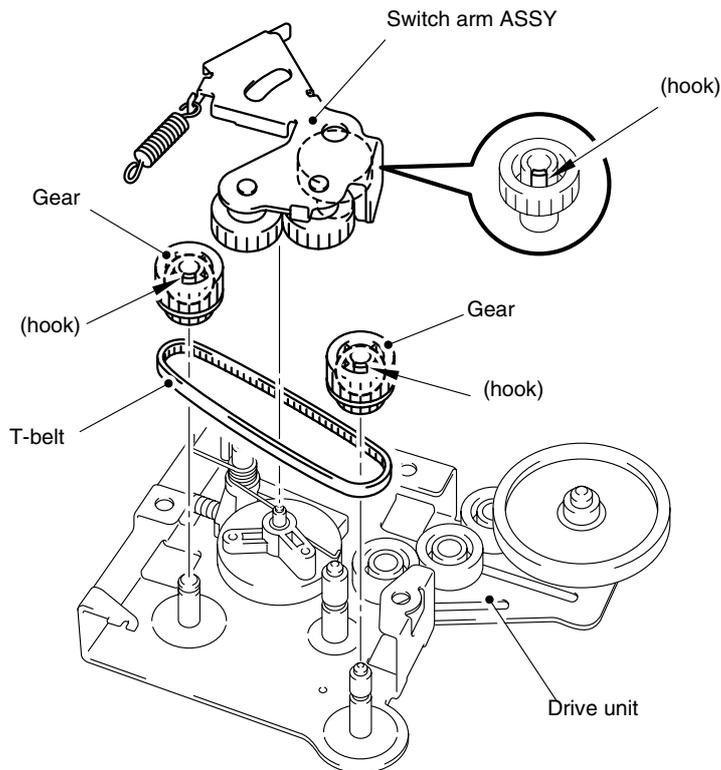


Fig. 4-74

- (5) Remove the two cup S tite 3x6 screws to remove the gear pressure plate from the gear plate.
- (6) Shift the pendulum gear 30 to the arrow direction and release the hook from the gear 21H to remove the gear 21H by pulling upward through the opening space of the gear plate.

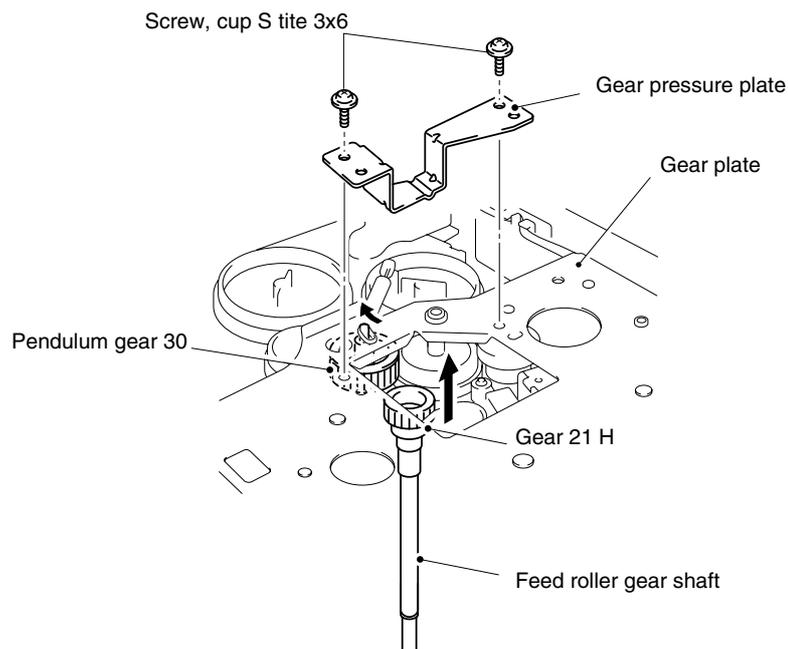


Fig. 4-75

- (7) Remove the three tapes on the harnesses and release the harness from the hooks.
- (8) Remove the four cup S tite 3x6 screws from the drive sub ASSY A and remove the spring, extension P/R from the gear 60 P/R.
- (9) Disconnect the connectors for the main motor ASSY and the toner LED PCB unit.
- (10) Remove the drive sub ASSY A from the main frame.

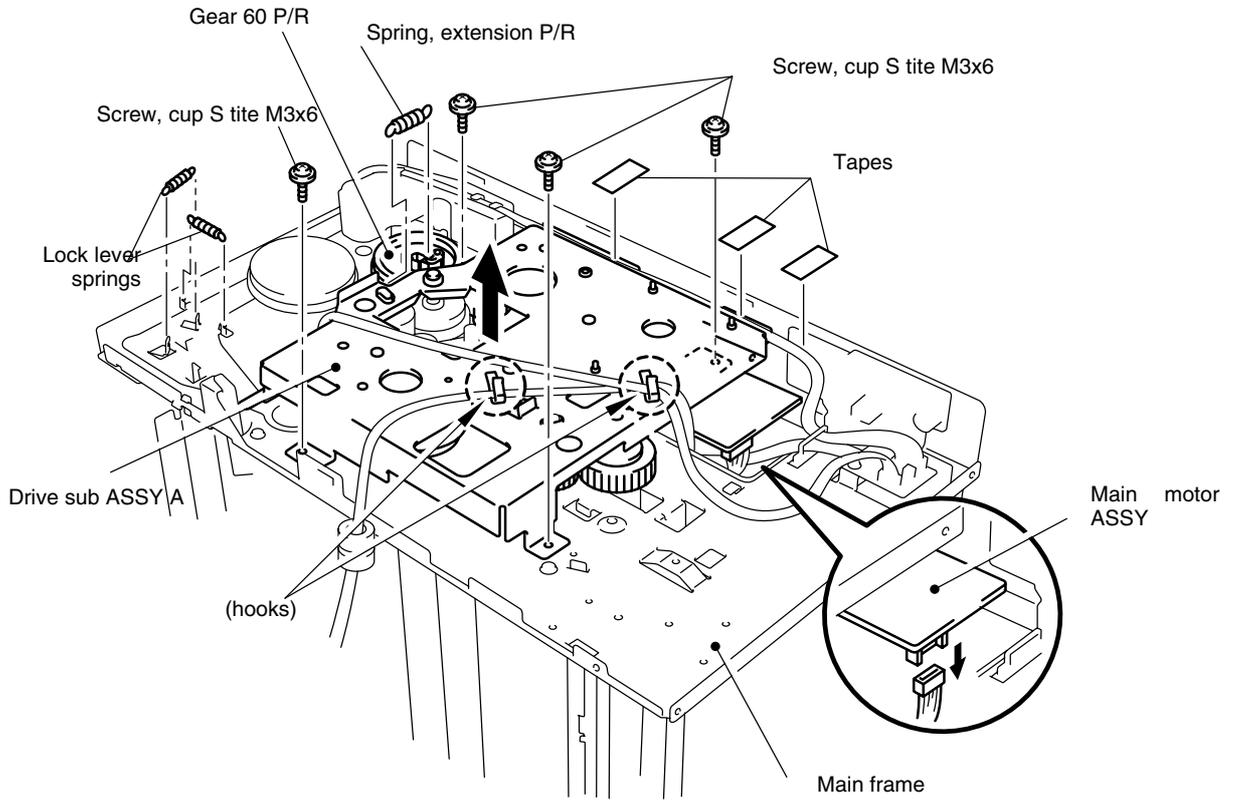


Fig. 4-76

**! CAUTION:**

- Be sure to hold the pendulum gear 30 when removing the drive sub ASSY A in order not to lose the friction spring fitted under the gear (name).
- Be careful not to lose the joint spring on the develop joint when removing the drive sub ASSY A.

- (11) Remove the four cup S tite 3x6 screws and disconnect the harness to remove the main motor ASSY from the drive sub ASSY A.

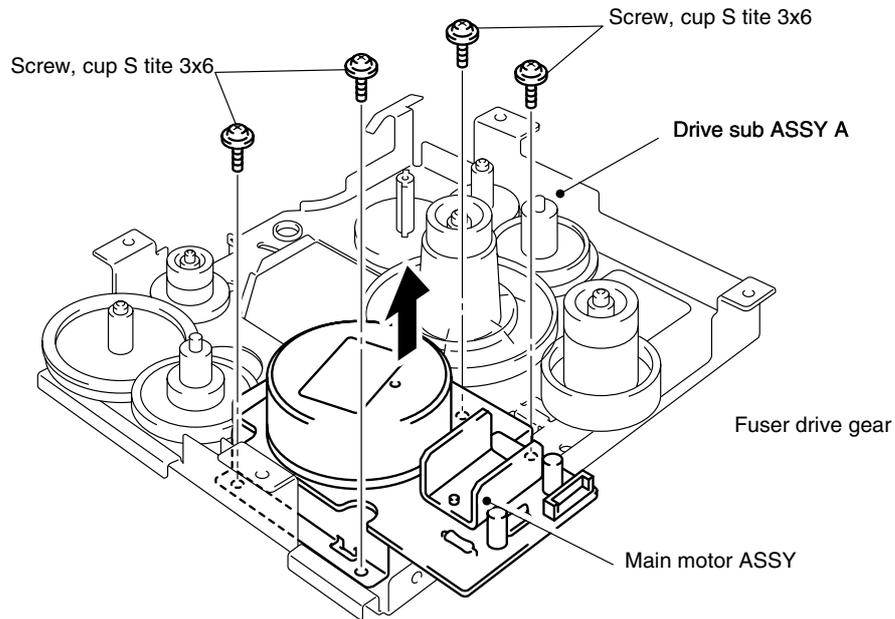


Fig. 4-77

- (8) Place the main frame so that the drive unit side is at the right as the figure shown below.  
 (9) Remove the two bind B M4x10 Taptite screws.

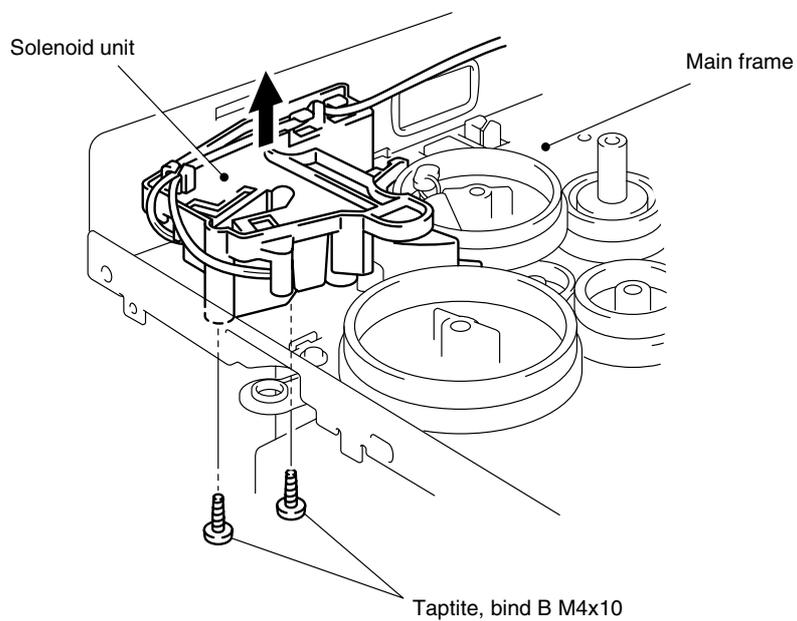


Fig. 4-78

- (10) Disconnect the two connectors for the solenoid relay PCB to remove the solenoid unit from the drive unit.
- (11) Release the two hooks and remove the solenoid ASSY 04C4 (red) and the solenoid ASSY 04C5 (black) from the unit.

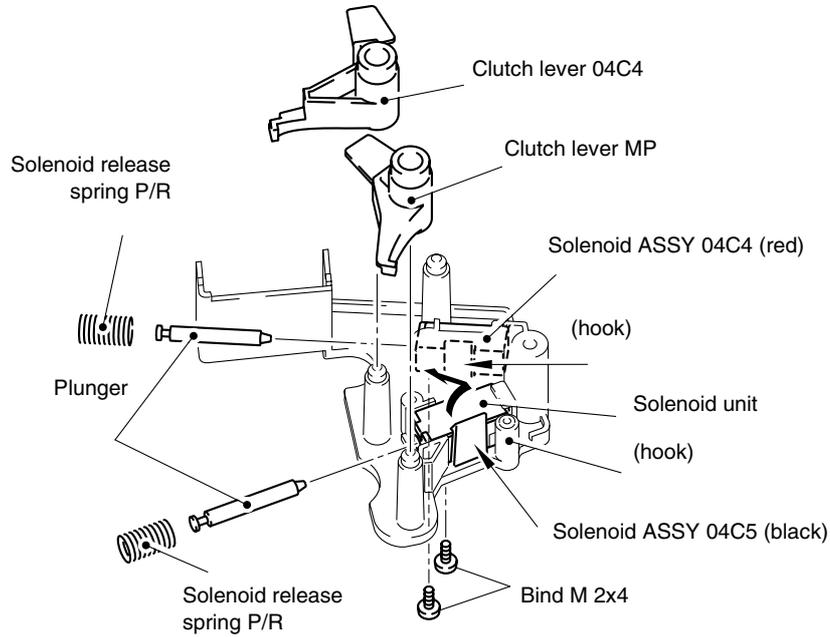
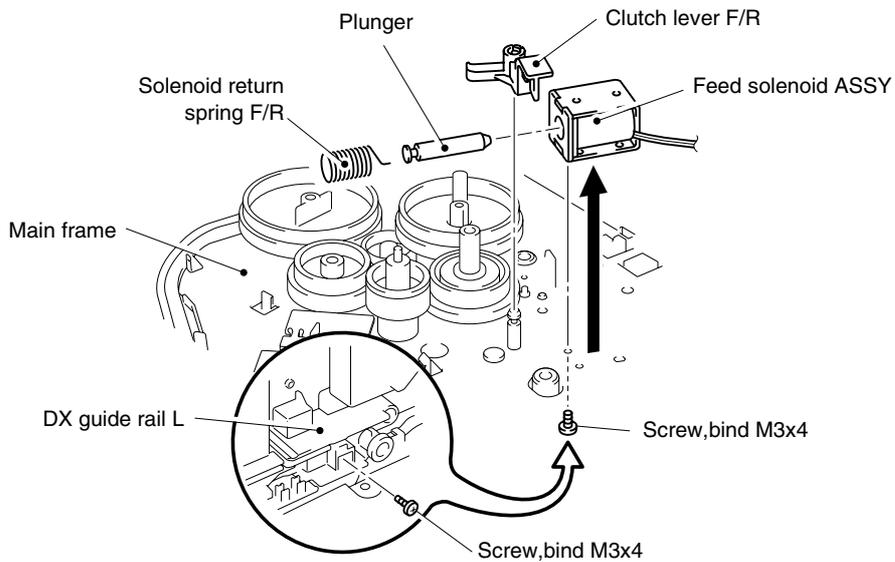


Fig. 4-79

- (12) Place the main frame so that the drive unit side is at the right as the figure shown below.
- (13) Remove the bind M3x4 screw to remove the feed solenoid ASSY from the main frame L.

**CAUTION:**  
 Be sure not to lose the solenoid return spring F/R when removing the clutch lever F/R.

- (15) Remove the clutch lever F/R from the main frame.



**Fig. 4-80**

- (16) Remove the gear 60 P/R and gear 72 MP from the conductor bearing 5, and remove the middle roller gear from the conductor bearing H.
- (17) Remove the two conductor bearing 5.
- (18) Turn the knob of the conductor bearing H as the figure shown below, and remove the conductor bearing H from the main frame L.

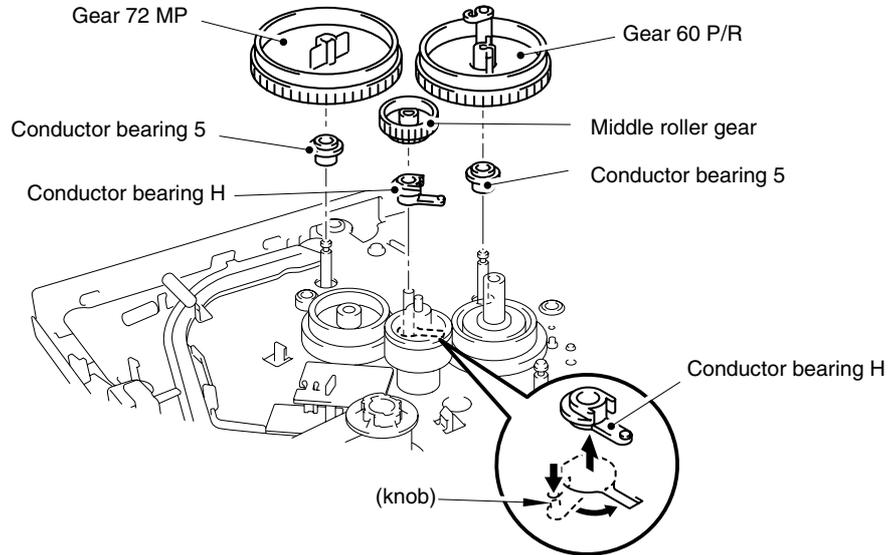
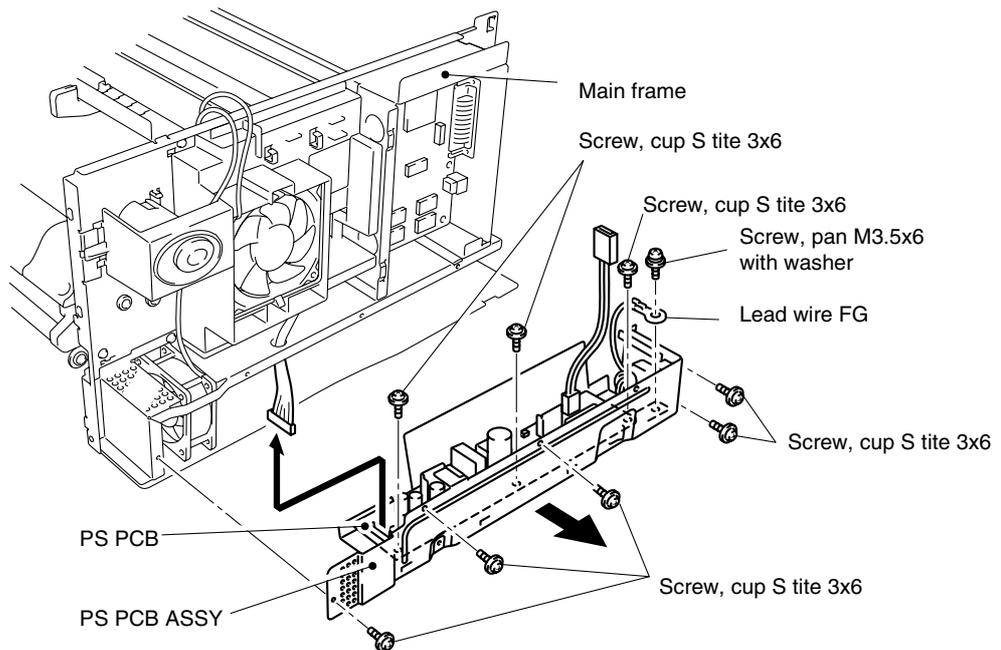


Fig. 4-81

### 3.16 Low-voltage Power Supply PCB ASSY

- (1) Remove the eight cup S tite 3x6 screws and the pan M3.5x6 screw with washer and the lead wire FG, and then disconnect the engine PCB connector.
- (2) Remove the PS PCB ASSY from the main frame.



**Fig. 4-82**

### 3.17 Main PCB ASSY

- (1) Remove the two pan M3x6 screws and the six cup S tite 3x6 screws from the main PCB ASSY.
- (2) Disconnect the four connectors for the low-voltage power supply, engine PCB, the panel PCB and the scanner unit.
- (3) Remove the main PCB ASSY from the frame.

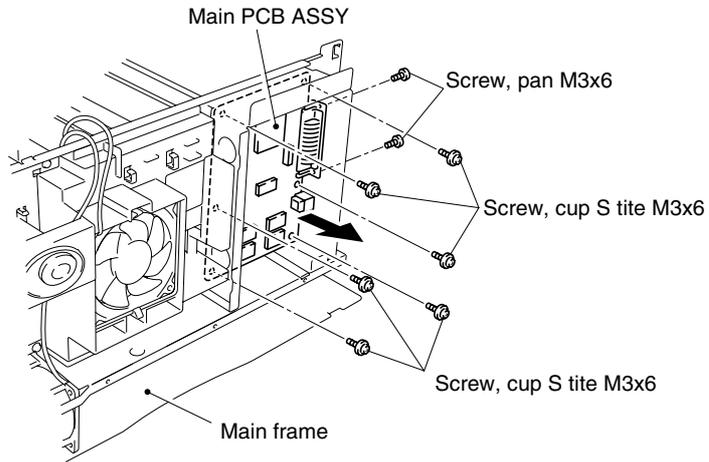


Fig. 4-83

### 3.18 Fan Motor / Fan Motor 60

NOTE:

Be sure to disconnect the fan motor connector on the fan relay PCB before removing the fan motor and fan motor 60.

- (1) Release the two hooks and remove the fan motor from the fan duct by pulling slightly forward.
- (2) Remove the fan motor 60 from the main frame by pulling upward.

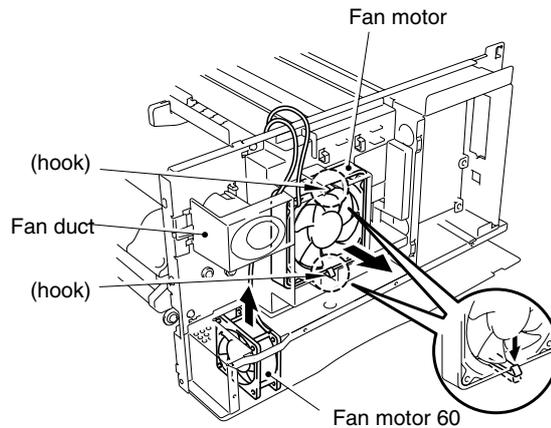


Fig. 4-84

NOTE:

*When re-assembling the fan motor and the fan motor 60, fit the both motors with the labeled surface facing the printer.*

### 3.19 Base Plate

- (1) Turn the main frame upside down.
- (2) Remove the five bind B M4x10 Taptite screws and four cup S tite 3x6 screws from the base plate.
- (3) Slide the base plate to the rear of the printer to remove it.

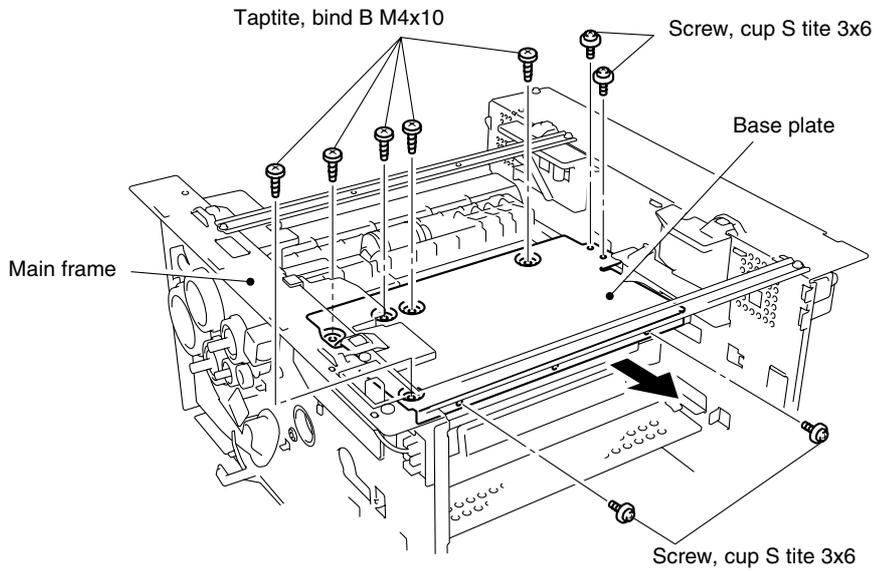


Fig. 4-85

### 3.20 Engine PCB ASSY / High-voltage Power Supply PCB ASSY

- (1) Remove the two bind B M4x10 Taptite screws to remove the PCB insulation sheet.

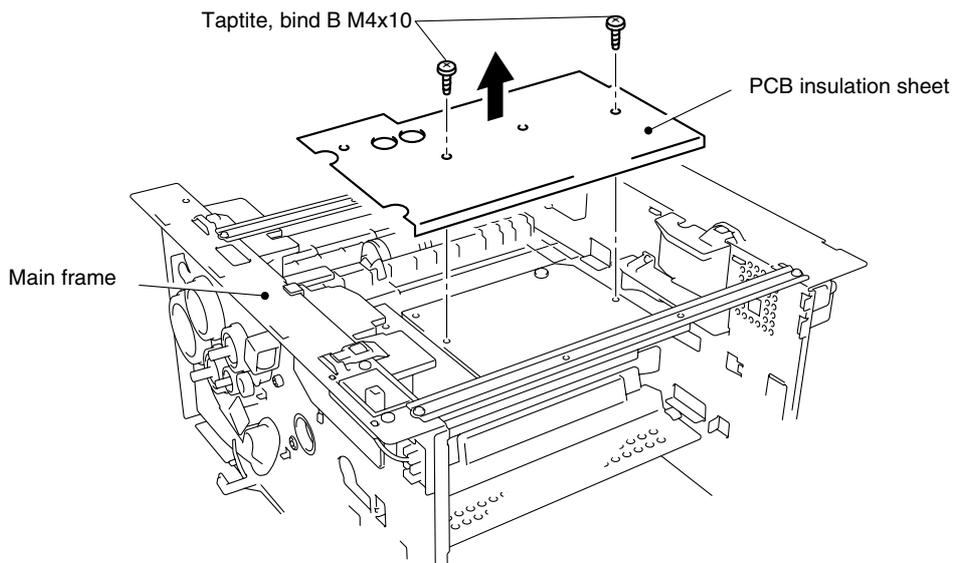


Fig. 4-86

- (2) Remove the two bind B M4x10 Taprite screws, one from the high-voltage PS PCB ASSY and the other from the engine PCB ASSY.
- (3) Shift the engine PCB ASSY slightly and remove the central connector, which connects the engine PCB ASSY, and the high-voltage PS PCB ASSY.
- (4) Remove the high-voltage PS PCB ASSY first by lifting up straight upward.
- (5) Disconnect the 12 (twelve) connectors from the engine PCB to remove the engine PCB ASSY.

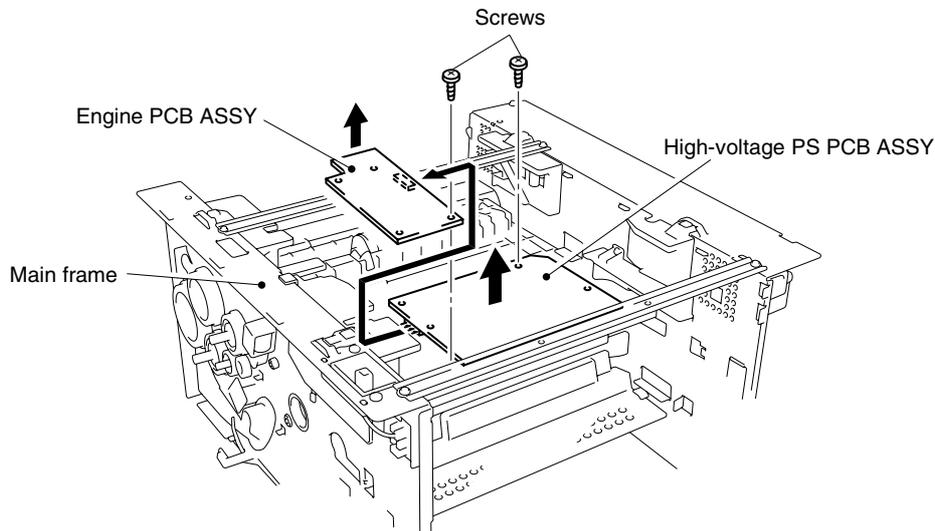


Fig. 4-87

**NOTE:**

When re-assembling the the engine PCB ASSY and the high-voltage PS PCB ASSY, fit the engine PCB ASSY on the frame, then connect the both PCB ASSY with each other by the central connector. And then fit the high-voltage PS PCB ASSY straight downward onto the frame. Fix the both PCB ASSY with the two screws.

**!** **CAUTION:**

- Even if you want to remove only one of either the engine and high-voltage power supply PCBs, ensure you remove all screws securing both PCBs and disconnect the central connector while lifting both of them up. Failure to do so may damage the PCBs.
- When re-assembling the engine PCB, ensure it is aligned with the positioning boss first. Be careful the main motor harness is not caught between the engine PCB and the frame.
- When re-assembling the engine PCB or high-voltage PS PCB, ensure the central connector is connected correctly.

### 3.21 DX Sensor PCB ASSY

**NOTE:**

Be sure to disconnect the DX sensor connector on the engine PCB before removing the DX sensor PCB ASSY.

- (1) Remove the two cup S tite 3x6 screws to remove the DX guide rail L with DX sensor PCB ASSY from the main frame.

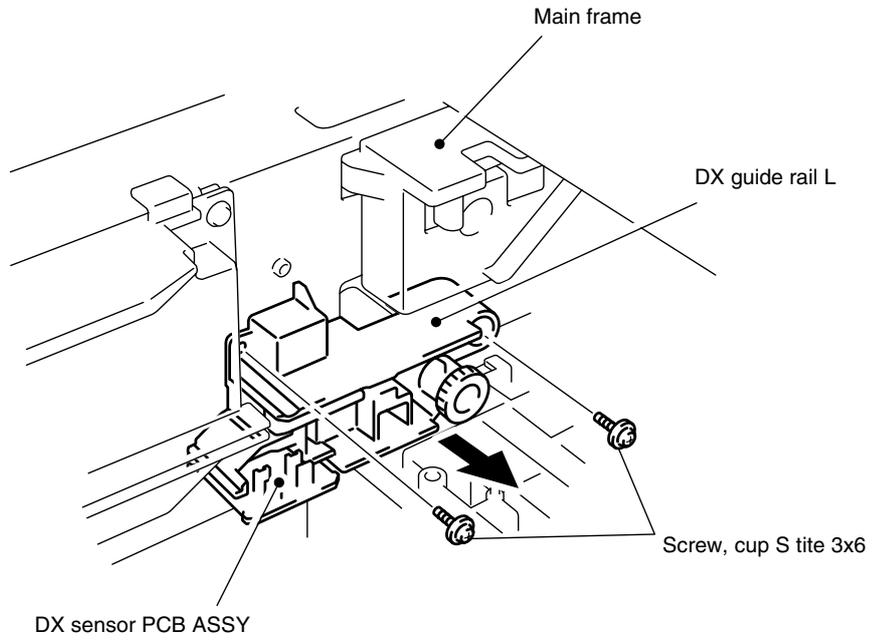


Fig. 4-88

- (2) Remove the bind B M3x8 Taptite screw to remove the DX sensor PCB ASSY from the DX guide rail L.

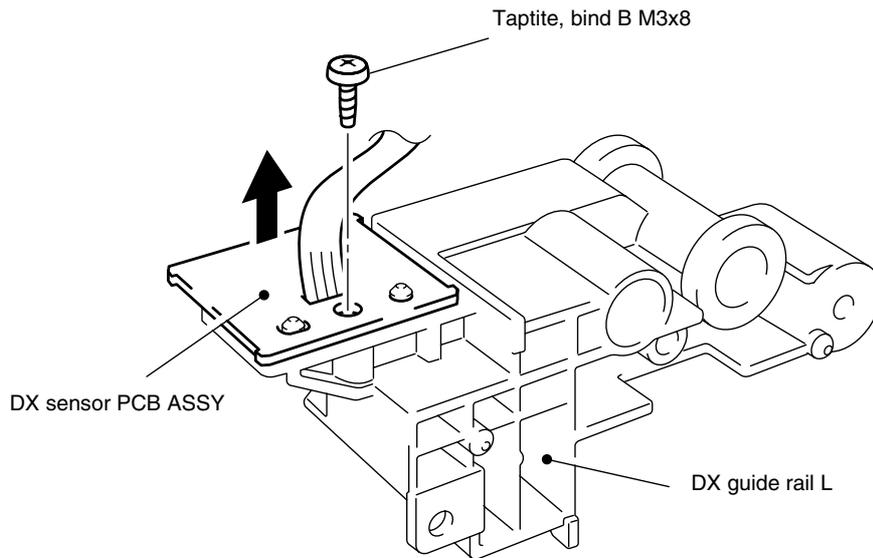


Fig. 4-89

### 3.22 Toner Sensor PCB Unit (Light Reception)

**NOTE:**

*Be sure to disconnect the toner sensor (light reception) connector on the engine PCB before removing the toner sensor PCB ASSY (light reception).*

- (1) Remove the harness from the hooks on the fan duct.
- (2) Release the three hooks, and then lift up slightly and slide the fan duct to remove it.
- (3) Remove the cup S tite 3x6 screw to remove the toner sensor PCB unit.

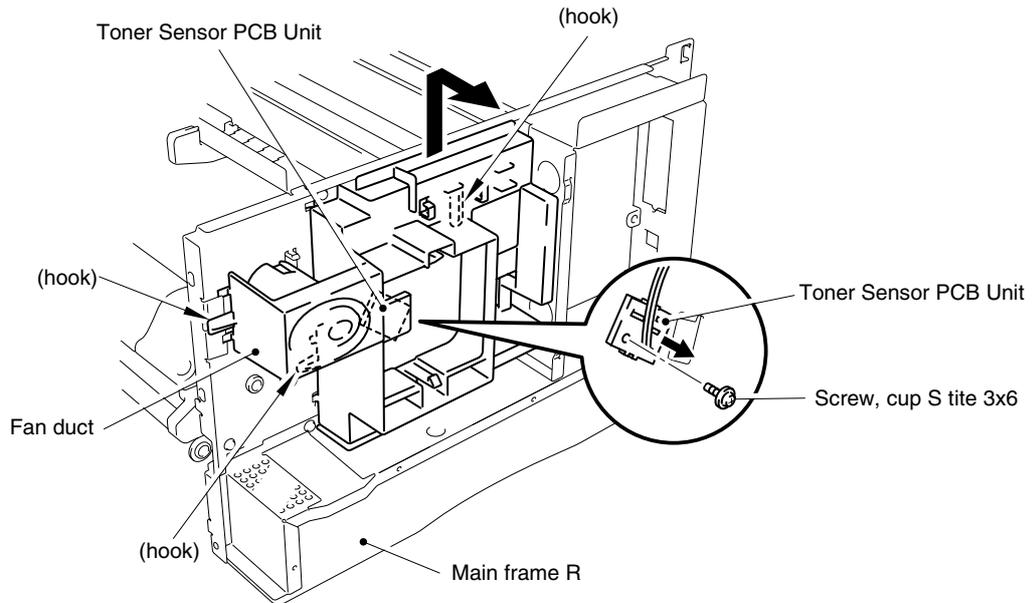


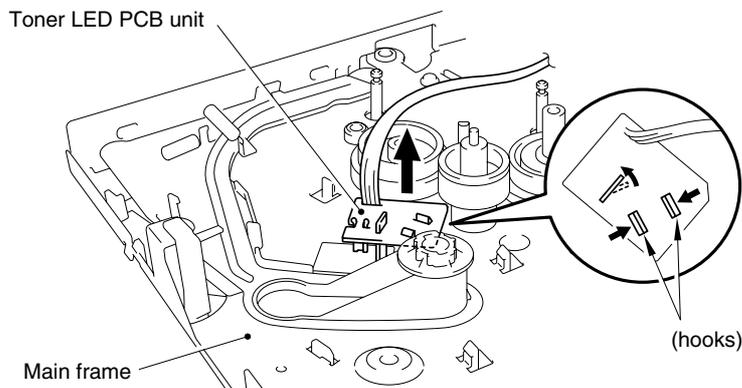
Fig. 4-90

### 3.23 Toner LED PCB Unit (Light Emission)

**NOTE:**

*Be sure to disconnect the toner LED (light emission) connector on the engine PCB before removing the toner sensor PCB ASSY (light emission).*

Release the two hooks from the LED holder and remove the toner LED PCB unit (light emission) by pulling upward.



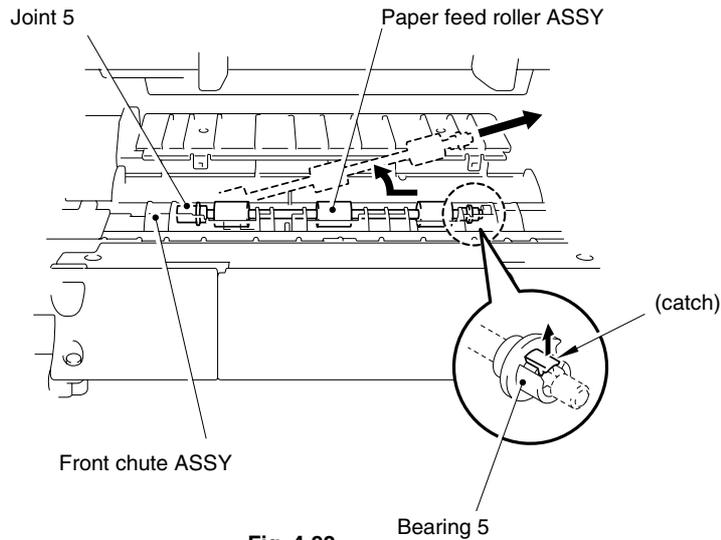
**Fig. 4-91**

### 3.24 Paper Feed Roller ASSY

**NOTE:**

*Be sure to remove all the covers and the gear 21 before removing the paper feed roller ASSY.*

- (1) Unhook the catch to remove the bearing 5 from the front chute ASSY.
- (2) Remove the paper feed roller ASSY from the front chute ASSY by sliding to the left, then lifting upward.
- (3) Remove the joint 5 from the paper feed roller ASSY.



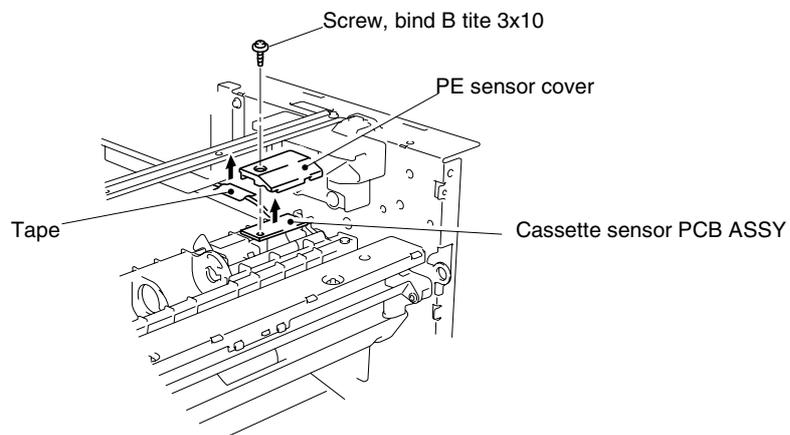
**Fig. 4-92**

### 3.25 First Feed Roller ASSY

**NOTE:**

*Be sure to disconnect the engine PCB connector on the cassette sensor PCB ASSY and remove the tape on the engine PCB connector before removing the cassette sensor PCB ASSY.*

- (1) Place the frame upside down.
- (2) Remove the bind B tite 3x10 screw to remove the PE sensor cover and the cassette sensor PCB ASSY from the front chute ASSY.



**Fig. 4-93**

- (3) Remove the paper pick-up roller shaft and the first feed roller shaft from the front chute ASSY.
- (4) Remove the four bind B M4x10 Taptite screws to remove the front chute ASSY.

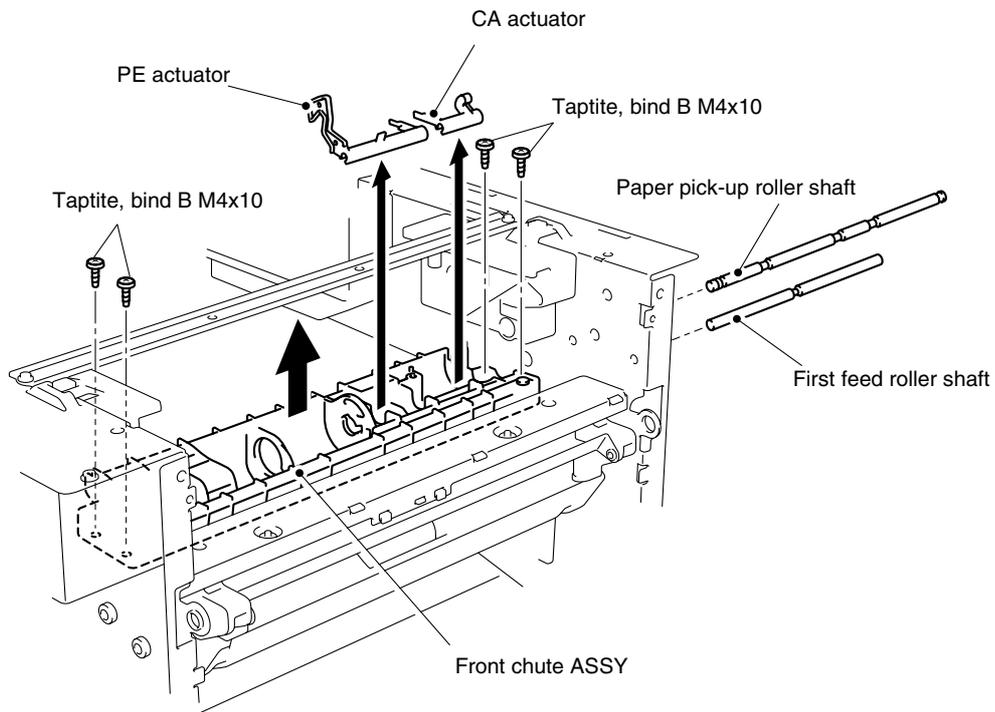


Fig. 4-94

- (5) Turn the front chute ASSY upside-down, and then remove the bearing 5 and the joint 5 to remove the first feed roller from the front chute ASSY.

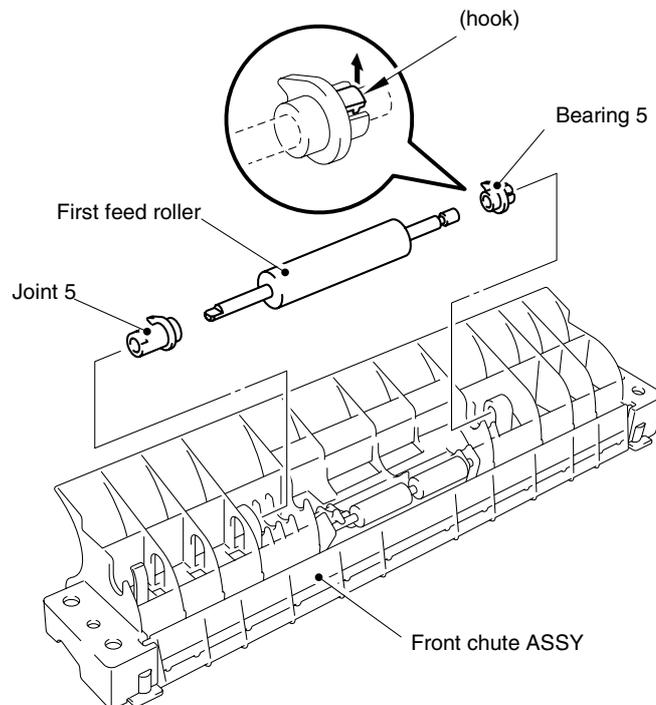


Fig. 4-95

### 3.26 Exit Roller Unit

**NOTE:**

*Be sure to disconnect all the connectors on the fan relay PCB before removing the exit roller unit.*

- (1) Remove the two shoulder screws to remove the exit roller unit from the printer.

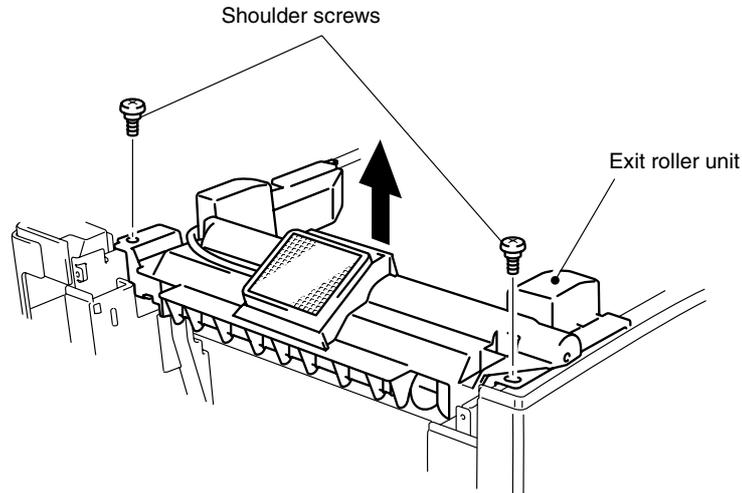
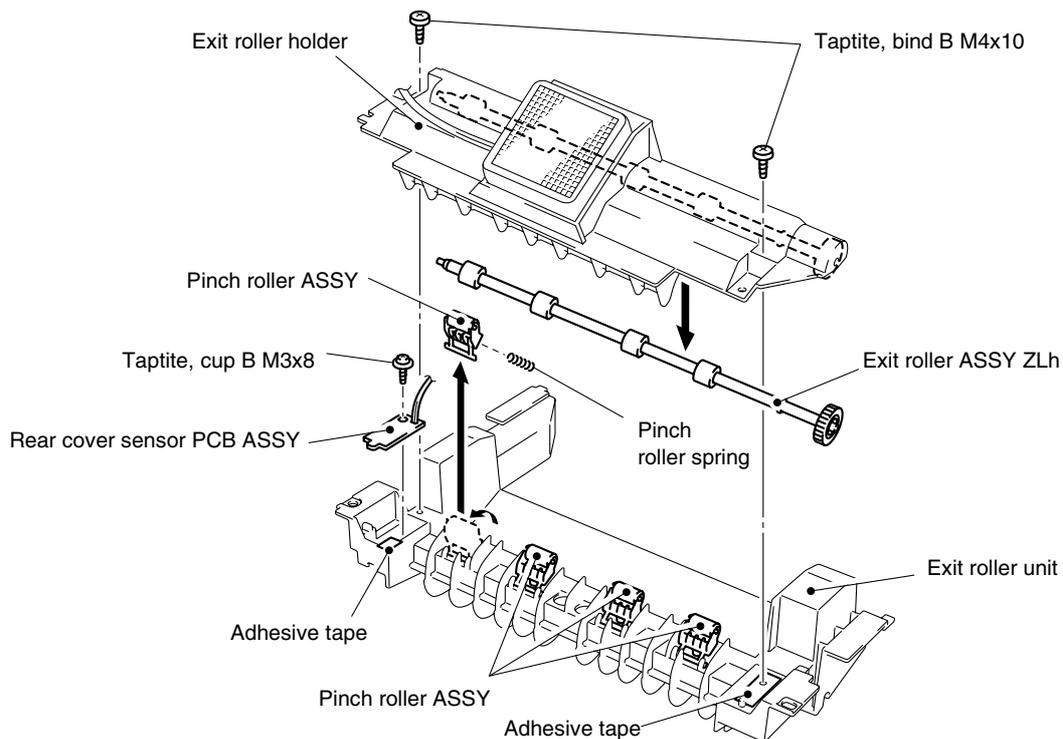


Fig. 4-96

- (2) Remove the two bind B M4x10 Taptite screws to remove the exit roller holder from the exit roller unit.
- (3) Lift up and remove the pinch roller ASSY from the exit roller unit, and then remove the pinch roller spring from the pinch roller ASSY.
- (4) Remove the cup B M3x8 Taptite screw to remove the rear cover sensor PCB ASSY from the unit.



**Fig. 4-97**

(5) Remove the fan motor 60B unit from the exit roller holder.

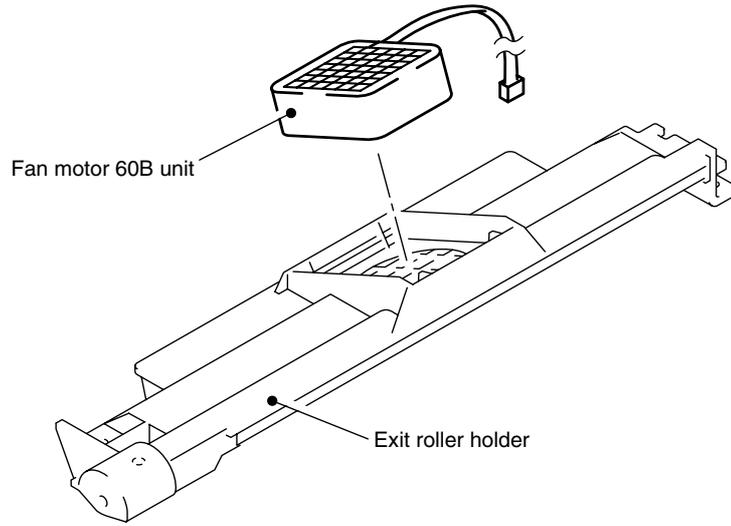


Fig. 4-98

### 3.27 Harness Winding Form

## 4. PACKING

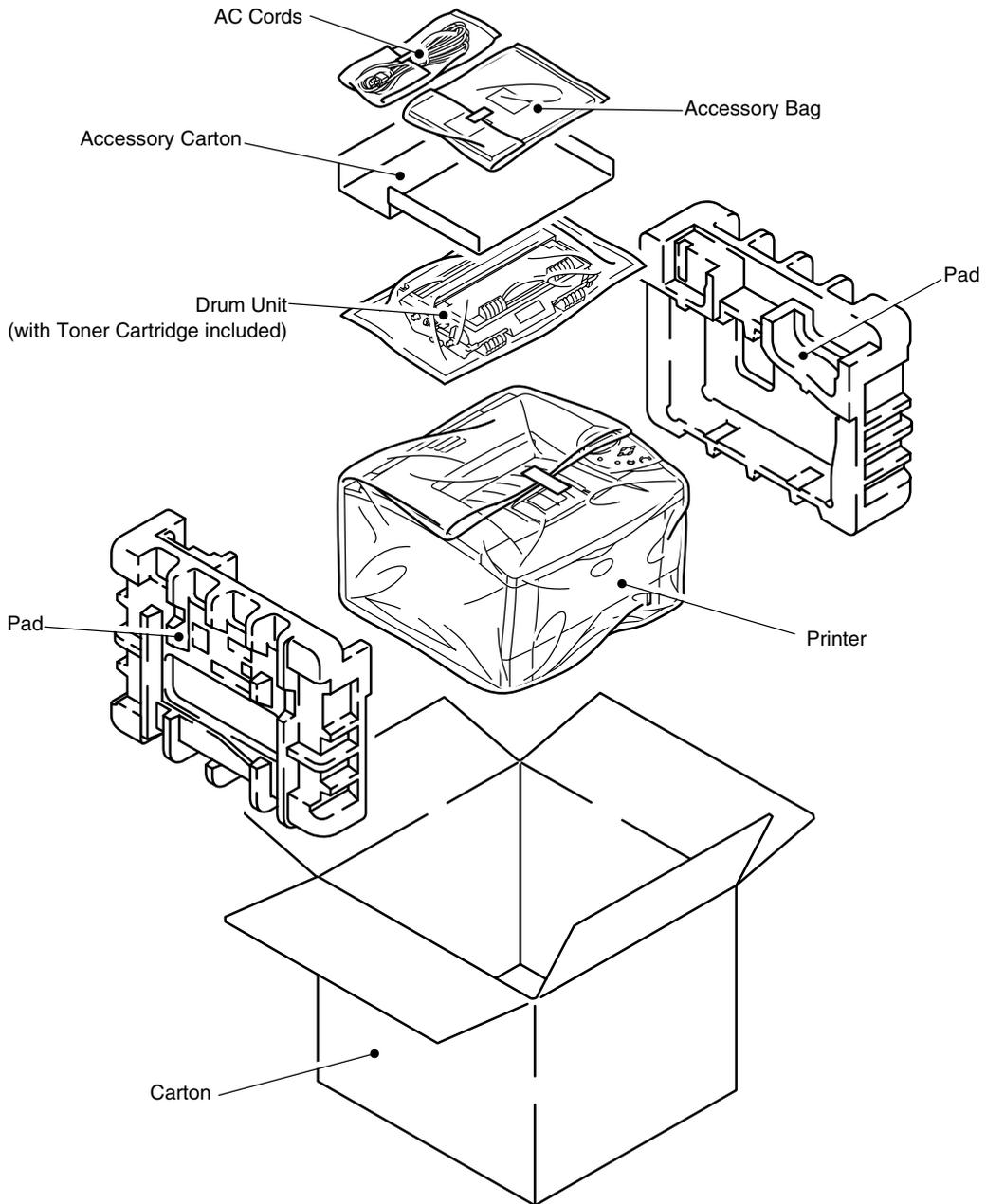


Fig. 4-99

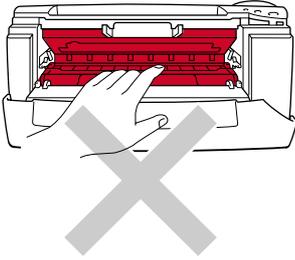
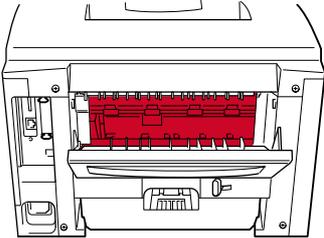
## CHAPTER 5 PERIODIC MAINTENANCE

To avoid creating secondary problems by mishandling, follow the warnings below during maintenance work.

 **WARNING**

**(1) Always turn off the power switch and unplug the power cord from the power outlet before accessing any parts inside the printer.**

**(2) Some parts inside the printer are extremely hot immediately after the printer is used. When opening the front cover or rear cover to access any parts inside the printer, never touch the red colored parts shown in the following figures.**

### 1. CONSUMABLE PARTS

The consumable parts described in this section are parts which are subject to deterioration or damage and should be replaced at least once during the period of warranty of the product if any print quality problem appears.

#### 1.1 Drum Unit

The "CHANGE DRUM SOON" message appears on the LCD display when the drum unit is nearly at the end of its life.

Life expectancy: 20,000 pages  
(When printing A4 or Letter size paper at 5% print coverage)

**NOTE:**

*There are many factors that determine the actual drum life, such as temperature, humidity, type of paper and toner that you use, etc.*

**<Replacement Procedure>**

- (1) Press the cover release button; and then open the front cover.
- (2) Pull out the drum unit assembly.  
(Fig.5-1)

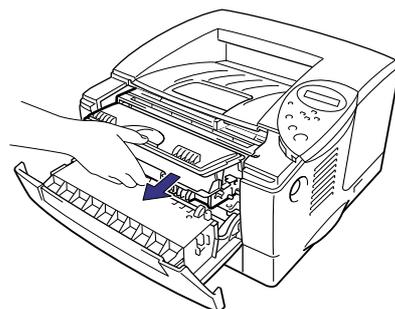


Fig. 5-1

**! CAUTION:**

*It is recommended to place the drum unit assembly on a piece of disposable paper or cloth in case you accidentally spill or scatter toner.*

- (3) While pressing the lock lever, pull the toner cartridge out of the drum unit assembly. (Fig.5-2)

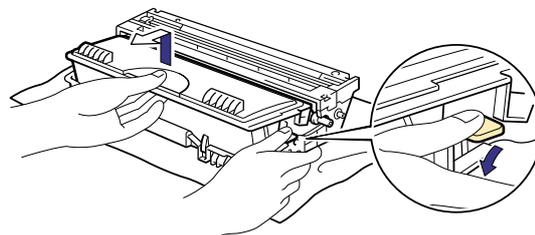


Fig. 5-2

- (4) Unpack the new drum unit, and remove the protective materials.
- (5) Install the toner cartridge into the new drum unit until you hear it lock into place with a click. When the toner cartridge is installed correctly, the lock lever is lifted automatically. (Fig.5-3)

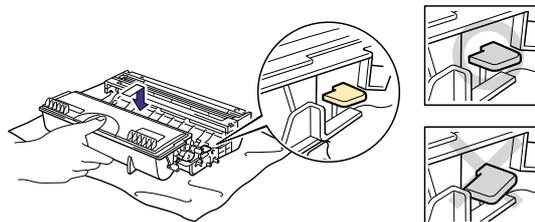


Fig. 5-3

- (6) Re-install the drum unit assembly in the printer.
- (7) Reset the page counter referring to the instructions supplied with the new drum unit.
- (8) Close the front cover.

**! CAUTION:**

- *For best performance, use only genuine Brother toner. The product should only be used in a clean, dust-free environment with adequate ventilation..*
- *Only unpack a drum unit immediately before you need to install it into the printer. If an unpacked drum unit is subjected to excessive direct sunlight or room light, the unit may be damaged.*
- *Handle the drum unit and toner cartridge carefully. If toner scatters on your hands or clothes, wipe or wash it off with cold water immediately.*
- *Discard the used drum unit according to local regulations. Be sure to seal up the drum unit tightly so that toner powder does not spill out of the unit.*
- *Do not reset the page counter when replacing the toner cartridge only.*
- *It is recommended to clean the printer when you replace the drum unit. Refer to **subsection 3. 'PERIODICAL CLEANING' in this Chapter.***

**1.2 Toner Cartridge**

- Toner low: The "TONER LOW" message appears at intervals on the LCD display when the toner cartridge has nearly run out of toner.
- Toner empty: The "TONER EMPTY" message appears on the LCD display when the printer has run out of toner or the toner is not evenly distributed inside the cartridge.
- Life expectancy: 6,500 pages / toner cartridge  
(When printing A4 or Letter size paper at 5% print coverage)

**NOTE:**

There are many factors that determine the actual toner life, such as temperature, humidity, type of paper that you use, the number of pages per print job, etc.

**<Replacement Procedure>**

- (1) Press the cover release button and then open the front cover.
- (2) Pull out the drum unit assembly. (Fig.5-4)

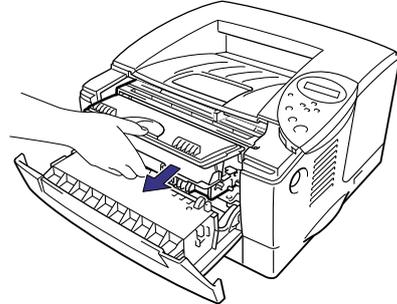


Fig. 5-4

**CAUTION:**

It is recommended to place the drum unit assembly on a piece of disposable paper or cloth in case you accidentally spill or scatter toner.

- (3) Press the lock lever down, and then pull the toner cartridge out of the drum unit assembly.
- (4) Unpack the new toner cartridge. Keeping the cartridge horizontal, gently rock it from side to side five or six times. (Fig.5-5)

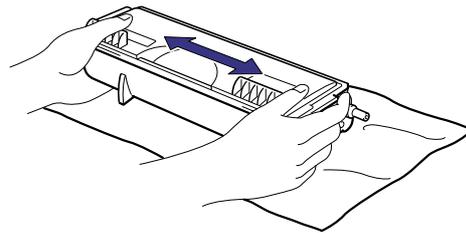


Fig. 5-5

- (5) Remove the protective cover. (Fig.5-6)

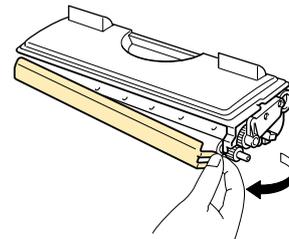


Fig. 5-6

- (6) Install the new toner cartridge into the drum unit until you hear it lock into place. when the toner cartridge is installed correctly, the lock lever is lifted automatically. (Fig.5-7)

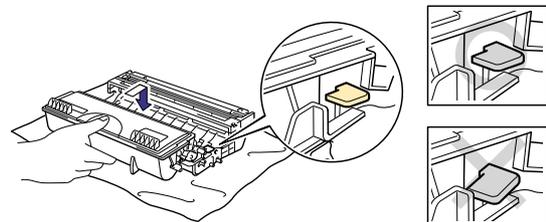


Fig. 5-7

- (7) Clean the primary corona wire inside the drum unit by gently sliding the blue tab from right to left several times. Return the tab to the home position (▲ mark position) before you re-install the drum unit assembly.

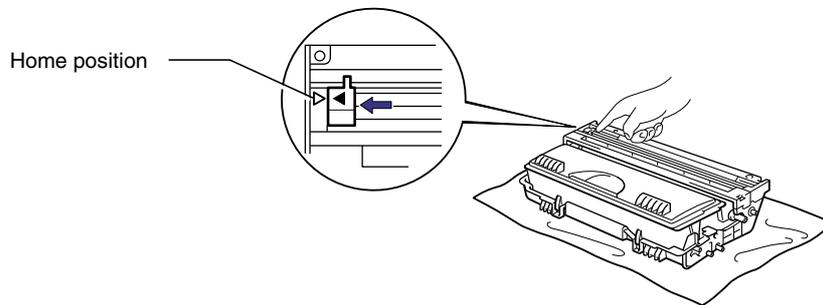


Fig. 5-8

- (8) Re-install the drum unit assembly into the printer. Close the front cover.

**! CAUTION:**

- Handle the drum unit and toner cartridge carefully. If toner scatters on your hands or clothes, wipe or wash it off with cold water immediately.
- Be sure to seal the toner cartridge tightly so that toner powder does not spill out of the cartridge.
- Dispose of the used toner cartridge in accordance with local plastic waste regulations.
- Only unpack a toner cartridge immediately before you need to install it into the printer. If a toner cartridge is left unpacked for a long period of time, the toner life is shortened
- If an unpacked drum unit is subjected to excessive direct sunlight or room light, the unit may be damaged.
- Use a Brother genuine toner cartridge which is specially formulated to ensure top print quality.
- Printing with a 3rd party toner or toner cartridge may reduce not only the printing quality but also the quality and life of the printer itself. It may also cause serious damage to the performance and life of a genuine Brother drum unit. Warranty cover is not applied to problems caused by the use of 3rd party toner or toner cartridges.
- Make sure that the wire cleaner on the drum unit is returned to the home position (▲ mark position) before re-installing the drum unit into the printer, or printed pages may have vertical stripes. (Refer to Fig. 5-8.)
- Install the toner cartridge immediately after you remove the protective cover. Do not touch the development roller and photosensitive drum colored red as shown below;

Fig. 5-9

**NOTE:**

It is recommended to clean the printer when you replace the toner cartridge. Refer to subsection 3. 'PERIODICAL CLEANING' in this Chapter.

## 2. PERIODICAL REPLACEMENT PARTS

Periodical replacement parts are the parts to be replaced periodically to maintain product quality. These parts would affect the product quality greatly if they lost their function even if they do not appear to be damaged or there is no change in their appearance.)

The periodical replacement parts listed below should be replaced at the service center referring to the service life. For the procedures to replace these parts, refer to CHAPTER 4 "DISASSEMBLY AND RE-ASSEMBLY".

Parts Name	Part No.	Qty	Service life (number of prints)	Replacement Procedure
Fixing Unit (115V)	LJ7005001	1	80,000 pages	See subsection 3.12 in CHAPTER 4.
Fixing Unit (230V)	LJ7006001	1	80,000 pages	
Paper Feeding Kit (Pad holder ZLh ASSY / Paper pick-up roller ASSY)	LJ5927001	1	50,000 pages	See subsection 3.3 and 3.13 in CHAPTER 4.
Laser Unit H	LJ7004001	1	200,000 pages	See subsection 3.11 in CHAPTER 4.

**NOTE:**

The above table shows only estimated values. They are subject to change without prior notice.

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### 3. PERIODICAL CLEANING

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Clean the following parts periodically to avoid any printer problems or print image defects.



**CAUTION:**

*While drum unit and scanner window cleaning basically can be implemented by the end user, the electrical terminals inside the printer and on the drum unit should be cleaned by a service technician. Instruct the users not to touch those terminals.*



**WARNING**

***There are high voltage electrodes inside the printer. Before cleaning the printer, make sure that the power switch has been turned off and the power cord has been unplugged from the power outlet.***

#### 3.1 Cleaning the Printer Exterior

Clean the printer exterior to keep the printer clean.

- 1) Turn off the power switch and unplug the power cord.
- 2) Wipe dirt and dust away from the printer exterior with a damp cloth and allow the printer to dry completely before turning the power on again.
- 3) Plug in the power cord.



**CAUTION:**

- *Use water or neutral detergents for cleaning. Cleaning with volatile liquids such as thinner or benzene will damage the surface of the printer.*
- *Do not use cleaning materials that contain ammonia. They will damage the printer and the toner cartridge.*

#### 3.2 Cleaning the Drum Unit

When replacing the drum unit or toner cartridge with a new one, be sure to clean the drum unit.

- 1) Turn off the power switch and unplug the power cord.
- 2) Press the cover release button, and then open the front cover.
- 3) Pull out the drum unit assembly.



**CAUTION:**

*It is recommended to place the drum unit assembly on a piece of disposable paper or cloth in case you accidentally spill or scatter toner.*

- 4) Clean the primary corona wire inside the drum unit by gently sliding the blue tab from right to left several times. Return the tab to the home position before re-install the drum unit assembly.

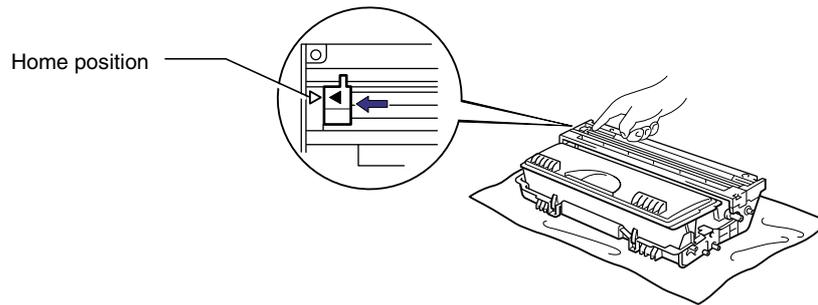


Fig. 5-10

**CAUTION:**

*Make sure that the blue tab on the drum unit is returned to the home position (▲ mark position) before re-installing the drum unit into the printer, or printed pages may have vertical stripes.*

- 5) Re-install the drum unit into the printer.
- 6) Close the front cover.

### 3.3 Cleaning the Scanner Window

When replacing the drum unit or toner cartridge with a new one, be sure to clean the scanner window.

- 1) Turn off the power switch and unplug the power cord.
- 2) Press the cover release button, and then open the front cover.
- 3) Pull the drum unit assembly out of the printer.

**CAUTION:**

*It is recommended to place the drum unit assembly on a piece of disposable paper or cloth in case you accidentally spill or scatter toner.*

- 4) Gently wipe the scanner window (colored magenta in the figures below) with a soft dry cloth.

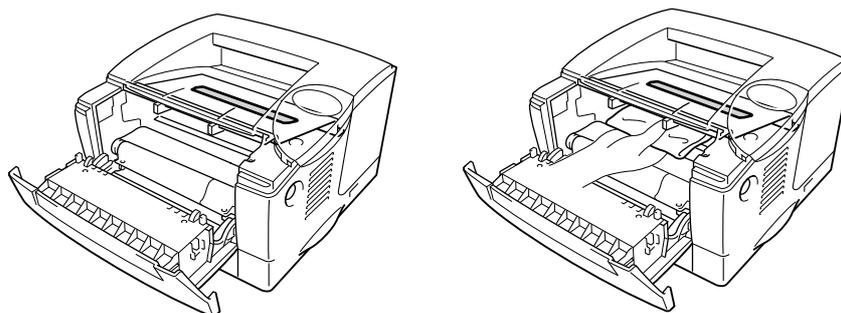


Fig. 5-11

- 5) Re-install the drum unit assembly into the printer. Close the front cover.
- 6) Plug in the power cord, and then turn on the power switch.

**! CAUTION:**

- *Handle the drum unit carefully since it contains toner. If toner scatters and your hands or cloths get dirty, immediately wipe or wash it off with cold water.*
- *Do not touch the scanner window with your fingers.*
- *Do not wipe the scanner window with isopropyl alcohol.*

### 3.4 Cleaning the Electrical Terminals

To obtain the best print performance, be sure to clean the electrical terminals inside the printer body.

- 1) Turn off the power switch and unplug the power cord.
- 2) Remove the drum unit from the printer.
- 3) Wipe the electrical terminals as shown in the figure below with a soft dry cloth.

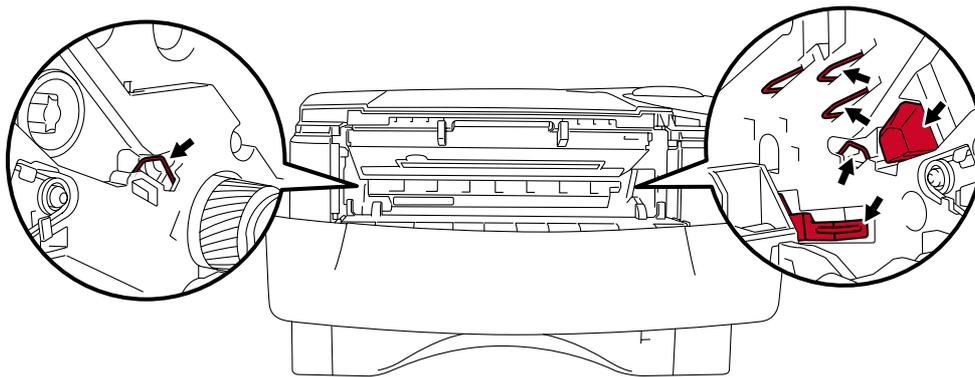


Fig. 5-12

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#### 4. MTBF / MTTR

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The meantime between failure (MTBF) and the meantime to repair (MTTR) for this printer are as follows;

MTBF: Up to 4,000 hours

MTTR: Average 30 minutes except the periodical maintenance parts (the Paper Feeding Kit) and the printer control boards whose MTTR is average 5 minutes.

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## CHAPTER 6 TROUBLESHOOTING

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### 1. INTRODUCTION

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#### 1.1 Initial Check

##### (1) Operating environment

Check if :

- The source voltage stays within  $\pm 10\%$  from the rated voltage shown on the rating plate.
- The printer is installed on a solid, level surface.
- The room temperature is maintained between 10°C and 32.5°C. The relative humidity is maintained between 20% and 80%.
- The printer is not located in a dusty place.
- The printer is not exposed to ammonia fumes or other harmful gases.
- The printer is not located in a hot or humid area (such as near water or a humidifier).
- The printer is not exposed to direct sunlight.
- The room is well-ventilated.
- The printer is not placed where the ventilation hole of the printer is blocked.

##### (2) Print paper

Check if :

- A recommended type of print paper is being used. [If the paper is too thick or too thin, or tends to curl, paper jams or paper feed problems may occur, or printed images may be blurred.]
- The print paper is damp. [If so, use fresh paper, and check whether the print quality improves or not.]
- The print paper is short-grained paper or acid paper. [If so, print quality problems may occur.]

For further information on paper, refer to [subsection 3.5 'Paper' in CHAPTER 1](#).

##### (3) Consumable parts

Check if:

- The "TONER LOW" message appears on the LCD display on the printer control panel when a toner cartridge is installed in the printer. [If the message appears, replace the cartridge with a new one.]

For further information on consumable parts, refer to [1. 'CONSUMABLE PARTS' in CHAPTER 5](#).

(4) Others

Condensation:

When the printer is moved from a cold room into a warm room in cold weather, condensation may occur inside the printer, causing various problems as listed below:

- Condensation on the optical surfaces such as the scanning mirror, lenses, the reflection mirror and the protection glass may cause the print image to be light.
- If the photosensitive drum is cold, the electrical resistance of the photosensitive layer is increased, making it impossible to obtain the correct contrast when printing.
- Condensation on the corona unit may cause corona charge leakage.
- Condensation on the hopper plate and separation pad may cause paper feed troubles.

If condensation has occurred, print several pages or leave the printer for 2 hours to allow it to reach room temperature.

If the drum unit is unpacked soon after it is moved from a cold room to a warm room, condensation may occur inside the unit, which may cause incorrect images. Instruct the user to allow the unit to come to room temperature before unpacking it. This will take one or two hours.

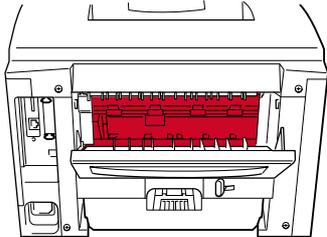
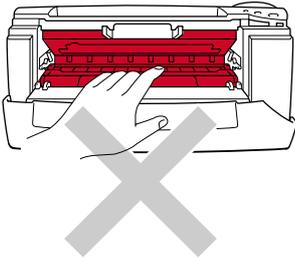
## 1.2 Warnings for Maintenance Work

To avoid creating secondary problems by mishandling, follow the warnings below during maintenance work.

 **WARNING**

***(1) Always turn off the power switch and unplug the power cord from the power outlet before accessing any parts inside the printer.***

***(2) Some parts inside the printer are extremely hot immediately after the printer is used. When opening the front cover or rear cover to access any parts inside the printer, never touch the red colored parts shown in the following figures.***





## 2. OPERATOR CALLS & SERVICE CALLS

### 2.1 Operator Calls

An 'operator call' which the printer indicates on the LCD display is user recoverable. Identify the error from the table below and take the corrective action described for each indication to correct it. The printer automatically recovers from most errors, but it may also be necessary to reset the printer with the control panel button.

Error Message	Remedy
TONER EMPTY	Replace the toner cartridge with a new one. Refer to <a href="#">subsection 1.2 'Toner Cartridge' in CHAPTER 5</a> .
NO PAPER XXXX	<ol style="list-style-type: none"> <li>(1) Load paper into the indicated printer tray.</li> <li>(2) If paper is empty, load a new stack of paper into the paper tray.</li> <li>(3) Check that paper in the tray is straight. If it is curled, straighten it before printing. Sometimes it is helpful to remove the paper, turn the stack over and put it back into the tray.</li> <li>(4) Check that the paper is specified type of paper.</li> </ol>
COVER OPEN	Close the front cover. If the cover is half-opened, the error may not be cleared even after closing it. In that case, open the cover once and close it again.
FUSER OPEN	Close the jam clear cover. Refer to the illustration of the jam cleaner cover in <a href="#">subsection 3.2.1 'Clearing jammed paper' in this Chapter</a> .
FACE UP OPEN	Close the face up output tray (rear cover).
JAM XXXXXX	Remove the jammed paper from the indicated area. Refer to <a href="#">subsection 3.2 'Paper jams' in this Chapter</a> .
MANUAL FEED	Load the correct size of paper on the Multi-purpose tray, and then press the <b>Go</b> switch.
BUFFER ERROR	Check the interface setting.
STORAGE FULL	Delete unnecessary macros or fonts.
DOWNLOAD FULL	Add the optional memory.
FONT FULL	<ol style="list-style-type: none"> <li>(1) Press the <b>Go</b> switch to print the data remaining in the printer.</li> <li>(2) Reduce the complexity of the document.</li> <li>(3) Expand the printer memory by adding a commercially available DIMM.</li> </ol>
MEMORY FULL	
SIZE MISMATCH	<ol style="list-style-type: none"> <li>(1) Put in the correct size of paper.</li> <li>(2) Select the correct size of paper on the Control Panel.</li> </ol>

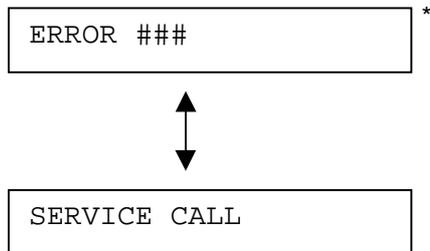
Error Message	Remedy
PRINT OVERRUN	Reduce the resolution, or add the optional memory. (1) Press the <b>Go</b> switch to print the data remaining in the printer. (2) Reduce the complexity of the document. (3) Expand the printer memory by adding a commercially available DIMM. (4) Set page protect to correct size.
IGNORE DATA	Send correct data to the printer.
SIZE ERROR DX	Specify the printable paper size.
SIZE ERROR T1	Set the correct paper that you want to use into the Tray 1, or load the same size paper that you selected in the current driver setting.
SIZE ERROR T2	Set the correct paper that you want to use into the Tray 2, or load the same size paper that you selected in the current driver setting.
NO DX TRAY	Install the duplex tray correctly.
DX LEVER ERROR	Set paper adjustment lever for duplex printing.
NO TRAY1	Install paper cassette (standard) into the Tray 1.
CLEAN DRUM UNIT	Clean the corona wire. Refer to <a href="#">subsection 3.2 'Cleaning the drum unit'</a> in <a href="#">CHAPTER 5</a> .

Maintenance Message	Remedy
CHANGE DRUM SOON	The drum unit is almost at the end of life. Prepare a new drum unit. Refer to <a href="#">subsection 1.1 'Drum Unit'</a> in <a href="#">CHAPTER 5</a> .
TONER LOW	Indicates that the toner cartridge is nearly empty. Purchase a new toner cartridge in order to be ready for when the "TONER EMPTY" message is indicated. Also refer to <a href="#">subsection 1.2 'Toner Cartridge'</a> in <a href="#">CHAPTER 5</a> .
REPLACE PF KIT1	Replace the paper feeding kit (pad holder ZLh ASSY / paper pick-up roller ASSY). Refer to <a href="#">subsection 3.3 'Paper Cassette'</a> and <a href="#">3.13 'Paper Pick-up Roller ASSY'</a> in <a href="#">CHAPTER 4</a> .
REPLACE PF KIT2	
REPLACE FUSER	Replace the fixing unit. Refer to <a href="#">subsection 3.12 'Fixing Unit'</a> in <a href="#">CHAPTER 4</a> .
REPLACE LASER	Replace the laser unit. Refer to <a href="#">subsection 3.11 'Laser Unit'</a> in <a href="#">CHAPTER 4</a> .

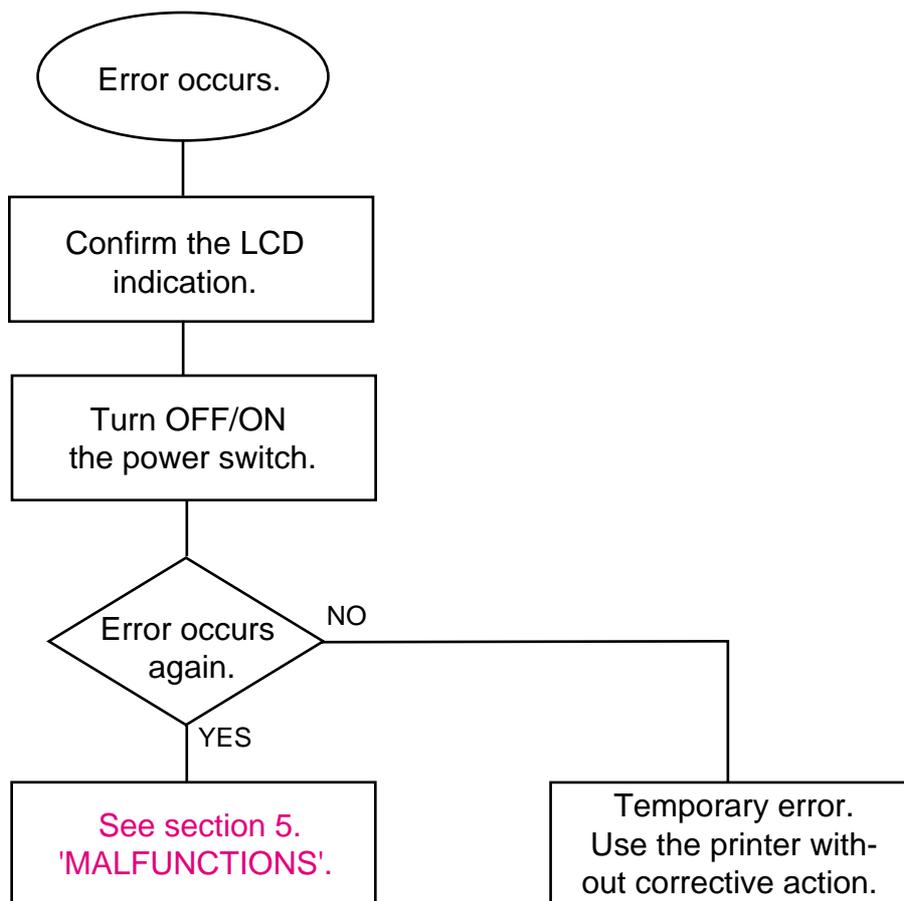
## 2.2 Service Calls

When each of the following messages appears alternately on the LCD, a user unrecoverable error may have occurred.

Instruct the user to turn off the power switch, wait 5 seconds and then turn it on again. If the error is not cleared and the same service call appears, identify the error from the table on the next page and take the corrective action described for each indication to correct it.



\* ### indicates the error codes.



Error Messages	Meaning	Remedy
<b>ERROR S01</b>		Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S02</b>	Instruction access error	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S03</b>	Memory address not aligned	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S04</b>	Instruction bus error	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S05</b>	Data bus error	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S06</b>	Privileged instruction	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S07</b>		Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S08</b>	Illegal instruction	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S09</b>	No fpu	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S10</b>		Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S11</b>		Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S12</b>		Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S13</b>		Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR S21</b>	Unknown operator call detected	Turn off the printer. Wait a few seconds, then turn it on again. If still remains, replace the main PCB.
<b>ERROR E41</b>	Error in communication with the engine controller	Turn off the printer. Wait a few seconds, then turn it on again. Refer to <b>M-12 'E41 error'</b> in this chapter.

		error' in this chapter.
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<b>Error Messages</b>	<b>Meaning</b>	<b>Remedy</b>
<b>ERROR E49</b>	Malfunction of fuser detected by hard wear.	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-9 'Fuser failure'</b> in this chapter.
<b>ERROR E50</b>	Malfunction of fuser detected	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-9 'Fuser failure'</b> in this chapter.
<b>ERROR E51</b>	Malfunction of laser beam detector	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-8 'Scanner failure'</b> in this chapter.
<b>ERROR E52</b>	Malfunction of laser unit motor	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-8 'Scanner failure'</b> in this chapter.
<b>ERROR E54</b>	Malfunction of main motor	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-4 'No paper supplied'</b> in this chapter.
<b>ERROR H60</b>	Bus error	Turn off the printer. Wait a few seconds, and then turn it on again.
<b>ERROR H61</b>	Program ROM checksum error	Turn off the printer. Wait a few seconds, and then turn it on again.
<b>ERROR H63</b>	D-RAM error	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-10 'ROM error / D-RAM error / NV-RAM error'</b> in this chapter.
<b>ERROR H66</b>	NV-RAM writing error	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-10 'ROM error / D-RAM error / NV-RAM error'</b> in this chapter.
<b>ERROR H67</b>	NV-RAM reading error	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-10 'ROM error / D-RAM error / NV-RAM error'</b> in this chapter.
<b>ERROR H68</b>	NV-RAM bus error	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-10 'ROM error / D-RAM error / NV-RAM error'</b> in this chapter.
<b>ERROR H73</b>	Flash reading error	Turn off the printer. Wait a few seconds, and then turn it on again.
<b>ERROR H74</b>	Flash writing error	Turn off the printer. Wait a few seconds, and then turn it on again.
<b>ERROR H37</b>	PCI registering error	Turn off the printer. Wait a few seconds, and then turn it on again.
<b>ERROR H38</b>	PCI bus error	Turn off the printer. Wait a few seconds, and then turn it on again. Refer to <b>M-13 'PCI BUS error'</b> is chapter.
<b>ERROR H39</b>	BR-NET typing error	Turn off the printer. Wait a few seconds,

		and then turn it on again.
--	--	----------------------------

### 3. PAPER PROBLEMS

When any paper related problem occurs, ensure that the paper used meets the recommended paper specifications referring to [subsection 3.5 'Paper' in CHAPTER 1](#).

#### 3.1 Paper Loading Problems

Problem	Remedy
The printer does not load paper.	(1) If there is paper in the paper cassette, make sure it is straight. If the paper is curled, straighten it before printing. Sometimes it is helpful to remove the paper, turn the stack over and place it back into the paper cassette.  (2) Reduce the amount of paper in the cassette, and then try again.
The printer does not load paper from the multi-purpose tray.	Fan the paper, and then re-install the paper firmly.
The printer does not load envelopes.	The printer can load envelopes from the multi-purpose tray. The application software must be set up correctly to print on the envelope size you are using. This is usually done in the page setup or document setup menu of the software. Refer to the software application manual.
The printer does not print into the face down output tray.	Close the face up output tray.
The printed pages are curled, so the face down output tray can not hold the prescribed number of pages.	(1) Turn the paper in the paper cassette over. (2) Change the printer driver setting in Media Type to a thinner level setting than current setting (If the current setting is plain paper, then to thin paper, if thin paper is selected, change to transparency).
The printer does not print on the specified paper.	(1) Make sure that the cable is connected to the printer. (2) Make sure that the appropriate printer driver is selected.

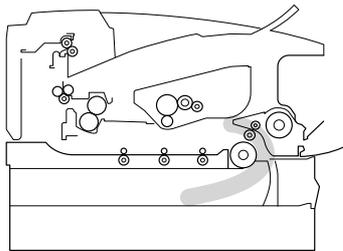
### 3.2 Paper Jams

- If paper jams in the printer, it will stop printing and display the following messages on the LCD display.

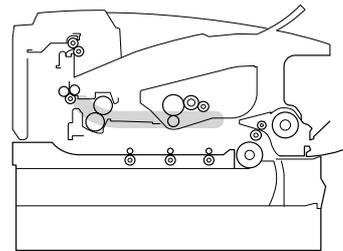
JAM TRAY1	JAM INSIDE
JAM TRAY2	JAM REAR
JAM MP TRAY	JAM DUPLEX
PAPER JAM	

- The shaded areas in the Fig. 6-1 below show the location of the jammed paper.
- Check the jam location and follow the instructions to remove the jammed paper. Refer to subsection 3.2.1 'Clearing jammed paper' in this Chapter.
- After you have followed the instructions, the printer will automatically resume printing.

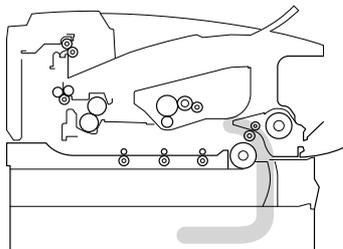
#### JAM TRAY 1



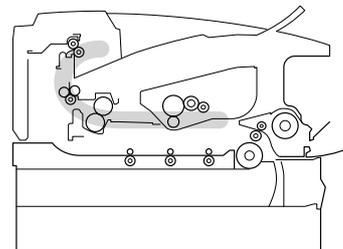
#### JAM INSIDE



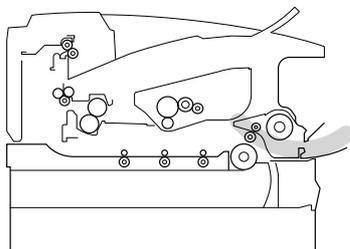
#### JAM TRAY 2



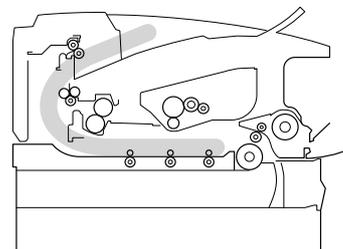
#### JAM REAR



#### JAM MP TRAY



#### JAM DUPLEX



#### PAPER JAM

If the "PAPER JAM" error message appears, there are several possible places that the paper could have jammed. Refer to 'PAPER JAM' section in this Chapter for more information.

Fig. 6-1

### 3.2.1 Clearing jammed paper

Clear the jammed paper following the procedures below;

#### JAM TRAY 1

- (1) Pull the paper cassette completely out of the printer.

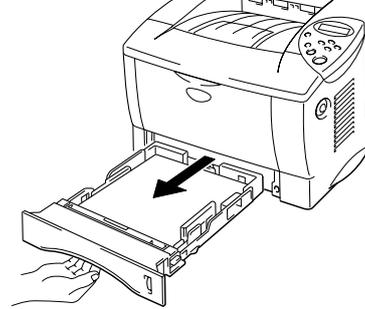


Fig. 6-2

- (2) Pull the jammed paper out of the printer.
- (3) Install the paper cassette into the printer.

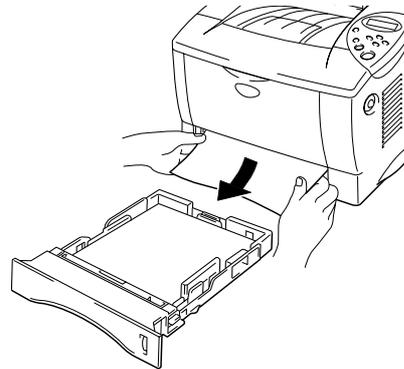


Fig. 6-3



**CAUTION:**

*Do not pull out the standard paper cassette while paper is being fed from the optional lower paper cassette because it will cause a paper jam.*

#### JAM TRAY 2

- (1) Pull the lower paper cassette completely out of the printer.

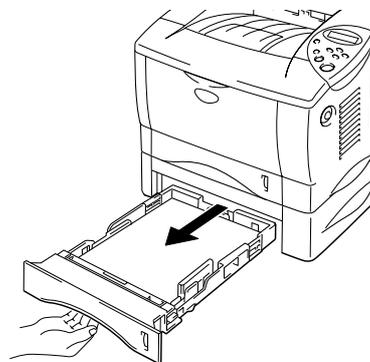


Fig. 6-4

- (2) Using both hands, pull the jammed paper out of the printer.
- (3) Install the lower paper cassette into the printer.

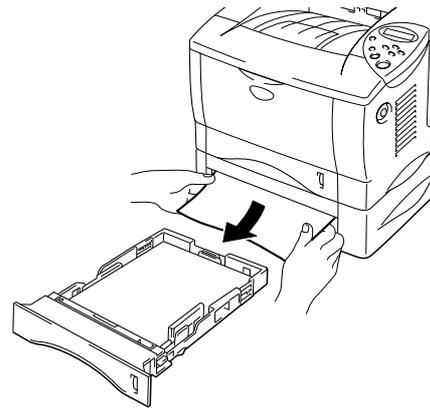


Fig. 6-5

**JAM MP TRAY**

- (1) Remove the jammed paper from the multi-purpose tray.

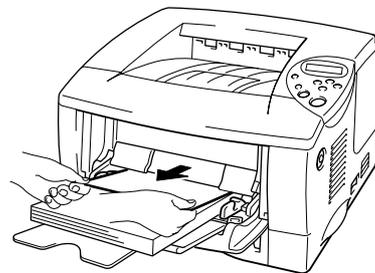


Fig. 6-6

- (2) Reset all the paper into the multi-purpose tray correctly.

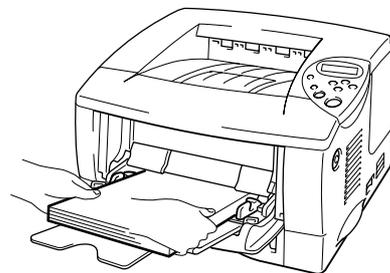


Fig. 6-7

**JAM INSIDE**

- (1) Press the cover release button, and then open the front cover.
- (2) Pull the drum unit assembly out of the printer. Pull the paper cassette completely out of the printer.

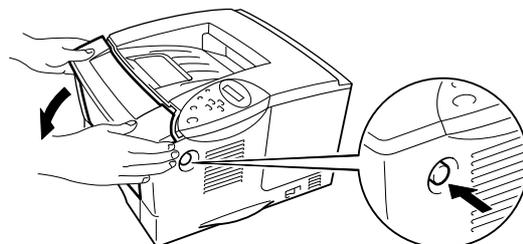


Fig. 6-8

- (3) Pull the jammed paper up and out of the printer.

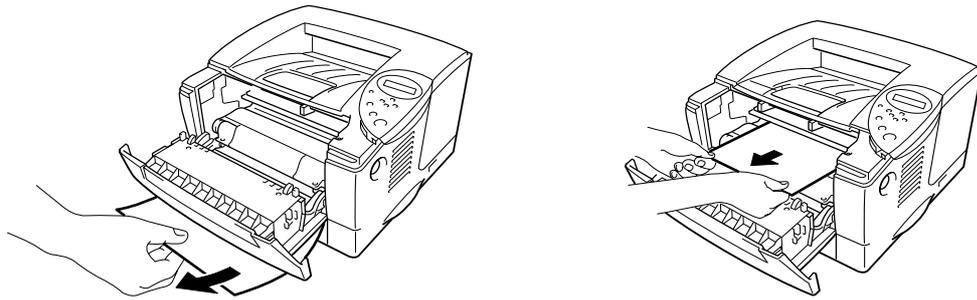


Fig. 6-9

- (4) Install the drum unit assembly and paper cassette into the printer. Close the front cover.

 **WARNING**  
*The fixing roller is extremely hot during operation. Remove the paper carefully.*

 **CAUTION:**

- After having removed the jammed paper, if the printed page has a stain, print several pages before restarting your print job.
- Remove the jammed paper carefully so you don't spread toner.
- Take care not to stain your hands and clothes with toner. Immediately wash toner stains with cold water.
- Never touch the transfer roller.

**JAM REAR**

- (1) Press the cover release button, and then open the front cover.

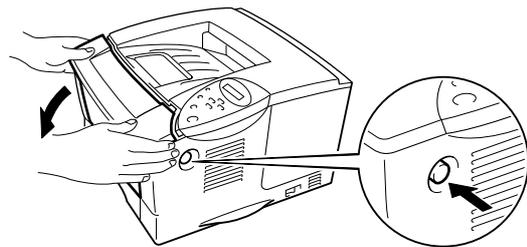


Fig. 6-10

- (2) Pull the drum unit assembly out of the printer.

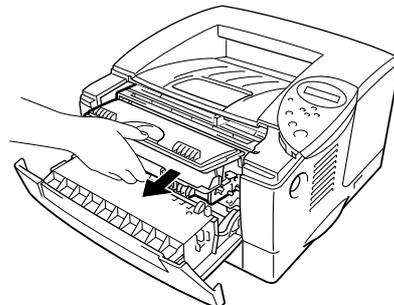
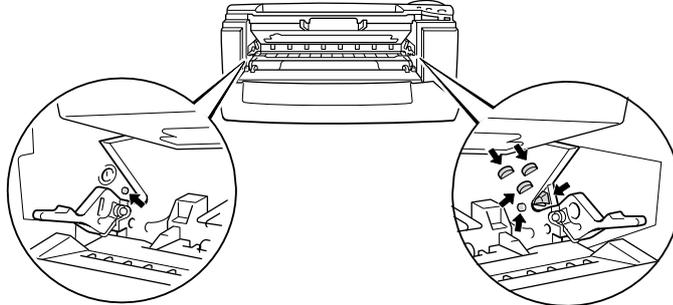


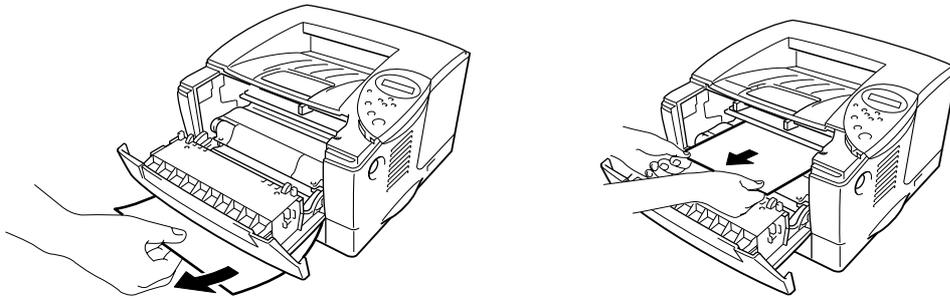
Fig. 6-11

**! CAUTION:**

- It is recommended to put the drum unit assembly on a piece of disposable paper or cloth so you don't accidentally spill or scatter toner.
- To prevent damage to the print caused by static electricity, do not touch the electrodes shown below.



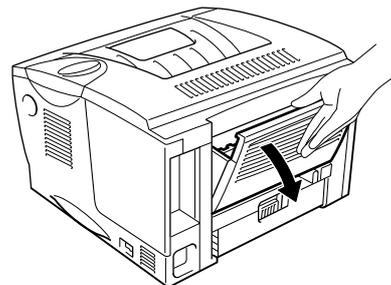
(3) Pull the jammed paper out of the printer.



**Fig. 6-12**

If the paper jam can be cleared, go to (7).

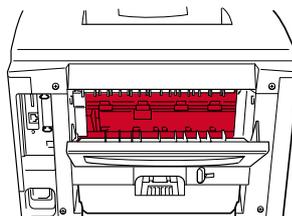
(4) Open the face up out put tray (rear cover).



**Fig. 6-13**

**! CAUTION:**

After the printer has just been used, some internal parts of the printer are extremely **hot!** Wait for the printer to cool down before you touch the internal parts of the printer.





- (5) Open the jam clear cover. Pull the jammed paper out of the fuser unit.

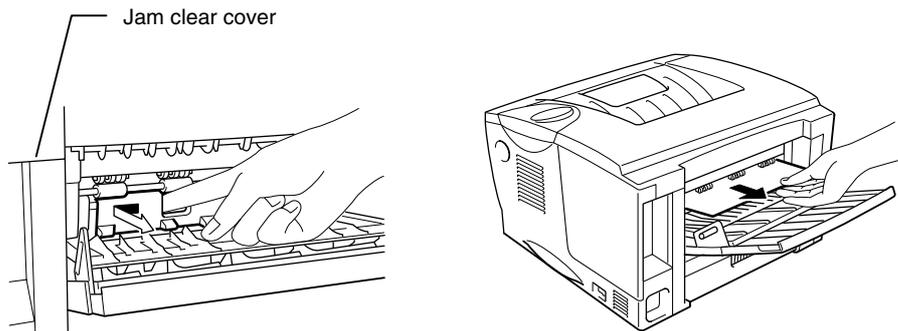


Fig. 6-14

- (6) Close the jam clear cover. Close the face up output tray (rear cover).

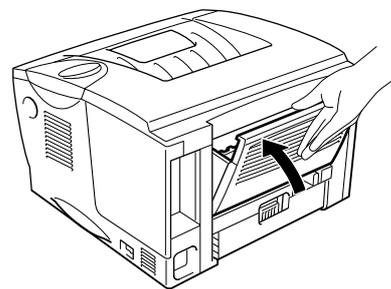


Fig. 6-15

- (7) Install the drum unit assembly into the printer.  
 (8) Close the front cover.

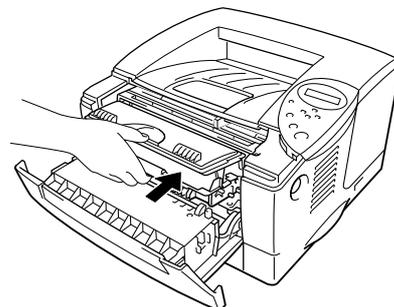


Fig. 6-16

**JAM DUPLEX**

- (1) Open the face up output tray (rear cover).

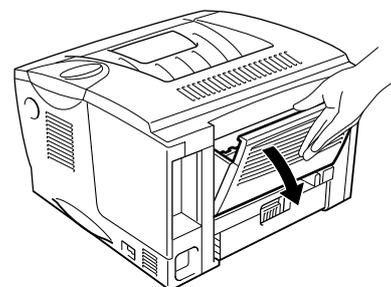


Fig. 6-17

- (2) Pull the jammed paper out of the fuser unit.

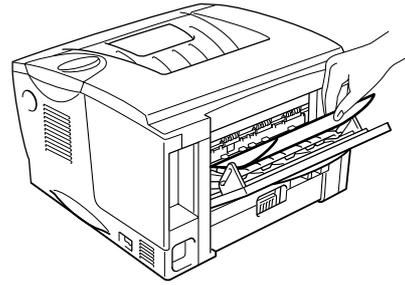


Fig. 6-18

- (3) Close the face up output tray (rear cover). If the paper jam can not be cleared, go to the next step.

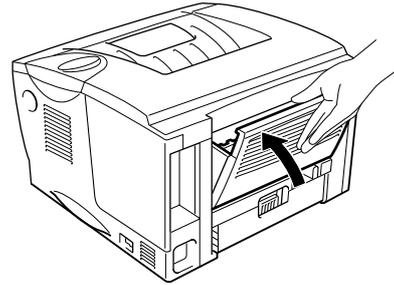


Fig. 6-19

- (4) Pull the duplex tray and paper cassette out of the printer.

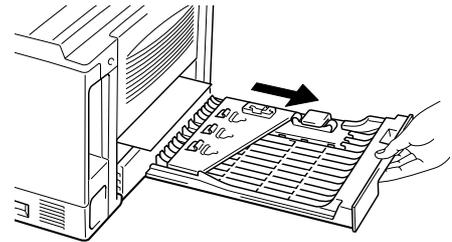


Fig. 6-20

- (5) Pull the jammed paper out of the printer.

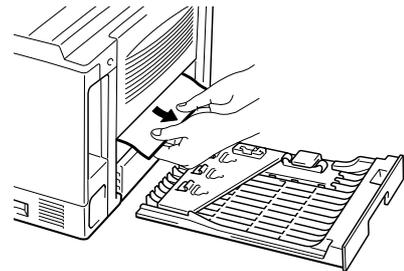


Fig. 6-21

- (6) Install the duplex tray and paper cassette into the printer.

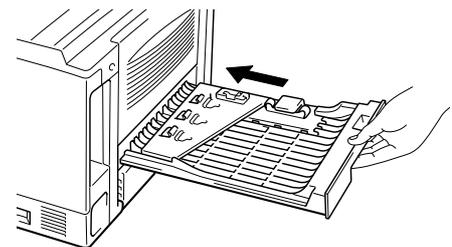


Fig. 6-22

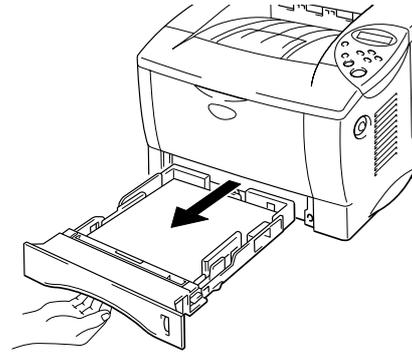


**NOTE:**

- The **JAM DUPLEX** message appears if you remove a sheet of paper from the face down output tray after only one side has printed.
- The paper sized you can use for the duplex printing function are A4, Letter and Legal.
- If the paper adjustment lever for duplex printing is not set correctly for the paper size, paper jams may occur and printing will be out of position on the page.

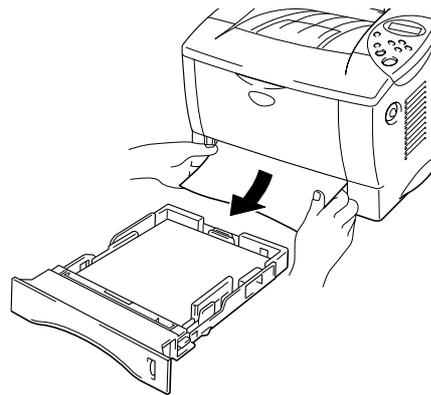
**PAPER JAM**

- (1) Pull the paper cassette completely out of the printer.



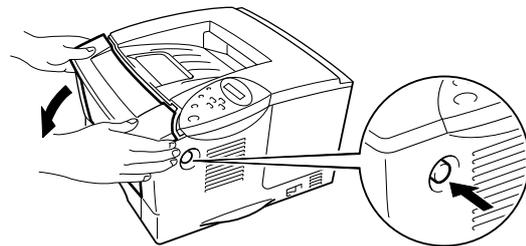
**Fig. 6-23**

- (2) Pull the jammed paper out of the printer. If the paper jam can be cleared, go to (10).



**Fig. 6-24**

- (3) Press the cover release button, and then open the front cover.



**Fig. 6-25**

- (4) Pull the drum unit assembly out of the printer. Pull the jammed paper up and out of the printer.

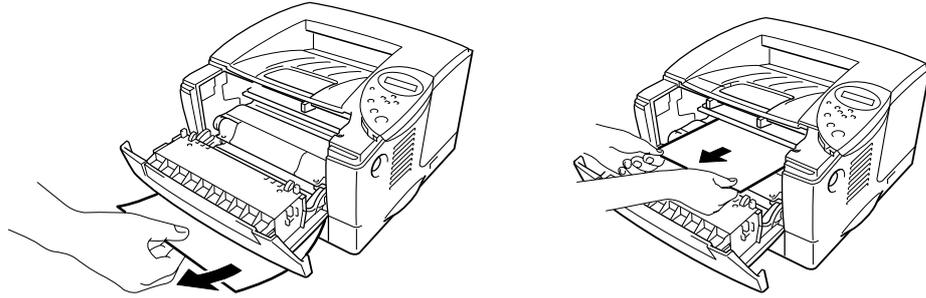


Fig. 6-26

If the paper jam can be cleared, go to (8).

- (5) Open the face up output tray (rear cover).

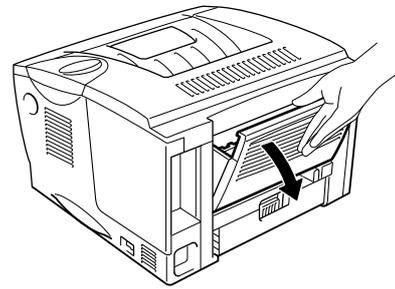


Fig. 6-27

- (6) Open the jam clear cover. Pull the jammed paper out of the fuser unit.  
 (7) Close the jam clear cover. Close the face up output tray (rear cover).

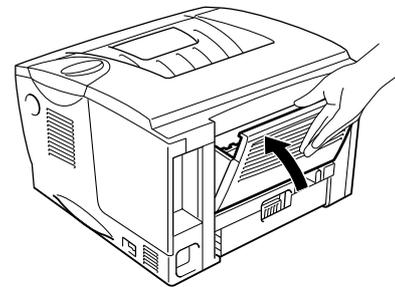


Fig. 6-28

- (8) Install the drum unit assembly into the printer.

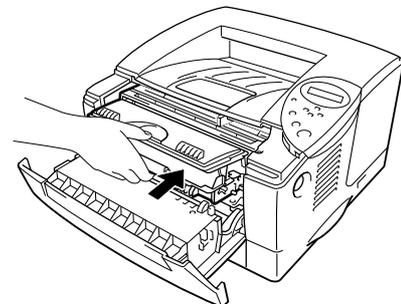


Fig. 6-29

- (9) Close the front cover.  
 (10) Install the paper cassette into the printer.

**3.2.2 Causes & countermeasures**

The causes for paper jam problems vary depending on the location of the paper jam. When a paper jam occurs inside the printer, you have to find the location of the paper jam first, remove the jammed paper and then take the appropriate countermeasure referring to the table below;

<b>Problem</b>	<b>Type of Jam</b>	<b>Cause</b>	<b>Remedy</b>
Jam when the printer is turned on.	Paper stuck	The front registration sensor or paper eject sensor is turned on.	Remove the paper inside the printer. If there is no paper, check the suspect sensors referring to <a href="#">subsection 9.2 'Sensor Check Mode'</a> in this Chapter.
Top of paper stopped at 350mm from the second exit roller. Next paper is not fed.	Jam caused by paper length detected as longer than 400mm (16 in).	The front registration sensor is not returning properly and is not turning off.	Check front registration sensor motion referring to <a href="#">subsection 9.2 'Sensor Check Mode'</a> in this Chapter.
Bottom of paper stopped around the transfer roller.	Jam caused by paper length detected as shorter than 80mm.	The front registration sensor was turned off early. Malfunction of actuator or hardware noise.	Check the front registration sensor referring to <a href="#">subsection 9.2 'Sensor Check Mode'</a> in this Chapter.
Top of paper stopped between the paper feed roller and the pick-up roller.	Jam caused by a paper feed delay.	Paper was not fed in at the proper timing due to paper dust or wear of the rubber pick-up roller.	Remove the paper dust attached to the pick-up roller. If the rubber is worn out, replace it with a new one.
Top of paper stopped at 50mm from the contact point of the heat roller and pressure roller.	Jam caused by the paper not being sensed when ejected from the paper eject sensor.	The paper eject sensor is not working properly and has not turned off. (single printing)	Check sensor motion referring to <a href="#">subsection 9.2 'Sensor Check Mode'</a> in this Chapter.
Jam after paper is ejected.	Jam caused by the paper not being sensed when ejected from the paper eject sensor.	The paper eject sensor or front registration sensor is not working properly and has not turned off. (continuous printing)	Check sensor motion referring to <a href="#">subsection 9.2 'Sensor Check Mode'</a> in this Chapter.

### 3.3 Paper Feeding Problems

Even if the paper is printed and ejected without any problems such as paper jams, paper feeding problems below may appear.

Users can clear these problems by following the 'User Check' items for each problem. Even if the same problem occurs again, follow the procedures in the table below.

F-1	Double feeding
-----	----------------

#### User Check

Check the paper used meets the recommended paper specifications.

Possible cause	Step	Check	Result	Remedy
Separation pad	1	Is the surface of the separation pad worn out?	Yes	Replace the separation pad.

F-2	Wrinkles or creases
-----	---------------------

#### User Check

- (1) Check that paper is loaded into the paper cassette correctly.
- (2) Check the paper used meets the recommended paper specifications.
- (3) Try printing using the straight-through output path.
- (4) Turn over the stack of paper in the cassette or try rotating the paper 180° in the cassette.

Possible cause	Step	Check	Result	Remedy
Paper	1	Is the problem solved if new paper is used?	Yes	Instruct the user how to store paper so that it does not absorb moisture.
Fixing unit entrance guide	2	Is the entrance guide dirty?	Yes	Clean the entrance guide.
Fixing unit	3	Is the pressure roller dirty?	Yes	Clean the pressure roller.
			No	Replace the fixing unit.

F-3	Page skew
-----	-----------

#### User Check

- (1) Check that the paper or other media is loaded into the paper cassette correctly and that the paper guides are not too tight or too loose against the paper stack.
- (2) If using the manual feed slot, check how to load paper into the manual feed slot correctly.
- (3) The paper cassette may be too full. Load paper below 27mm in depth.
- (4) Check the paper used meets the recommended paper specifications.



F-4	Curl or Wave
-----	--------------

**✓ User Check**

- (1) Check the paper used meets the recommended paper specifications. Both high temperature and humidity will cause paper to curl.
- (2) If the printer is used infrequently, the paper may have sat for too long in the paper cassette. Turn over the stack of paper in the paper cassette. Also, try rotating the paper 180° in the paper cassette.
- (3) Try printing using the straight-through output path.

**NOTE:**

*For no paper supplied as the cause of a malfunction, see M-4 'No paper supplied' in 5. 'MALFUNCTIONS' in this Chapter.*

F-5	Prints only single side of the paper when duplex printing
-----	-----------------------------------------------------------

**✓ User Check**

Check the size of the paper used meets the recommended paper specifications (A4 or Letter).

## 4. SOFTWARE SETTING PROBLEMS

The printer may not print the data correctly if there are incorrect software settings.

S-1	“There was an error writing to LPT1: (or BRUSB) for the printer” error message appears.
-----	-----------------------------------------------------------------------------------------

 **User Check**

- (1) Check that the printer cable is not damaged or broken. Check also that the cable is connected to the correct interface connectors of both the printer and PC.
- (2) Check that the correct printer is selected if you have an interface switching device.
- (3) Check that the appropriate printer driver is selected as ‘Set as Default’. Check also that the correct print port is set for the selected printer driver.
- (4) Check that the printer is not connected to the same port which is also connected to a mass storage device or scanner. Remove all other devices and connect the port to the printer only. Turn off the printer status monitor in the device options tab in the printer driver.
- (5) If the print port is set as an ECP port, change it to a normal port.
- (6) Try printing the test page referring to 9. ‘INSPECTION MODE’ in this Chapter.
- (7) Try resetting the factory settings.

Possible cause	Step	Check	Result	Remedy
Failure inside the printer	1	Is it possible to print the test page with the method of 9. ‘INSPECTION MODE’ in this Chapter?	No	Identify the error type, then refer to the specified section of this chapter.
Main PCB failure	2	Is it possible to print with another PC and printer cable?	No	Replace the main PCB.
			Yes	This problem may appear under the specified system environment. Check the environment which the user used.

S-2	Unable to print from application software <u>under DOS</u> .
-----	--------------------------------------------------------------

 **User Check**

- (1) Check that the DOS application software interface settings match that of your printer.
- (2) Check if the printer has any printer alarms active.
- (3) Check if the appropriate printer is selected in your application software.

Possible cause	Step	Check	Result	Remedy
Failure inside the printer	1	Is it possible to print the test page with the method of 9. 'INSPECTION MODE' in this Chapter?	No	Identify the error type, then refer to the specified section of this chapter.
Main PCB failure	2	Is it possible to print with another PC and printer cable?	No	Replace the main PCB.
			Yes	This problem may appear under the specified system environment. Check the environment which the user used.

S-3	Unable to print from application software <u>with an Apple Macintosh Computer</u> .
-----	-------------------------------------------------------------------------------------

 **User Check**

- (1) Check that the supplied Macintosh printer driver is installed in the System Folder and it is selected with Chooser.
- (2) Check the PORT selection within the Chooser. It should match the port to which you physically attached the printer cable.

Possible cause	Step	Check	Result	Remedy
Failure inside the printer	1	Is it possible to print the test page with the method of 9. 'INSPECTION MODE' in this Chapter?	No	Identify the error type, then refer to the specified section of this chapter.
Main PCB failure	2	Is it possible to print with another PC, printer cable and RS-100M?	No	Replace the main PCB.

S-4	This printer does not appear in Chooser with iMac and Power Macintosh G3/G4 with USB.
-----	---------------------------------------------------------------------------------------

 **User Check**

(1) Check the printer is turned on.  
 (2) Check the USB interface cable is connected correctly.  
 (3) Check the printer driver is installed correctly.

Possible cause	Step	Check	Result	Remedy
Printer connection	1	Select 'Apple System Profiler' in Apple Menu. Are the following items indicated in the USB box of the Device and Volumes tab? <ul style="list-style-type: none"> <li>• Product ID: 11 (\$6)</li> <li>• Vender: Brother International Corporation (or 0x4f9)</li> </ul>	No	Check the printer is turned on and the USB interface cable is connected correctly.  Check that the USB cable used is the shielded twisted pair type and 5 m or less.  Try to connect the printer and PC with the USB cable directly.
Driver installation	2	Are there the following files in the Extensions Folder of System Folder?  <For System 8.6 or higher> <ul style="list-style-type: none"> <li>• BR_Backgrounder</li> <li>• BR_PrintMonitor(USB)</li> <li>• HL-1850/1870N</li> <li>• USBPrintDriver</li> </ul> <For System 8.1, 8.5, 8.51> <ul style="list-style-type: none"> <li>• BR_Backgrounder</li> <li>• BR_PrintMonitor(USB)</li> <li>• HL-1850/1870N</li> <li>• USBPrintDriver(BRB)</li> </ul>	No	Try to re-install the printer driver.
			Yes	Turn off the printer and PC power switch, and check all connections between them. Then, turn them on again.

*\*NOTE:  
 The value or alphabet following 'BR' is a product ID.*

## 5. MALFUNCTIONS

When taking countermeasures for malfunctions as described in this section, check connectors for contact failure before measuring the voltage at the specified connector pins.

M-1	No AC power supplied
-----	----------------------

Possible cause	Step	Check	Result	Remedy
Supply voltage	1	Is the correct voltage present at the outlet?	No	Inform the user that the correct voltage is not supplied at the outlet.
Power plug	2	Is the power cord securely plugged into the outlet?	No	Plug the power cord securely into the outlet.
Fuse (F1, F2)	3	Is the fuse blown?	Yes	If the fuse blows again immediately after replacing the low-voltage power supply PCB, check that there is not a short circuit somewhere in the AC power supply line.
Wiring	4	Unplug the power supply plug. Is there a broken wire between the AC input connector of the low-voltage power supply and the power plug?	Yes	Replace the AC power cord.

M-2	No DC power supplied
-----	----------------------

Possible cause	Step	Check	Result	Remedy								
AC power supply	1	Is AC power supplied between connectors CN1-L and CN1-N when the power plug is plugged into the outlet?	No	Follow the same check procedure of M-1 "No AC power supplied".								
Wiring, DC load	2	Turn off the power switch and disconnect the P3 and P5 connectors on the engine PCB. Turn on the power again. Measure the voltages between the terminals. Do the measured voltage satisfy the prescribed valued in the table below?	Yes	Turn off the power switch, reconnect the connector and turn the power switch on again. If the protector circuit is activated, check the connector, the wiring from the connector, and the DC load.								
Low-voltage power supply PCB	3	<table border="1"> <thead> <tr> <th>PCB</th> <th>+ lead pin</th> <th>- lead pin</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>Engine</td> <td>P5-2 P3-10</td> <td>P5-3 P3-9</td> <td>Approx. 24V Approx. 5V</td> </tr> </tbody> </table>	PCB	+ lead pin	- lead pin	Voltage	Engine	P5-2 P3-10	P5-3 P3-9	Approx. 24V Approx. 5V	No	Replace the low-voltage power supply PCB.
PCB	+ lead pin	- lead pin	Voltage									
Engine	P5-2 P3-10	P5-3 P3-9	Approx. 24V Approx. 5V									



### WARNING

***If you analyze malfunctions with the power plug inserted into the power outlet, special caution should be exercised even if the power switch is OFF because it is a single pole switch.***

M-3	Main motor does not rotate
-----	----------------------------

Possible cause	Step	Check	Result	Remedy
Failure of connector	1	Is the connection of connector P9 on the engine PCB correct?	No	Reconnect the connector.
Main motor	2	Is the problem solved by replacing the main motor?	Yes	Replace the main motor.
Engine PCB	3	Is the problem solved by replacing the engine PCB?	Yes	Replace the engine PCB.
Main PCB	4	Is the problem solved by replacing the main PCB?	Yes	Replace the main PCB.

M-4	No paper supplied
-----	-------------------

Possible cause	Step	Check	Result	Remedy
Separation pad / pick-up roller failure	1	Is the surface of the separation pad or the pick-up roller dirty or worn out?	Yes	1) Clean the surface of the separation pad or pick-up roller. 2) Replace the separation pad or pick-up roller.
Failure of connector	2	Is the contact of the solenoid connector on the engine PCB good?	No	Reconnect the connector.
Engine PCB circuit	3	Set paper in the manual paper slot and make a test print by pressing the control panel button.	Yes	Replace the engine PCB.
Paper pick-up clutch solenoid		Does the voltage between pins 2 (SOLENOID) and 1 (24V) of the P13 connector on the engine PCB change from approx. 24V DC to 0V within the specified time?	No	Replace the paper pick-up solenoid.
Main PCB	4	Is the problem solved by replacing the main PCB?	Yes	Replace the main PCB.

M-5	Insufficient output from high-voltage power supply unit
-----	---------------------------------------------------------

Possible cause	Step	Check	Result	Remedy
High-voltage contact	1	Do any of the terminals on the high-voltage contacts have dirt or contact burns?	Yes	Clean the terminals.
High-voltage power supply PCB	2	Check the connections of the connector between the high-voltage power supply and the engine PCB are secured correctly.	Yes	Replace the high-voltage power supply PCB
			No	Reconnect the connector between the high-voltage power supply and the engine PCB.

M-6	Fixing heater temperature failure
-----	-----------------------------------

Possible cause	Step	Check	Result	Remedy
Poor thermistor harness contact	1	Is the contact of connector P6 on the engine PCB good?	No	Reconnect the connector.
Blown thermal fuse	2	Remove the fixing unit and measure the resistance of the thermal fuse. Is it open circuit?	Yes	Replace the fixing unit.
Thermistor failure	3	Is the thermistor installed properly?	Yes	Replace the fixing unit.
			No	Reinstall the thermistor properly.
Halogen heater lamp failure	4	Remove the fixing unit and measure the resistance of the halogen heater lamp. Is it open circuit?	Yes	Replace the halogen heater lamp.

M-7	BD failure
-----	------------

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is connector P10 on the main PCB secured correctly?	No	Reconnect the connector securely.
			Yes	Replace the laser unit.

M-8	Scanner failure
-----	-----------------

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection of the scanner motor connector <b>P3</b> on the engine PCB secure?	No	Reconnect the connector securely.
Power supply input	2	Is the voltage between pins 1 (+24V DC) and 2 (GND) of connector <b>P3</b> on the engine PCB 24V DC?	No	Check if +24V DC is supplied between pins <b>6</b> (+24V DC) and <b>5</b> (+24V GND) of connector P5 on the engine PCB. If not, check the power supply output on the low-voltage power supply PCB.
			Yes	Replace the laser unit.

M-9	Fuser failure
-----	---------------

Possible cause	Step	Check	Result	Remedy
Poor thermistor harness contact	1	Is the contact of connector P6 on the engine PCB good?	No	Reconnect the connector.
Blown thermal fuse	2	Remove the fixing unit and measure the resistance between the input connectors. Is it open circuit?	Yes	Replace the fixing unit.
Thermistor failure	3	Is the thermistor installed properly?	Yes	Replace the fixing unit.
			No	Reinstall the thermistor properly.
Halogen heater lamp failure	4	Remove the fixing unit and measure the resistance of the halogen heater lamp. Is it open circuit?	Yes	Replace the halogen heater lamp.
Heater harness connection failure	5	Is the heater harness connector connected to the low-voltage power supply PCB and fixing unit secure?	No	Reconnect the connectors securely.

**NOTE:**

- This problem will be cleared if leaving the printer power ON for ten minutes.
- If the heater is cooled down sufficiently, this problem may be cleared by pressing the **Go** switch and **Set** switch together till the back light turns green and turning off the power switch. **Be warned, however, that this operation will melt the fixing unit if the heater is hot.**

M-10	ROM error / D-RAM error / NV-RAM error
------	----------------------------------------

Possible cause	Step	Check	Result	Remedy
Main PCB	1	Is it possible to print the test page with the method of 9. 'INSPECTION MODE' in this Chapter?	No	Replace the main PCB.
Software bug	2	Does this problem appear when printing specific data or printing under a specific environment?	Yes	Inform the Brother office of the used specific data, printer condition and system environment.

M-11	SXX error
------	-----------

Possible cause	Step	Check	Result	Remedy
Main PCB	1	Is it possible to print the test page with the method of 9. 'INSPECTION MODE' in this Chapter?	No	Replace the main PCB.
Software bug	2	Does this problem appear when printing specific data or printing under a specific environment?	Yes	Inform the Brother office of the used specific data, printer condition and system environment.

M-12	E41 error
------	-----------

Possible cause	Step	Check	Result	Remedy
Process unit ground wire connection	1	Is the ground wire on the process unit secured correctly?	No	Secure the ground wire correctly with the shoulder screw If the ground wire is bent, fix it to a right shape with a pair of pliers.
Corona failure	2	Is the corona wire on the process unit dirty?	Yes	Clean the corona wire with the wire cleaner.
High-voltage power supply PCB failure	3	Is the high-voltage power supply PCB fixed correctly?	Yes	Reinstall the high-voltage power supply PCB correctly.
Metallic parts failure (electrostatic discharge when feeding paper)	4	Are any metallic parts loose?	Yes	Secure the parts correctly.

M-13	PCI BUS error
------	---------------

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection between connector P21 on the main PCB and connector P1 on the network board secure?	No	Reconnect the connectors securely.
Network board	2	Is the problem solved by replacing the network board?	Yes	Replace the network board.
Main PCB	3	Is the problem solved by replacing the main PCB?	Yes	Replace the main PCB.

## 6. IMAGE DEFECTS

### 6.1 Image Defect Examples

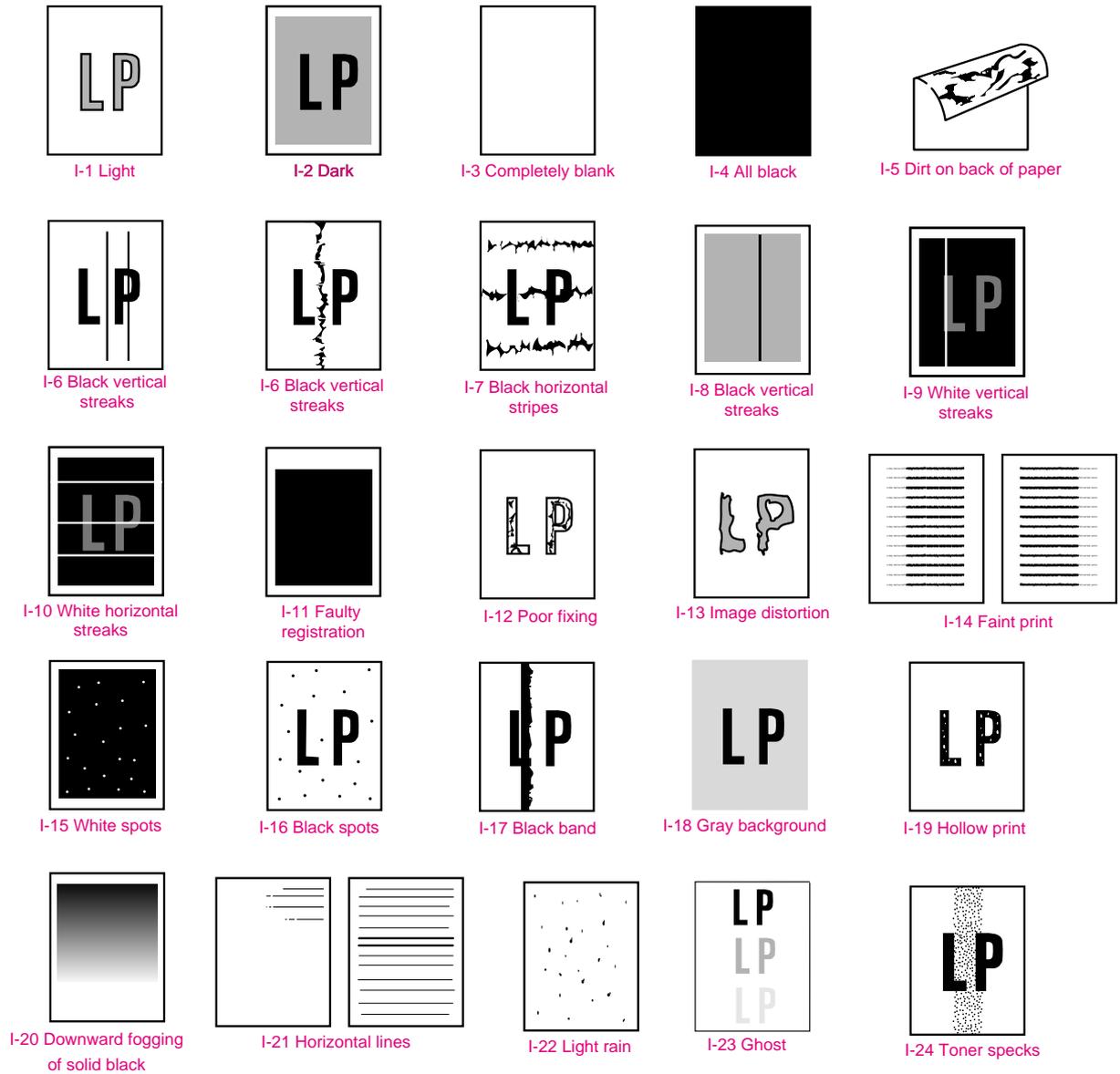


Fig. 6-30

## 6.2 Troubleshooting Image Defect

Several types of the image defects can be cleared by end users. For those defects, instruct the user to check the 'User Check' items described in each table. Even if the same image defect appears, the following procedures should be followed in the event of specific image defects.

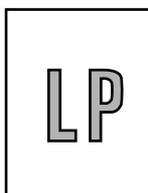
See also [subsection 6.3 'Location of Ground Contacts' in this Chapter](#) for information about the location of the grounding contacts.



**CAUTION:**

*When using the printer for a special job, such as printing of name cards, print quality cannot be guaranteed.*

I-1	Light
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**User Check**

- (1) Check the printer's environment. Conditions such as humidity, high temperatures, etc. may cause this situation to occur.
- (2) If the whole page is light, toner save mode may be on. Disable toner save mode within Printer Properties tab of the driver.
- (3) Try installing a new toner cartridge or drum unit.

Possible cause	Step	Check	Result	Remedy	Ground contacts
Toner sensing failure (printer side)	1	Can printing be started with the drum unit and toner cartridge removed?	Yes	Check if the toner sensor is dirty and check the toner sensor connection.	
Toner sensing failure (toner cartridge side)	2	Is the problem solved when 4 or 5 pages are printed after the toner cartridge is replaced with a full one?	Yes	The wiper of the toner cartridge is defective. Replace the toner cartridge.	
Drum connection failure	3	Are all the contacts between the drum unit and printer body connected correctly?	No	Clean contact electrodes both on the drum unit and in the printer body.	(1), (4), (5), (6)
High-voltage power supply PCB failure	4	Is the harness connection between the high-voltage power supply PCB and the engine PCB correct?	Yes	Replace the high-voltage power supply PCB.	
Engine PCB / Main PCB failure	5	Is the harness connection between the engine PCB and the main PCB correct?	Yes	Replace the engine PCB or the main PCB.	
Dirt on the scanner window	6	Is there any dirt on the scanner window?	Yes	Wipe it off with a soft clean paper.	
Laser unit failure	7	Is the problem solved after replacing the laser unit?	Yes	Replace the laser unit.	

I-2	Dark
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**User Check**

- (1) Check the paper used meets the recommended paper specifications.
- (2) Check the printer's environment. High temperature and high humidity conditions can increase the amount of background shading.
- (3) Clean the corona wire with the wire cleaner.
- (4) Try installing a new toner cartridge or drum unit.

Possible cause	Step	Check	Result	Remedy	Ground contacts
Corona failure (contact failure)	1	Are the charge electrodes between the printer body and the drum unit dirty?	Yes	Clean both electrodes.	(3)
Drum unit failure	2	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit with a new one.	
Toner cartridge failure	3	Is the problem solved after replacing the toner cartridge?	Yes	Replace the toner cartridge with a new one.	
High-voltage power supply PCB failure	4	Is the connections of the connector between the high-voltage power supply PCB and the engine PCB secured correctly?	Yes	Replace the high-voltage power supply PCB.	
Main PCB failure	5	Are there any disconnected connectors?	No	Replace the main PCB.	
Engine PCB failure	6	Are there any disconnected connectors?	No	Replace the engine PCB.	

I-3	Completely blank
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Possible cause	Step	Check	Result	Remedy	Ground contacts
Developing bias contact failure	1	Are the developing bias contacts between the printer body and drum unit dirty?	Yes	Clean the electrodes at both sides.	(4)
Drum unit	2	Are the drum shaft and drum electrode of the printer body connected correctly?	Yes	Clean the shaft and the electrode.	(1)
			No	Check the connection between the shaft and the electrode.	(1)
Drum unit failure	3	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit.	
Toner cartridge failure	4	Is the problem solved after replacing the toner cartridge?	Yes	Replace the toner cartridge with a new one.	
Scanner harness connection failure	5	Is the scanner harness connected securely? (Check if there is any play in the connection.)	No	Reconnect the connector correctly.	
Main PCB failure	6	Are printing signals being input to the laser unit?  Is the problem solved after replacing the main PCB?	Yes	Replace the main PCB.	
Laser unit failure	7	Is the scanner interlock lever damaged?	Yes	Replace the laser unit.	
		Is the scanner mirror broken or loose?	No	Replace the high-voltage power supply PCB.	

I-4	All black
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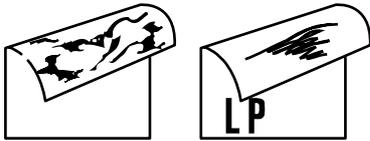


 **User Check**

- (1) Clean the corona wire of the drum unit.  
 (2) The drum unit may be damaged. Install a new drum unit.

Possible cause	Step	Check	Result	Remedy	Ground contacts
Corona failure	1	Is the corona wire dirty?	Yes	Clean the corona wire with the wire cleaner.	(2)
	2	Is the corona wire broken?	Yes	Replace the drum unit.	
	3	Are the charge electrodes between the printer body and the drum unit dirty?	Yes	Clean both electrodes.	(3)
Harness connection	4	Is the laser unit connected to the main PCB correctly?	No	Connect the harness between the laser unit and the main PCB correctly.	
High-voltage power supply PCB failure	5	Is the problem solved after replacing the high-voltage power supply PCB?	Yes	Replace the high-voltage power supply PCB.	
Main PCB failure	6	Is the problem solved after replacing the main PCB?	Yes	Replace the main PCB.	

I-5	Dirt on the back of paper
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Possible cause	Step	Check	Result	Remedy
Fixing unit dirty	1	Is the pressure roller dirty? Is any other area in the printer dirty?	Yes	Clean the pressure roller referring to <a href="#">the following procedure</a> .
Dirt in the drum unit	2	Is the transfer roller dirty? Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit
			No	Replace the high-voltage power supply PCB.

**NOTE:**

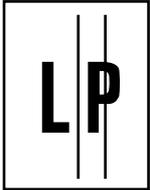
*This problem may disappear after printing approximately 10 pages of completely blank sheets.*

**How to clean the pressure roller**

Clean the pressure roller as follows;

- (1) Set three or more sheets of paper in the paper cassette.
- (2) Turn off the power switch of the printer.
- (3) While holding down the **Go** switch, press – switch, + switch, and then **Set** switch. The LCD display shows “TEST MENU”.
- (4) Press the **Set** switch and “SINGLE TEST PRINT” will appear on the LCD display.
- (5) Press the + switch and “REPEAT TEST PRINT” will appear on the LCD display.
- (6) Press the **Set** switch and “TEST PRINT NORMAL” will appear on the LCD display.
- (7) Press the + switch four times and “TEST PRINT WHITE” will appear on the LCD display.
- (8) Press the **Set** switch and release it immediately. A blank page is printed while cleaning the pressure roller.
- (9) Press the **Job Cancel** switch after printing three or more pages to stop printing.

I-6	Black and blurred vertical streaks
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**User Check**

- (1) Clean the corona wire in the drum unit.
- (2) Check that the corona wire cleaner is at the home position.
- (3) Check that the toner cartridge is not empty.
- (4) The drum unit may be damaged. Install a new drum unit.
- (5) The toner cartridge may be damaged. Install a new toner cartridge.

Possible cause	Step	Check	Result	Remedy
Corona failure	1	Is the vertical block streak about 10mm wide? (Check if the wire cleaner is at its home position.)	Yes	Return the wire cleaner to its home position.
Dirt in the paper feed system	2	Is the paper cassette or feed system on the drum unit dirty with toner?	Yes	Clean the toner off.
Scratch on the drum	3	Is the drum surface scratched?	Yes	Replace the drum unit.
Cleaning failure	4	Is the drum surface dirty with toner in streaks?	Yes	Replace the drum unit.
Scratch on the heat roller	5	Is the surface of the heat roller scratched?	Yes	Replace the fixing unit.

**NOTE:**

- If you print the same pattern (especially vertical streaks) continuously, electrostatic charge performance of the drum will decrease temporarily and black vertical streaks may appear on the paper.
- This problem may occur with noise due to the corona wire being dirty. In that case, clean the corona wire with the wire cleaner.

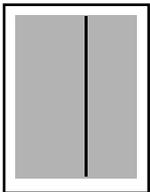
I-7	Black and blurred horizontal stripes
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<input checked="" type="checkbox"/>	<b>User Check</b>
<p>(1) The drum unit may be damaged. Install a new drum unit.</p> <p>(2) Check the paper used meets the recommended paper specifications.</p> <p>(3) Clean the printer interior and the corona wire in the drum unit.</p>	

Possible cause	Step	Check	Result	Remedy	Ground contacts
Scratch on the drum	1	Are the horizontal stripes at 94mm (photosensitive drum) intervals?	Yes	The photosensitive drum was scratched. Replace the drum unit.	
Toner stuck on the developer roller	2	Are the horizontal stripes at 39mm (developer roller) intervals?	Yes	After printing several pages, the problem will disappear. If not, replace the toner cartridge.	
Scratch on the heat roller	3	Are the horizontal stripes at 79mm (heat roller) intervals?	Yes	Replace the heat roller.	
Corona contact failure	4	Are the charge electrodes between the printer body and the drum unit dirty?	Yes	Clean both electrodes.	(3)
High-voltage power supply PCB failure	5	Is the problem solved after replacing the high-voltage power supply PCB?	Yes	Replace the high-voltage power supply PCB.	

I-8	Black vertical streaks (in a gray background)
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Possible cause	Step	Check	Result	Remedy	Ground contacts
Translucent stain on the scanner window	1	Is there any dirt on the scanner window?	Yes	1) Clean the scanner window. 2) If it is not effective, replace the laser unit.	
Corona failure	2	Is the corona wire dirty?	Yes	Clean the corona wire with the wire cleaner.	(2)

I-9	White vertical streaks
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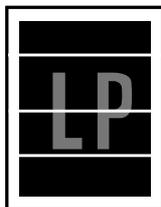


**✓ User Check**

- (1) Try to wipe the scanner window with a soft cloth.
- (2) The toner cartridge may be damaged. Install a new toner cartridge.
- (3) Check the printer's environment. High temperature and high humidity conditions can cause this problem.
- (4) Damp (wet) paper might be used. Try to change to freshly unpacked paper.

Possible cause	Step	Check	Result	Remedy
Transfer failure	1	Is the transfer roller scratched?	Yes	Replace the drum unit.
Condensation	2	Has condensation occurred inside the printer?	Yes	Try to print several pages or leave the printer 2 hours to allow it to reach room temperature.

I-10	White horizontal stripes
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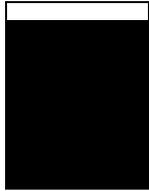


**✓ User Check**

- (1) Check the paper used meets the recommended paper specifications. A rough surfaced paper, damp paper or thick media can cause the problem.
- (2) Check that the appropriate media type is selected in the printer driver.
- (3) The problem may disappear by itself. Try printing multiple pages to clear this problem especially if the printer has not been used for a long time.
- (4) The drum unit may be damaged. Install a new drum unit.

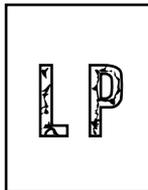
Possible cause	Step	Check	Result	Remedy	Ground contacts
Developing bias contact failure	1	Are the developing bias contacts between the printer body and toner cartridge dirty?	Yes	Clean the electrodes at both sides.	(4)

I-11	Faulty registration
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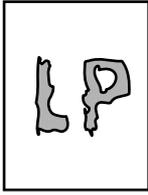
Possible cause	Step	Check	Result	Remedy
Excessive paper load	1	Is the paper loaded in the paper cassette more than 27mm high?	Yes	Instruct the user to keep paper loads below 27mm in depth.
Print paper	2	Is the specified weight of the recommended paper being used?	No	Recommend to use the specified types of paper.
	3	Is the first printing position within $\pm 1$ mm of the tolerance specification?	Yes	Adjust the Y offset by using the utility software supplied.
Rear regist sensor position incorrect	4	Is the rear registration sensor off from the correct position?	Yes	Reposition the sensor to the correct position.

I-12	Poor fixing
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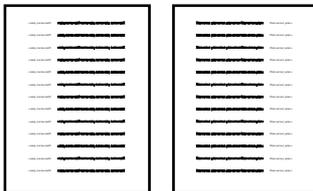
Possible cause	Step	Check	Result	Remedy
Print paper	1	Is thick paper of more than 43lb being used?	Yes	Recommend to use the specified types of paper.
Toner sensing failure (When printing is faint.)	2	Is the problem solved by replacing the drum unit or the toner cartridge?	Yes	1) Toner is empty. 2) The toner sensing is defective. Clean the toner sensor. 3) If the wiper in the toner cartridge is broken, replace the toner cartridge with a new one.
Fixing unit thermistor failure	3	Is the thermistor fitted correctly?	No	Fit the thermistor correctly.
Low-voltage power supply PCB failure	4	Is the problem solved by replacing the low-voltage power supply PCB?	Yes	Replace the low-voltage power supply PCB.

I-13	Image distortion
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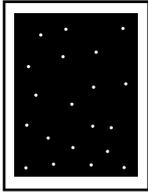
Possible cause	Step	Check	Result	Remedy
Laser unit installation	1	Is the laser unit secured to the frame incorrectly? (Check if there is any play.)	Yes	Secure the unit correctly and tighten the screws.
Scanner LD emission failure Scanner motor rotation failure	2	Is the laser diode or the scanner motor defective?	Yes	Replace the laser unit.
Scanner connection failure	3	Is the scanner harness connected properly? (Check if it is coming loose.)	No	Connect the harness correctly.

I-14	Faint print
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Possible cause	Step	Check	Result	Remedy
Printer installation	1	Is the printer placed horizontally?	No	Place the printer on a flat surface.
Toner cartridge	2	Does the problem happen immediately after replacing the toner cartridge with a new one?	Yes	Remove and carefully shake the toner cartridge horizontally.
Scanner window dirty	3	Is the scanner window dirty?	Yes	Clean the scanner window with a soft dry cloth.
Laser unit failure	4	Is the problem solved by replacing the laser unit?	Yes	Replace the laser unit.

I-15	White spots
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**✓ User Check**

(1) If the problem is not solved after printing a few pages, the drum unit may have glue from label stock on the photosensitive drum surface. Refer to Step 1 in the table below and **NOTE** in the next page.

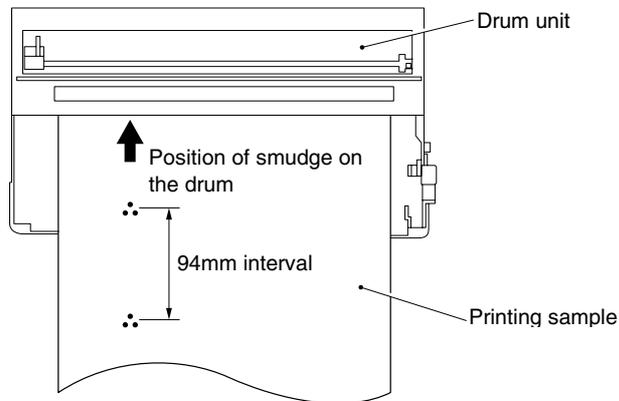
(2) The drum unit may be damaged. Install a new drum unit.

Possible cause	Step	Check	Result	Remedy
Drum unit failure	1	Are the white spot at 94mm intervals?	Yes	1) If toner or glue remains stuck, wipe it off gently with a cotton swab. (Refer to <b>NOTE</b> in the next page.) 2) If the drum surface is scratched, replace the drum unit.
Drum unit failure	2	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit.
No toner	3	Is the toner in the toner cartridge almost empty?	Yes	Replace the toner cartridge with a new one.
Print paper	4	Is the problem solved after changing to specified freshly unpacked paper?	Yes	Damp (wet) paper might be used. Recommend to change freshly unpacked paper.
Environment	5	Does the problem still appear after the printer has warmed up?	Yes	1) Replace the drum unit. 2) Advise the user of the specified print environment.

**NOTE:**

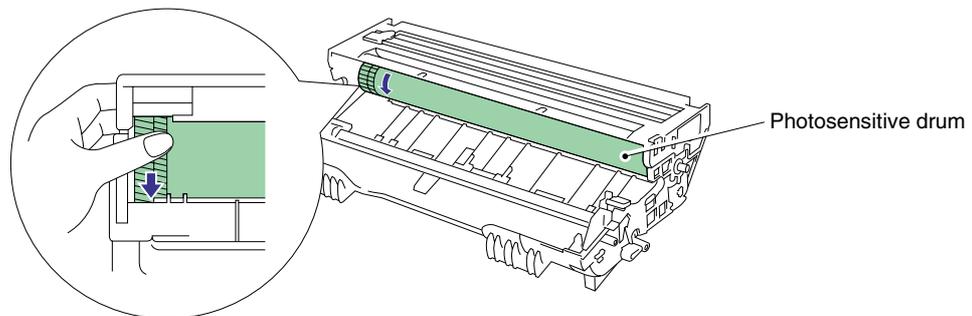
Clean the drum unit as follows:

- (1) Remove the toner cartridge from the drum unit. Place the printing samples in front of the drum unit, and find the exact position of the image defect.



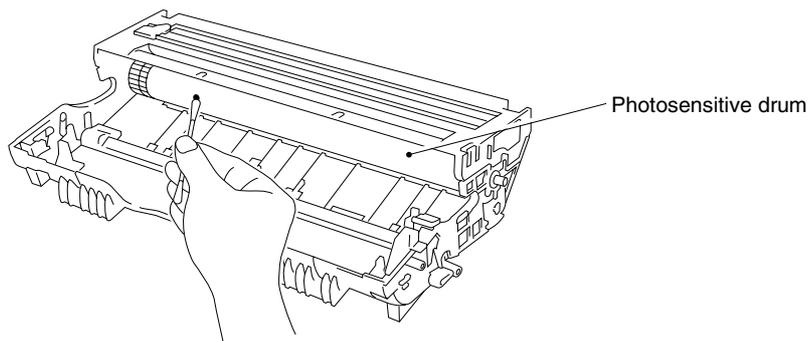
**Fig. 6-31**

- (2) Turn the drum gear by hand while looking at the surface of the photosensitive drum.



**Fig. 6-32**

- (3) Wipe the surface of the photosensitive drum with a cotton swab until the dust or paper powder on the surface comes off.



**Fig. 6-33**

**! CAUTION:**

- Do not wipe the surface of the photosensitive drum with something sharp. (ball-point pen etc.)
- Use cleaning liquid which is a 50-50 mixture of ethyl alcohol and pure water.

I-16	Black spots
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**User Check**

- (1) If the problem is not solved after printing a few pages, the drum unit may have glue from label stock on the photosensitive drum surface. Refer to Step 1 in the table below and **NOTE** in the previous page.
- (2) The drum unit may be damaged. Install a new drum unit.

Possible cause	Step	Check	Result	Remedy	Ground contacts
Drum unit	1	Are the spots at 94mm intervals? (The problem is not solved after printing a few pages.)	Yes	1) If toner or glue remains stuck, wipe it off gently with a cotton swab. (Refer to <b>NOTE</b> in the previous page.) 2) If the photosensitive drum is scratched or deteriorated (exposed), replace the drum unit.	
Drum connection failure	2	Is the contact between the drum unit and printer body connected correctly?	No	Clean contact electrode both on the drum unit and in the printer body.	(8)
Fixing unit	3	Are the spots at 79mm intervals? (The problem is not solved after printing a few pages.)	Yes	1) Check and clean the heat roller with a cloth dampened with alcohol. 2) Replace the fixing unit.	
High-voltage power supply PCB failure	4	Is the problem solved after replacing the high-voltage power supply PCB?	Yes	Replace the high-voltage power supply PCB.	

I-17	Black band
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Possible cause	Step	Check	Result	Remedy	Ground contacts
Corona failure	1	Is the wire cleaner at its home position?	No	Return the wire cleaner to its home position.	(2)
Corona failure	2	Is the corona wire dirty?	Yes	1) Clean the corona wire. 2) If the problem still appears after cleaning, replace the drum unit.	(2)

I-18	Gray background
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Possible cause	Step	Check	Result	Remedy
Print paper	1	Does the paper being used meet the paper specification (weight, etc.).	No	Recommend to use the specified types of paper.
			Yes	Recommend to change to freshly unpacked paper.
Toner sensing failure (printer side)	2	Does the “Ready” message appear on the LCD display even after removing the drum unit and toner cartridge?	Yes	Toner sensor failure. Clean the toner sensor and check the toner sensor connection.
Toner cartridge failure	3	Is the problem solved after replacing the toner cartridge?	Yes	Replace the toner cartridge.
Drum unit failure	4	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit.
			No	Replace the high-voltage power supply PCB.

**NOTE:**

*The following cases increase the possibility of this problem.*

- *Acid paper is being used.*
- *The drum unit is at the end of its life.*
- *There is dust or paper powder.*

I-19	Hollow print
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**✓ User Check**

- (1) Check the paper used meets the recommended paper specifications.
- (2) Select the 'Thick paper mode' in the printer driver, or use thinner paper than you are currently using.
- (3) Check the printer's environment, conditions such as high humidity may cause this situation to occur.

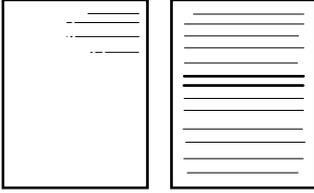
Possible cause	Step	Check	Result	Remedy
Print paper	1	Is thick paper of more than 43lb being used or extremely rough surface paper?	Yes	Recommend to use the specified types of paper.
			No	Refer and compare with I-15.

I-20	Downward fogging of solid black
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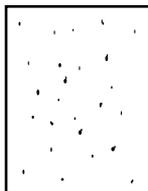
Possible cause	Step	Check	Result	Remedy
Toner cartridge failure	1	Is the problem solved after replacing the toner cartridge?	Yes	Replace the toner cartridge.
High-voltage power supply PCB failure	2	Is the problem solved after replacing the high-voltage power supply PCB?	Yes	Replace the high-voltage power supply PCB.

I-21	Horizontal lines
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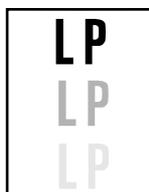
Possible cause	Step	Check	Result	Remedy	Ground contacts
Paper cassette contacts	1	Are the ground contacts on the back side of the paper cassette connecting correctly?	No	Clean the contacts.	(7)

I-22	Light rain
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Possible cause	Step	Check	Result	Remedy	Ground contact
Drum unit failure	1	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit.	
Drum connection failure	2	Is the contact between the drum unit and printer body connected correctly?	No	Clean contact electrode both on the drum unit and in the printer body.	(8)
High-voltage power supply PCB failure	3	Is the problem solved after replacing the high-voltage power supply PCB?	Yes	Replace the high-voltage power supply PCB.	

I-23	Ghost
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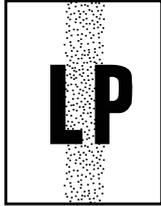


**User Check**

- (1) Check the paper used meets the recommended paper specifications. Damp paper, thick media or rough surfaced paper can cause the problem.
- (2) Check the printer's environment. High temperature and high humidity conditions can cause the problem.
- (3) Check that the appropriate media type is selected in the printer driver.
- (4) Try installing a new drum unit.

Possible cause	Step	Check	Result	Remedy
Driver setting	1	Is thin paper such as 64g/m <sup>2</sup> used under the thick paper mode?	Yes	1) Change the current mode to the normal mode from the driver setting. 2) Print 5 or 6 blank pages if this problem occurs.
Drum unit failure	2	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit.
High-voltage power supply PCB failure	3	Is the problem solved after replacing the high-voltage power supply PCB?	Yes	Replace the high-voltage power supply PCB.

I-24	Toner specks
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**User Check**

- (1) Check the paper used meets the recommended paper specifications. A rough surfaced paper may cause the problem.
- (2) The toner cartridge may be damaged. Install a new toner cartridge.
- (3) The drum unit may be damaged, or may be nearly at the end of life. Install a new drum unit.

### 6.3 Location of Grounding Contacts

#### 6.3.1 Drum unit

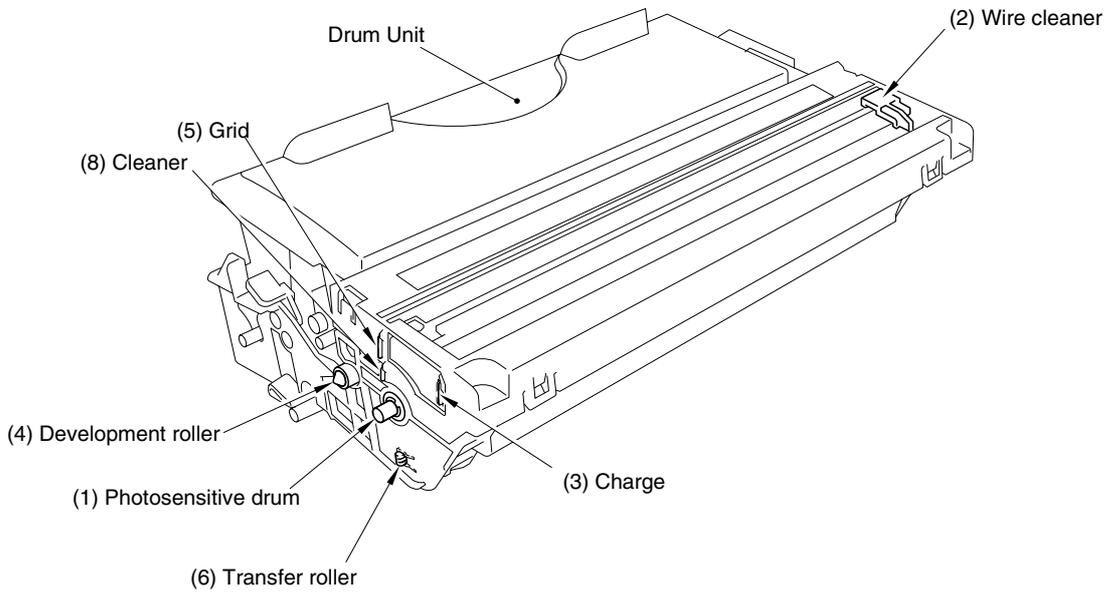


Fig. 6-34

#### 6.3.2 Printer body & Paper cassette

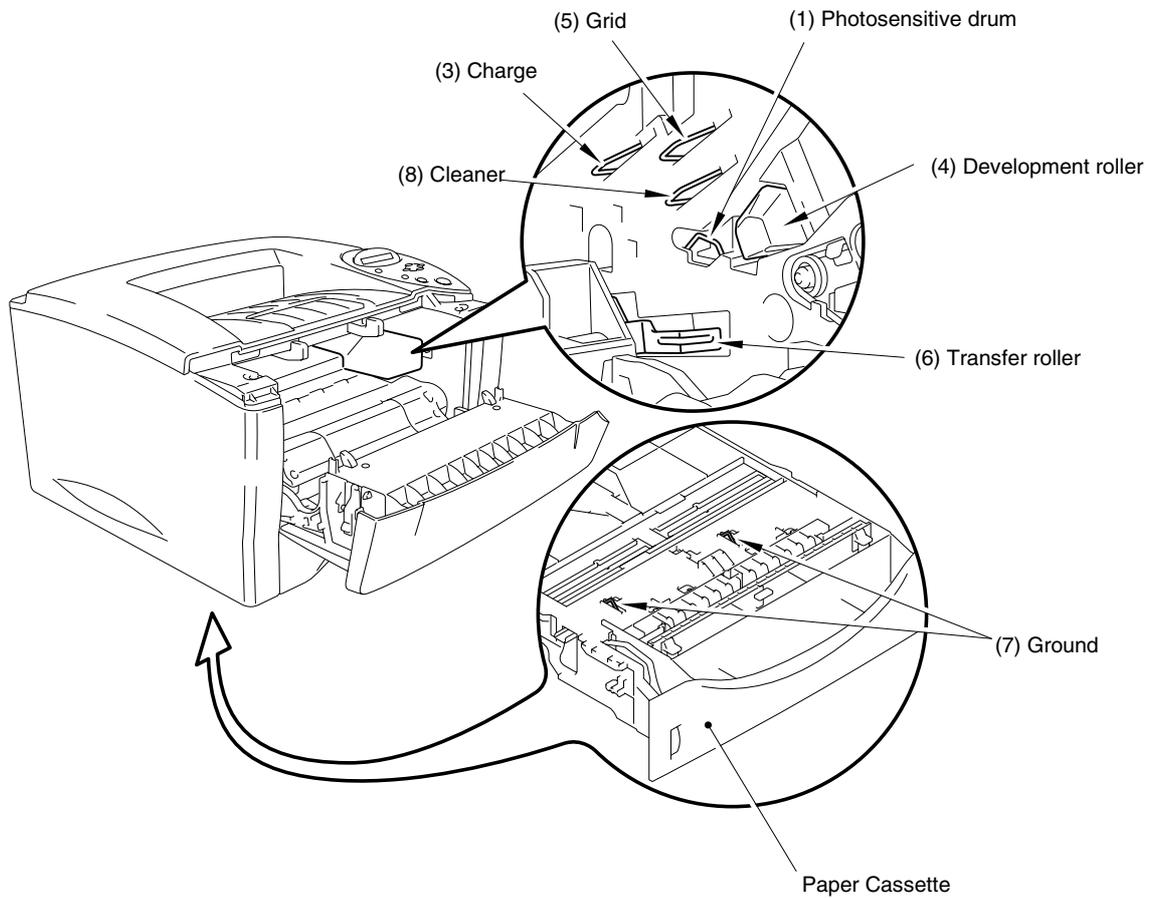


Fig. 6-35

## 7. INCORRECT PRINTOUT

When the data is not printed correctly as it is seen on the PC screen, follow the procedures below in the event of a specific error.

P-1	The printer prints unexpectedly or it prints garbage.
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 **User Check**

- (1) Check if the printer cable is not too long. It is recommended to use a parallel cable of less than 2 meters (6.6 feet) in length.
- (2) Check that the printer cable is not damaged or broken. Check also that the printer cable is connected to the correct interface connectors of both the printer and PC.
- (3) If an interface switching device is used, remove it and connect the computer directly to the printer and try again.
- (4) Check that the appropriate printer driver is selected as 'Set as Default'. Check also that the correct print port is set for the selected printer driver.
- (5) Check that the printer is not connected to the same port which is also connected to a mass storage device or scanner. Remove all other devices and connect the port to the printer only. Turn off the printer status monitor in the device options tab in the printer driver.
- (6) If the print port is set as an ECP port, change it to a normal port.
- (7) Try printing the test page referring to 9. 'INSPECTION MODE' in this Chapter.
- (8) Try resetting the factory settings.

Possible cause	Step	Check	Result	Remedy
Failure inside the printer	1	Is it possible to print the test page with the method of 9. 'INSPECTION MODE' in this Chapter?	No	Identify the error type, then refer to the specified section of this chapter.

**NOTE:**

*If the printer prints garbage or incorrect fonts, instruct the user to use the 'Troubleshooting for Printer won't print' tool of the self-diagnostics tools. If the problem cannot be solved, instruct user to use the 'Diagnostics' tool described in the Appendix so that you can get a log file to investigate the cause of the problem. For details on the self-diagnostics tools, see APPENDIX 18 'HOW TO USE SELF-DIAGNOSTICS TOOLS'.*

P-2	Unable to print full pages of a document with the “PRINT OVERRUN” message.
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 **User Check**

- (1) Press the **Go** switch on the control panel to print the data remaining in the printer.
- (2) If this does not clear the error, reduce the complexity of your document or reduce the printer resolution.
- (3) Expand the printer memory by adding a commercially available DIMM.
- (4) Change the following setting in the printer driver and try again. The best combination of settings below will vary depending on your document.

Graphic Mode / TrueType™ mode / Use Printer TrueType™ Fonts.

*NOTE:*

*This problem may appear if the data is too complex. If it is not cleared by taking the actions above, it will be impossible to print such data under the printer specifications.*

P-3	Unable to print full pages of a document with the “MEMORY FULL” message.
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 **User Check**

- (1) Press the **Go** switch on the control panel to print the data remaining in the printer.
- (2) Reduce the complexity of your document or reduce the printer resolution.
- (3) Expand the printer memory by adding a commercially available DIMM.

*NOTE:*

*This problem may appear if the data is too complex.*

Possible cause	Step	Check	Result	Remedy
Unable to recognize DIMM	1	Check the memory size in Print Configuration. Is it the default size?	Yes	Expand the memory size by adding DIMM.  If the memory is already at the maximum size, it will be impossible to print the data under the printer specifications.
			No	Replace the main PCB.
DIMM / main PCB failure	2	Try installing DIMM into another printer, then check the memory size in Print Configuration.  Is it possible to print the data?	Yes	Replace the DIMM.
			No	Replace the main PCB.

P-4	Headers or footers are not printed out even though they are viewed on PC screen.
-----	----------------------------------------------------------------------------------

 **User Check**

Most laser printers have a restricted area that cannot be printed on. Usually the first two lines and last two lines of text cannot print (leaving 62 printable lines). Adjust the top and bottom margins in your document to allow for this.

P-5	The printer sometimes prints a couple of characters and then ejects the page.
-----	-------------------------------------------------------------------------------

 **User Check**

**(For DOS environment only)**

The application printer emulation setting and the printer's emulation do not match. Check in the application software which printer you have selected to make sure the printer is set up correctly. Remember that the printer emulates widely used printer selections:

HP LaserJet, Brother BR-Script Level 3, Epson FX-850, IBM Proprinter XL

Try setting the printer into HP emulation and then select the HP LaserJet 6P printer in the application software.

---

## 8. NETWORK PROBLEM

---

If the error related to network occurs, refer to the following sections;

### 8.1 Installation Problem

If you cannot print over the network, check the following:

- (1) Make sure that the printer is powered on, is on-line and ready to print.

Verify that the printer and the configuration are good by printing the Network Configuration page. (To print the Configuration page press the Network Test button for less than 5 seconds. See [section 6. 'NETWORK BOARD OPERATION' in CHAPTER 2.](#)) If the test fails, the network firmware setting may be corrupted. In this event, try to restore the factory default settings of the print server by pressing the Network Test button on the back panel of the printer for more than 5 seconds. Once you have done that, turn the printer power off and then on again, and try to print out the Network Configuration page.

- (2) If the Configuration page is printed but you cannot print documents, try the following

**NOTE:**

*If none of the following steps are successful, there is almost certainly a hardware or network problem!*

- a) If you are using TCP/IP:

Try pinging the print server from the host operating system prompt with the command `ping ipaddress`, where `ipaddress` is the print server IP address (note that in some instances it can take up to two minutes for the print server to load its IP address after setting the IP address). If a successful response is received, then proceed to the *UNIX, TCP/IP Windows NT/LAN Server, Windows98/95/Me Peer to Peer (LPR), Internet Printing or Web Browser troubleshooting section*. Otherwise, proceed to [step \(3\)](#), and then go to [subsection 8.3 'TCP/IP Troubleshooting'](#).

- b) If you are using Novell system:

Verify that the print server can be seen on the network. To do this, login as the SUPERVISOR (not as someone with supervisor privileges) or ADMIN (for Netware 4 or later servers), go into PCONSOLE, select PRINT SERVER INFORMATION, and select the name of the print server (make sure that you have entered the print server name). If you can see `Print Server Status` and `Control` in the menu, then the Brother print server is visible to the network, proceed to [subsection 8.10 'Novell NetWare Troubleshooting'](#). Otherwise, go to [step \(3\)](#).

- c) If you are running AppleTalk for Macintosh:

Make sure that you can see the print server name under the LaserWriter 8 icon in the Chooser. If it is visible, then the connection is good, so proceed to [subsection 8.11 'AppleTalk Troubleshooting'](#). Otherwise, go to [step \(3\)](#).

- (3) If you cannot make any of the connections in step (2), check the following:
- a) Make sure the printer is turned on and on-line.
  - b) Verify that the cabling and network connection are good. If possible, try the print server on a different connection on the network. Also, print out a Configuration page to see if you can see any Network Statistics information.
  - c) Check to see if there is any LED activity.
 

The print server has three LEDs. These can be used to diagnose problems.

    - L-LED (green): Link activity  
This LED is on if there is a valid connection to the network (either 10BaseT or 100BaseTX). It is off if no network is detected.
    - F-LED (orange): Fast Ethernet  
This LED will be on if the print server is connected to a 100BaseTX Fast Ethernet network. It is off if the print server is connected to a 10BaseT network.
    - A-LED (green): Transmission Activity  
This LED will blink synchronized to the transmission or receive status.
- (4) If you are using a repeater or hub, make sure that SQE (heartbeat) is turned off at the hub. Also, if you have a hub or multi-port repeater, verify that the hub or repeater port is good by trying the print server on a different port.
- (5) If you have a bridge or router located between the print server and host computer, make sure that the device is set up to allow the print server to send and receive data from the host. For example, a bridge can be set up to only allow certain types of Ethernet addresses to pass through (a process known as filtering); therefore, such a bridge must be configured to allow Brother print server addresses. Likewise, a router can be set up to pass only certain protocols, so be sure that the desired protocol can be passed through to the print server.
- (6) If the job exits the queue but does not print, make sure that you are not trying to print a text job to a PostScript printer. If you have a printer that is capable of automatic language switching, make sure that the printer is not forced into PostScript mode.

## 8.2 Intermittent Problem

If the print server and printer start up OK, but you intermittently have problems printing, check the following:

- (1) If you can print small jobs but large graphics jobs are distorted or incomplete, make sure that you have adequate memory in your printer and the latest printer driver installed on your computer. The latest Brother printer drivers can be downloaded from [www.brother.com](http://www.brother.com).
- (2) Check the individual protocol troubleshooting sections in this chapter for additional causes of intermittent printer problems.

### 8.3 TCP/IP Troubleshooting

If you are using TCP/IP and cannot print to the print server and you have checked the hardware and network as described in the previous steps, then check the following:

**NOTE:**

*It is always a good idea to try the following in order to eliminate the possibility of setup errors.*

- Turn off the printer and then on again,
  - Delete and recreate the print server and create a new print queue in order to eliminate the possibility of setup errors.
- (1) The problem may be the result of mismatched or duplicate IP address. Verify that the IP address is correctly loaded into the print server (via the configuration page). Make sure that no other nodes on the network have this address (DUPLICATE IP ADDRESS ARE THE BIGGEST CAUSE OF TCP/IP PRINTING PROBLEMS).
  - (2) If you used BRCONFIG to enter the IP address, make sure that you exited the remote console properly with a CTRL-D or EXIT and that you turned the printer off and then on again (it may take up to two minutes for the IP address to take effect).
  - (3) Make sure that the TCP/IP protocol of the print server is enabled.
  - (4) If you used rarp, make sure that you started the rarp daemon on any workstation using the rarpd, rarpd-a, or equivalent command. Verify that the `/etc/ethers` file contains the correct Ethernet address and that the print server name matches the name in the `/etc/hosts` file.
  - (5) If you used bootp, make sure that you started the bootp daemon on any UNIX workstation and bootp is enabled (i.e., the “#” is removed from the bootp entry) in the `/etc/bootptab` file is correctly configured.
  - (6) Also verify that host computer and the print server are on the same subnet, if the printer is on a different subnet, make sure that the router is configured correctly and ensure that the GATEWAY address is configured to match the IP address of the router.

### 8.4 UNIX Troubleshooting

- (1) Make sure that the `/etc/printcap` file (if applicable) is typed in correctly. In particular, look for missing "." and "\" characters, because a small error *anywhere* in the file can have *major* consequences. Also check the `/usr/spool` directory to make sure that you have created a valid spool directory.
- (2) If you are using a Linux operating system, the X-Window Print tool program that is included with Linux may not properly configure the `etc/printcap` file for lpd operation, then you might also edit the `etc/printcap` file and change the following line in the entry for the printer.
 

```

if
:lp = /dev/null: \

then to
:lp = :\
      
```
- (3) If you are using a Berkeley-based UNIX, make sure that the daemon is started on Berkeley based systems with the command `lpc start printer`, where *printer* is the name of the local print queue.

- (4) If you are using an AT&T-based UNIX, make sure the printer is enabled (enable *printer*, where *printer* is the name of the local print queue).
- (5) Make sure that the lpr/lpd remote line printer service are running on the host computer (refer to your host computer documentation for information on how to do this).
- (6) If you are having trouble printing more than one job at a time, try increasing the IP timeout using the SET IP TIMEOUT command or using BRAdmin32.
- (7) If text or PCL jobs are run together, try setting the service (remote printer) with EOT set to string number 2 (<ESC>E). For example:
 

```
SET SERVICE BRN_XXXXXX_P1 EOT 2
```
- (8) If PostScript jobs fail to print or are run together, try setting the service (remote printer) with EOT set to string number 3 (control-D). For example:
 

```
SET SERVICE BRN_XXXXXX_P1 EOT 3
```
- (9) If the lines of a text file are staggered, make sure that you have specified a remote printer (rp) name of TEXT in your `/etc/printcap` file.
- (10) If you are using Sun Solaris V2.4 or earlier, there is a bug which causes long print jobs to fail when using a print server. If you are having trouble printing long jobs (over 1MB), add the line `mx#0` to your `etc/printcap` file entry.

## 8.5 Windows NT/LAN Server (TCP/IP) Troubleshooting

If you are having trouble printing with Windows NT or LAN Server, check the following:

- (1) Make sure that TCP/IP and TCP/IP print service are installed and running on the Windows NT system or the LAN Server file server.

## 8.6 Windows 95/98/Me (or later) Peer to Peer Print (LPR) Troubleshooting

If you are having trouble printing on a Windows 95/98/Me Peer to Peer network (LPR method), check the following:

- (1) Make sure that the Brother LPR Port driver is correctly installed and configured according to the Windows 95/98/Me Peer to Peer chapters in the Network User's Guide.
- (2) You may find that during the installation of BLP software, the screen that prompts you for a Port name is not displayed. This may happen on some Windows 95/98/Me computers. Press the ALT and TAB keys to make it appear.

## 8.7 Windows 95/98/Me (or later) Peer to Peer (HP JetAdmin Compatible Method) Troubleshooting

If you are having trouble printing on a Windows 95/98 (or later) Peer to Peer network, check the following (HP JetAdmin compatible method):

- (1) If the print server does not show up under JetAdmin on a Windows 95/98 Peer to Peer network, try removing all of the Windows 95/98 network software from the Network Control panel and then reinstalling them as follows:
  - First install the IPX/SPX-Compatible Protocol (or the TCP/IP protocol if you are using a later version of JetAdmin), the Client for Microsoft Networks, and the network adapter card driver.
  - Install the Latest HP JetAdmin software
  - Restart the system, and then add the HP JetAdmin service.

## 8.8 Windows 95/98/Me/NT 4.0/2000 (or later) Peer to Peer Print (NetBIOS) Troubleshooting

If you are having trouble printing on a Windows 95/98/Me/NT 4.0/2000 (or later) Peer to Peer network (NetBIOS), check the following:

- (1) Make sure that the Brother NetBIOS Port driver is securely installed and configured according to the Windows 95/98/Me/NT 4.0/2000 Peer to Peer (NetBIOS) chapters. You may find that during the installation of the port driver, the screen that prompts you for a Port name is not displayed. This happens on some Windows 95/98/Me/NT 4.0/2000 computers. Press the ALT and TAB keys to make it appear.
- (2) Make sure that the print server is configured to be in the same workgroup or domain as the test of your computers. It may take several minutes for the print server to appear in the network neighborhood.

## 8.9 Internet Print (TCP/IP) Troubleshooting

- (1) The first step in troubleshooting is to make sure that you have a valid E-mail connection on both the sending PC and the receiving print server. Try sending an E-mail message from the PC to a user at the remote site who can receive mail via the POP3 server. If this does not work, there may be an E-mail configuration problem on the PC, on the local E-mail server, or on the remote POP3 server. Double check to make sure that the E-mail parameters that you configured on the PC and on the remote print server match those that are configured on the E-mail servers.
- (2) If you can print small files OK but are having problems printing large files, the problem may be in the e-mail system. Some E-mail systems have difficulties printing large files. If the file does not reach its destination intact, then the problem is with the E-mail system.
- (3) You can also enable the partial e-mail print facility on your client PC, this will split the e-mail up into fragments which should then not overwhelm your e-mail server. To do this, select the property dialog of the Brother Internet Print Port.

## 8.10 Novell Netware Troubleshooting

If you cannot print from NetWare and you have checked the hardware and network as described in the previous steps, first verify that the Brother print server is attached to the server queue by going to PCONSOLE, selecting `PRINT QUEUE INFORMATION`, and then `CURRENTLY ATTACHED SERVERS`. If the print server does not appear in the list of attached servers, then check the following:

### NOTE:

*It is always a good idea to try followings in order to eliminate the possibility of setup errors*

- *Turn the printer off and then on again to force the printer to rescan the Netware queue.*
  - *Delete and recreate the print server and create a new print queue in order to eliminate the possibility of setup errors.*
- (1) If you changed the login password, you must change the password in *both* the Brother print server (using the `SET NETWARE PASSWORD` command if you are using the BRConfig software) or by using a web browser or the BRAdmin32 utility and in the file server (using the PCONSOLE Print Server Information Change Password command).
  - (2) If you created the print queue using PCONSOLE and instead of BRAdmin32, make sure that you have enabled at least one NetWare file server using the `SET NETWARE SERVER servername ENABLED` command.
  - (3) Have you exceeded your NetWare user limit?
  - (4) Make sure that the print server name you used in PCONSOLE *exactly* matches the name that is configured in the print server, and make sure it is defined as a Queue Server for the print queue.
  - (5) If you are running both 802.3 and Ethernet II frames on different file servers on your network, there is a possibility that the print server may not make a connection to the desired file server. Try forcing the frame type to the desired one using the `SET NETWARE FRAME` command from the print server remote console or using BRAdmin32.
  - (6) If you are using DOS CAPTURE statement and losing portions of your print job, try setting the TIMEOUT parameter in your CAPTURE statement to a higher value (at least 50 seconds for Windows).

## 8.11 AppleTalk Troubleshooting

If you cannot print from an AppleTalk for Macintosh computer and you have checked the hardware and network as described in the previous steps, then check the following:

- (1) Make sure that you are running Phase 2 AppleTalk and that you have selected the correct network interface from the Network Control Panel on the Macintosh.
- (2) Make sure that the AppleTalk protocol of the print server is enabled.
- (3) If you have a large network, make sure that you have the Laser Writer V8.xx or equivalent driver, since earlier versions may cause PostScript errors. Also, verify that you get the correct printer information when you select **Printer Info** from the **Setup** button in the Chooser.
- (4) Make sure that you have selected the correct Printer Description File (PPD) from the Chooser (otherwise PostScript errors may result)

- (5) Verify that you have selected the correct AppleTalk zone. Because the print server gets its zone information from router broadcasts, it may not be in the zone you expect, and will therefore not show up in the Chooser. If this is the case, you may need to force the zone name with the `SET APPLETTALK ZONE` command described in Appendix A in the Technical Reference Guide or using BRAdmin Professional.
- (6) Verify that the Laser Prep versions on all Macintosh computers that need to print to the print server are the same.

### **8.12 Apple TCP/IP Printing (System 8.6 or later)**

- (1) From system 8.6 or later, Apple introduced the Desktop Printer Utility. This utility allows TCP/IP printing from an i-Mac/G3 or later Macintosh.
- (2) From the "Internet Printer" dialogue, please ensure that you enter the correct service name in the "Queue" option. For example, for NC-4100h series network cards enter `BRN_XXXXXX_P1_AT` (where `XXXXXX` is the last six digits of the MAC address of the NC-3000 series card). For NC-2000 series network cards enter `BRO_XXXXXX_P1_AT` (where `XXXXXX` is the last six digits of the MAC address of the NC-4100h network card).
- (3) This method of printing requires that the printer supports PostScript. If your printer does not support PostScript printing. Please consult your printer manual to see if your printer supports PostScript.

### **8.13 Web Browser Troubleshooting (TCP/IP)**

- (1) If you can not connect to the print server using your web browser it may be worth checking the Proxy Settings of your browser. Look in the Exceptions setting and if necessary, type in the IP address of the print server. This will stop your PC from trying to connect to your ISP or proxy server every time you wish to look at the printer server.
- (2) Make sure that you are using the proper Web Browser, we recommend Netscape Navigator version 4.0 or later/ Microsoft Internet Explorer version 4.0a or later.

## 9. INSPECTION MODE

### 9.1 Entering Inspection Mode

Select the inspection mode you want to use following the steps below;

- (1) Turn off the power switch of the printer
- (2) Turn on the power switch while holding down the **Go** switch and the **Set** switch.
- (3) Release the both switches when the message “GO TEST MODE” appears on the LCD display.
- (4) Holding down the **Go** switch will cause the 16 black square symbol appear in order on the LCD display from the left to the right as the figure shown below, and when you release the switch, a mode is selected:

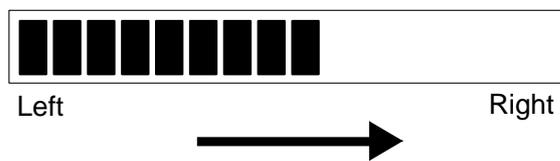


Fig. 6-36

#### Inspection Mode List

Where you release the 'Go' switch	Type of inspection
1st Square	Prints a test sample page. Prints a test print page when the NV-RAM setting is OFF. (When “NV_DEMO” value is “0”.)
2nd Square	Prints the Print Configuration page and a font list.
3rd Square	Returns to the factory default settings.
4th Square	NVRAM hex dump mode (Not used when the NV-RAM setting is OFF; when “NV_DISPMAINT” value is “0”.)
5th Square	Writes the main program.
6th Square	Not used
7th Square	Writes the engine patch program.
8th Square	Not used
9th Square	Writes the message patch program.
10th Square	Prints a continuous grid pattern test page.
11th Square	Prints fusing test print pages in three different modes; grid → horizontal stripes → 100% density
12th Square	4% density pattern print mode
13th Square	Not used
14th Square	Factory check mode <b>Do not use this mode.</b>
15th Square	Not used
16th Square	Sensor check mode (See 9.2 'Sensor Check Mode')

## 9.2 Sensor Check Mode

The sensor check mode is used to check if the sensors in the printer are functioning correctly. In the process of this inspection, the Data LED and the control panel switches are also checked.

On entering this mode, the LCD display shows the status of the respective sensors as shown in the figure below;



Fig. 6-37

There are 15 sensors to be checked. The letters above represent the respective sensors and are displayed in the specific place on the LCD display when the sensor is ON, and the black square box appears when the sensor is OFF. Refer to the table in the next page for identifying status of sensors:

No.	Display	Name of Sensor	Status
1st	<b>C</b>	Cover sensor	ON: The front cover is open.
	Black square		OFF: The front cover is closed.
2nd	<b>T</b>	Toner sensor	ON: The toner cartridge is installed.
	Black square		OFF: No toner cartridge is installed.
3rd	<b>P</b>	Cassette sensor	ON: No paper cassette is installed.
	Black square		OFF: The paper cassette is installed.
4th	<b>E</b>	Paper empty sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
5th	<b>D</b>	DX tray sensor	ON: No DX tray is installed.
	Black square		OFF: The DX tray is installed.
6th	<b>S</b>	DX lever sensor	ON: A4 size paper is installed.
	Black square		OFF: Letter size paper is installed.
7th	<b>M</b>	MP sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
8th	<b>R</b>	DX cover sensor	ON: DX cover is open.
	Black square		OFF: DX cover is closed.
9th	<b>F</b>	The fixing unit cover sensor	ON: The fixing unit cover is open.
	Black square		OFF: The fixing unit cover is closed.
10th	<b>G</b>	Lower tray unit registration sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
11th	<b>L</b>	Lower tray unit paper empty sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
12th	<b>2</b>	Lower tray unit sensor	ON: No lower tray unit is installed.
	Black square		OFF: The lower tray unit is installed.
13th	<b>F</b>	Front registration sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
14th	<b>R</b>	Rear registration sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
15th	<b>E</b>	Paper eject sensor	ON: Paper is detected.
	Black square		OFF: No paper is detected.
16th	Not used		



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## CHAPTER 7 HIDDEN FUNCTIONS

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### 1. ENTERING HIDDEN FUNCTION MENU MODES

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HL-1850/1870N has 3 entrances into the hidden function menu;

1. Power on and press the **Go** switch and the **Set** switch. (Professional Menu mode) See section 2. 'PROFESSIONAL MENU MODE' in this Chapter.
2. Power on, and while holding down the **Go** switch, press the **+** switch once and then the **Set** switch. (Service Menu mode) See section 3. 'SERVICE MENU MODE' in this Chapter.
3. Power on and press the specified switch(es) and others. See section 4. 'OTHER HIDDEN FUNCTION MENUS' in this Chapter.)

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## 2. PROFESSIONAL MENU MODE

---

The Professional Menu mode enables to customize various functions for specific users and may be opened to users if necessary.

### 2.1 Enabling and Disabling Professional Menu Mode

#### *Entering the Professional Menu Mode*

Turn the machine on. Press the **Go** switch and **Set** switch together to enter the Professional Menu mode.

#### *Accessing the Required Menu*

Use the either “+” or “-” switch to scroll through the menu listing. To select an item, press the “**Set**” switch. Then the sub-menu will appear.

Scroll through the sub menu items using the “+/-” switches. To go back to a higher level, select the “exit ...” menu in the same level using the “+/-” switches.

#### *Inputting a Value or Setting for a Professional Menu Mode*

Enter the required mode as explained above. The setting appearing on the display is the current setting.

Select the required setting using the “+/-” switches, then press the “**Set**” switch. The previous value remains if the “**Set**” switch is not pressed.

#### *Exiting the Professional Menu Mode*

There are three options to exit the Professional Menu mode; either to press “**Go**” switch at any sub menus, to press the “-” switch consecutively to go up roots till exiting the Professional Menu mode, or to go down the menu using “+/-” switches till the menu “exit MENU” appears, and then press the “**Set**” switch to exit the mode.

## 2.2 Function Table

The following printer settings and function will be available with this operation.

Title & Subtitle	Item to be Set	Description
TRAY SETTING (MANUAL FEED)	PAPER IN=CONT*	Feeds paper automatically when printing using the manual feed function.
	PAPER IN=STOP	Feeds paper by pressing the <b>Go</b> switch when printing using the manual feed function.
TRAY COMMAND MODE	TRAY COM.=NORM*	HP LaserJet 4 compatible.
	TRAY COM.=SPEC.	HP LaserJet 3 compatible.
READOUT SELECT	READOUT=OFF*	When receiving DC3 in FX emulation, ignores the data received before DC1.
	READOUT=ON	Not ignore the data even DC3 is received.
FONT SELECT		
SCALABLE FONT	FONT=ALL*	Enables all scalable fonts when selecting PCL font setting.
	FONT=LJ4	Disables the fonts below when selecting PCL font setting. <i>Atlanta, Bermuda Script, PC Brussels, Copenhagen, Germany, Portugal, Calgary, San Diego, US Roman</i>
FONT SELECT	PRIMARY FONT	Selects primary fonts in LaserJet emulation.
	SECONDARY FONT	Selects secondary fonts in LaserJet emulation.
IBM CHR SET MODE	IBM E1H=Esszet	Places "Esszet" on E1h of IBM character set.
	IBM E1H=Beta	Places "Beta" on E1h of IBM character set.
W BOLD ON/OFF	W BOLD=OFF*	ON: Makes a reprinted character bold. (Print speed would get slow.)
	W BOLD=ON	
DLFNT Bd/It	DLFNT Bd/It=NO*	YES: Creates bold and italic font from download fonts.
	DLFNT Bd/It=YES	
B PROD ON/OFF	B PROD=OFF*	ON: Creates bold and italic font from bitmap fonts.
	B PROD=ON	
CONDENCE SELECT	CONDENC=16.66p*	Selects the pitch for EPSON / IBM condensed characters.
	CONDENC=17.14p	
OEM FONT SELECT	OEMFONT=DISABLE*	Enables and disables to select European Parliament fonts.
	OEMFONT=ENABLE	

<b>ISR FONT SELECT</b>	<b>ISRFONT=DISABLE*</b>	Enables and disables to select Hebrew font.
	<b>ISRFONT=ENABLE</b>	
<b>BRO FONT SELECT</b>	<b>BROBITM=DISABLE*</b>	Enables and disable the built-in 10/12 pitch Brougham bitmap font.
	<b>BROBITM=ENABLE</b>	

Title & Subtitle	Item to be Set	Description
<b>FONT SELECT</b>		
300DPI PRIORITY	3B PRIO=LOW*	The priority of selection for 300dpi bitmap fonts are standard (=low).
	3B PRIO=HIGH	The priority of selection for 300dpi bitmap fonts are higher than scalable font. The compatibility of font selection manner with HP LaserJet 4 is not maintained if you choose 3B PRIO=HIGH.
FX/XL SCALE FONT	SCAL.F=NORMAL*	Only similar size fonts are selectable as scalable is selected.
	SCAL.F=ALL SIZE	All fonts are selectable.
FX/XL SCALE ITA.	ITA=OBLIQUE*	Makes upright font oblique to have italic as scalable font is selected.
	ITA=ITALIC SEL	Uses the italic font to have italic as scalable font is selected.
exit FONT		
<b>PAPER&amp;TRAY SIZE</b>	DEF PAPER=LT*	Printers to be shipped to USA and Canada have the Letter size setting by default.
	DEF PAPER=A4	Printers to be shipped to the other area than USA and Canada have the A4 size setting by default.
<b>PARALLEL MENU</b>		
PARALLEL TIMING	CDCC PSW=H*	BUSY signal gets high when STROBE signal goes up. This is chosen by default.
	CDDC PSW=L	BUSY signal gets high when STROBE signal goes down (low).
STB/ACK DELAY	CDCC BSSL=L*	ACK signal is sent out before BUSY signal goes down. This is chosen by default.
	CDCC BSSL=H	ACK signal is sent out when BUSY signal goes down.
exit PARALLEL		
<b>REPRINT ON/OFF</b>	REPRINT=ON*	Follows the user menu's setting which selects either enabling or disabling reprint function.
	REPRINT=OFF	Enables reprint function.

DRAM CHECK START	START DRAM TEST	Tests DRAM data.
------------------	-----------------	------------------

Title & Subtitle	Item to be Set	Description
AUTO HRC ON/OFF	AUTO HRC=OFF*	Enables and disables automatic HRC control.
	AUTO HRC=ON	
DEMO PAGE ON/OFF	DEMO PAGE=ON*	Adds and removes "DEMO PAGE" into the user menu.
	DEMO PAGE=OFF	
APPLETALK AT/PS	APPLE TALK=PS*	Switches the emulation to the PS mode when AppleTalk receives data..
	APPLE TALK=AUTO	The auto emulation function switches emulations.
PS BINARY SELECT	PS BINARY=ASCII*	Handle the data as ASCII. Ctrl-T, Ctrl-C etc. are handled as the control codes.
	PS BINARY=BIN	Binary data can be printed. Ctrl-T, Ctrl-C etc. does not work.
PS QUOTE BINARY	PS QUOTEBIN=OFF*	Not accept the binary data even with special codes.
	BS QUOTEBIN=ON	Accepts the binary data with special codes.
PS IMAGE MASK	PS IMAGEMSK=OFF*	ON: Makes print speed faster with an OS/2 driver.
	BS IMAGEMSK=ON	
PS CELL MODE	PS CEIL=FLOOR*	Modulates calculation diffusion of PostScript.
	PS CEIL=CEIL	
PS STATUS ECHO	STATUS ECHO=ON*	ON: Effects PS calculation.
	STATUS ECHO=OFF	
BOISE ID MODE	BOISE ID=IEEE*	Selects BOISE ID mode compatibility, IEEE or Windows95.
	BOISE ID=WIN95	
PROTECT OFF MODE	PRO.OFF=AUTO*	Carries out the page protect if it is turned OFF.
	PRO.OFF=NORMAL	Carries out the page protect.
HP ESC E COMMAND	HP ESC E=RESET*	Reset a printer with ESC E.
	HP ESC E=F/F	Carries out form feed with ESC E.
DPX FF SUP.MODE	DPX FF SUP.=NORMAL*	Does not eject paper when there is no data.
	DPX FF SUP.=SPEC.	Does not eject paper if both the 1st and 2nd faces are blank when using duplex function.

Title & Subtitle	Item to be Set	Description
PS300RESO	PS300RESO=NO*	Does not reduce the resolution automatically.
	PS300RESO=IF 2M	Reduces the resolution to 300dpi when the total memory is 2Mbytes.
	PS300RESO=FORCE	Reduces the resolution to 300dpi.
COPY PAGES	COPY PAGES=ON*	OFF: 1 page is fixed for the copy page number.
	COPY PAGES=OFF	
PANEL RESET MODE	RESET=NORMAL*	JOB: Changes “reset printer” function to “job cancel” function.
	RESET=JOB	
JOB TIMEOUT SEL	TIMEOUT=ON*	PJL JOB TIMEOUT is effective.
	TIMEOUT=OFF	PJL JOB TIMEOUT does not carry out.
BACKLIGHT TEST	BACKLIGHT=OFF	Tests color of the backlight.
	BACKLIGHT=GREEN	
	BACKLIGHT=RED	
	BACKLIGHT=ORANGE	
	exit	
VIEWANGLE TEST	VIEWANGLE=0	Tests view angle of the LCD display.
	VIEWANGLE=1	
	VIEWANGLE=2	
	exit	
NV-RAM DEBUG	NV-RAM DISPLAY	Displays and prints out NVRAM data. <b>Users MUST NOT use this function.</b>
	NV-RAM HEX PRINT	
	exit	
JOB CANCEL TIME	TIME OUT=XXsec	Selects time (1 to 255 seconds) “job cancel” job becomes time out
PSJAPANESE FONT	JAPFONT=OFF JAPFONT=ON	Decide to support PS3 Japanese font or not. Default is ON in domestic. OFF in overseas.
EXCAHNGE FONTNAME	EXCHANGE=OFF EXCHANGE=ON	In PS3 Japanese fonts, when the font name which is not supported is specified, it determines whether substitute internally or not.
PSCOPYPAGE	PSCOPYPAGE=L3* PSCOPYPAGE=L2	Switch the PS ccopypage operator mode to level 2 mode or level 3 mode. Default is L3.

<b>APPLEUSBPS</b>	<b>BINARY=OFF*</b> <b>BINARY=ON</b>	Enables to print PSPureBinary data via MacUSB.
<b>DX 1JOB1PAGE SEL</b>	<b>1JOB1PAGE=SX*</b> <b>1JOB1PAGE=DX</b>	Select print by simplex or duplex when certain JOB which has only 1 page was sent. Default is simplex.
<b>PS FONT CACHE</b>	<b>CLEAR CACHE=OFF*</b> <b>CLEAR CACHE=ON</b>	Determine PS font cache to delete or not when the job is complete. (It deletes when command is ON)
<b>exit MENU</b>		Exit the Professional Menu mode.

### 3. SERVICE MENU MODE

By enabling the Service Menu mode provides, you will get various printer information. This mode is not open to users.

#### 3.1 Entering the Service Menu Mode

Turn the machine on. While holding down the **Go** switch, press the **+** switch once and then the **Set** switch until the menu "-- SERVICE MENU --" appears on the LCD display.

#### 3.2 Function Table

The following information will be available with this operation.

Title	Subtitle	Description
SERVICE INFO	PAGE COUNT	Displays the number of printing pages.
	JAM COUNT	Displays the number of jam occurrence.
	TONER CHANGE	Displays the number of the toner cartridge replacement .
	DRUM CHANGE	Displays the number of the drum unit replacement.
	PF KIT 1 CHANGE	Displays the number of the PF kit 1 replacement.
	PF KIT 2 CHANGE	Displays the number of the PF kit 2 replacement.
	FUSER CHANGE	Displays the number of the fuser unit replacement.
	LASER CHANGE	Displays the number of the laser unit replacement.
	COVERAGE	Displays the average coverage (when printing Letter size paper at 100% print coverage). COVERAGE counter can be initialized by clearing "TONER EMPTY".
	A4 PAGE	Displays the number of pages when printing A4 size paper.
	LETTER PAGE	Displays the number of pages when printing Letter size paper.
	LEGAL PAGE	Displays the number of pages when printing Legal size paper.
	EXECUTIVE PAGE	Displays the number of pages when printing Executive size paper.
	B5 PAGE	Displays the number of pages when printing B5 size paper.
JIS B5 PAGE	Displays the number of pages when printing JIS B5 size paper	

	<b>A5 PAGE</b>	Displays the number of pages when printing A5 size paper.
	<b>A6 PAGE</b>	Displays the number of pages when printing A6 size paper.
<b>Title</b>	<b>Subtitle</b>	<b>Description</b>
<b>SERVICE INFO</b>	<b>B6 PAGE</b>	Displays the number of pages when printing B6 size paper.
	<b>COM10 PAGE</b>	Displays the number of pages when printing COM10 size paper.
	<b>C5 PAGE</b>	Displays the number of pages when printing C5 size paper.
	<b>DL PAGE</b>	Displays the number of pages when printing DL size paper.
	<b>MONARCH PAGE</b>	Displays the number of pages when printing Monarch size paper.
	<b>A4LONG PAGE</b>	Displays the number of pages when printing A4long size paper.
<b>ERROR HISTORY</b>	1:##### 2:##### 3:##### ..... 10:#####	Displays the 10 latest errors in order of newest to the oldest. <i>NOTE: "COVER OPEN" and "NVRAM ERROR" are not displayed in the history. If an error occurs consecutively, it will be displayed only once.</i>
<b>LIFE PERIOD</b>	<b>DRUM LIFE</b>	Modify the drum unit life period.(Initial rate ; 16,000 pages)
	<b>DRUM UNIT</b>	Modify the drum unit life expectancy reset rate.(Initial rate ; 20,000 pages)
	<b>PF KIT 1</b>	Modify the PF kit 1 life period.
	<b>PF KIT 2</b>	Modify the PF kit 2 life period.
	<b>FUSER UNIT</b>	Modify the fixing unit life period.
	<b>LASER UNIT</b>	Modify the laser unit life period.
<b>MODIFY COUNT</b>	<b>JAM COUNT</b>	Modify the number of paper jam occurrence.
	<b>REPLACE COUNT</b>	
	<b>TONER</b>	Modify the number of the toner cartridge replacement.
	<b>DRUM UNIT</b>	Modify the number of the drum unit replacement.
	<b>PF KIT 1</b>	Modify the number of the PF kit replacement.
	<b>PF KIT 2</b>	
	<b>FUSER UNIT</b>	Modify the number of the fixing unit replacement.
	<b>LASER UNIT</b>	Modify the number of the laser unit replacement.

Title	Subtitle	Description
MODIFY COUNT	REMAIN LIFE	
	DRUM UNIT	Modify the drum unit remaining life counters.
	PF KIT 1	Modify the PF kit remaining life counters.
	PF KIT 2	
	FUSER UNIT	Modify the fixing unit remaining life counters.
LASER UNIT	Modify the laser unit remaining life counters.	
RESET COUNT	CLEAR COVERAGE	Initialize average coverage counter.
	CLEAR ERROR HIST	Clear error histories.

## 4. OTHER HIDDEN FUNCTION MENUS

### 4.1 Hidden Function Menus Enabled by Pressing Switch(es) When Turning the Machine on

The following settings and function will be available by holding down the specified switch(es) while turning the machine on.

Switch(es)	Display	Description
Go	DEMO MODE=ON* DEMO MODE=OFF	Enables and disables DEMO MODE. If this function is ON (default setting), the user can set a printer to work as a demo machine. It turns OFF automatically when the printing data is sent to the printer.
Reprint		Continuously print the test pattern sheet.
Back	LANG.=ENGLISH* .....	Selects a local language for display.
-	HEX DUMP MODE	Hex dump mode. Printer reset is needed to exit this function.
+		Displays information about program/font ROMs by pressing "Set" switch.
Set		Clear NVRAM. <b>This function is not normally used.</b>
Go & +	DRAM CHECK MODE	Check DRAM.
Go & Set	GO TEST MODE	Enters the inspection mode. See <a href="#">section 9. 'Inspection Mode' in CHAPTER 6.</a>
- & +	LINE TEST MODE	Printer test mode. <b>For factory use.</b>
- & Set with cover open	ZLH HV CHECK	<b>For factory use.</b>

### 4.2 Drum Life Reset Function

This function is used by the user when changing the new drum unit to clear the drum life counter.

To operate this function, hold down the "Go" switch while the front cover (process unit cover) is open until the message ">>>>DRUM CLEAR" appears on the LCD display.

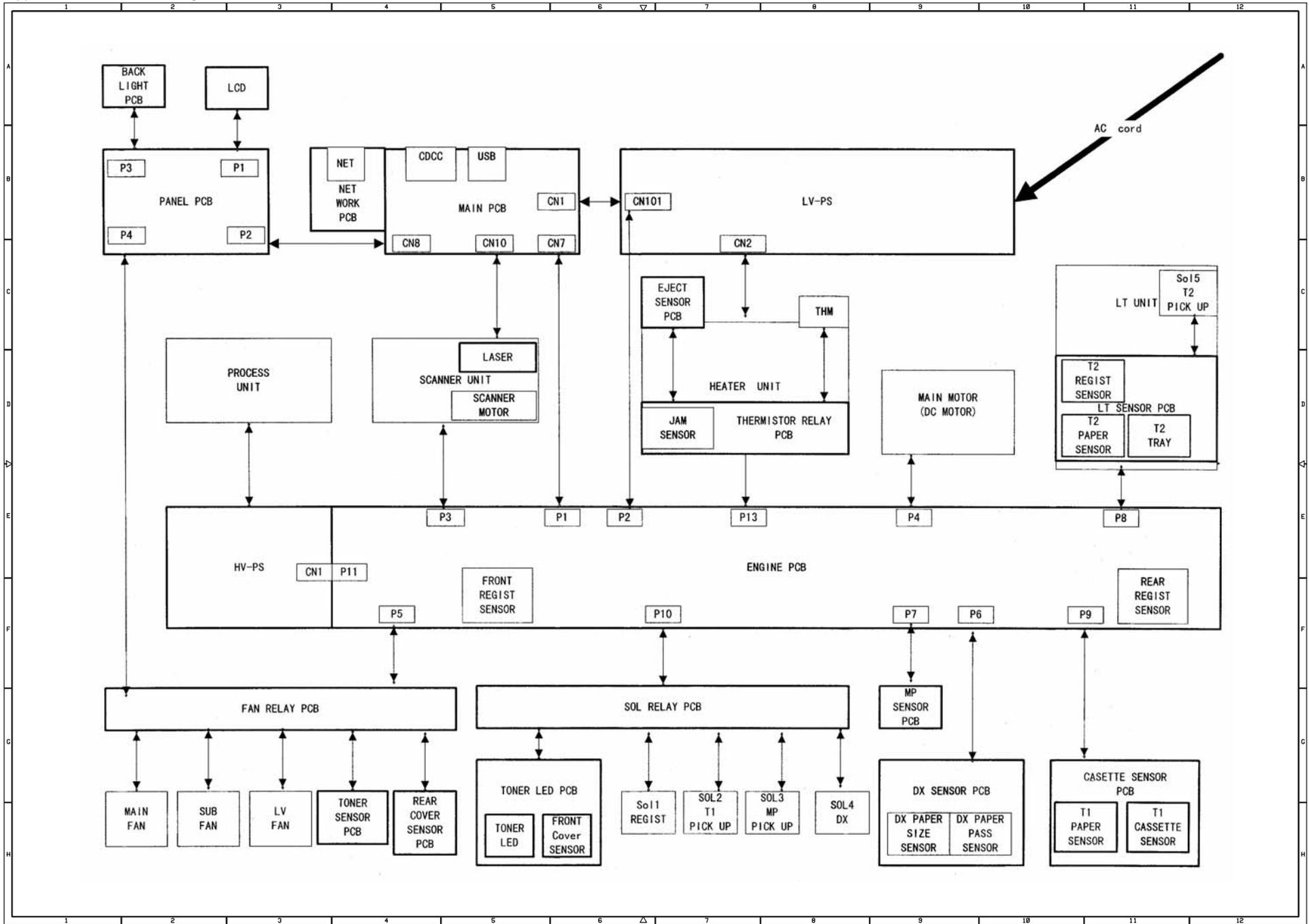
### 4.3 Parts Life Reset Function

This function is used by service specialists only when changing the periodical replacement parts to clear the life counter.

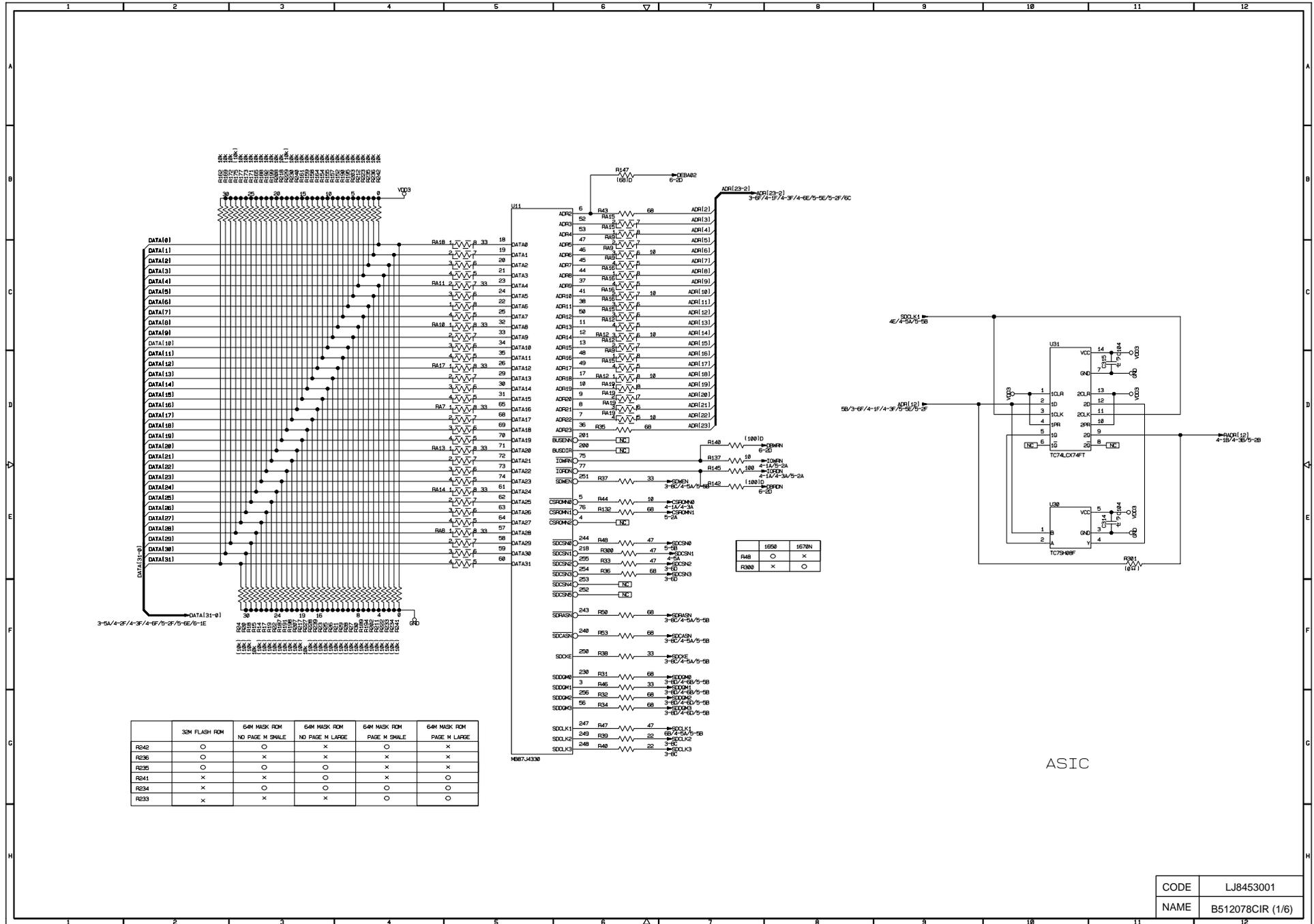
To operate this function, press the "Go" and "+" switches together until the menu "RESET PARTS LIFE" appears on the LCD display. Select the required item (part name) using the "+/-" switches, then press the "Set" switch. See [subsection 2. 'PERIODICAL REPLACEMENT PARTS' in CHAPTER 5](#) for more information about the periodical replacement parts.



Appendix 1. Connection Diagram, HL-1850/1870N



Appendix 2. Main PCB Circuit Diagram, HL-1850/1870N (1/6)

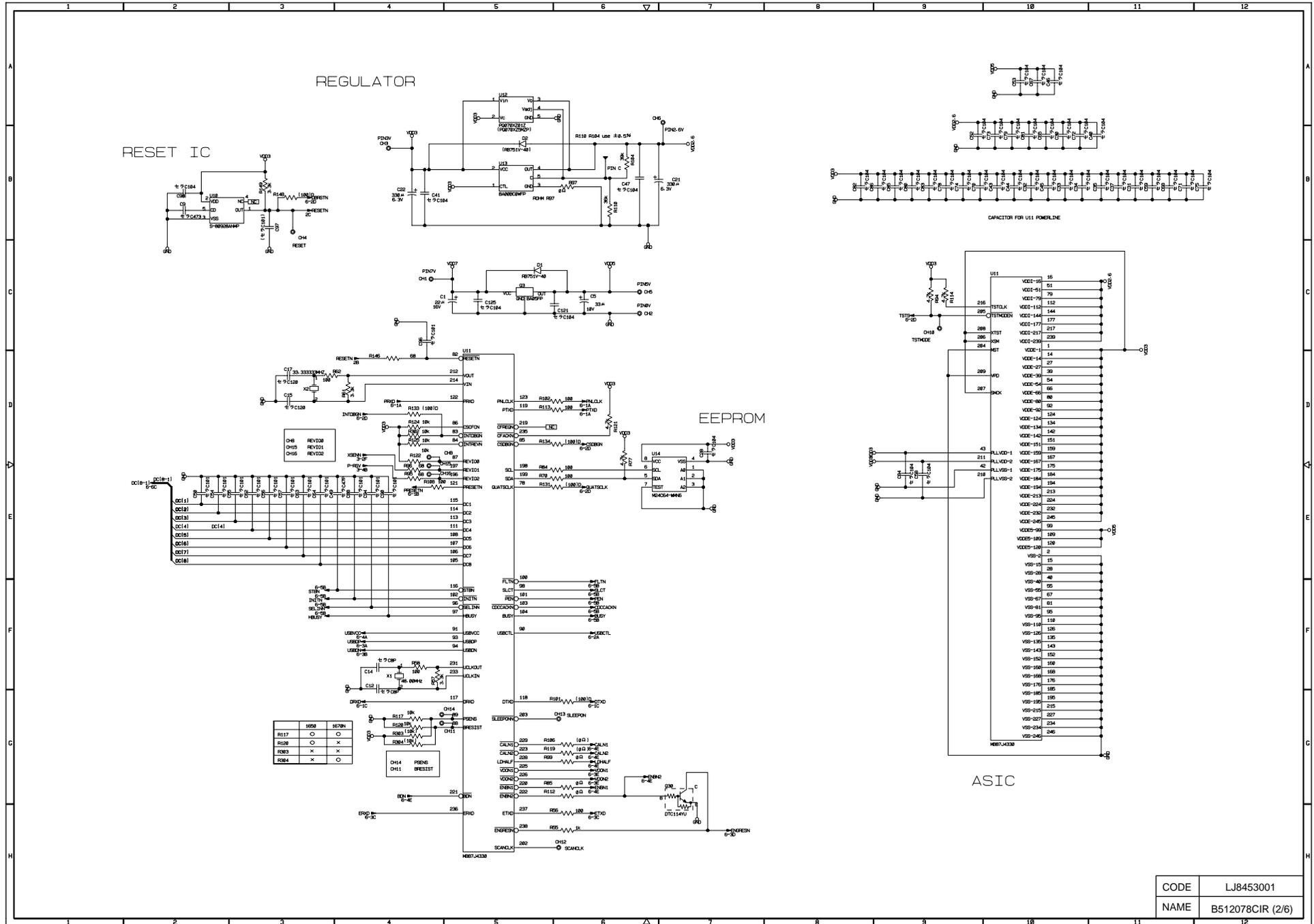


	32K FLASH ROM	64K MASK ROM NO PAGE M SMALL	64K MASK ROM NO PAGE M LARGE	64K MASK ROM PAGE M SMALL	64K MASK ROM PAGE M LARGE
R242	○	○	×	○	×
R236	○	○	○	×	×
R241	×	×	○	×	○
R234	×	○	○	○	○
R233	×	×	×	○	○

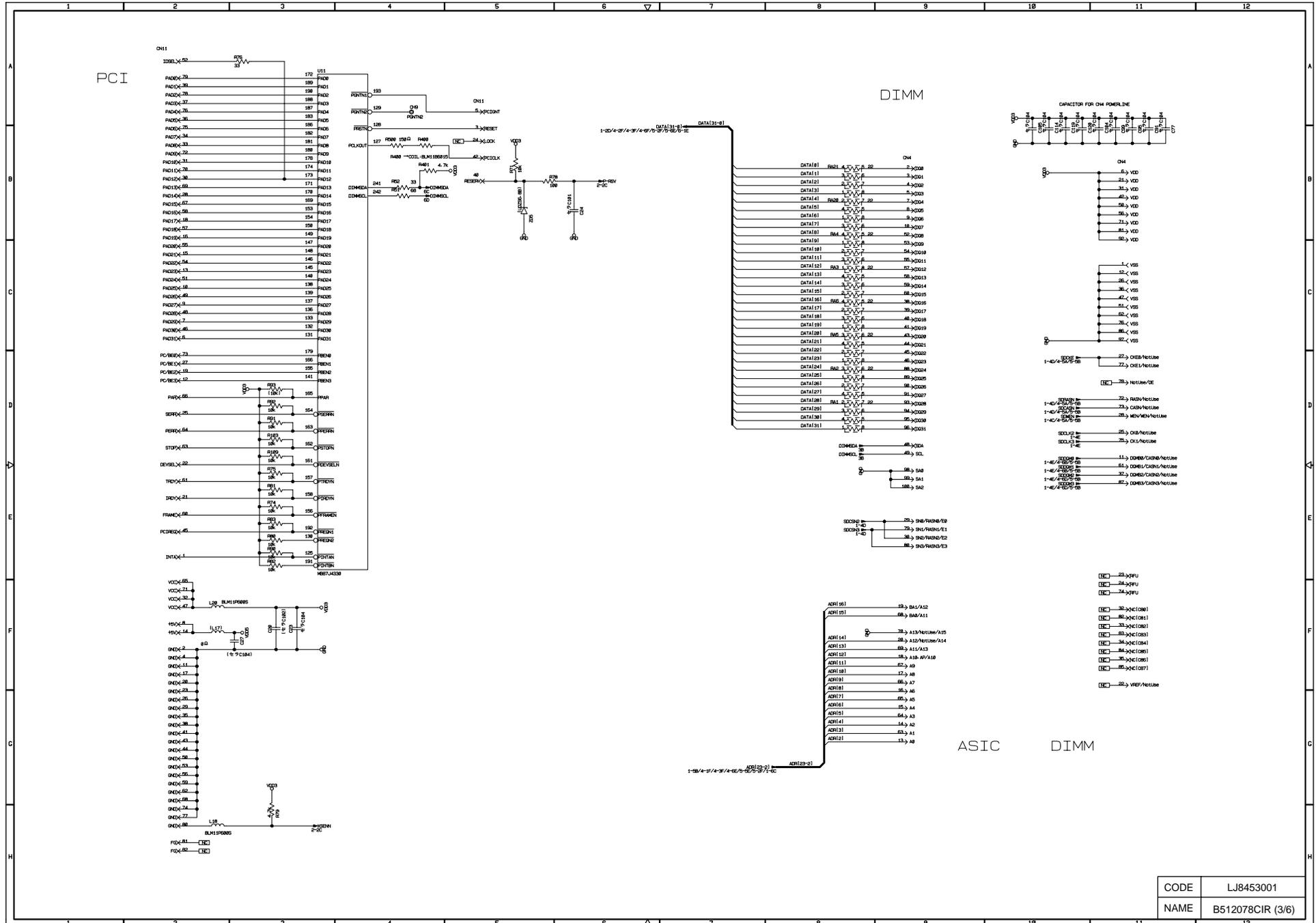
R48	○	×
R30	×	○

CODE	LJ8453001
NAME	B512078CIR (1/6)

Appendix 3. Main PCB Circuit Diagram, HL-1850/1870N (2/6)

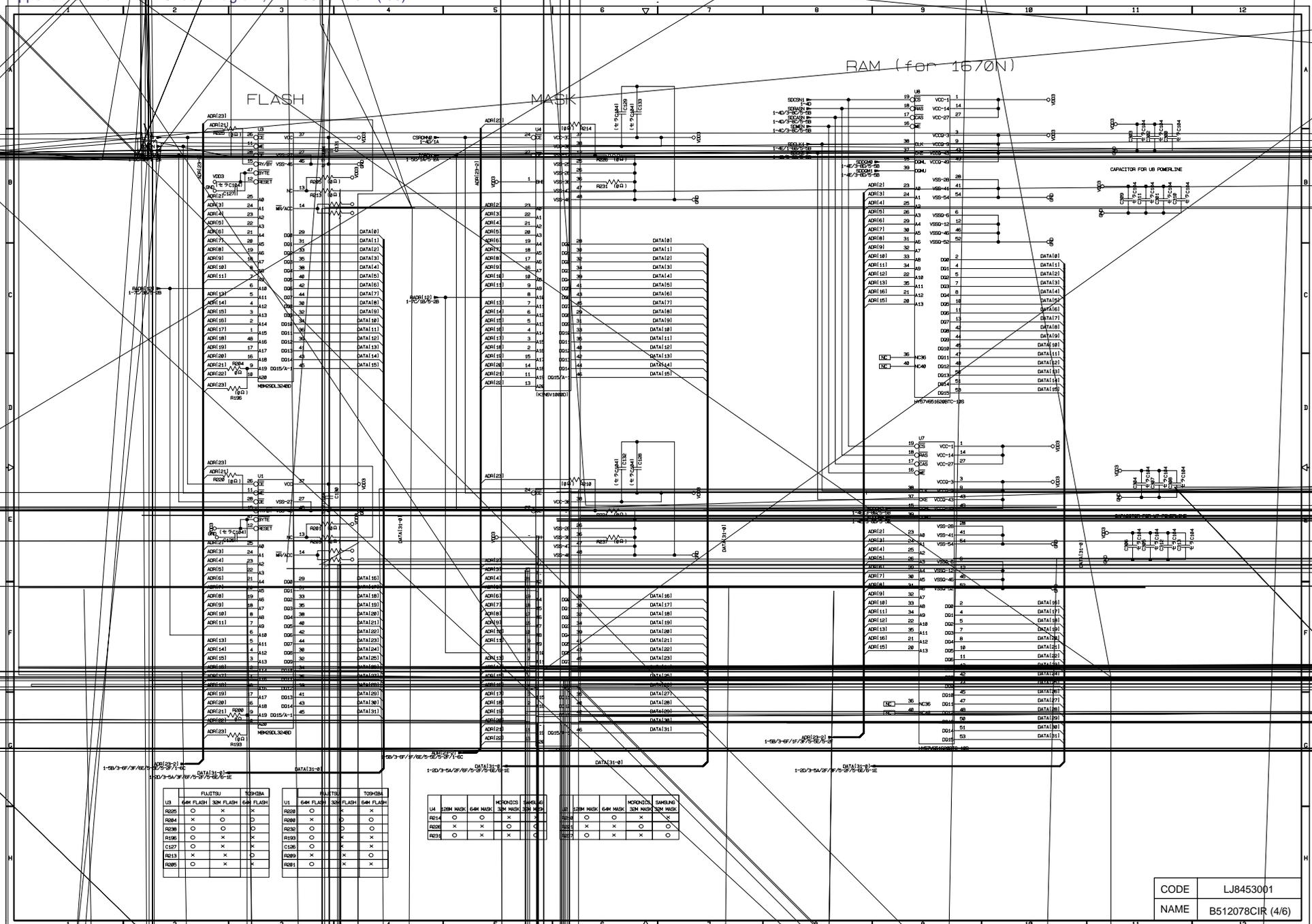


Appendix 4. Main PCB Circuit Diagram, HL-1850/1870N (3/6)



CODE	LJ8453001
NAME	B512078CIR (3/6)

Appendix 5. Main PCB Circuit Diagram, HL-1850/1870N (4/6)



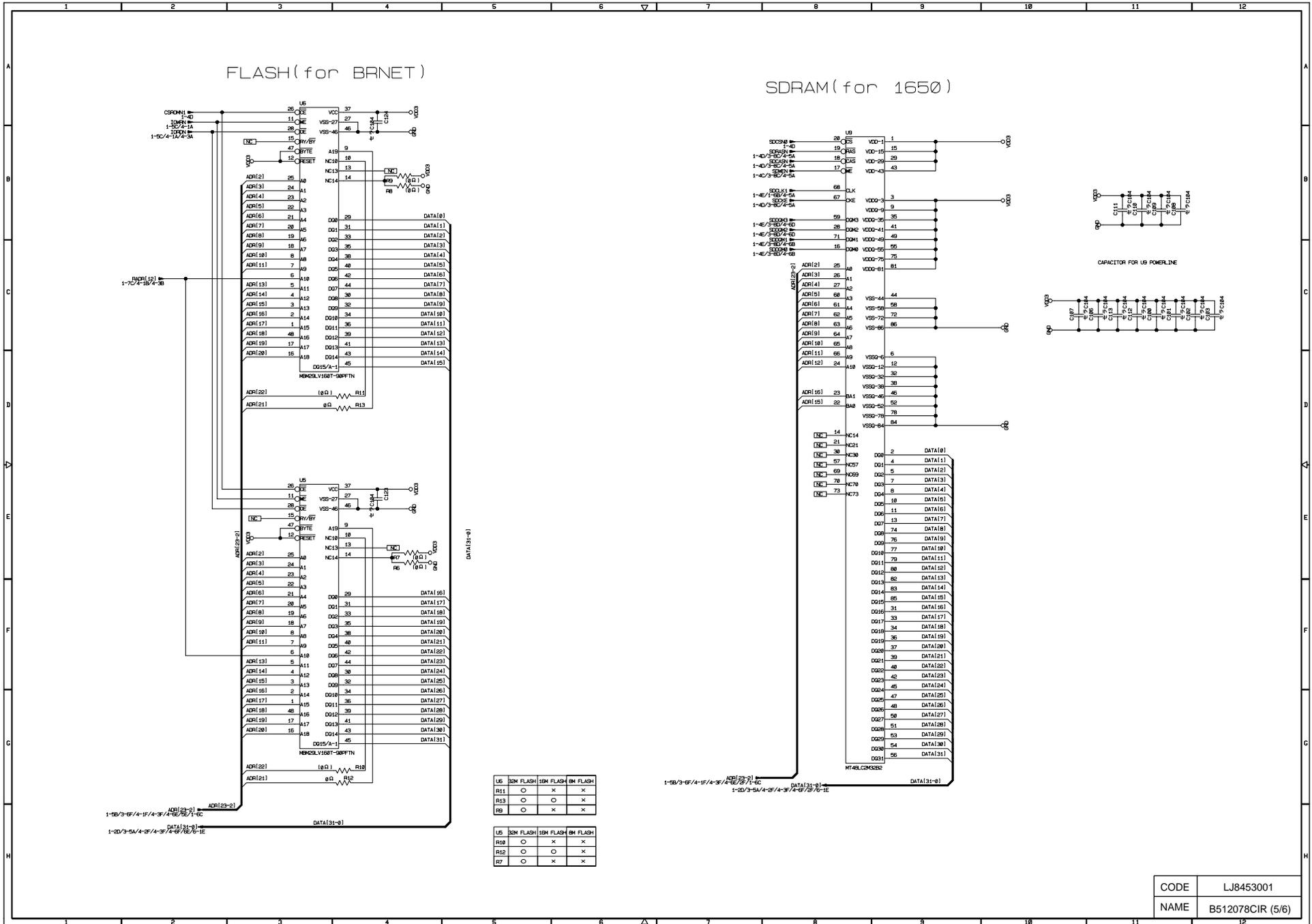
LIB	64M FLASH	32M FLASH	16M FLASH	8M FLASH
R205	O	O	O	O
R204	X	O	O	O
R206	O	O	O	O
R106	O	X	X	O
C127	O	X	X	O
R213	X	X	O	O
R209	O	X	X	O

LIB	64M MASK	32M MASK	16M MASK	8M MASK
R214	O	O	X	O
R215	X	X	O	O
R216	O	X	X	O

LIB	64M MASK	32M MASK	16M MASK	8M MASK
R217	O	O	X	O
R218	X	X	O	O
R219	O	X	X	O

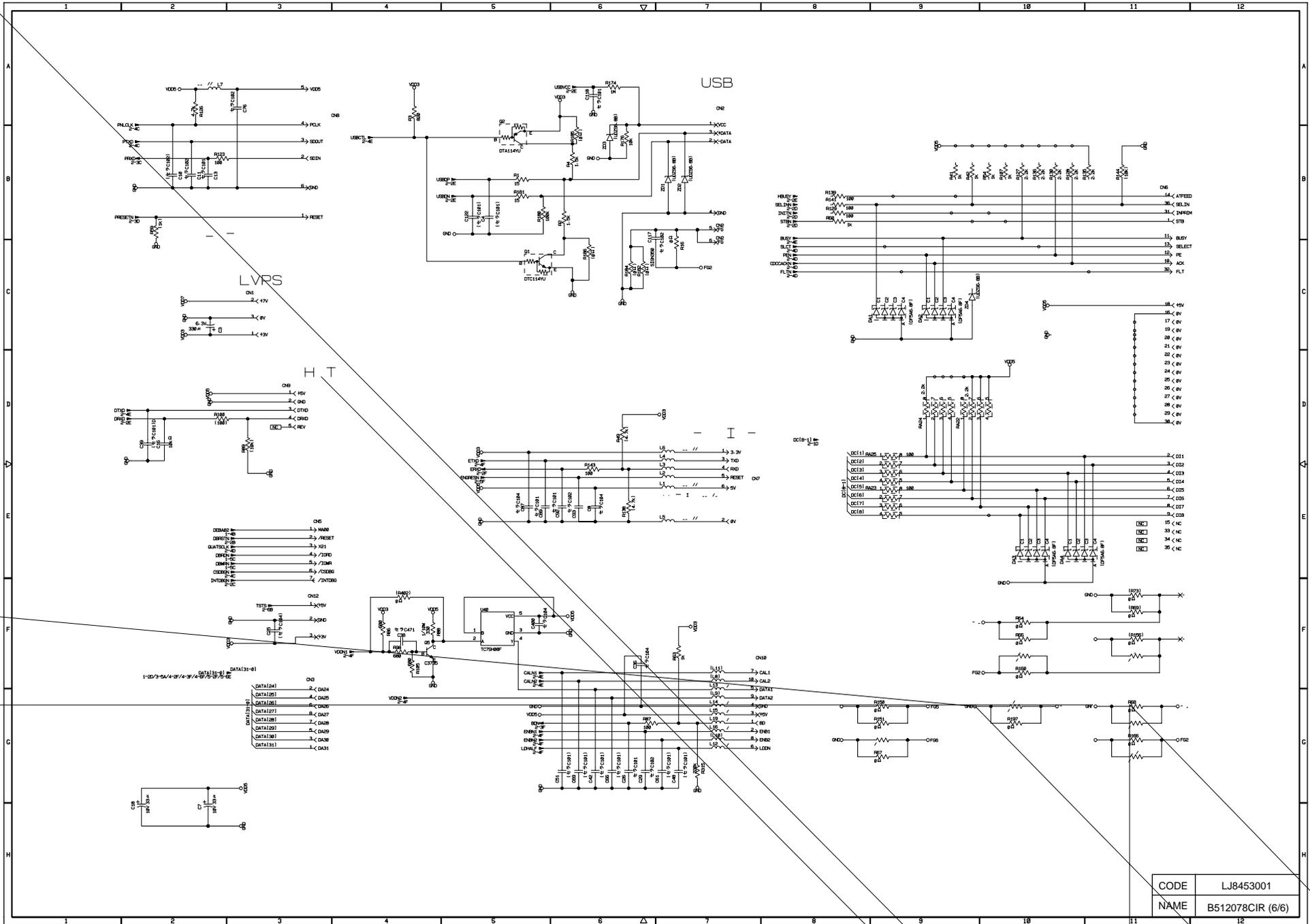
CODE	LJ8453001
NAME	B512078CIR (4/6)

Appendix 6. Main PCB Circuit Diagram, HL-1850/1870N (5/6)



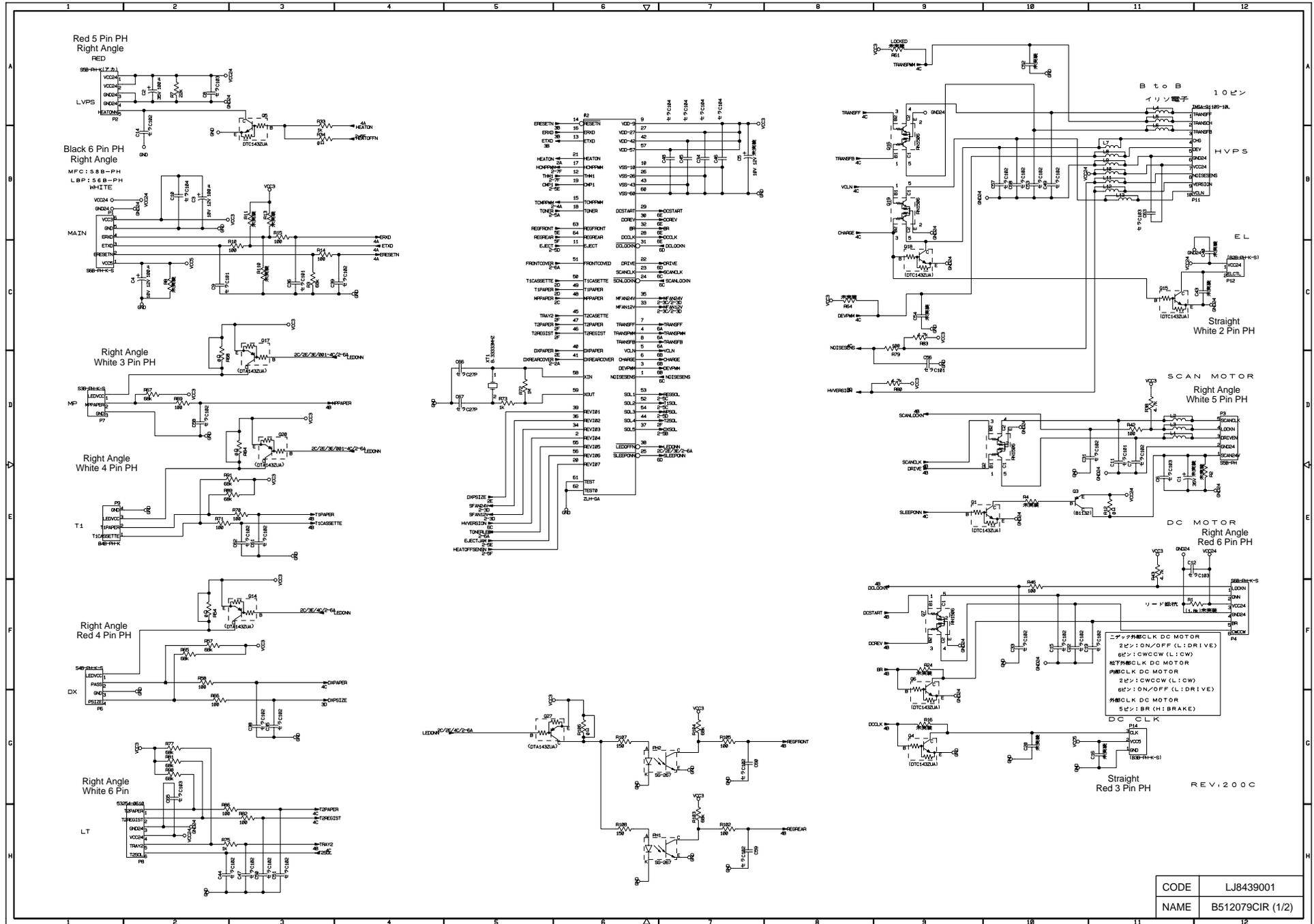
CODE	LJ8453001
NAME	B512078CIR (5/6)

Appendix 7. Main PCB Circuit Diagram, HL-1850/1870N (6/6)



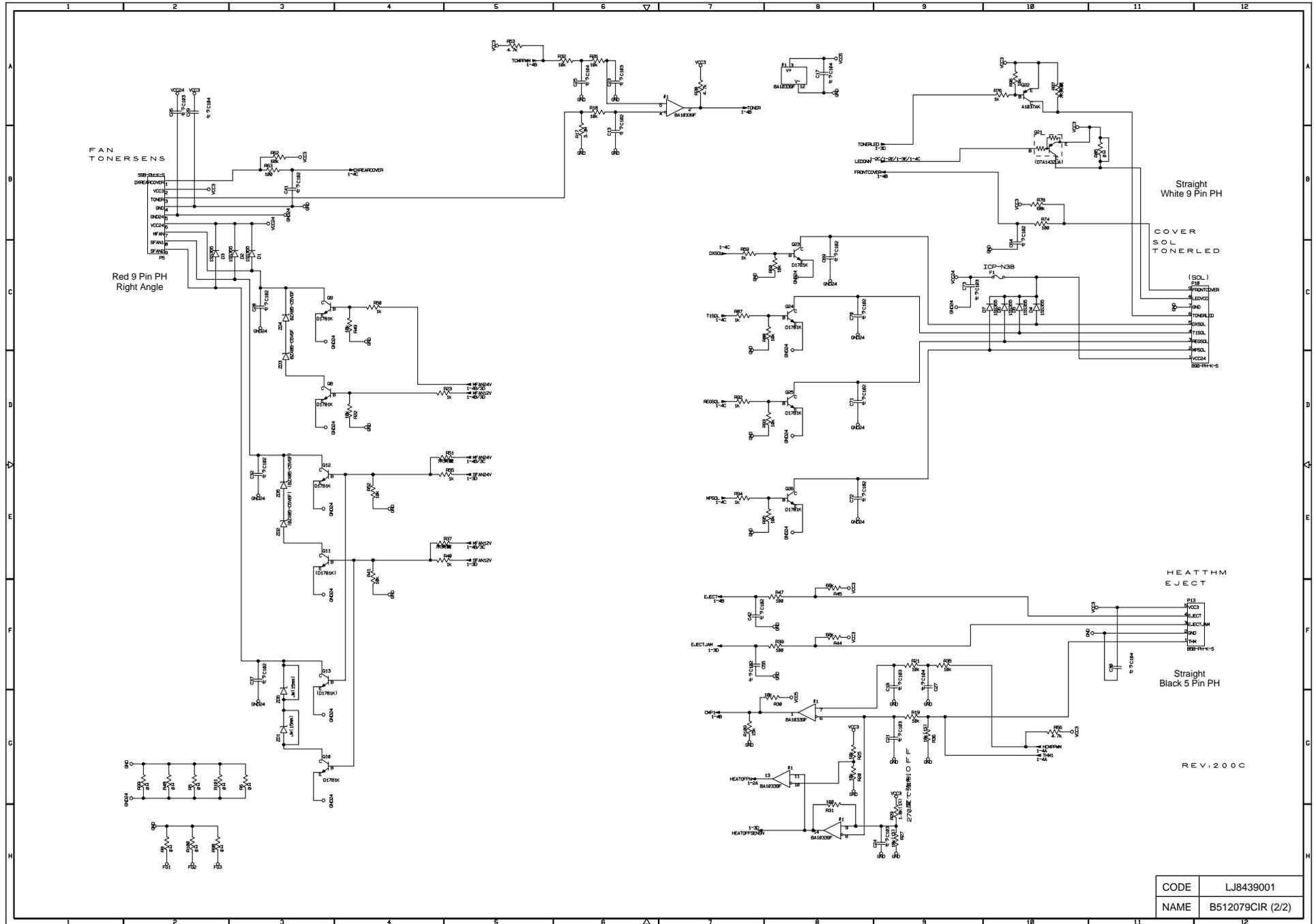
CODE	LJ8453001
NAME	B512078CIR (6/6)

Appendix 8. Engine PCB Circuit Diagram, HL-1850/1870N (1/2)



CODE	LJ8439001
NAME	B512079CIR (1/2)

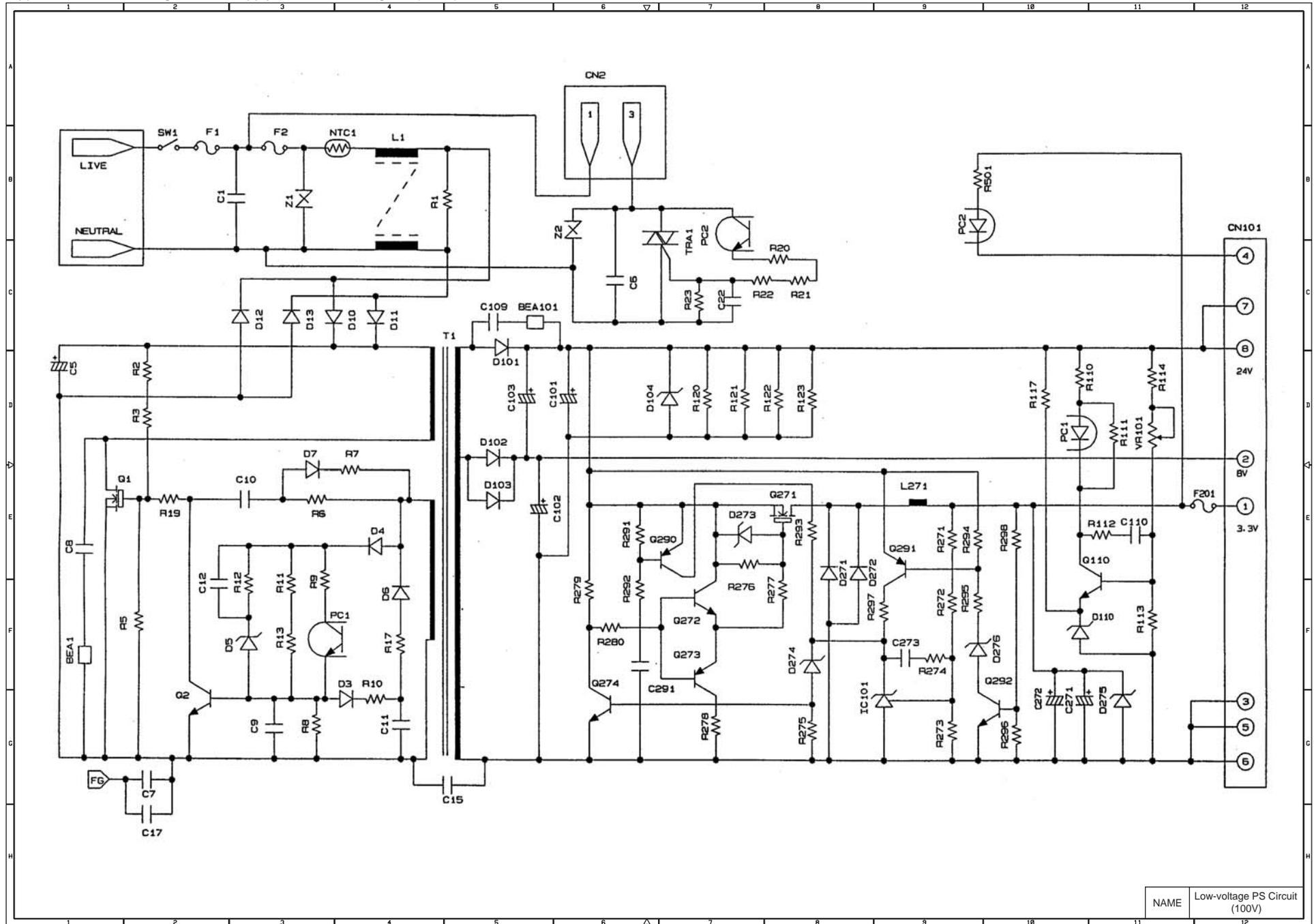
Appendix 9. Engine PCB Circuit Diagram, HL-1850/1870N (2/2)



CODE	LJ8439001
NAME	B512079CIR (2/2)

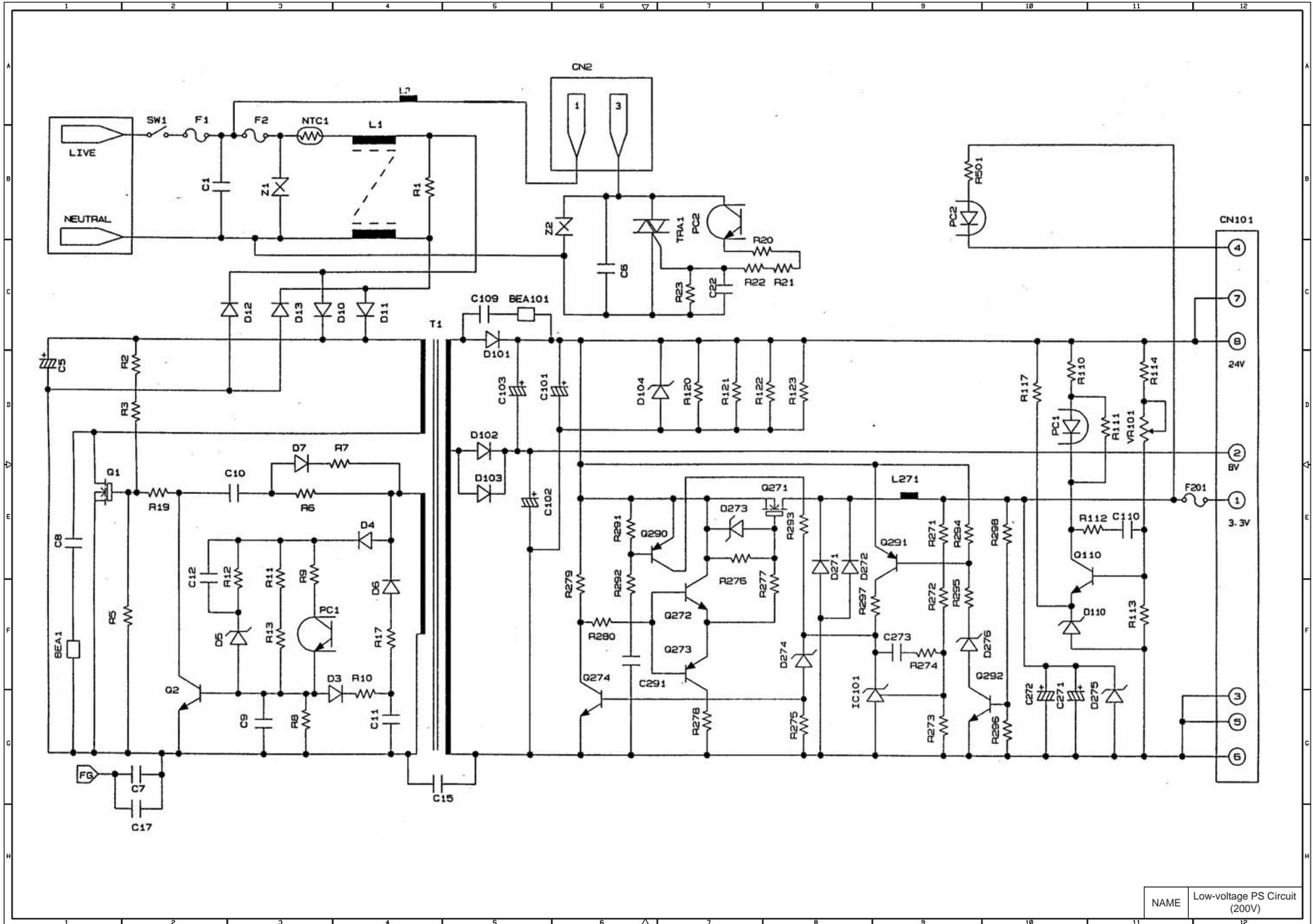


Appendix 11. Low-voltage Power Supply PCB Circuit Diagram (100V)



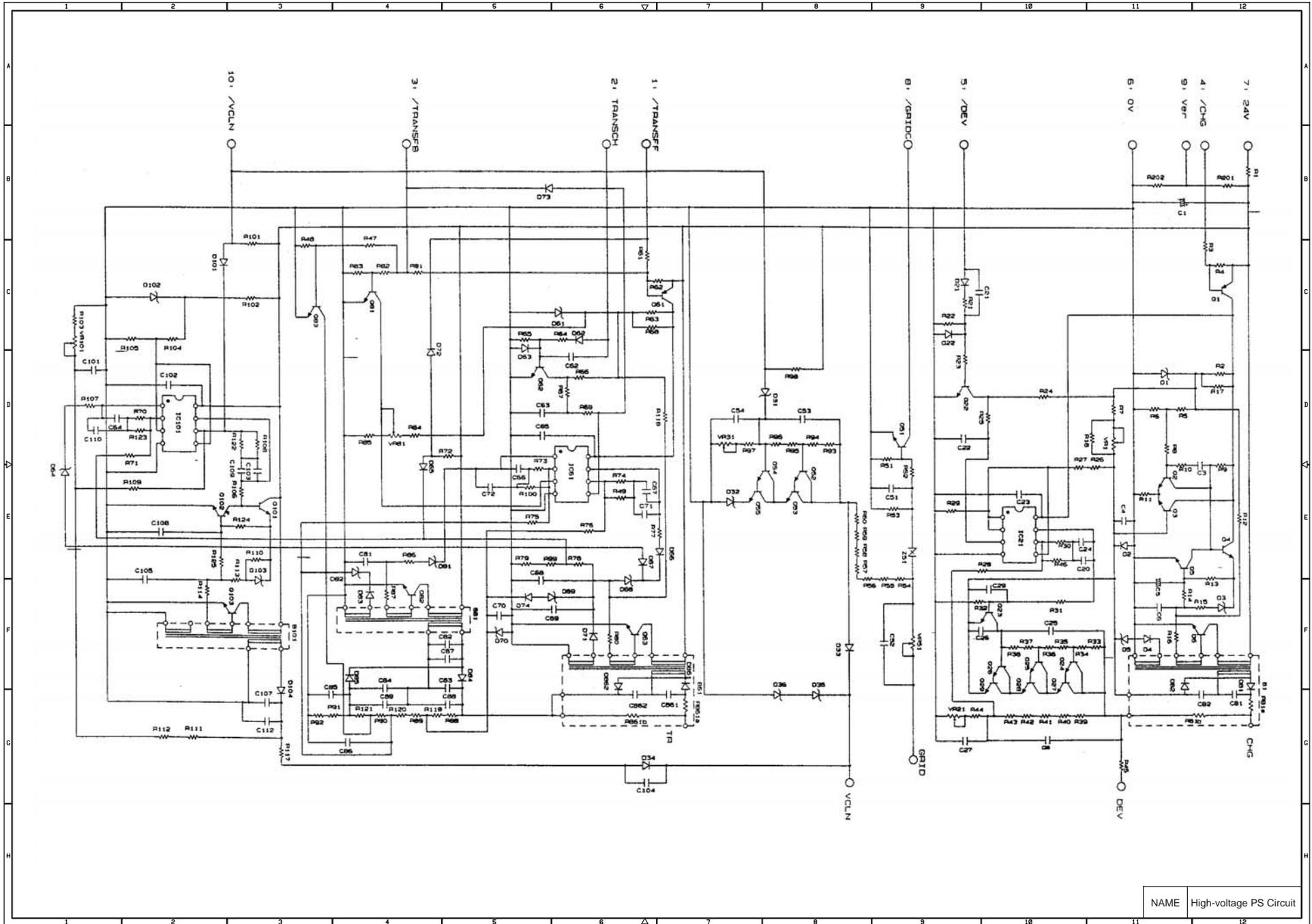
NAME	Low-voltage PS Circuit (100V)
------	-------------------------------

Appendix 12. Low-voltage Power Supply PCB Circuit Diagram (200V)



NAME	Low-voltage PS Circuit (200V)
------	-------------------------------

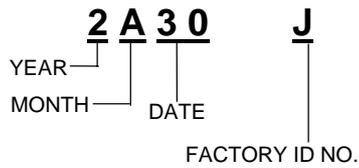
Appendix 13. High-voltage Power Supply PCB Circuit Diagram



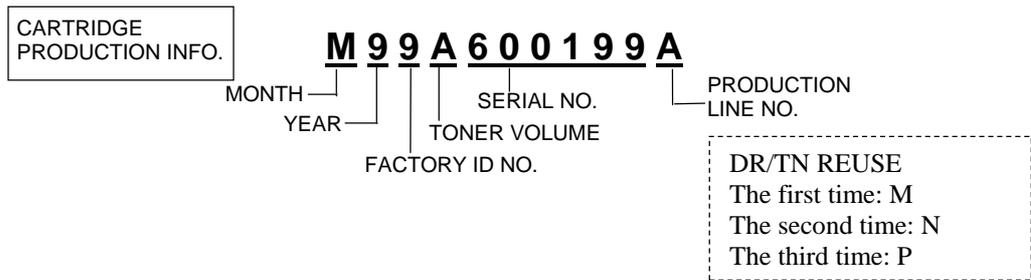
NAME	High-voltage PS Circuit
------	-------------------------



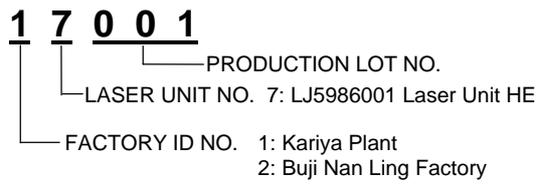
(4) Toner cartridge: Imprinted on the aluminum bag



Printed on the bar code label attached on the toner cartridge



(5) Laser unit: On the laser unit



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**APPENDIX 15. DIAMETER / CIRCUMFERENCE OF ROLLERS**

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The diameter and circumference of each roller are listed below;

No.	Parts Name	Diameter (Circumference)
1	First Paper Feed Roller	φ 13.8 mm (43.3 mm)
2	Paper Feed Roller	φ 14.0 mm (44.0 mm)
3	Transfer Roller	φ 15.20 mm (47.7 mm)
4	Photosensitive Drum	φ 29.97 mm (94.1 mm)
5	Heat Roller	φ 25.0 mm (78.5 mm)
6	Pressure Roller	φ 25.0 mm (78.5 mm)
7	Development Roller	φ 20.0 mm (39.0 mm)

## APPENDIX 16. PRINT SPEEDS WITH VARIOUS SETTINGS

Print speed of the HL-1850/1870N printers is up to 18/19 ppm when loading A4 or Letter size paper from the paper cassette in the Regular mode.

Actual print speed varies depending on the media type or paper size as shown in the tables below;

<A4 / Letter size>

Media type setting	All models
Transparency	Up to 18/19 ppm
Thin Paper	Up to 18/19 ppm
Plain paper	Up to 18/19 ppm
Thick Paper	Up to 18/19 ppm
Thicker/Bond Paper	A4: 4 ppm / Letter: 4 ppm

<Smaller size than A4 or Letter>

Media type setting	All models
Transparency	Up to 18/19 ppm
Thin Paper	Up to 18/19 ppm
Plain paper	8 ppm after 5 min. have passed.
Thick Paper	8 ppm after 30 sec. have passed.
Thicker/Bond Paper	4 ppm

### NOTE:

- *When a smaller size paper than A4 or Letter is printed, the temperature on both edges of the fixing unit is much higher than the temperature on the center of the unit where the paper is fed depending on the setting or model. Therefore, the print speed is slowed in order to decrease the temperature on the edges after the specified time, it is maximum print speed when you first start printing.*
- *Max. speed is 18/19 ppm or more. It varies depending on the paper size.*





### 3. How to Read the Page Counter

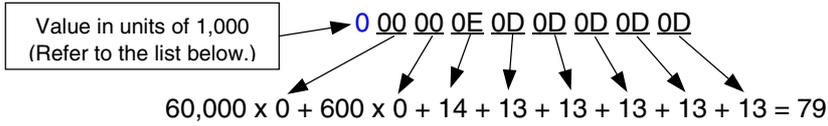
The page counter is shown at the right upper corner in Print Configuration.

It is also shown in the upper line on the right below the drum life bar and indicates the number of printed pages in units of 1 and 1,000.

- Value in units of 1

The hexadecimal value stored in NV-RAM is printed.

Example: 000000E0D0D0D0D0D



- Value in units of 1,000

Page counter indicated by units of 1,000 pages.

→ 0 - 99 pages	0	600 - 699 pages	6
100 - 199 pages	1	700 - 799 pages	7
200 - 299 pages	2	800 - 899 pages	8
300 - 399 pages	3	900 - 999 pages	9
400 - 499 pages	4	1,000 - 1,999 pages	A
500 - 599 pages	5	2,000 - 2,999 pages	B

#### 4. How to Read the Maintenance Information

The maintenance information such as the frequency of consumable parts replacement or paper jam can be found from the 17-digit number shown in the lower line on the right below the drum unit life bar.

**NOTE:**

The 17-digit number is also shown in the Printer Information dialog box which is one of the self-diagnostics tools. For details, refer to [section 3 'Printer Information' in APPENDIX 18](#).

To obtain the maintenance information, you need to obtain and load the Maintenance Information utility which supplied on Service Databank by following the steps below;

- (1) Download the Maintenance Information utility from the Printer Utility DB in Service Databank.
- (2) Open the utility, then select 'Decode the 4-byte data' in the menu.

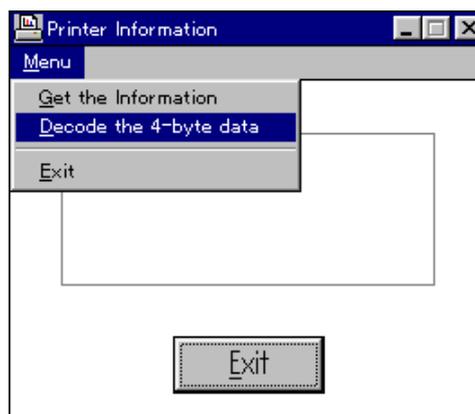


Fig. A-3

- (3) Enter the 8-digit number as shown on the right from the 17-digit number.
- (4) Click the **OK** button.

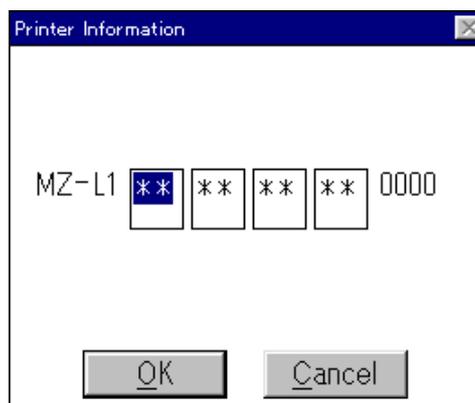


Fig. A-4

- (5) The dialog box shown at the right will appear and show the frequencies of drum unit change, toner cartridge change and paper jam.

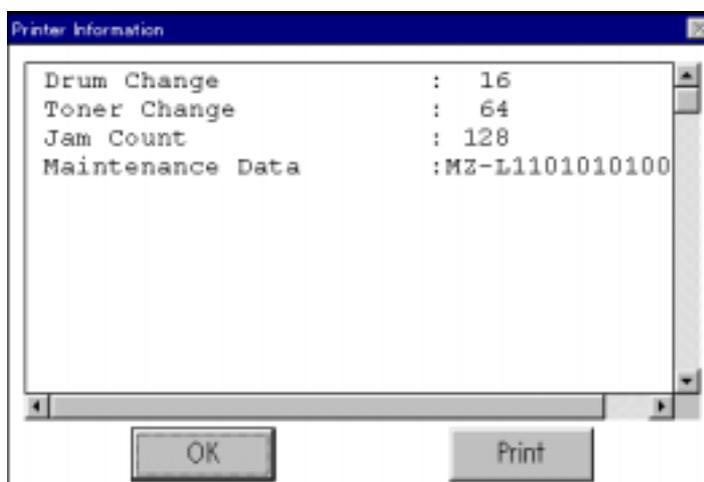


Fig. A-5

*If the printer is connected to a parallel port, you can take the following steps:*

- (1) *Open the Maintenance Information utility, then select 'Get the Information' in the menu.*
- (2) *Select the LPT port you are using and click the **OK** button.*



Fig. A-6

- (3) *Click the **Exit** button.*
- (4) *The dialog box will appear and show the frequencies of drum unit change, toner cartridge change and paper jam.*



Fig. A-7

Note that each maintenance information is counted under the conditions below;

Information	Conditions
Drum unit change	When drum unit life is 100 pages or more, and the drum counter is reset. (Maximum counter: 63)
Toner cartridge change	When the toner cartridge is replaced after a Toner Empty error is stored in NVRAM, then warming-up completes without a Toner Empty or Toner Low error being detected. (Maximum counter: 127)
Paper jam	When a paper jam occurs. (Maximum counter: 2047)

## APPENDIX 18. HOW TO USE THE SELF-DIAGNOSTICS TOOLS

Three self-diagnostics tools below are automatically installed when the printer driver is installed;

- 1) Troubleshooting for Printer won't print
- 2) Diagnostics
- 3) Printer Information

The following sections describe the details on each tool.

### 1. Troubleshooting for Printer won't print

This tool instructs you how to clear the problem such as 'The printer can't print' or 'The printer prints garbage or incorrect fonts'.

- (1) When you start the program, the Help dialog box shown below appears.



Fig. A-8

- (2) Select the problem you have had, then the specified window appears.
- (3) Follow the instructions that appear on the PC screen.

If the problem cannot be solved, start the "Diagnostics" tool to create a log file which should be sent to the authorized service center to investigate the cause of problem. For the details on the "Diagnostics" tool, see the following section, '2. Diagnostics'.

## 2. Diagnostics

This tool helps you to report your PC environment to investigate the cause of problem such as 'Printer won't print' or 'Printer prints garbage or incorrect fonts'. Before using this tool, however, you have to check if you can clear the problem using the 'Troubleshooting for printer won't print' tool described in the previous section.

- (1) When you start the program, the dialog box shown below appears. Follow the steps described in the box, then click the **OK** button.

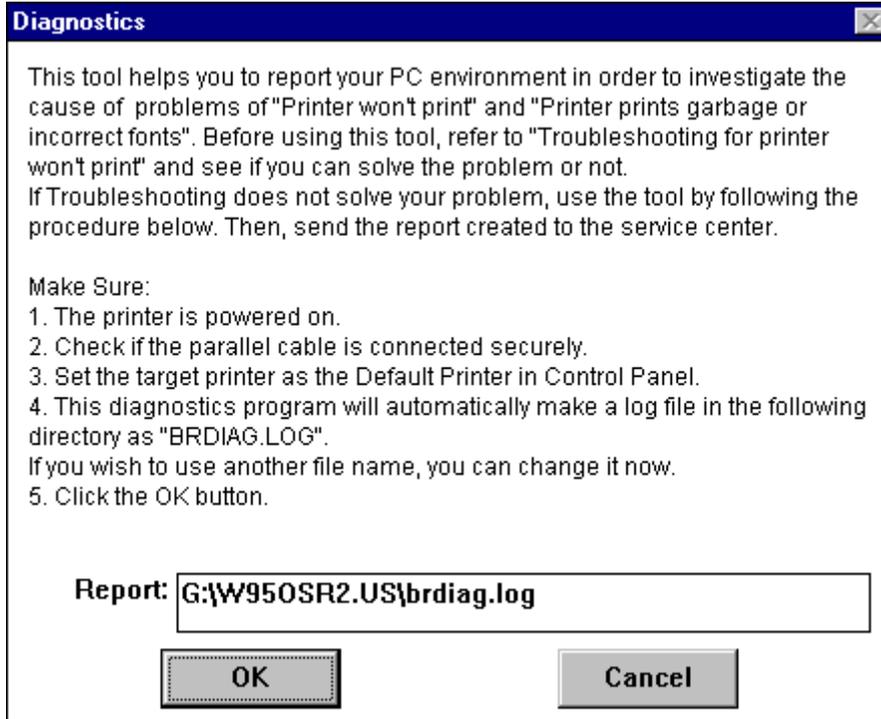


Fig. A-9

- (2) The message below appears, click the **OK** button if you want to check whether there is any incorrect data or not. If you do not want to check it, click the **Cancel** button.

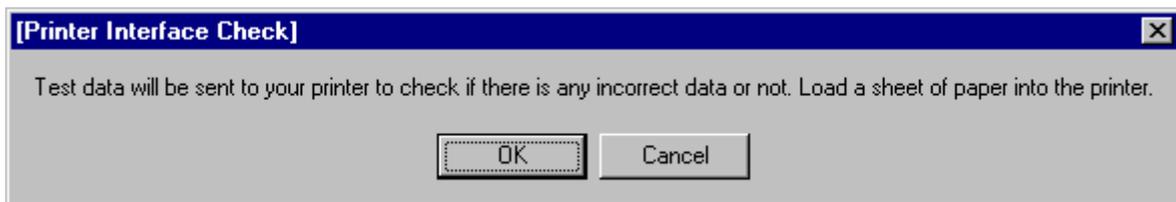


Fig. A-10

- (3) If you click the **OK** button in Step 2, the dialog box below appears.

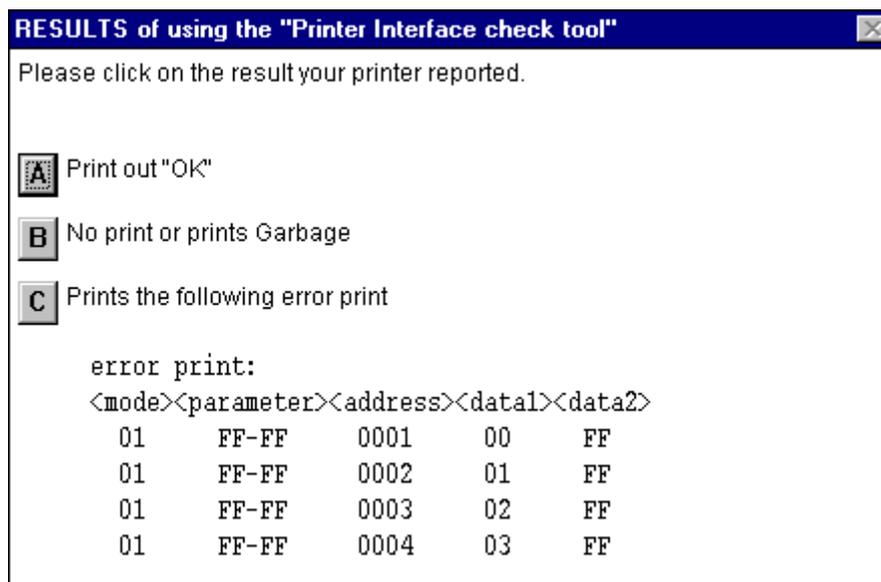


Fig. A-11

- (4) Check the result that the printer reported and click the **A**, **B** or **C** button depending on the result.
- (5) The created log file is shown on the PC screen. (The software will ask whether you wish to print the log file or not.)

Send the log file created with this tool to investigate the problem to the authorized service center.

### 3. Printer Information

The drum unit life or page counter is printed on Print Configuration in some countries as described in [APPENDIX 17 'HOW TO KNOW DRUM UNIT LIFE & PAGE COUNTER'](#).

This tool also shows the printer information such as printer version or page counter for all models only when the printer is connected to a parallel port.

(1) When you start the program, the dialog box shown below appears.

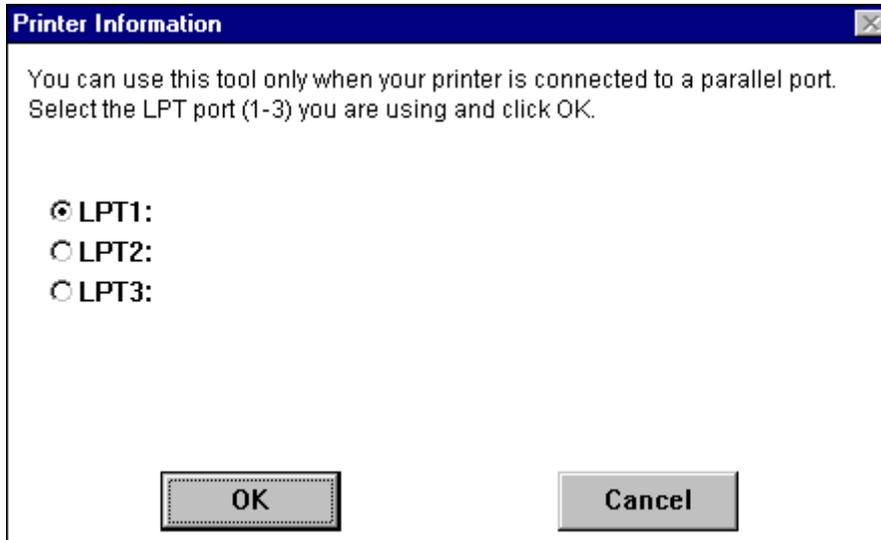


Fig. A-12

(2) Select the LPT port you are using and click the **OK** button.

(3) The dialog box below appears and indicates the printer information, printer ID, version, drum unit life, page counter and drum counter.

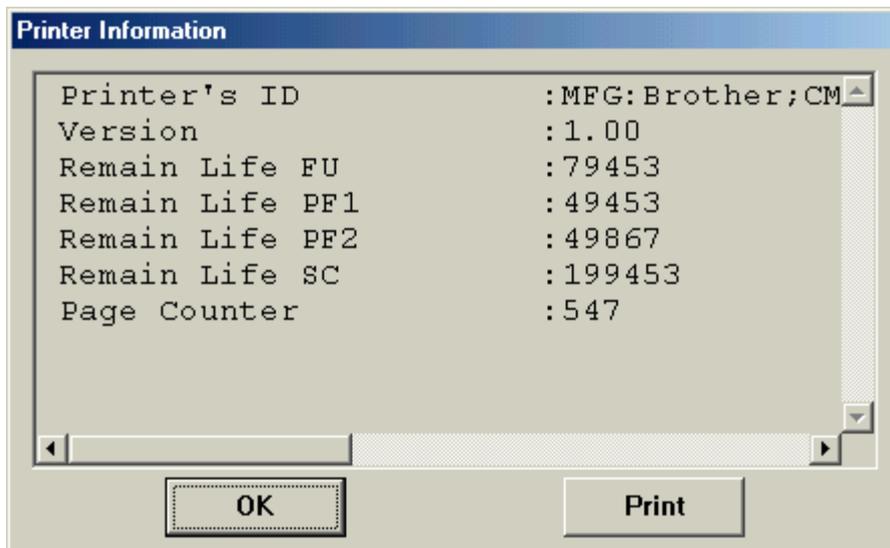


Fig. A-13

**NOTE:**

For how to read the Maintenance Data shown in the dialog box above, see [Section 4 'How to Read the Maintenance Information'](#) in [APPENDIX 17](#).

## APPENDIX 19. NVRAM DEFAULT VALUE

The default values for the main items to be set in NVRAM are as follows;

Items	Descriptions
Timing of Drum LED ON	16,000 page (Counted from the drum unit life.)
Development switching timing	The developing bias is switched from 400V to 300V when 7,000 pages are printed. It is switched to 400V again when the toner cartridge is replaced following the "TONER EMPTY" error message (Counted from the number of the drum rotation in non-continuous printing)
Fixing temperature	<ul style="list-style-type: none"> <li>• Transparency: 170°C</li> <li>• Thin paper: 185°C</li> <li>• Plain paper: 208°C (195°C when printing using duplex function)</li> <li>• Thick paper: 220°C</li> <li>• Thicker/Bond paper: 220°C (in non-continuous printing)</li> </ul>
Smaller size mode	See <b>APPENDIX 16 'PRINT SPEEDS WITH VARIOUS SETTINGS'</b> .

### <The Developing Bias Reset Function>

This function makes a counter reset for initializing the developing bias function when changing the new toner cartridge before the previous one gets empty for any reason.

With the following settings, the developing bias reset function operates.

1. Open the front cover, and take the drum unit out.
2. Press the "GO" switch once when keeping the front cover open.
3. Install the drum unit into the printer.
4. Press the "GO" switch again when keeping the front cover open.
5. Close the front cover.

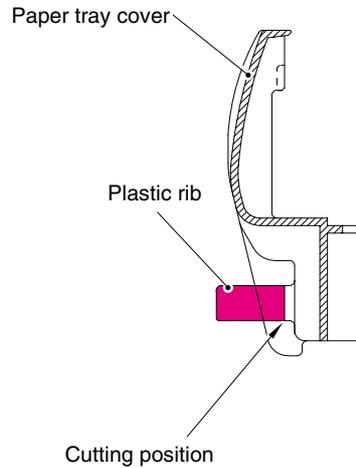
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**APPENDIX 20. PAPER CASSETTE INFORMATION (FOR EUROPE ONLY)**

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The paper cassette fitted to the printer is different from the service manual information for printers shipped to Europe as follows:-

- (1) The paper cassette supplied with the HL-1850/1870N printer has a plastic rib on the paper tray cover.
- (2) The plastic rib is removed from the tray cover for the paper cassette supplied with the LT-500, (optional Lower Tray Unit) as shown on the right;



**Fig. A- 14**

- (3) If the optional LT-500 Lower Tray Unit is installed onto the HL-1850/1870N printer, it is necessary to exchange the cassette supplied with the LT-500 Unit with the upper cassette already fitted into the printer. Install the cassette originally fitted in the printer into the LT-500 Unit.

Failure to do so will cause paper jams as the paper cannot be fed from the lower cassette to the printer body because the plastic rib on the paper tray cover is blocking the paper path.

- (4) For paper cassettes supplied as spare parts, the plastic rib has been cut off so that you can use it as both an upper cassette and lower cassette.

## APPENDIX 21. GUIDELINES FOR LEAD FREE SOLDER (MAIN PCB ASSY)

The LSI component mounting side of the MAIN PCB ASSY is soldered using lead free solder, be sure to use **lead free solder** that meets the following specification in the case of repair.

### Lead free solder ; NIHON GENMA DHB-RMA3 NP303

**(This can be distinguish from the lead free identification sign “LFH” on the MAIN PCB ASSY REV.)**

However, the solder side of the MAIN PCB ASSY and other PCBs are soldered using lead content solder, use conventional lead content solder in the case of repair.

Since the reliability of soldering cannot be guaranteed if lead free solder and lead content solder are mixed, take care not to use the incorrect solder or mix the solder types.

### <Information on Manually Repairing PCB Soldered with Lead-Free Solder>

This document provides information on how to correctly make manual repairs to a printed circuit board (PCB) soldered with lead-free solder.

#### 1. Characteristics of lead-free solder

Melting point higher than that of conventional tin-lead solder

(Lead-free solder: approx. 220°C, Conventional tin-lead solder: approx. 180°C)

Relatively poor solder wettability and spread (difficult to wet and spread), and hard

Appearance (dull and grainy surface) different from that of conventional solder

Relatively poor wettability, rough surface (bumps are likely to be formed), and solder dragging

Poor solder elevation

Poor thermal conductivity and heat resistant (difficult to melt)

#### 2. Metal composition & wire solder

The metal composition of lead-free solder allowed for use on PCBs for Brother's products is following.

LF Indication		Compositon	Manufacturer	Origin	Name
<b>1</b>		Sn/Ag/Cu	Nihon Genma	Japan	DHB-RMA3 NP303
<b>H</b>	only Component-side	Sn/Ag/Cu	Nihon Genma	Japan	DHB-RMA3 NP303

We use wire solder which is indicated by digit after LF indication on PCB.

Wire solder made in the countries except Japan are under investigation, and will be evaluated.

#### 3. Appearance quality criteria

The appearance of the surface of portions soldered with lead-free solder is basically the same as that for those soldered with conventional lead-tin solder, except for the following points.

- 1) The surface of a portion soldered with lead-free solder is dull and not smooth.
- 2) Shrinkage cracks can be observed on the surface of a portion soldered with lead-free solder. (They can be observed using a magnifying glass with approx. 10x magnification.)

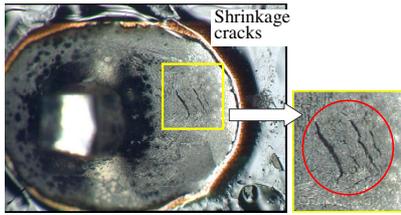


Figure 1 Shrinkage Cracks

#### 4. Identification of lead-free solder on PCBs

For PCBs that use lead-free solder, "LF" is indicated by silk-screen printing or attaching a label. "LF" stands for lead free and indicates that the PCBs bearing such an indication have been soldered with lead-free solder. A digit is given in a box following "LF" if produced by silk-screen printing or follows "LF" without a box on an attached label, the digit indicating the metal composition and wire solder.

#### 5. Precautions for hand soldering operations

- 1) Soldering operations using lead-free solder are basically the same as those using tin-lead solder, however, due to the lead-free solder's characteristics of being difficult to melt, wet, and spread, as well as being hard, a soldering iron needs to be applied for a longer period of time than when soldering with conventional tin-lead solder. While soldering is being performed, it must be confirmed that the lead-free solder is spreading. When solder needs to be added when repairing PCBs, the solder must only be added after sufficiently melting the previously soldered area. When poor soldering is repaired, the solder of the poorly soldered area must be sufficiently removed and lead-free solder newly supplied.
- 2) Before starting soldering operations, it must be determined whether or not the PCB has an "LF" indication. If the PCB has an "LF" indication, lead-free solder corresponding to the digit following "LF" must be used. Conventional solder including lead (tin-lead solder) must not be used on a PCB that has an "LF" indication. (Use of tin-lead solder on a PCB having an "LF" indication is prohibited.)
- 3) A soldering iron for exclusive use with lead-free solder must only be used; a soldering iron used for soldering with tin-lead solder must not be used with lead-free solder. The use of soldering irons designed for lead-free solder is desirable (see "7. Soldering iron" below).
- 4) The requirement for the temperature of the soldering iron's tip is the same as that for soldering using conventional solder; the temperature of the soldering iron's tip must not be raised even though the melting point of the lead-free solder is higher. The temperature of the soldering iron's tip is restricted to the temperature that the component to be soldered can resist. It should be noted that the temperature that the components to be soldered with lead-free solder can resist has not increased even though the melting point of the solder has.
- 5) A soldering iron must be correctly applied. Even though the melting point of the solder has increased, soldering operations must be performed with the soldering iron's tip at the same temperature as prescribed before. Therefore, heat needs to be effectively applied from the tip of the soldering iron to the base metal. For effective heat application, the shape of the soldering iron's tip and application of the soldering iron (position and angle relative to the base metal) need to be more strictly controlled than before.
- 6) The soldered point must be left as it is after the soldering iron is removed for a period of time longer than that required when soldering is performed with conventional solder.

The amount of heat applied to the base metal increases due to the higher melting point of the lead-free solder, and the base metal is heated to higher temperatures. Consequently, it takes time for the melted solder to cool and to solidify and, therefore, the soldered area must be left as it is after the soldering iron is removed for a longer period of time.

Lead-free solder does not contain the toxic substance lead, however, inhalation of the fumes may adversely affect the health of workers. The silver contained in lead-free solder is also a toxic substance, though it is not as toxic as lead, and, therefore, a localized ventilation system and gloves are required for lead-free solder soldering operations, as required for those with conventional solder.

#### 6. Soldering irons

When soldering is performed manually using lead-free solder, a soldering iron that has little reduction in its temperature needs to be used. This refers to a soldering iron that has a smaller degree of decrease in the temperature at the soldering iron's tip, such as when the soldering iron is applied to the base metal or solder is supplied, and the temperature is soon returned to the specified temperature.

With soldering operations using lead-free solder, the requirement for the temperature of the soldering iron's tip is the same as that for conventional solder, however, the melting point of lead-free solder is higher than that of conventional solder so productivity will decrease with conventional soldering irons.

Some tool manufacturers sell soldering irons designed for lead-free solder and that can maintain the productivity of the soldering operations.

The soldering irons used at BIL are model no. 941 manufactured by HAKKO and M6-SIC-40 manufactured by BONKOTE. The prices of these soldering irons for use with lead-free solder are three to four times higher than those for conventional soldering irons with a temperature controller built in.

#### 7. No mixing of different solders

When repairs are made on a PCB with an "LF" indication on it, lead-free solder with the same metal composition, which is expressed by the digit following "LF", must be used on a single PCB. For a PCB with an "LF" indication on it, neither tin-lead solder nor lead-free solder with a different metal composition must be used.

**Compatible solder for each countries are listed below. Solders are freely available from each manufacturer. Visit the web site below for more detail.**

Countries	Manufacturer	Origin	Name	Web site
For Japan, UK, Finland, Germany, France, Sweden	ALMIT	JAPAN	KR-19 SH RMA LFM-48	<a href="http://www.almit.com">http://www.almit.com</a>
For World wide except Australia, New Zealand	KESTER	U.S.A.	KESTER245 KESTER285	<a href="http://www.kester.com">http://www.kester.com</a>
For Worldwide	AIM	CANADA	CASTIN RMA2	<a href="http://www.aimsolder.com">http://www.aimsolder.com</a>

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## APPENDIX 22. HOW TO REWRITE HL-1850/1870N FLASH ROM

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The ROM composition of each PCB is as follows.

	Main PCB	
	ROM 0 (64 Mbit x 2)	ROM 1 (8 Mbit x 2)
Production	MASK	FLASH
Spares	FLASH	FLASH

### Working contents

- 1) Rewrite a Main firmware / Network firmware
- 2) Set up by country.

### Object parts

LH8944001 MAIN PCB ASSY, HL1850/1870N

### Preparation tool

- 1) PC (Windows® 98)  
Create the folder "ZLHE" in C drive.
- 2) 1 HL-1850/1870N printer
- 3) 1 parallel cable
- 4) FLS-PRG.EXE or FILEDG32.EXE \*1  
Download "FLS-PRG.EXE" or "FILEDG32.EXE" from Utility DB, then copy it to "ZLHE" folder in C drive.
- 5) PIT2LZSP.EXE  
Create the folder "PIT2" in C drive. Download "PIT2LZSP.EXE" from Utility DB, then copy it to "PIT2" folder in C drive. Extract the EXE file.
- 6) Firmware: verxxx.ava or verxxx.blf (Main firmware) \*2

\*1

File Type	Software tool
AVA	FLS-PRG.EXE
BLF	FILEDG32.EXE

\*2

Download and extract the firmware from ROM/Firmware DB, then copy it to folder "ZLHE" in C drive.

## 1. Controller Firmware (ROM 0)

### Rewriting procedure (For AVA file)

- (1) Choose Start...>Program...>MS-DOS  
Since the DOS window is opened, move the "ZLHE" folder. Type **c:\ZLHE** and then press "**Enter**" key.
- (2) Connect the parallel cable to the printer, then turn the printer power switch **ON**. Wait until the printer LCD display turn green and "**READY**" message appears.
- (3) Type "**fls-prg verXXX.ava**" in DOS window, then press **ENTER** key.  
(XXX expresses a version.)  
Data is sent to the printer via parallel cable.
- (4) After finishing rewriting, the system will be rebooted. Wait until "**READY**" message appears on the LCD display of printer.

After you have done (1) to (4) written above, follow the procedures below;

#### <PIT2>

- (5) Go to "PIT2" folder in DOS window and type "**PIT2**", then press **ENTER** key. PIT2 (software tool) will start.
- (6) Input "**/CS1850 or /CS1870N**" in PIT2 control window, then press **ENTER**. "**CS1850 or CS1870N (SCRPTY.YY)**" message appears in the model section of PIT2 control window.  
(Y,YY expresses a version of script)
- (7) Input "**.VVVVV**", then press **ENTER**. (**.VVVVV** expresses a country code. See the detail below.)  
ex. If you Input "**.00101** (USA version) , "**00101 (USA / USA)**" message appears in the specification section of PIT2 control window, and "**READY**" message appears in the PIT2 status window.
- (8) Input 9 digit serial number in the PIT2 control window, then press **ENTER**. PIT2 will be started, "**RUNNING**" message appears in the PIT2 status window accordingly.
- (9) "**SER:VVVVVVVVVVVVVVVVVV**" message appears in the PIT2 control window, and "**PASS**" message appears in ERR CODE section. "**READY**" message appears in the PIT2 status window. (READY is displayed in about 3 seconds.)  
<When the error occurs>  
The error generated step appears in the PIT2 control window, error code appears in ERR CODE section, "**ERROR**" message appears in the PIT2 status window. To release the error, Input "**check**", then press **ENTER**.  
Please carry out (8) again at the time of error generating. If the error message still appears, please judge that there is something wrong with PCB.
- (10) Turn the printer power switch **OFF**, then disconnect the parallel cable.
- (11) In case of performing the rewriting work to other printers, repeat from the step 2. To finish working, Input "**quit**" in the PIT2 control window, then press **ENTER** key.

## 2. Patch Area (ROM 1)

- (1) Install the printer driver to the PC. Make an short-cut icon for FILEDG32 on the Desktop.
- (2) Connect the parallel cable to the printer.
- (3) Double click the FILEDG32 icon, and drag and drop the ROM2 data to the printer icon in the FILEDG32.
- (4) After finishing rewriting, the system will be rebooted. Wait until “**READY**” message appears on the LCD display of the printer.

### Country code

00101	USA
00102	CANADA
00103	GERMAN
00104	UK
00105	FRANCE
00106	AUSTRALIA
00107	NORWAY
00108	BELGIUM
00109	NETHERLANDS
00110	SWITZERLAND
00112	FINLAND
00113	DENMARK
00115	SPAIN
00116	ITALY
00117	ISRAEL
00120	CHINA
00124	SOUTH AFRICA
00126	SWEDEN
00136	CHILE
00146	MEXICO
50108	FRANCE /BELGIUM/ NETHERLAND

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**APPENDIX 23. TONER CARTRIDGE WEIGHT INFORMATION**


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**Toner Cartridge Weight (approx weight)  
Before M4JN000001B, M4JN000001C (Serial No.)**

	<b>TN7600/TN560</b>
Brand new Toner Cartridge Weight	827.5g
Toner Weight at Brand New Toner Cartridge	197.5±2.5g
Toner Cartridge Weight at Toner Near Empty	720-725g
Remain Toner Weight at Toner Near Empty	90-95g
Toner Cartridge Weight at Toner Empty	710-715g
Remain Toner Weight at Toner Empty	80-85g
You can print 500 to 600 pages with 10g toner.	

\*Without yellow protector

\*Toner cartridge weight may vary within 2 to 3g depending on the cartridge weight.

**Toner Cartridge Weight (approx weight)  
From M4JN000001B, M4JN000001C (Serial No.)**

	<b>TN7600/TN560</b>
Brand new Toner Cartridge Weight	812.5g
Toner Weight at Brand New Toner Cartridge	182.5±2.5g
Toner Cartridge Weight at Toner Near Empty	720-725g
Remain Toner Weight at Toner Near Empty	90-95g
Toner Cartridge Weight at Toner Empty	710-715g
Remain Toner Weight at Toner Empty	80-85g
You can print 500 to 600 pages with 10g toner.	

\*Without yellow protector

\*Toner cartridge weight may vary within 2 to 3g depending on the cartridge weight.

The filling quantity of the toner cartridge is changed from the serial number "M4JN000001B" and "M4JN000001C". The previous toner cartridge lasts about 8600 pages and far exceeds the ensured life expectancy. The filling quantity of the toner cartridge with the later serial number noted above is reduced, but the life expectancy of the toner cartridge (6500 pages) is ensured.