brother

LASER PRINTER
SERVICE MANUAL

MODEL:HL-1060

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PREFACE

This service manual contains basic information required for after-sales service of the laser printer (here- in-after 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-1060 laser printer.

This manual consists of the following chapters:

CHAPTER I : FEATURES AND SPECIFICATIONS

Features, specifications, etc.

CHAPTER II : THEORY OF OPERATION

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

CHAPTER III : DISASSEMBLY AND REASSEMBLY

Procedures for disassembling and reassembling the mechanical system.

CHAPTER IV : MAINTENANCE AND TROUBLESHOOTING

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

APPENDICES : SERIAL NO. DESCRIPTIONS, CONNECTION DIAGRAMS, PCB CIRCUIT DIAGRAMS.

Information in this manual is subject to change due to improvement or re-design 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.

CONTENTS

CHAPTER I FEATURES AND SPECIFICATIONS

1. FEATURES

This printer has the following features:

1200dpi Resolution and 10ppm Printing Speed

600 dots per inch (dpi) with microfine toner and ten pages per minute (ppm) printing speed (A4 or Letter size paper). The printer also supports 1200 (H) x 600 (V) dots per inch (dpi) resolution for Windows DIB graphics. (It is recommended to add memory when printing in 1200 x 600dpi mode.)

User-Friendly Operation for Windows

The dedicated printer driver and TrueType™-compatible fonts for Microsoft® Windows 3.1 and Windows 95 are available on the floppy disk 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 set various printer settings including toner saving mode, custom paper size, sleep mode, gray scale adjustment, resolution, and so forth. You can easily setup these print options in the graphic dialog boxes through the Printer Setup menu within the Windows Control Panel.

Printer Status Monitor with Bi-directional Parallel Interface

The printer driver can monitor your printer's status using bi-directional parallel communications.

The printer status monitor program can show the current status of your printer. When printing, an 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. For example: when your printer is out of paper, the dialog box will display "Paper Empty" and instructions for the corrective action to take.

Versatile Paper Handling

The printer has two multi-purpose sheet feeders and a straight paper path mechanism. From the front Feeder 1, you can load A4, letter, legal, B5, A5, A6, and executive sizes of paper, and various types of media including envelopes, postcards, organizer paper, or your custom paper size. From the rear Feeder 2 you can load A4, letter, legal, B5 and executive sizes of paper. The front Feeder 1 also allows manual paper loading, so you can also use labels and transparencies.

Environment-Friendly

Economy Printing Mode:

This feature will cut your printing cost by saving toner. It is useful to obtain draft copies for proof-reading. You can select from two economy modes 25% toner saving and 50% toner saving, 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. The printer consumes less than 13W when in sleep mode.

Low Running Cost:
The toner cartridge is separate from the drum unit. You need to replace only the toner cartridge after around 2,200 pages, which is cost effective and ecologically friendly.

Remote Printer Console Program for DOS

The utility program, Remote Printer Console (RPC), is available on the floppy disk supplied with your printer. When you operate your computer in the DOS (Disk Operating System) environment, this program allows you to easily change the default settings of the printer such as fonts, page setup, emulations and so on.
This program also provides a status monitor program, which is a Terminate-and-Stay Resident (TSR) program. It can monitor the printer status while running in the background and report the current status or errors on your computer screen.

Popular Printer Emulation Support

This printer supports three printer emulation modes, HP LaserJet 5P, Epson FX-850, and IBM Proprinter XL. The printer also supports Auto-emulation switching between HP and Epson or HP and IBM. If you want to select the printer emulation, you can do it using the Remote Printer Console Program.

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 600dpi graphic and text data, including large fonts, with the printer's standard memory.

2. SPECIFICATIONS

2.1 Printing

Print method	Electrophotography by semiconductor laser beam scanning
Resolution	600 x 600dpi (for Windows/DOS) 300 x 300dpi (under Apple Macintosh using optional RS-100M) 1200 x 600dpi (Horizontal x Vertical) (for Windows DIB graphics)
Print speed	10 page/minute (when loading Letter-size paper from the multipurpose sheet feeder 1)
Warm-up	Max. 30 seconds at 23°C (73.4°F)
First print	15 seconds (when loading Letter-size paper from the multipurpose sheet feeder 1)
Print media	Toner cartridge Life Expectancy: 2,200 pages/cartridge (when printing A4 or letter - size paper at 5% print coverage)
Developer	Drum unit, separated from toner cartridge Life Expectancy: 20,000 pages/drum unit (4% coverage, continuous printing) at 20 pages per job 8,000 pages at 1 page per job

2.2 Functions

CPU	IDT 79R3041-20J 20mhz
Emulation	Automatic emulation selection among HP LaserJet 5P, EPSON FX-850, and IBM Proprinter XL BR-Script (option)
Printer driver	Windows 95/Windows™ 3.1 driver, supporting Brother Native Compression mode and bi-directional capability Optional Macintosh® QuickDraw driver (Standard in some countries)
Interface	Bi-directional parallel interface (IEEE 1284 compatible) A RS-422A/RS-232C serial interface is optionally available. (The serial interface is a standard in some countries.)
Memory	2.0Mbytes with Data Compression Technology Expandable up to 34Mbytes with the SIMM
Control panel	1 switch and 5 lamps
Diagnostics	Self-diagnostic program

2.3 Electrical and Mechanical

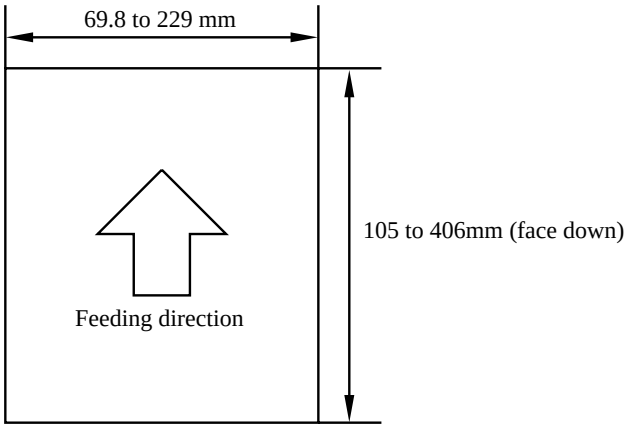
Power source	U.S.A. and Canada:	AC 110 to 120V, 60Hz
	Europe and Australia:	AC 220 to 240V, 50Hz/60Hz
Power consumption	Printing:	280W or less
	Standing by:	60W or less
	Sleep:	13W or less
Noise	Printing:	49dB A or less
	Standing by:	38dB A or less
Temperature	Operating:	10 to 32.5°C (59 to 90.5°F)
	Storage:	0 to 40°C (38 to 104°F)
Humidity	Operating:	20 to 80% (non condensing)
	Storage:	10 to 85% (non condensing)
Dimensions (W x D x H)	402 (W) x 439 (D) x 274 (H) (when the output tray is closed and the Multi-purpose sheet feeder is removed.)	
Weight	Approx. 9.6kg (21.2lb.) including the drum unit and toner cartridge	

2.4 Paper Specification

(1) Multi-purpose sheet feeder loading

< Sheet Feeder 1 (Front)>

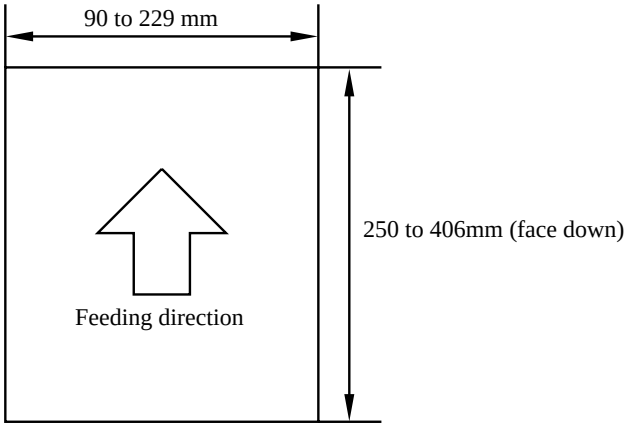
Paper size: A4, Letter, Legal, B5, A5, A6, and Executive, and other sizes of media that can be handled by the feed mechanism, can be loaded.



Feedable paper weight:	60 (16lb.) to 157 (42lb.) g/m^2
Maximum load height :	22mm (200 sheets of 80g/m^2 paper) letter size
Envelopes :	10 envelopes
Setting method:	Pull the MP sheet feeder 1 cover toward you, insert the stack of paper into the feeder, aligning the top edge of the sheets, then push the cover back to its original position.

<Sheet Feeder 2 (Rear)>

Paper size: A4, Letter, Legal, B5, and Executive, and other sizes of media that can be handled by the feed mechanism, can be loaded, except special papers such as envelopes, OHP sheets, labels and organizer sheets.



Feedable paper weight:	60 (16lb.) to 157 (42lb.) g/m^2
Maximum load height:	22mm (200 sheets of 80g/m^2 paper) letter size.
Setting method:	Pull the MP sheet feeder 2 cover toward you, insert the stack of paper into the feeder, aligning the top edge of the sheets, then push the cover back to its original position.

2.5 Print Delivery

(1) With the output tray opened
Tray capacity : Maximum 100 sheets (80g/m^2), face-down only

(2) With the output tray closed
Tray capacity : 1 sheet (80g/m^2), face-down only

Note: Face down: Deliver the printed face of the paper downward.
Environment : 23°C

2.6 Paper

(1) Types of paper

<Sheet Feeder 1 (Front)>

(a) Normal paper (60 to 157g/m^2, specified types of high-quality paper)
- A4 size
- Letter size
- Legal size
- B5 size
- A5 size
- A6 size
- Executive size
- 9" envelop size (maximum printable area)

* The recommended types of plain paper are as follows:
Letter : Xerox 4200 (75g/m^2)
A4 : Xerox 80 Premier Paper (80g/m^2)

(b) Special paper (specified types)
- Labels
- Envelopes (DL, C5, COM10)
- Postcards
- Organizers (K, L, and J sizes of DAY-TIMERS)

<Sheet Feeder 2 (Rear)>

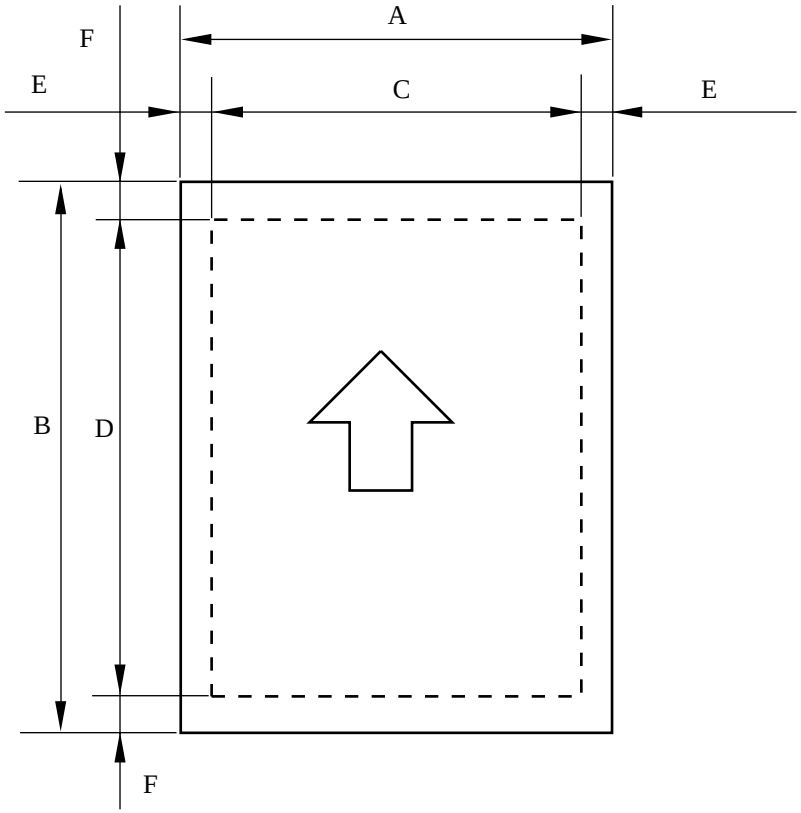
(a) Normal paper (60 to 157g/m^2, specified types of high-quality paper)
- A4 size
- Letter size
- Legal size
- B5 size
- Executive size
- The specified types of plain paper are as follows:
  Letter : Xerox 4200 (75g/m^2)
  A4 : Xerox 80 Premier Paper

(2) Paper feed conditions

Type	Name	Feeder		Manual feed
		Feeder 1	Feeder 2	
Normal paper (cut sheet)	60 to 80 g/m^2	○ (200 sheets)	○ (200 sheets)	○
	80 g/m^2 paper (Legal)	○ (100 sheets)	○ (100 sheets)	○
	157 g/m^2	○ (30 sheets)	○ (30 sheets)	○
Special paper (cut sheet)	Labels	○ (50 sheets)	×	○
	Envelopes	○ (10 sheets)	×	○
	Postcards	○ (30 sheets)	×	○
	Organizers	○ (10 sheets)	×	○

2.7 Effective Printing Area

Printable area



The effective printing area means the area within which the printing of all the data received without any omissions can be guaranteed.

The table below shows the effective printing areas.

Size	A	B	C	D	E	F
A 4	210.0mm 8.27” (2,480 dots)	297.0mm 11.69” (3,507 dots)	203.2mm 8.0” (2,400 dots)	288.5mm 11.36” (3,407 dots)	3.4mm 0.13” (40 dots)	4.23mm 0.17” (50 dots)
Letter	215.9mm 8.5” (2,550 dots)	279.4mm 11.0” (3,300 dots)	203.2mm 8.0” (2,400 dots)	271.0mm 10.67” (3,200 dots)	6.35mm 0.25” (75 dots)	↑
Legal	215.9mm 8.5” (2,550 dots)	355.6mm 14.0” (4,200 dots)	203.2mm 8.0” (2,400 dots)	347.1mm 13.67” (4,100 dots)	↑	↑
B 5 (JIS)	182.0mm 7.16” (2,149 dots)	257.0mm 10.12” (3,035 dots)	170.0mm 6.69” (2,007 dots)	248.5mm 9.78” (2,935 dots)	6.01mm 0.24” (71 dots)	↑
B 5 (ISO)	176.0mm 6.93” (2,078 dots)	250.0mm 9.84” (2,952 dots)	164.0mm 6.46” (1,936 dots)	241.5mm 9.5” (2,852 dots)	↑	↑
Executive	184.15mm 7.25” (2,175 dots)	266.7mm 10.5” (3,150 dots)	175.7mm 6.92” (2,075 dots)	258.3mm 10.17” (3,050 dots)	6.35mm 0.25” (75 dots)	↑
A 5	148.5mm 5.85” (1,754 dots)	210.0mm 8.27” (2,480 dots)	135.8mm 5.35” (1,604 dots)	201.5mm 7.93” (2,380 dots)	6.01mm 0.24” (71 dots)	↑
A6	105.0mm 4.13” (1,240 dots)	148.5mm 5.85” (1,754 dots)	93.0mm 3.66” (1,098 dots)	140.0mm 5.51” (1,654 dots)	↑	↑
Organizer (J size)	69.85mm 2.75” (825 dots)	127.0mm 5.0” (1,500 dots)	57.15mm 2.25” (675 dots)	118.5mm 4.66” (1,400 dots)	6.35mm 0.25” (75 dots)	↑
Organizer (K size)	95.25mm 3.75” (1,125 dots)	171.45mm 6.75” (2,025 dots)	82.55mm 3.25” (975 dots)	162.98mm 6.42” (1,925 dots)	↑	↑
Organizer (L size)	139.7mm 5.5” (1,650 dots)	215.9mm 8.5” (2,550 dots)	127.0mm 5.0” (1,500 dots)	207.43mm 8.17” (2,450 dots)	↑	↑
COM-10	104.78mm 4.125” (1,237 dots)	241.3mm 9.5” (2,850 dots)	92.11mm 3.63” (1,087 dots)	232.8mm 9.16” (2,750 dots)	↑	↑
MONARCH	98.43mm 3.875” (1,162 dots)	190.5mm 7.5” (2,250 dots)	85.7mm 3.37” (1,012 dots)	182.0mm 7.16” (2,150 dots)	↑	↑
C 5	162mm 6.38” (1,913 dots)	229mm 9.01” (2,704 dots)	150.0mm 5.9” (1,771 dots)	220.5mm 8.68” (2,604 dots)	6.01mm 0.24” (71 dots)	↑
DL	110mm 4.33” (1,299 dots)	220mm 8.66” (2,598 dots)	98.0mm 3.86” (1,157 dots)	211.5mm 8.33” (2,498 dots)	↑	↑

(Note that the paper sizes indicated here should conform to the nominal dimensions specified by JIS.)
A4 paper must accommodate 80 characters printed in pica pitch (203.2 mm).
The dot size is based on 300 dpi resolution.

3. SAFETY INFORMATION

3.1 Laser Safety (110 - 120V Model only)

This printer is certified as a Class 1 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 housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

3.2 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, Japan.
This product complies with FDA radiation performance standards, 21 CFR Subchapter J.

The label for US manufactured products

MANUFACTURED:
BROTHER INDUSTRIES (USA) INC.

2950 Brother Blud., Bartlet, TN 38133, U.S.A.
This product complies with FDA radiation performance standards, 21 CFR Subchapter J.

Fig. 1.1

3.3 Caution for Laser Product (Warnhinweis für Laserdrucker)

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, please 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.

(1) Location of the laser beam window.

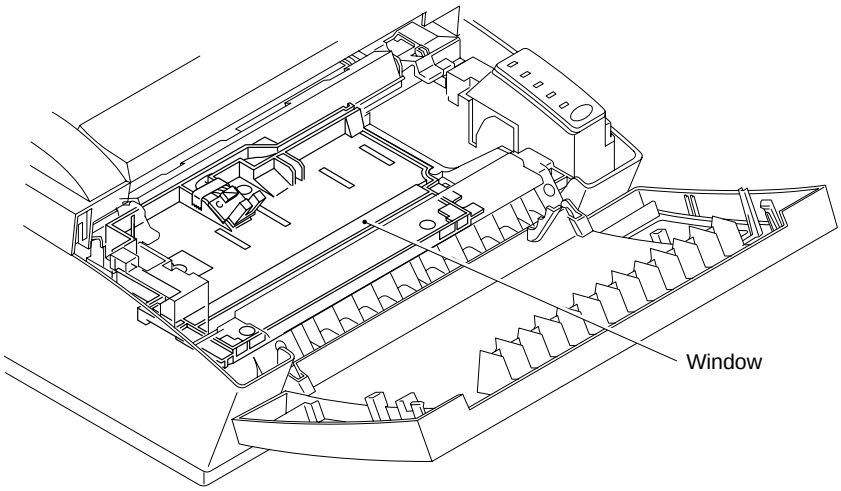


Fig. 1.2

(2) Location of Caution Label for Laser Product. (200V only)

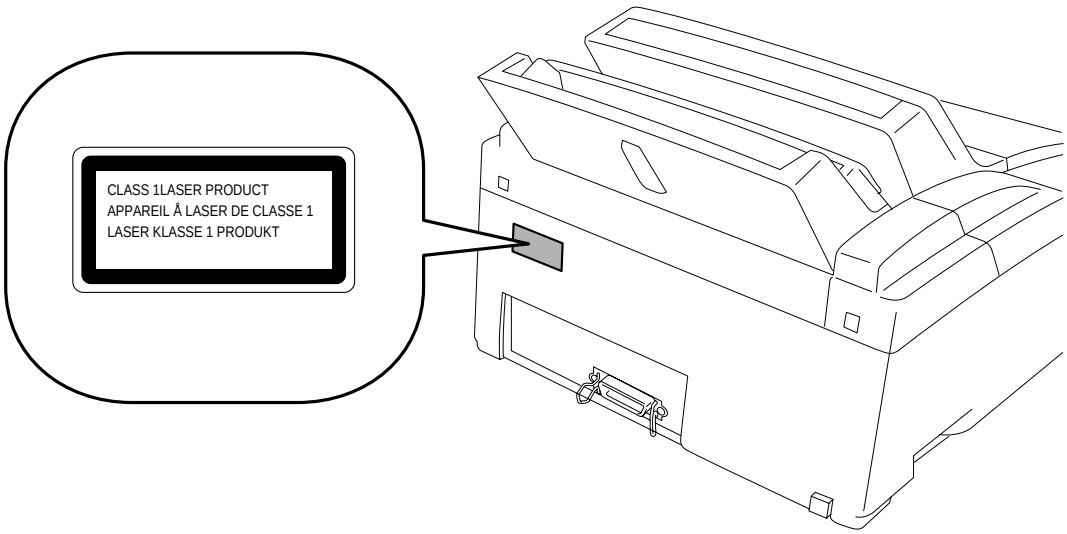


Fig. 1.3

CHAPTER II THEORY OF OPERATION

1. ELECTRONICS

1.1 General Block Diagram

Fig. 2.1 shows a general block diagram of the HL-1060 printer.

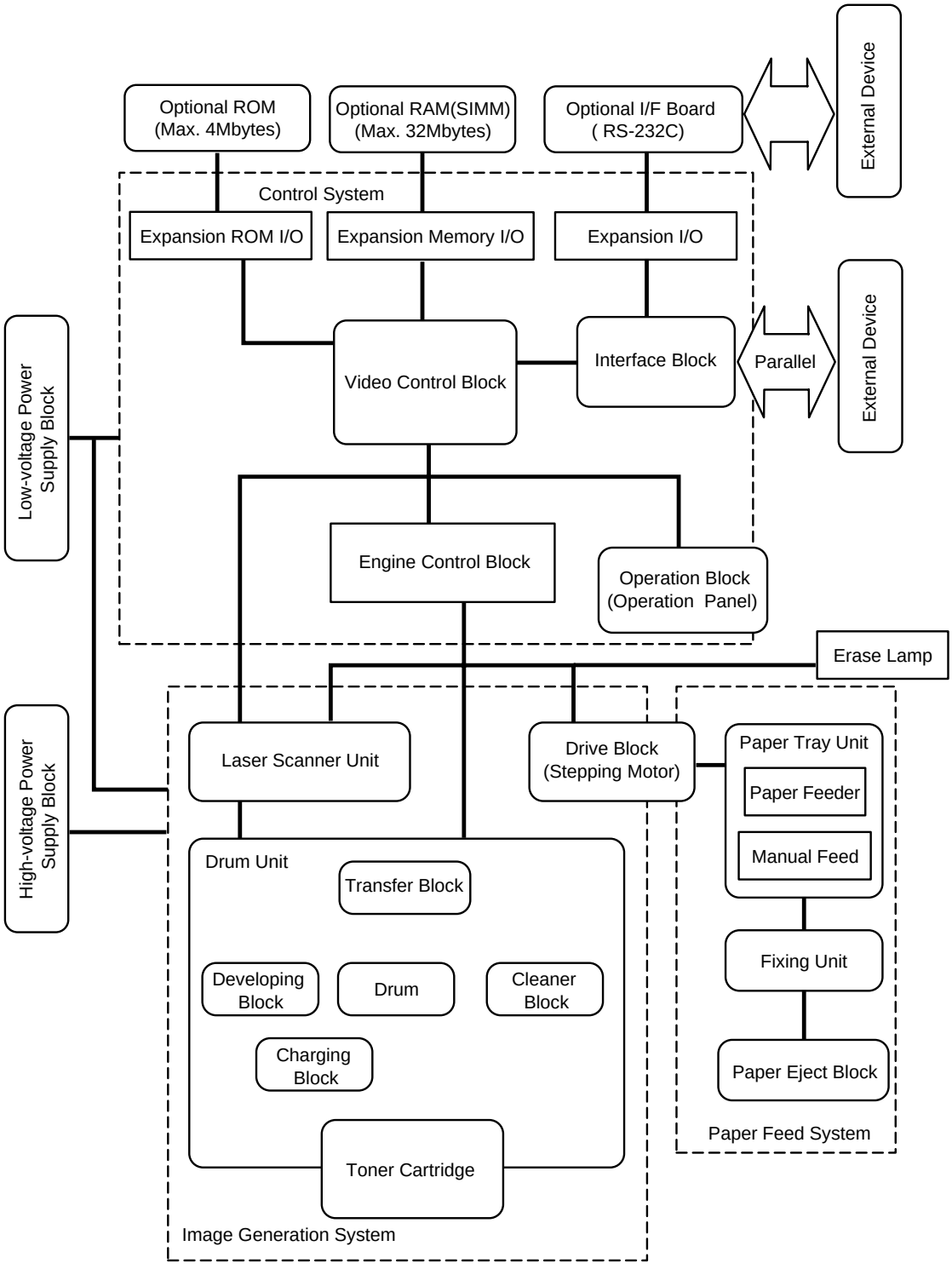


Fig. 2.1

1.2 Main PCB Block Diagram

Fig. 2.2 shows the block diagram of the main PCB.

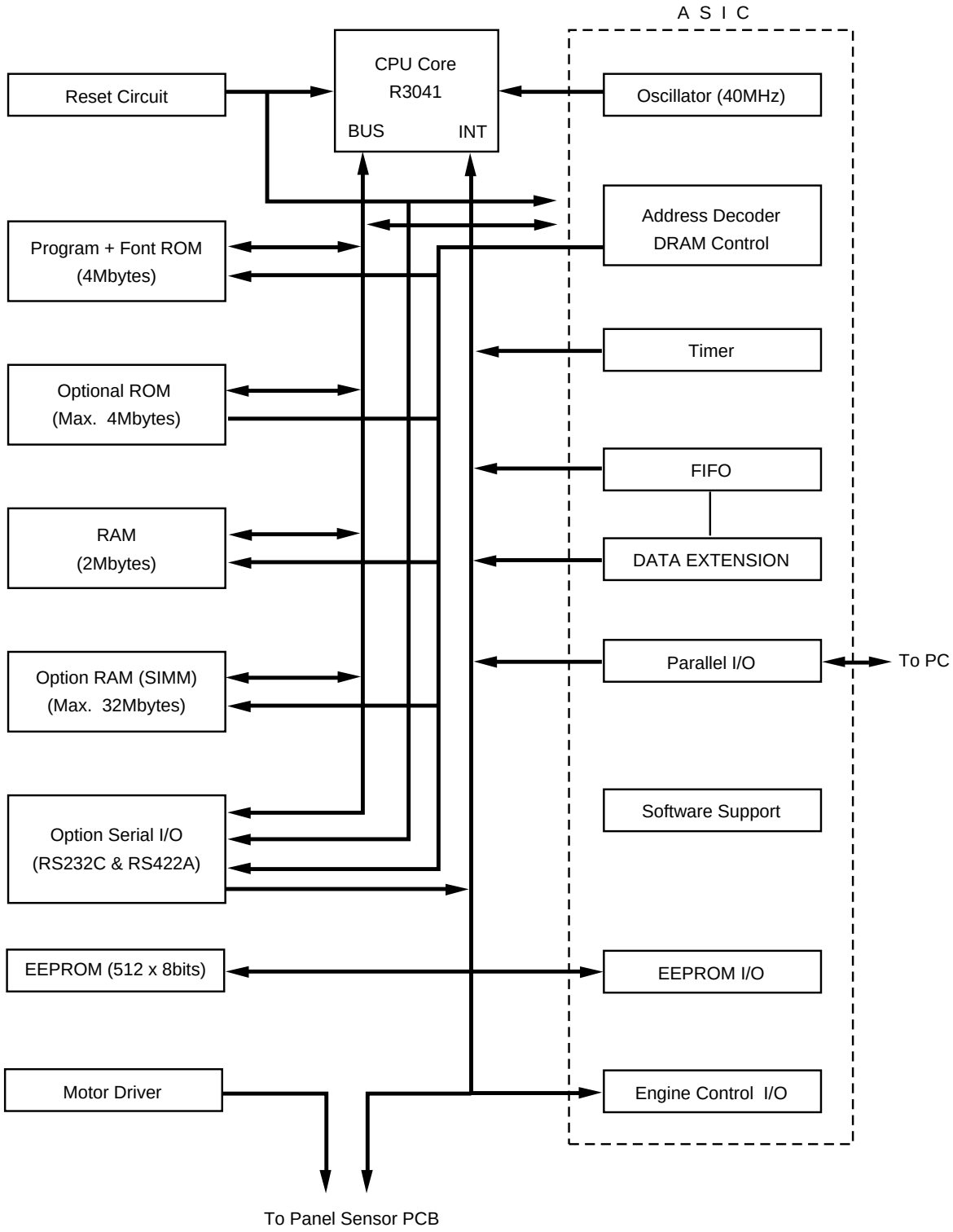


Fig. 2.2

1.3 Main PCB

1.3.1 CPU Core

Fig. 2.3. shows the CPU circuit block on the main PCB.

The CPU is an IDT 79R3041-20J which is driven at a clock frequency of 20MHz. This clock frequency is made by dividing the source clock frequency of 40.0MHz by two. The address and data bus are both 32bits consisting of AD0 to AD31. The total addressable memory space is 4Gbytes.

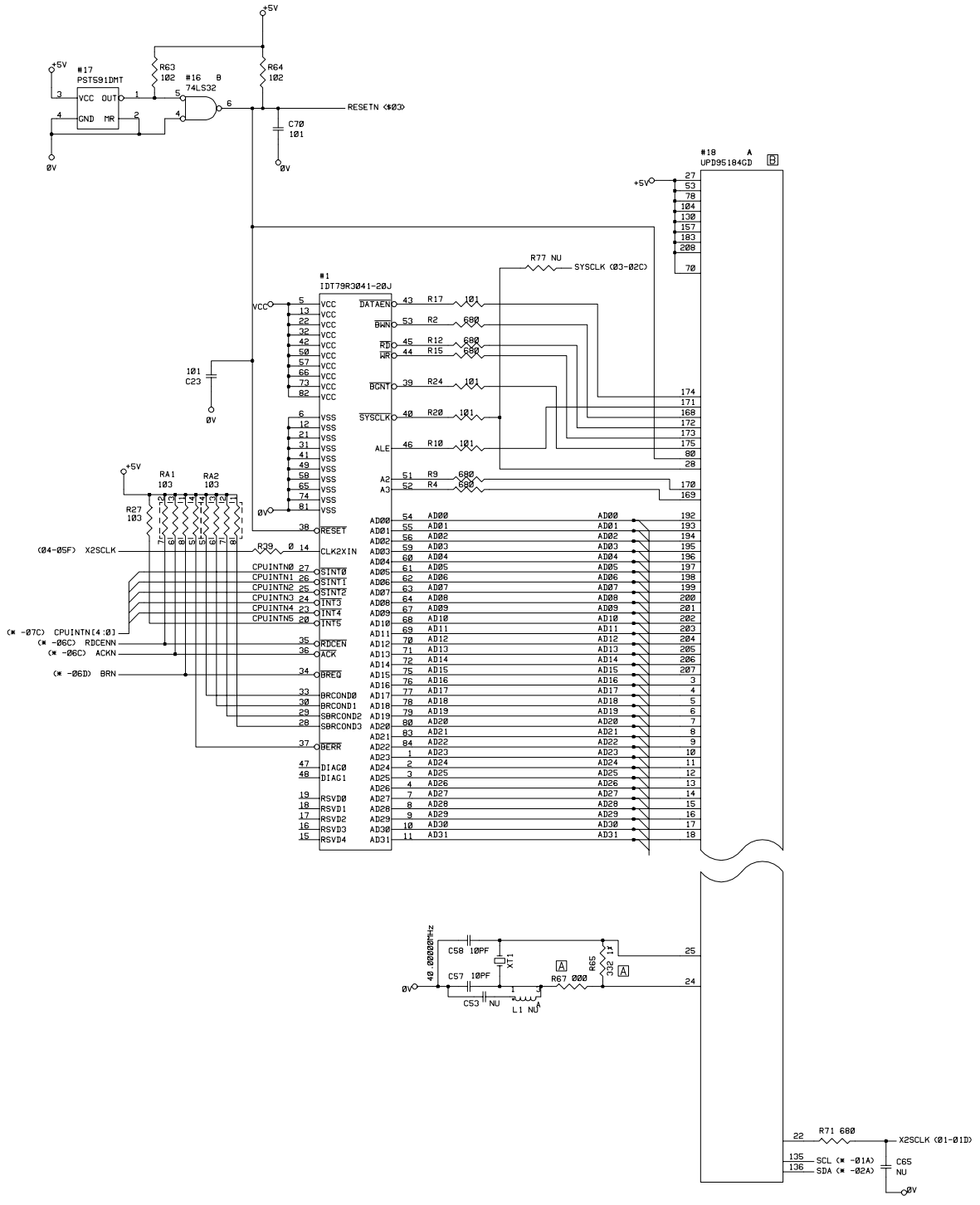


Fig. 2.3

1.3.2 ASIC

The ASIC is composed of a Cell Based IC that contains the following functional blocks.

(1) Oscillator circuit
Generates the main clock for the CPU by dividing the source clock frequency by two.

(2) Address Generator
Generates the address bus by latching the AD bus with the ALE signal.

(3) Address decoder
Generates the CS signal for each device.

(4) DRAM control
Generates the RAS, CAS, WE, OE and MA signals for the DRAM and controls the refresh processing (CAS before RAS self-refreshing method).

(5) Interrupt control

Interrupt levels:

Priority	High	9	TIMER 3 (Watch Dog)
		8	MONITOR
		7	FIFO
		6	EXINT
		5	TIMER 1
		4	BD
		3	SPARE
		2	CDCC / BOISE / DATA EXTENTION
	Low	1	TIMER 2

Note: All the interrupts can be masked.

(6) Timers
The following timers are included:

Timer 1	16-bit timer
Timer 2	10-bit timer
Timer 3	Watch-dog timer

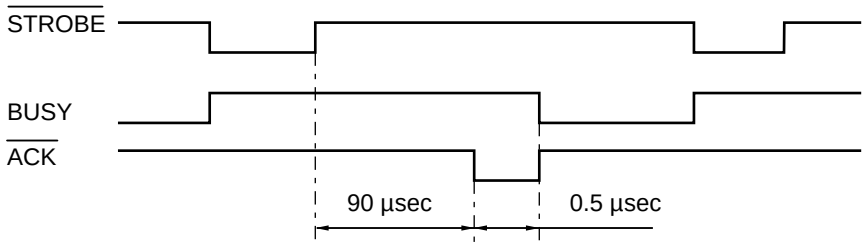
(7) FIFO
A 10Kbit FIFO is included. Data for one raster is transferred from the RAM to the FIFO by DMA transmission and is output as serial video data. The data cycle is 6.13mhz.

(8) Parallel I/O

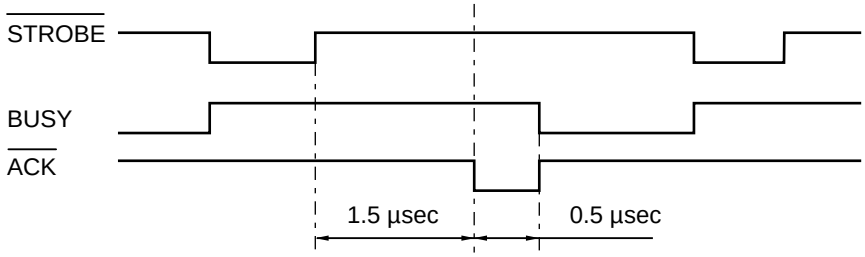
<Data receive Mode>

There are two modes in this unit. One is the CPU receive mode and the other is the DMA receive mode. In the CPU receive mode the CPU receives the command data from the PC, and after the CPU is switched to the DMA mode, it receives the image data and writes it to the DRAM directly.

CPU Receive Mode



DMA Receive Mode



BUSY goes HIGH at the falling edge of the STROBE signal. The data (8 bits) from the PC is latched into the data buffer at the rising edge of the STROBE signal. The pulse width of ACK varies according to the speed MODE as shown above. BUSY goes LOW on the rising edge of ACK.

<IEEE1284 support>

This supports the IEEE1284 data transfer with the following mode.

Nibble mode
Byte mode
ECP mode

(9) Data extension

This circuit extents the compressed image data which are received from the PC, and writes the bit map data to the FIFO.

(10) Software support

Supports 16 x 16 rotation, bit expansion, bit search, and decimal point conversion.

(11) EEPROM I/O

One output port and one I/O port are assigned.

(12) Engine control I/O

This I/O is used for the connection to the driver PCB. It controls the main motor, solenoid, sensors, etc.

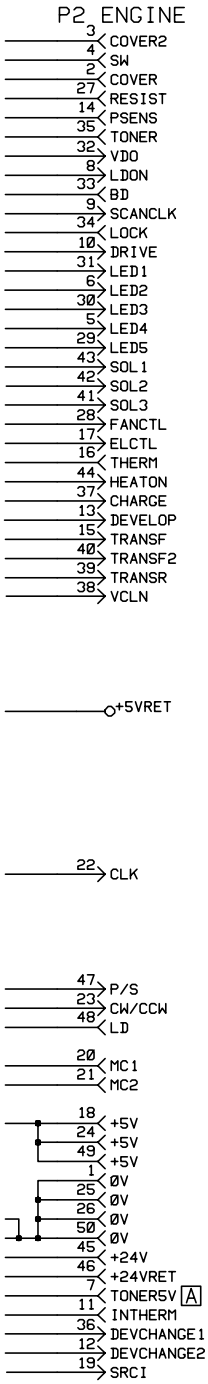


Fig. 2.4

1.3.3 ROM

The program and the font data are stored in 4Mbytes of ROM. The ROM is composed of two 16Mbit masked ROMs which are mounted in 42-pin IC sockets.

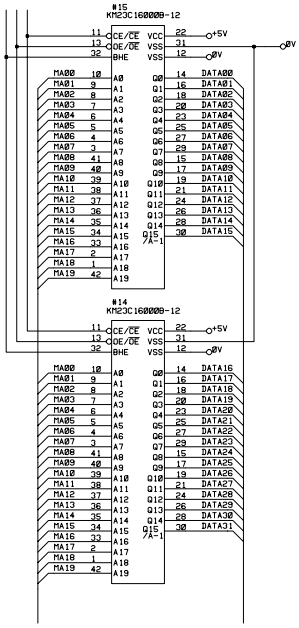


Fig. 2.5

1.3.4 Optional ROM

The program and the font data are stored in 4Mbytes of ROM. The ROM is composed of two 16Mbit masked ROMs which are mounted in 42-pin IC sockets.

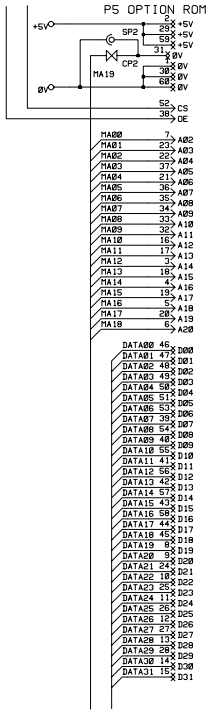


Fig. 2.6

1.3.5 DRAM

Four 4Mbit DRAM (x 8bit) are used as the printer memory.

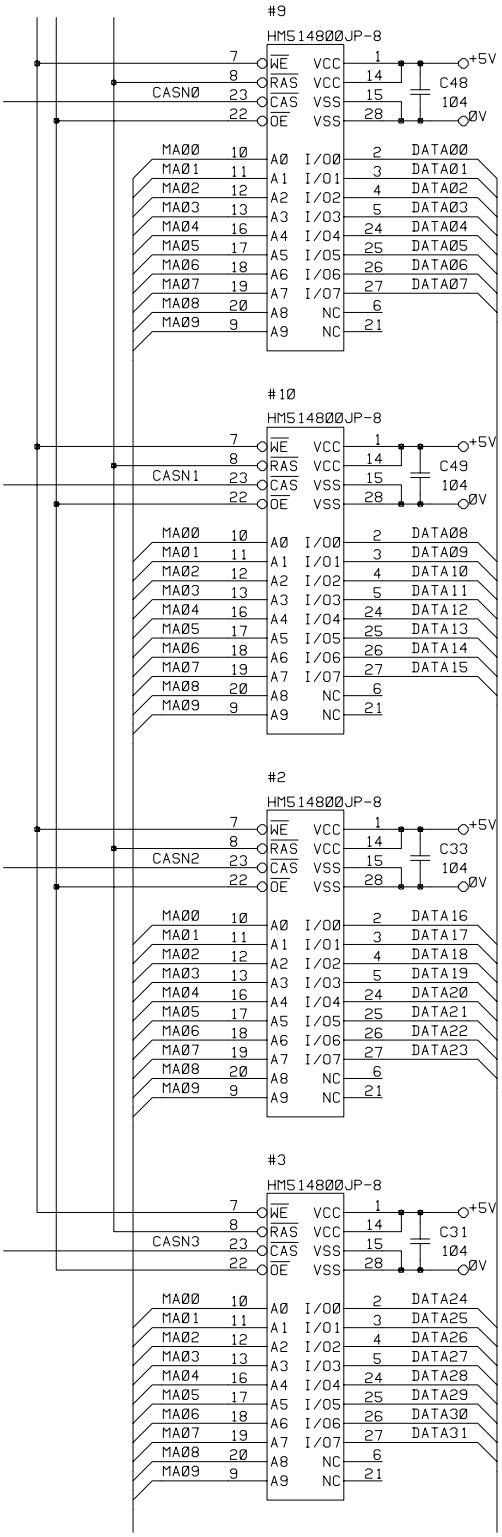


Fig. 2.7

1.3.6 Optional RAM

A 32bit SIMM (72 pin) can be fitted as optional RAM. The main PCB has one slot and its capacity is for SIMM from 1Mbytes to 32Mbytes.

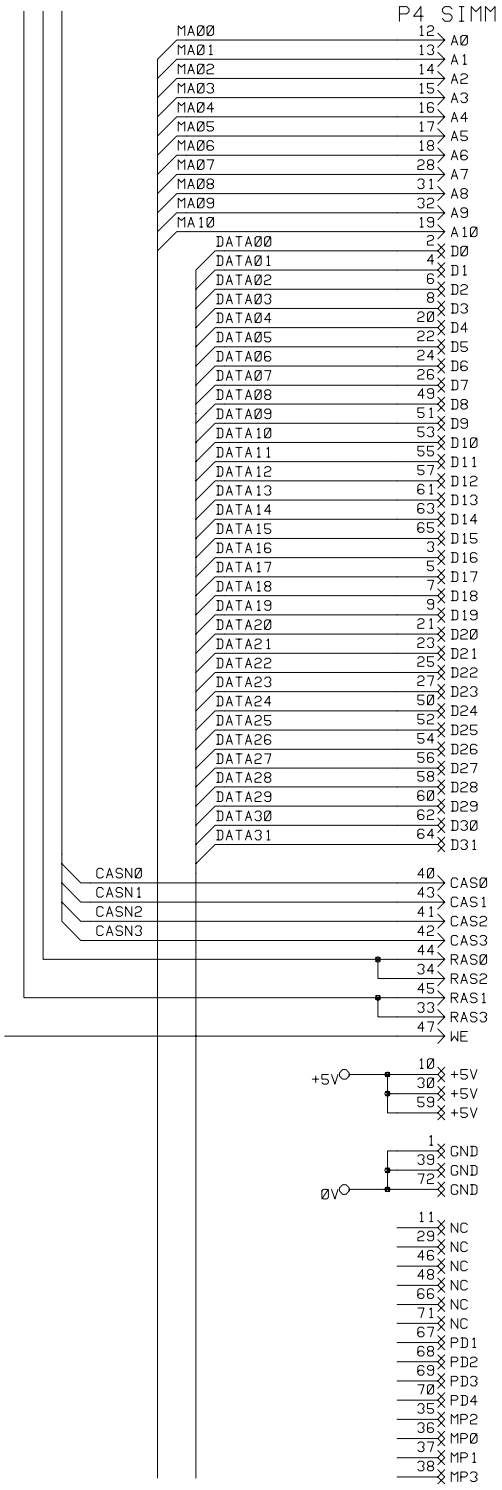


Fig. 2.8

1.3.7 Optional Serial I/O

The interrupt of the serial I/O is input to the EXINT terminal of the ASIC, and recognized by the CPU. A 32-byte space for a register is provided for this I/O, which is read and written to by the CPU.

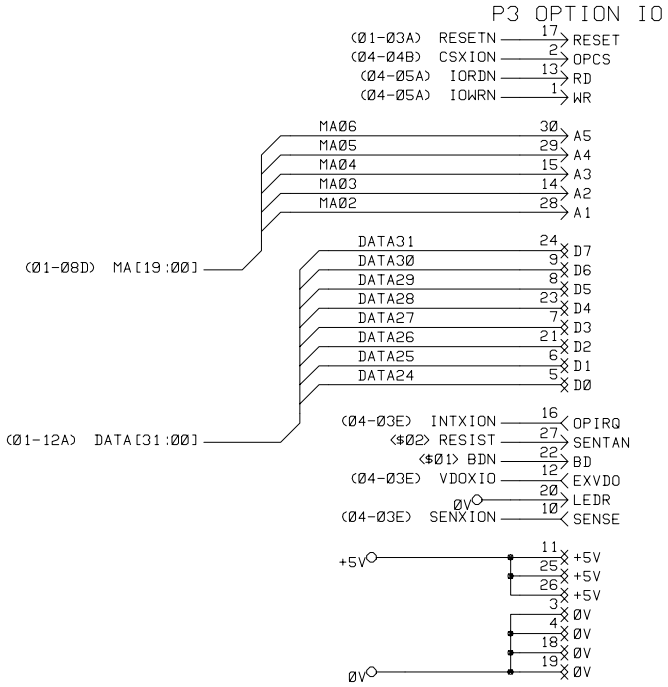


Fig. 2.9

1.3.8 EEPROM

The EEPROM is an X24C04F two-wire type with a 512 x 8bits configuration.

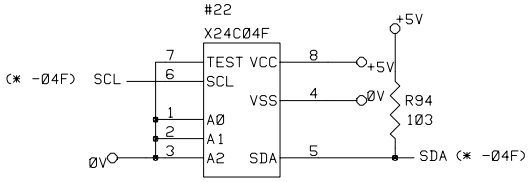


Fig. 2.10

1.3.9 Reset Circuit

The reset IC is a PST591DMT. The reset voltage is 4.2V (typ.) and the LOW period of the reset signal is 50ms (typ.).

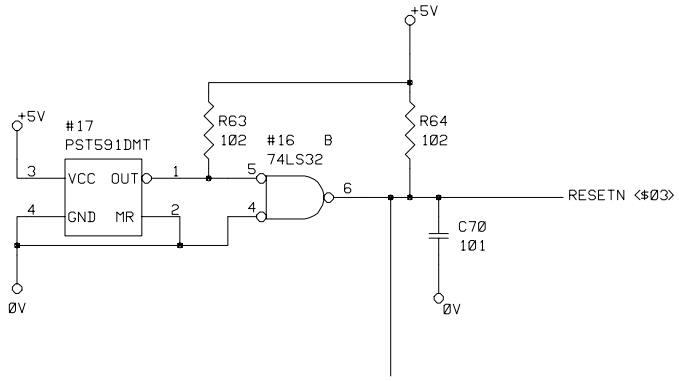


Fig. 2.11

1.3.10 Parallel I/O

Fig. 2.12 shows the parallel interface circuit.

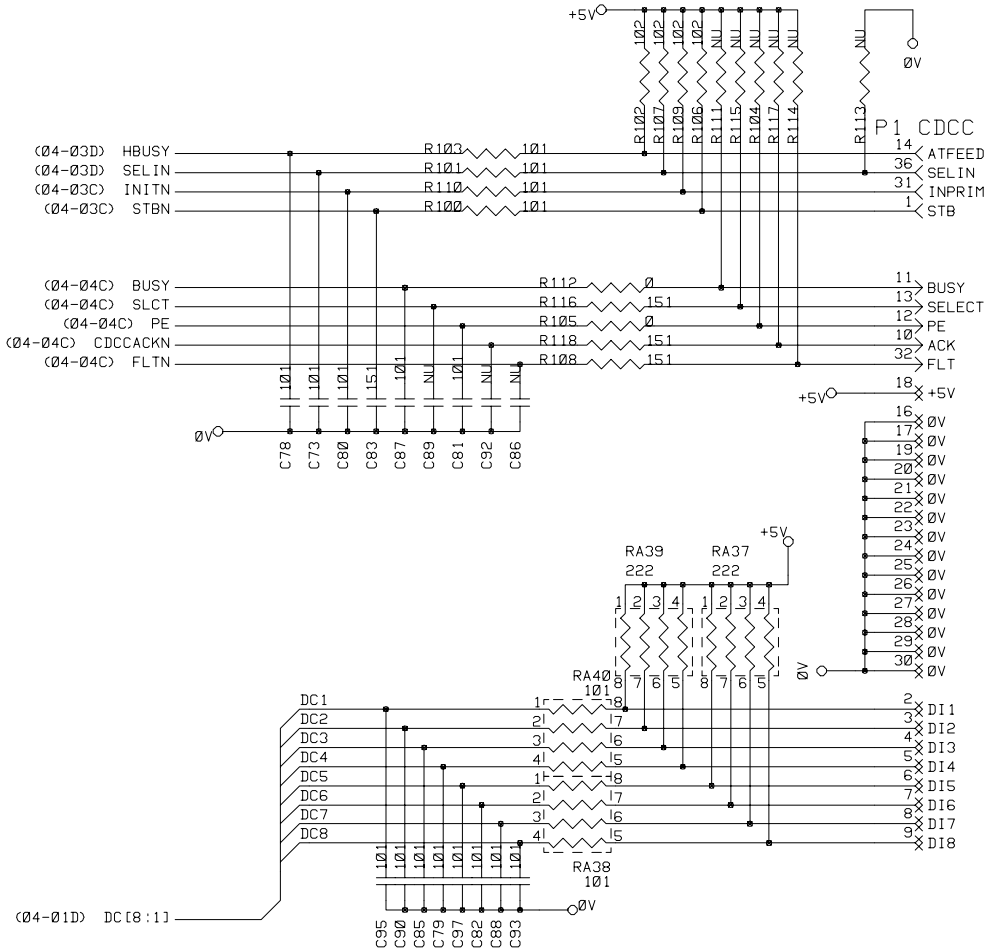


Fig. 2.12

1.3.11 Engine I/O

Fig. 2.13 shows the engine interface circuit.

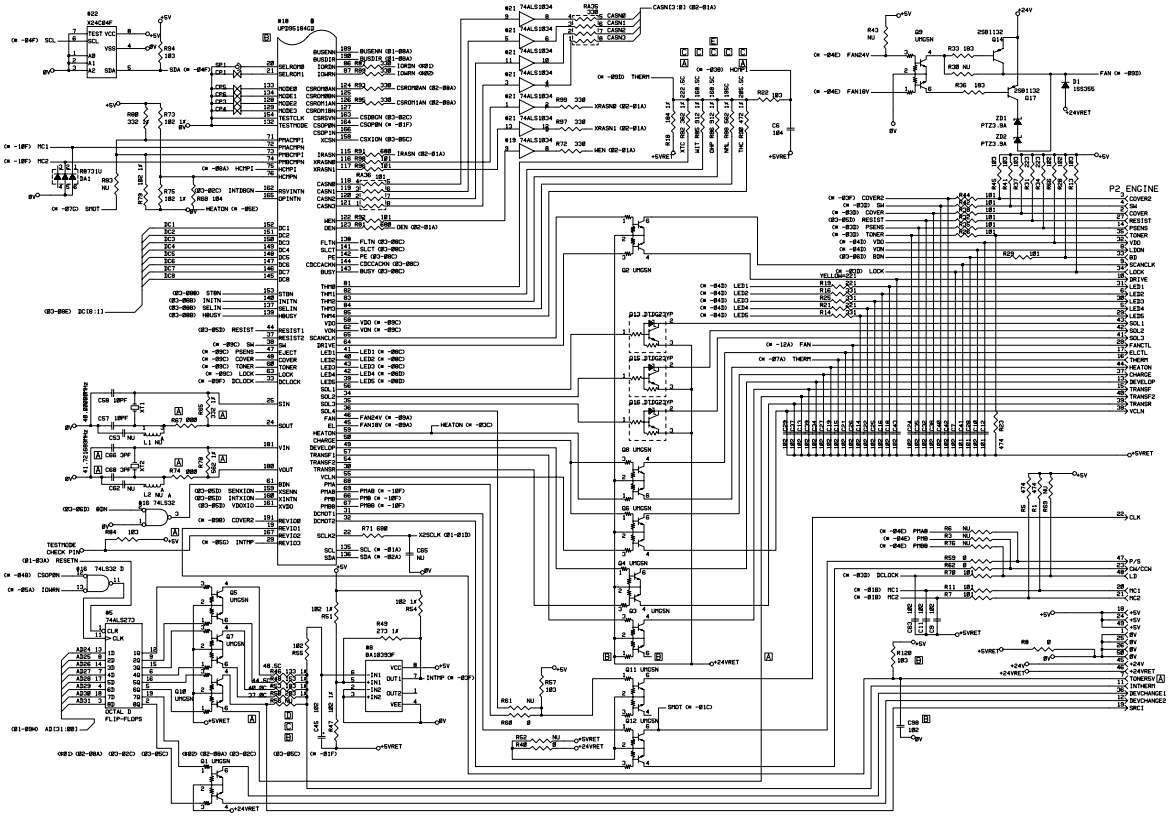


Fig. 2.13

1.3.12 Paper Feed Motor Drive Circuit

A DC motor is used for paper feeding.

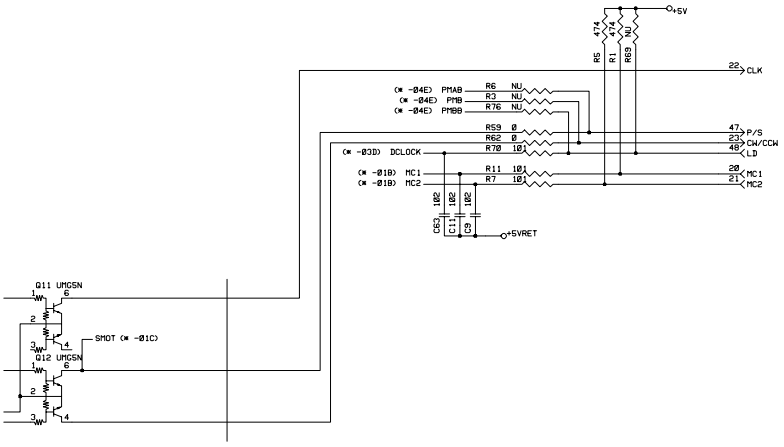


Fig. 2.14

1.4 Driver PCB

The following parts are mounted on the driver PCB.

- Connectors .....Low-voltage, high-voltage, solenoid, main motor, toner sensor, laser, polygon motor, connector for main PCB
- Registration sensor

1.5 SW Panel PCB

The following parts are mounted on the SW panel PCB.

- Operation panel .....1 Key, 5 LEDs

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 (+5V and +24V), which are converted from the AC line.

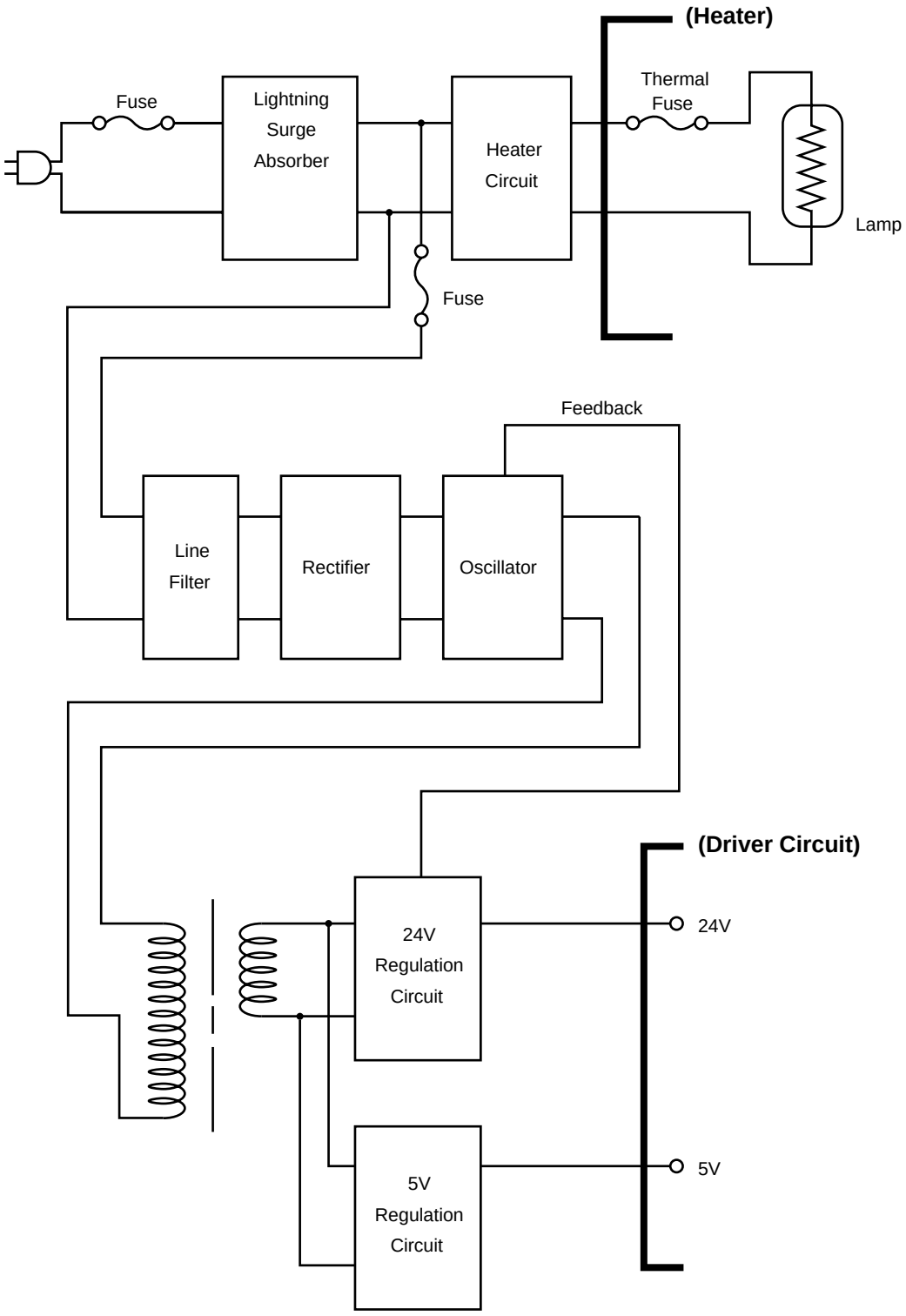


Fig. 2.15

1.6.2 High-voltage Power Supply, SR PCB

This generates and outputs the voltages and currents for the charging, development and transfer functions.

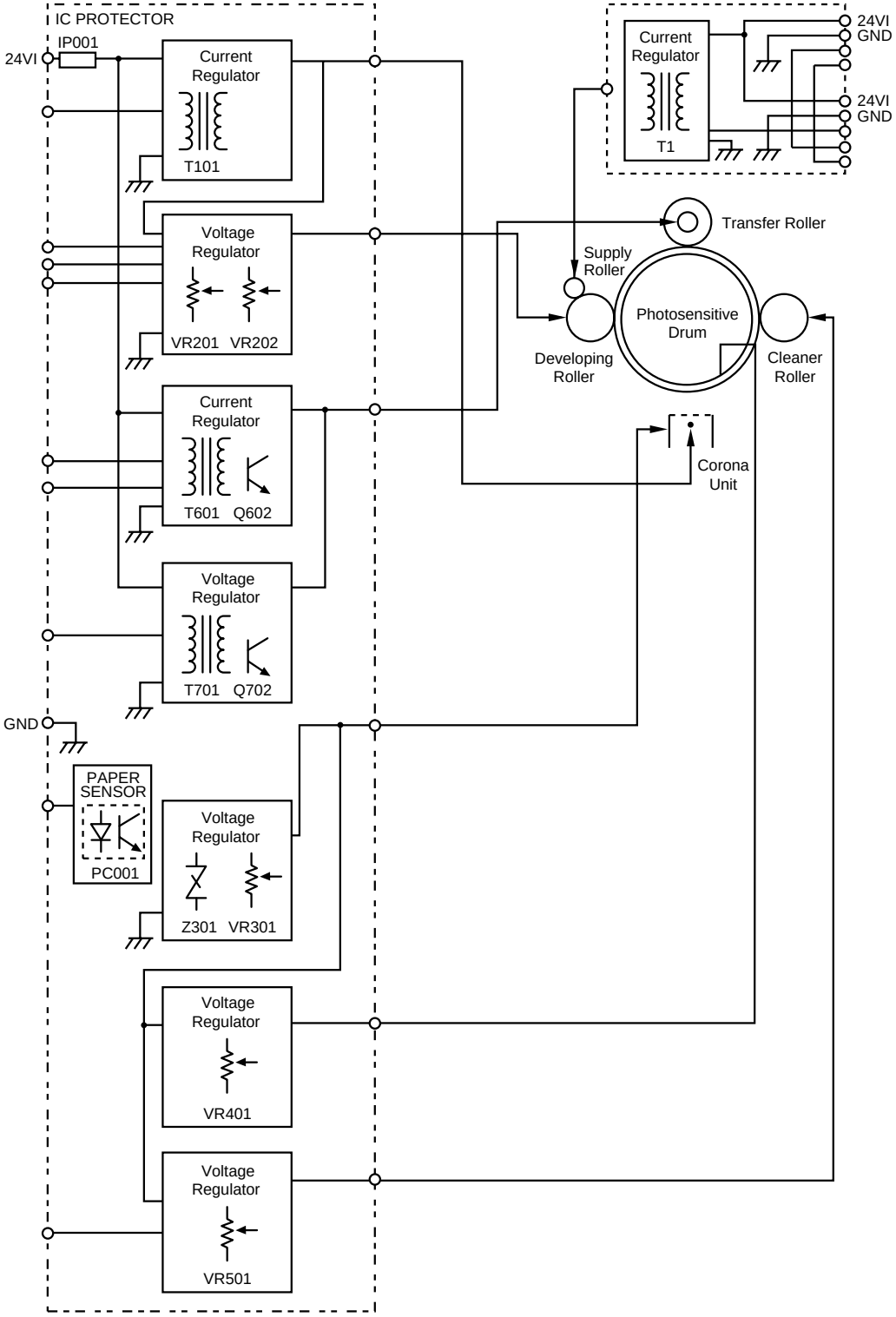


Fig. 2.16

2. MECHANICS

2.1 Overview of Printing Mechanism

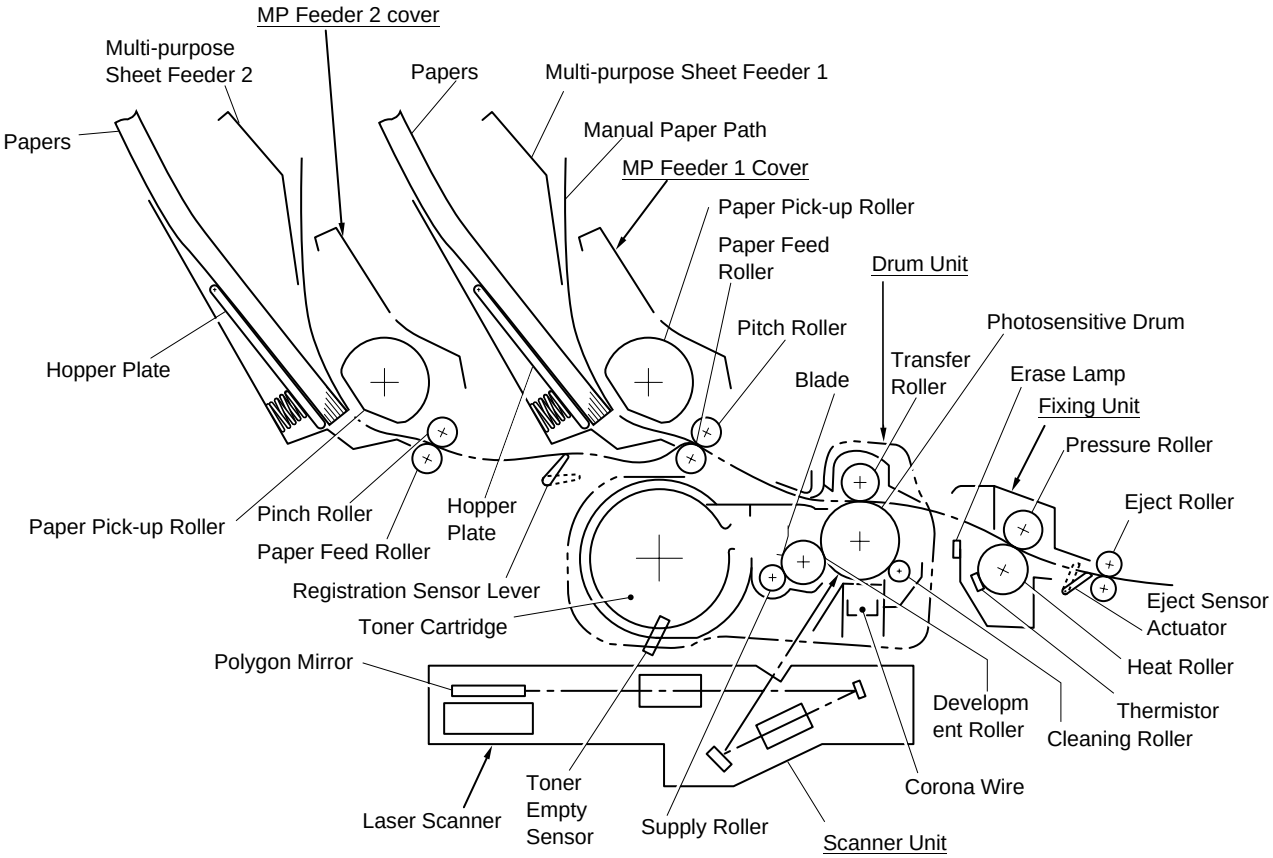


Fig. 2.17

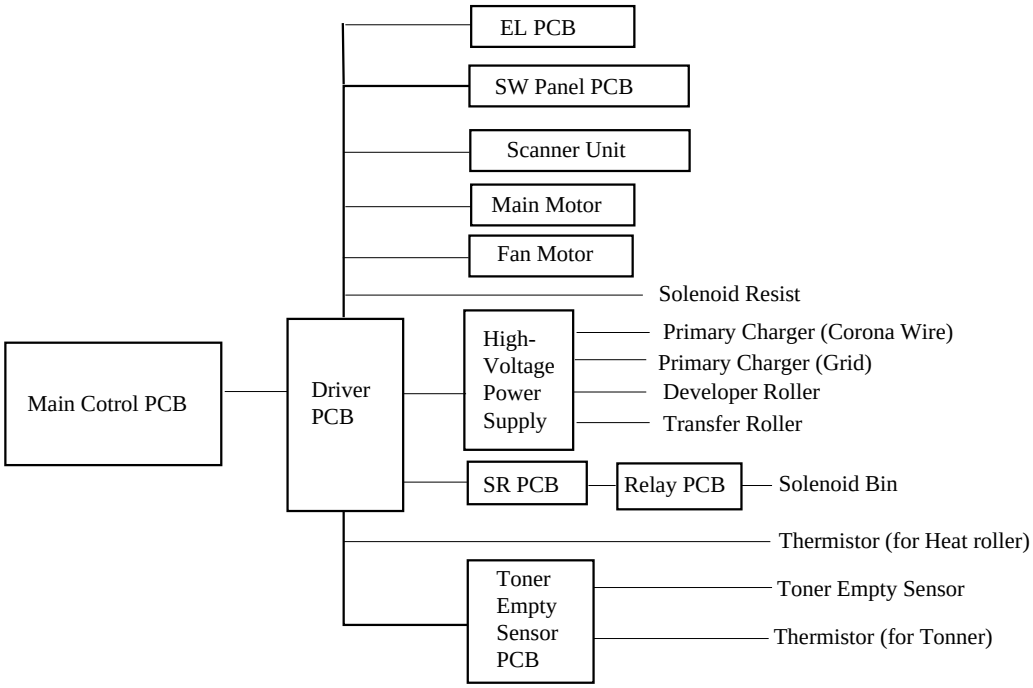


Fig. 2.18

2.2 Paper Transfer

2.2.1 Paper Supply

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

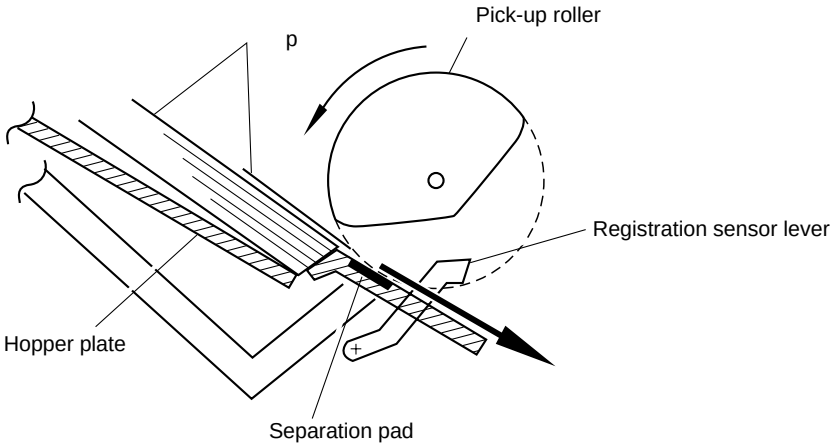


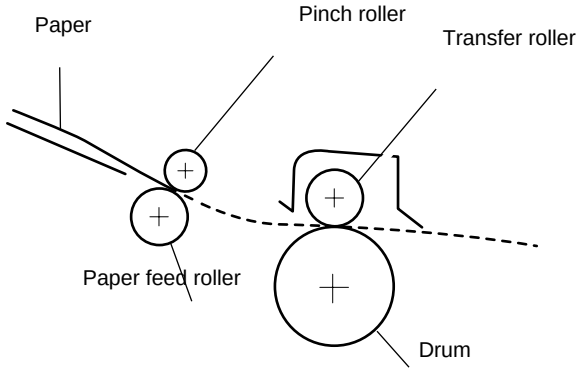
Fig. 2.19

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

The pick-up roller is directly connected to the sector gear, whose rotation is forcibly stopped by the gear stopper; when the pick-up solenoid is activated, the clutch mechanism is engaged by the solenoid action and the sector gear is driven; when it has completed one full turn its rotation is stopped again by the gear stopper. The paper drawn out by the pick-up roller pushes against the top of form sensor lever and the paper top position/absence of paper is detected by sensing the motion of the lever.

2.2.2 Paper Registration

When paper picked up from the multi-purpose sheet feeder (MPF) pushes against the top of form sensor actuator, the registration sensor lever is caused to turn, and the photo sensor detects this motion. When this signal from the sensor is detected the paper feed roller is stopped temporarily by the clutch. The paper is fed to the nip point between the paper feed roller and the pinch roller in the multi-purpose sheet feeder, and the skew of the paper is corrected by pushing the leading edge of the paper against the nip point. When the paper feed roller starts to be rotated again when it is released by the clutch, paper with the leading edge correctly aligned, is fed by the paper feed roller and is transported to the transfer roller.



Clutch mechanism (engaged/released by the solenoid assembly)
Released when the solenoid is ON and engaged when the solenoid is OFF.

Fig. 2.20

2.2.3 Paper Eject

The completion of paper eject is detected in the following manner:

(a) When the leading edge of the paper pushes down the eject sensor actuator located in the fixing unit, the photo sensor (photo interrupter) is opened and detects the start of paper eject.

(b) When the trailing edge of the paper has passed through the paper eject sensor actuator, the photo sensor is closed and the completion of paper eject is recognized.

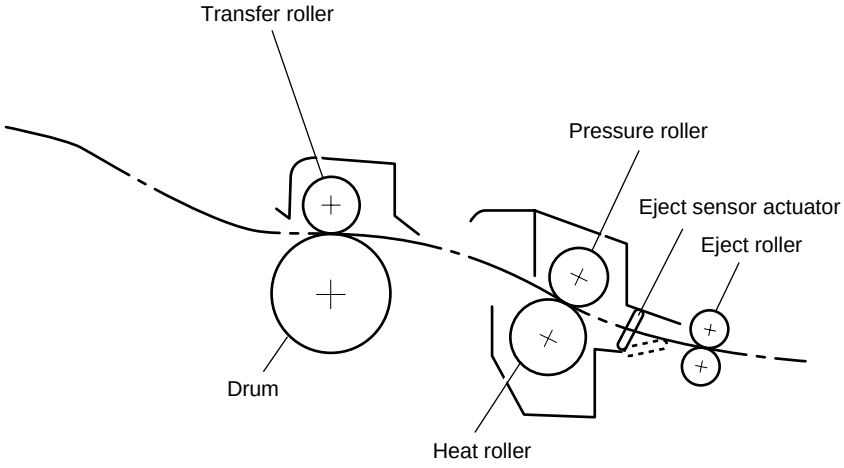


Fig. 2.21

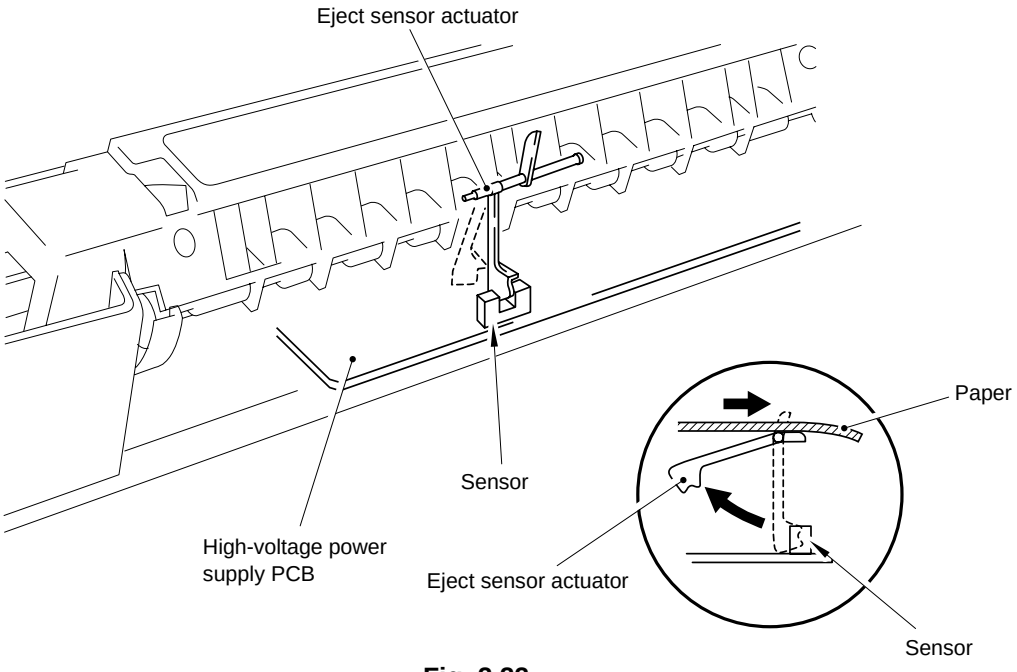


Fig. 2.22

2.3 Sensors

2.3.1 Cover Sensor

Detects opening and closing of the top cover.

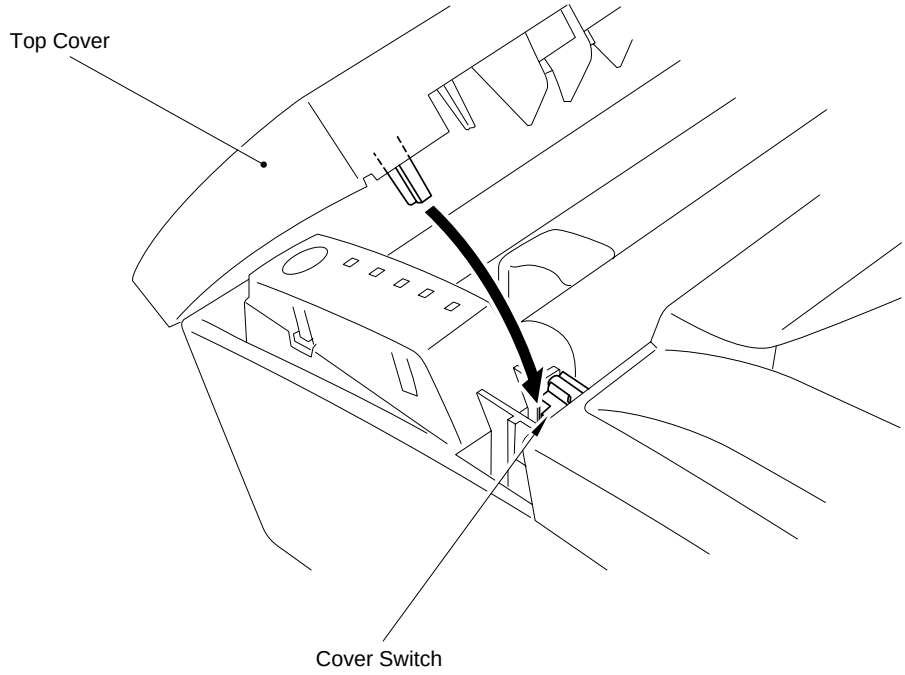


Fig. 2.23

2.3.2 Toner Empty Sensor

Detects if there is toner in the toner cartridge. It also detects whether or not the drum unit is installed. (The toner cartridge is installed in the drum unit).

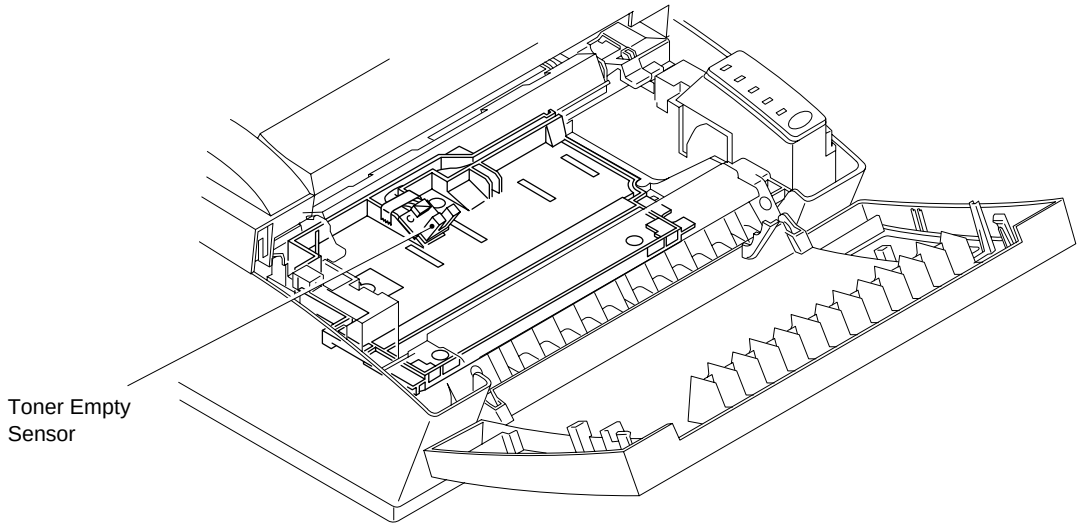


Fig. 2.24

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 Developer Roller

Develops the latent electrostatic image on the drum surface by the addition of the toner.

2.4.4 Transfer Roller

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

2.4.5 Cleaner Roller

Removes and recycles the toner remaining on the drum surface.

2.4.6 Erase Lamp

Discharges the electrostatic latent image on the drum.

2.5 Print Process

2.5.1 Charging

The drum is charged to approx. +1000V 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 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 drum sleeve is regulated to approx. 280V by the voltage regulator.

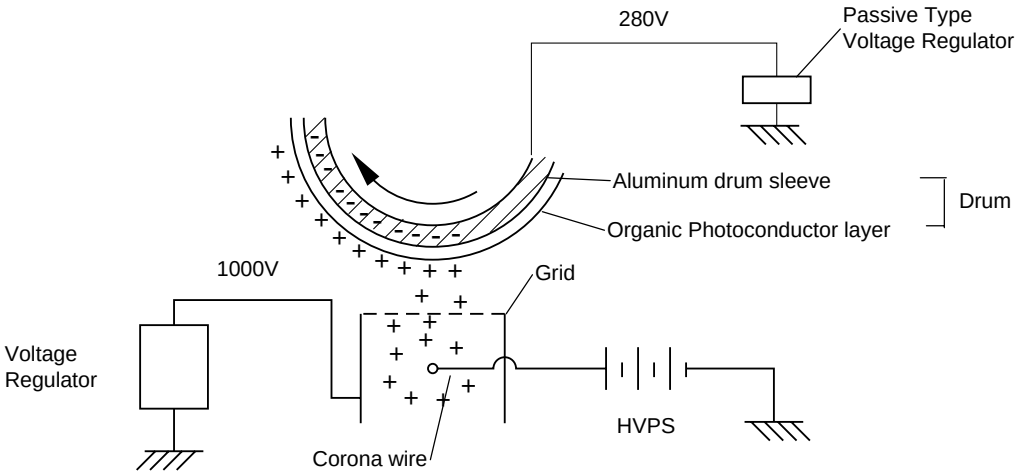


Fig. 2.25

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.

2.5.2 Exposure Stage

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

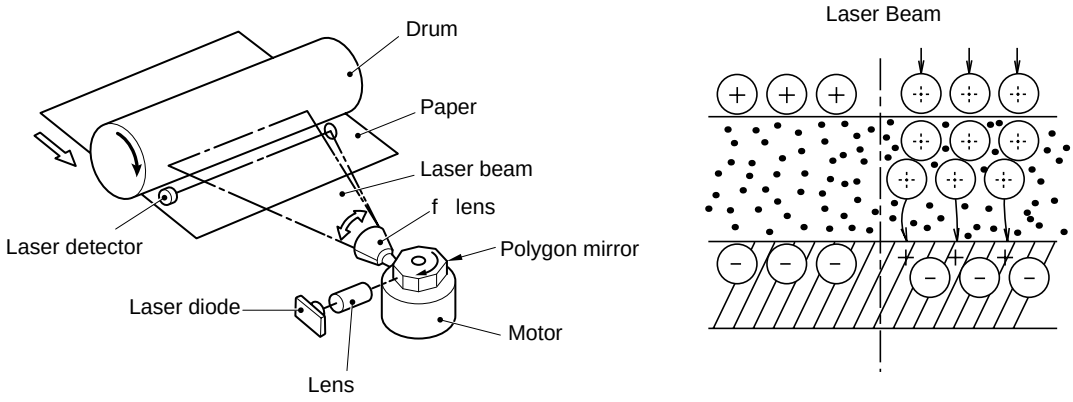
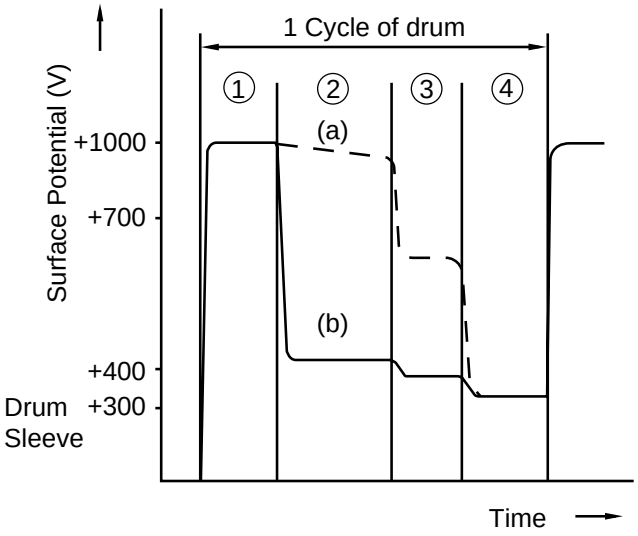


Fig. 2.26

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.



① Primary charging

② Laser beam exposure and developing
(a) Unexposed area
(Non image area)
(b) Exposed area
(Image area)

③ Transfer the image to paper

④ Erase the residual potential

Fig. 2.27

2.5.3 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 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.

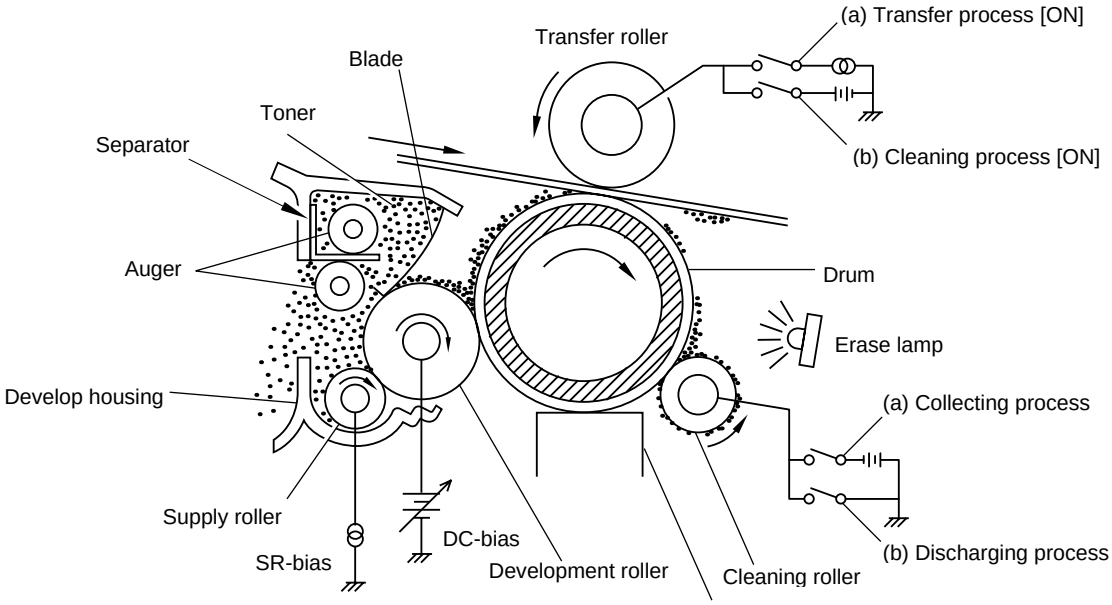


Fig. 2.28

2.5.4 Transfer

(a) 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 backside 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.

(b) 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 charges to a positive voltage during non-printing rotation of the drum. Therefore the transfer roller is cleaned by returning the positive charged toner adhered on the transfer roller onto the photo-conductive drum.

2.5.5 Drum Cleaning Stage

In the image transfer stage, not all the toner on the photosensitive drum is transferred onto the paper but some remains on the drum. In the drum cleaning stage, the drum surface is cleaned by the cleaning roller, so that residual toner on the drum surface is removed and collected on the cleaning roller itself. The residual toner on the cleaning roller will be discharged to the drum when starting or non-printing time. The toner will be collected by the developing roller and reused (for further developing).

2.5.6 Erasing Stage

Before the cleaning stage, the drum surface is exposed to the light emitted from the erase lamp. (LED lamp) This stage prepares the drum by decreasing its surface voltage uniformly, ready to receive uniform change in the primary charging stage.

2.5.7 Fixing Stage

An image transferred on 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 ASSY 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. The cleaner ASSY HR eliminates toner stains on the surface of the heat roller.

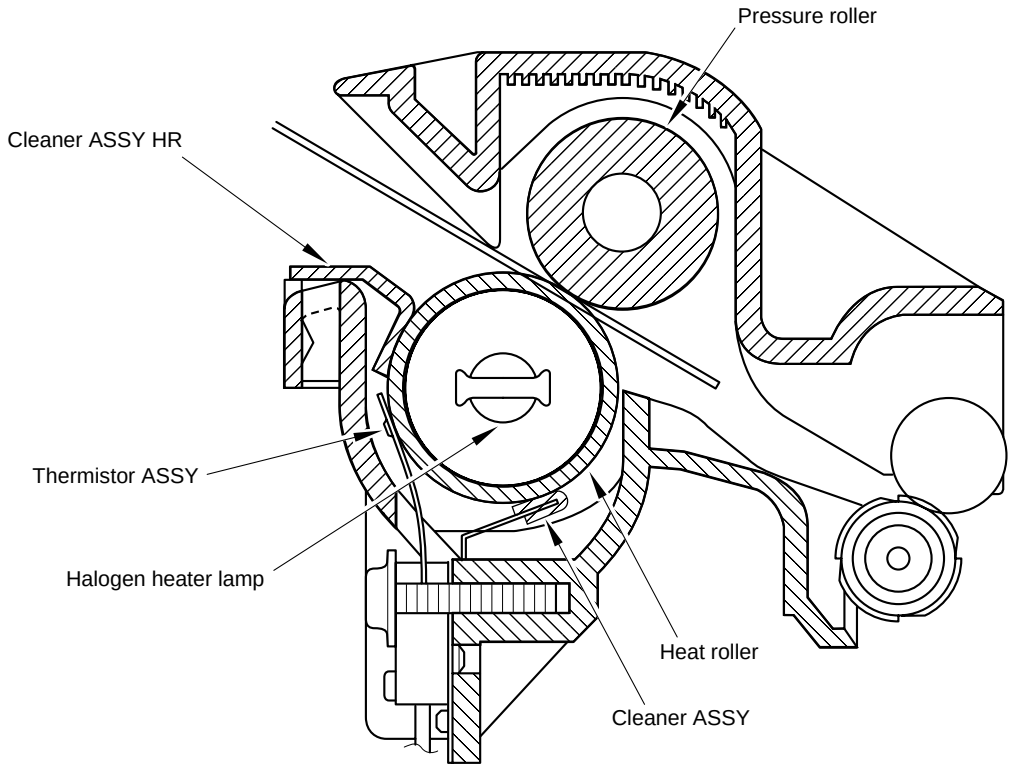


Fig. 2.29

CHAPTER III DISASSEMBLY AND REASSEMBLY

1. SAFETY PRECAUTIONS

To avoid creating secondary problems by mishandling, be careful to follow the following precautions during maintenance work.

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

(2) Be careful not to lose screws, washers, or other parts removed.

(3) Be sure to apply grease to the gears and applicable positions specified in this chapter.

(4) When using soldering irons or other heat-generating tools, take care not to accidentally damage parts such as wires, PCBs, and covers.

(5) Before handing 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.

(6) When transporting PCBs, be sure to wrap them in the correct protective packaging.

(7) 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 : 7kgf • cm
M4 : 10kgf • cm

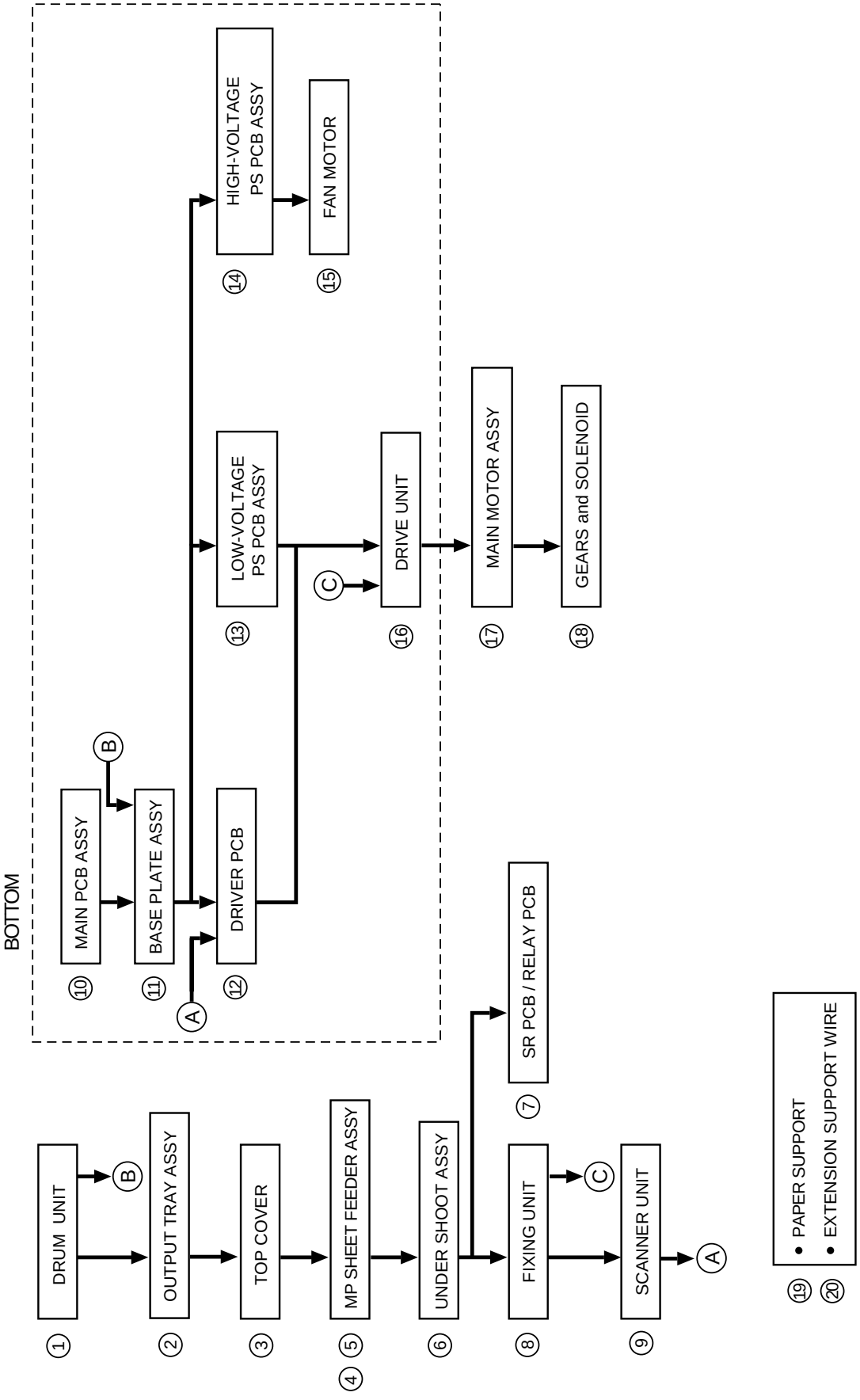
TAPTITE, CUP S
M3 : 8kgf • cm

SCREW
M3 : 7kgf • cm
M4 : 8kgf • cm

(8) When connecting or disconnecting cable connectors, hold the connector bodies, but not the cables. If the connector has a lock, release the connector lock first to unlock it.

(9) 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

3.1 Drum Unit

(1) Open the top cover.

(2) Lift out the drum unit.

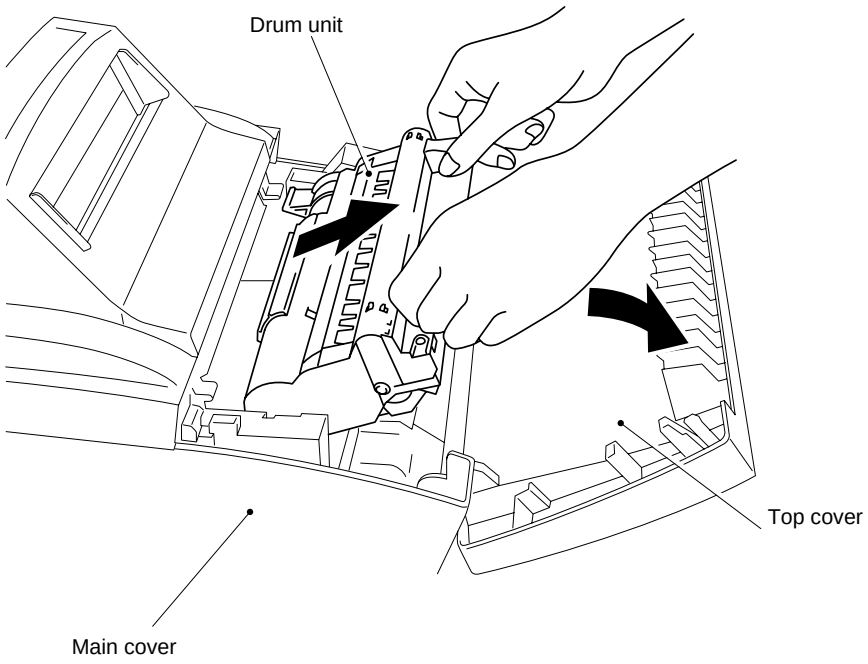


Fig. 3.1

3.2 Output Tray ASSY

(1) Press the hinges at the left and right ends of the output tray inwards to release the output tray from the main cover.

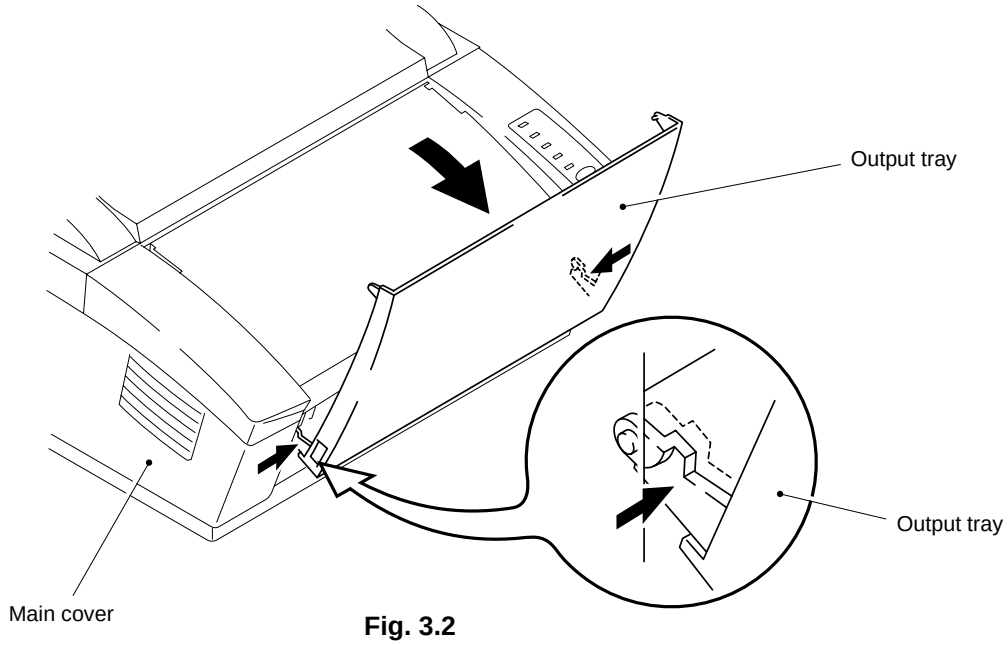


Fig. 3.2

3.3 Top Cover

(1) Open the top cover.

(2) Press the hinges at the left and right ends of the top cover inwards to release the top cover from the main cover.

Note: If it is impossible to release the top cover in the above way, press the side of the top cover (①) while pulling the side of the main cover (②).

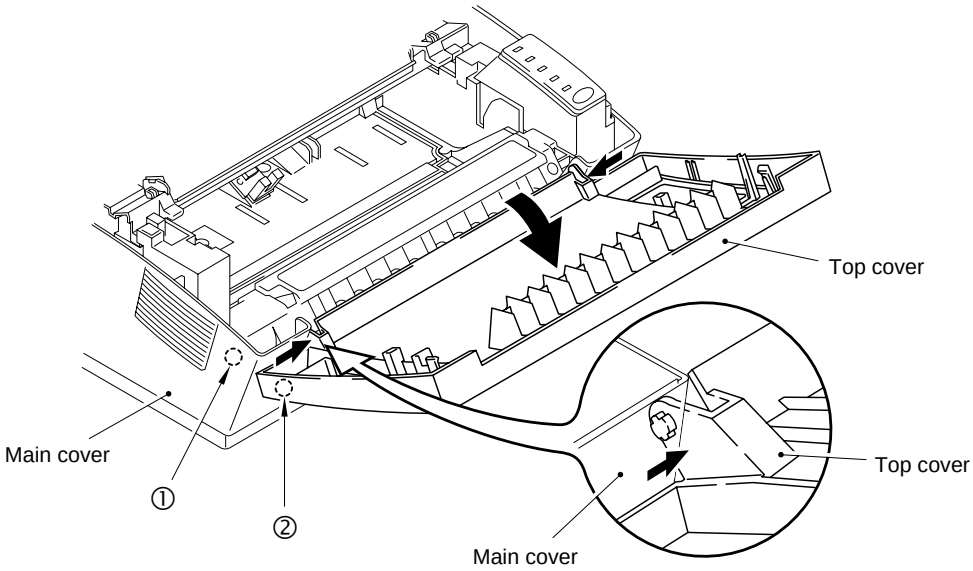


Fig. 3.3

3.4 MP Sheet Feeder 1 ASSY

Note: When disassembling the MP sheet feeder ASSY, the grease which smears your fingers will stick to the separation pad or the paper pick-up roller, and then spread to the paper and the drum unit. It might cause to appear black spots on the printing page.

(1) Slide the upper portion of MP sheet feeder 1 toward you and remove it.

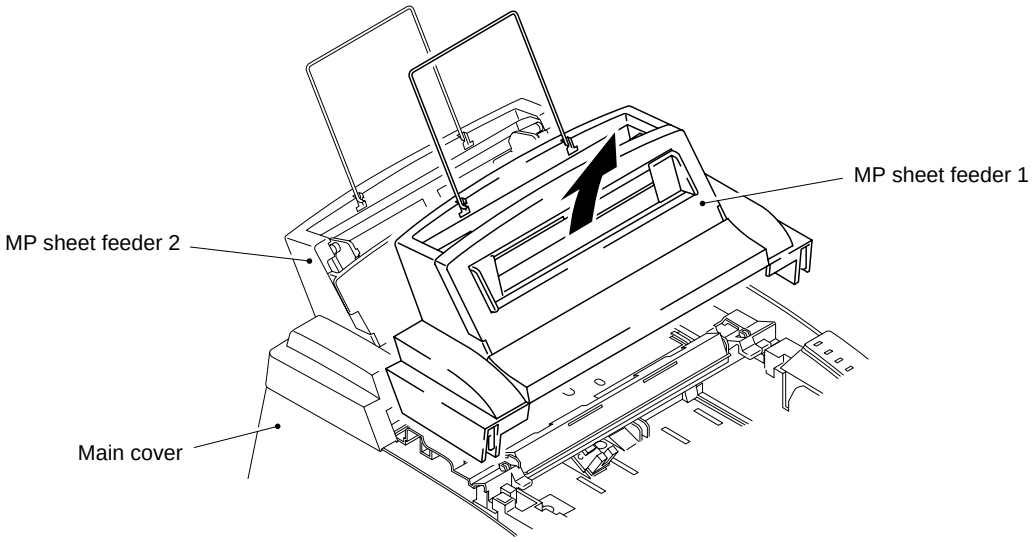


Fig. 3.4

(2) Raise the pick-up roller cover (①) and remove it (②).

(3) Remove the MP feeder cover (③).

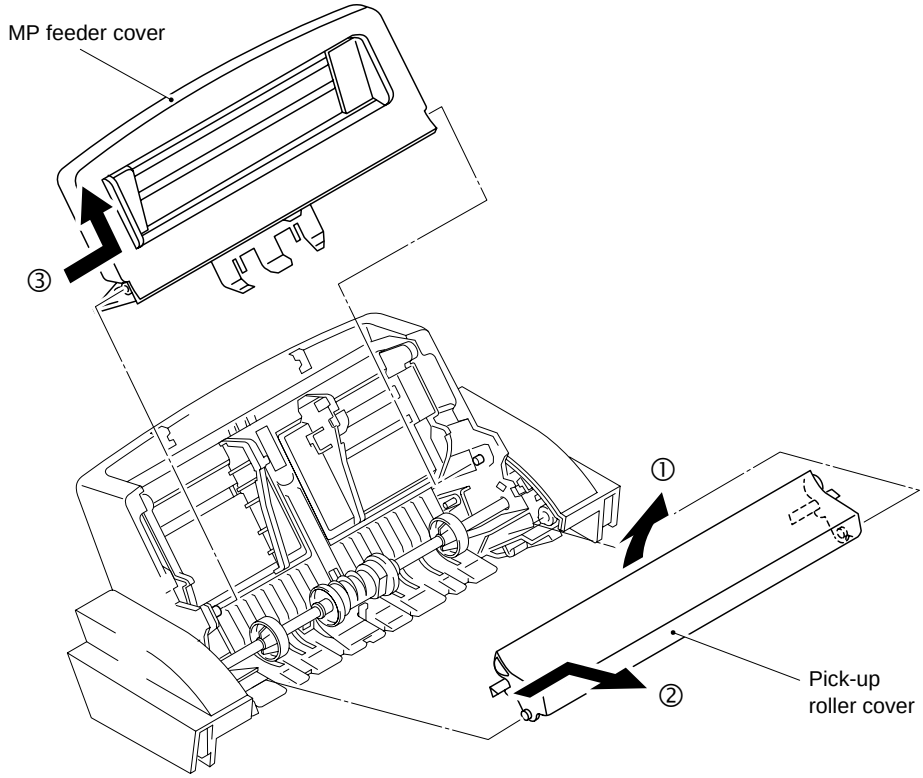
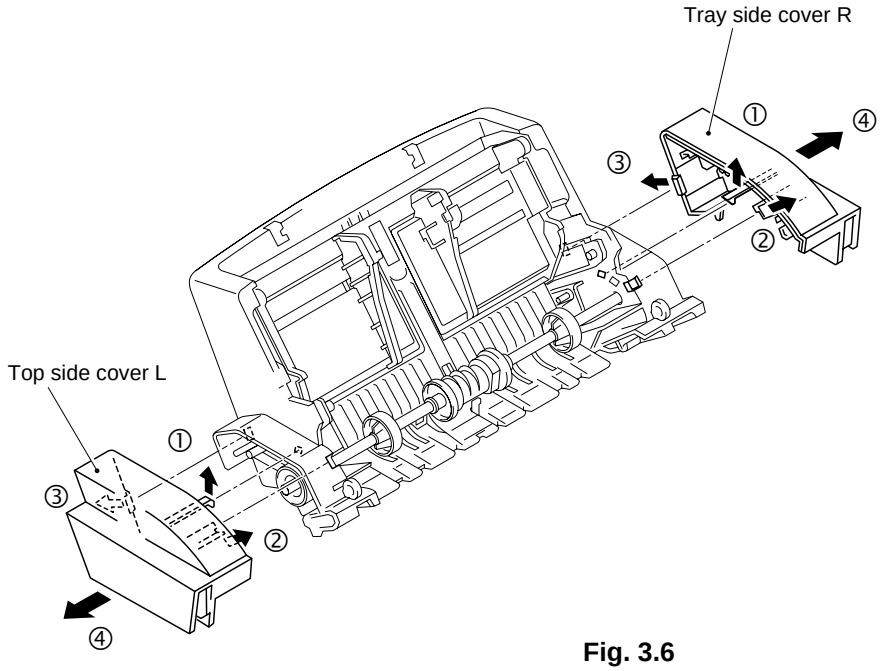


Fig. 3.5

(4) Remove the tray side covers R and L by releasing the three hooks inside each of the covers as the following order.



<Releasing procedure>
1. Release the hook ① by hands.
2. Release the hook ② by using a screwdriver.
3. Release the hook ③ by using a screwdriver.
4. Pull out the tray side covers straight.

Fig. 3.6

(5) After removing the sector gear, paper feed bearing, and bearing 6, take off the paper pick-up roller unit.

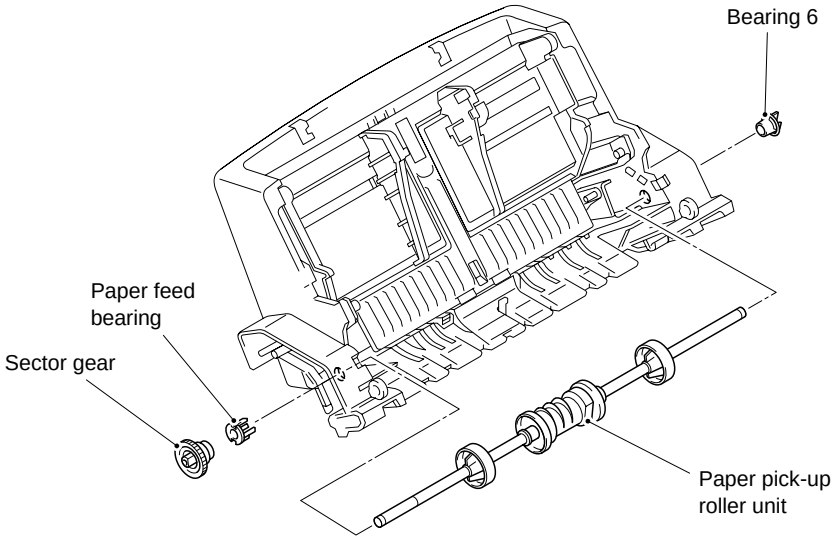


Fig. 3.7

(6) Raise the pressure plate toward you and press both sides of the pad inward to release it by pressing the separation pad holder. Then take off the spring.

Note: If it is impossible to release the pressure plate in the above way, press the side of the pressure plate (①) while pulling the side of the sheet feeder (②).

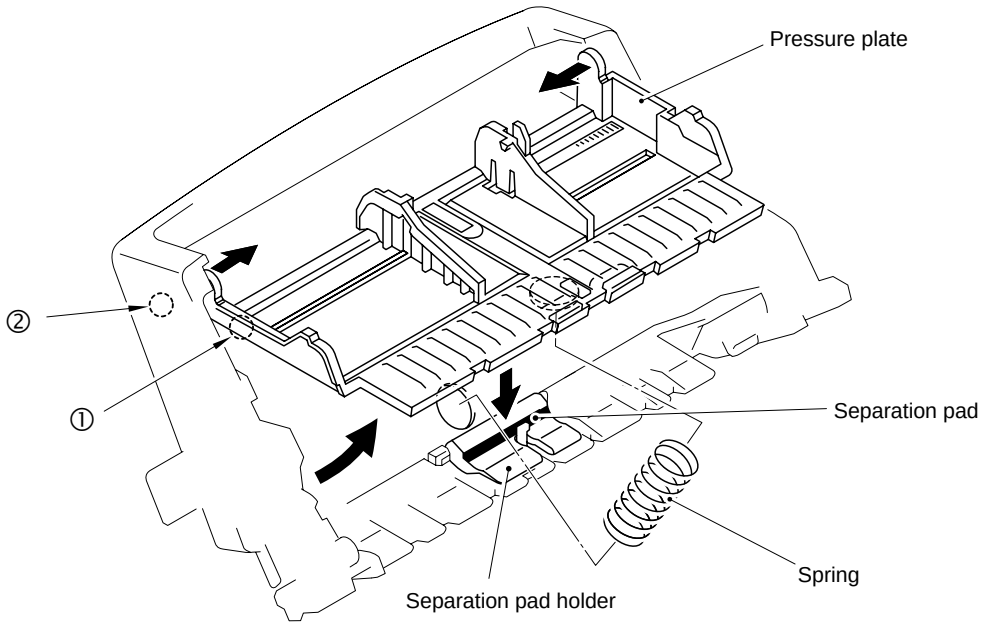


Fig. 3.8

Note: Be sure to replace the regist sensor actuator film together whenever replacing the regist sensor actuator.

3.5 MP Sheet Feeder 2 ASSY

(1) Remove the four screws.

(2) Disassemble any other parts of MP sheet feeder 2 in the same way as described for MP sheet feeder 1.

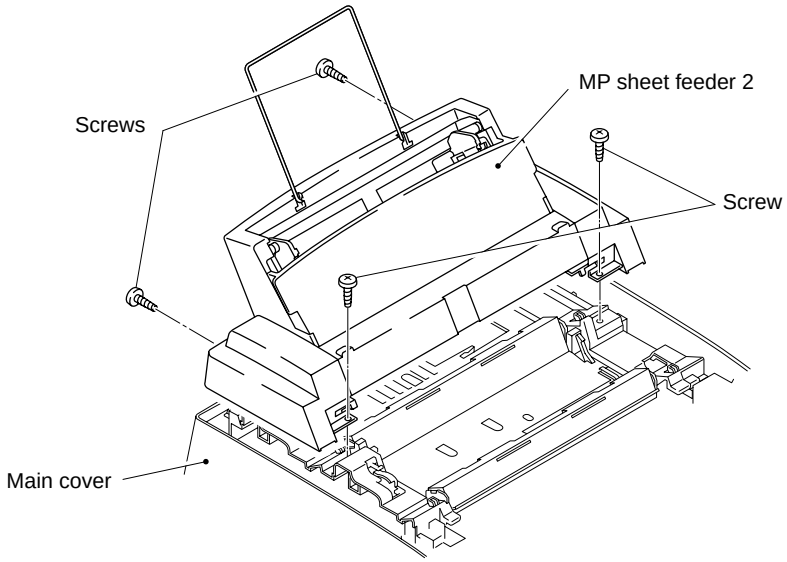


Fig. 3.9

3.6 Under Shoot ASSY

(1) Disconnect the two cable harnesses from the relay PCB.

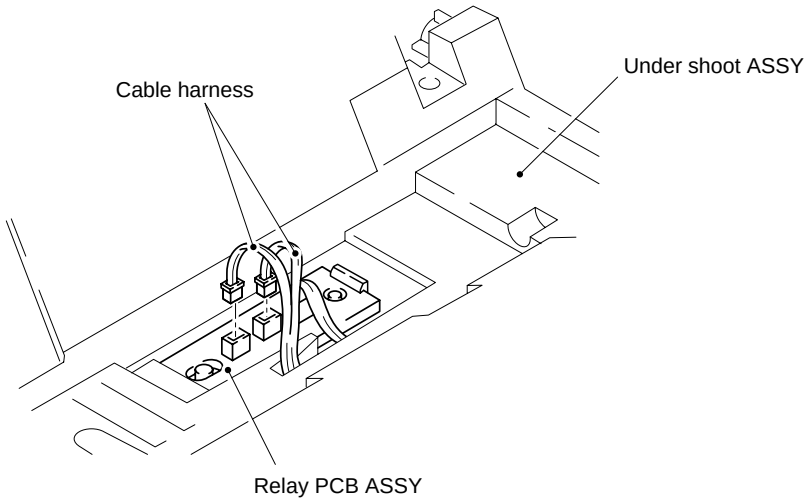


Fig. 3.10

(2) Remove the two screws.

(3) Lift the rear portion of the under shoot assy to remove it.

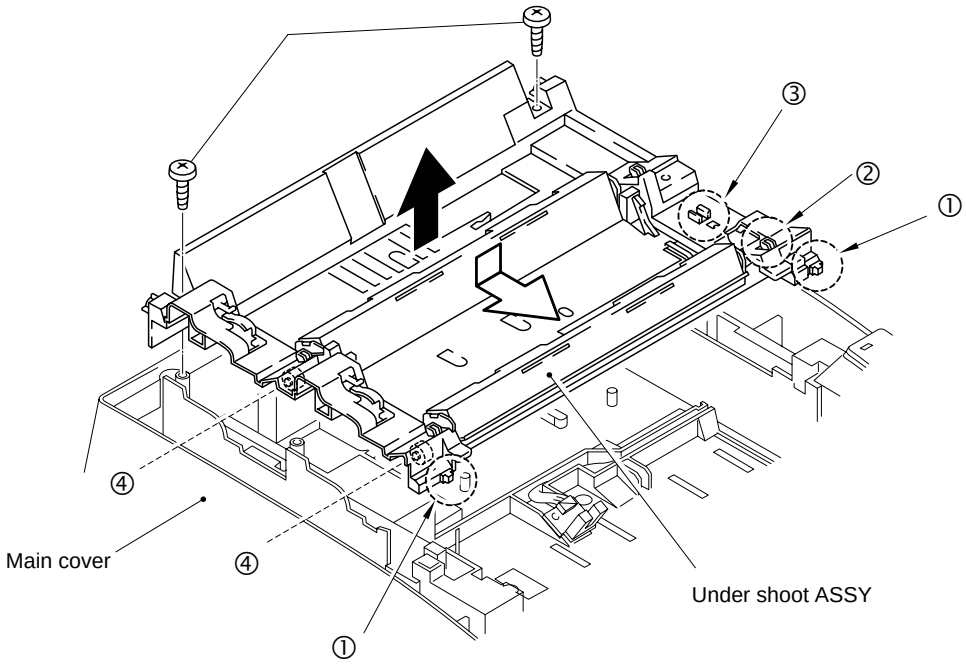


Fig. 3.11

Note: Follow the number above in order when assembling.

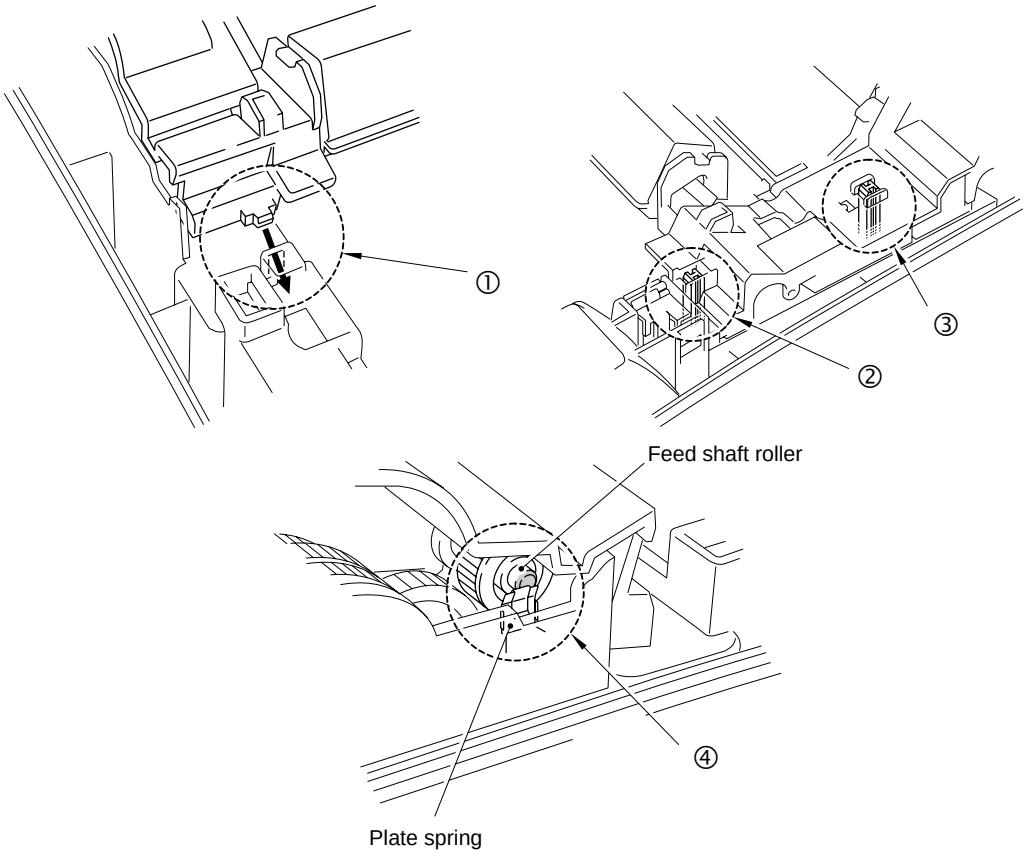


Fig. 3.11.1

3.7 SR PCB / Relay PCB

(1) Remove the SR protect sheet.

(2) Disconnect the connector of the SR harness ASSY connecting the SR PCB and the driver PCB and remove the high-voltage cover.

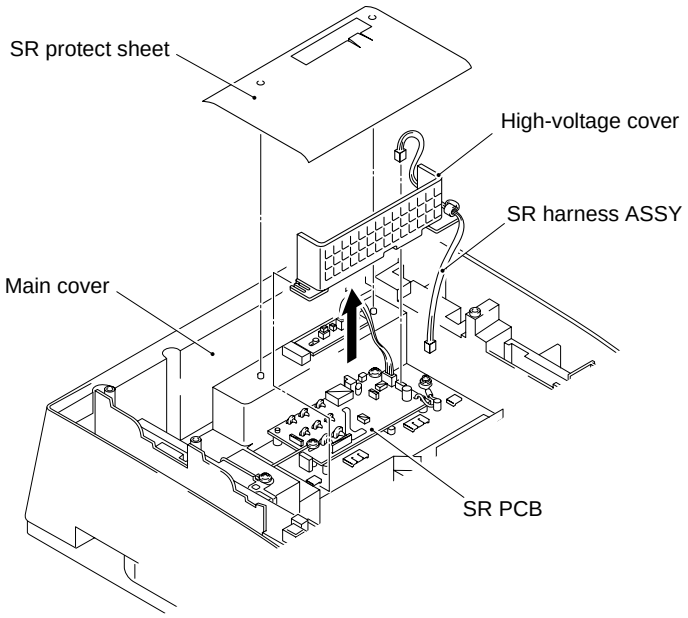


Fig. 3.12

(3) Disconnect the connector of the relay harness ASSY connecting the SR PCB and the relay PCB and remove the two screws on the SR PCB, and remove the SR PCB.

(4) Remove the relay PCB.

(5) Remove the two screws, and remove the electrode SR1, SR2.

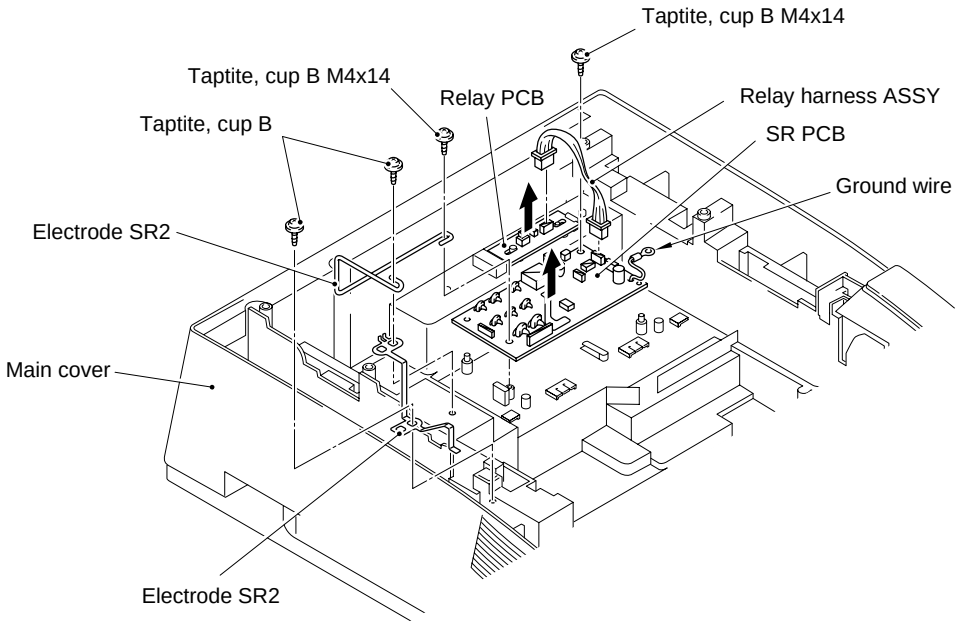


Fig. 3.13

3.8 Fixing Unit

(1) Remove the two screws.

(2) Lifting the fixing unit, disconnect the two heater harnesses and the thermistor connector on the EL PCB.

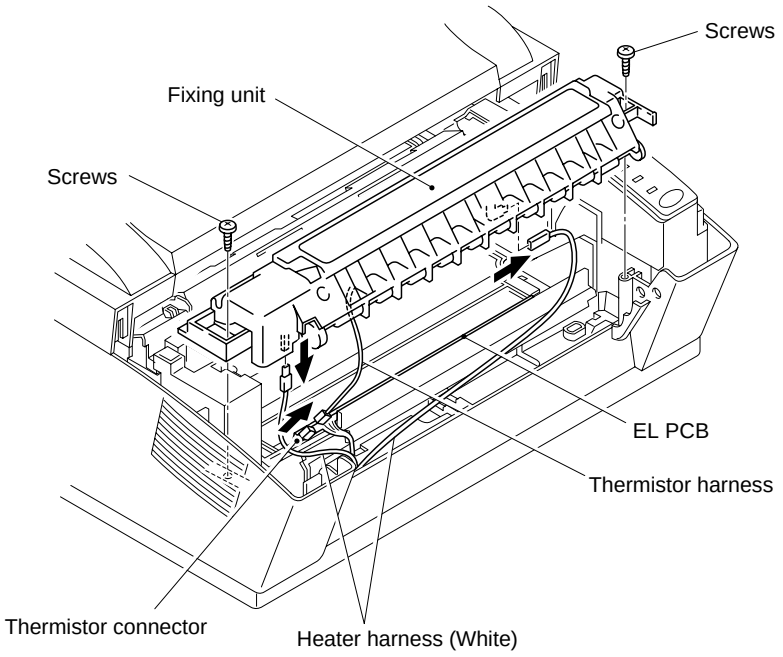


Fig. 3.14

(3) Unhook the harness of the thermistor ASSY from the hook of the fixing unit.

(4) Remove the screw.

(5) Remove the thermistor ASSY.

(6) Remove the cleaner ASSY.

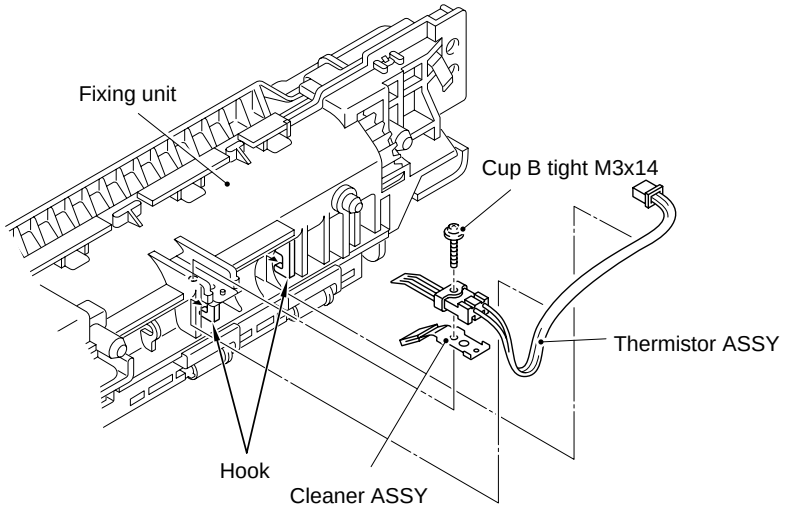


Fig. 3.15

Note: Follow instructions below when installing the thermistor in the fixing unit.
- *Place the cleaner felt of the cleaner ASSY under the heat roller.*
- *Place the end of the thermistor on the heat roller.*
- *Insert the boss1 of the thermistor into the hole of the fixing unit frame.*
- *Do not place the thermistor on the boss2 of the fixing unit frame.*

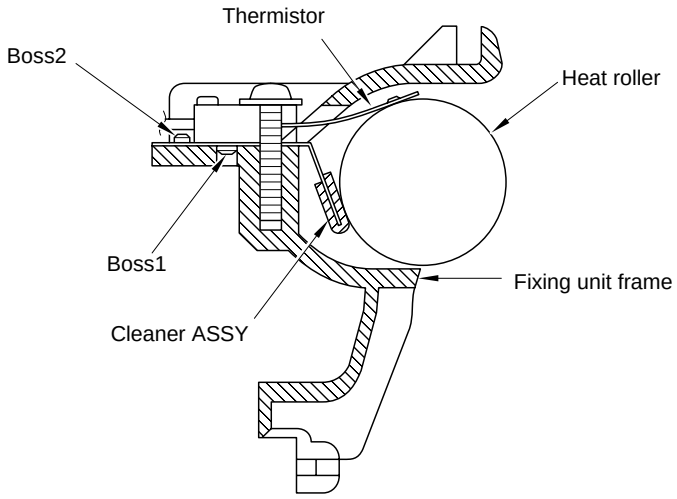


Fig. 3.16

(7) Remove the two screws.

(8) Open the fixing unit cover along the open side of the fixing unit cover.

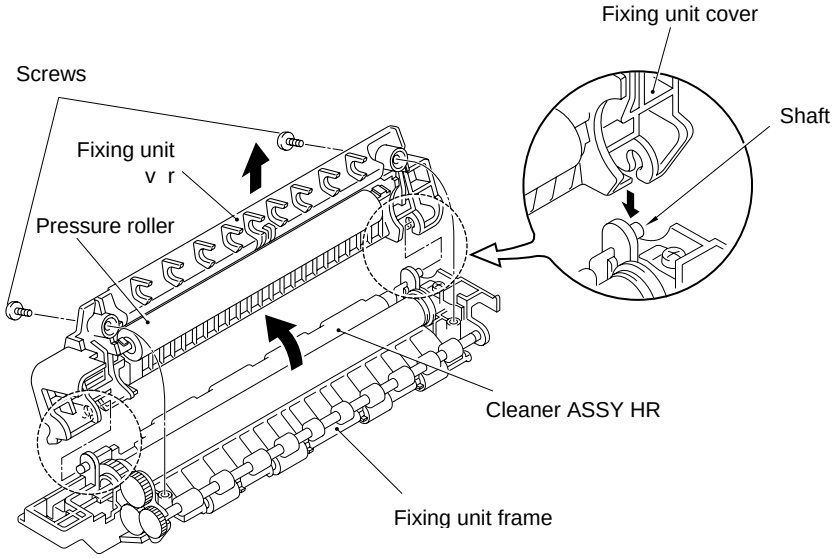


Fig. 3.17

(9) Release the cleaner lock from the cleaner ASSY HR.

(10) Remove the cleaner ASSY HR from the fixing unit.

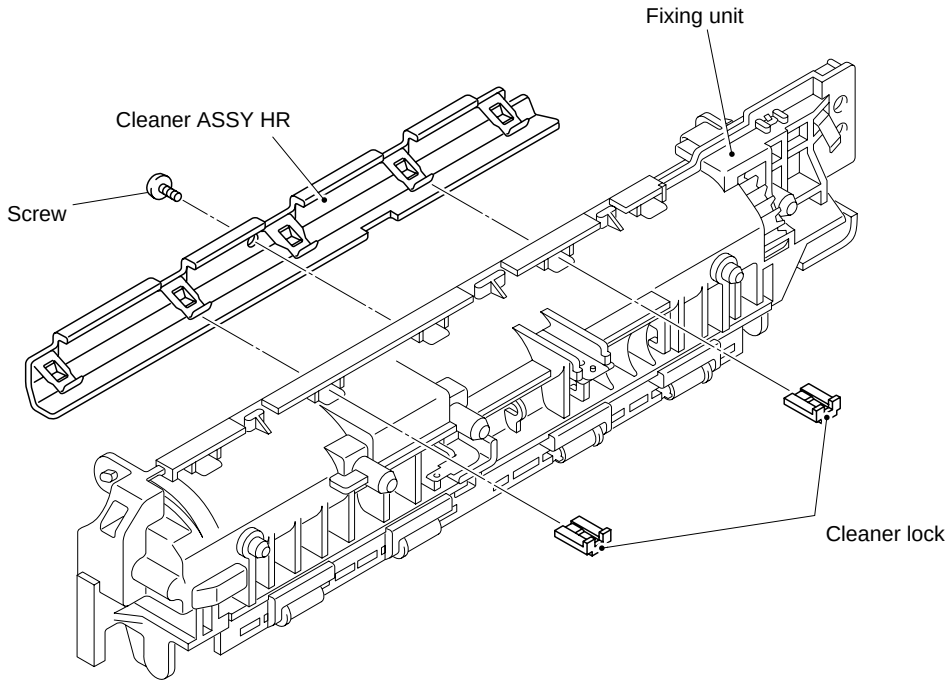


Fig. 3.18

(11) Release the right side of the paper eject roller shaft.

(12) Remove the four eject pinch rollers and the pinch springs from the fixing unit frame. Then, remove the pinch spring from each pinch roller.

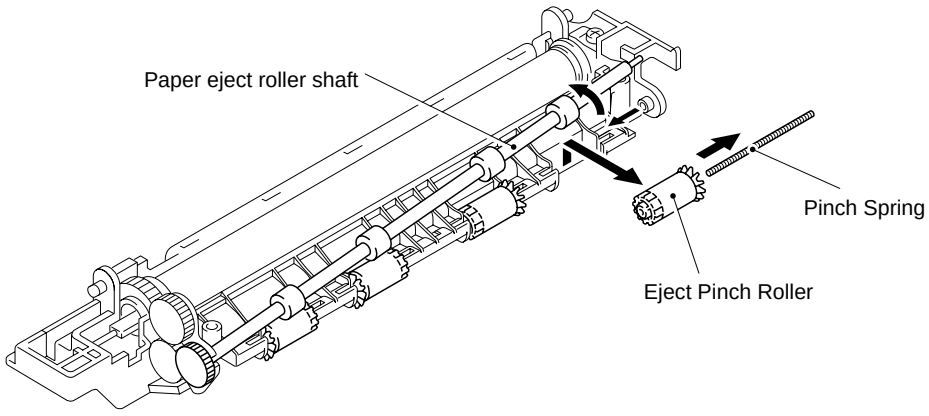


Fig. 3.18a

Note: Follow instructions below when installing the cleaner ASSY HR.
• Put the cleaner ASSY HR on the heat roller.
• Rotate the hook of the cleaner ASSY HR as shown in the figure to fit it into the fixing unit frame.
• Insert the cleaner lock into the fixing unit frame.

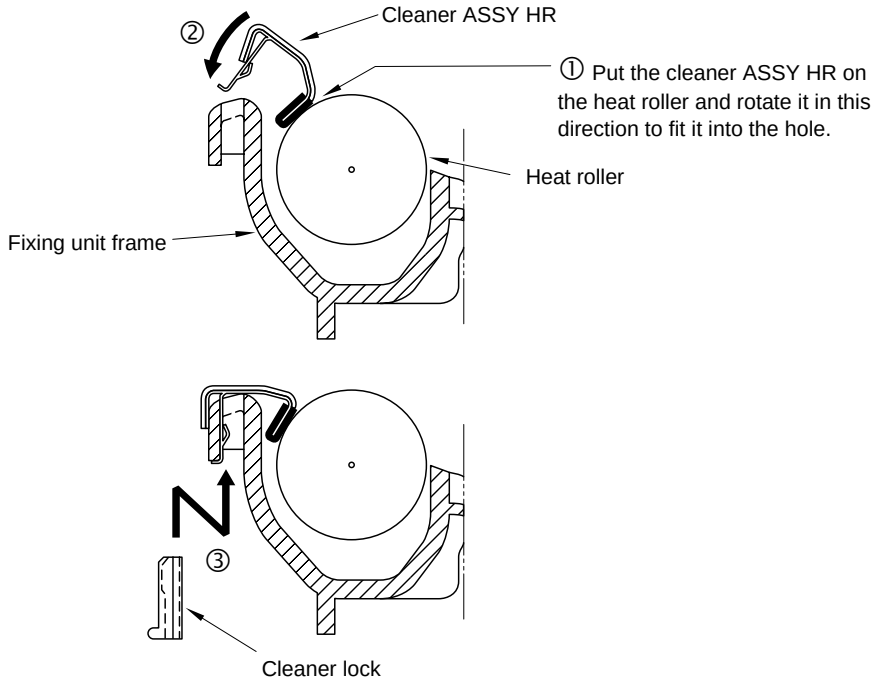


Fig. 3.19

(13) Remove the bind B tight 3 x 10 screw securing the connector plate.

(14) Remove the connector plate from the fixing unit frame and loosen the other bind B tight 3 x 10 screw securing the fixing unit cover.

(15) After removing the idle gear 16 from the fixing unit frame, the heat roller can be removed. You can then remove the halogen heater lamp from the heat roller.

Note: Never touch the surface of the halogen heater lamp.

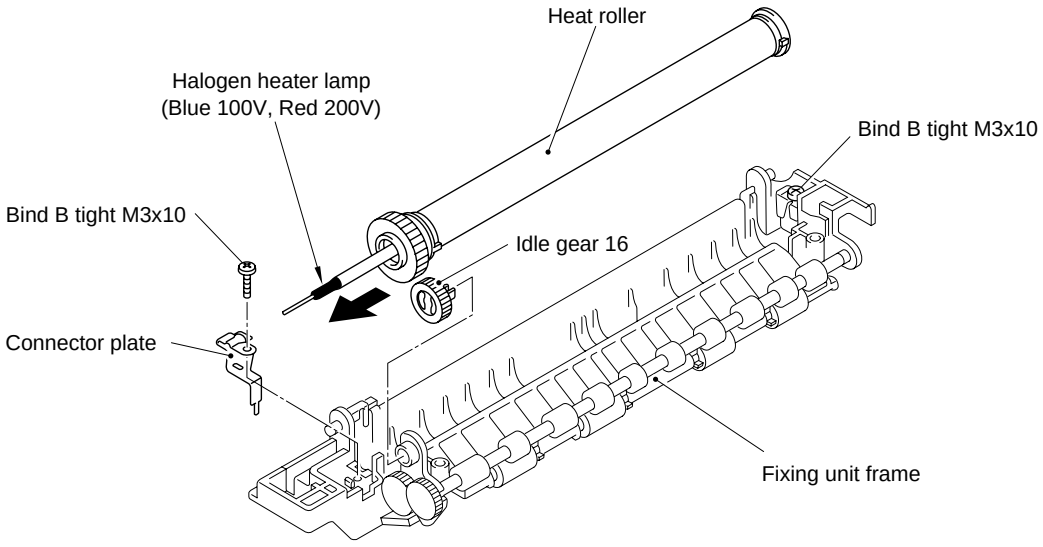


Fig. 3.20

3.9 Scanner Unit

(1) Remove the three screws.

(2) Lift out the scanner unit.

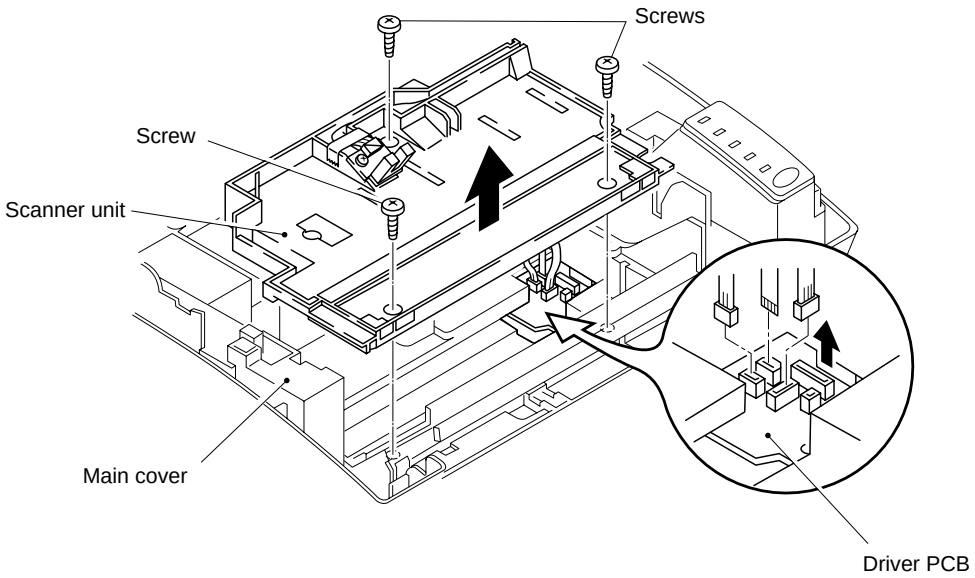


Fig. 3.21

(3) Disconnect the three connectors from the driver PCB.

(4) Remove the screw and the tape, and lift the toner sensor PCB from the scanner unit.

Note: Never touch the inside of the scanner unit or the mirror when disassembling or reassembling. If there is any dirt or dust on the mirror, blow it off.

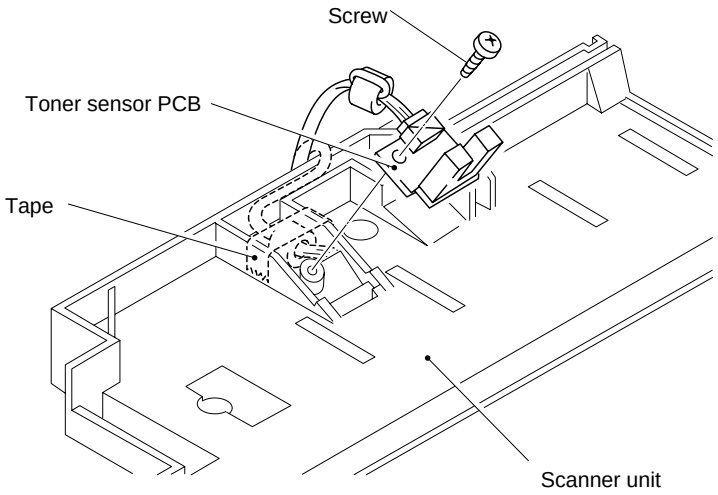


Fig. 3.22

(5) Turn the scanner unit upside down and remove the screw to release the toner sensor harness.

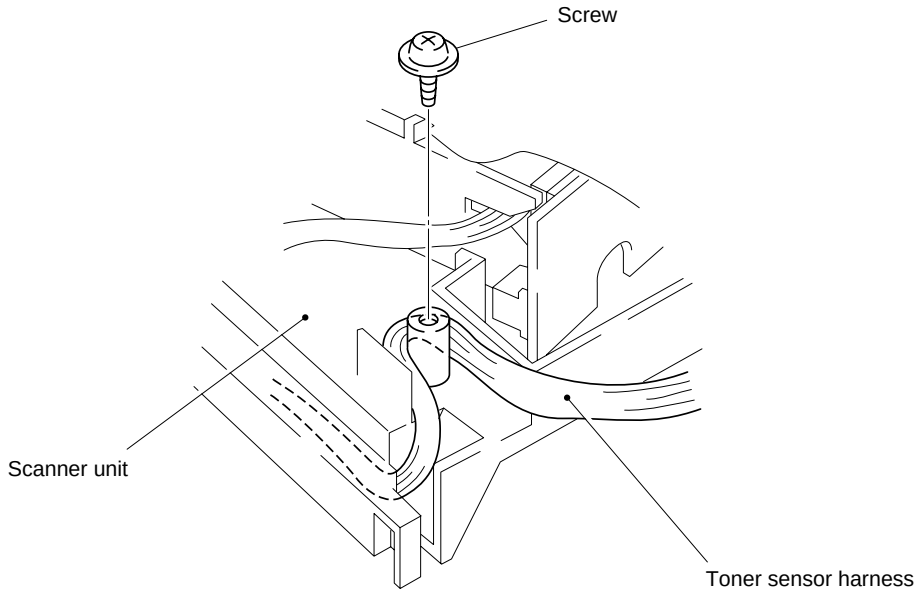


Fig. 3.22-1

3.10 Main PCB ASSY

(1) Remove the four screws.

(2) Hold the hooks at left and right to pull out the main PCB ASSY.

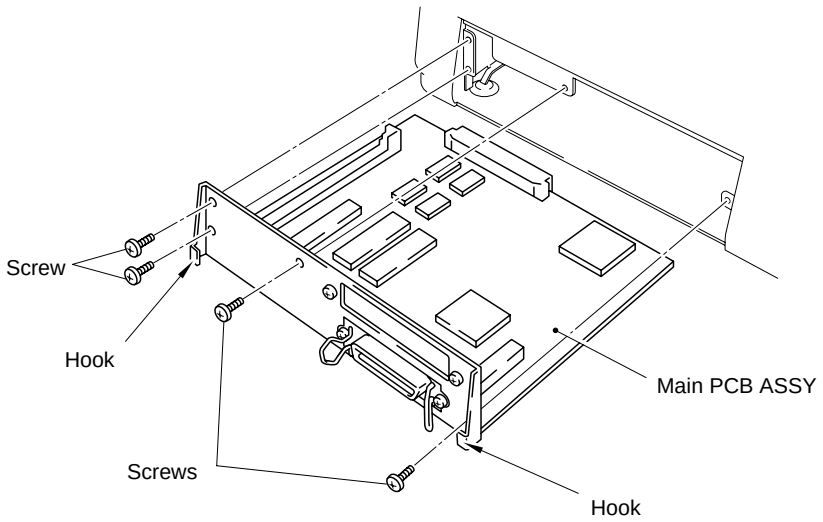


Fig. 3.23

3.11 Base Plate ASSY

Note: Prior to turning the printer upside-down, ensure that the drum unit has been removed from the printer.

(1) Turn the printer upside down.

(2) Remove the five M4 and four M3 self tapping screws and one screw.

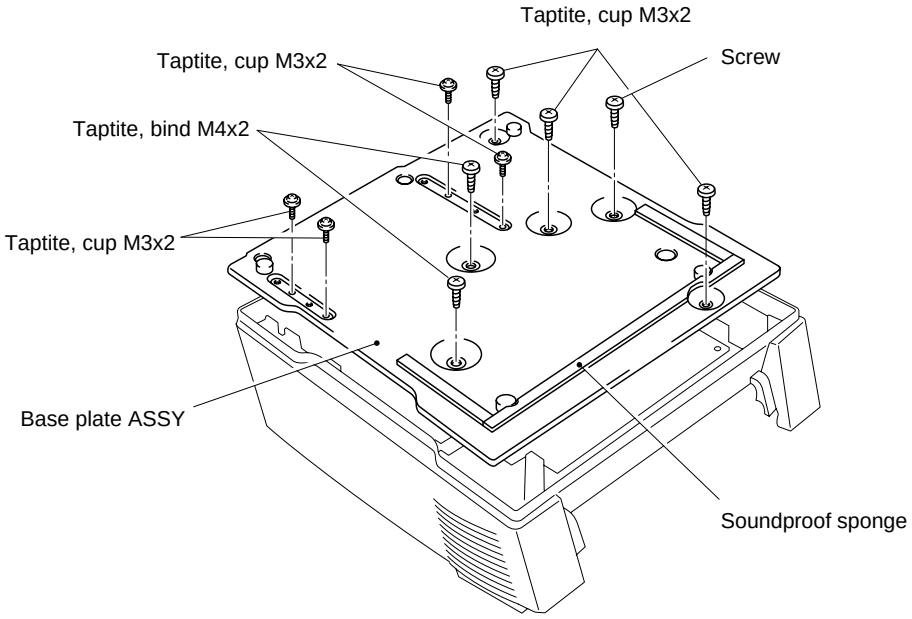


Fig. 3.24

(3) Lift the base plate ASSY and remove the grounding screw.

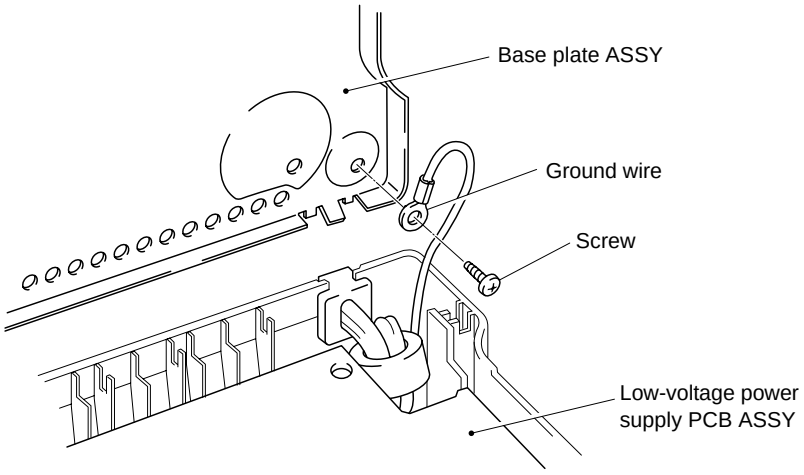


Fig. 3.25

Note: See the Fig. 3.26 about the position installing the dumping material and the soundproof sponge A,B.

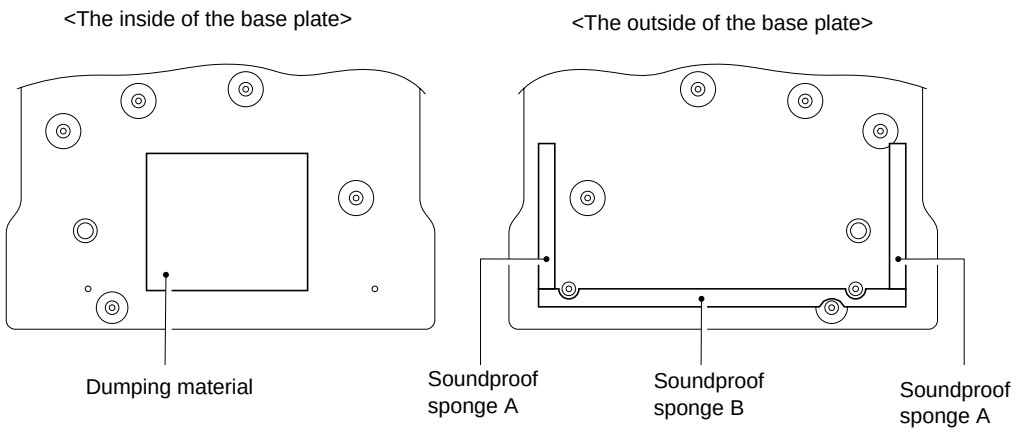


Fig. 3.26

3.12 Driver PCB ASSY

(1) Remove the screw securing the driver PCB ASSY. (Slide the PCB A from underneath the main shield.)

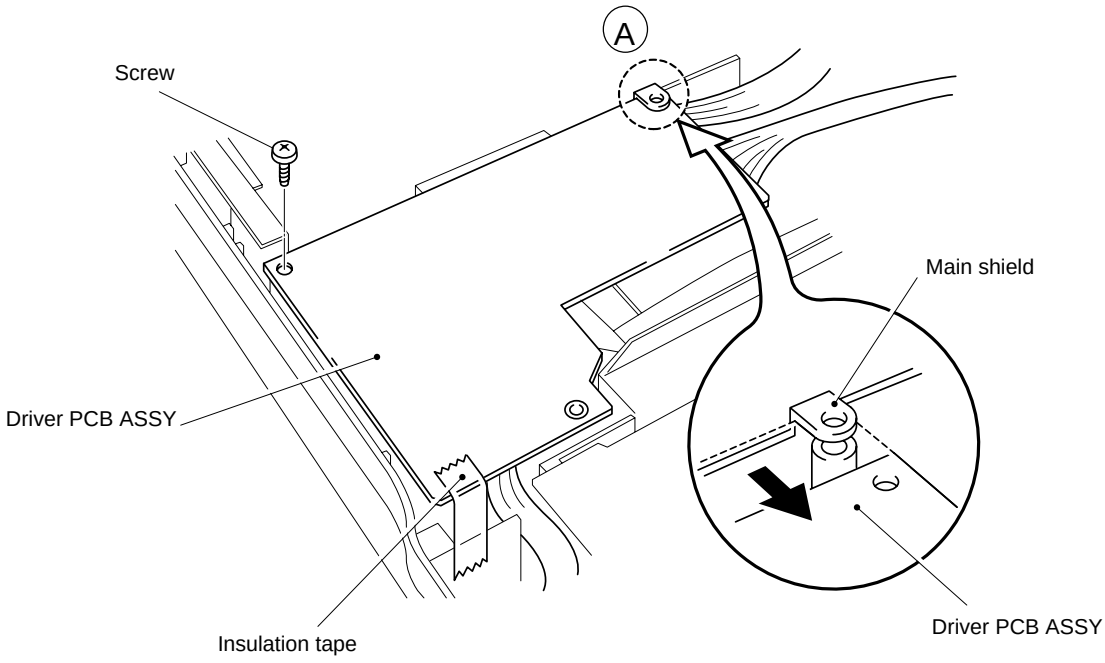
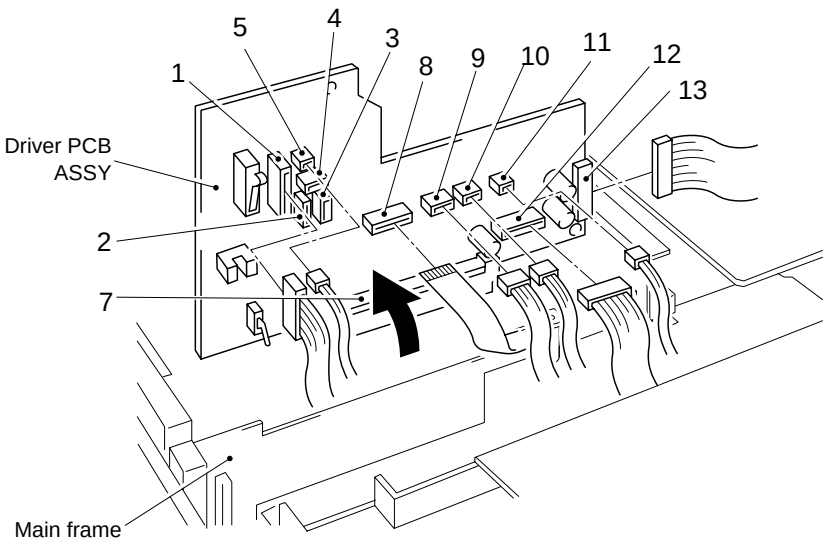


Fig. 3.27

(2) Disconnect the eleven connectors from the PCB. (Three connectors have already been disconnected when removing the scanner unit.)



(Name of the harnesses)
1. SW panel harness
2. Scan motor harness
3. Toner harness
4. Laser harness
5. Fan motor harness
7. Main connector
8. High-voltage flat cable
9. Erase lamp harness
10. SR harness
11. Solenoid harness
12. Main motor harness
13. Low-voltage harness

Fig. 3.28

Note 1: When reassembling, the cable connectors must be inserted securely into the PCB connectors and the PCB must not be stressed by the harnesses.
Note 2: The connectors should be inserted by matching the housing color and the number of pins.

3.13 Low-voltage Power Supply PCB ASSY

(1) Remove the screw securing the low-voltage power supply PCB ASSY.

(2) Disconnect the two connectors for the heater harness and the LV harness from the PCB.

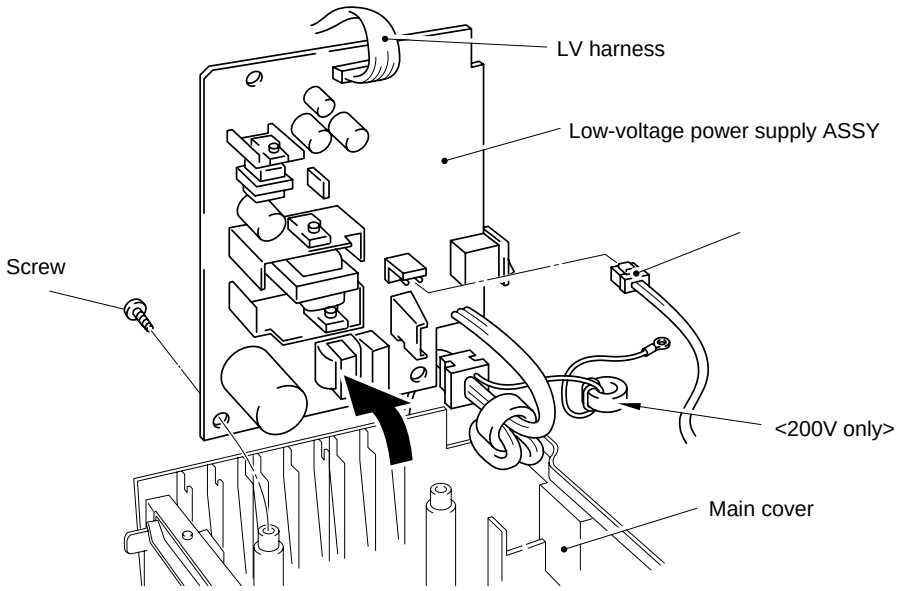


Fig. 3.29

3.14 High-voltage Power Supply PCB ASSY

(1) Remove the screw securing the high-voltage power supply PCB ASSY.

(2) Disconnect the HV flat cable from the PCB.

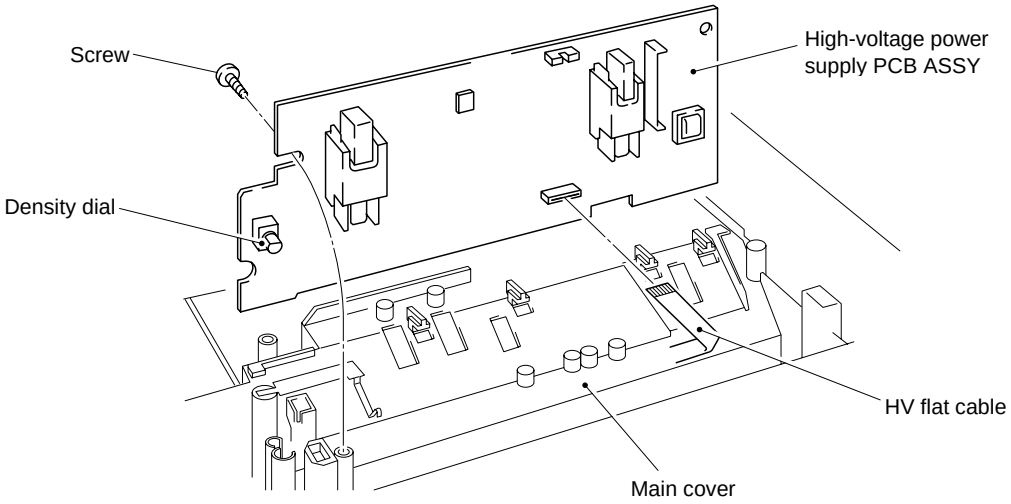


Fig. 3.30

Note: When reassembling, the flat side of the density dial shaft must be aligned with the flat side of the density dial plastic adjustment cover.

3.15 Fan Motor ASSY

(1) Remove the screw securing the fan motor ASSY.

(2) Release the two hooks of the fan holder from the main cover.

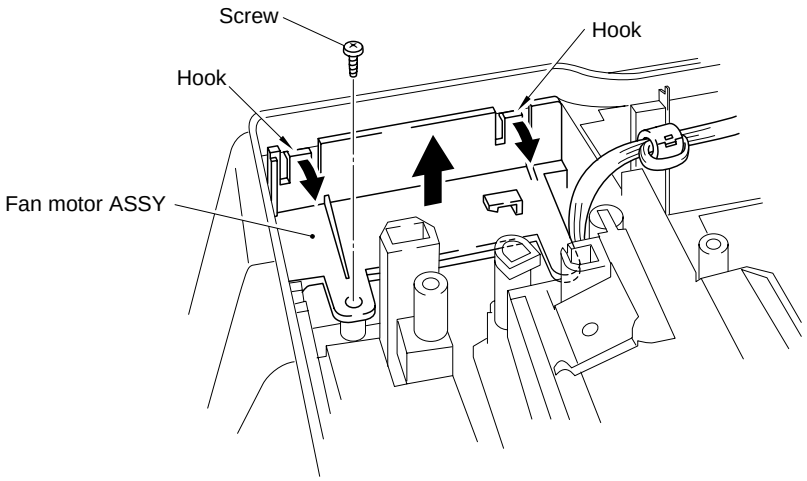


Fig. 3.31

(3) Remove the two screws securing the fan motor.

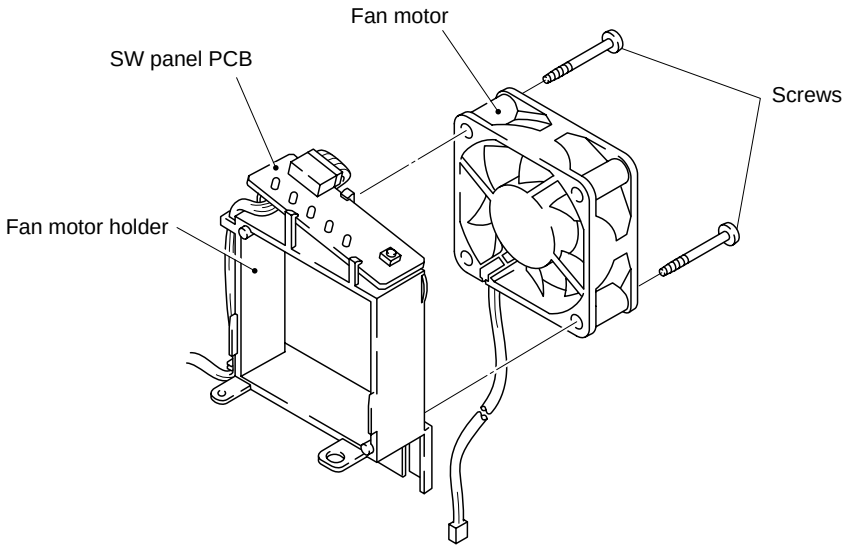


Fig. 3.32

3.16 Drive Unit

(1) Unhook the heater harness from the drive unit.

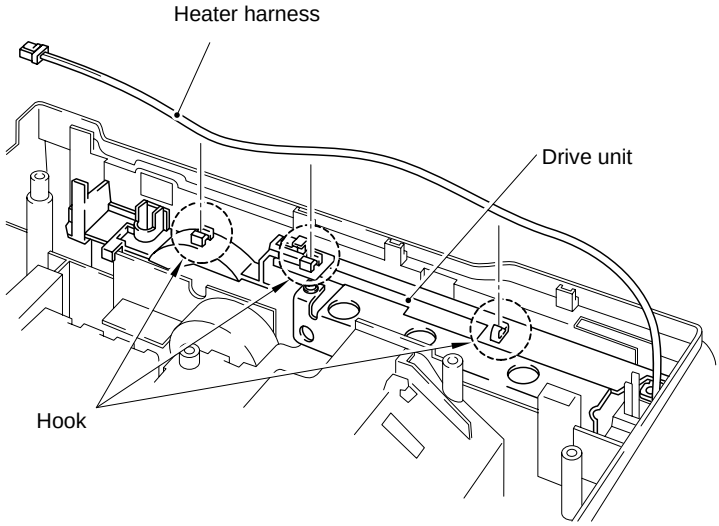


Fig. 3.33

(2) Release the hook to remove the gear cover.

(3) Remove the six screws securing the drive unit. Lift the drive unit while pressing and releasing the static removal plate spring on the drive unit.

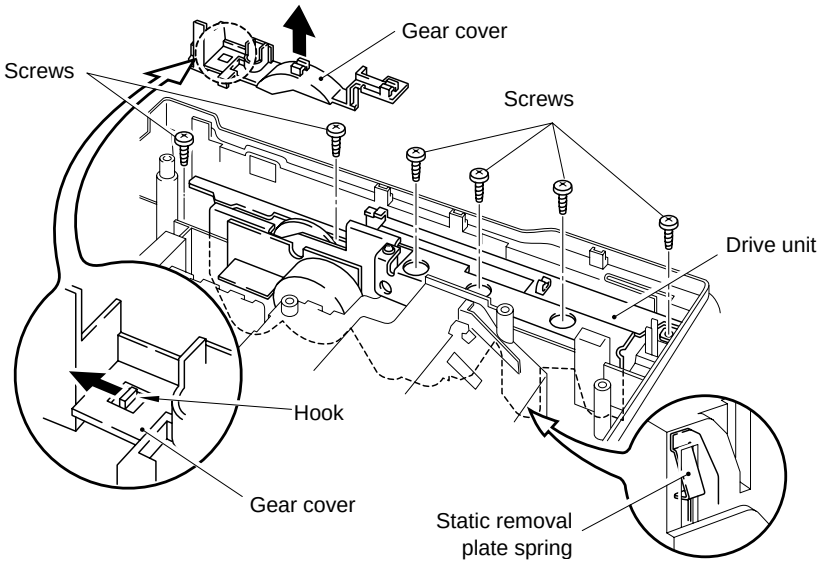


Fig. 3.34

3.17 Main Motor ASSY

(1) Remove the four screws securing the main motor ASSY.

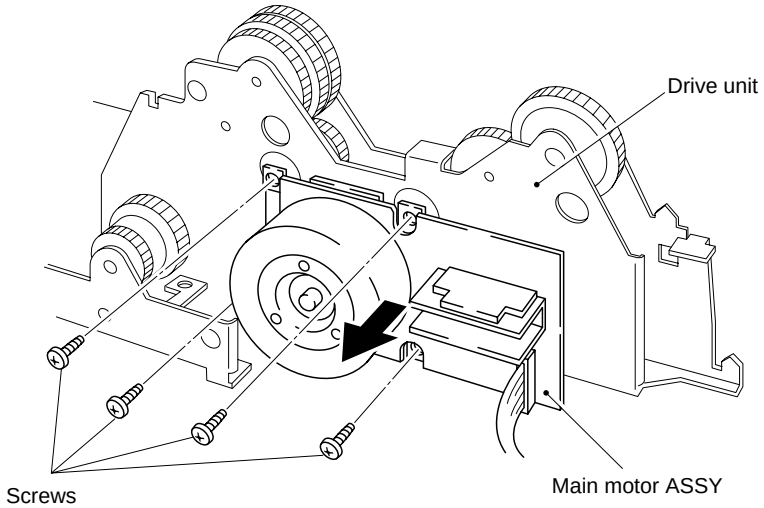


Fig. 3.35

3.18 Gears and Solenoid

(1) Apply grease to the points shown below.

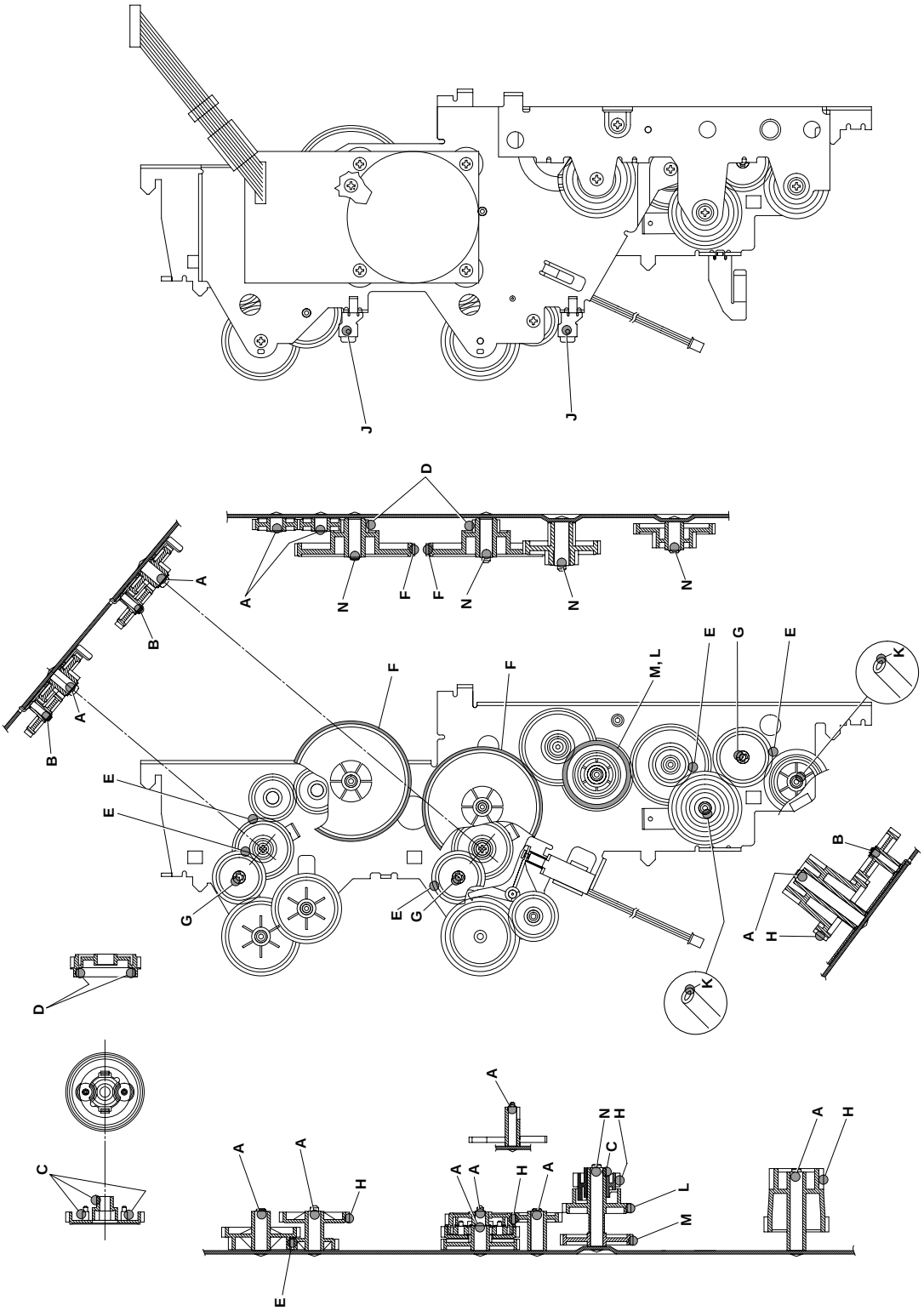


Fig. 3.36

Note: Follow instructions below when applying the grease.

Sign	When applying the grease	Grease	Application amount
A	Before installing the gear.	Dow Corning LTD. EM-30L	1 rice-grain size
B	After installing the bending washer, and before installing the gear.	Dow Corning LTD. EM-30L	1 rice-grain size
C	Before installing the gear.	Dow Corning LTD. EM-30L	1 rice-grain size
D		Dow Corning LTD. EM-30L	5 rice-grain size
E		Dow Corning LTD. EM-30L	5 rice-grain size
F		Dow Corning LTD. EM-D110	Refer to the Fig. 3.36
G		Dow Corning LTD. EM-30L	1 rice-grain size
H	After installing the drive unit on main body.	Dow Corning LTD. EM-30L	5 rice-grain size
J	After installing the drive unit on main body.	Kanto Kasei LTD. FLOIL GE334C or GE676	1/2 rice-grain size
K		Dow Corning LTD. EM-30L	1 rice-grain size
L		Dow Corning LTD. EM-D110	Refer to the Fig. 3.36
M		Dow Corning LTD. EM-D110	Refer to the Fig. 3.36
N	Before installing the gear.	Dow Corning LTD. EM-D110	5 rice-grain size

3.19 Paper Support

(1) Pull the paper support down toward you and pull both legs outwards to release it.

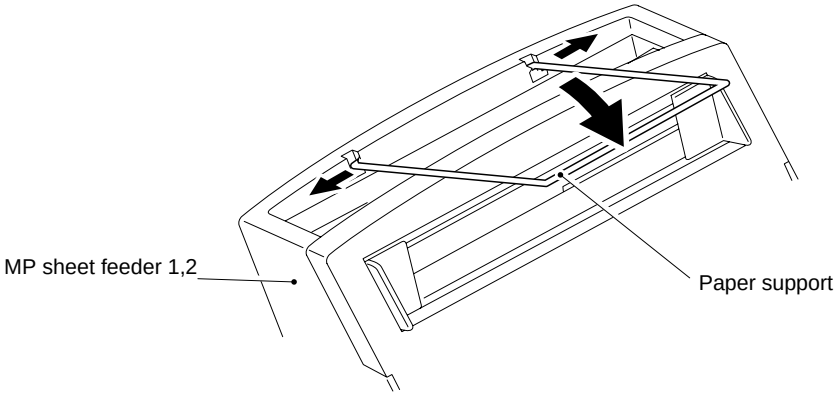


Fig. 3.37

3.20 Extension Support Wire

(1) Raise the extension support wire toward you, press both legs inward to release it, and then release the paper stopper from the wire.

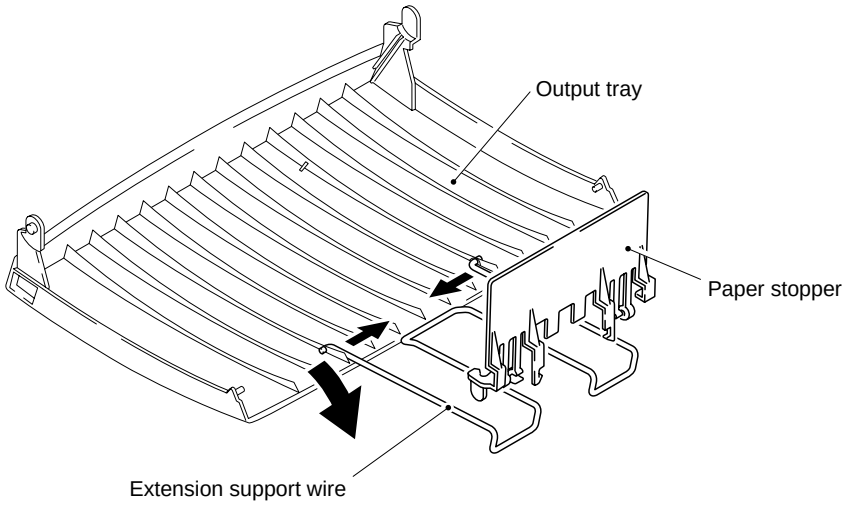


Fig. 3.38

4. PACKING

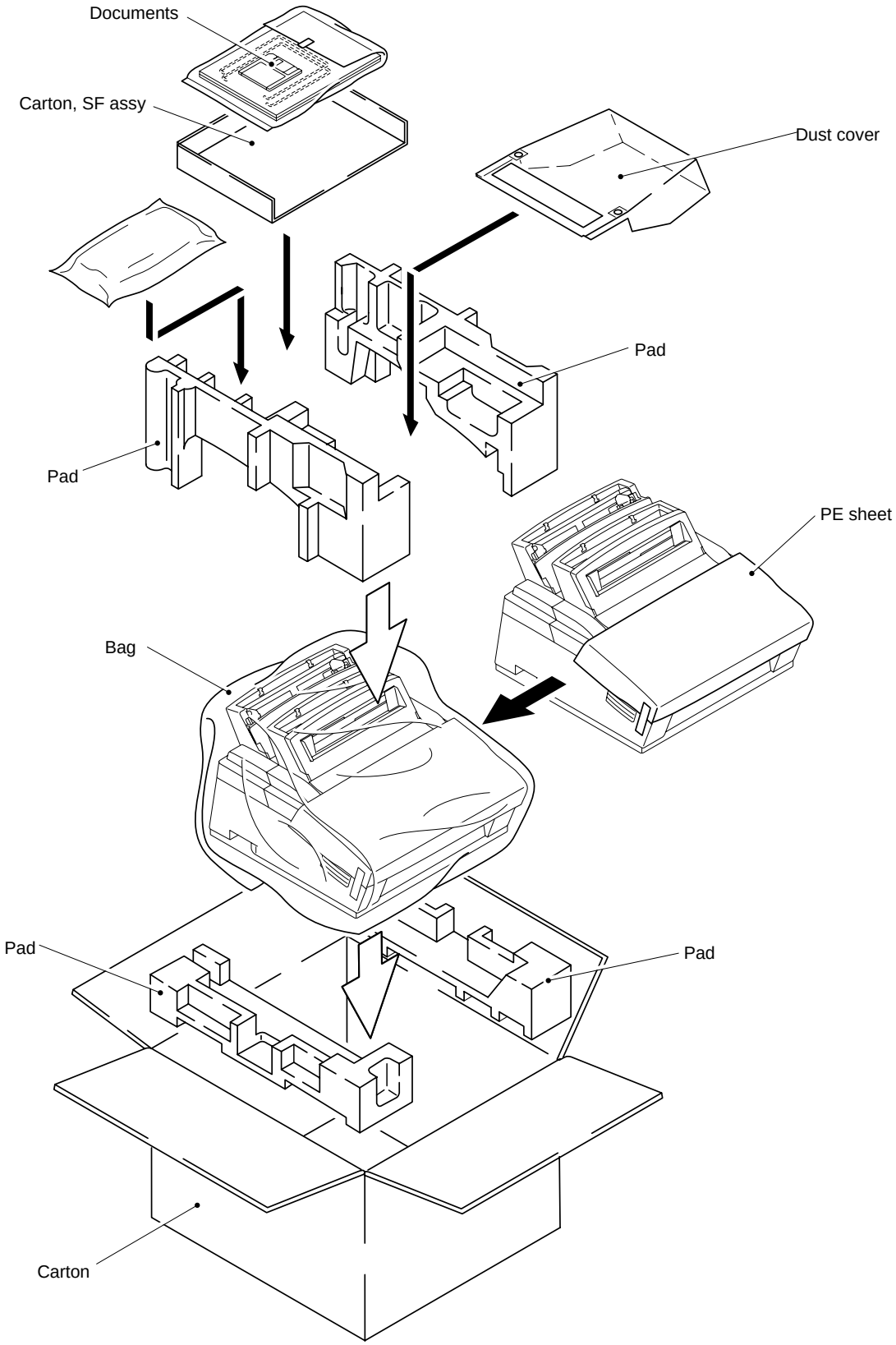


Fig. 3.39

CHAPTER IV MAINTENANCE AND TROUBLESHOOTING

1. INTRODUCTION

1.1 Initial Check

(1) Operating environment

Check if :
- The source voltage stays within ±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 damped. [If so, use fresh paper, and check whether the print quality improves or not.]

(3) Consumables

Check if :
- The Toner lamp is not lit on the control panel when a toner cartridge is installed in the printer. [If the above lamp is lit, replace the cartridge with a new one. If blank spots occur on printouts, take out the drum unit and slowly rock it to redistribute the toner evenly.]

(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 gate and separation pad may cause paper feed troubles.

If condensation has occurred, wipe the effected units or parts with a dry cloth.

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 Basic Procedure

If a malfunction or incorrect print appears, make an initial check following the basic procedure below:

(1) Check the error lamps following the inspection procedure described later in this section. If no error lamps are lit, see Section 4 for troubleshooting information.

(2) If any defective image output is found, follow the image defect fault descriptions in this section.

2. CONSUMABLE PARTS

2.1 Drum Unit

The Drum lamp is on when the drum unit is nearly at the end of its life.

Life expectancy: 20,000 pages at 20 pages per job
8,000 pages at 1 page per job

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

2.2 Toner Cartridge

Toner low: The Data and Alarm lamps blink once every five seconds.

Toner empty: The Data and Alarm lamps blink once every second.

Life expectancy: 2,200 pages/a new toner cartridge
(when printing A4- or letter-size paper at 5% print coverage)

Note: Toner life expectancy will vary depending on the type of average print job printed.

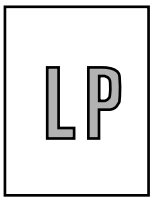
2.3 Periodical Replacement Parts

No.	Description	Part No.	Qty	service life (number of print)	Remarks
1	Fixing Unit Y (Cleaner ASSY HR)	UH3308001 (UH3310001)	1 1	(100,000)	120V
	Fixing Unit Y (Cleaner ASSY HR)	UH3309001 (UH3310001)	1 1	(100,000)	230V
2	Scanner Unit Y		1	(100,000)	
3	MP sheet feeder 1 ASSY Y (P pick-up roller shaft ASSY Y)		1 1	(100,000)	
4	MP sheet feeder 2 ASSY Y (P pick-up roller shaft ASSY Y)		1 1	(100,000)	

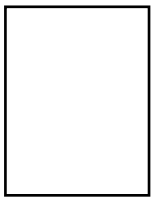
Note: The above table shows only estimated value, so these values are subject to change without prior notice.

3. IMAGE DEFECTS

3.1 Image Defect Examples

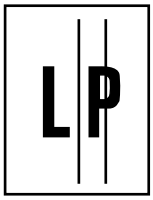

I-1 Light


I-2 Dark


I-3 Completely blank

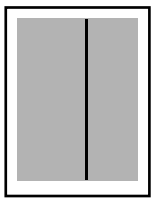

I-4 All black

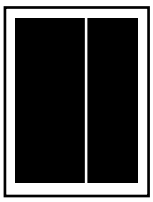

I-5 Dirt on back of paper

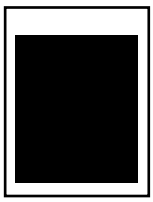

I-6 Black vertical streaks

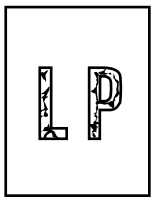

I-6 Black vertical streaks

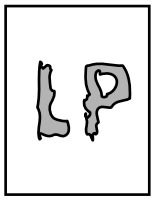

I-7 Black horizontal stripes

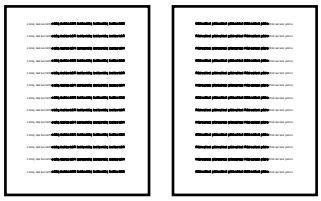

I-8 Black vertical streaks

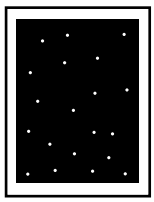

I-9 White vertical streaks


I-10 Faulty registration

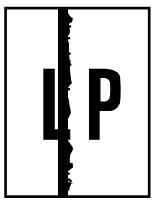

I-11 Poor fixing


I-12 Image distortion


I-13 Faint print

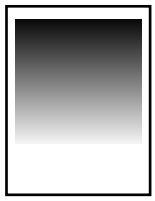

I-14 White spots

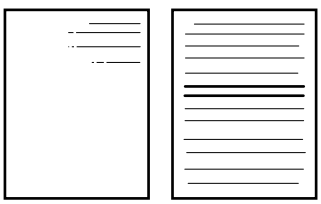

I-15 Black spots


I-16 Black band


I-17 Gray background


I-18 Hollow print


I-19 Downward fogging of solid black


I-20 Horizontal lines

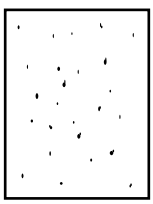
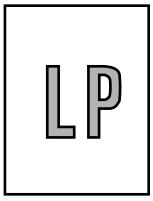

I-21 Light rain

Fig. 4.1

3.2 Troubleshooting Image Defects

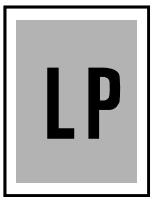
The following procedures should be followed in the event of specific image defects. See subsection 3.3 for information about the location of the high-voltage contacts and grounding contacts.

I-1	Light



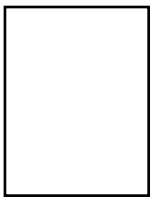
Possible cause	Step	Check	Result	Remedy	HV.GND contacts (Fig.4-5)
Density dial	1	Is the density dial in the center of the click position?	No	Set it to the center detect position.	
Toner sensing failure (printer side)	2	Can printing be started with the drum unit removed?	Yes	Toner sensor failure. Check if the toner sensor needs cleaning and check the toner sensor connection.	
Toner sensing failure (toner cartridge side)	3	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	4	Is all the contacts (HV, GND) connected with electrode when the drum unit is installed?	No	Clean contact electrodes both in the printer body and on the drum unit.	①
High-voltage power supply PCB failure	5	Check the harness connection between the high-voltage power supply PCB and the driver PCB.	No	If the connection is normal, replace the high-voltage power supply PCB.	
Driver PCB or main PCB failure	6	Perform the same check as step 5 above and also between the driver PCB and the main PCB.	No	Replace the driver PCB or the main PCB.	
Scanner unit failure	7	Is the problem solved by repealing the scanner unit?	Yes	Replace the scanner unit.	

I-2	Dark



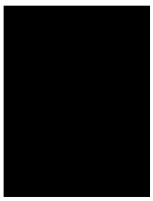
Possible cause	Step	Check	Result	Remedy	HV.GND contacts (Fig.4-5)
Density dial	1	Is the density dial at the center click position?	No	Set it to the center click position or reasonable position.	
Corona failure (soiled wire)	2	Is the corona wire dirty?	Yes	Clean the corona wire by using the wire cleaner.	⑧
Corona failure (contact failure)	3	Are the corona electrodes between the printer body and drum unit dirty?	No	Clean both electrodes.	⑥
Drum unit failure	4	Is the problem solved when the drum unit is replaced?	Yes	Replace the drum unit with a new one.	
H.V. power supply PCB	5	Are there any disconnected connectors?	No	Replace the H.V. power supply.	
Main PCB	6	Are there any disconnected connectors?	No	Replace the main PCB.	
Driver PCB	7	Are there any disconnected connectors?	No	Replace the driver PCB.	

I-3	Completely blank



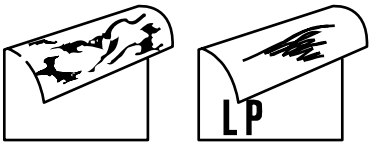
Possible cause	Step	Check	Result	Remedy	HV.GND contacts (Fig.4-5)
Developing bias contact failure	1	Are the developing bias contacts between the printer body and drum unit dirty?	Yes	Clean the electrodes at both sides.	⑦
Drum unit	2	Are the drum shaft and drum electrode of the printer body connected 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 the drum unit is replaced?	Yes	Replace the drum unit.	
Scanner harness connection failure	4	Is the scanner harness connected securely? Is there any play in the connection?	Yes	Reconnect the connector properly.	
Main/Driver PCB connection failure	5	Are printing signals being input to the scanner? Is the problem solved after the main PCB or the driver PCB replaced?	Yes	Replace the main PCB or the driver PCB.	
Scanner unit failure	6	Scanner interlock lever damaged.	Yes	Replace the scanner unit.	
		Scanner mirror is broken or loose.	No	Replace the H.V. power supply.	

I-4	All black



Possible cause	Step	Check	Result	Remedy	HV.GND contacts (Fig.4-5)
Corona failure	1	Is the corona wire of the drum unit broken?	Yes	Replace the drum unit.	
	2	Are the electric terminal springs in the printer body and the electrode on the bottom face of the drum unit dirty?	Yes	Clean the terminals in the printer and on the drum.	⑥
Harness connection	3	Is the scanner unit connected with the driver PCB correctly?	Yes	Check the harness connection between the scanner unit and the driver PCB.	
H.V. power supply PCB	4	Is the problem solved after H.V. power supply PCB replaced?	Yes	Replace the H.V. power supply PCB.	
Ditto	5	Perform the same check as in step 3.	No	Replace the panel sensor PCB.	
Main PCB	6	Is the problem solved after main PCB replaced?	Yes	Replace the main PCB.	
Driver PCB	7	Is the problem solved after driver PCB replaced?	Yes	Replace the driver PCB.	

I-5	Dirt on the back of paper



Possible cause	Step	Check	Result	Remedy
Fixing unit	1	Is the pressure roller dirty? Is any other area in the printer dirty?	Yes	Clean the pressure roller. (See the following note.)
Dirt in the drum unit	2	Is the transfer roller dirty? is the problem solved after the drum unit replaced?	Yes	Replace the drum unit
			No	Replace the H.V. power supply PCB.

Note: Cleaning of the pressure roller

(1) Set three or more sheets of paper in MP sheet feeder 1 (or 2).

2) Open the top cover.

(3) Turn on the power switch while holding down the switch on the control panel.

(4) Release the panel switch when the Drum lamp is on.

(5) Close the top cover.

(6) Hold down the panel switch until the Ready lamp is on, and then release the switch.

(7) Print three patterns; grid, zip and solid black.

(8) Turn off the power switch with the top cover closed.

(9) Set paper in the manual slot with the solid black side up.

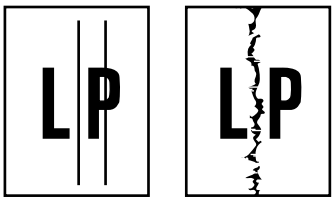
(10) Turn on the power switch while holding down the switch on the control panel.

(11) Release the panel switch when the Drum lamp is on.

(12) Press the panel switch again and release it immediately.

(13) Print a page of test pattern while cleaning the pressure roller.

I-6	Black vertical streaks	Black and blurred vertical streaks



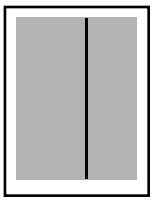
Possible cause	Step	Check	Result	Remedy	HV.GND contacts (Fig.4-5)
Corona failure	1	Is the corona wire dirty?	Yes	Clean the corona wire with the wire cleaner.	⑧
Corona failure	2	Is the vertical block streak about 10mm wide? Is the corona wire cleaner not in its home position?	Yes	Return the wire cleaner to its home position.	
Dirt in the paper feed system	3	Is the paper tray or feed system on the drum unit soiled with toner?	Yes	Clean the toner off.	
Scratch on the drum	4	Is the drum surface scratched?	Yes	Replace the drum unit.	
Cleaning failure	5	Is the drum surface dirty with toner in streaks?	Yes	Replace the drum unit.	
Scratch on the heat roller	6	Is the surface of the heat roller scratched?	Yes	Replace the fixing unit.	

Note: Is you print the same pattern continuously, the drum will be worn away and black vertical streaks appear on the paper.

I-7	Black and blurred horizontal stripes

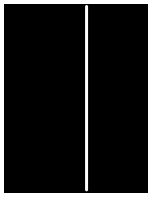
Possible cause	Step	Check	Result	Remedy
Scratch on the drum	1	Are the horizontal stripes at 94mm (OPC drum) intervals?	Yes	Replace the drum unit.
Toner stuck on the developer roller	2	Are the horizontal stripes at 25mm (developer roller) intervals?	Yes	Print several sheet and see what happens. The problem will disappear after a while. If not, replace the drum unit.
Scratch on the fixing roller	3	Are the horizontal streaks at 63mm (heat roller) intervals?	Yes	Replace the fixing unit.
SR PCB	4	Is the problem solved after the SR PCB replaced?	Yes	Replace the SR PCB.

I-8	Black vertical streaks (in the gray background)



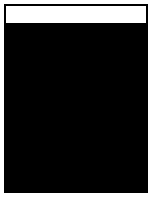
Possible cause	Step	Check	Result	Remedy
Translucent stain on the scanner window	1	Are there any stains?	Yes	Clean the scanner window. If it is not effective, replace the scanner unit.

I-9	White vertical streaks



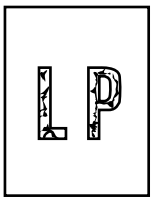
Possible cause	Step	Check	Result	Remedy
Scanner window dirty	1	Is the scanner window dirty?	Yes	Clean the scanner window with a dry tissue.
Transfer failure	2	Is the transfer roller scratched?	Yes	Replace the drum unit.

I-10	Faulty registration



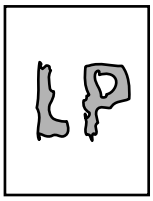
Possible cause	Step	Check	Result	Remedy
Excessive paper load	1	Is the paper loaded in the paper feeder more than 22mm deep?	Yes	Instruct the user to keep paper loads below 22mm in depth.
Print paper	2	Is the specified weight of the recommended paper being used?	No	Instruct the user to use the recommended types of paper.
Ditto	3	Is the first printing position within ±1mm of the tolerance specification?	Yes	Adjust the Y offset by using the utility software supplied.
Paper resist sensor position incorrect	4	Is the position of the paper resist sensor normal?	No	Reposition the sensor to the correct position.

I-11	Poor fixing



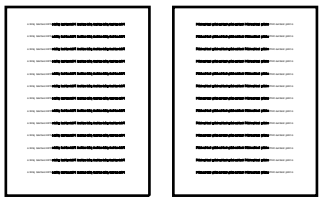
Possible cause	Step	Check	Result	Remedy
Printing paper	1	Is thick paper more than 36lb weight in use?	Yes	Instruct the user to use paper of the recommended weight and thickness.
Toner sensing failure	2	Is the problem solved by replacing the drum unit or the toner cartridge? (When printing is faint.)	Yes	Toner is empty. The toner sensing is defective, clean the toner sensor. If the wiper in the toner cartridge is broken, replace the toner cartridge with a new one.
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-12	Image distortion



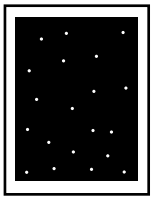
Possible cause	Step	Check	Result	Remedy
Scanner	1	Is the scanner unit secured to the frame incorrectly? Is there any play?	Yes	Secure the unit correctly and tighten the screws.
Scanner LD emission failure Scanner motor rotation failure	2	Is the laser diode or the laser scanner motor defective?	Yes	Replace the scanner unit.
Scanner connection failure	3	Is the scanner harness connected properly? Is it coming loose?	Yes	Connect the harness correctly.

I-13	Faint print



Possible cause	Step	Check	Result	Remedy
Printer not level	1	Is the printer placed horizontally?	No	Place the printer on a flat surface.
Drum unit	2	Does the problem happened immediately after replacing the drum unit with a new one?	Yes	Remove and shake the drum unit horizontally with care.
Scanner window dirty	3	Is the window of the laser scanner dirty?	Yes	Clean the scanner window with a dry tissue.
Scanner unit failure	4	Is the problem solved by replacing the scanner unit?	Yes	Replace the scanner unit.

I-14	White spots



Possible cause	Step	Check	Result	Remedy
Toner cartridge	1	Is the toner in the toner cartridge almost empty?	Yes	Shake the drum unit horizontally. Replace the toner cartridge with a new one.
			No	Replace the drum unit.
Print paper	2	Is the problem solved after change to specified of fresh unpacked paper?	Yes	Recommend the user to change the paper. (Damp (wet) paper might be used.)
Environment	3	Check if the problem still appears after the printer has warmed up.	Yes	Replace the drum unit. Advise the user of the specified print environment.

I-15	Black spots

Possible cause	Step	Check	Result	Remedy
Drum unit	1	Are the spots at 94mm intervals? The problem is not solved after printing a few pages.	Yes	If toner remains stuck, wipe it off gently with a cotton swab. Replace the drum unit if the OPC drum is scratched or deteriorated (exposed). (Refer to the following note.)
Fixing unit	2	Are the spots at 63mm intervals? And the problem is not solved after printing a few pages.	Yes	Check and clean the heat roller with a cloth dampened with alcohol. Replace the fixing unit.
SR PCB	3	Is the problem solved after the SR PCB replaced?	Yes	Replace the SR PCB.

Note: Clean the drum unit as follows:

(1) Place the printing samples in front of the process unit, and find the exact portion of image defect.

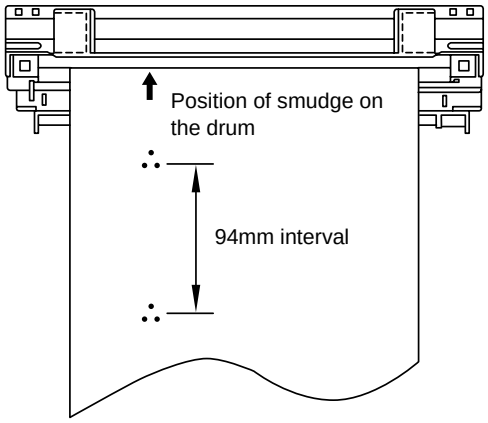


Fig. 4.2

(2) Turn the drum gear by finger while looking at the surface of the OPC drum.

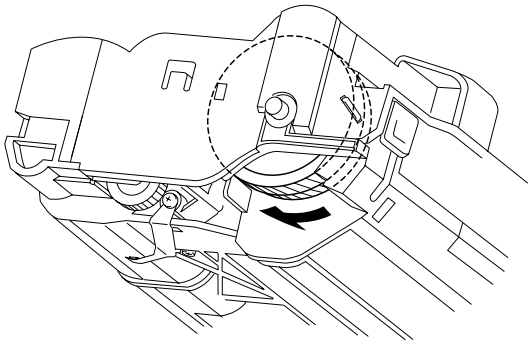


Fig. 4.3

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

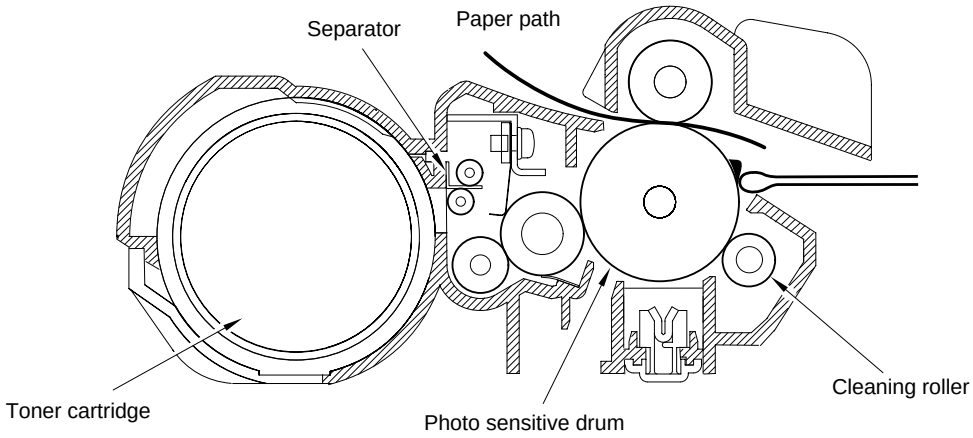
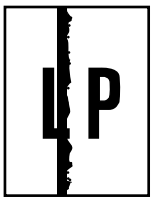


Fig. 4.4

Caution: Don't wipe the surface of the photosensitive drum with something sharp. (ball-point pen etc.)

Use the cleaning liquid which is mixed ethyl alcohol and pure water at the rate of each 50%.

I-16	Black bank



Possible cause	Step	Check	Result	Remedy
Drum unit	1	Is the wire cleaner positioned at its home position?	No	Return the wire cleaner to its home position.
			Yes	Replace the drum unit.

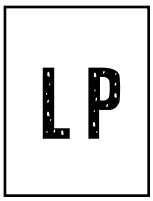
I-17	Gray background

Possible cause	Step	Check	Result	Remedy
Density dial	1	Is the problem corrected by adjusting the density dial?	Yes	Adjust the dial to the most suitable position.
Print paper	2	Does the paper being used meet the paper specification (weight, etc.).	No	Recommend to change the paper to a specified type of the paper.
			Yes	Recommend to change the paper to a fresh pack paper.
Drum unit	3	Is the problem solved after replacing the drum unit?	Yes	Replace the H.V. power supply.
				Replace the drum unit.

Note: The following cases raise the possibility of this problem.

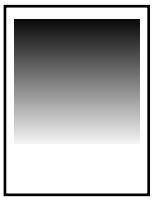
1. The drum unit is at the end of its life.
2. There is dust or paper powder.
3. A large number of paper whose width is narrower than A4 is printed.

I-18	Hollow print



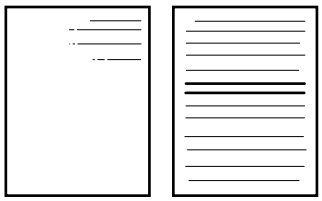
Possible cause	Step	Check	Result	Remedy
Print paper	1	Is thick paper of more than 42lb being used or extremely rough surface paper?	Yes	Recommend to use the specified type of paper.
			No	Refer and compare with I-14.

I-19	Downward fogging of solid black



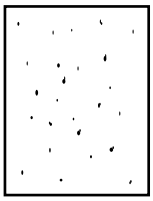
Possible cause	Step	Check	Result	Remedy
Drum unit	1	Is the problem solved after replacing the drum unit?	Yes	Replace the drum unit.
SR PCB	2	Is the problem solved after replacing the SR PCB?	Yes	Replace the SR PCB.

I-20	Horizontal lines



Possible cause	Step	Check	Result	Remedy	HV.GND contacts (Fig.4-5)
SR electrode	1	Are the SR electrodes between the printer body and the drum unit dirty?	Yes	Clean both electrodes.	⑨
SR connection failure	2	Are the SR electrodes between the printer body and the drum unit connected correctly?	No	Check the SR connection.	
Feed roller	3	Are the feed roller shaft and the ground contact connected correctly?	No	Check the connection between the shaft and the ground contact.	⑩

I-21	Light rain



Note: Make the printer in the light rain test mode as follows before checking;

1. Turn on the power switch and open the top cover.
2. Hold down the panel switch until all the lamps are on, and then release the switch.

Possible cause	Step	Check	Result	Remedy
Drum unit failure	1	Is the problem solved after replacing the drum unit which contains no more starter sheet**?	Yes	Replace the drum unit.
SR PCB failure	2	Is the problem solved after replacing the SR PCB?	Yes	Replace the SR PCB.
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.

***Note: Make sure to use the used drum unit which has already ejected the starter sheet. It is not possible to find the drum unit failure if you use a new drum unit with the starter sheet.*

3.3 Location of High-voltage Contacts and Grounding Contacts

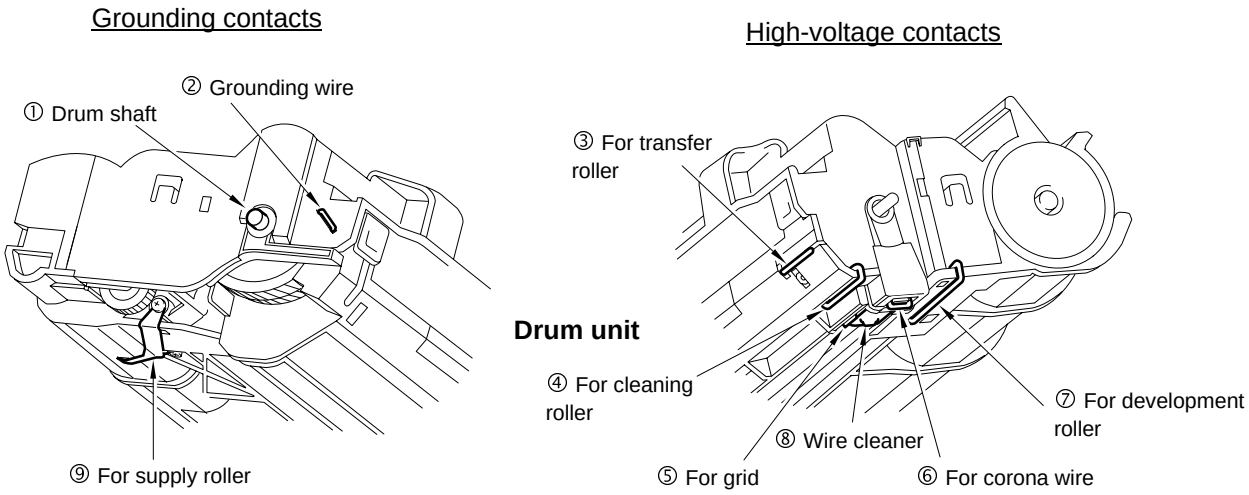


Fig. 4.5

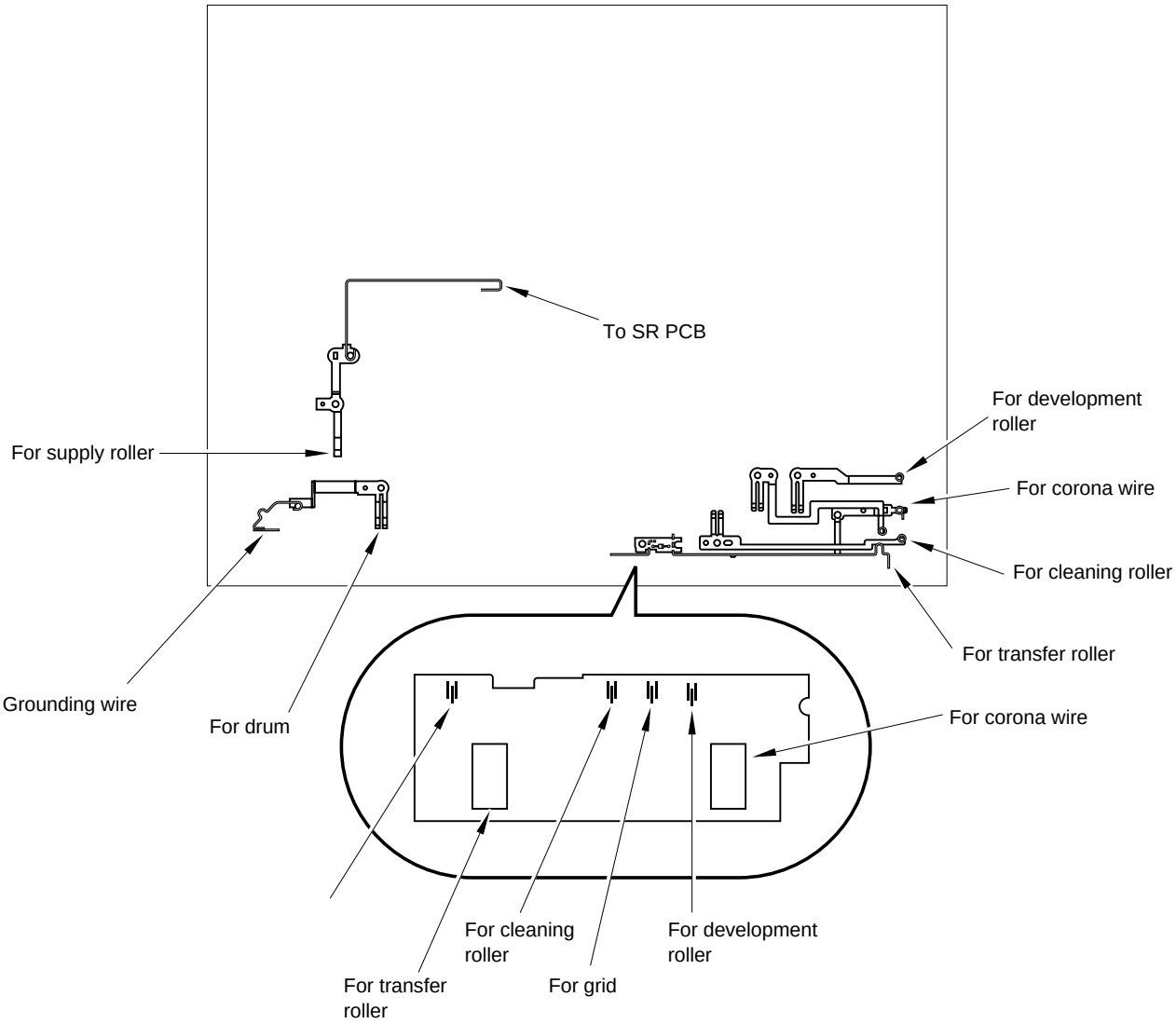


Fig. 4.6

3.4 Location of Feed Roller Shaft and Grounding Contacts

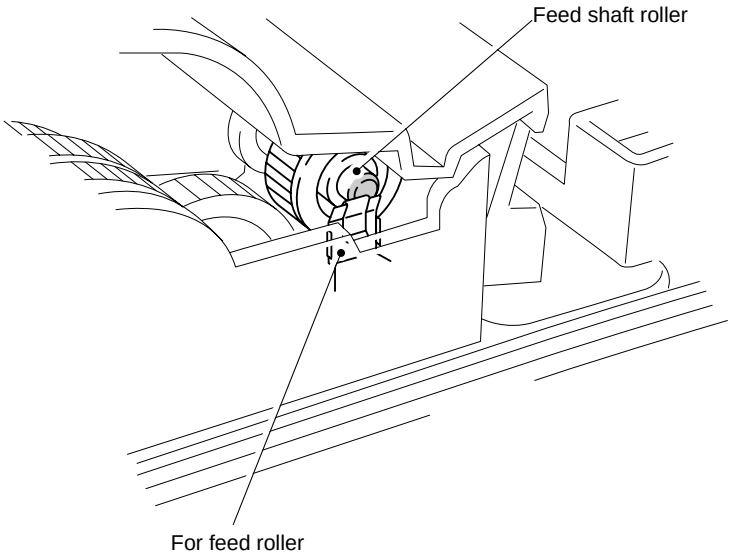


Fig. 4.7

4. PAPER JAM

Problem	Type of jam	Cause	Temp measure
Jam at power on	Paper stuck	The paper feed sensor of paper eject sensor is turned on.	Remove the paper inside the printer. If there is no paper exist, check suspected sensors referring to note and clear the problem.
Top of paper stopped at 20mm from the fixing unit. The paper feed roller rotated twice.	No paper	The paper feed sensor is not turned on.	Check the paper feed sensor motion referring to note and clear the problem.
Top of paper stopped at 250mm from the fixing unit. Next paper is not fed.	1) Jam caused by paper length considered longer than 400mm (16 inches).	1) The paper feed sensor is not returned properly, and is not turned off.	1) Check the paper feed sensor motion referring to note and clear the problem.
	2) Jam caused by malfunction of the regist sensor	2) The regist sensor actuator is not returned to the home position.	2) Attach the film onto the regist sensor actuator.
Top paper stopped at the transfer roller.	Jam caused by paper length considered shorter than 80mm.	The paper feed sensor was turned off earlier.	Malfunction of actuator or hardware noise. Check sensors referring to note and clear the cause of the problem.
Paper was fed approx. 20mm transfer roller.	Jam caused by delay of paper feed.	Due to the paper dust or rubber of the paper feed roller war, paper was not fed in proper timing.	Remove the paper dust attached to the paper feed roller. If the rubber is worn out, replace it with new one.
Top of paper stopped at 17mm from the contact point of the heat roller and pressure roller.	Jam caused paper is not ejected from paper eject sensor.	Paper eject sensor does not work properly and is not turned off. (single printing)	Check the sensor motion referring to note and clear the problem.
Top of paper stopped at 35mm from the contact point of the heat roller and pressure roller.	Jam caused paper is not ejected from paper eject sensor.	Paper feed sensor is not turned on.	Check the sensor motion referring to not and clear the problem.
Jam occurred after ejecting paper.	Same as above.	Same as above. (continuous printing)	Same as above.
Top of paper stopped at 20mm from the fixing unit.	1) Cover open.	1) Cover is not closed properly.	1) Check if the drum unit is installed correctly.
	2) Bug	2) Bug	2) Please inform BIL.

Note: *How to make the sensors*

(1) Open the cover.
(2) Power on the printer while pressing the panel switch.
(3) Release the panel switch.
(4) Press and release the panel switch.

Results:
*Alarm Lamp is ON = Paper feed sensor is turned ON
*Drum Lamp is ON = Paper eject sensor is turned ON

5. TROUBLESHOOTING MALFUNCTIONS

When carrying out 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 the power switch OFF and disconnect the P13 connector (Driver PCB). Turn the power switch ON again. Measure the voltages between the terminals. Do the measured voltage satisfy the prescribed value in the table below?	Yes	Turn the power switch OFF, 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			No	Replace the low-voltage power supply PCB.

PCB	+ lead pin	- lead pin	Voltage
Driver	P13-4.5	P13-2.3	Approx. 24V
	P13-8.9	P13-6.7	Approx. 5V

***Caution**: 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 unrotated

Possible cause	Step	Check	Result	Remedy
Failure of connector	1	Is the connection of connector P12 on the driver PCB correct?	No	Reconnect the connector.
Main motor (M1)	2	Disconnect connector P12 from the driver PCB. Measure the resistance between the connector pins of the main motor by using a circuit tester. Do the measured resistances satisfy the prescribed values in the table below? P12-1 and P12-3: Approx. 9Ω P12-4 and P12-6: Approx. 9Ω	No	Replace the Main motor.
Driver PCB	3	is the problem solved by replacing the driver PCB?	Yes	Replace the driver PCB.

M-4	No paper supplied

Possible cause	Step	Check	Result	Remedy
Connection failure	1	Is the contact of connector P11 on the driver PCB good?	No	Reconnect the connector.
Driver PCB circuit	2	Set paper on the manual paper slot and make the test print by pressing the switch on the control panel.	No	Replace the driver PCB.
Paper pick-up clutch solenoid		Does the voltage between pins 2 (SOLENOID) and 1 (24V) of the P11 connector on the driver PCB change from approx. 24V DC to 0V within the specified time?	Yes	Replace the paper pick-up solenoid.
MP tray unit failure	3	Is the surface of the separation pad or the pick up roller worn out or stained?	Yes	Clean the surface or replace.
Main PCB	4	Is the problem solved by replacing the main PCB?	Yes	Replace the main PCB.
Relay PCB	5	Is the problem solved by replacing the relay PCB?	Yes	Replace the relay 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 high-voltage contact.
	2	Check the connection of the harness between the high-voltage power supply and the driver PCB is OK.	Yes	Replace the high-voltage power supply PCB.
			No	Reconnect the harness between the high-voltage power supply and the driver PCB.

M-6	SR PCB failure

Possible cause	Step	Check	Result	Remedy
SR bias contact	1	Do any of the terminals on the SR contacts have dirt or contact burns?	Yes	Clean the SR bias contact.
Ditto	2	Check the connection of the harness between the SR PCB and the driver PCB.	Yes	Replace the SR PCB.

M-7	Fixing heater temperature failure

Possible cause	Step	Check	Result	Remedy
Poor thermistor harness contact	1	Are the connectors on the erase lamp PCB and the high-voltage power supply PCB secured correctly?	No	Connect the connectors securely.
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 fixing unit lamp. Is it open circuit?	Yes	Replace the halogen heater lamp.

M-8	BD failure

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is connector P4 on the driver PCB secured correctly?	No	Connect it securely.

M-9	Scanner failure

Possible cause	Step	Check	Result	Remedy
Harness connection failure	1	Is the connection of the scanner motor connector P2 on the driver PCB secured?	No	Reconnect the connectors securely.
Power supply input	2	Is the voltage between pins 1 (+24VDC) and 2 (GND) of connector P2 on the driver PCB 24 Volts DC?	No	Check if +24VDC is supplied between pins 4.5 (+24VDC) and 2.3 (+24VRET) of connector P13 on the driver PCB. If not, check the power supply output on the low-voltage power supply PCB.
			Yes	Replace the scanner unit.

F-1	Double feeding

Possible cause	Step	Check	Result	Remedy
Paper	1	Is paper of a recommended type being used?	No	Instruct the user to use recommended types of paper.
Separation pad	2	Is the surface of the separation pad worn out?	Yes	Replace the MP sheet feeder.

F-2	Wrinkles

Possible cause	Step	Check	Result	Remedy
Paper	1	Is paper of a recommended type being used?	No	Instruct the user to use the recommended types of paper.
	2	Is the wrinkle 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	3	Is the entrance guide dirty?	Yes	Clean the entrance guide.
Fixing unit	4	Is the pressure roller dirty?	Yes	Clean the pressure roller
			No	Replace the fixing unit.

6. INSPECTION MODE

6.1 Incorporated Inspection Modes

The printer incorporates various inspection modes such as the factory inspection mode and the test print mode. The inspection mode varies depending on the model of the printer.

This printer supports a factory inspection mode, continuous grid pattern print mode, 3 patterns print mode and NV-RAM value dump mode.

The operation of the inspection mode is as follows.

(1) Turn off the power switch of the printer.

(2) With the top cover open, turn on the power switch while holding down the switch on the control panel.

When you enter this inspection mode, the Drum lamp is ON. Holding down the panel switch will cause the lamps turn ON in the order Drum → Alarm → Ready → Data → Drum. When you release the switch, a mode is selected.

The mode selected is indicated by the lamp which is ON when you release the switch.

The inspection modes are assigned to the respective lamps as shown below.

Lamp	Type of inspection
Drum	Factory inspection mode
Alarm	Continuous grid pattern print mode
Ready	3 patterns print mode (grid → zip → black)
Data	NV-RAM value dump mode
Drum + Alarm	ROM code reprogramming mode (only when the flash memory is fitted)
Alarm + Ready	RAM check
Ready + Data	4% density pattern print mode

Details of the factory inspection mode are as follows.

This mode is used to check if the sensors in the printer are functioning correctly. In the process of this inspection, the lamps and the switch on the control panel are also checked. On entering this mode, the lamps show the status of the respective sensors as follows.

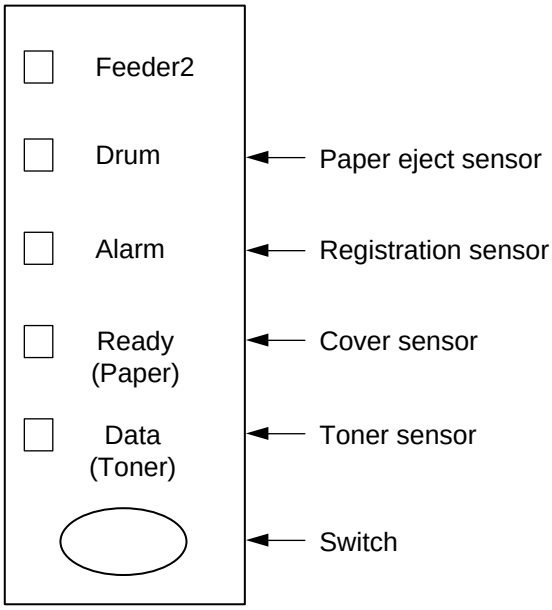


Fig. 4.8

Paper eject sensor	ON (Paper is detected.)	Drum lamp ON
	OFF (No paper is detected.)	Drum lamp OFF
Registration sensor	ON (Paper is detected.)	Alarm lamp ON
	OFF (No paper is detected.)	Alarm lamp OFF
Cover sensor	ON (The top cover is closed.)	Ready lamp OFF
	OFF (The top cover is open.)	Ready lamp ON
Toner sensor	ON (The toner cartridge is installed.)	Data lamp OFF
	OFF (No toner cartridge is installed.)	Data lamp ON

The procedure for the factory inspection mode is as follows.

(1) Turn the printer power switch OFF, open the top cover, and remove the drum unit.

(2) Turn the printer power switch ON while holding down the control panel switch. The Drum lamp comes ON.

(3) Lightly press the panel switch again.

(4) Check that the Drum(paper eject sensor) and Alarm(registration sensor) lamps go OFF after all the lamps have been ON.

If the paper eject sensor is ON at this point, the Drum lamp stays ON (error).
If the registration sensor is ON at this point, the Alarm lamp stays ON (error).

(5) Install the drum unit.
Check that the Data lamp goes OFF.

(6) Lightly touch the registration sensor actuator.
Check that the Alarm lamp comes ON.

(7) Close the top cover.
Check that the Ready lamp goes OFF.

(8) Press the control panel switch.

(9) If all the sensors are correct, the printer goes back to the Ready status. If any error is detected, the corresponding lamp stays ON.

6.2 Error Codes

In the event of a printer failure, error codes will be indicated as shown below. All the lamps and the specific lamps are turned ON alternately. The specific combination of lamps that are ON indicates the type of the error.

Type of error	Data	Ready	Alarm	Drum	Feeder
Fuser Malfunction				○	
Laser BD Malfunction			○		
Scanner Malfunction			○	○	
ROM Error		○			
D-RAM Error		○		○	
Service A *		○	○		
Service B *		○	○	○	
NV-RAM Error	○	○		○	
CPU Runtime Error *	○	○	○	○	
Main Motor Error					○

* Refer to the further description of those errors as follows;

- Service A: Address Error
- Service B: Buse Error
- CPU Runtime Error: The error which CPU other than the above two detects, such as Illegal Instruction or Operation Overflow

HOW THE LED INDICATE AN ERROR

FUSER MALFUNCTION

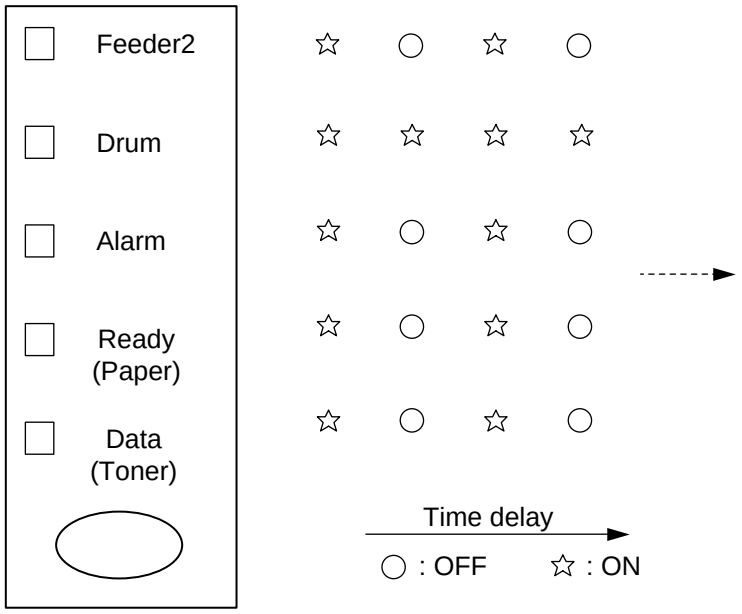


Fig. 4.9

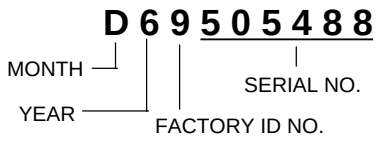
APPENDIX 1. SERIAL NO. DESCRIPTIONS

The descriptions as below shows how to read labels on each place.

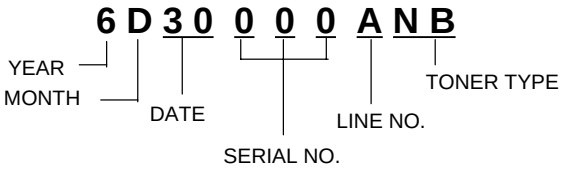
< ID for production month >

A:	January	E:	May	J:	September
B:	February	F:	June	K:	October
C:	March	G:	July	L:	November
D:	April	H:	August	M:	December

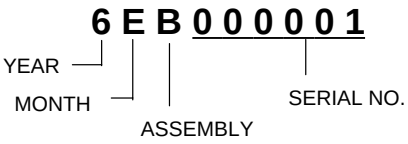
(1) Printer .....on the main body



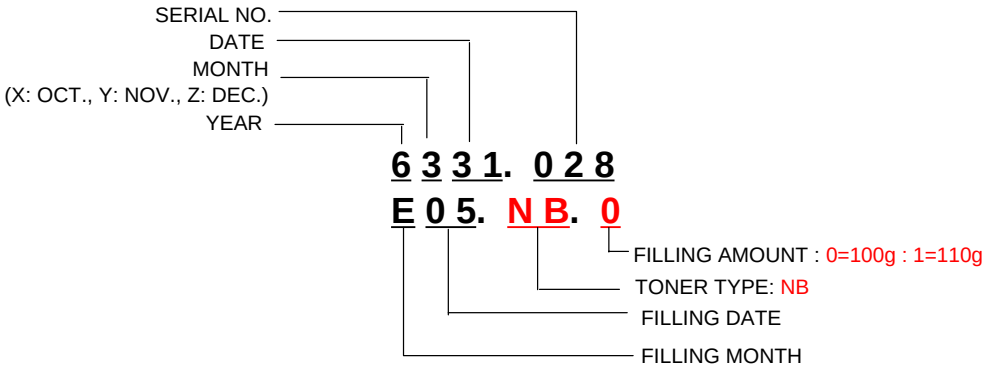
(2) Process unit .....on the package of the process unit
(Drum unit with toner cartridge)



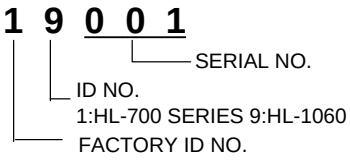
(3) Drum unit .....on the drum unit



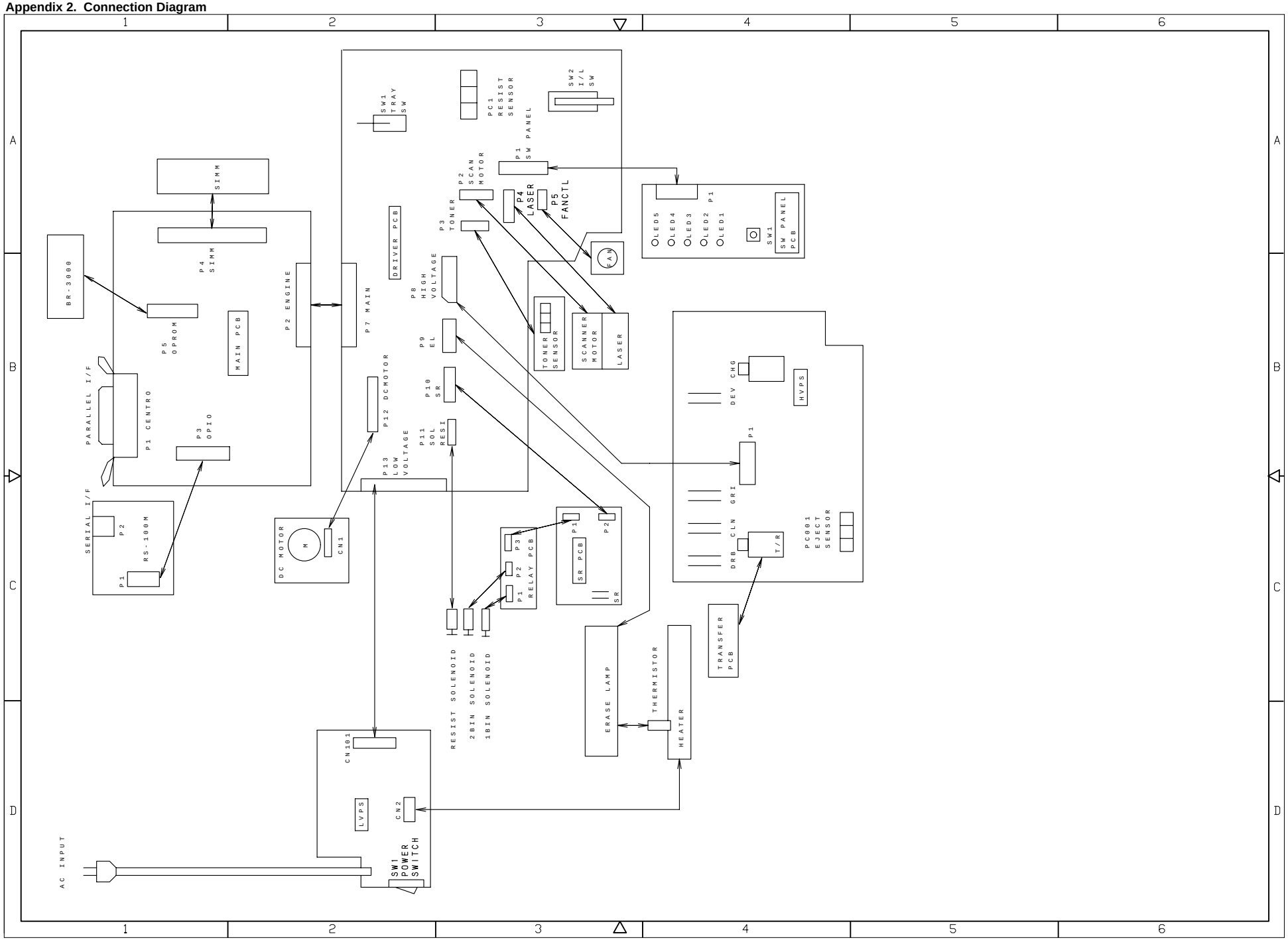
(4) Toner cartridge .....on the toner cartridge



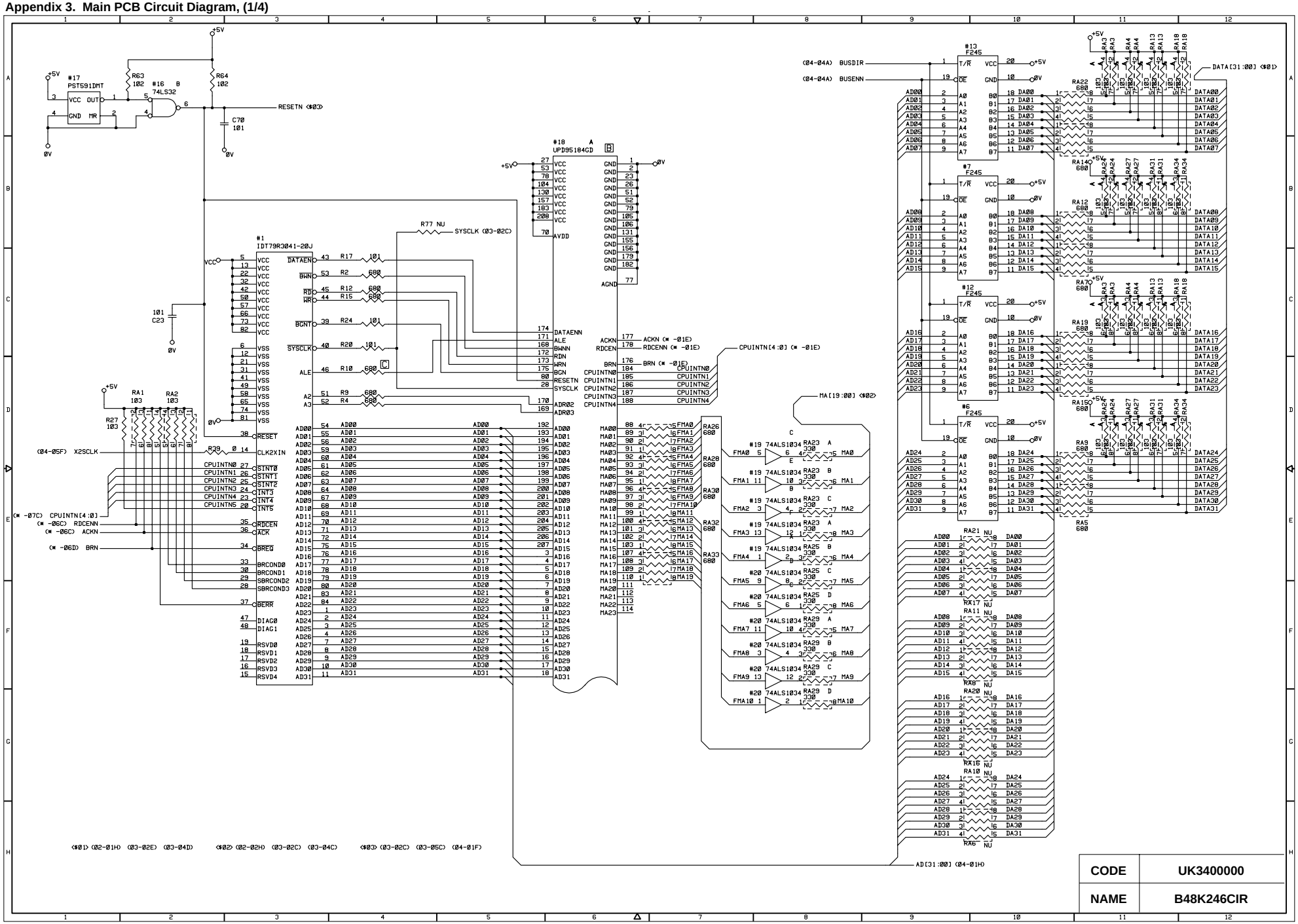
(5) Scanner unit .....on the scanner unit



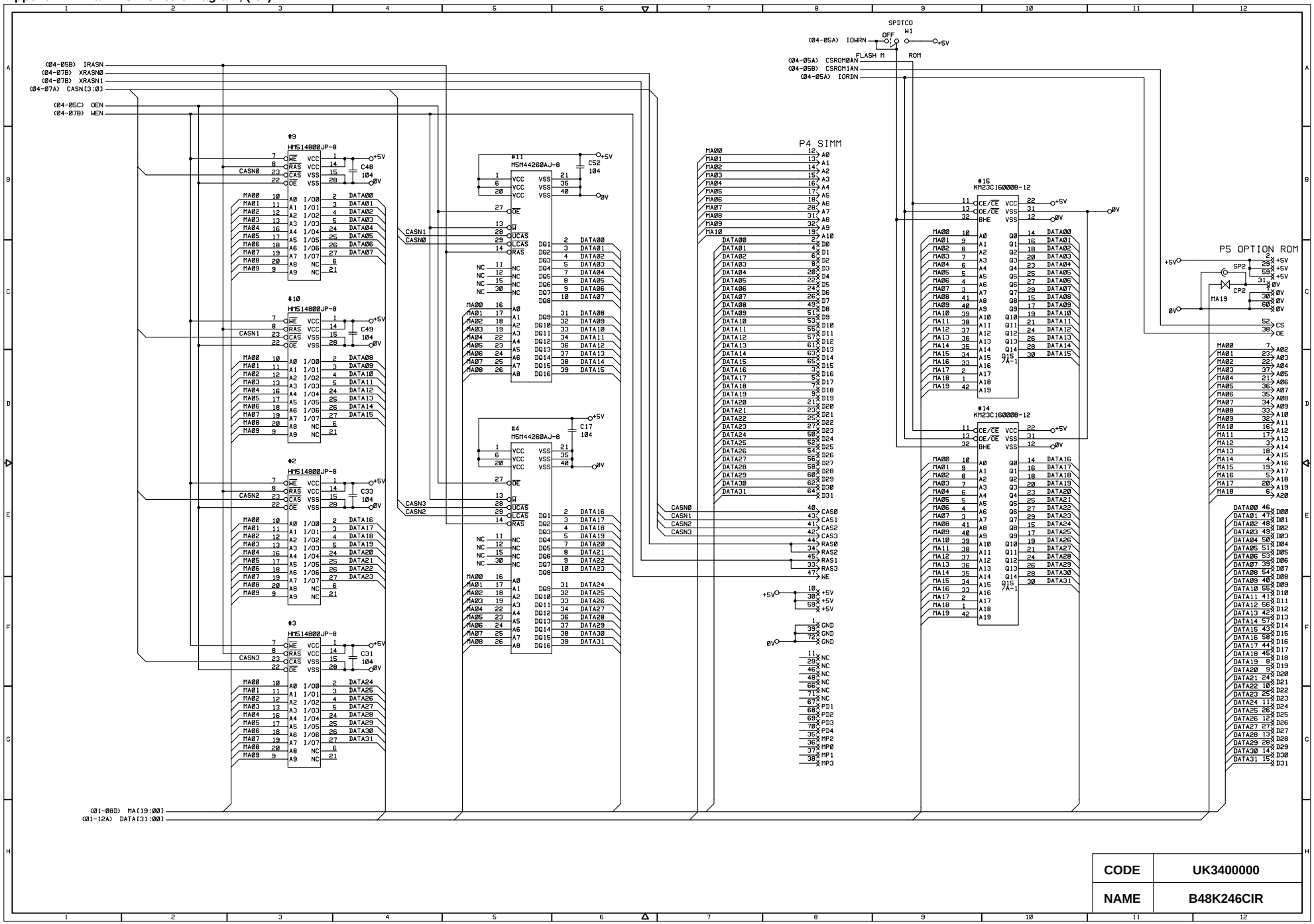
Appendix 2. Connection Diagram



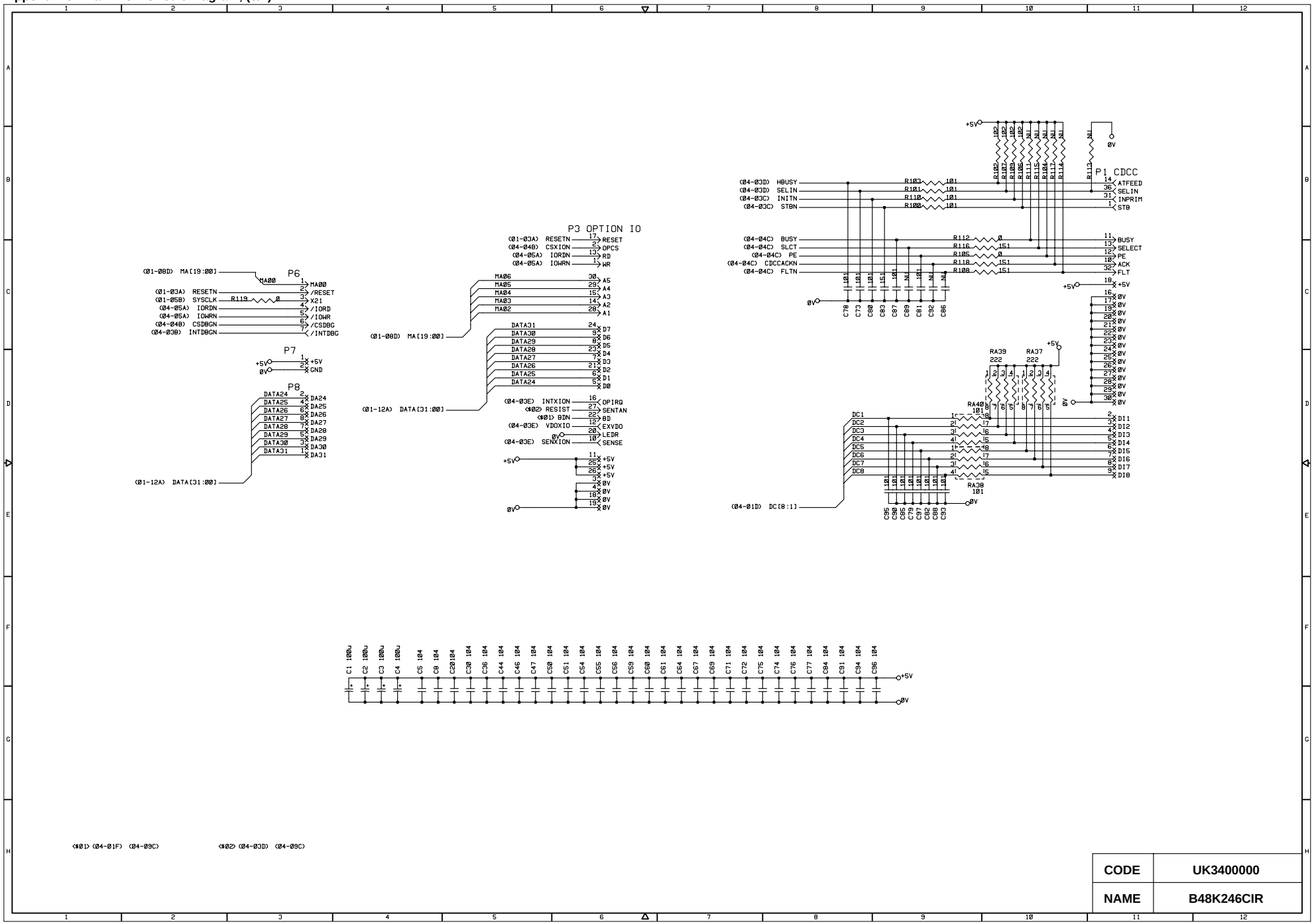
Appendix 3. Main PCB Circuit Diagram, (1/4)



Appendix 4. Main PCB Circuit Diagram, (2/4)

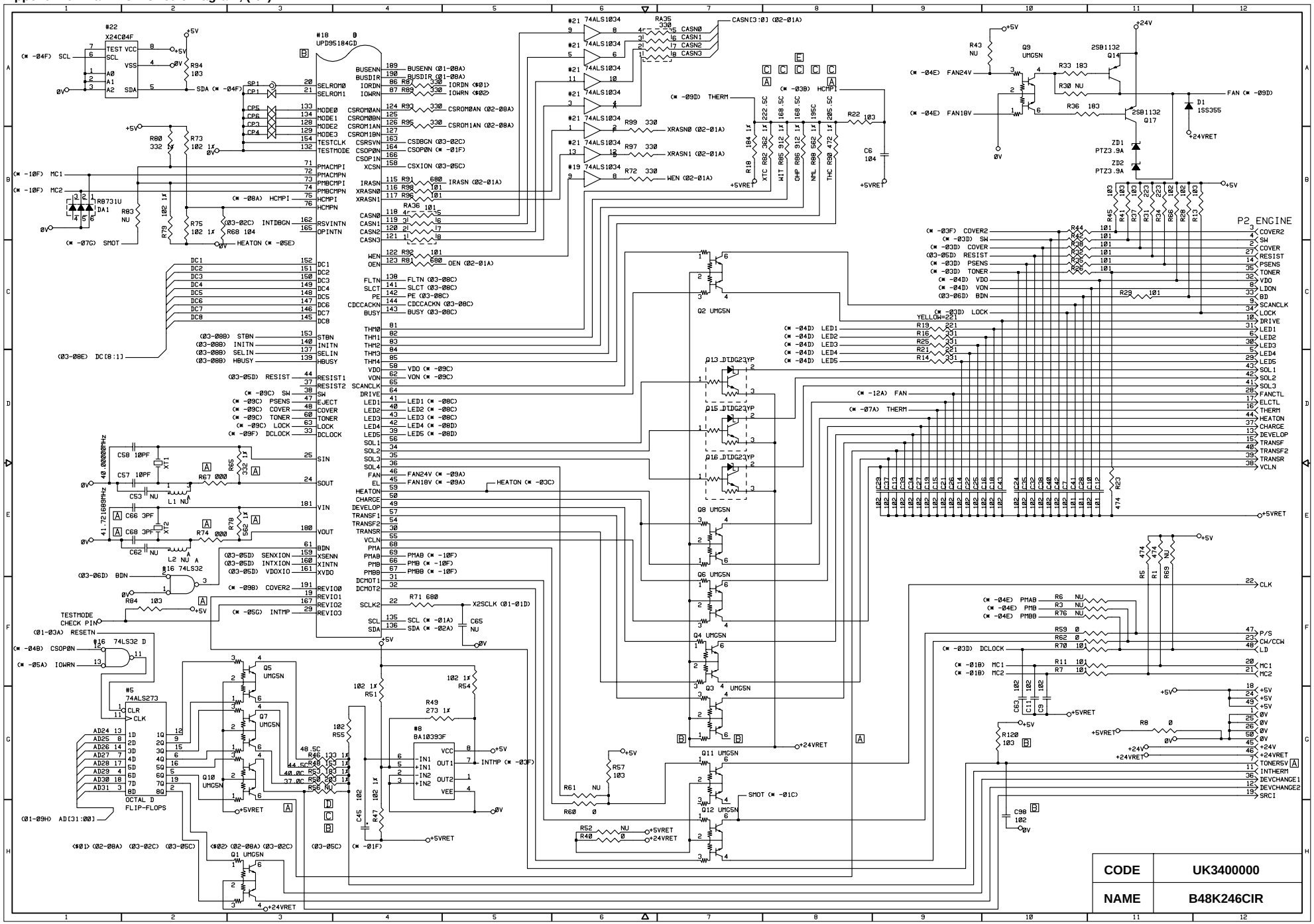


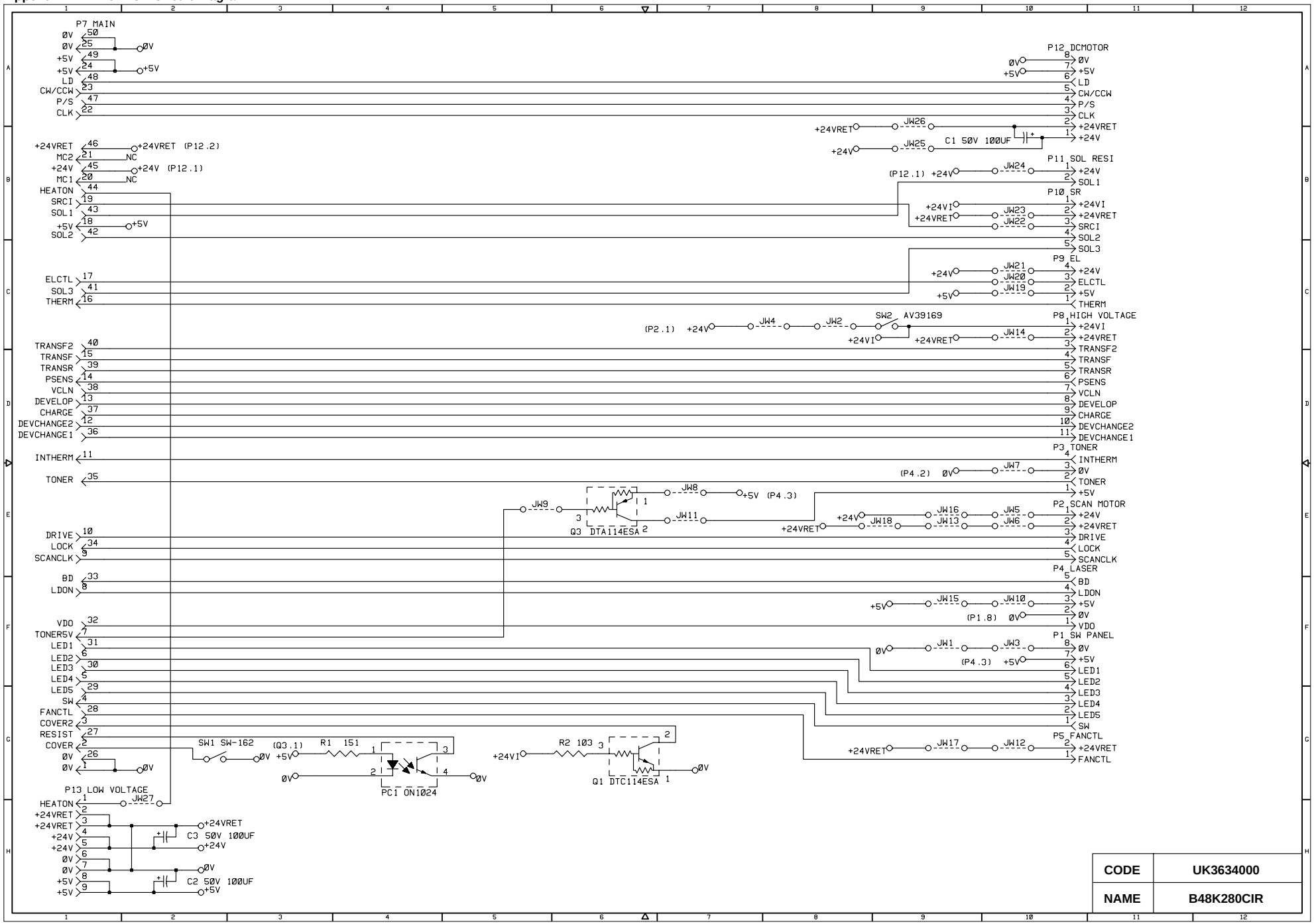
CODE	UK3400000
NAME	B48K246CIR

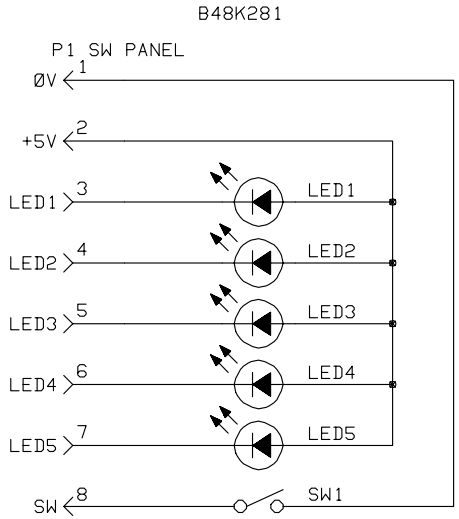


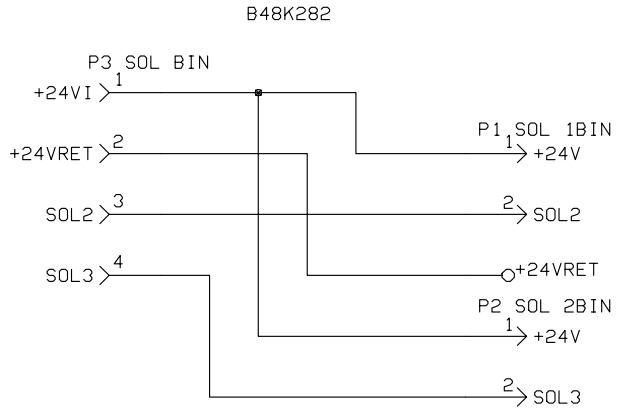
CODE	UK3400000
NAME	B48K246CIR

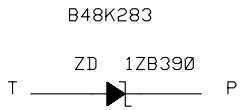
Appendix 6. Main PCB Circuit Diagram, (4/4)




P7 MAIN
P12 DCMOTOR
P11 SOL RESI
P10 SR
P9 EL
P8 HIGH VOLTAGE
P3 TONER
P2 SCAN MOTOR
P4 LASER
P1 SW PANEL
P5 FANCTL
P13 LOW VOLTAGE
Q3 DTA114ESA
Q1 DTC114ESA
PC1 ON1024
SW1 SW-162
C1 50V 100UF
C2 50V 100UF
C3 50V 100UF
CODE
UK3634000
NAME
B48K280CIR

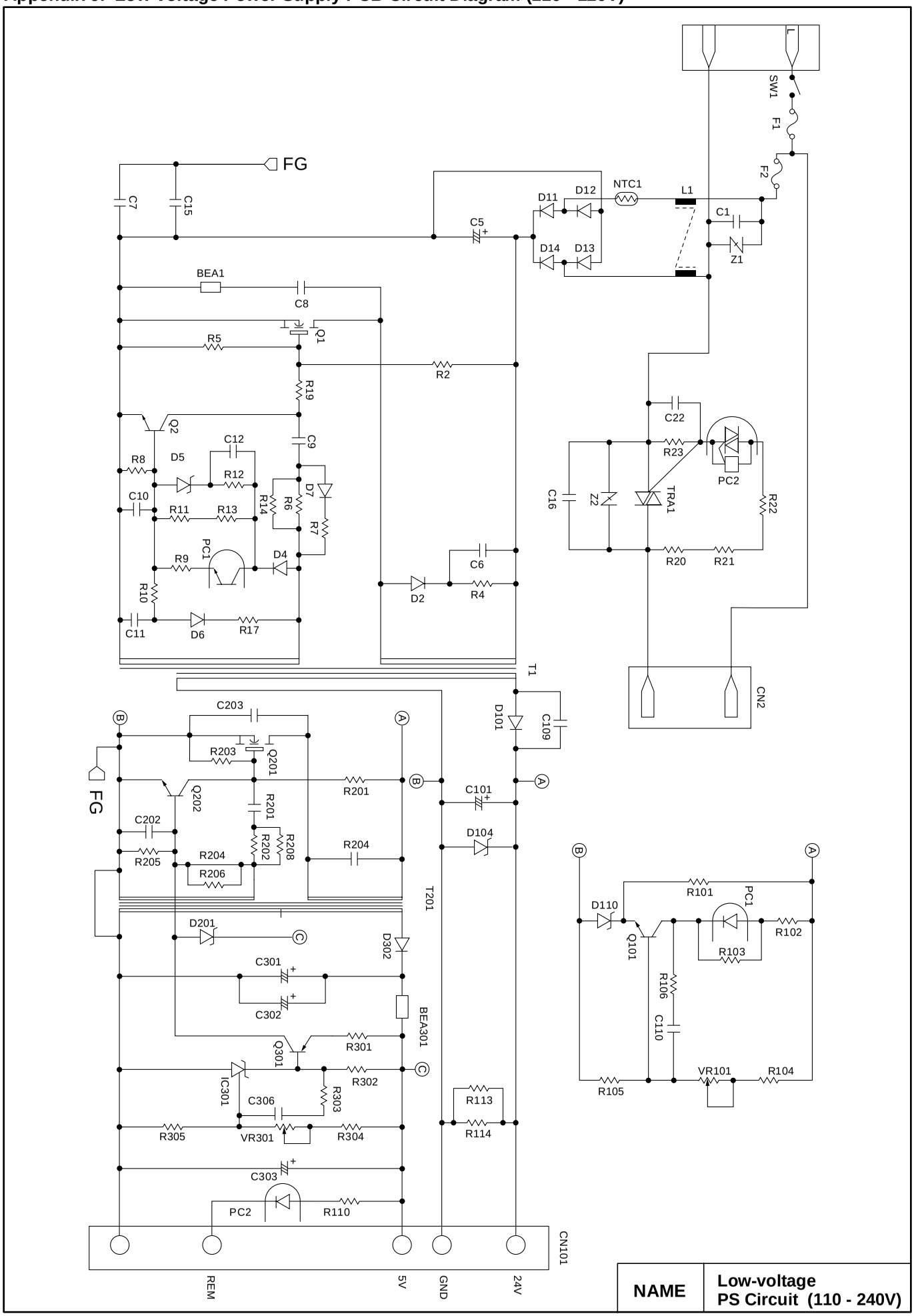




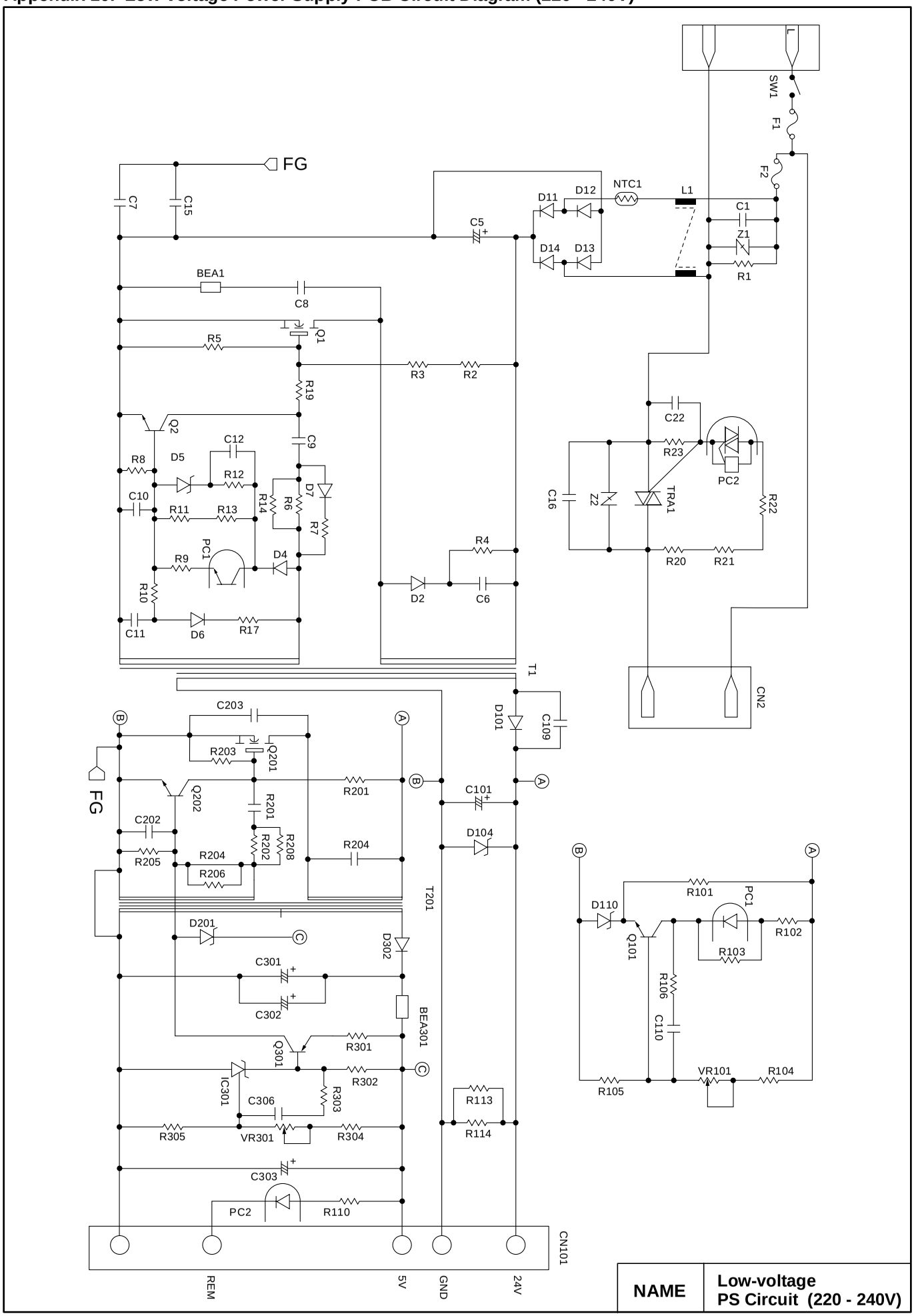


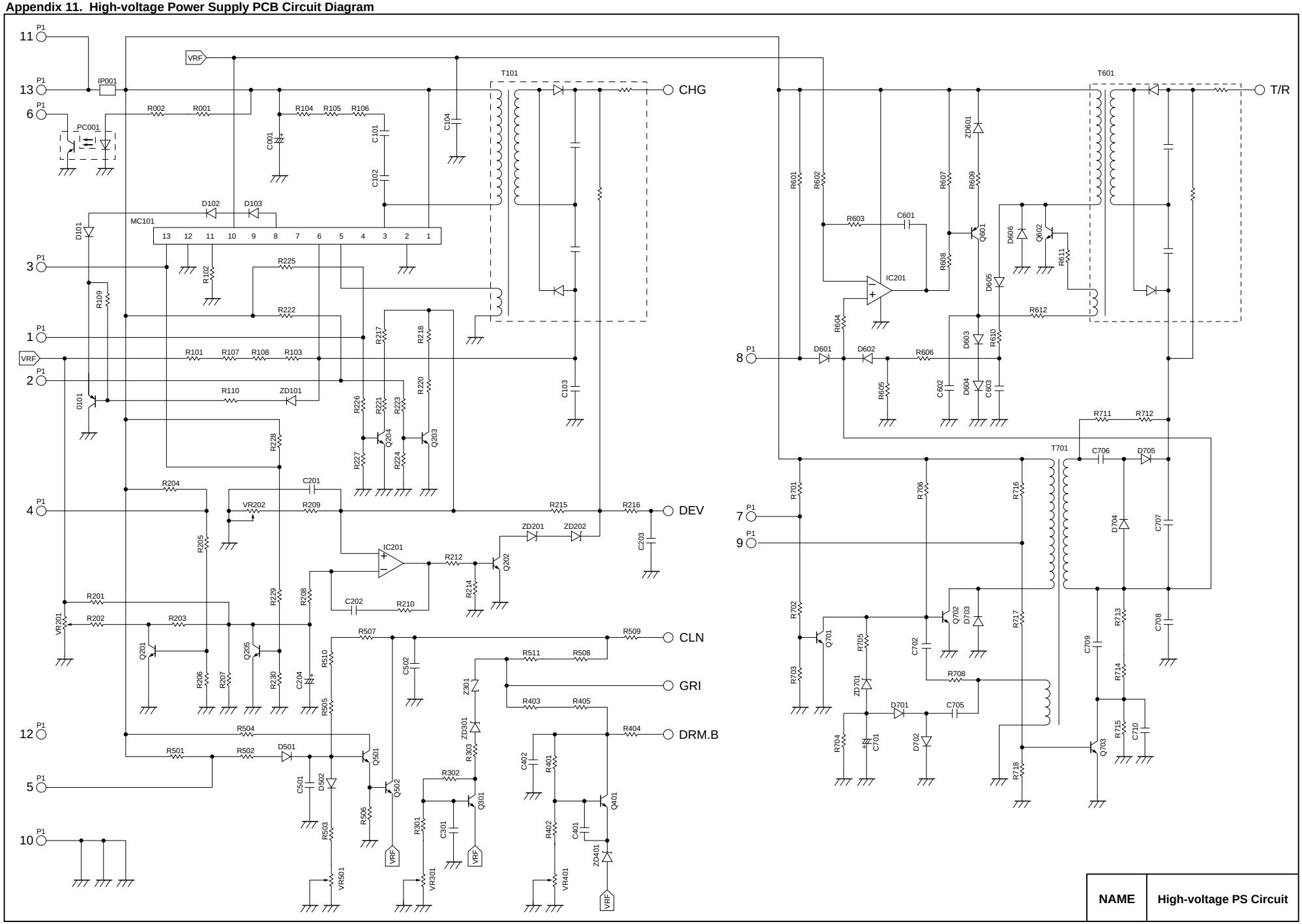
CODE	UK3635000
NAME	281/282/283 CIR

Appendix 9. Low-voltage Power Supply PCB Circuit Diagram (110 - 120V)

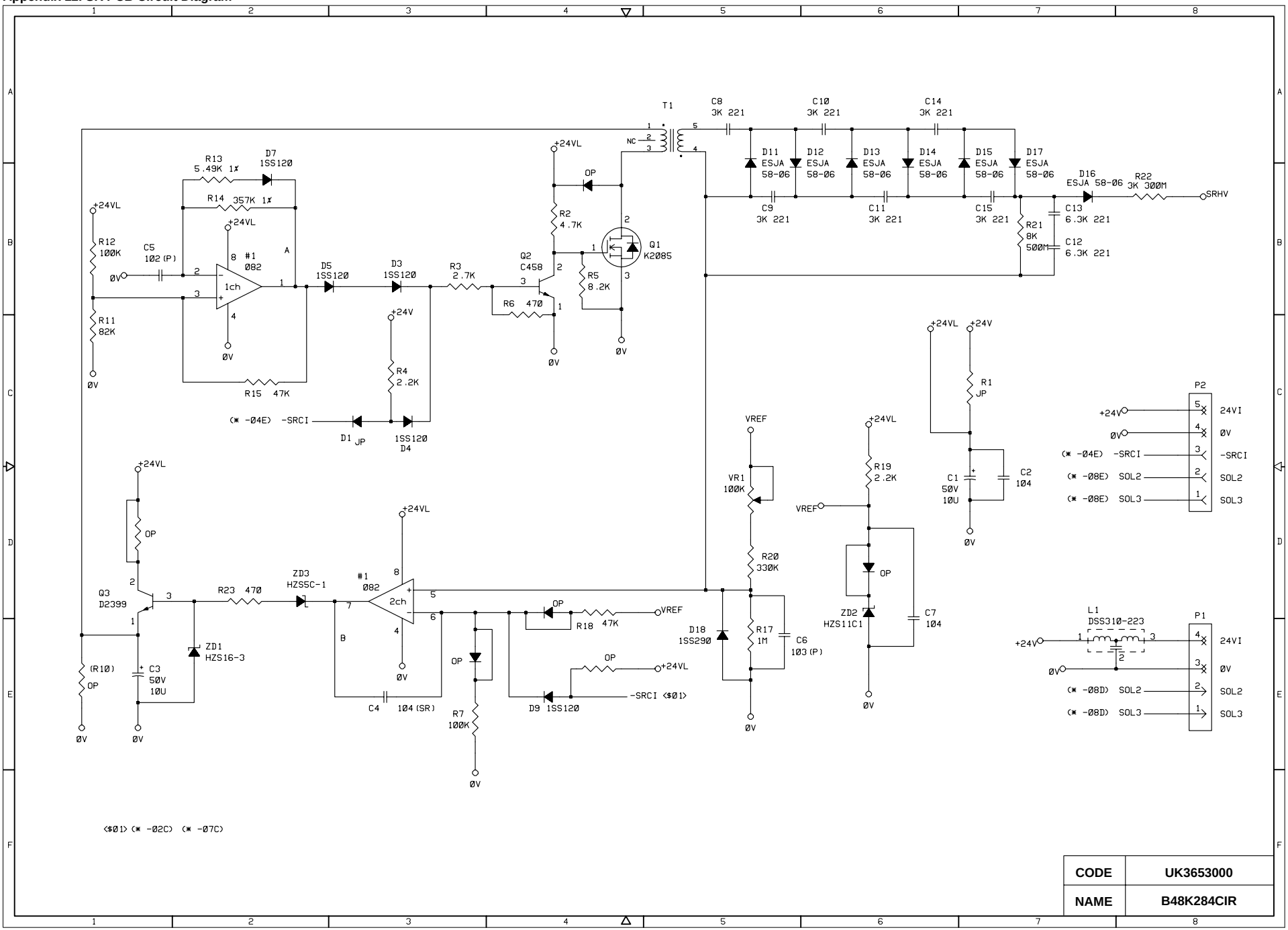


Appendix 10. Low-voltage Power Supply PCB Circuit Diagram (220 - 240V)




CHG
DEV
CLN
GRI
DRM.B
T/R
T101
T601
T701
MC101
IP001
PC001
IC201
VRF
NAME
High-voltage PS Circuit

Appendix 12. SR PCB Circuit Diagram



CODE	UK3653000
NAME	B48K284CIR

5. FIXING UNITS PR99042

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1-9	UH3164001	1	FIXING UNIT Y, 120V (SP)	
1-9	UH3165001	1	FIXING UNIT Y, 230V (SP)	
1	UH3306001	1	HALOGEN LAMP Y, 120V (SP)	
1	UH3307001	1	HALOGEN LAMP Y, 230V (SP)	
2	087411616	2	TAPTITE, CUP B M4X16	
3	UL6667001	1	THERMISTOR ASSY	CHNG
4	UH3188001	1	CLEANER ASSY Y	
5	UH3178000	2	H/R BEARING Y	
6	UH3419001	1	HEAT ROLLER YS ASSY	
7	087311415	1	TAPTITE, CUP B 3X14	
8	UH3323001	4	EJECT PINCH ROLLER ASSY	
9	UL6682001	4	PINCH SPRING	

MODEL HL-1060 54U-S01-051

T/I NO. PR98040 / PR98292 / PR99042

7. MAIN PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3439001	1	MAIN PCB ASSY, PCL5 2M(SP)	B48K246-300J	

MODEL HL-1060 54U-S01-101

T/I No. 97-P028 / 97-P043 / PR97161

5. FIXING UNITS

PR99042

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARK
1-9	UH3164001	1	FIXING UNIT Y, 120V (SP)	
1-9	UH3165001	1	FIXING UNIT Y, 230V (SP)	
1	UH3306001	1	HALOGEN LAMP Y, 120V (SP)	
1	UH3307001	1	HALOGEN LAMP Y, 230V (SP)	
2	087411616	2	TAPTITE, CUP B M4X16	
3	UL6667001	1	THERMISTOR ASSY	CHNG
4	UH3188001	1	CLEANER ASSY Y	
5	UH3178000	2	H/R BEARING Y	
6	UH3419001	1	HEAT ROLLER YS ASSY (SP)	
7	087311415	1	TAPTITE, CUP B 3X14	
8	UH3323001	4	EJECT PINCH ROLLER ASSY	
9	UL6682001	4	PINCH SPRING	

MODEL HL-1070 54U-S03-050/051

T/I NO. PR98292 / PR99042

7. MAIN PCB

REF.NO.	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3950001	1	MAIN PCB ASSY	B48K302-100C	
2	UH3542001	1	CONDUCTIVE TAPE		

MODEL HL-1070 54U-S03-101

T/I NO. PR98108

3. MP SHEET FEEDER

PR99042

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARK
1	UL8749001	1	MP SHEET FEEDER ASSY (SP)	
1	UL8832001	1	MP SHEET FEEDER ASSY (LEGEND) (SP)	

MODEL HL-820/1020/1040/1050 84U-821/831/832/861/862-040

T/I NO. PR98176

4. FIXING UNIT

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARK
1-11	UL8750001	1	FIXING UNIT, 120V (SP)	
1-11	UL8751001	1	FIXING UNIT, 230V (SP)	
1-11	UL8833001	1	FIXING UNIT (LEGEND) (SP)	
1	UH3306001	1	HALOGEN LAMP Y, 120V (SP)	
1	UH3307001	1	HALOGEN LAMP Y, 230V (SP)	
2	087411616	2	TAPTITE, CUP B M4X16	
3	085311216	2	TAPTITE, BIND B M3X12	
4	083311017	2	TAPTITE, PAN B M3X10	
5	UL8757001	1	HEAT ROLLER YS (SP)	
5	UL8834001	1	HEAT ROLLER (LEGEND) (SP)	
6	UH3178000	2	H/R BEARING Y	
7	UL8758001	1	H/R CLEANER	
7	UL8855001	1	H/R CLEANER (LEGEND)	
8	UL8754001	1	H/R WASHER	
9	UL6667001	1	THERMISTOR ASSY	CHNG
10	UH3323001	4	EJECT PINCH ROLLER ASSY	
11	UL6682001	4	PINCH SPRING	

MODEL HL-820/1020/1040/1050 84U-821/831/861-050/051 84U-832/862-052

T/I NO. PR98116 / PR98176 / PR98271 / PR98292 / PR99042

6. FIXING UNIT

PR99042

REF.NO.	CODE	Q'TY	DESCRIPTION	REMARK
1-11	UL8750001	1	FIXING UNIT, 120V (SP)	
1-11	UL8751001	1	FIXING UNIT, 230V (SP)	
1-11	UL8833001	1	FIXING UNIT, LEG 230V (SP)	
1	UH3306001	1	HALOGEN LAMP Y, 120V (SP)	
1	UH3307001	1	HALOGEN LAMP Y, 230V (SP)	
2	087411616	2	TAPTITE, CUP B M4X16	
3	085311216	2	TAPTITE, BIND B M3X12	
4	083311017	2	TAPTITE, PAN B M3X10	
5	UL8757001	1	HEAT ROLLER YS (SP)	
5	UL8834001	1	HEAT ROLLER, LEG (SP)	
6	UH3178000	2	H/R BEARING Y	
7	UL8758001	1	H/R CLEANER	
7	UL8855001	1	H/R CLEANER, LEG	
8	UL8754001	1	H/R WASHER	
9	UL6667001	1	THERMISTOR ASSY	CHNG
10	UH3323001	4	EJECT PINCH ROLLER ASSY	
11	UL6682001	4	PINCH SPRING	

MODEL MFC-P2000/HL-P2000 84U-901/902-050/051/052

T/I NO. PR98271 / PR98292 / PR98303

8. MAIN PCB

REF.NO.	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1-1	UK4250001	1	MAIN PCB ASSY, US (SP)	B512018-100C	
1-1	UK4251001	1	MAIN PCB ASSY, EUR (SP)	B512018-101B	
1-1	UK4252001	1	MAIN PCB ASSY, HEB (SP)	B512018-102	
1	UK4328000	1	MROMP2000, US	#4	
1	UK4320000	1	MROMP2000, EUR	#4	
1	UK4160000	1	MROMP2000, HEB	#4	

MODEL MFC-P2000/HL-P2000 84U-901/902-101/102/103

T/I NO. PR98260

brother

LASER PRINTER
PARTS REFERENCE LIST

MODEL:HL-1060

MECHANISMS & ELECTRONICS

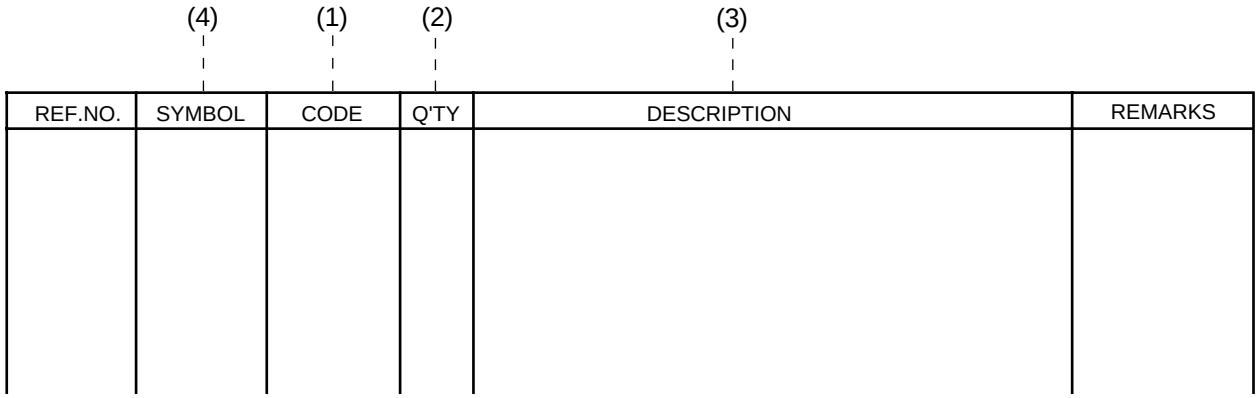
NOTE FOR USING THIS PARTS REFERENCE LIST

1.In the case of ordering parts, it needs mentioning the following items:

(1) Code
(2) Q'ty
(3) Description
(4) Symbol (PCB No., Revision , and Parts location mounted on the PCB.)

Note : No orders without Parts Code or Tool No. can be accepted.

< Example >



Revision No. : marked on the printed circuit board.

2. Design-changed parts:
If the parts are changed, any one of the following symbols is indicated in the REMARKS column.

#A : compatible between old and new
#B : replaceable from old to new
#D : incompatible
: newly established

3. The original of this list was made based on the information available in Mar.,1997.

4. Parts are subject to change in design without prior notice.

CONTENTS

1. DRIVE UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3302001	1	DRIVE UNIT Y (SP)	
2	UH3031000	1	REGIST SOLENOID LEVER	
3	UH3032001	1	REGIST SOLENOID	
4	UH3033001	1	REGIST SOLENOID SPRING	
5	060300605	4	SCREW, BIND M3X6	
6	060300605	4	SCREW, BIND M3X6	
7	UH3036001	1	MAIN MOTOR ASSY	
8	085320516	4	TAPTITE, BIND S M3X4	
9	UH3037000	2	GROUND PLATE SPRING	
10	UH3038000	1	STATIC REMOVAL PLATE SPRING	
11	UK3584001	1	MAIN MOTOR HARNESS ASSY	
12	UH3040000	1	HEATER HARNESS HOOK	
13	087411215	6	TAPTITE, CUP B M4X12	
14	UH3046000	2	PLATE SPRING FILM	
15	UH3047000	2	PLATE SPRING CAP	
16	0A2300605	2	SCREW, PAN (WASHER) M3X6B	

MODEL HL-1060 54U-S01-010

T/I NO. PR98056

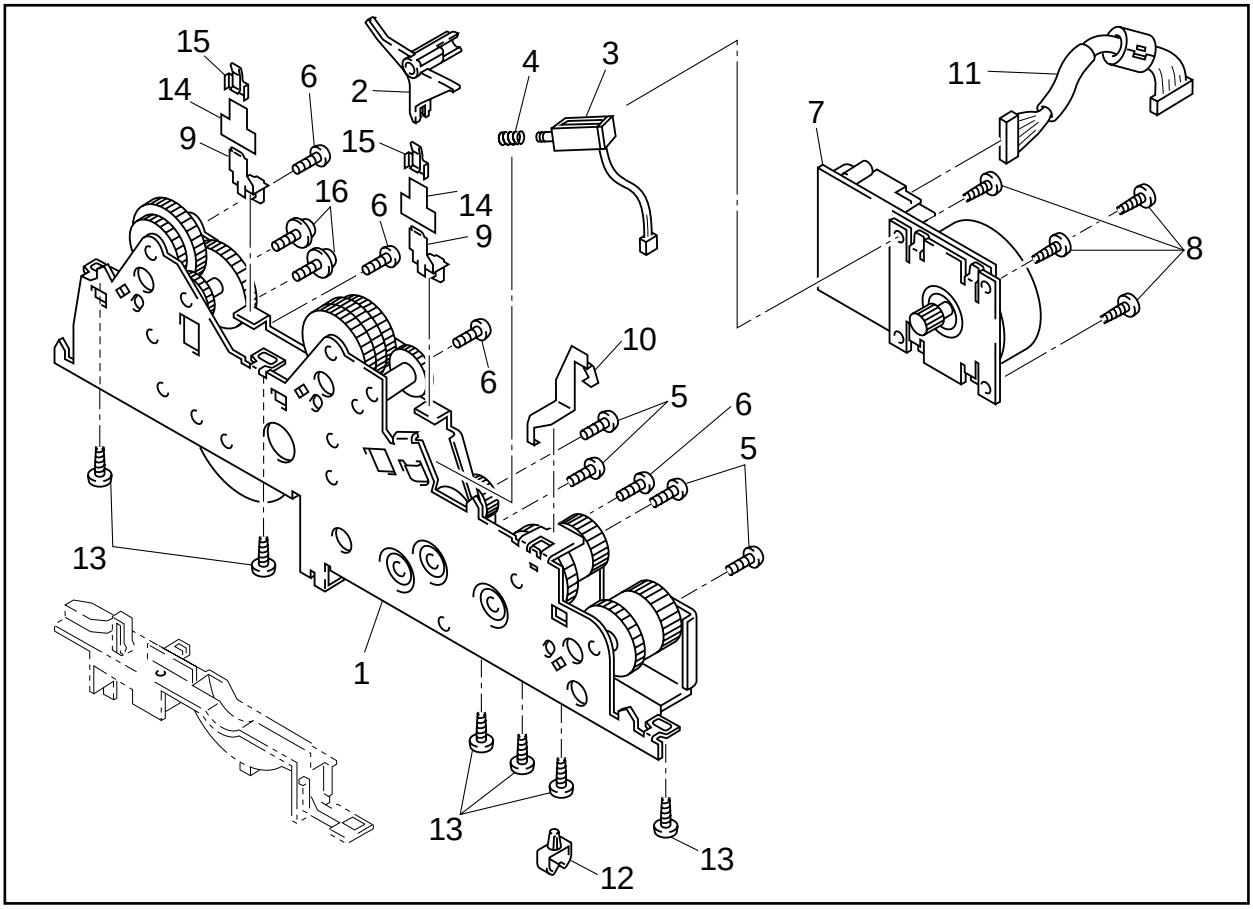
2. SCANNER UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1-2	UH3301001	1	SCANNER UNIT Y (SP)	(B48K226)	
1	UL6614001	1	S SHEET 1		
2	UL6615001	1	S SHEET 2		
3	UG4142001	1	TONER SENSOR PCB ASSY F	B53K268	
4	087310815	2	TAPTITE, CUP B M3X8		
5	UK3588001	1	TONER SENSOR HARNESS ASSY		
6	085411215	3	TAPTITE, BIND B M4X12		
7	UL6740001	1	LASER CAUTION LABEL, EUR		
8	UL6741001	1	CAUTION LABEL, TONER		

MODEL HL-1060 54U-S01-020

T/I No. 97-P028 / 97-P045 / 97-P052

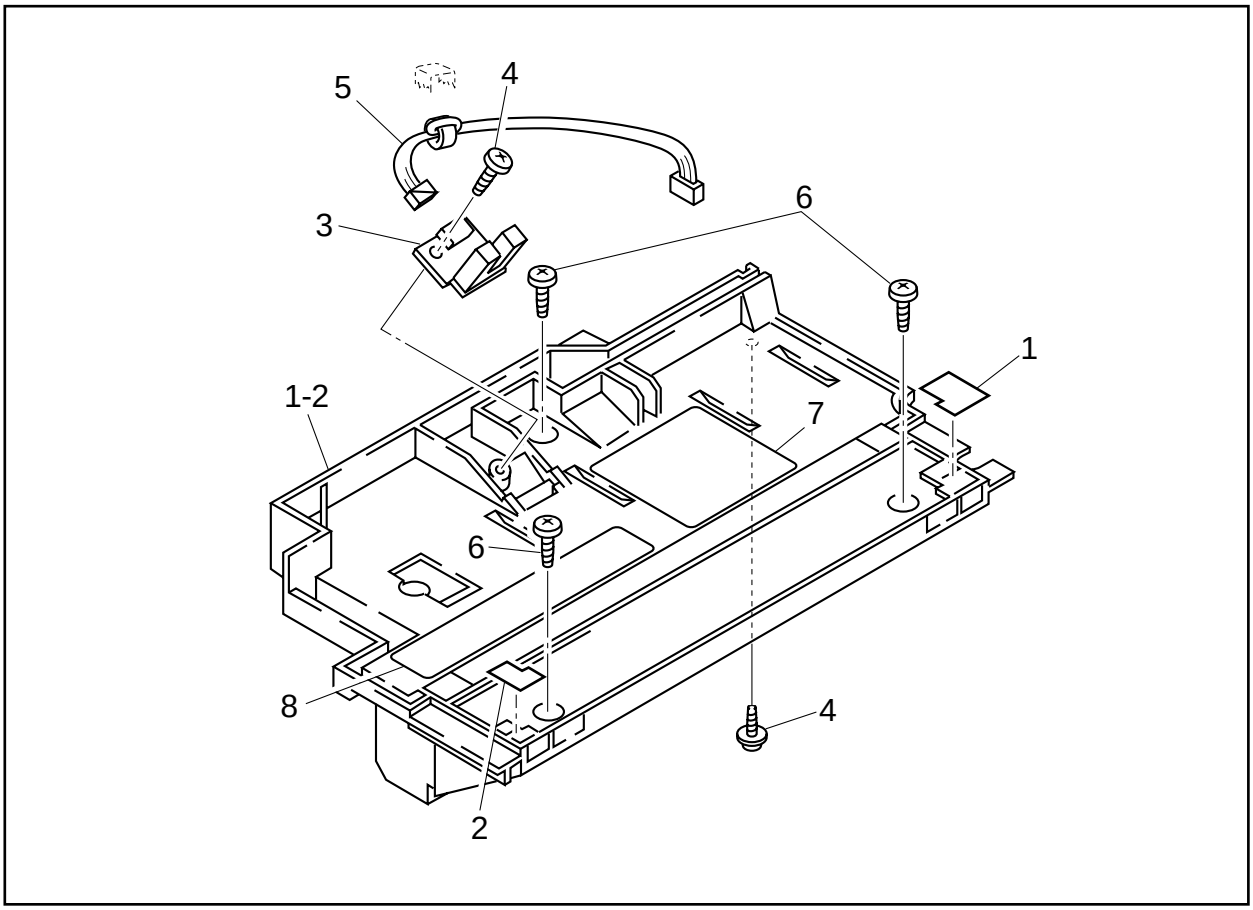
1. DRIVE UNIT



T/I NO. PR98056

MODEL HL-1060 54U-S01-010

2. SCANNER UNIT



MODEL HL-1060 54U-S01-020

T/I No. 97-P028 / 97-P045 / 97-P052

3. MP SHEET FEEDER

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3303001	1	MP SHEET FEEDER 1 ASSY Y (SP)	
1-1	UH3314001	1	MP FEEDER 1 COVER ASSY HY (SP)	
1-2	UH3078001	1	PICK-UP ROLLER COVER 1, GRAY1227	
1-3	UH3074001	1	P PICK-UP ROLLER SHAFT ASSY Y	
1-4	UH3077001	1	REGIST SENSOR ACTUATOR 1Y	
1-5	UD4742001	1	REGIST SENSOR ACTUATOR FILM	
2	UH3304001	1	MP SHEET FEEDER 2 ASSY Y (SP)	
2-1	UD4344001	1	MP FEEDER 2 COVER HY	
2-2	UH3104001	1	PICK-UP ROLLER COVER 2, GRAY1227	
2-3	UH3074001	1	P PICK-UP ROLLER SHAFT ASSY Y	

MODEL HL-1060 54U-S01-040/041

T/I NO. PR98062

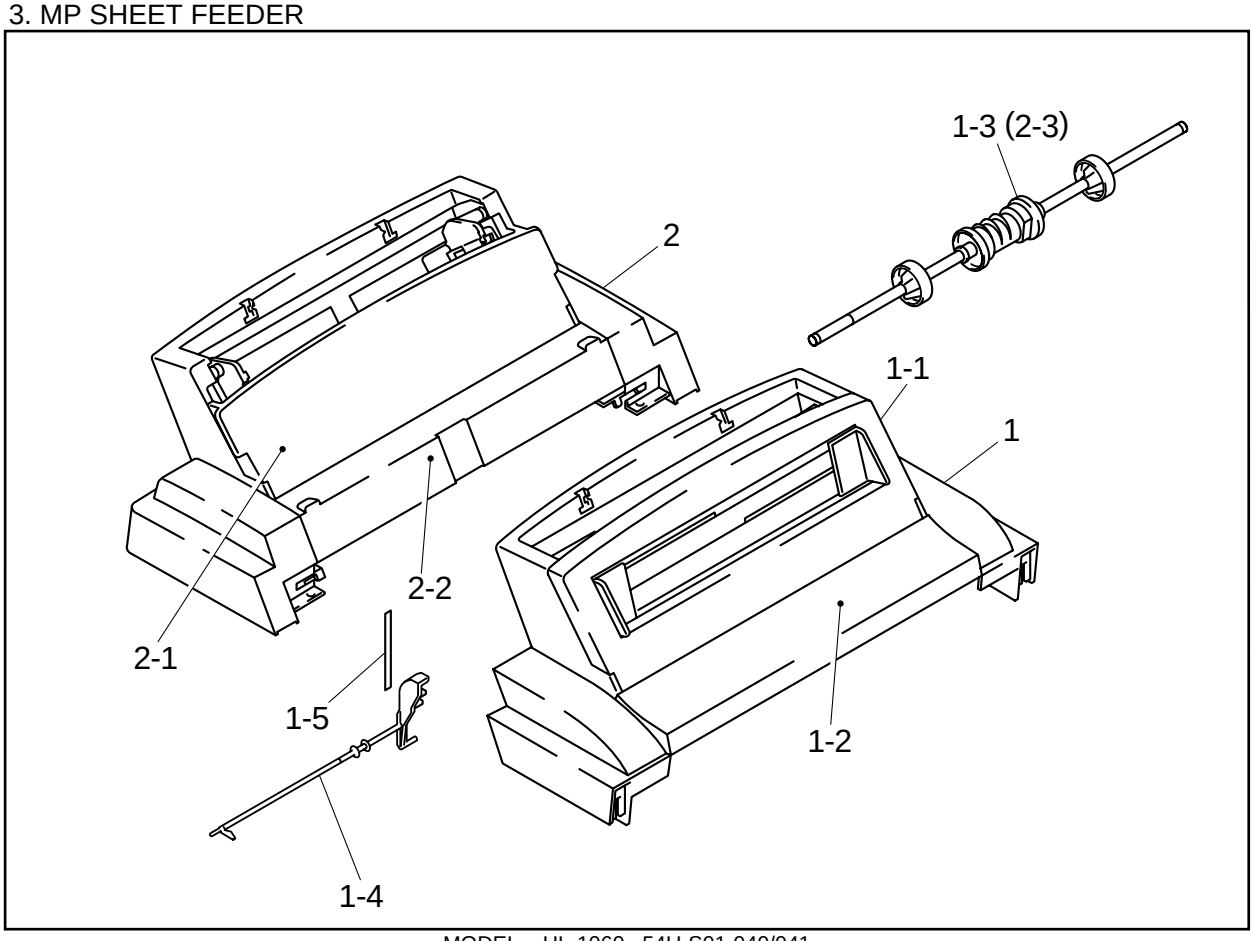
4. PAPER FEEDER UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1-10	UH3305001	1	PAPER FEED UNIT Y (SP)	
1	UH3154001	1	REGIST SENSOR ACTUATOR 2 YL	
2	UH3140001	1	REGIST SENSOR LINK, BLACK	
3	UH3141001	1	SPRING, EXTENSION	
4	UL6933001	1	PAPER DUST REMOVING BRUSH S	
5	UH3145000	2	PAPER PICK-UP SOLENOID LEVER	
6	087270815	2	TAPTITE, CUP B M2.6X8	
7	UH3146001	1	PAPER PICK-UP SOLENOID ASSY 1	
8	UH3147001	1	PAPER PICK-UP SOLENOID ASSY 2	
9	087310815	2	TAPTITE, CUP B M3X8	
10	085411416	4	TAPTITE, BIND B M4X14	
11	085411216	2	TAPTITE, BIND B M4X12	

MODEL HL-1060 54U-S01-042

TI NO. 97-P079

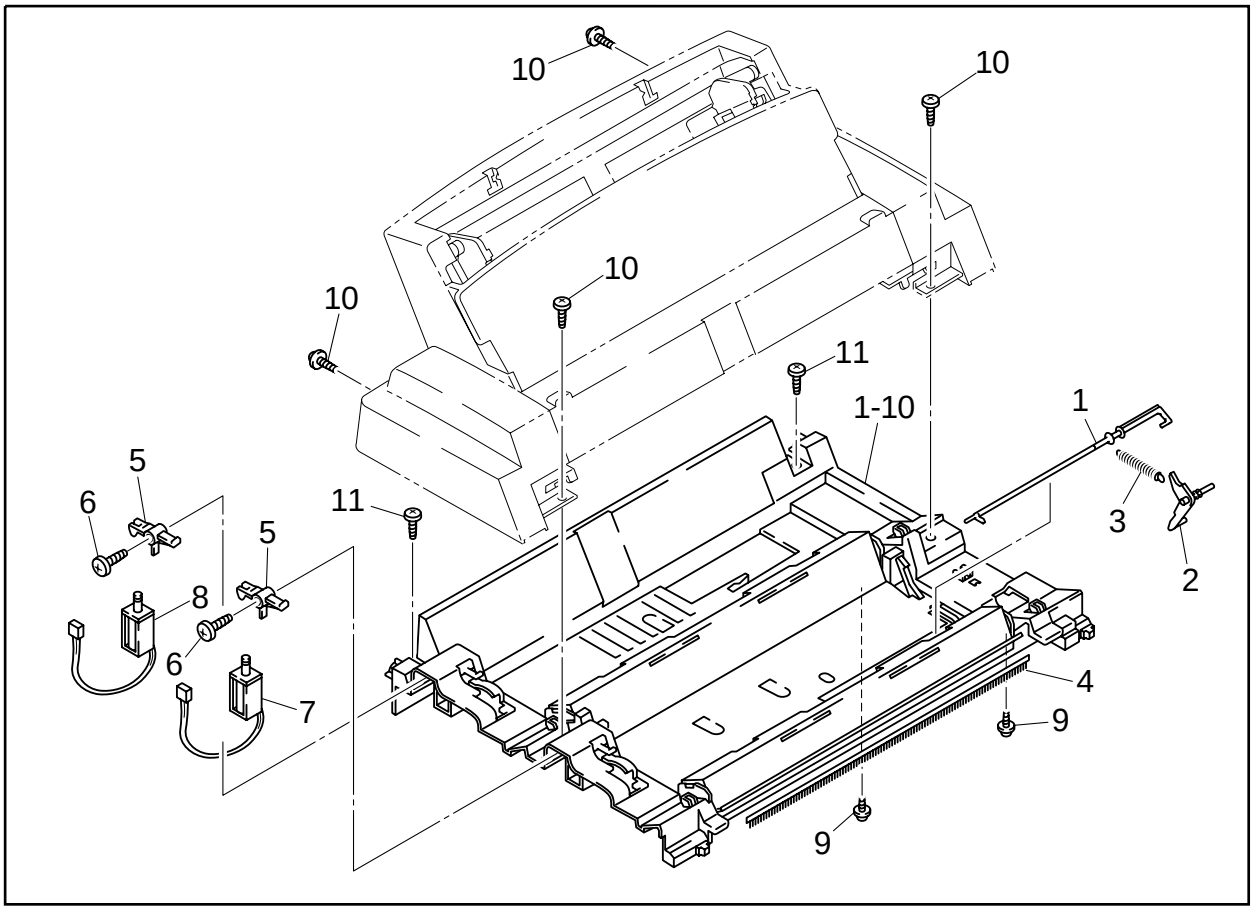
3. MP SHEET FEEDER



MODEL HL-1060 54U-S01-040/041

T/I NO. PR98062

4. PAPER FEEDER UNIT



MODEL HL-1060 54U-S01-042

5. FIXING UNITS

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1-9	UH3164001	1	FIXING UNIT Y, 120V (SP)	
1-9	UH3165001	1	FIXING UNIT Y, 230V (SP)	
1	UH3306001	1	HALOGEN LAMP Y, 120V (SP)	
1	UH3307001	1	HALOGEN LAMP Y, 230V (SP)	
2	087411616	2	TAPTITE, CUP B M4X16	
3	UH3196001	1	THERMISTOR ASSY Y	
4	UH3188001	1	CLEANER ASSY Y	
5	UH3178000	2	H/R BEARING Y	
6	UH3419001	1	HEAT ROLLER YS ASSY	
7	087311415	1	TAPTITE, CUP B 3X14	
8	UH3323001	4	EJECT PINCH ROLLER ASSY	
9	UL6682001	4	PINCH SPRING	

MODEL HL-1060 54U-S01-051

T/I NO. PR98040 / PR98292

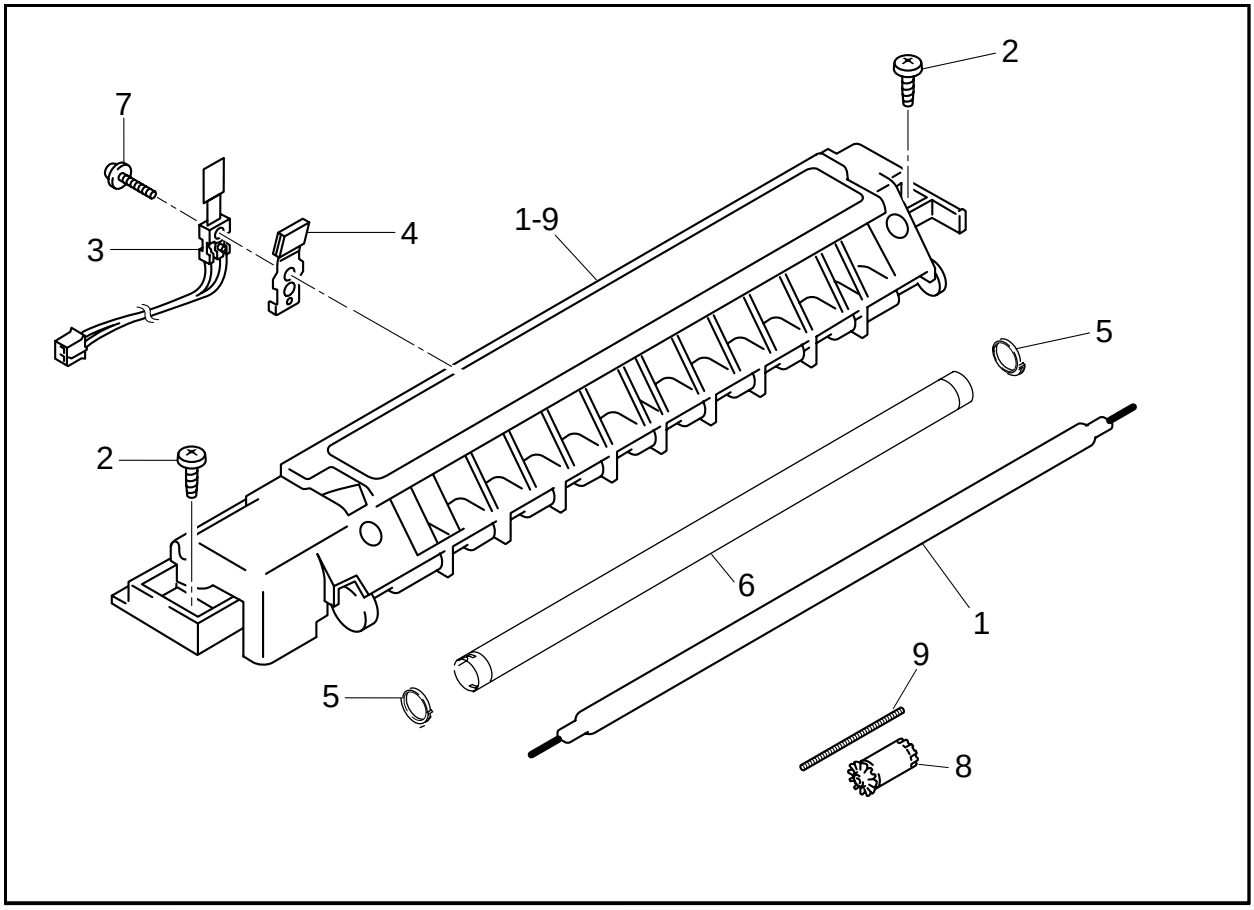
7. MAIN PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3439001	1	MAIN PCB ASSY, PCL5 2M(SP)	B48K246-300J	

MODEL HL-1060 54U-S01-101

T/I No. 97-P028 / 97-P043 / PR97161

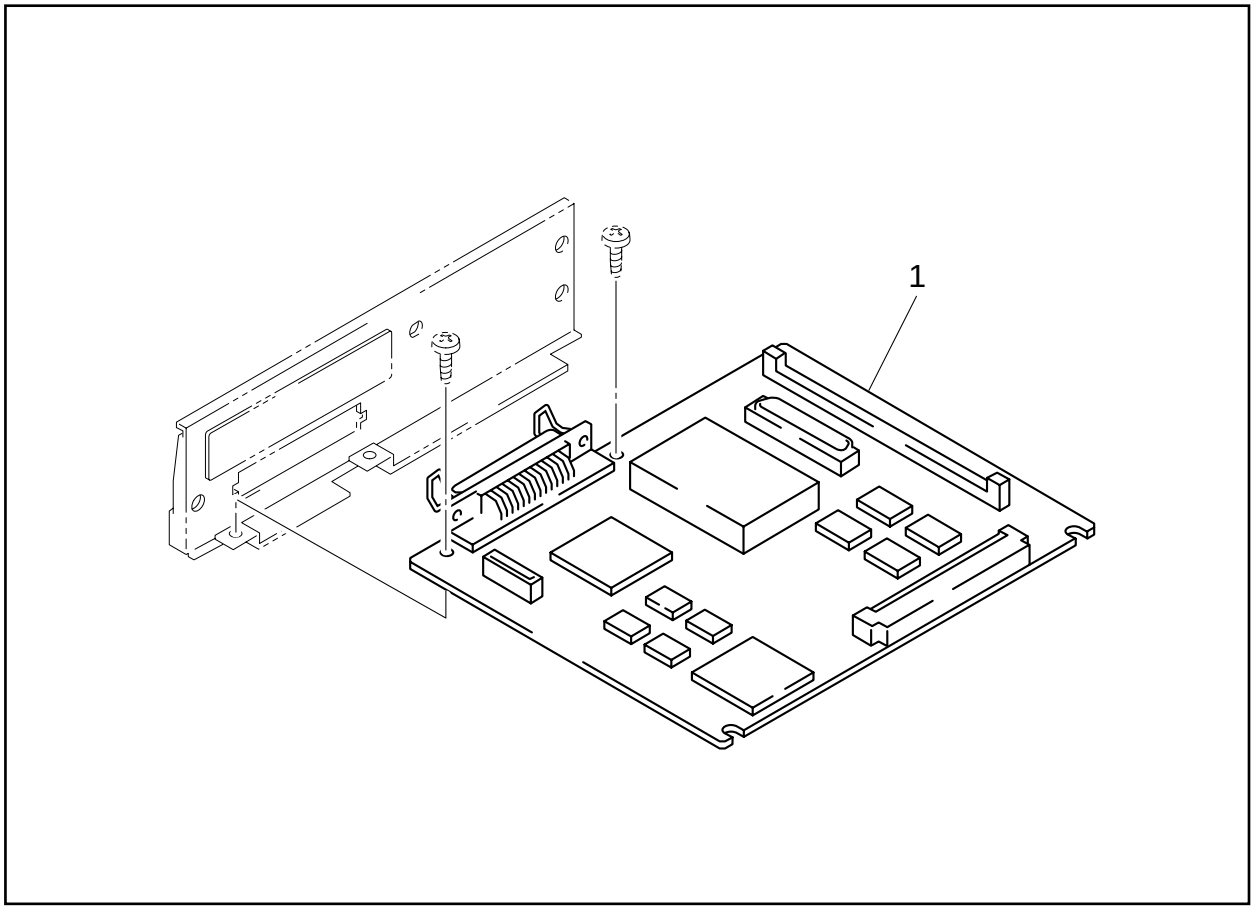
5. FIXING UNITS



MODEL HL-1060 54U-S01-051

T/I NO. PR98040 / PR98292

7. MAIN PCB



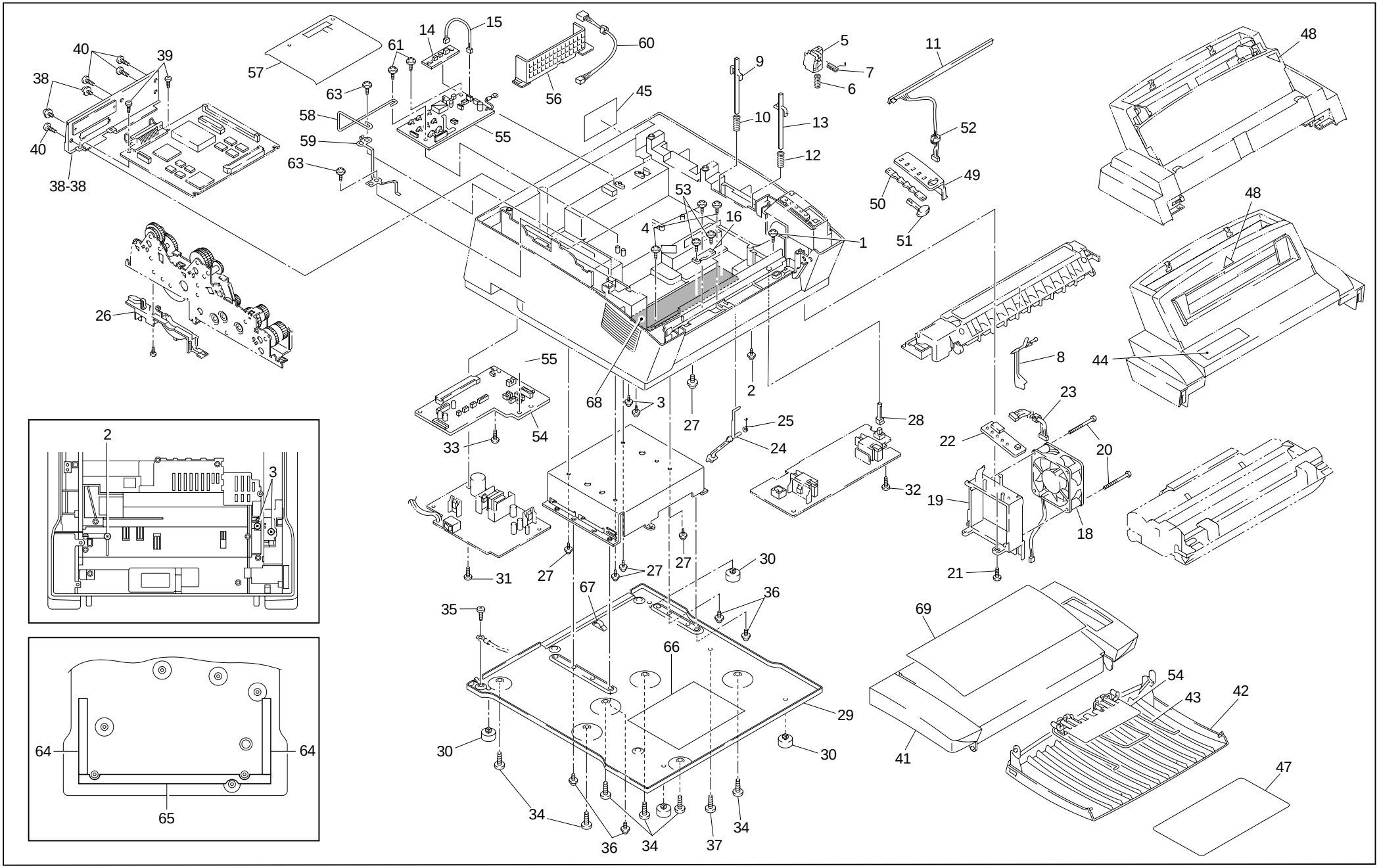
MODEL HL-1060 54U-S01-101

6. COVERS

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	087310815	1	TAPTITE, CUP B M3X8		
2	087310815	1	TAPTITE, CUP B M3X8		
3	087310815	2	TAPTITE, CUP B M3X8		
4	087310815	2	TAPTITE, CUP B M3X8		
5	UL6721000	1	LOCK LEVER		
6	UL6722001	1	SPRING, COMPRESSION		
7	UH3244001	1	SPRING, PR LOCK Y		
8	UH3207001	1	PAPER EJECT ACTUATOR, BLACK		
9	UH3208000	1	SENSOR LEVER		
10	UH3245001	1	SPRING,LEVER		
11	UK3432001	1	EL PCB UNIT Y	B48K228	
12	UH3245001	1	SPRING,LEVER		
13	UH3242001	1	INTERLOCK LEVER		
14	UK3632001	1	RELAY PCB ASSY	B48K282	
15	UK3621001	1	RELAY HARNESS ASSY		
16	UK3633001	1	TRANSFER PCB ASSY	B48K283	
18	UH3210001	1	FAN MOTOR 80		
19	UH3211000	1	FAN HOLDER		
20	083313515	2	TAPTITE, PAN B M3X35		
21	085411215	1	TAPTITE, BIND B M4X12		
22	UK3631001	1	CONTROL PANEL PCB ASSY	B48K281	
23	UK3586001	1	SW PANEL HARNESS ASSY		
24	UH3212001	1	REGIST SENSOR ACTUATOR, BODY BLACK		
25	UH3237001	1	REGIST SENSOR SPRING		
26	UH3213000	1	GEAR COVER		
27	087310815	4	TAPTITE, CUP B M3X8		
28	UH3215001	1	DENSITY DIAL Y, GRAY1252		
29	UH3216000	1	BASE PLATE		
30	UH2208001	4	RUBBER FOOT		
31	085411215	1	TAPTITE, BIND B M4X12		
32	085411215	1	TAPTITE, BIND B M4X12		
33	085411215	1	TAPTITE, BIND B M4X12		
34	085411215	5	TAPTITE, BIND B M4X12		
35	0A5350605	1	SCREW, PAN (S/P WASHER) M3.5X6		
36	087320616	4	TAPTITE, CUP S M3X6		
37	UF3043001	1	TAPTITE, PAN (WASHER) 3X6DB		
38-38	UH3217001	1	I/F SHIELD ASSY		
38	002300616	2	SCREW, PAN M3X6		
39	087320616	2	TAPTITE, CUP S M3X6		
40	002400616	4	SCREW, PAN M4X6		
41	UH3219001	1	TOP COVER		
42	UH3313001	1	OUTPUT TRAY ASSY (SP)		
43	UH3401000	1	EXTENSION SUPPORT WIRE LTR		
43	UH3250000	1	EXTENSION SUPPORT WIRE A4		
44	UH3221001	1	MODEL PLATE, HL-1060		
44	UH3239001	1	MODEL PLATE, HL-1060 EUR		
45	UH0905001	1	PATENT LABEL, US/CSA		
47	UH3243001	1	MYLAR LABEL, HL-1060 CAN		
47	UH3320001	1	MYLAR LABEL, HL-1060 US		
48	UH3225001	2	PAPER SETTING LABEL Y		
49	UH3227001	1	PANEL COVER, GRAY1227		
50	UH3228000	1	PANEL RIGHT GUIDE Y		
51	UH3229001	1	SWITCH KEY		
52	UG3005000	1	FERRITE CORE:16X8X10		

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
53	087311216	2	TAPTITE, CUP B M3X12		
54	UH3249001	1	PAPER STOPPER LTR		
54	UH3248001	1	PAPER STOPPER A4		
55	UK3608001	1	SR PS ASSY (SP)		
56	UH3370001	1	HIGH-VALTAGE COVER		
57	UH3371000	1	SR PROTECT SHEET		
58	UH3368001	1	ELECTRODE SR1		
59	UH3369001	1	ELECTRODE SR2		
60	UK3624001	1	SR HARNESS ASSY		
61	087411415	2	TAPTITE, CUP B M4X14		
63	087310815	1	TAPTITE, CUP B M3X8		
64	UH3405001	2	SOUNDPROOF SPONGE A		
65	UH3406001	1	SOUNDPROOF SPONGE B		
66	UH3412001	1	DAMPING MATERIAL		
67	UH3372000	1	SHIELD FINGER		
68	UH3064001	1	S SEAL SPONGE		
69	UH3167001	1	TOP COVER LABEL		

T/I No. 97-P028 / 97-P030 / 97-P039 / 97-P045 / 97-P064 / PR97038



T/I NO. 97-P028 / 97-P030 / 97-P045 / PR97038

MODEL HL-1060 54U-S01-060

8. DRIVER PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3440001	1	DRIVER PCB ASSY (SP)	B48K280	

MODEL HL-1060 54U-S01-151

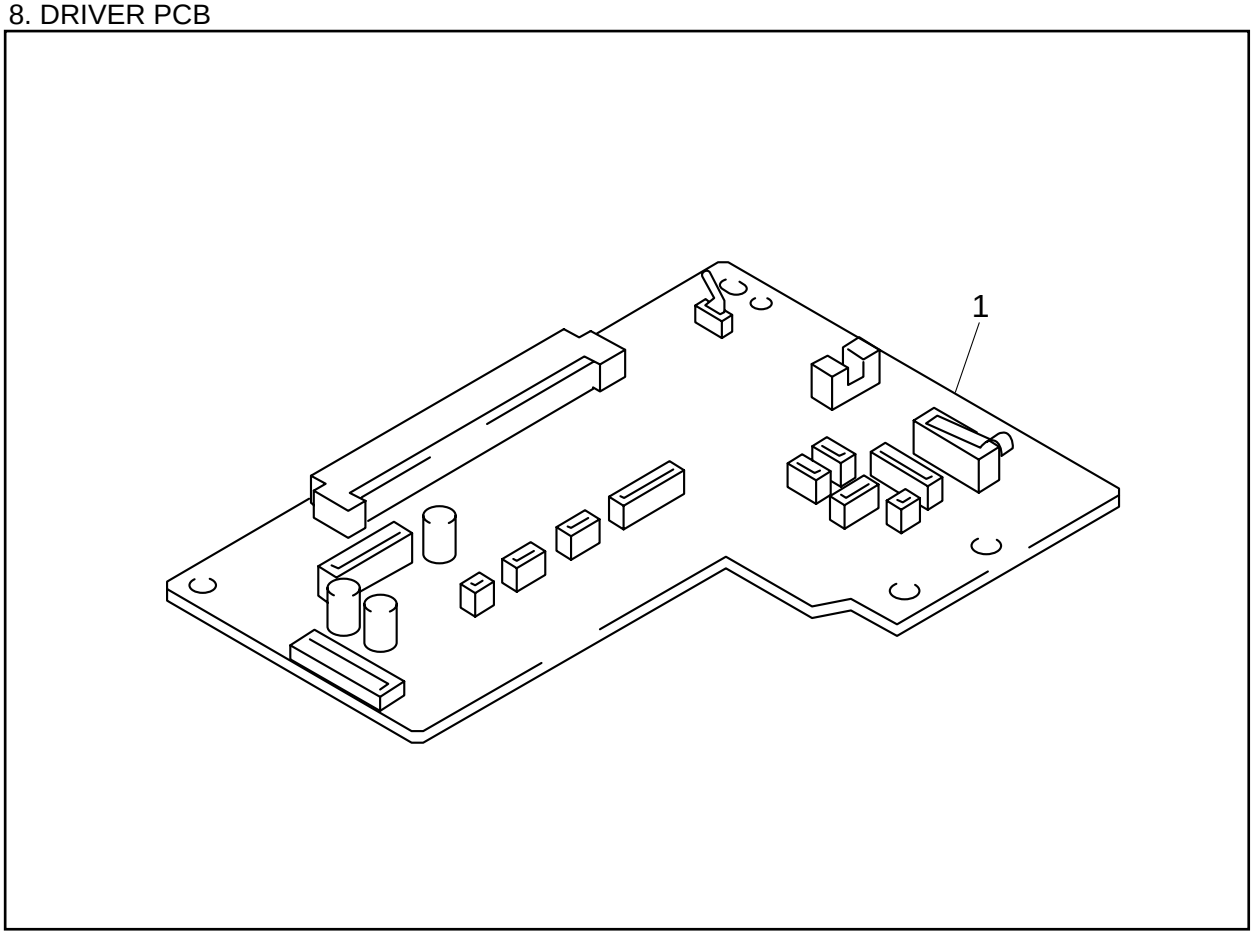
9. POWER SUPLLY PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3441001	1	LOW-VOLTAGE PS ASSY, 115V (SP)	REV.B	CHNG VER.#
1	UK3442001	1	LOW-VOLTAGE PS ASSY, 230V (SP)	REV.B	CHNG VER.#
2	UK3585001	1	LV HARNESS ASSY		
3	UK3461001	1	HEATER HARNESS ASSY		
4	J02101051	1	BINDER 2.3X79		

MODEL HL-1060 54U-S01-201

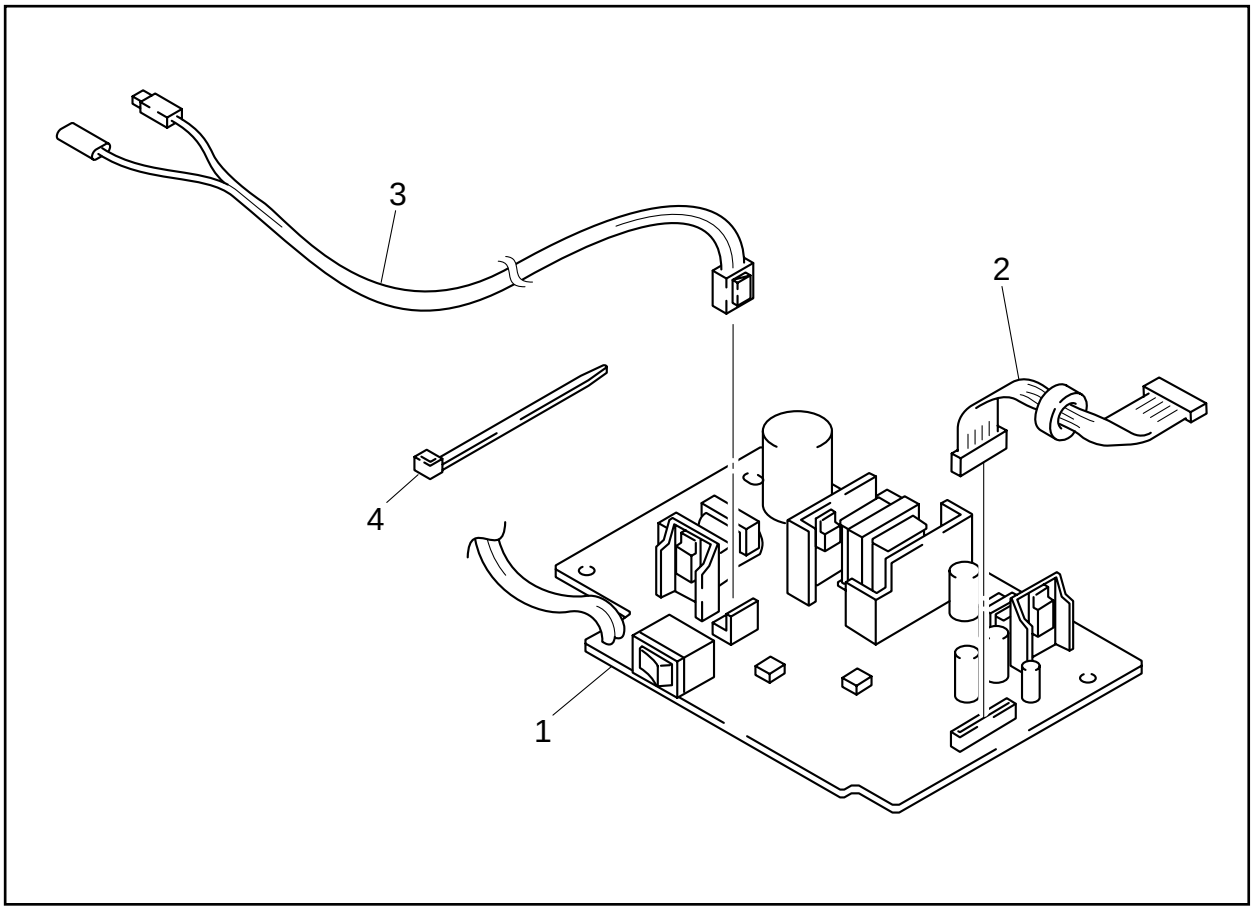
T/I NO. PR98022

8. DRIVER PCB



MODEL HL-1060 54U-S01-151

9. POWER SUPPLY PCB



MODEL HL-1060 54U-S01-210

10. HIGH VOLTAGE POWER SUPPLY

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3443001	1	HIGH-VOLTAGE PS ASSY (SP)	REV.D	
2	UK3433001	1	HV FLAT CABLE 11		

MODEL HL-1060 54U-S01-220

T/I NO. PR98208

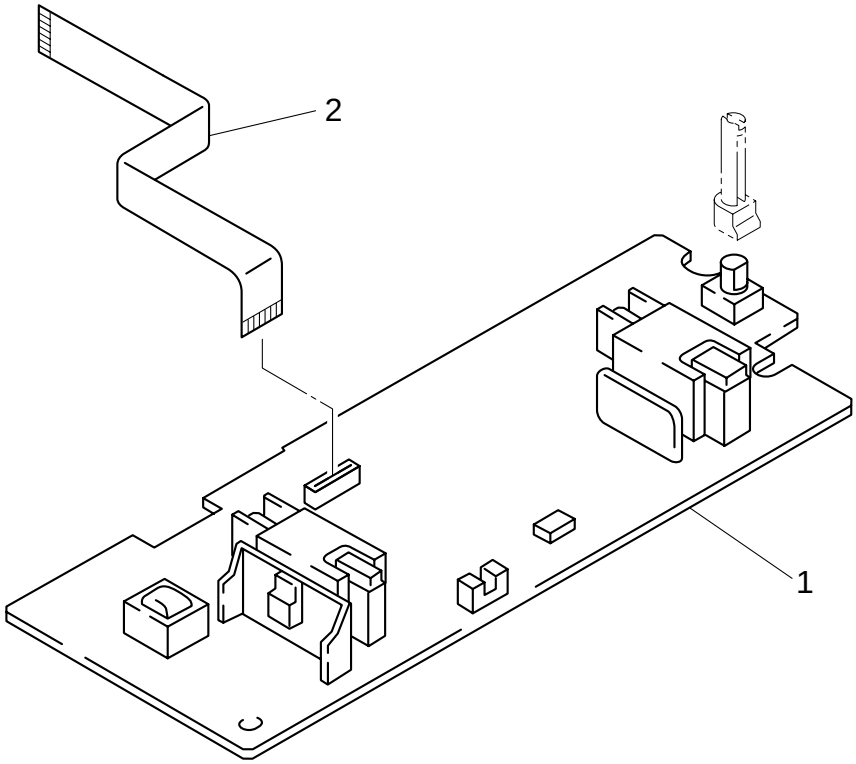
11. AC CORDS

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UK3483001	1	AC CORD ASSY, US	
1	UK3485001	1	AC CORD ASSY, UK	
1	UK3487001	1	AC CORD ASSY, EUR	
1	UK3489001	1	AC CORD ASSY, SAA	
1	UK3491001	1	AC CORD ASSY, SEV	
1	UK3968001	1	AC CORD ASSY, DEMKO	
1	UK3495001	1	AC CORD ASSY, HEB	
1	UK3496001	1	AC CORD ASSY, S.AF	
1	UK3498001	1	AC CORD ASSY, CHLI	
2	UH3298001	1	CORE/SPONGE LVPS ASSY	

MODEL HL-1060 54U-S01-230

T/I NO. PR98037

10. HIGH-VOLTAGE POWER SUPPLY



MODEL HL-1060 54U-S01-220

11. AC CORDS

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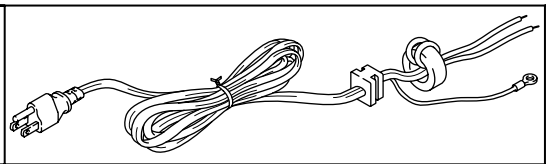
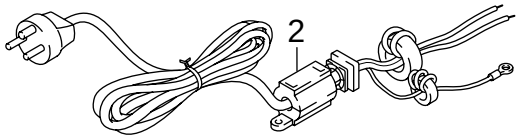
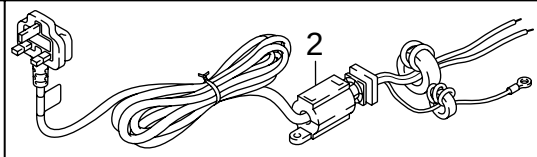
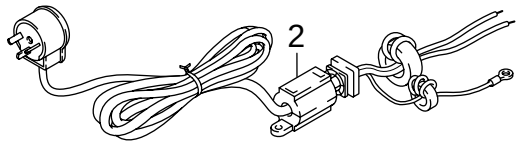
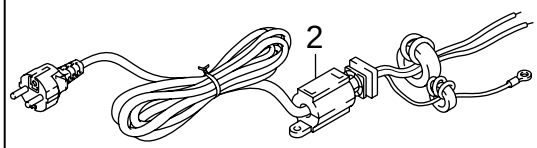
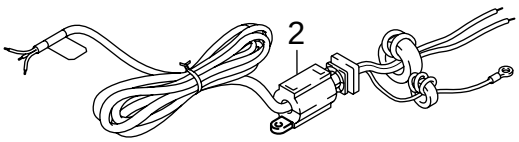
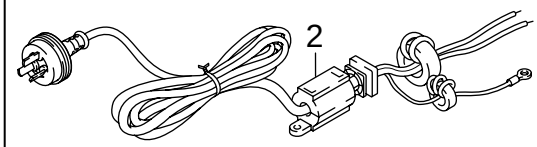
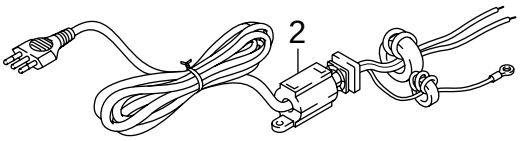
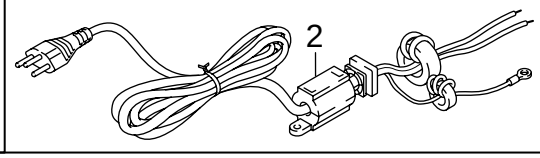
1A		1F	
1B		1G	
1C		1H	
1D		1I	
1E			

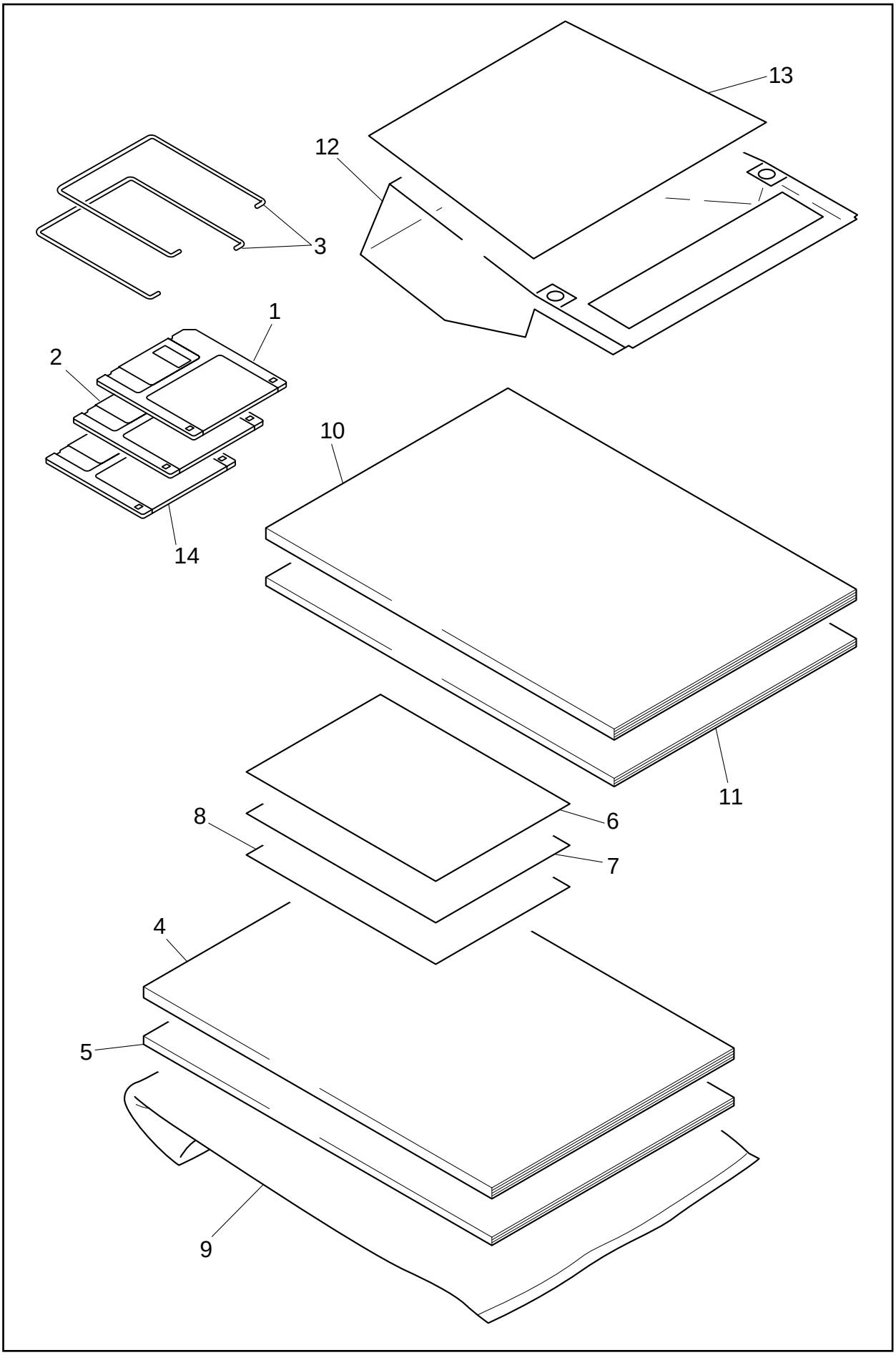
MODEL HL-1060 54U-S01-230

12. ACCESORRIES

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UK3507001	1	PR DRIVER DISK ASSY 1, WINDOWS	
1	UK3720001	1	PR DRIVER DISK ASSY 1, WINDOWS (ISR)	
2	UK3509001	1	PR DRIVER DISK ASSY 2,FONT&DOS	
2	UK3722001	1	PR DRIVER DISK ASSY 2,FONT&DOS (ISR)	
14	UK3676001	1	PR DRIVER DISK ASSY 3	
14	UK3714001	1	PR DRIVER DISK ASSY 5 (CANADA)	
3	UL6856000	2	PAPER SUPPORT	
4	UH3252001	1	USER'S MANUAL, US	
4	UH3255001	1	USER'S MANUAL, GER	
4	UH3276001	1	USER'S MANUAL, NOR	
4	UH3284001	1	USER'S MANUAL, DEN	
4	UH3287001	1	USER'S MANUAL, ITA	
4	UH3290001	1	USER'S MANUAL, SWE	
4,10	UH3265001	1	USER'S MANUAL, FRA	
4,10	UH3279001	1	USER'S MANUAL, NL	
5	UH3253001	1	SET GUIDE, US	
5	UH3256001	1	SET GUIDE, GER	
5	UH3277001	1	SET GUIDE, NOR	
5	UH3285001	1	SET GUIDE, DEN	
5	UH3288001	1	SET GUIDE, ITA	
5	UH3291001	1	SET GUIDE, SWE	
5,11	UH3266001	1	SET GUIDE, FRA	
5,11	UH3280001	1	SET GUIDE, NL	
6	UH2717001	1	WARRANTY CARD, USA	
6	UH2693001	1	WARRANTY CARD, CAN	
6	UL7581001	1	WARRANTY CARD, FRA2	
7	UL7426001	1	SC INSERTION SHEET, US	
8	UH3261001	1	ACCESSORY ORDER FORM (USA)	
8	UH3294001	1	ACCESSORY ORDER FORM (CANADA)	
9	UE2014001	1	BAG, 215X350H	
12	UH3257001	1	DUST COVER Y	
13	UH3260001	1	INSERTION DC	

MODEL HL-1060 54U-S01-920

T/I No. 97-P028 / 97-P038 / 97-P057 / 97-P062 / 97-P074 / PR97113


13
12
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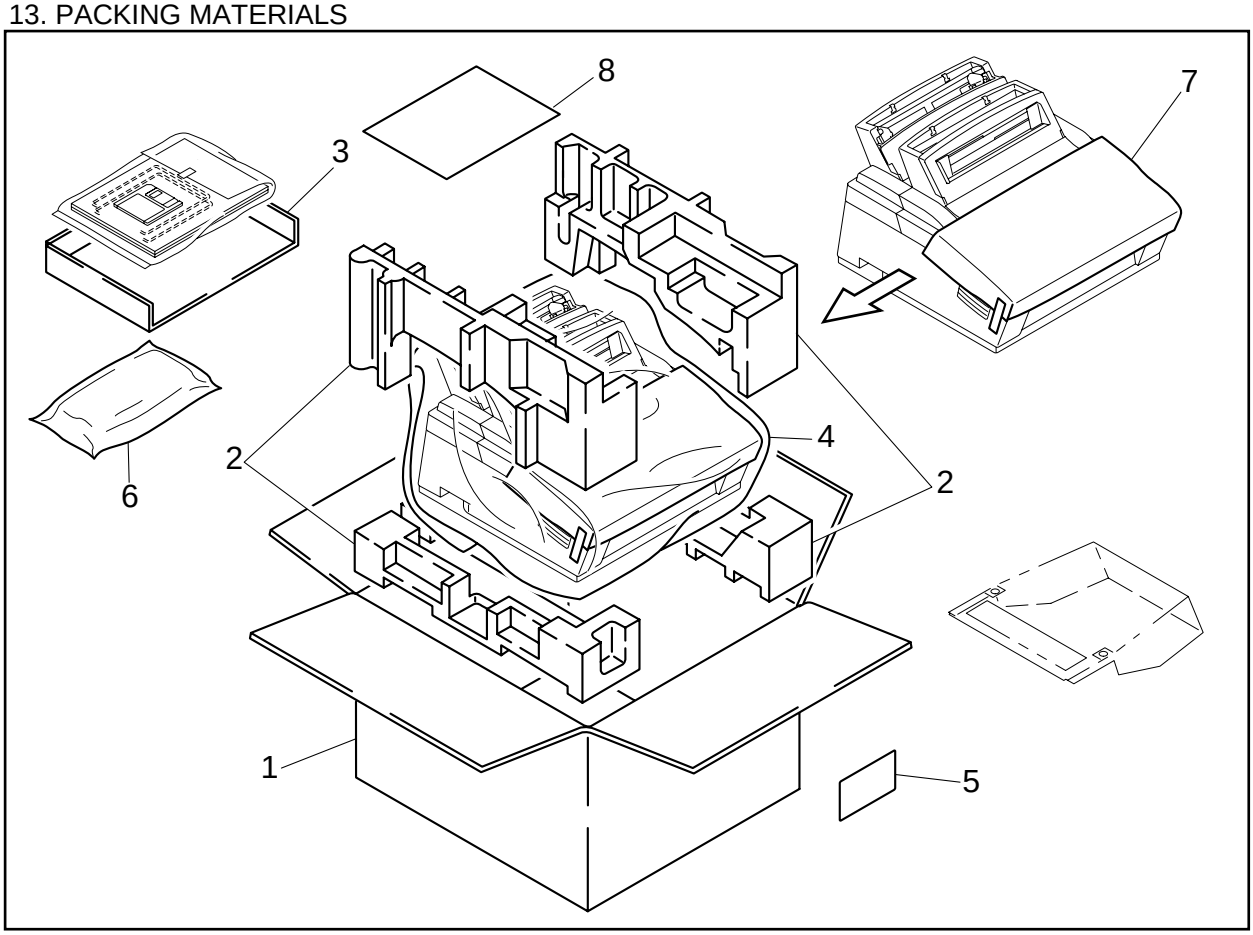
13. PACKING MATERIALS

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UE0507001	1	CARTON, USA/CAN HL-1060	
1	UE0508001	1	CARTON, EUR HL-1060	
2	UE0529000	1	STYROFOAM PAD ASSY HL-Y	
3	UE0533000	1	CARTON, ACCESORRIES	
4	UE0534001	1	BAG, 800X1000 (BODY)	
5	UH3351001	1	BAR CODE LABEL, 52438 USA HL-1060	
5	UH3352001	1	BAR CODE LABEL, 52562 EUR HL-1060	
6	UL7932001	1	BAG, (DRUM UNIT)	
7	UE0596001	1	PE SHEET 220X450	
8	UH3373001	1	NO RETURN FORM (USA)	
8	UH3295001	1	NO RETURN FORM (CANADA)	

MODEL HL-1060 54U-S01-930

T/I No. 97-P019 / 97-P081

13. PACKING MATERIALS



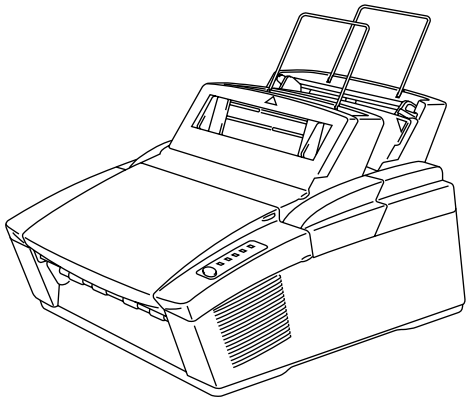
MODEL HL-1060 54U-S01-930

Please read this manual thoroughly before using the printer.

Brother Laser Printer

HL-1060 Series

User’s Guide



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

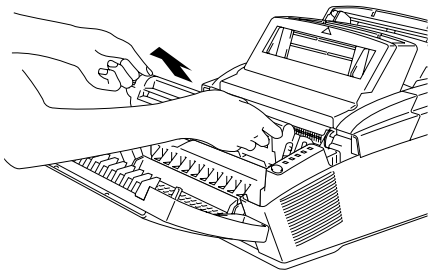
Shipment of the Printer

If for any reason you must ship your printer, carefully package the printer to avoid any damage during transit. It is recommended that you save and use the original packaging. The printer should also be adequately insured with your carrier.

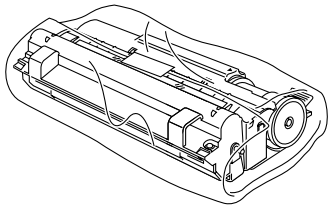
Warning

When shipping the printer, the DRUM UNIT assembly including the TONER CARTRIDGE must be removed from the printer and placed in the plastic bag. **Failure to remove and place it in the plastic bag during shipping will cause severe damage to the printer and will VOID THE WARRANTY.**

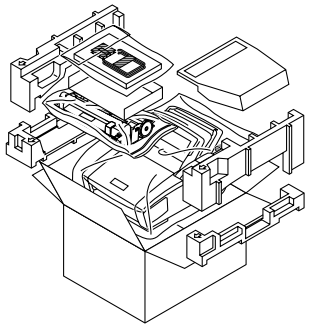
1 Remove the drum unit.



2 Place it in the plastic bag and seal the bag completely.



3 Re-pack the printer.
See “REPACKING THE PRINTER” in Chapter 5.



brother

Laser Printer HL-1060 Series User's Guide

(For USA & CANADA Only)

For technical and operational assistance, please call:

In USA	1-800-276-7746	(outside California)
	714-859-9700 Ext. 329	(within California)
In CANADA	1-800-853-6660	
	514-685-6464	(within Montreal)

If you have comments or suggestions, please write us at:

In USA	Printer Customer Support Brother International Corporation 15 Musick Irvine, CA 92718
In CANADA	Brother International Corporation (Canada), Ltd. - Marketing Dept. 1, rue Hôtel de Ville Dollard-des-Ormeaux, PQ, Canada H9B 3H6

BBS
For downloading drivers from our Bulletin Board Service, call:

In USA	1-714-859-2610
In CANADA	1-514-685-2040

Please log on to our BBS with your first name, last name and a four digit number for your password. Our BBS supports modem speeds up to 14,400, 8 bits, no parity, 1 stop bit.

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Brother Customer Service has installed an easy to use Fax-Back System so you can get instant answers to common technical questions and product information for all Brother products. This is available 24 hours a day, 7 days a week. You can use the system to send the information to any fax machine, not just the one you are calling from.
Please call 1-800-521-2846 and follow the voice prompts to receive faxed instructions on how to use the system and your index of Fax-Back subjects.

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For the name of an authorized dealer or service center, call 1-800-284-4357.

SERVICE CENTERS (Canada only)
For service center addresses in Canada, call 1-800-853-6660

INTERNET ADDRESS
For technical questions and downloading drivers: **http://www.brother.com**

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Compilation and Publication Notice

Under the supervision of Brother Industries Ltd., this manual has been compiled and published, covering the latest product's descriptions and specifications.

The contents of this manual and the specifications of this product are subject to change without notice.

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Definitions of Warnings, Cautions, and Notes

The following conventions are used in this User's Guide:

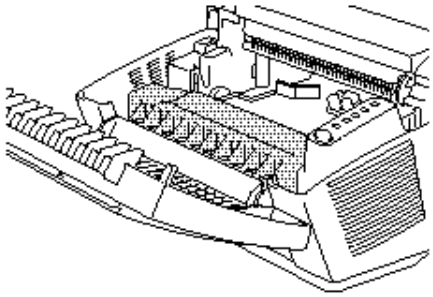
> **⚠ Warning**
> **Indicates warnings that must be observed to prevent possible personal injury.**

> **Caution**
> Indicates cautions that must be observed to use the printer properly or prevent damage to the printer.

> **Note**
> Indicates notes and useful tips to remember when using the printer.

To Use the Printer Safely

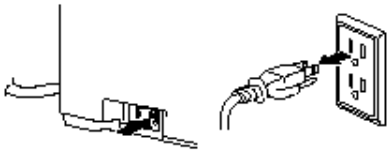
> **⚠ Warning**
> **After you have just used the printer, some internal parts of the printer are extremely hot. When you open the top cover of the printer, never touch the shaded parts shown in the following illustration.**



High Temperature

Inside the Printer

> **⚠ Warning**
> **There are high voltage electrodes inside the printer. Before cleaning the printer, make sure to turn off the power switch and unplug the power cord from the power outlet.**



Turning off the Switch and Unplugging the Printer

TABLE OF CONTENTS

REGULATIONS

Federal Communications Commission Compliance Notice (For USA Only)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ❏ Reorient or relocate the receiving antenna.
- ❏ Increase the separation between the equipment and receiver.
- ❏ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- ❏ Consult the dealer or an experienced radio/TV technician for help.

Important

A shielded interface cable should be used in order to ensure compliance with the limits for a Class B digital device.
Changes or modifications not expressly approved by Brother Industries, Ltd. could void the user's authority to operate the equipment.

Industry Canada Compliance Statement (For Canada Only)

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur la matériel brouilleur du Canada.

International Energy Star Compliance Statement

The purpose of the International Energy Star Program is to promote the development and popularization of energy-efficient office equipments, which includes computers, monitors, printers, facsimile receivers and copy machines world-wide.
As an International Energy Star partner, Brother Industries, Ltd. has decided that this product meets the guideline of the program.

Radio Interference (220-240 V Model Only)

This printer complies with EN55022(CISPR Publication 22)/Class B.

Before this product is used, ensure that you use a double-shielded cable with twisted-pair conductors and that it is marked “IEEE 1284 compliant”. The cable must not exceed 1.8 meters in length.

Laser Safety (For 110–120 V Model Only)

This printer is certified as a Class I laser product under the U.S. 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 protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

FDA Regulations (For 110-120 V Model Only)

U.S. 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.

MANUFACTURED:
BROTHER INDUSTRIES (USA) INC.
2950 Brother Blvd., Bartlett, TN 38133, U.S.A.
This product complies with FDA radiation performance standards, 21 CFR Subchapter J

MANUFACTURED:
BROTHER INDUSTRIES LTD.
15-1 Naeshiro-cho Mizuho-ku Nagoya, 467 Japan
This product complies with FDA radiation performance standards, 21 CFR Subchapter J

Caution

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

Declaration of Conformity (For Europe)

We, Brother International Europe Ltd.,
Brother House 1 Tame Street, Guide Bridge, Audenshaw, Manchester M34 5JE, UK.

declare that this product is in conformity with the following normative documents.

Safety:	EN 60950,	EN 60825
EMC:	EN 55022 Class B,	EN 50082-1

following the provisions of the Low Voltage Directive 73/23/EEC and the Electromagnetic Compatibility Directive 89/336/EEC (as amended by 91/263/EEC and 92/31/EEC).

Issued by:
Brother International Europe Ltd.
European Technical Services Division

IEC 825 Specification (For 220–240 V Model Only)

This printer is a Class 1 laser product as defined in IEC 825 specifications. The label shown below is attached in countries where required.

This printer has a Class 3B Laser Diode which emits invisible laser radiation in the Scanner Unit. The Scanner Unit should not be opened under any circumstances.

Caution

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

The following caution label is attached near the scanner unit.

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.

IMPORTANT - For Your Safety

To ensure safe operation the three-pin electrical plug supplied must be inserted only into a standard three-pin power point which is properly grounded through normal household wiring.

Extension cords used with the equipment must be three-pin plug type and correctly wired to provide proper grounding. Incorrectly wired extension cords may cause personal injury and equipment damage.

The fact that the equipment operates satisfactorily does not imply that the power is grounded and that the installation is completely safe. For your safety, if in any doubt about the effective grounding of the power, consult a qualified electrician.

Disconnect device

This printer must be installed near a power outlet, which is easily accessible. In case of emergencies, you must disconnect the power cord from the power outlet in order to shut off power completely.

Geräuschemission / Acoustic Noise Emission (For Germany Only)

Lpa < 70 dB (A) DIN 45635-19-01-KL2

IMPORTANT - Wiring Information (For U.K. only)

If the power cord supplied with this printer is not suitable for your electrical outlet, remove the plug from the mains cord and fit an appropriate three pin plug. If the replacement plug is intended to take a fuse then fit the same fuse as the original.

If a moulded plug is severed from the power cord then it should be destroyed because a plug with cut wires is dangerous if plugged into a live socket outlet. Do not leave it where a child might find it.

In the event of replacing the plug fuse, fit a fuse approved by ASTA to BS1362 with the same rating as the original fuse.

Always replace the fuse cover. Never use a plug with the cover omitted.

WARNING - THIS PRINTER MUST BE PROPERLY EARTHED.

The wires in the mains cord are coloured in accordance with the following code:

Green and yellow:	Ground
Blue:	Neutral
Brown:	Live

The colours of the wiring in the power lead of this printer may not correspond with the markings which identify the terminals in your plug. If you need to fit a different plug, proceed as follows.

Remove a length of the cord outer sheath, taking care not to damage the coloured insulation of the wires inside.

Cut each of the three wires to the appropriate length. If the construction of the plug permits, leave the green and yellow wire longer than the others so that, in the event that the cord is pulled out of the plug, the green and yellow wire will be the last to disconnect.

Remove a short section of the coloured insulation to expose the wires.

The wire which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter "E" or by the earth symbol or coloured green or green and yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter "N" or coloured black or blue.

The wire which is coloured brown must be connected to the terminal which is marked with the letter "L" or coloured red or brown.

The outer sheath of the cord must be secured inside the plug. The coloured wires should not hang out of the plug.

CHAPTER 1
INTRODUCTION

ABOUT THE GUIDEBOOKS

Finding Out How to Use the Printer

You have two guidebooks for this printer. Read each guidebook in the following order:

1. Read the Quick Setup Guide to set up your printer and to ensure proper connection with your computer. It also contains information for installing the printer driver, fonts and Remote Printer Console Program.

2. Read the User's Guide to get information about the following.

   - Features and operating environment requirements of your printer – Chapter 1
   - Paper Handling – Chapter 2
   - Control Panel – Chapter 3
   - Options – Chapter 4
   - Maintenance – Chapter 5
   - Troubleshooting – Chapter 6
   - Specifications – Appendices
   - Index

ABOUT YOUR PRINTER

Printer Overview

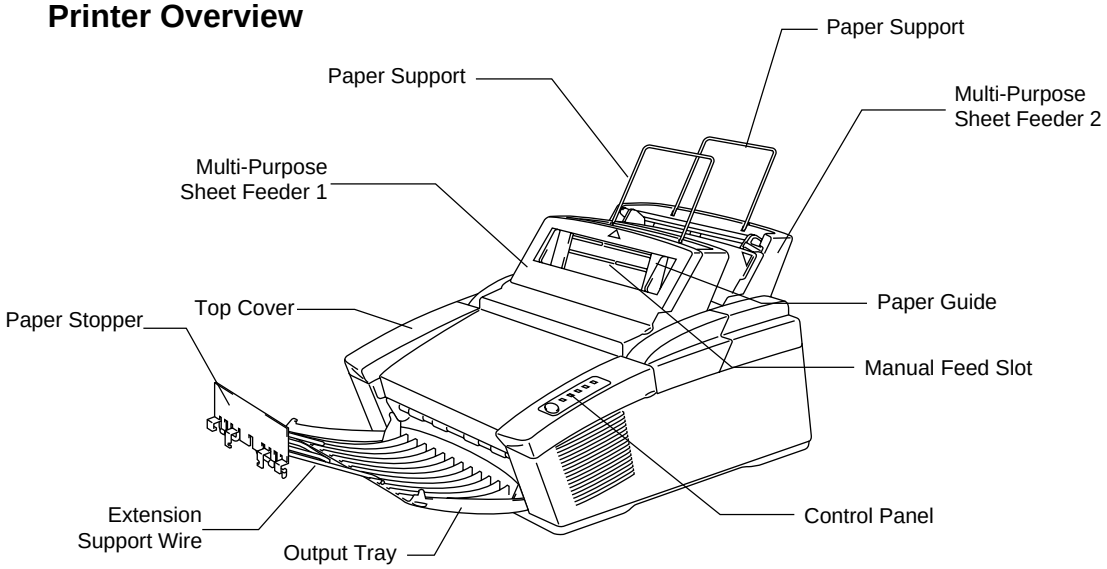


Fig. 1-1 Front View

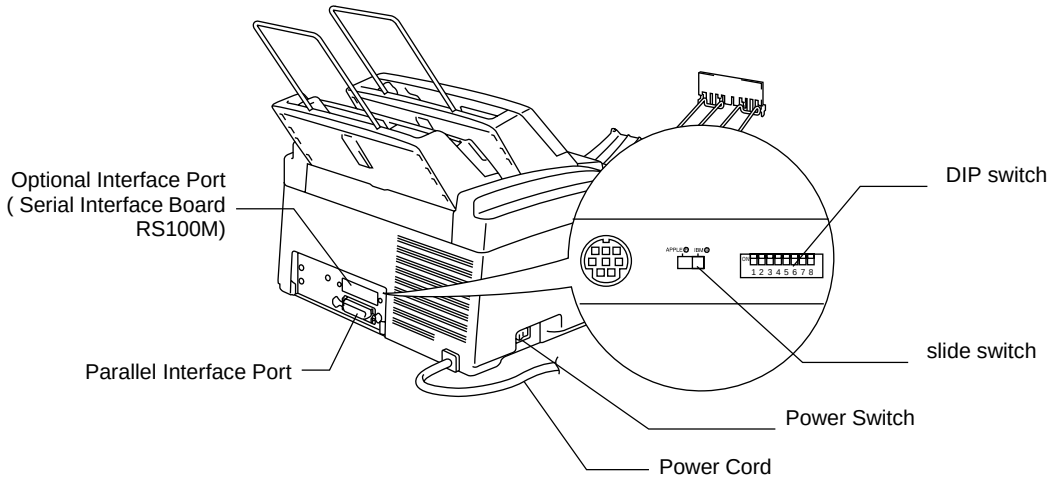


Fig. 1-2 Rear View

System Requirements in the Brother Printing Solution for Windows

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

- IBM PC or compatible with 80486 SX or higher microprocessor
- Parallel interface (or printer port)
- 4 MB or more of memory (8 MB recommended)
- 10 MB of space available on your hard disk for the printer driver and all fonts
- Microsoft Windows 95 or Windows 3.1/3.11

Features

This printer has the following features:

❑ **Up to 1200 (H) x 600 (V) dpi Resolution and 10 ppm Printing Speed**
True 600 dots per inch (dpi) with microfine toner and ten pages per minute (ppm) printing speed (A4 or Letter paper). This printer also supports 1200 (H) x 600(V) dots per inch (dpi) resolution for Windows DIB (Device Independent Bitmap) graphics. (It is recommended to add memory when printing in 1200 x 600 dpi mode.)

❑ **Versatile Paper Handling**
The printer has two multi-purpose sheet feeders and a straight paper path mechanism.
From the front Feeder 1 you can load A4, letter, legal, B5, A5, A6 and executive sizes of paper, and various types of paper including envelopes, postcards, organizer paper, and your custom paper size.
From the rear Feeder 2 you can load A4, letter, legal, B5, and executive sizes of paper. The front Feeder 1 also allows manual paper loading, so you can also use labels and transparencies.

❑ **Enhanced Printing Performance and User-Friendly Operation for Windows®**
The dedicated printer driver and TrueType™-compatible fonts for Microsoft® Windows 95 and Windows 3.1 are available on the floppy disk 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 saving mode, custom paper size, sleep mode, gray scale adjustment, resolution and so forth. You can easily set these print options through the Printer Setup Menu within the Windows Control Panel.

- **Remote Printer Console Program for DOS**
  The utility program, Remote Printer Console (RPC), is available on a floppy disk supplied with your printer. When you operate your computer in the DOS (Disk Operating System) environment, this program allows you to easily change the default settings of the printer such as fonts, page setup, emulations and so on.
  This program also provides a status monitor program, which is a Terminate-and-Stay Resident (TSR) program. It can monitor the printer status while running in the background and report the current status or errors on your computer screen.

- **Popular Printer Emulation Support**
  This printer supports three popular printer emulation modes, HP LaserJet 5P, 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 printer. This printer has an optional BR-Script 2 ROM board which adds a PostScript Level 2 language emulation to your printer. The printer also supports auto-emulation switching between HP, optional BR-Script 2 and Epson or HP, optional BR-Script 2 and IBM. If you want to select the printer emulation, you can do it using the Remote Printer Console Program.

- **Printer Status Monitor with Bi-directional Parallel Interface**
  The printer driver can monitor your printer's status using bi-directional parallel communications. A high quality 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. For example: when your printer is out of paper, the dialog box will display "Paper Empty" and instructions for the proper corrective action.

- **Enhanced Memory Management**
  The printer provides its own data compression technology in the 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 larger fonts, with the printer's standard memory.

❑ **Environment-Friendly**

Economy Printing Mode

This feature will cut your printing cost by saving toner. It is useful to obtain draft copies for proof-reading. You can select from two economy modes—25% toner saving and 50% toner saving—through the Windows printer driver supplied with your printer.

Sleep Mode (Power Save Mode)

When the printer is not used for a certain amount of time, sleep mode automatically reduces power consumption. The printer consumes less than 13 W 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 approximately 2,200 pages, which is cost effective and ecologically friendly.
The actual number of pages printed with each toner cartridge may vary depending on your average type of print job.

OPERATING AND STORAGE ENVIRONMENT

Please take note of the following before using the printer.

Power Supply

Use the printer within the specified power range.

AC power: ±10% of the rated power voltage in your country
Frequency: 50 Hz (220 V– 240 V) or 50/60 Hz (110–120 V)

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, shredder and so on. 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.

Environment

The printer should be installed near a power outlet, which is easily accessible.

Use the printer only within the following ranges of temperature and humidity.

Ambient temperature: 10°C to 32.5°C (50°F to 90.5°F)
Ambient humidity: 20% to 80% (without condensation)

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 on the right hand side of the printer is blocked.

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 gases.

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 top cover.

CHAPTER 2
PAPER HANDLING

PAPER SPECIFICATIONS

The multi-purpose sheet feeders can handle paper that has the following specifications.

❑ Sheet Feeder 1 (Front) / Manual slot

Paper Type	Paper Size
Cut sheet	A4, Letter, Legal, B5, A5, A6, Executive, Custom size (70-216 x 127-356 mm, 2.75-8.5 x 5-14 inches)
Envelopes	DL, C5, COM-10, Monarch, 9” x 12”, C4
Post Card	70-216 x 127-356 mm, 2.75-8.5 x 5-11 inches
Organizer	Day-Timer® J, K, L, M 70-216 x 127-356 mm, 2.75-8.5 x 5-11 inches
Labels and Transparencies	70-216 x 127-356 mm, 2.75-8.5 x 5-14 inches

❑ Sheet Feeder 2 (Rear)

Paper Type	Paper Size
Cut sheet	A4, Letter, Legal, B5, Executive

	Cut Sheet	Envelope
Basis Weight	60 to 158 g/m^2 (16 to 42 lb.)	75 to 90 g/m^2 (20 to 24 lb.) single thickness
Caliper	±0.03 to ±0.08 in. (0.08 to 0.2 mm)	0.0033 to 0.0058 in. (0.084 to 0.14 mm) single thickness
Moisture Content	4% to 6% by weight	4% to 6% by weight
Smoothness	100 to 250 (Sheffield)	100 to 250 (Sheffield)

Paper Capacity in Feeder

Multi-purpose	
Sheet Feeder:	Up to 22 mm (0.87 inch) in height (up to the mark) Approx. 200 sheets of 80 g/m^2 (20 lb.) or 30 sheets of 158 g/m^2 (42 lb.) A4/Letter paper, or 10 envelopes
Output Tray:	Approx. 100 sheets of 80 g/m^2 (20 lb.) A4/Letter paper

Recommended paper

Cut sheet:	Xerox 4200 (in USA) / Xerox 80 Premier Paper (in Europe) or equivalent
Label:	Avery laser label or equivalent
Transparency:	3M PP2500 / Avery 5282 (in USA) / STABILO 7250 (in Europe) or equivalent

Remarks

It is recommended that you test paper, especially special sizes and types of paper, on this printer before purchasing large quantities.

Avoid feeding labels with carrier sheets exposed (sheets with labels previously removed), or your printer will be damaged.

Avoid using coated paper, such as vinyl coated paper.

Avoid using preprinted or highly textured paper.

Use a recommended type of paper, especially plain paper and transparencies, for optimum printing. For more information on paper specifications, consult your nearest authorized sales representative or the place of purchase of your printer.

We recommend you use label or transparencies which are designed for use in laser printers.

We recommend you use long-grained paper for the best print quality.

If the paper has problems feeding from the multi-purpose sheet feeder, use the manual feed slot and try again.

You can use recycled paper in this printer.

Before using paper with holes such as organizer sheets, you must fan the stack well to avoid paper jams and misfeeds.

Before using any paper, make sure that it is not curled. If it is, you should straighten the paper as much as possible. Feeding curled paper can cause paper jams and misfeeds.

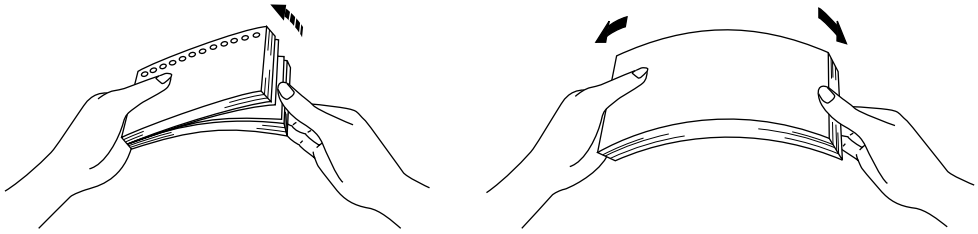


Fig. 2-1 Fan the Paper and Straighten the Paper

The following types of envelopes are not recommended for use.

- Damaged, curled, wrinkled, or irregularly shaped envelopes
- Extremely shiny or highly textured envelopes
- Envelopes with clasps
- Envelopes with self-adhesive closures
- Envelopes of baggy construction
- Envelopes not sharply creased
- Embossed envelopes
- Envelopes already printed by a laser printer
- Envelopes pre-printed on the inside
- Envelopes that cannot be arranged uniformly when placed in a pile

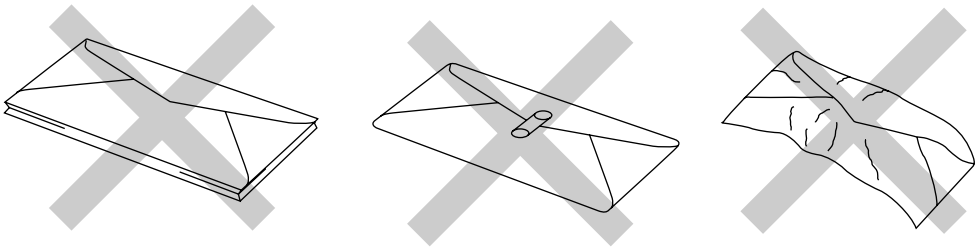
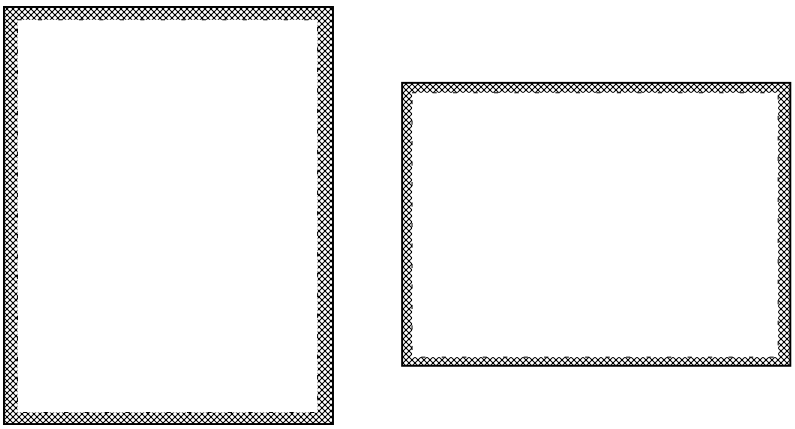


Fig. 2-2 Envelopes

Printable Area The figure below shows the physically printable area. (Except 9"x12" envelope)



Unprintable area
Approximately 4 mm(0.16 inch) for any sizes of paper

Fig. 2-3 Printable Area

MULTI-PURPOSE SHEET FEEDERS

The printer has two multi-purpose sheet feeders that can feed plain paper, envelopes, transparencies and organizer paper.

To use the multi-purpose sheet feeders, follow these steps:

1. Make sure that you have selected the proper paper source, paper size and orientation.

> **Note**
> - You may select the proper paper source, paper size, and orientation in your application software.
> - If your application software does not support your custom paper size, select the next paper size up that is closest but larger than the custom size. Then adjust the print area by changing the right and left margins in your application software.

2. Make sure that the multi-purpose sheet feeder contains the selected size of paper in the selected orientation. If necessary, change the paper in the feeder.

3. Send your file or document to the printer.

   When the printer receives data, it begins the print process by loading paper from the multi-purpose sheet feeder. If the printer is in sleep mode when it receives data, it will wake up and start the printing process automatically.

Loading Paper into the Feeder

To load paper into the feeder, follow these steps.

> **Note**
> This section describes loading paper into the front multi-purpose sheet feeder 1. Load paper into the rear sheet feeder 2 in the same way as described here. Remember, however, that paper sizes vary for Feeder 1 and Feeder 2. For paper sizes, see "PAPER SPECIFICATIONS" in Chapter 2.

1. Open the multi-purpose sheet feeder by gently pulling the tabs forward towards you. (①)
2. Move the paper guides horizontally to the widest position. (②)

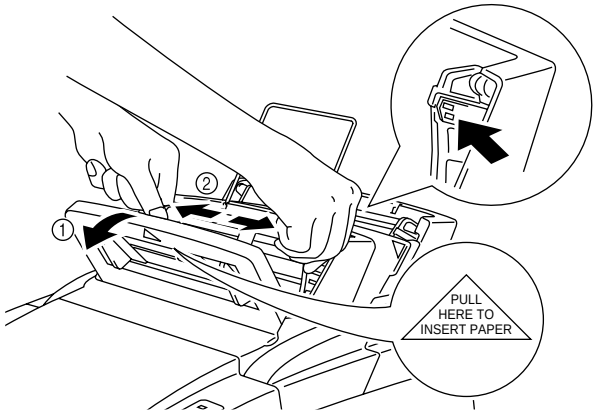


Fig.2-4 Opening the Feeder and Moving the Paper Guides

3. Load paper into the multi-purpose sheet feeder with the printing surface face down.

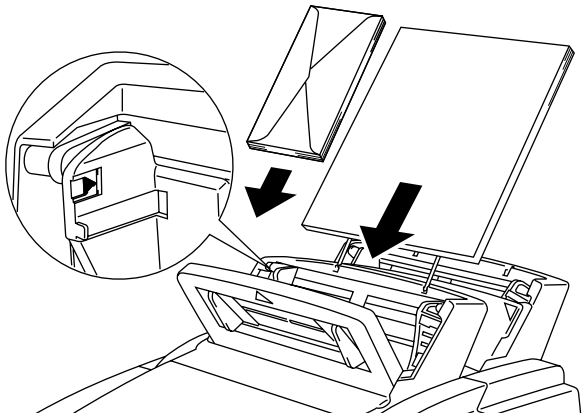


Fig. 2-5 Loading Paper or Envelopes in the Feeder

Note
If you load envelopes in Feeder 1, make sure they are inserted in the direction shown on the previous page.

Caution

- **If you print transparencies, load them sheet by sheet. Failure to do so may cause a double feed error.**
- The feeder can hold up to 200 sheets of plain paper (80 g/m^2, 20 lb.). If you load too many sheets, paper jams could occur.
- Make sure that the paper is stacked below the ▼ mark.
- If there is still some paper in the feeder, you must first remove it, put it together with the new paper and then insert the stack in the feeder.

4. Move the paper guide to the appropriate paper width (①) and close the multi-purpose sheet feeder. (②)

Caution

Failure to set the paper guides to the paper size may cause paper skew or jams.

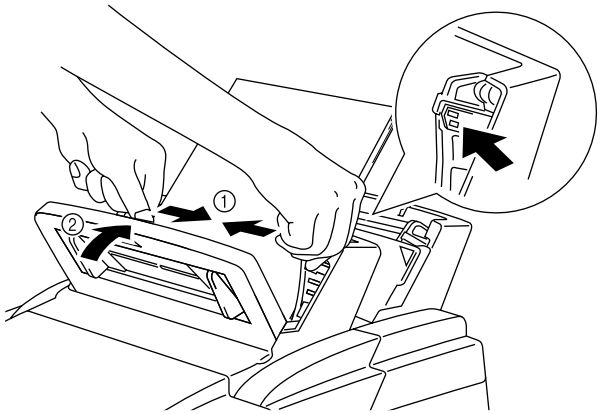


Fig. 2-6 Moving the Paper Guides and Closing the Feeder

Note

- If the multi-purpose sheet feeder runs out of paper when you try to print, the Alarm and Paper lamps blink to alert you. You have to load paper in the feeder and push the panel switch to cancel the alarm and continue printing. If paper jams in the printer, the Alarm and Paper lamps also blink. If the error is a paper jam, clear it referring to "PAPER JAMS" in Chapter 6.
- When the rear sheet feeder 2 runs out of paper and there is paper loaded in the front sheet feeder 1, be sure to remove paper from Feeder 1 temporarily (①) and load paper in Feeder 2. (②)

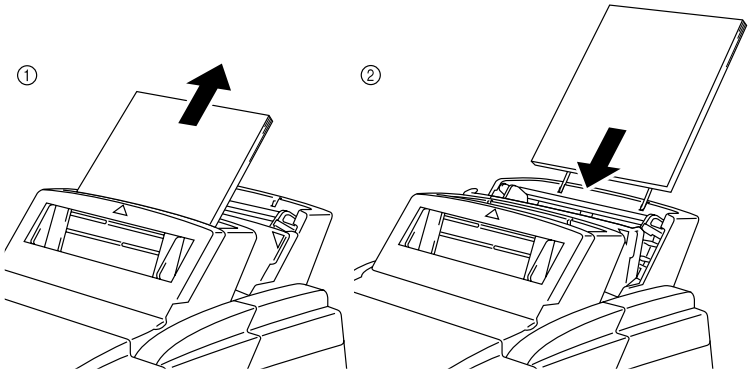


Fig. 2-7 Loading Paper in Feeder 2

Two Side Printing (Manual Duplexing)

The supplied printer driver for Windows 95 or Windows 3.1 allows for manual duplex printing both with Feeder 1 and Feeder 2. For more information about settings, see the help text in the printer driver.

The printer prints all the even numbered pages on one side of the paper first, and then prints all the odd pages on the reverse side of the paper.

When you have finished printing the even numbered sides of the paper, the driver instructs you to re-insert the paper by a pop-up message on your computer screen. Follow the instructions on how to reinsert the paper.

Note
- Before re-inserting the sheets, you have to straighten them, or you will get paper handling errors.
- The use of very thin or very thick paper is not recommended.
- If you encounter a double feeding error, we recommend that you hold all sheets of paper except the front sheet while the paper is feeding.

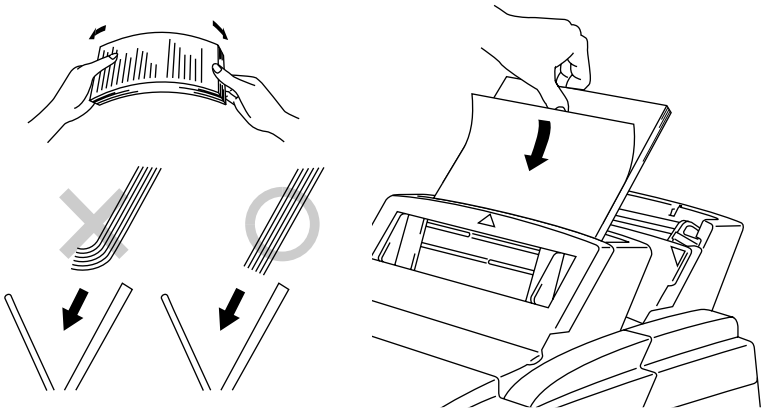


Fig. 2-8 Notes for Manual Duplexing

Note
When you use the Manual Duplex function, it is possible that paper jams may occur or print quality might not be satisfactory.

MANUAL FEED SLOT

The front multi-purpose sheet feeder 1 also has a manual feed slot. You can manually load paper **sheet by sheet** from this slot. You do not need to remove paper from the multi-purpose sheet feeder when using the manual feed slot.

❑ **When you load one sheet of paper manually:**
You do not need to choose manual feed in the Setup dialog box of your printer driver. While holding the selected size of paper in the proper orientation (Portrait or Landscape), place the side of the paper you wish to print on face down into the manual feed slot. Align the paper at the center of the manual feed slot, and be sure to insert it all the way. (①) Move the paper guide of the manual feed slot to the paper width you are using. (②)

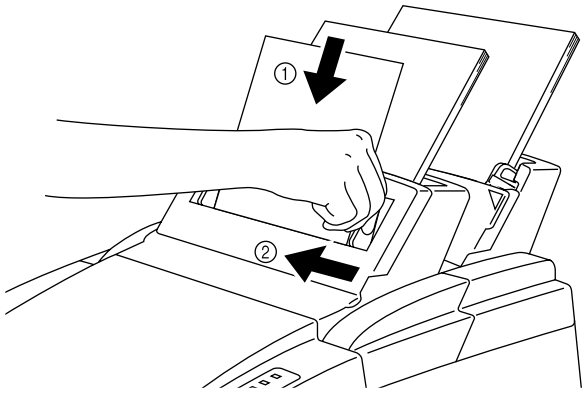


Fig. 2-9 Moving the Paper Guide

❑ **When you load more than one sheet of paper manually:**
Open the Setup dialog box of the supplied Windows printer driver and choose Manual Feed in the Paper Source section. Follow the above instructions to load the first page. The printer automatically starts printing. After the first page is printed, the dialog box appears and prompts you to load the next page. Load a sheet and choose OK to resume printing. Repeat these steps until you have finished printing all the pages.

Caution

If bi-directional communications are not operational between the printer and the computer, such as when the printer is shared on a network, the dialog box will not appear to load the next page. Manual paper feeding is not recommended when your printer is attached to a network.

Note
- Insert paper firmly into the manual feed slot.
- Be sure to load sheet by sheet when using the manual feed slot.

OUTPUT TRAY AND PAPER SUPPORT WIRE

The printer ejects paper with the printed surface face down into the output tray at the front of the printer.

When the output tray is closed, the ejected paper comes out sheet by sheet through the slit at the front. When you open the tray, sheets can be stacked on the tray.

Follow these steps to open the output tray:

1. Pull the top of the tray down (①).

2. Extend the extension support wire (②) and set the paper stopper (③).

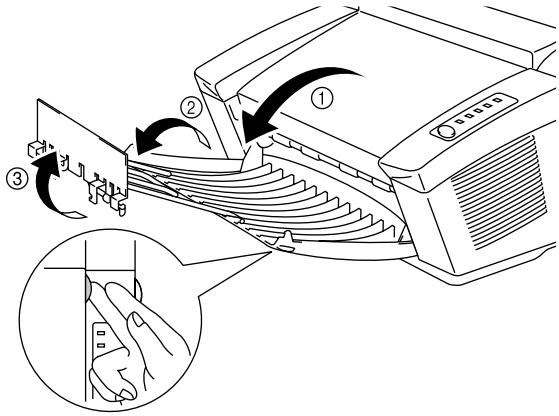


Fig. 2-10 Opening the Output Tray and Extending the Extension Support Wire

You can stack up to 100 sheets in the output tray.

Caution

- Use the paper stopper only when printing A4 or Letter size paper. Failure to set the paper stopper may cause ouput stack sheets to scatter.
- When you use transparencies, remove each sheet immediately after printing. Stacking sheets may cause the transparency to curl or jams
- Continuous printing with the output tray closed may cause condensation inside the output tray.

CHAPTER 3
CONTROL PANEL

LAMPS AND SWITCH

This section refers to the following lamps and switch on the printer control panel.

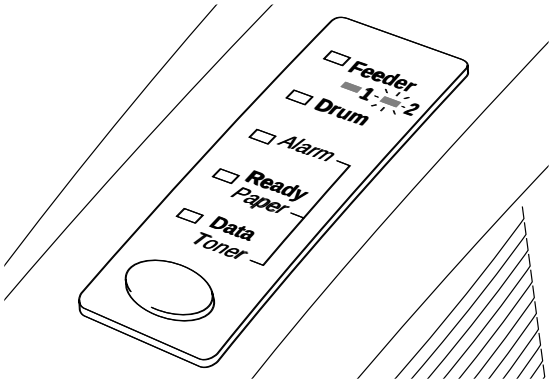


Fig. 3-1 Lamps and Switch on Control Panel

> **Note**
> When the power switch is off or the printer is in sleep mode, all lamps including the Ready lamp are off.

Ready (Paper) Lamp

The Ready lamp indicates the current status of the printer.

Lamp	Printer status
Off ❍	The power switch is off or the printer is in sleep mode. If the printer is in sleep mode, it will wake up automatically when it receives data or you press the control panel switch.
Blinking ❍↔●	The printer is warming up. (Blinking at 1 second intervals)
Blinking ❍↔●	The printer is cooling down and pauses printing until the printers internal temperature is lowered. (Blinking at 2 seconds intervals)
On ●	The printer is ready to print.

This lamp also works as the Paper lamp with the Alarm lamp. They blink simultaneously to indicate a paper error. See “Operator Calls” in Chapter 6.

Data (Toner) Lamp

The Data lamp indicates the current status of the print data process.

Lamp	Printer status
Off ❍	The printer has no print data.
Blinking ❍↔●	The printer is receiving data from the computer or the printer is processing data in memory.
On ●	Print data remains in the printer memory. If the Data lamp is on for a long period of time and nothing has printed, you need to press the switch to print the remaining data.

This lamp also works as the Toner lamp with the Alarm lamp. They blink simultaneously to indicate a toner error. See "REPLACING THE TONER CARTRIDGE" in Chapter 5 and "Operator Calls" in Chapter 6.

Drum Lamp

The Drum lamp indicates the drum unit is nearly at the end of its life.

Lamp	Printer status
Off ❍	The drum unit can be used.
On ●	The drum unit is nearly at the end of its life. Installing a new drum unit turns off this lamp. See "REPLACING THE DRUM UNIT" in Chapter 5.

Feeder Lamp

The Feeder lamp indicates that the rear sheet feeder 2 is selected through your software. When the front sheet feeder 1 is selected, the lamp is turned off.

Lamp	Printer status
Off ❍	Feeder 1 is selected.
On ●	Feeder 2 is selected.

Alarm Lamp

The Alarm lamp blinks to indicate a printer error status such as “Cover Open” and “Memory Full.” If any other error occurs, the printer indicates the error by blinking the Alarm lamp with another lamp or by printing an error report.

> **Note**
> The Ready, Data and Drum lamps are used to indicate printer errors with the Alarm lamp. See “ALARM INDICATIONS AT A GLANCE” in Chapter 6 and take corrective action for the error.

Switch

If you press the switch during printing, the printer immediately stops printing and ejects the paper. It is recommended that you wait until the page has finished printing, then press the switch, otherwise you will lose data on the page.

If the printer is in sleep mode, pressing the switch wakes it up into the ready state.

If the Data lamp is on, press the switch. The printer prints any data remaining in the printer memory: this operation is called “Form Feed.”

If an error occurs, the printer will recover from some errors automatically. If the error does not clear automatically, press the switch to clear the error and continue printer operation.

If the Ready lamp is on, press the switch. You can select Feeder 1 or Feeder 2.

Other Control Features

The printer has the following useful features:

Sleep Mode

When the printer does not receive data for a certain period of time (time-out), it enters sleep mode. Sleep mode acts as though the printer was turned off. The default time-out is 5 minutes. While the printer is in sleep mode, all the lamps are off and it is as if it was 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 the switch 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.
- Sleep mode allows the print engine to cool, so the temperature of your room and how long the printer has been in sleep mode affects the warm-up time. This warm-up time can take up to 30 seconds. The Ready lamp blinks to indicate that the printer is warming up.
- You can change the time out for the sleep mode with the supplied printer driver or Remote Printer Console program. Refer to the Help section in the printer driver or RPC program for more information about the sleep mode setting.

Test Print Mode

The printer has the following test print mode. Follow these steps:

1. Make sure that the top cover is closed.

2. Hold down the switch and turn on the power switch. Keep the switch depressed until the Drum lamp comes on.

   The Drum lamp lights to indicate that the printer is in the test print mode.

3. Press the switch again to execute the test print or hold down the switch to select another option and release the switch to execute the selected option.

   The test print mode varies depending upon the printer model as follows:

Lamp Lit	Choice	Function
Drum	Test sample page	The printer prints a test sample page. The printer returns to the ready status after printing.
Alarm	Print Config & Print Fonts I	The printer prints the current configuration of the printer and a list of the internal fonts. The printer returns to the ready status after printing.
Ready	Factory Reset	The printer is restored to the factory setting and permanent fonts and macros are cleared. The printer returns to the ready status after printing.
Data	Hex Dump Print	The printer can print data as hexadecimal values, so that you can check data errors and problems. To exit from this mode, you have to turn off the printer.

Control Features Set by the Brother Driver

Page Protection

If the printed images are too complex to print, the printer may print a partial image on the page. If this occurs, the printer has lost some print data and will indicate a “print overrun” error by printing an error report.

The page protection feature allows the printer to create the image to be printed in memory before physically moving the paper through the printer. Therefore, setting page protection to ON may eliminate the “PRINT OVERRUN” error.

The “AUTO” setting does not require additional memory and automatically uses page protection only when it is necessary. Occasionally, when AUTO page protection is on, processing complex print data may be slightly delayed.

Note

To set the Page Protection to A4, Letter or Legal paper sizes, the following total capacity of memory is required.

	300 dpi	600 dpi
Letter/A4	2 Mbytes	6 Mbytes
Legal	3 Mbytes	6 Mbytes

If your printer does not have enough memory for page protection, your document may be printed at 300 dpi.

You can set this function in the following ways.

- The supplied printer driver for Windows 95/Windows 3.1
- The supplied RPC program for DOS

For details of the settings, see the relevant help screen.

APT (Advanced Photoscale Technology)

APT allows your printer to produce fine gray scales to improve the appearance of documents containing photographic images.
Using this feature, the image is printed in 256 shades of gray at near photographic quality.

This setting can be made by using the supplied Windows driver. Also, a demo file which can be opened within Windows Write is included on the supplied disk. Try printing it with the APT feature.

For details of the settings, see the relevant help screen of the RPC or Windows driver.

> **Note**
> APT is a simpler feature than 1200 x 600 dpi for Windows DIB graphics. APT does not required so much memory as the 1200 x 600 dpi resolution setting.

CHAPTER 4
OPTIONS

SERIAL INTERFACE BOARD RS100M

To connect the printer to a DOS computer with a serial interface or to an Apple Macintosh computer, you need to install the optional serial interface board. When you have installed the serial interface board, you can share the printer between two computers (two IBM compatible PCs or one IBM compatible PC and one Apple Macintosh) using the parallel and serial interfaces at the same time. Automatic interface selection is a standard feature.

> **Note**
> - The serial interface board for this printer is optional, but in some countries the serial interface board may have been installed by either the factory or dealer.
> - The serial interface for Apple Macintosh (RS-422A) will only print at 300 dpi.

The serial interface board is installed onto the main controller board inside the printer. For the details about installation, see the instruction guide which was provided with the serial interface board.

Selecting the RS-422A (Apple) or RS-232C (IBM) Serial Interface

> **Note**
> This section is only for printer models which have had the serial interface installed.

> **Caution**
> Be sure to select the serial interface type to match your computer as follows:
> - For Apple Macintosh computers: you should not have to change any settings because the Apple (RS-422A) setting is factory selected (default).
> - For IBM compatible PCs you should move the switch to the IBM (RS-232C) setting.
> - If you are using an Apple Macintosh on the RS-422A port and an IBM compatible PC on the parallel port, it is not necessary to make any changes to the switch setting.

If necessary, select the interface type as follows:

1. Make sure that the printer is in the off-line state.
2. Select the RS-422A(Apple) or RS-232C(IBM) interface by changing the serial interface slide switch to the right for IBM(RS-232C) or to the left side for Apple(RS-422A).

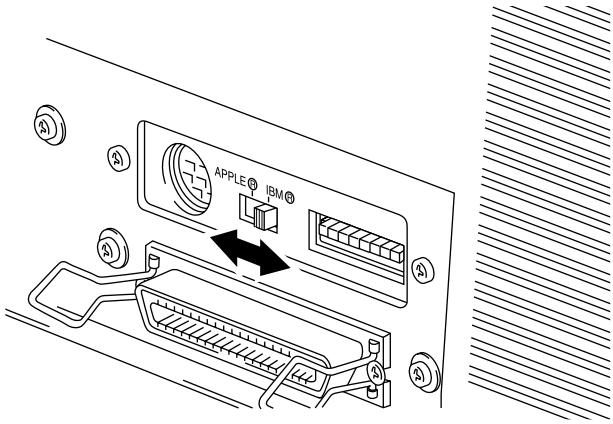


Fig. 4-1 Selecting the RS-422A (Apple) or RS-232C (IBM) Serial Interface

Setting the Serial Interface Parameters

> **Note**
> This section is only for printer models which have had the serial interface installed.

> **Caution**
> Be sure to set the parameters to match your computer as follows:
> - Never change the RS-422A parameters for Apple Macintosh computers. Because the RS-422A parameters have been correctly set at the factory for Apple Macintosh computers, you do not need to change the settings. You may skip this section. If you change parameters for the RS-232C serial interface and you switch back to RS-422A for Apple Macintosh computers, be sure to restore the parameters to the factory settings.
> - Set the RS-232C parameters to match your computer. You can set serial settings in several different places, within your DOS application, within the Windows Printer Icon (for Windows application software only), or within your AUTOEXEC.BAT file using MODE commands. For information on serial interface parameters, see the user's guide of your computer or software.

If necessary, set the serial interface parameters as follows:

1. Make sure that the printer is in the off-line state.

2. Set the serial interface parameters by moving up (on) or down (off) the selectors of the dual in-line package (DIP) switch.

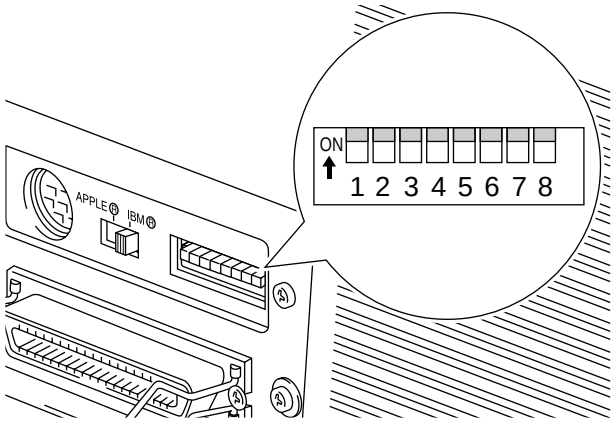


Fig. 4-2 Setting the Serial Interface Parameters

Table 1: Serial Interface Parameter Settings

Selector	Parameters	On (up)	Off (down)
1	Baud Rate	— See Table 2.	—
2	Baud Rate	— See Table 2.	—
3	Data Length	7 bits	**8 bits**
4	Stop Bit	2 bits	**1 bit**
5	Parity	— See Table 3.	—
6	Parity	— See Table 3.	—
7	Protocol	Xon/Xoff + DTR	**DTR only**
8	Robust Xon	On	**Off**

Table 2: Baud Rate Settings

Selector 1	Selector 2	For RS-422A	For RS-232C
Off	Off	**57600**	**9600**
On	Off	9600	4800
Off	On	1200	1200
On	On	19200	19200

Table 3: Parity Settings

Selector 1	Selector 2	Parity
On	On	Odd
On	Off	Even
Off	—	**None**

Note
- The factory settings are indicated in bold.
- If the robust Xon setting is turned on with selector 8, the printer sends Xon signals at one second intervals to the connected computer until it receives data. It is effective only if selector 7 is set to the On position for the Xon/Xoff plus DTR setting.

Connecting the Serial Interface Cable

Note
This section is only for printer models which have had the serial interface installed.

You need a serial interface cable with an 8-pin, DIN-type connector to connect your printer and computer.

Note
- Consult your dealer for a serial interface cable.
- If you are a Macintosh user, you can easily find the necessary cable at a local computer store. Look for Apple serial cables labeled as "Macintosh to ImageWriter II™ or "Macintosh to Personal LaserWriter™ 300" or the "Apple System Peripheral 8 Cable". **Do not purchase a serial cable labeled as "Straight-through" or "LocalTalk."**
- If you are a PC user, you need to purchase a special serial cable from your dealer. If you have a 9-pin connector on your computer, look for a cable labeled "IBM AT to ImageWriter II" cable. If you have a 25-pin connector, look for a cable labeled "DB25 to ImageWriter II." These cables most likely would be found in the Apple Macintosh section at your computer dealer. For more information about the interface specification, consult your dealer.

You can connect a parallel and a serial interface cable at the same time. The auto interface selection function allows you to share the printer with two computers. To do this, connect the parallel interface cable and then connect the serial interface cable as follows:

1. Make sure that the power switch is turned off.

Caution

Be sure to turn off the power switch before connecting or disconnecting the interface cables, or the printer may be damaged.

2. Insert and secure the parallel interface connector into the parallel interface port of your printer.

3. Insert and secure the serial interface connector into the serial interface port of your printer.

4. Turn on the power switch.

BR-SCRIPT 2 ROM BOARD BR-3000

The BR-Script 2 ROM board provides a PostScript Level 2 language emulation. Installing this ROM board in your printer allows your printer to print PostScript data.

With a BR-Script 2 ROM board installed, the automatic emulation switching function will work among HP LaserJet 5P, BR-Script 2 and EPSON FX-850 or HP LaserJet 5P, BR-Script 2 and IBM Proprinter XL.

Caution

Although Brother supplies two types of ROM boards, BR-2000 and BR-3000, this printer supports only the BR-3000 option. You cannot use the BR-2000 option with this printer.

ADDITIONAL MEMORY

This printer has 2.0 MByte of standard memory and has one slot for optional additional memory. The memory can be expanded up to 34 MBytes by installing a commercially available single in-line memory module (SIMM).

Additional memory is useful and may be necessary if you are using the optional BR-Script 2 emulation, or the Page Protection function, full page graphics with APT or 1200 x 600 dpi resolution set to on. (For details about Page Protection, see Chapter 3 "Other Features".)

Minimum Memory Recommendation (including resident memory)

■ HP LaserJet 5P, EPSON FX-850, and IBM Proprinter XL

Page Protect = AUTO or Off

	300 dpi	600 dpi
Letter/A4	2 MB	2 MB
Legal	2 MB	2 MB

Page Protect = Letter, A4, or Legal

	300 dpi	600 dpi
Letter/A4	2 MB	6 MB
Legal	3 MB	6 MB

> **Note**
> This printer can also support DIB graphics with a resolution of 1200 x 600 dpi under Windows 95/Windows 3.1 with the supplied printer driver. We recommend to expand the printer memory to avoid any memory full errors that may occur at this high resolution.

■ BR-Script 2 (when the BR-Script 2 ROM board is installed.)

	300 dpi	600 dpi
Letter/A4	2 MBytes	6 MBytes
Legal	3 MBytes	6 MBytes

The following type of SIMMs can be installed:

- 1 MByte HITACHI HB56D25632B-6A, -7A
- 2 MByte HITACHI HB56D51232B-6A, -7A
- 4 MByte HITACHI HB56A132BV-7A, 7AL, -7B, -7BL
- 8 MByte HITACHI HB56A232BT-7A, -7AL, -7B, -7BL
- 16 MByte TOSHIBA THM324000BSG-70
- 32 MByte TOSHIBA THM328020BSG-70

This printer can accept the following types of SIMMs;

Speed	60 nsec - 80 nsec
Pin Type	72 pin
Height	25.4 mm (1") or less
Output	32 bit or 36 bit

Note
The printer has only one slot for a SIMM upgrade.If you want to increase your printer memory again after you have installed a SIMM module into the slot, you will need to remove the previously installed SIMM first. For example if you have previously increased your memory from the standard 2 MB to 4 MB by adding a 2 MB SIMM and you wish to increase your total memory to 6 MB, you need to remove the installed 2 MB SIMM and install the new 4 MB SIMM into the printer.

Installing the SIMM

When you install the SIMM, follow these steps:

1. Turn off the power switch and unplug the power cord from the AC outlet. Then, disconnect the interface cable from the printer.

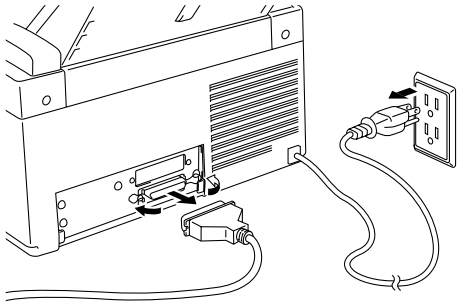


Fig. 4-3 Unplug the power cord and disconnect the interface cable

Note
Be sure to unplug the power cord to the printer before installing or removing the SIMM and the main controller board.

2. Unscrew the four screws securing the rear plate of the main controller board and pull out the main controller board.

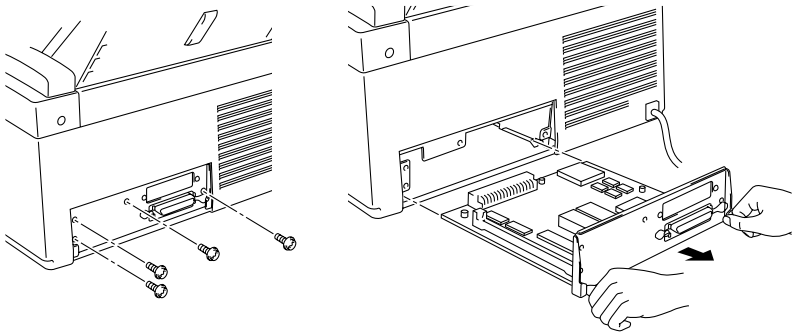


Fig. 4-4 Remove the main controller board

3. Unpack the SIMM and hold it on its edge.

> **Note**
> Do not touch the memory chips and the surface of the main controller board. If static electricity collects, it damages the memory.

4. Install the desired size of SIMM into the slot and push gently until it clicks into place.

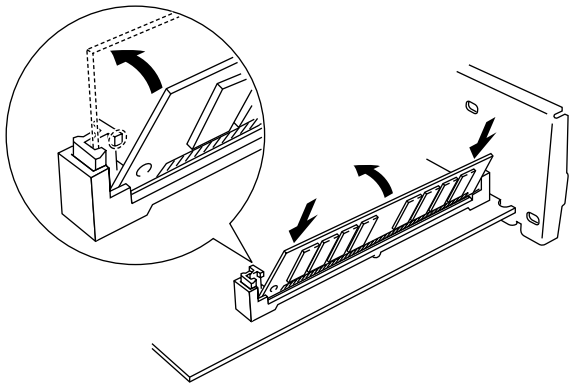


Fig. 4-5 Install the SIMM

5. Install the main controller board into the printer by sliding it into the guide rails.

6. Secure the main controller board with the four screws.

7. Reconnect the interface cable from your computer and plug the power cord into the AC outlet.

CHAPTER 5
MAINTENANCE

REPLACING THE TONER CARTRIDGE

The printer can print approximately 2,200 pages with one toner cartridge. When the toner cartridge is running low, the Alarm and Data (Toner) lamps blink once every 5 seconds to indicate toner low.

Note

- Actual page count will vary depending on your average document type. (i.e.: standard letter, detailed graphics, etc.)
- It is recommended that you always keep a new toner cartridge ready for use for when you get the toner low warning.
- Discard the used toner cartridge according to local regulations. If you are not sure of them, consult your local dealer. Be sure to seal the toner cartridge tightly so that toner powder does not spill out of the cartridge. Do not discard used toner cartridges with domestic rubbish.
- It is recommended that you clean the printer when you replace the toner cartridge. See "CLEANING THE PRINTER" in this chapter.

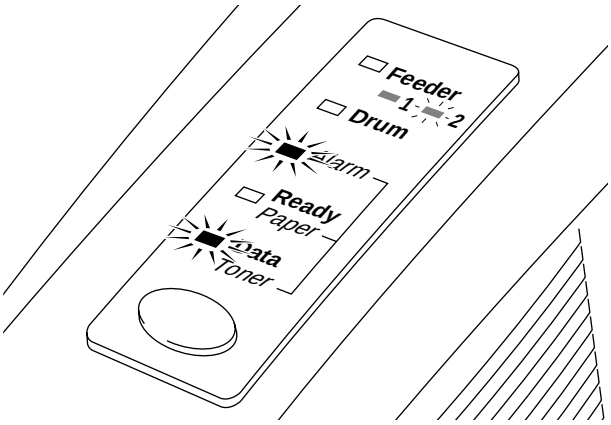


Fig. 5-1 Toner Low and Empty Indication

Caution

You may print approximately 100 pages after the first toner low indication. Both Alarm and Data (Toner) lamps will blink continuously to indicate that the toner is empty. Once this indication appears, your printer cannot resume printing until you have installed a new toner cartridge.

Caution

Keep the drum unit level after removing the toner cartridge, to avoid possible toner spill or scatter.

Follow these steps to replace the toner cartridge:

1. Turn off the power switch.

2. Open the top cover. Remove the drum unit by holding each side of the drum and gently lifting the drum towards you (up and out).

Note

Make sure that the top cover is correctly latched open, indicated by a click

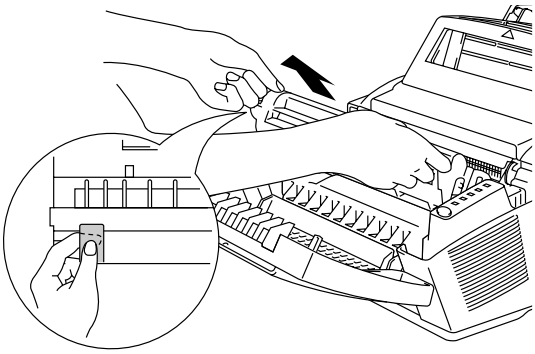


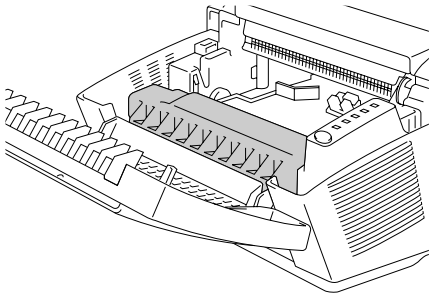
Fig. 5-2 Removing the Drum Unit

Note

It is recommended to put the drum unit on a piece of disposable paper or cloth in case of accidental toner spill or scatter.

⚠ Warning

After you have just used the printer, some internal parts of the printer are extremely hot. When you open the top cover of the printer, never touch the shaded parts shown in the following illustration.



⚠ High Temperature

Fig. 5-3 Inside the Printer

3. Gently turn the lever on the toner cartridge forward until it stops.

Note

The toner cartridge cannot be removed unless the shutter is completely closed by turning the lever fully to the front.

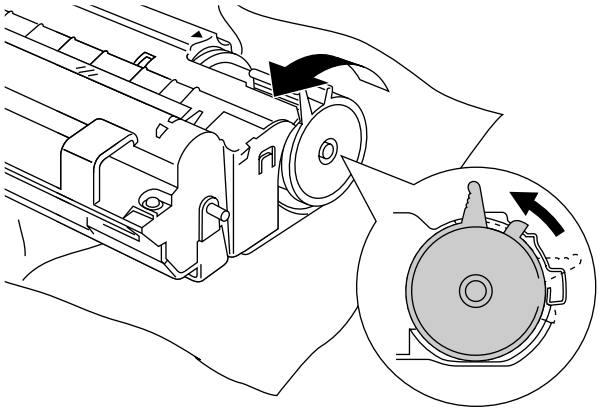


Fig. 5-4 Turning the Lever to Close the Shutter

4. Remove the old toner cartridge from the drum unit by pulling it out gently.

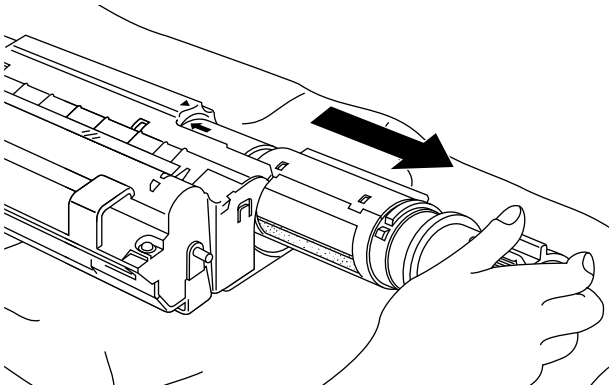


Fig. 5-5 Removing the Old Toner Cartridge

> **Caution**
> Handle the toner cartridge carefully. If toner scatters on your hands or clothes, wipe or wash it off with cold water immediately.

5. Unpack the new toner cartridge, gently shake it five or six times and then remove the protective part.

> **Caution**
> - Only unpack the toner cartridge immediately before installing it into the printer. If toner cartridges are left unpacked for a long period of time, the toner life is shortened.
> - Never turn the black ring of the toner cartridge.
> - **You can only use a Brother genuine toner cartridge which is specially formulated to ensure top print quality. Using another brand of toner cartridge could void your printer's warranty.**

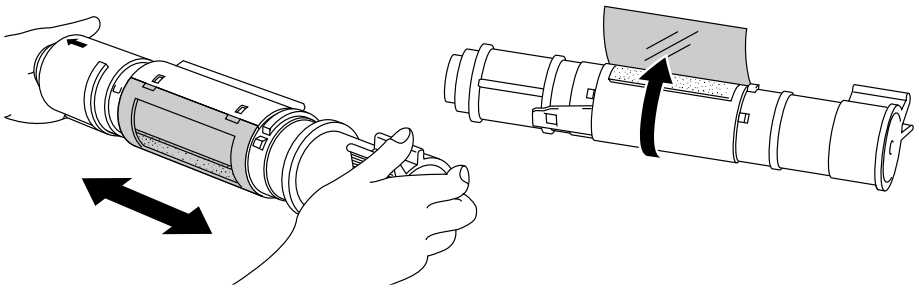


Fig. 5-6 Shaking the Toner Cartridge and Remove the Protective Part

6. Install the new toner cartridge into the right hand side of the drum unit. Make sure that the toner cartridge guide bar is exactly aligned with the guide slot in the drum unit to ensure that the toner cartridge and the drum unit fit together correctly.

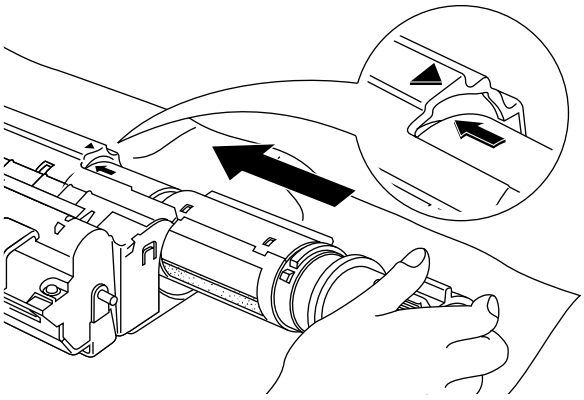


Fig. 5-7 Installing the Toner Cartridge into the Drum Unit

7. Gently turn the lever on the toner cartridge backward until it stops.

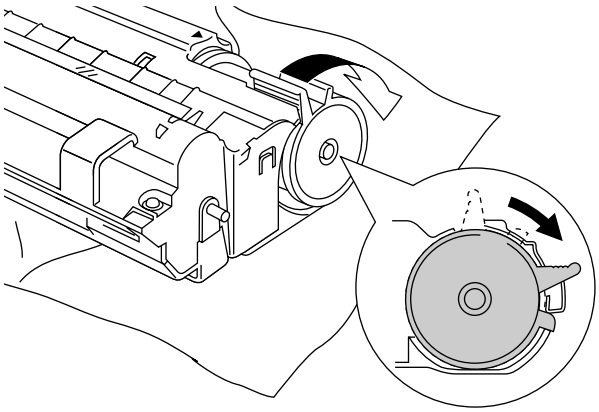


Fig. 5-8 Turning the Lever to Open the Shutter

8. Re-install the drum unit into the printer and close the top cover. Then, turn on the power switch.

REPLACING THE DRUM UNIT

The printer uses a drum unit to create the print images on paper. If the Drum lamp is on, it indicates the drum unit is nearly at the end of its life. We recommend you prepare a new drum unit to replace the current one. Even if the Drum lamp is on, you may be able to continue to print without replacing the drum unit for a while. If there is a noticeable deterioration in the output print quality even before the Drum lamp lights, then the drum unit should be replaced.

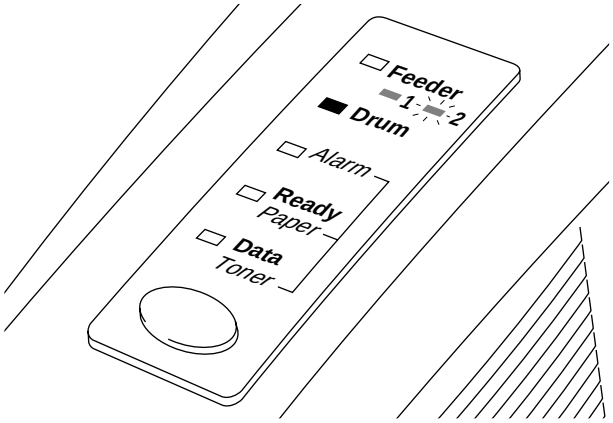


Fig. 5-9 Drum Unit Nearly at the End of its Life

Caution

- When removing the drum unit, handle it carefully as it may contain toner.
- You should clean the printer when you replace the drum unit. See "CLEANING THE PRINTER" in this chapter.

Note

The drum unit is a consumable, and it is necessary to replace it periodically. There are many factors that determine the actual drum life, such as temperature, humidity, type of paper and toner that you use, the number of pages per print job, etc.. The drum life is estimated at approximately 20,000 pages at 20 pages per job and 8,000 pages at 1 page per job. The actual number of pages that your drum will print may be significantly less than these estimates. Because we have no control over the many factors that determine the actual drum life, we cannot guarantee a minimum number of pages that will be printed by your drum.

For best performance, use only genuine Brother toner, and the product should only be used in a clean, dust-free environment with adequate ventilation.

Follow these steps to replace the drum unit:

1. Turn off the power switch.
2. Open the top cover and remove the old drum unit.

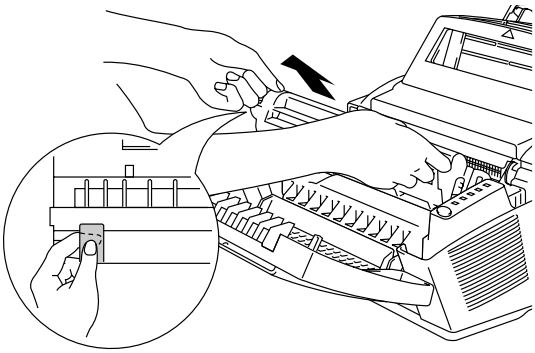
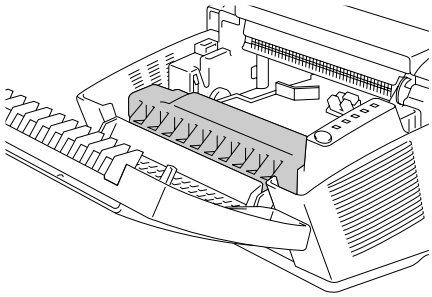


Fig. 5-10 Removing the Drum Unit

⚠ Warning

After you have just used the printer, some internal parts of the printer are extremely hot. When you open the top cover of the printer, never touch the shaded parts shown in the following illustration.



⚠ High Temperature

Fig. 5-11 Inside the Printer

3. Remove the toner cartridge from the drum unit and keep it in a safe place. For more information, see "REPLACING THE TONER CARTRIDGE" in this chapter.

Note

- Discard the used drum unit according to local regulations. If you are not sure of them, consult your local dealer/retailer. Be sure to seal the drum unit tightly so that toner powder does not spill out of the unit. Do not discard used drum units with domestic rubbish.
- It is recommended to put the drum unit on a piece of disposable paper or cloth in case of accidental toner spill or scatter.

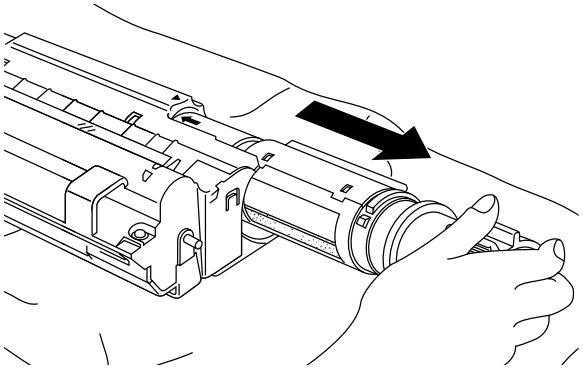


Fig. 5-12 Removing the Toner Cartridge

4. Unpack the drum unit and gently shake it five or six times horizontally.

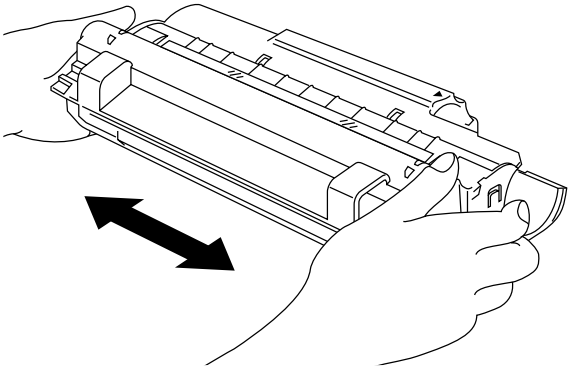


Fig. 5-13 Shaking the Drum Unit

Caution

- **Do not remove the starter sheet.**

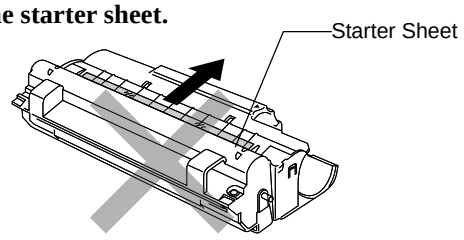


Fig. 5-14 Do Not Remove the Starter Sheet

- Only unpack a drum unit immediately before installing 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 toner cartridge and the drum unit carefully as it contains toner. If toner scatters and your hands or clothes get dirty, wipe or wash it off with cold water immediately.

5. Install the toner cartridge into the new drum unit. For more information, see “REPLACING THE TONER CARTRIDGE” in this chapter.

6. Install the new drum unit into the printer.

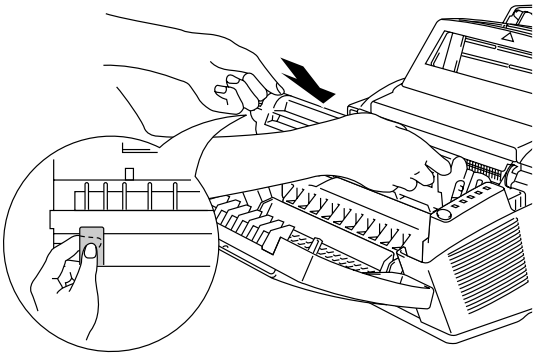


Fig. 5-15 Installing the Drum Unit

7. Close the top cover.

8. Turn on the power switch. The printer automatically ejects the starter sheet. Ejecting this sheet resets the drum life alarm.

> **Caution**
> Do not open the top cover until the printer ejects the starter sheet completely. It may cause the starter sheet to jam.

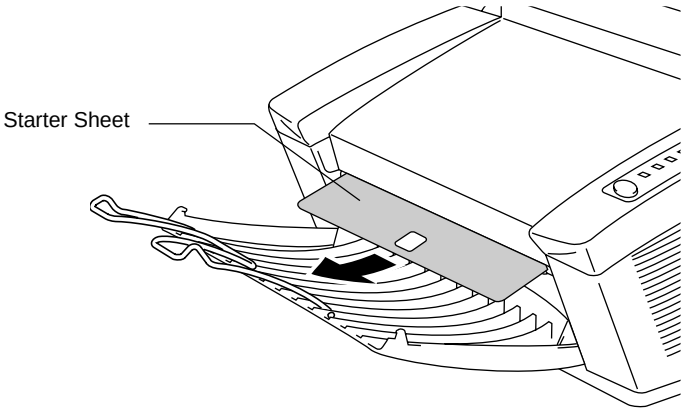


Fig. 5-16 Ejecting the Starter Sheet

ADJUSTING THE PRINT DENSITY

The print density dial is located inside the printer. You can use it to adjust the amount of toner applied to the paper.

When the toner cartridge and drum unit are replaced, or if the operating temperature and humidity are high or low, print conditions may change causing darker or lighter printouts.

Use a screwdriver to turn the print density dial gently clockwise for darker printouts and counterclockwise for lighter printouts. The dial has been factory set to the middle position.

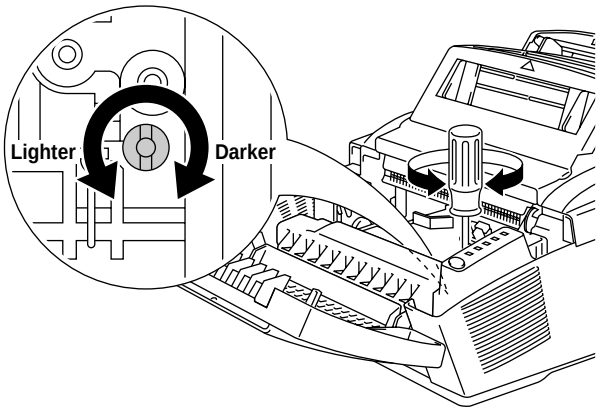
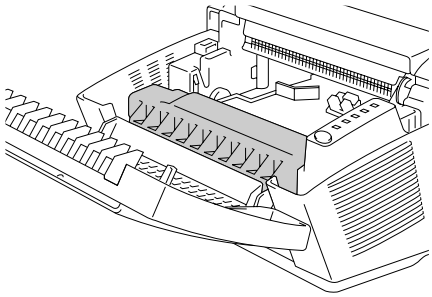


Fig. 5-17 Adjusting the Print Density Dial

⚠ Warning

After you have just used the printer, some internal parts of the printer are extremely hot. When you open the top cover of the printer, never touch the shaded parts shown in the following illustration.



⚠ High Temperature

Fig. 5-18 Inside the Printer

CLEANING THE PRINTER

Clean the printer exterior and interior periodically. If printed pages get stained with toner, clean the printer interior and drum unit.

Cleaning the Printer Exterior

Clean the printer exterior as follows:

1. Turn off the power switch and unplug the power cord.

⚠ Warning

There are high voltage electrodes inside the printer. Before cleaning the printer, make sure to turn off the power switch and unplug the power cord from the power outlet

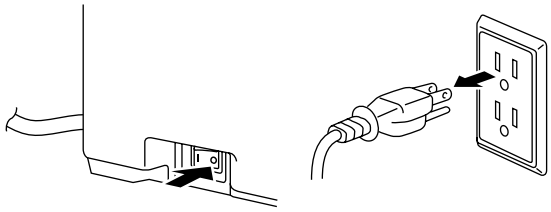


Fig. 5-19 Turning off the Switch and Unplugging

2. Remove the paper in the multi-purpose sheet feeders.

3. Use a damp cloth for cleaning.

❗ Caution

Use water or neutral detergents for cleaning. Cleaning with volatile liquids such as thinners or benzene will damage the surface of the printer.

4. Wipe dirt and dust away from the printer exterior and feeders with a cloth.

5. Load paper into the multi-purpose sheet feeders, and plug in the power cord.

Cleaning the Printer Interior and Drum Unit

Clean the printer interior and the drum unit as follows:

1. Turn off the power switch and unplug the power cord.

⚠ Warning

There are high voltage electrodes inside the printer. Before cleaning the printer, make sure to turn off the power switch and unplug the power cord from the outlet.

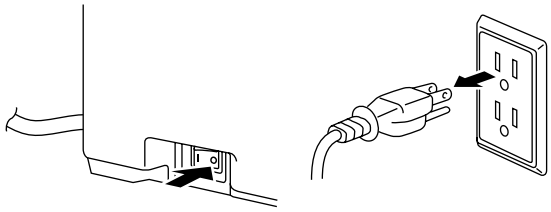


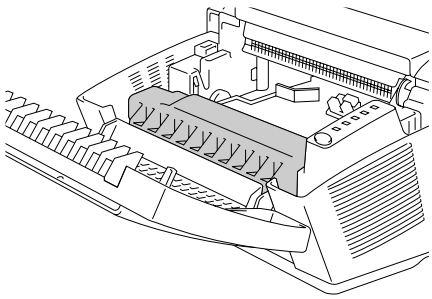
Fig. 5-20 Turning off the Switch and Unplugging

2. Open the top cover of the printer.

3. Take the drum unit out of the printer and put it aside on a piece of disposable paper.

⚠ Warning

After you have just used the printer, some internal parts of the printer are extremely hot. When you open the top cover of the printer, never touch the shaded parts shown in the following illustration.



⚠ High Temperature

Fig. 5-21 Inside the Printer

4. Gently wipe the scanner window with a soft dry cloth.

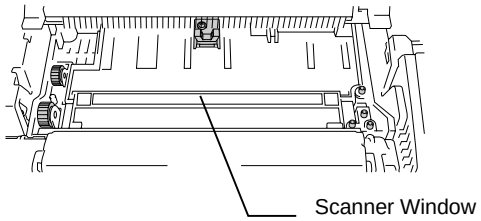


Fig. 5-22 Cleaning the Scanner Window

Caution

- Do not touch the scanner window with your finger.
- Do not wipe the scanner window with cleaning alcohol (isopropyl).

5. Turn the drum unit upside down carefully.

Caution

Handle the drum unit carefully as it contains toner. If toner scatters and your hands or cloths get dirty, wipe or wash it off with cold water immediately.

Note

It is recommended to put the drum unit on a piece of disposable paper or cloth in case of accidental toner spill or scatter.

6. Clean the primary corona wire inside the drum unit by gently sliding the tab to the right and left several times.

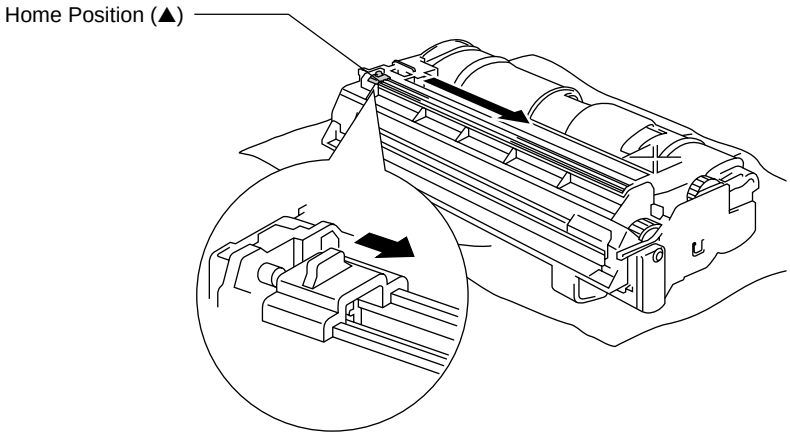


Fig. 5-23 Cleaning the Primary Corona Wire

7. Return the tab to the home position (▲ mark position) before reinstalling drum unit.

> **Caution**
> Be sure to position the tab at the home position, or printed pages may have vertical stripes.

8. Install the drum unit into the printer.
   See the section "REPLACING THE DRUM UNIT" in Chapter 5.

9. Close the top cover.

10. Plug in the power cord and turn on the power switch.

Cleaning the Paper Feed Rollers

Clean the paper feed rollers inside the multi-purpose sheet feeders with a clean cloth as shown below:.

1. Cleaning the Feeder 1 paper feed rollers.

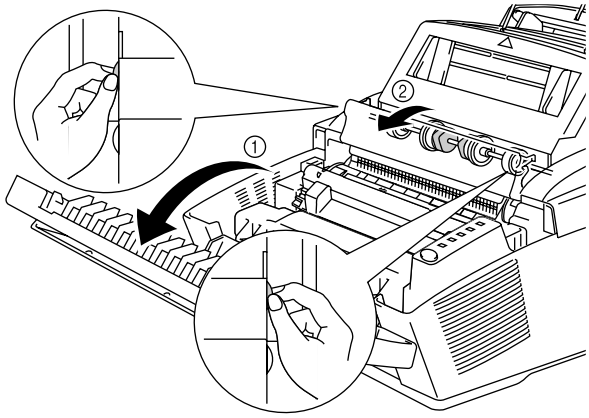


Fig. 5-24 Cleaning the Feeder 1 Paper Feed Rollers

2. Cleaning the Feeder 2 paper feed rollers.

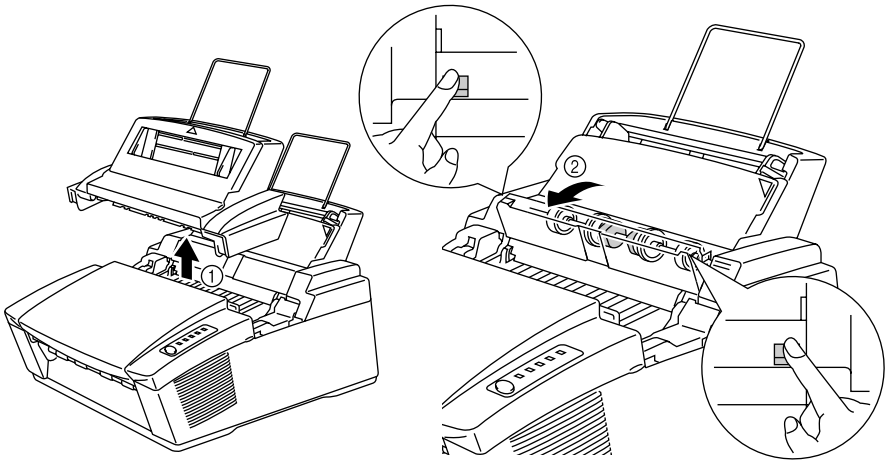


Fig. 5-25 Cleaning the Feeder 2 Paper Feed Rollers

RE-PACKING THE PRINTER

Caution

Whenever you transport the printer, use the packing materials which are provided with your printer. Also, follow the steps below to re-pack the printer, or the printer may be damaged which will void the printer's warranty.

1. Turn off the power switch and unplug the printer from the AC outlet.
2. Open the top cover.
3. Remove the drum unit assembly, referring to the previous section.

Note

Remove the drum unit assembly with the toner cartridge included.

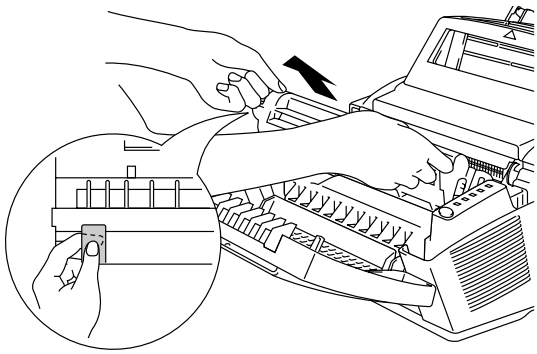


Fig. 5-26 Removing the Drum Unit Assembly

4. Place the drum unit assembly in the plastic bag and seal the bag completely.

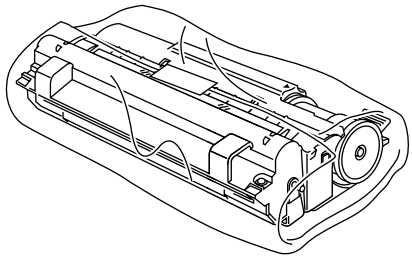


Fig. 5-27 Placing the Drum Unit in the Plastic Bag

5. Close the top cover, the extension wire, and the output tray.

6. Wrap the printer in the plastic bag and place it in the original carton box with the original Styrofoam packing material.

7. Place any documents (manual and any documentation describing the reason for repacking printer), and drum unit assembly in the carton box as shown below.

8. Close the carton box and tape it.

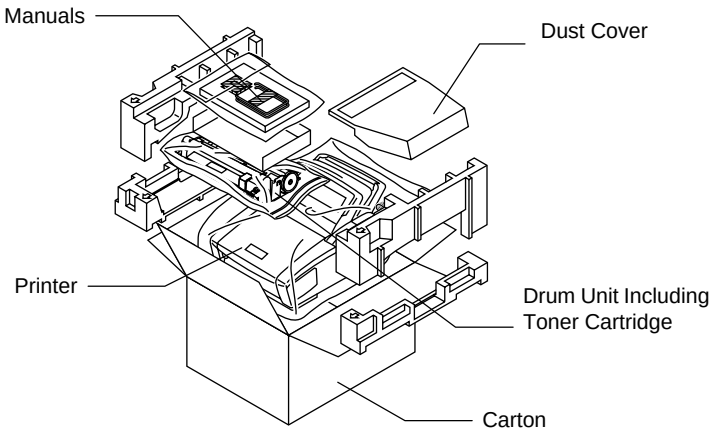


Fig. 5-28 Repacking the Printer

CHAPTER 6 TROUBLESHOOTING

ALARM INDICATIONS AT A GLANCE

Operator Calls

If a recoverable error occurs, the printer indicates an ‘operator call’ by blinking the Alarm lamp and any of the following lamps.

Find the error and take the proper action to correct it. The printer automatically recovers from most errors, but you may need to reset the printer with the panel switch as described below.

Blinking Lamp	Error	Action
Paper ❍↔● Alarm❍↔●	Paper jam	Clear the paper jam referring to the next section “PAPER JAMS” and press the panel switch if the printer does not automatically resume printing.
	Paper empty	Load paper in the printer referring to Chapter 2 and press the panel switch.
	Misfeed	Reinstall the paper and press the panel switch.
Toner ❍↔● Alarm❍↔● (every 5 seconds)	Toner low	Indicates that the printer has approximately 100 pages of printing left before the toner cartridge is empty. Prepare a new toner cartridge.
Toner ❍↔● Alarm❍↔● (Fast blinking)	Toner Empty	Replace the toner cartridge with a new one referring to Chapter 5.

For errors shown below, the printer indicates an operator call by blinking the Alarm lamp. If you use the printer with the supplied Windows driver, the status monitor will appear to indicate the error on your computer screen. The printer also prints some error messages on paper.

Error	Action
Cover Open	Close the top cover of the printer.
Print Overrun	• Press the panel switch to print the data remaining in the printer. • If you are using the supplied Windows driver, try again after changing the following settings. The best combination of the settings below will vary depending on your document. Graphics Mode TrueType™ Mode Use Printer True Type Fonts Page Protection • If this does not clear the error, reduce the complexity of your document or reduce the print resolution. • Expand the printer memory by installing a SIMM and set page protection to ON by using the supplied Windows driver or RPC program.
Memory Full	• Press the panel switch to print the data remaining in the printer. • If you are using the supplied Windows driver, try again after changing the following settings. The best combination of the settings below will vary depending on your document. Graphics Mode TrueType™ Mode Use Printer True Type Fonts Page Protection • Expand the printer memory by adding a commercially available SIMM. • Reduce the print resolution or reduce the complexity of your document.
Parallel Interface Line Error	• Press the panel switch to resume printing. • Check that the connection between your computer and printer is secure and correct, and check the interface cable.
Serial Interface Framing Error	• Press the panel switch to resume printing. • Check the communication parameters such as baud rate and stop bit on both your computer and printer.
Serial Interface Parity Error	• Press the panel switch to resume printing. • Check the communication parameters such as bit length and parity on both your computer and printer.
Serial Interface Overrun Error	• Press the panel switch to resume printing. • The interface hardware may be damaged. Consult your dealer.

Error	Action
Serial Interface Input Buffer Overflow	• Press the panel switch to resume printing. • Check the communication parameters such as the handshake protocols on both your computer and printer. • If the error occurs again, the interface hardware may be damaged. Consult your dealer.

Note
If the printer does not operate as you expect it to, it is recommended that you turn off the power switch, wait a few seconds and then turn it on again. If you still have problems, consult your dealer or our authorized service representative.

Service Calls

If an unrecoverable error occurs, the printer indicates the need for a service call by lighting **all the lamps** and then the following combination of lamps alternately:

Service Call	Fuser mal-function	Laser BD malfunction	Scanner malfunction	ROM error
Feeder	❍	❍	❍	❍
Drum	●	❍	●	❍
Alarm	❍	●	●	❍
Ready	❍	❍	❍	●
Data	❍	❍	❍	❍

Service Call	D-RAM error	Service A	Service B	CPU Runtime error
Feeder	❍	❍	❍	❍
Drum	●	❍	●	●
Alarm	❍	●	●	●
Ready	●	●	●	●
Data	❍	❍	❍	●

Service Call	NV-RAM error
Feeder	❍
Drum	●
Alarm	❍
Ready	●
Data	●

● ON ❍ OFF

If you see any of these service call indications, turn off the power switch, wait a few seconds and then turn it on and try to print again.

If you cannot clear the error and see the same service call indication after turning on the printer, consult your dealer or our authorized service representative. Report the error status and situation referring to the above table.

> **Note**
> Ensure that the top cover is properly closed and the main controller board is correctly installed.

PAPER JAMS

Before you can clear a paper jam error, you need to find the location of the paper jam. Locate the position referring to the following figure.

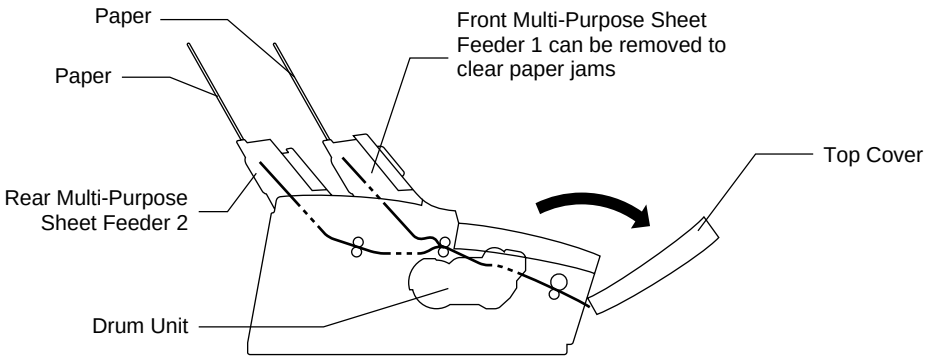
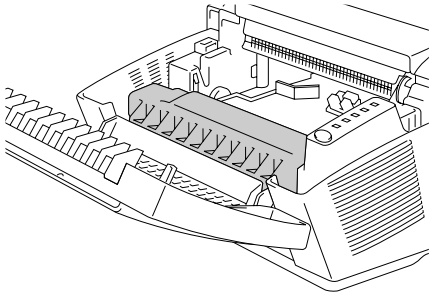


Fig. 6-1 Locating Paper Jam Position

After locating the position, clear the jammed paper referring to the following descriptions. If the jammed paper is removed completely and the top cover is closed, the printer may resume printing automatically. If the printer does not resume printing, press the control panel switch.

⚠ Warning

After you have just used the printer, some internal parts of the printer are extremely hot. When you open the top cover of the printer, never touch the shaded parts shown in the following diagram.



⚠ High Temperature

Fig. 6-2 Inside the Printer

❑ Paper Jam in the Multi-Purpose Sheet Feeder

If a paper jam has occurred inside the multi-purpose sheet feeder 1 or 2, pull the jammed paper upwards out of the feeder. Also, remove Feeder 1 and open the top cover to check that a torn piece of paper does not remain inside the printer: refer to the following sections.

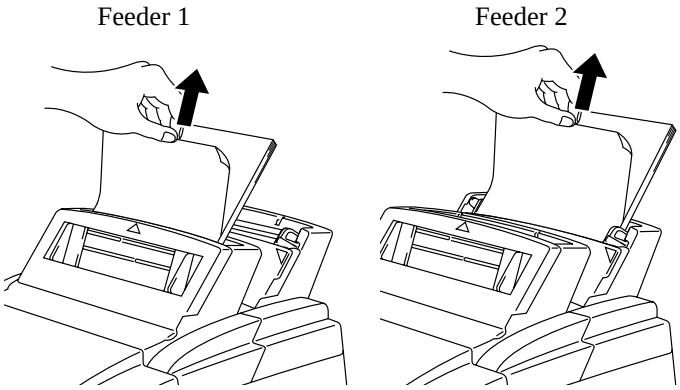


Fig. 6-3 Paper Jam in the Feeders

If the paper cannot be pulled up, see the next sections "Paper Jam under Feeder 1" and "Paper Jam near the Drum Unit."

❑ Paper Jam under Feeder 1

If a paper jam has occurred under the front multi-purpose sheet feeder 1, remove the feeder. (①) Then, pull the jammed paper upwards and out of the printer. (②) Re-install the feeder.

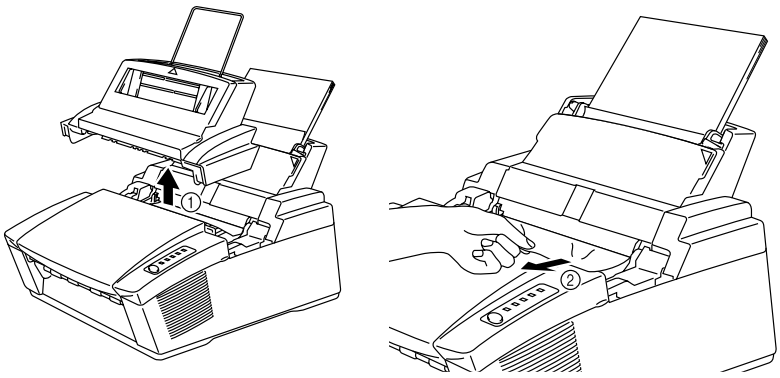


Fig. 6-4 Paper Jam under Feeder 1

❑ Paper Jam near the Drum Unit

If a paper jam has occurred near the drum unit, open the top cover and remove the drum unit. (①) Then, pull the jammed paper upwards slowly and out of the printer. (②) Install the drum unit and close the top cover.

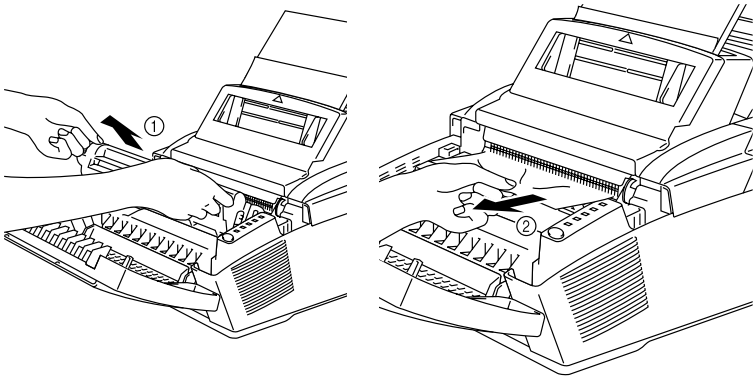


Fig. 6-5 Paper Jam near the Drum Unit

❑ Paper Jam in the Fuser Unit or at the Paper Output Tray

If a paper jam has occurred in the fuser unit or at the paper output tray, open the top cover and remove the drum unit. (①) Then, pull the jammed paper slowly out of the fuser. (②) Install the drum unit and close the top cover.

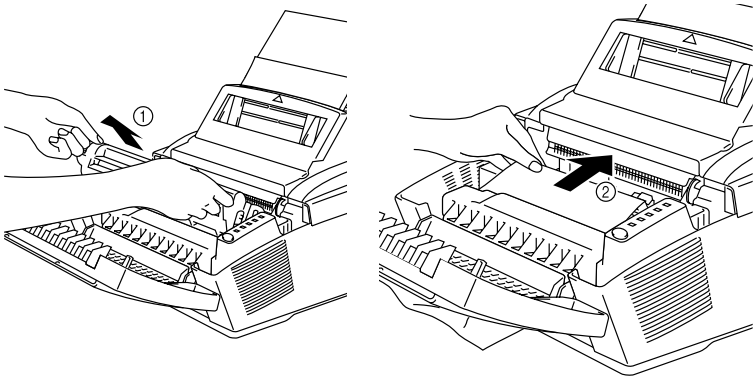


Fig. 6-6 Paper Jam Inside the Printer

Caution

Do not pull jammed paper from the output tray. Be sure to open the top cover to remove the jam, or the fuser may get dirty with toner powder and may result in toner scatter on the next printed page or pages.

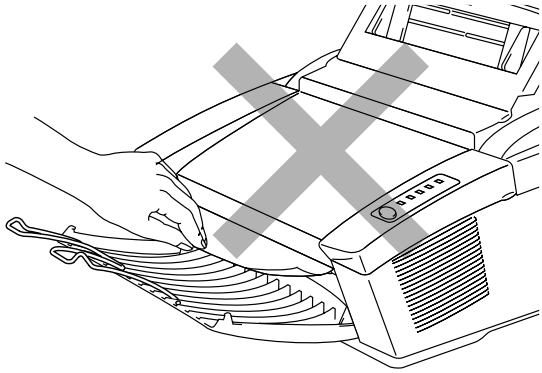


Fig. 6-7 Do Not Pull the Jammed Paper from the Output Tray

Q & A

This section contains questions and answers for using your printer. If you have encountered a problem, find the question relating to your problem and take the steps recommended to correct the problem.

Setting Up the Printer Hardware

Question	Recommendation
The printer does not work. All lamps are off.	The printer may be in sleep mode. Press the panel switch to wake up the printer. Check to see if the printer is plugged into a live power source and the power switch is on.
The printer does not print.	Check the following: • The printer is turned on. • All of the protective parts have been removed. • The toner cartridge and drum unit are installed properly. • The interface cable is securely connected between the printer and computer. • Check to see if the Alarm lamp is blinking. If the lamp is blinking, refer to the Operator Call section of this manual. • Check to see if the Ready lamp is blinking. If the lamp is blinking fast, the printer might be cooling down to lower the printers internal temperature. Open the top cover of the printer to lower the temperature.

Setting Up the Printer for Windows

Question	Recommendation
I cannot print from my application software.	• Make sure the supplied Windows printer driver is installed and selected with your application software. • If you use the serial interface, make sure that the serial slide switch of the serial interface is in the correct position and the interface settings are correctly set up with the DIP switches.
Sometimes I get a Print Overrun error when printing certain documents from Windows.	• Change the following settings in the driver and try again. Page Protection Graphics Mode TrueType™ Mode Use Printer TrueType™ Fonts • Reduce the print resolution or reduce the complexity of your document and try again. • Expand the printer memory by installing SIMM and turn page protection A4, Letter or Legal to ON through the supplied Windows driver or RPC.
Sometimes I get the Memory Full message. How can I correct this?	• Change the following settings in the driver and try again. Page Protection Graphics Mode TrueType™ Mode Use Printer TrueType™ Fonts • Another solution is to purchase more memory. • Reduce the print resolution or reduce the complexity of your document and try again.

Setting Up the Printer for DOS

Question	Recommendation
I cannot print from my application software.	• Check if the DOS application software interface settings match that of your printer: for example, if you are using a parallel printer cable, you would most likely set your DOS software printer port to LPT1. • Check to see if the printer has any printer alarms active. • If the serial interface is used, make sure that the RS-232C serial interface is selected with the slide switch. Make sure that the interface settings are correctly set up with the proper DIP switches. Make sure the serial parameters of baud rates, parity and stop bits match between your application software and the printer.
The printer prints, but it prints incorrect information. Sometimes it prints a couple of characters and then ejects the page, etc.	This is an indication that your application printer emulation setting and the printer's emulation do not match. Check in your application software which printer you have selected to make sure the printer is set up correctly. Remember this printer emulates three widely used printer selections: HP LaserJet 5P, Epson FX-850, and IBM Proprinter XL. Try setting the printer into HP emulation and then select the HP LaserJet 5P printer in your application software.
The printer does not print when I press the Print Screen Key. (Data lamp On)	Press the panel switch. The data has been sent to the printer but the printer did not receive the Page Eject command: print screens do not send this command.
The printer prints the first part of my document but does not print the last page. (Data lamp On)	This was a common problem with database software and spreadsheet software when not correctly set up. The data has been sent to the printer but the printer did not receive the Page Eject command. Press the panel switch to eject the page. Then check with your software supplier on how to add a Page Eject (or Form Feed) command to the end of your print job.
How can I change the User settings or default settings of the printer?	Use the remote printer console (RPC) program.

Setting Up the Printer for Apple Macintosh Computers

When Using the Optional RS-100M Serial Interface

Question	Recommendation
I cannot print from my application software.	• Make sure that the supplied Macintosh printer driver is installed in the System Folder and it is selected with Chooser. • Check the PORT selection within the Chooser: it should match the port to which you physically attached the printer cable. • The serial slide switch of the optional interface board should be in the Apple (RS-422A) position. • Check the printer cable type: you cannot use a LocalTalk or straight-through cable. Refer to Chapter 4 for details on printer cable type.

When Using the Optional BR-Script 2 ROM Board BR-3000

Question	Recommendation
The printer does not print.	Check the following: • The printer is plugged in. • Paper is loaded. • No error conditions are active (any blinking lamps on printer.) • Printer is on-line.

Paper Handling

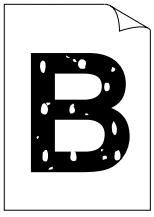
Question	Recommendation
The printer does not load paper.	• Check to see if the “Paper Empty” message appears on your computer screen or the Alarm and Paper lamps are blinking on the printer control panel. If so, the multi-purpose sheet feeder may be out of paper or not properly installed. If it is empty, load a new stack of paper into the feeder. • If there is paper in the multi-purpose sheet feeder, make sure it is straight. If the paper is curled, you should straighten it before printing. Sometimes it is helpful to remove the paper, turn the stack over and put it back into the paper tray. • Reduce the amount of paper in the multi-purpose sheet feeder, then try again. • Clean the paper feed rollers. See “Cleaning the Paper Feed Rollers” in Chapter 5.
The printer does not load paper from the manual feed slot.	Re-insert the paper firmly, one sheet at a time.
How can I load envelopes?	You can load envelopes from either the multi-purpose sheet feeder 1 or the manual feed slot. Your 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 your software. Refer to your application manual.
What paper can I use?	You can use plain paper, envelopes, transparencies, labels, and organizer paper. For information on loading paper, see “Paper Handling” in Chapter 2.
How can I clear paper jams?	See “PAPER JAMS” in this chapter.

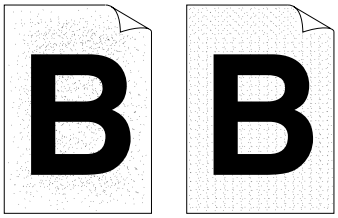
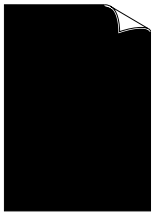
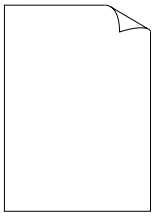
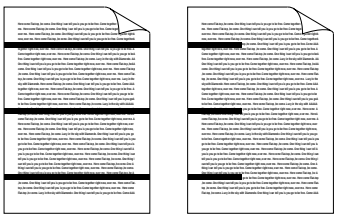
Printing

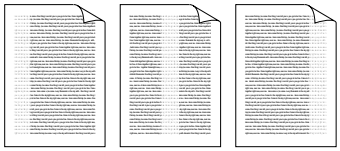
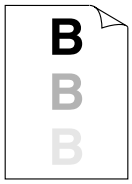
Question	Recommendation
The printer prints unexpectedly or it prints garbage.	• Turn on and off the printer or reset the printer. • Make sure your application software is correctly set up to use this printer by checking the printer settings in your application software. • Check the printer emulation settings. If you can use the supplied RPC program, use it to change the settings as required. Also, you can print the current setting list from the RPC program or Printer Control Panel. • Make sure that the correct interface type and settings are set up to match your computer. Be sure to use the RS-422A serial interface for Macintosh computers and the RS-232C serial interface for PCs. Refer to "SERIAL INTERFACE BOARD RS100M" in Chapter 4.
The printer cannot print full pages of a document. An error message "Print Overrun" occurs.	The printer received a very complex print job and could not process part of the page. This may be solved by the following ways. • If you are using Windows 3.1 with the supplied printer driver, change the following settings in the driver and try again. Graphics Mode TrueType™ Mode Use Printer TrueType™ Font • Set the page protection mode to "AUTO" or your document size. • Reduce the print resolution or reduce the complexity of your document and try again.
The printer prints the first couple of pages correctly, then some pages have text missing.	This is a problem usually relating to serial interface settings. Your computer is not recognizing the printer's input buffer full signal. Causes could be incorrect serial cable (incorrectly wired or too long) or incorrect setting of your computer serial interface.
The printer cannot print full pages of a document. A "Memory Full" error message occurs.	Some applications download several types and sizes of fonts. This can use up your printer memory very quickly. Set the Page Protection to AUTO, reduce the number of font sizes within your application, reduce the resolution, or purchase additional SIMM for the printer.
My headers or footers appear when I view my document on screen but do not show up when I print them.	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.

Print Quality

> **Caution**
> You may clear a print quality problem by replacing the drum unit with a new one **if the Drum lamp is on**. The drum unit is at the end of its life.

Question	Recommendation
Printouts are too dark or light.	Turn the print density dial counterclockwise for lighter images and clockwise for darker images. It has been factory set to the middle position. See "ADJUSTING THE PRINT DENSITY" in Chapter 5.
Printed pages contain white stripes.  **Fig. 6-8 White Stripes or Faint Images**	You may clear the problem by wiping the scanner windows with a soft cloth. (See "Cleaning the printer interior and Drum unit." in Chapter 5.) If you still have the same problem and the Drum lamp is on after cleaning, replace the drum unit with a new one.
Printed pages are stained with toner or have vertical stripes.  **Fig. 6-9 Dark Stripes or Toner Stains**	• Clean the printer interior and the primary corona wire of the toner cartridge. See "Cleaning the Printer Interior and Drum Unit" in Chapter 5. • Make sure that the tab of the corona wire is at the home position. If you still have the same problem and the Drum lamp is on after cleaning, replace the drum unit with a new one.
Printed pages have white spots in black text and graphics area.  **Fig. 6-10 White Spots**	Make sure that you use paper that meets the specifications. Rough surface or thick media can cause the problem. If you still have the same problem and the Drum lamp is on, replace the drum unit with a new one.

Question	Recommendation
Toner scatters and stains the printed page.  **Fig. 6-11 Scattering Toner**	• If toner scatters over the whole printing surface, adjust the print density dial inside the printer counter clockwise. See "ADJUSTING THE PRINT DENSITY" in Chapter 5. • Clean the printer interior. See "Cleaning the Printer Interior and Drum Unit" in Chapter 5. • Make sure that you use paper that meets specifications. If you still have the same problem and the Drum lamp is on, replace the drum unit with a new one.
The whole page is printed in black.  **Fig. 6-12 Black Page**	Wipe the electric terminals referring to "Cleaning the Printer Interior and Drum Unit" in Chapter 5. Never use heat-sensitive paper as it will cause this problem. If you still have the same problem and the Drum lamp is on after cleaning, replace the drum unit with a new one.
Nothing is printed on the page.  **Fig. 6-13 White Page**	• Make sure that the toner cartridge is not empty. • Wipe the electric terminals referring to "Cleaning the Printer Interior and Drum Unit" in Chapter 5. • Make sure that a torn piece of paper does not remain on the scanner window.
Printed pages are marked at regular intervals.  **Fig. 6-14 Example of Regular Marking**	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. If the surface of the drum has been scratched, replace the drum unit with a new one. If the problem does not disappear, it may be that the drum has been marked or damaged due to excessive exposure to light. In this case, replace the drum unit with a new one. If you still have the same problem after replacing the drum unit, consult your dealer or our authorized service representative.

Question	Recommendation
Printed pages are blurred at the center or either edge.  **Fig. 6-15 Blurred Page**	Certain environmental conditions such as humidity, high temperatures, etc. may cause this situation to occur. • Make sure that the printer is placed on a flat, horizontal surface. • Remove the drum unit with the toner cartridge installed. Try shaking them from side to side. • You may clear the problem by wiping the scanner windows with a soft cloth. (See "Cleaning the Printer Interior and Drum Unit.") If the same problem occurs after cleaning and Drum lamp is still on, replace the drum unit with a new one.
Ghost images show up on printed pages.  **Fig. 6-16 Ghost Images**	• Turn the print density dial counterclockwise for lighter images. See "ADJUSTING THE PRINT DENSITY" in Chapter 5. • Make sure that you use paper that meets the specifications. Rough surface or thick media can cause the problem. If you still have the same problem, consult your dealer or our authorized service representative.

Note
The drum unit is a consumable, and it is necessary to replace it periodically.

APPENDIX A

PRINTER SPECIFICATIONS

Printing

Print Method	Electrophotography by semiconductor laser beam scanning
Laser	Wavelength: 780 nm Output: 5 mW max
Resolution	1200 (H) x 600 (V) dots/inch (for Windows DIB graphics) 600 x 600 dots/inch (for Windows and DOS) 300 x 300 dots/inch (under Apple Macintosh using the optional RS-100M)
Print Quality	Normal printing mode Economy printing mode (up to 25% and 50% toner saving)
Print Speed	Up to 10 pages/minute (when loading A4 or letter-size paper from a multi-purpose sheet feeder) **NOTE**: Maximum print speed is obtained by printing several copies of the same page. Print speed may vary depending on interface type, emulation, processing power of the computer, memory allocated to the print job, paper size and graphic quality.
Warm-Up	Max. 30 seconds at 23°C (73.4°F) (The warm up time depends on the ambient temperature and humidity.)
First Print	15 seconds (when loading A4 or letter-size paper from the multi-purpose sheet feeder 1)
Print Media	Toner cartridge: Life Expectancy: 2,200 pages/new toner cartridge (when printing A4- or letter-size paper at 5% print coverage) **NOTE**: Toner life expectancy will vary depending on the type of average print job printed.

	Drum Unit: Life Expectancy: 20,000 pages at 20 pages per job 8,000 pages at 1 page per job
	NOTE: There are many factors that determine the actual drum life, such as temperature, humidity, type of paper and toner that you use, the number of pages per print job, etc..

Functions

Emulation	Brother Printing Solution for Windows Automatic emulation selection among HP LaserJet 5P, EPSON FX-850 or IBM Proprinter XL
Printer Driver	Windows 3.1/3.11 and Windows 95 driver, supporting Brother Printing Solution for Windows, Brother Native Compression mode and bi-directional capability Optional Macintosh driver available for System 6.0.7 or higher
TrueType Fonts on disks	TrueType-compatible soft-fonts for Windows on the supplied disk
Interface	Bi-directional parallel RS-422A/RS-232C serial interface RS-100M is optionally available.
Memory	2.0 MB Expandable up to 34 MB with one SIMM
Diagnostics	Self-diagnostic program

Electrical and Mechanical

Power Source	U.S.A. and Canada:	AC 110 to 120 V, 50 / 60 Hz
	Europe and Australia:	AC 220 to 240 V, 50 Hz
Power Consumption	Printing:	280 W or less
	Stand-by:	60 W or less
	Sleep:	13 W or less
Noise	Printing:	49 dB A or less
	Stand-by:	38 dB A or less
Temperature	Operating:	10 to 32.5°C (50 to 90.5°F)
	Storage:	0 to 40°C (38 to 104°F)
Humidity	Operating:	20 to 80% (without condensation)
	Storage:	10 to 85% (without condensation)
Dimensions (W x D x H)	402 x 439 x 274 mm (15.8 x 17.3 x 10.8 inches) (when the output tray is closed.)	
Weight	Approx. 9.6 kg (21.2 lb.) including the drum unit and toner cartridge	

PARALLEL INTERFACE SPECIFICATIONS

> **Note**
> To ensure the highest quality performance, it is recommended that you use an IEEE 1284 compliant parallel cable between the printer and your computer. Only IEEE 1284 cables support all of the advanced printing capabilities, such as bi-directional communication. These cables will be clearly marked with "IEEE-1284".

Interface Connector Printer Side: Amphenol FCN-685J036-L/X or equivalent
A shielded cable should be used.

Pin Assignment

Pin No.	Signal	Direction	Pin No.	Signal	Direction
1	$\overline{\text{DATA STROBE}}$	Input	19	0V (S.G.)	–
2	DATA 1	Input	20	0V (S.G.)	–
3	DATA 2	Input	21	0V (S.G.)	–
4	DATA 3	Input	22	0V (S.G.)	–
5	DATA 4	Input	23	0V (S.G.)	–
6	DATA 5	Input	24	0V (S.G.)	–
7	DATA 6	Input	25	0V (S.G.)	–
8	DATA 7	Input	26	0V (S.G.)	–
9	DATA 8	Input	27	0V (S.G.)	–
10	$\overline{\text{ACKNLG}}$	Output	28	0V (S.G.)	–
11	BUSY	Output	29	0V (S.G.)	–
12	PE	Output	30	0V (S.G.)	–
13	SLCT	Output	31	$\overline{\text{INPUT PRIME}}$	Input
14	$\overline{\text{AUTO FEED}}$	Input	32	$\overline{\text{FAULT}}$	Output
15	N.C.	–	33	N.C.	–
16	0V (S.G.)	–	34	N.C.	–
17	0V (S.G.)	–	35	N.C.	–
18	+5V	–	36	$\overline{\text{SLCT IN}}$	Input

Note
To use bi-directional communication, an interface cable which has the pin connections above must be used.

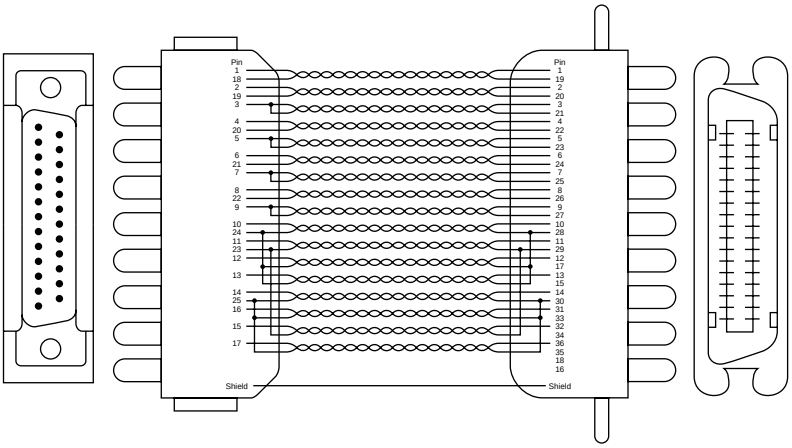


Fig. A-1 Parallel Interface Cable

RESIDENT FONTS

Bitmapped Fonts

This printer has the following bitmapped fonts. They can be used in the HP LaserJet 5P, EPSON FX-850, and IBM Proprinter XL modes. They have the following characteristics.

- Letter Gothic 16.66 Normal, Italic, Bold, BoldItalic (Portrait & Lanscape)
- OCR-A(Portrait & Lanscape)
- OCR-B(Portrait & Lanscape)

Scalable Fonts

■ The following scalable fonts can be used in the HP LaserJet 5P, EPSON FX-850, and IBM Proprinter XL modes.

Intellifont Compatible Fonts

- Alaska (Extrabold)
- Antique Oakland (Oblique, Bold)
- Brougham (Oblique, Bold, BoldOblique)
- Cleveland Condensed
- Connecticut
- Guatemala Antique (Italic, Bold, BoldItalic)
- Letter Gothic (Oblique, Bold)
- Maryland
- Oklahoma (Oblique, Bold, BoldOblique)
- PC Tennessee Roman (Italic, Bold, BoldItalic)
- PC Brussels Light (Italic, Demi, DemiItalic)
- Utah (Oblique, Bold, BoldOblique)
- Utah Condensed (Oblique, Bold, BoldOblique)

Microsoft Windows 3.1 TrueType Compatible Fonts

- BR Symbol
- Helsinki (Oblique, Bold, BoldOblique)
- Tennessee Roman (Italic, Bold, BoldItalic)
- W Dingbats

■ The following scalable fonts can be used in the BR-Script mode.
(Only when you have installed the BR-Script 2 ROM board.)

Atlanta Book (BookOblique, Demi, DemiOblique)
BR Dingbats
BR Symbol
Brougham (Oblique, Bold, BoldOblique)
Brussels Light (LightItalic, Demi, DemiItalic)
Calgary MediumItalic
Copenhagen Roman (Italic, Bold, BoldItalic)
Helsinki (Oblique, Bold, BoldOblique)
Helsinki Narrow (Oblique, Bold, BoldOblique)
Portugal Roman (Italic, Bold, BoldItalic)
Tennessee Roman (Italic, Bold, BoldItalic)

SYMBOL SETS/ CHARACTER SETS

OCR Symbol Sets

When the OCR-A or OCR-B font is selected, the corresponding symbol set is always used.

- OCR-A
- OCR-B

HP LaserJet 5P Mode

- Roman 8 (8U)
- ISO Latin1 (0N)
- ISO Latin2 (2N)
- ISO Latin5 (5N)
- PC-8 (10U)
- PC-8 D/N (11U)
- PC-850 (12U)
- PC-852 (17U)
- PC-8 Turkish (9T)
- Windows Latin1 (19U)
- Windows Latin2 (9E)
- Windows Latin5 (5T)
- Legal (1U)
- Ventura Math (6M)
- Ventura Intl (13J)
- Ventura US (14J)
- PS Math (5M)
- PS Text (10J)
- Math-8 (8M)
- Pi Font (15U)
- MS Publishing (6J)
- Windows 3.0 (9U)
- Desktop (7J)
- MC Text (12J)
- Symbol (19M)
- Windings (579L)
- ISO2 IRV
- ISO4 UK
- ISO6 ASCII
- ISO10 Swedish
- ISO11 Swedish
- ISO14 JIS ASCII
- ISO15 Italian
- ISO16 Portuguese
- ISO17 Spanish
- ISO21 German
- ISO25 French
- ISO57 Chinese
- ISO60 Norwegian1
- ISO61 Norwegian2
- ISO69 French
- ISO84 Portuguese
- ISO85 Spanish
- HP German
- HP Spanish

EPSON Mode

- US ASCII
- PC-8
- PC-8 D/N
- PC-850
- PC-852
- PC-860
- PC-863
- PC-865
- PC-8 Turkish
- German
- UK ASCII I
- French I
- Danish I
- Italy
- Spanish
- Swedish
- Japanese
- Norwegian
- Danish II
- UK ASCII II
- French II
- Dutch
- South African

IBM Mode

- PC-8
- PC-8 D/N
- PC-850
- PC-852
- PC-860
- PC-863
- PC-865
- PC-8 Turkish

> **Note**
> If you want to know what characters are in each symbol/character set, print CHARASET.PRN file from the "Print form" option in the Direct Access Menu of the Remote Printer Console Program.

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