



COLOR LASER PRINTER SERVICE MANUAL

MODEL:HL-2400C



**COLOR LASER PRINTER
SERVICE MANUAL**

MODEL:HL-2400C

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PREFACE

This service manual contains basic information required for after-sales service of the color 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-2400C color laser printer.

This manual consists of the following chapters:

CHAPTER I : OUTLINE OF PRODUCT

Features, parts names, internal structure, and description of the control panel.

CHAPTER II : SPECIFICATIONS

Specifications, etc.

CHAPTER III : INSTALLATION

Installation conditions and installation procedures.

CHAPTER IV : STRUCTURE OF SYSTEM COMPONENTS

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

CHAPTER V : CONTROL PANEL OPERATION

Operation and setting procedures on the control panel.

CHAPTER VI : PERIODIC MAINTENANCE

Description of periodic maintenance parts, and procedures for periodic replacement and cleaning.

CHAPTER VII : DISASSEMBLY

Procedures for replacement of the mechanical system parts.

CHAPTER VIII : TROUBLESHOOTING

Description of error messages on the control panel, troubleshooting image failure, etc.

APPENDICES : SERIAL NO. DESCRIPTIONS, ETC.

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.

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REGULATIONS

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)

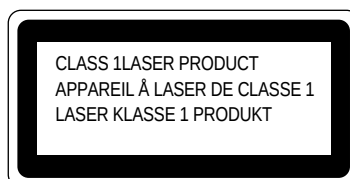
U.S. Food and Drug Administration (FDA) has implemented regulations for laser products manufactured on and after August 2, 1976. Compliance is mandatory for products marketed in the United States. One of the following labels on the back of the printer indicates compliance with the FDA regulations and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

Caution

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

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.

SAFETY INSTRUCTIONS

SAFETY PRINCIPLE

- 1) Before starting any operations, read this manual thoroughly. Especially read the safety instructions in this section carefully and ensure that you understand the contents.
- 2) Perform all the operations by following the procedures described in this manual. Follow all the cautions and warnings set out in the procedures and on safety labels affixed to the machine. Failure to do so may result in human injury or equipment damage.
- 3) Perform only the procedures explained in this manual. Refrain from opening or touching any portions that are not related to your required operation(s).
- 4) Repair and replacement of parts should be performed by trained and qualified persons only. Operators should not attempt to do such repair or replacement work.
- 5) It must be appreciated that the above-mentioned cautions and warnings do not cover everything because it is impossible to evaluate all the circumstances of repair situations.

SPECIAL SAFETY INFORMATION

Introductory Information

Cautions and warnings are made clear by following the 'Safety Alert Symbols' or 'Signal Words' such as DANGER, WARNING and CAUTION.

<SAFETY ALERT SYMBOL>

This is the safety alert. When you find this symbol placed on the equipment or marked in this manual, be aware of the potential of human injuries. Follow the recommended precautions and safety operation practices.

<Understanding Signal Words>

DANGER is used to indicate the presence of a hazard which will cause severe human injuries or a fatal accident if the warning is ignored.

WARNING is used to indicate the presence of a hazard or unsafe practices which may cause severe human injuries or a fatal accident if the warning is ignored.

CAUTION is used to indicate the presence of a hazard or unsafe practices which may cause minor human injuries if the warning is ignored. CAUTION also calls your attention to safety messages in this manual.

<Follow Safely Instructions>

Carefully read all the safety messages set out in this manual and also in the safety warning signs placed on the equipment. In this manual, the safety instructions (safety alert symbols and signal words) are enclosed in a rectangular enclosure to bring them to your attention. Keep the safety signs on the equipment in good condition and ensure none are missing or damaged. Replace the safety signs if unreadable or damaged. Learn how to operate the equipment and how to use the controls properly. Do not let anyone operate this equipment without following the instructions. Keep the equipment in proper working condition. Unauthorized modification to the equipment may impair the function & safety and affect the life of the equipment.

Listed below are the various kinds of "WARNING" messages contained in this manual.



WARNING

HAZARDOUS VOLTAGE

May cause serious injuries or fatal accidents. Voltage is now applied from the power supply of printer. There is a danger of electrical shock if you touch the active area inside the printer.

Be sure to turn the power supply switch OFF and pull the plug out from the power outlet before starting maintenance work on the printer.



WARNING

HARMFUL OZONE GAS

Inhalation of an excessive amount of ozone gas may adversely affect the respiratory organs.

An Ozone Filter is fitted to this printer to reduce the exhausted ozone. This filter must be replaced with a new filter periodically in accordance with the manual supplied with the printer.



WARNING

HOT SURFACE

The Fusing Unit reaches a temperature of approx.160°C and adjacent parts are also very hot.

When you need to change the cleaning pad or remove jammed paper, wait about 20 minutes after opening the paper exit unit to allow the unit to cool down.



CAUTION

ROTATING PARTS

Be aware of the potential danger of various rollers and take care not to get your fingers or hand caught into the machine, this can cause serious injuries. Note that the exit roller that ejects the printed paper is rotating while printing.

Be careful not to get your hair, fingers, hands, sleeve or necktie caught in the machine while operating the machine.



CAUTION

HAZARDOUS POWDER

Toner is a fine powder which can cause a powder explosion if disposed of into a fire. Under no circumstances dispose of toner into a fire.



CAUTION

HAZARDOUS POWDER

Toner is a fine powder which may cause irritation to the eyes and respiratory organs if inhaled.

Handle the toner cartridge, waste toner pack and developing unit carefully so as not to spill the toner.



CAUTION

POWER CORDS & PLUGS

This printer is equipped with a 3-wire power cord fitted with a 3-pronged plug (bi-polar plug with grounding) for the user's safety.

Use these power cords in conjunction with a properly grounded electrical outlet to avoid an electrical shock.

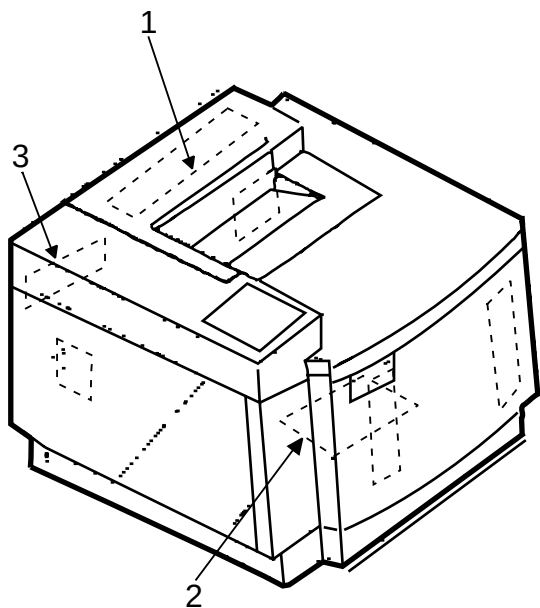


CAUTION

SAFETY INTERLOCK

The front cover, paper exit unit and transfer unit of this printer have electrical safety interlocks to turn the power off whenever they are opened. Do not attempt to circumvent these safety interlocks.

<Label Location>



1. Hot Caution Label

	 WARNING	 WARNUNG	 AVERTISSEMENT	 高圧注意
	Hot surface. Avoid contact.	Heiße oberfläche. Bei beseitigung.	Surface chaude. Eviter tout contact.	火傷の恐れがあります。 触れないでください。

2. Laser Caution Label



5mW
780nm-800nm

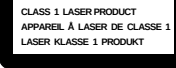
DANGER-	INVISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM.
VORSICHT-	UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET UND SICHERHEITSVERRIEGELUNG ÜBERBRÜCKT. NICHT DEM STRAHL AUSSETZEN.
DANGER-	RAYON LASER INVISIBLE LORS DE L'OUVERTURE. EVITER L'EXPOSITION DIRECTE.
PELIGRO-	RADIACION LASER INVISIBLE AL ABRIR. EVITAR LA EXPOSICION DIRECTA AL HAZ.
危険	開けたときレーザー放射の危険有り。 ビームに直接当たらないように注意して下さい。 MAS

3. Rating Label

(For US)

 MODEL HL-C1 SER. NO.  U 5 2 4 9 2 L 7 H 1 1 1 1 0 1 120V ~ 50/60Hz 8.0A BROTHER INDUSTRIES, LTD. MADE IN JAPAN BROTHER PRINTER HL SERIES COVERED BY ONE OR MORE FOLLOWING PATENTS: USP4, 968, 159 USPS, 050, 228 USPS, 068, 805 USPS, 086, 481 USPS, 093, 904 USPS, 126, 788	 CLASS 1 LASER PRODUCT APPAREIL À LASER DE CLASSE 1 LASER KLASSE 1 PRODUKT MANUFACTURED: NOVEMBER 1997 HTJ BROTHER INDUSTRIES, LTD. 15-1, Haasetsu-cho, Maunoh-ku, Nagoya 467, Japan. This product complies with FCC radiation performance standards, 21 CFR Subchapter J. FCC ID: B3QHLC1 This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause unintended operation.

(For Europe)

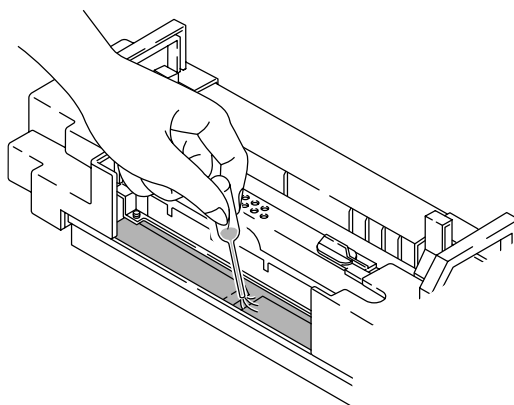
 MODEL HL-C1 SER. NO.  E 5 2 6 1 9 L 7 H 1 1 1 1 0 1 220V-240V ~ 50/60Hz 4.0A BROTHER INDUSTRIES, LTD.     	 CLASS 1 LASER PRODUCT APPAREIL À LASER DE CLASSE 1 LASER KLASSE 1 PRODUKT  ACN 001 393 835 MADE IN JAPAN

SHIPMENT OF THE PRINTER

If for any reason you must ship the 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 the carrier.

CAUTION

- *When shipping the printer, remove the toner cartridges, the OPC belt cartridge and the waste toner pack from the printer to prevent toner spill in the printer or damage of the toner cartridge and the OPC belt cartridge.*
- *When shipping the printer, remove the oil bottle and the fuser cleaner from the fusing unit. After removing the oil bottle, be sure to remove the oil remaining in the fusing unit with the supplied syringe. Failure to do so will cause severe damage to the printer.*



CHAPTER I

PRODUCT OUTLINE

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CHAPTER I PRODUCT OUTLINE

1. FEATURES

This printer has the following features:

2400 x 600 dpi Class Resolution

The printer prints pages with a resolution of 600 dots per inch (dpi) as default. It also provides higher quality printout which is the equivalent of 2400 x 600 dpi resolution when using HRC or CAPT.

High Speed Color Laser Printing

The printer allows crisp printing in 24 bit brilliant color. The printer prints at a speed of 16 pages per minute in monochrome mode and 4 pages per minute in full color mode. The controller utilizes a high speed 32-bit RISC microprocessor and special hardware chips, which provides a very fast processing speed.

High Resolution Control (HRC)

The high resolution control (HRC) technology provides clear and crisp printouts and improves even the 600 dpi resolution. This mode is effective when printing text data.

Color Advanced Photoscale Technology (CAPT)

The printer can print graphics in 256 shades for each color in HP® color printer PCL5C™ and BR-Script level 2 emulations, producing nearly photographic quality. This mode is effective when printing photographic images.

Maintenance-Free Toner Cartridge

A toner cartridge can print up to 10,000 (Black) and 6,000 (Cyan, Magenta and Yellow) single-sided pages at 5% coverage. The one piece, easy-to-replace toner cartridges do not require difficult maintenance.

Universal Media Cassette

This printer loads paper automatically from the media cassette. Since the media cassette is a universal type, a number of different sizes of paper can be used. Even envelopes can be loaded from the media cassette.

Three Interfaces

This printer has a high speed IEEE 1284 compliant bi-directional parallel interface, an RS-232C serial interface, and a modular input/output (MIO) compatible interface.

If the application software supports the bi-directional parallel interface, you can monitor the printer status. It is fully compatible with the industry-standard IEEE 1284 bi-directional parallel interface.

The RS-232C serial interface is an industry standard so that you can connect it to any computer using a standard serial cable.

The MIO interface allows you to install a commercial MIO-compatible card. If the card is installed, this interface port can be used for features such as networking or printer sharing.

Automatic Interface Selection

The printer can automatically select the bi-directional parallel, RS-232C serial, or MIO interface depending on the interface port through which it receives data. With this feature, the printer can be connected to more than one computer.

Five Emulation Modes

The printer can emulate Hewlett-Packard Color PCL® 5C (PCL6® in monochrome mode) and PostScript® Level 2 language emulation (Brother BR-Script Level 2) printers, the industry-standard HP-GL™ plotter as well as EPSON® FX-850™, and IBM® Proprinter XL® printers (in monochrome mode). It is possible to print with all application programs that support one of these printers.

Automatic Emulation Selection

The printer can automatically select the printer emulation mode depending on the print commands it receives from the computer software. With this feature, many users can share the printer on a network.

Data Compression Technology

The printer can internally compress the received graphics and font data in its memory so that it can print larger graphics and more fonts without additional memory.

Various Fonts

The printer has 75 scalable fonts and 12 bitmapped fonts. The fonts that can be used vary according to the current emulation mode.

CCITT G3/G4

Since the printer supports the CCITT G3/G4 format in addition to HP-compatible formats, it can quickly receive and print data compressed in this format.

Lock Panel

If the panel button settings have been changed, the printer may not work as expected. It is possible for the administrator of the printer to lock the settings to prevent changes from being made.

Power Save Mode

The printer has a power saving mode. As laser printers consume power to keep the fixing assembly at a high temperature, this feature can save electricity when the printer is on but not being used. The factory setting of the Power Save mode is ON so that it complies with the EPA Energy Star new specification. Compared with conventional laser printers, this printer consumes less power even when the power saving mode is turned off.

Toner Save Mode

The printer has an economical toner save mode. This mode allows you to reduce the printer running cost substantially in addition to the improved life expectancy of the toner cartridge.

Reprint Function

A touch of a panel button allows reprinting of the last print job without sending the data again from the computer. When there is not enough memory to print the last complete job out, the last print page can be reprinted.

PCMCIA Card Slot

The printer has two PCMCIA card slots (Type II cards: 2 slots available, Type III cards: 1 slot available). The following cards can be installed;

- PCMCIA-compatible flash memory card
- HDD card
- PCMCIA Fax Modem card

Saving User Settings

It is possible to operate the printer differently from other users with the panel button settings. Two sets of user settings can be stored.

2. PARTS NAMES & FUNCTIONS

<Front View>

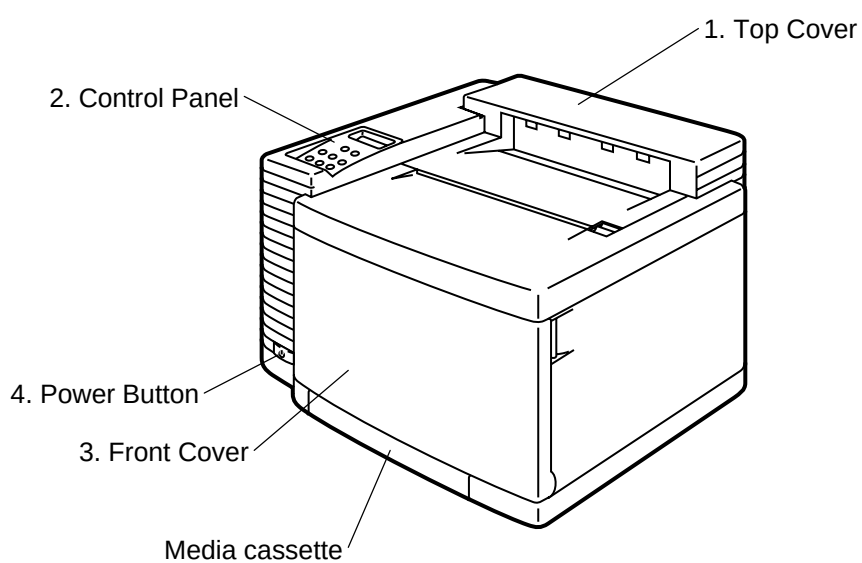


Fig.1-1

<Rear View>

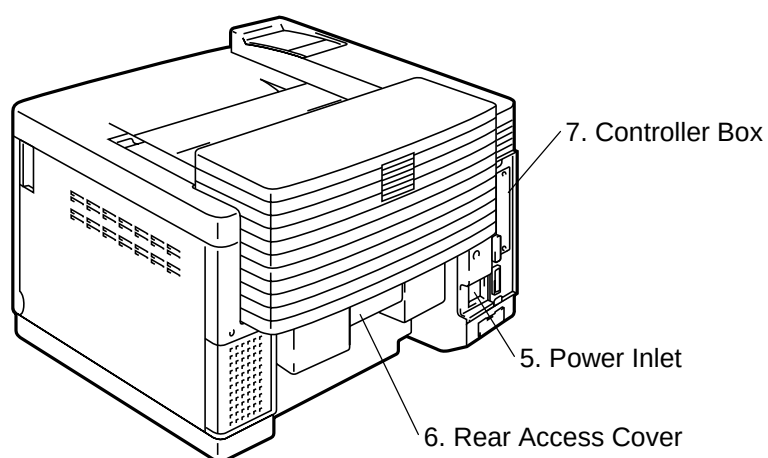


Fig.1-2

No.	Part Name	Outline of Functions
1	Top Cover	To act as an upper enclosure and also as a paper tray for printed paper.
2	Control Panel	To display the status of printer operation.
3	Front Cover	To act as a front enclosure, opened when replacing a toner cartridge or waste toner pack.
4	Power Button	To operate power-on and off to the printer. (Push for On/Off operation)
5	Power Inlet	To connect a power supply cable.
6	Rear Access Cover	To act as a rear enclosure, opened when clearing an internal jam or doing maintenance work.
7	Controller Box	Space where the main (video controller) PCB is installed.

3. INTERNAL STRUCTURE

<Cross Sectional View >

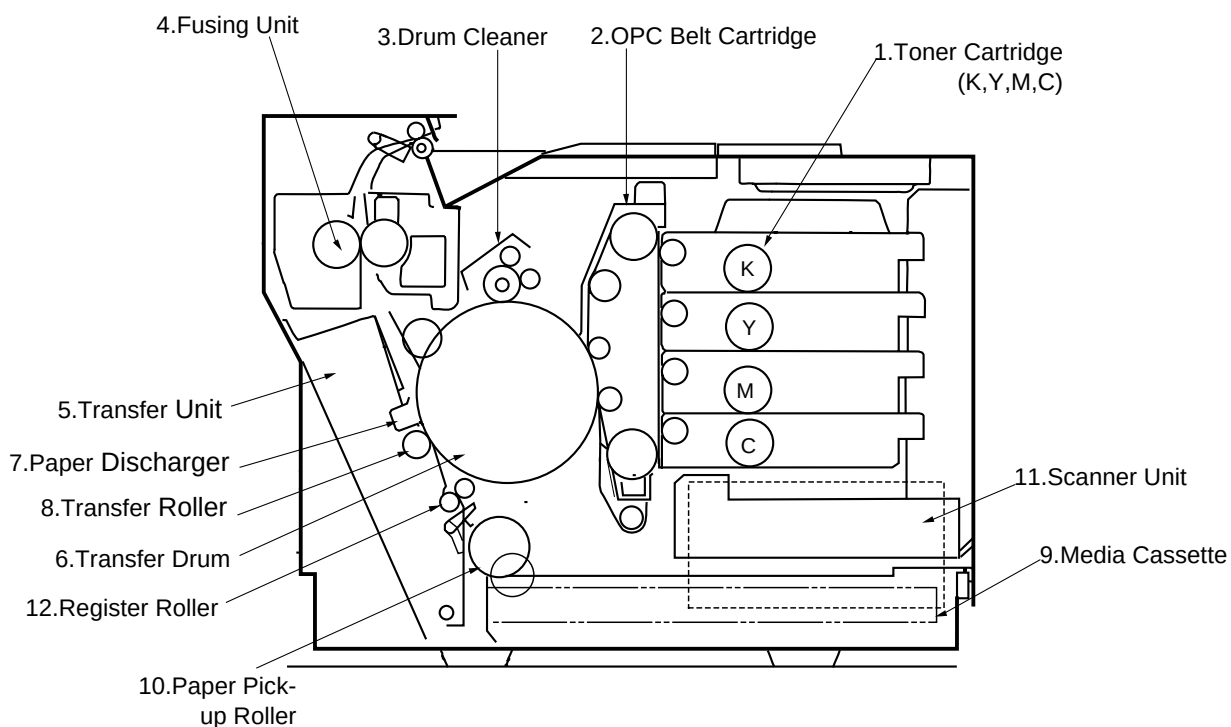


Fig.1-3

No.	Components Name	Outline of Functions
1	Toner Cartridge	Contain the toner (K, Y, M, C) for developing. Each toner cartridge (K, Y, M, C) is independent.
2	OPC Belt Cartridge	Forms images and includes the photoconductive belt.
3	Drum Cleaner	Cleans and collects waste toner adhering to the transfer drum.
4	Fusing Unit	Fixes by heat and pressure the toner image onto the paper.
5	Transfer unit	Transfers toner images from the transfer drum to the paper.
6	Transfer Drum	Forms color images, combining the toner images from the OPC belt on the drum.
7	Paper Discharger	Emits a corona charge for separating the paper from the transfer drum.
8	Transfer Roller	Transfer the toner image on the transfer drum to the paper.
9	Media Cassette	Feeds paper automatically.
10	Paper Pick-up Roller	Feeds paper automatically from the paper cassette.
11	Scanner Unit	Generates a laser beam and scans the OPC belt.
12	Register roller	Aligns the paper correctly ready for printing

4. DESCRIPTION OF CONTROL PANEL

The printer control panel provides control of the printer including test printing, maintenance operations performed by the video controller and also the ones which are performed by the engine controller.

The Video Controller Mode and the Engine Controller Mode have some common functions. Under normal circumstances the functions in the Video controller mode will be used. Refer to Chapter V for further information.

4.1 Video Controller Mode

The printer goes into the Video Controller Mode when the power is turned on by pressing the power button.

The Video Controller Mode supplies the general test printing and setting functions and some of the maintenance operations. If further engine settings are required, use the Engine Controller Mode.

4.2 Engine Controller Mode

The printer goes into the Engine Controller Mode when power is turned on by pressing the power button at the same time as holding down the Mode, Set and ▼ buttons. (Refer to Fig.1-4.)

Note:

This mode provides unique control panel display and operation functions which are completely different from the ones described on the actual control panel or in the user's guide. Refer to Chapter V for detailed information.

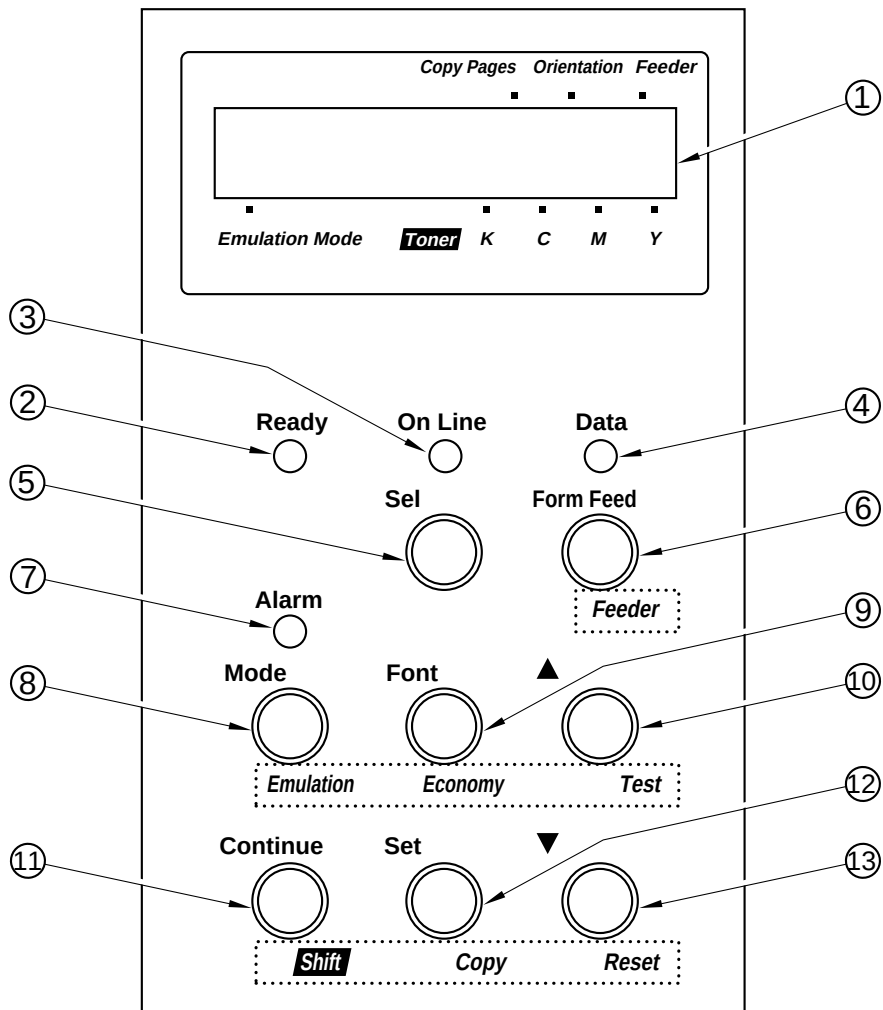


Fig.1-4

No.	LED / Button Name
1	LCD: 16 character by 2 lines
2	Ready LED
3	On Line LED
4	Data LED
5	Select button
6	Form Feed / Feeder button
7	Alarm LED
8	Mode / Emulation button
9	Font / Economy button
10	▲ / Test button
11	Continue / Shift button
12	Set / Copy button
13	▼ / Reset button

CHAPTER II

SPECIFICATIONS

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CHAPTER II SPECIFICATIONS

1. RATING



WARNING
*Use the power supply cable supplied with the printer, or a similar cable complying with the following specification (3-wire power cable with ground).
Use of an “out of specification” cable may result in an electric shock.*

Destination	Voltage (V)	Frequency (Hz)	Input Current (A)	Power Cord (Piece)
US / Canada	120	50/60	8	1
Europe	220 - 240	50/60	4	1 *

* For the model for Europe, the power supply cable depends on the country as follows;

Figure	Rating	Approval Agency	Applicable Area
A	250VAC, 6A	VDE, DEMKO, SEV	Europe (Continent)
B		BS	UK

Figure A: For Europe (Sample)

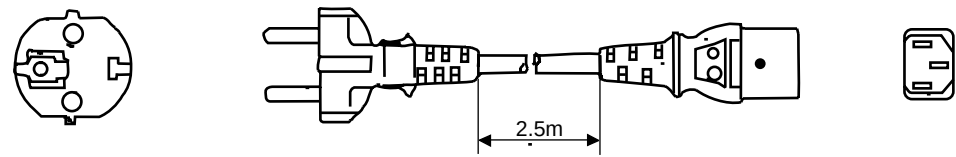
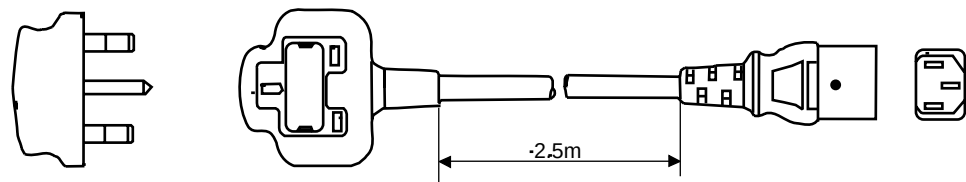


Figure B: For UK



Note:

For details of other power supply cables, refer to the parts reference list.

** For rating labels, refer to the Safety Instruction on Page vi.

2. GENERAL SPECIFICATIONS

2.1. Printing

Print method: Electrophotography by semiconductor laser beam scanning

Resolution: 300 x 300 dots per inch (Normal)
600 x 600 dots per inch (Fine)
The resolution can be enhanced to 2400 dpi class by using the HRC(High Resolution Control) and CAPT (Color Advanced Photoscale Technology) features.

Print speed: Monochrome mode: 16 page/minute (A4/Letter-size)
Full color mode: 4 page/minute (A4/Letter-size)

Warm-up: Max. 3 minute at 20°C (68°F)

First print: Monochrome mode: 19 seconds or less
Full color mode: 30 seconds or less
(when loading A4/Letter-size paper by face down print delivery from standard upper cassette feed)

Print media: Toner in a single-color single-component cartridge
Life Expectancy: 10,000 single-sided pages/cartridge (Black)
6,000 single-sided pages/cartridge (Cyan, Magenta, Yellow)

Note: These figures are based on an average of 5% coverage of the printable area for one color using laser paper. The frequency of replacement will vary, depending on the complexity of the prints, the percentage of coverage, and the type of media. Transparencies, glossy coated paper and other special media will result in shortened consumable life.

Resident Printer Fonts:
<HP PCL, EPSON FX-850, and IBM Proprinter XL modes>
66 scalable fonts and 12 bitmapped fonts
<BR-Script Level 2 mode>
66 scalable fonts

2.2. Functions

CPU:	MB86832 (SPARC architecture)
Emulation:	Automatic emulation selection HP Color Printer (PCL5C) including HP LaserJet 4+ (PCL5e) and HP LaserJet 5 (PCL6 monochrome) BR-Script Level 2 (Adobe PostScript Level 2 compatible) HP-GL EPSON FX-850 IBM Proprinter XL
Interface:	Automatic interface selection between the bi-directional parallel, RS-232C serial and MIO interface.
RAM:	Standard model: 16Mbytes Network model: 32Mbytes (Expandable up to 112Mbytes with SIMMs) The standard memory fitted can vary depending on the printer model and country
Card Slots:	2 card slots: PCMCIA Type I, II 1 card slot: PCMCIA Type III Compatible for Flash Memory or HDD cards
Control panel:	8 buttons, 4 LEDs and a 16-column x 2 lines liquid crystal display
Diagnostics:	Self-diagnostic program

2.3. Electrical and Mechanical

Power source:	U.S.A. and Canada: AC 120V, 50/60Hz Europe and Australia: AC 220 to 240V, 50/60Hz
Power consumption:	Printing: 450W or less Standing by: 150W or less Sleep: 25W or less
Noise:	Printing: 55dB A or less Standing by: 48dB A or less
Temperature:	Operating: 10 to 32.5°C (50 to 90.5°F) Non Operating: 5 to 35°C (41 to 95°F) Storage: 0 to 35°C (38 to 95°F)
Humidity:	Operating: 20 to 80% (non condensation) Storage: 20 to 80% (non condensation)
Dimensions (W x D x H):	500 x 490 x 388 mm (19.7 x 19.3 x 15.3 inches) 500 x 490 x 493 mm (19.7 x 19.3 x 19.4 inches) with the optional lower tray unit fitted
Weight:	Approx. 32kg (70.5lbs.) Approx. 36kg (79.4lbs.) with the optional lower tray unit and toner cartridges fitted

2.4. Paper Specification

2.4.1 Printable Media & Cassette Capacity

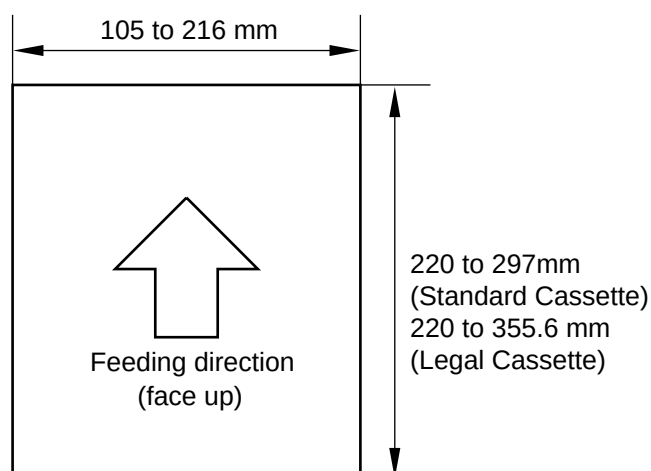
The standard media cassette (upper cassette) is supplied with the printer. The optional lower tray unit and the optional Legal cassette can also be installed.

Note:

The standard cassettes (including the optional lower tray unit) and the optional Legal cassette are interchangeable between the upper and the lower feeder.

- 1) Printable Media: Plain paper / Envelope / Transparency / Label
- 2) Printable size: (Refer to the list below.)
- 3) Feedable paper weight: 60 (16lb.) to 160 (43lb.) g/m²
- 4) Maximum load height : 27mm
 - Plain paper: 250 sheets of 75g/m² (20lb) paper
 - Envelopes : 15 sheets
 - Transparency: 50 sheets
 - Label: 80 sheets
- 5) Setting method: Pull the media cassette out of the printer toward you, insert the paper into the cassette after aligning the top edge of the sheets, then push the cassette back into its original position.

Paper Source	Printable Media Size
The Standard Media Cassette (Upper/Lower feeder)	Plain paper: A4, Letter, B5, Executive Envelope: COM10, DL Other size: width 105-216mm (4.1"-8.5") length 220-297mm (8.7"-11.7")
The Optional Legal Cassette	Plain paper: Legal, A4, Letter, B5, Executive Envelope: COM10, DL Other size: width 105-216mm (4.1"-8.5") length 220-355.6mm (8.7"-14")



2.4.2 Printed Output

250 sheets of 75g/m² (20lb) paper / plain paper can be stacked in the output tray.

Face-down print delivery

Note: Face down: Delivers the printed side of the paper downwards

Environment: 17.5 ~ 27.0°C, 50 ~ 70%RH

2.4.3 Recommended Paper Specifications

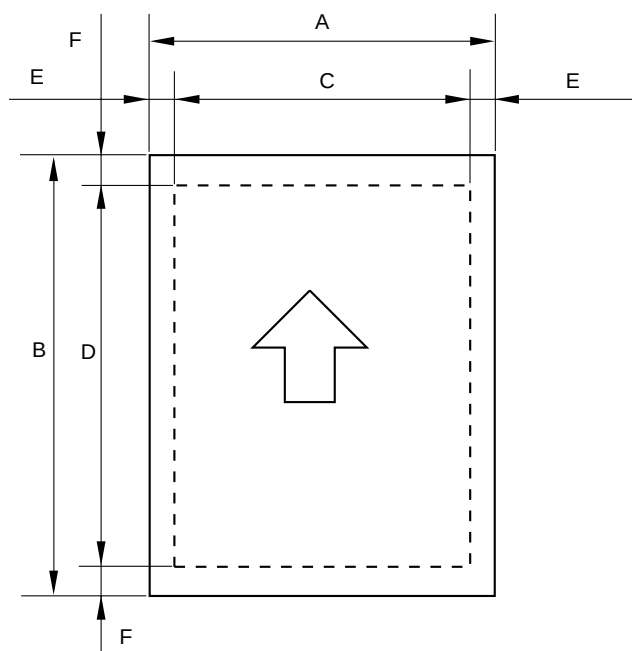
Item	Description
Basis Weight (g/m ²)	82 ± 5
Thickness (μ m)	95 ± 6
Smoothness (Bekk) (seconds)	90 ± 20
Stiffness (Clark)	100 ± 15
Brightness (%)	85 ± 2
Surface Resistance (Ω)	10 ¹⁰ ~ 10 ¹¹
Grain Direction	Long

Measurement Condition: 17.5 ~ 27.0°C, 50 ~ 70%RH

Note: Keep the paper sealed in the bag as supplied and do not open the paper bag until the paper is required for use.

2.4.4 Effective Printing Area

(1) Printable area



The effective printing area means the area within which the printing of all the data received without any omissions can be guaranteed. (Refer to Table 2-1 for details.)

Table 2-1: Effective Printing Areas

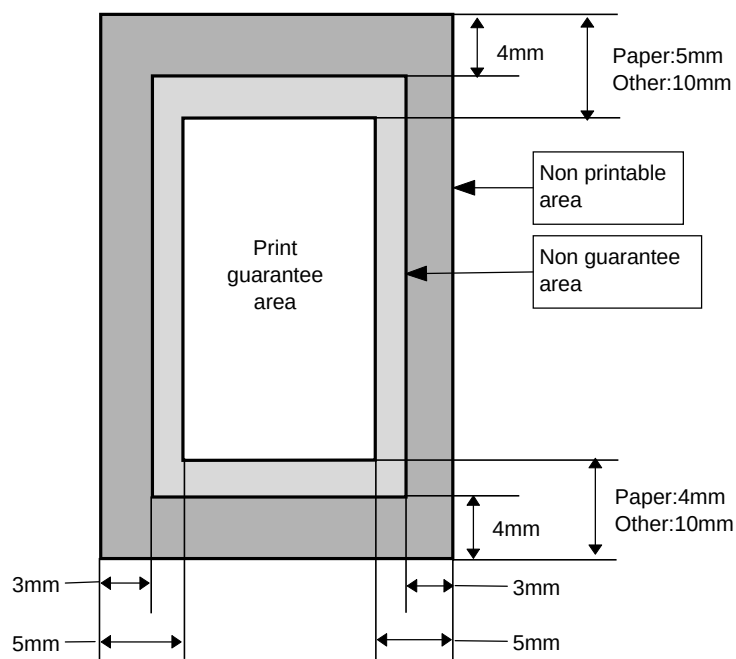
Size	A	B	C	D	E	F
A 4	210.0mm 8.27" (2,480 dots)	297.0mm 11.69" (3,507 dots)	203.2mm 8.0" (2,400 dots)	288.5mm 11.36" (3,407 dots)	3.4mm 0.13" (40 dots)	4.23mm 0.17" (50 dots)
Letter	215.9mm 8.5" (2,550 dots)	279.4mm 11.0" (3,300 dots)	207.44mm 8.16" (2,450 dots)	271.0mm 10.67" (3,200 dots)	4.23mm 0.17" (50 dots)	↑
Legal	215.9mm 8.5" (2,550 dots)	355.6mm 14.0" (4,200 dots)	207.44mm 8.16" (2,450 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)	173.54mm 6.82" (2,049 dots)	248.5mm 9.78" (2,935 dots)	↑	↑
B 5 (ISO)	176.0mm 6.93" (2,078 dots)	250.0mm 9.84" (2,952 dots)	167.54mm 6.59" (1,978 dots)	241.5mm 9.5" (2,852 dots)	↑	↑
Executive	184.2mm 7.25" (2,175 dots)	266.7mm 10.5" (3,150 dots)	175.74mm 6.91" (2,075 dots)	258.3mm 10.17" (3,050 dots)	↑	↑
COM-10	104.8mm 4.125" (1,237 dots)	241.3mm 9.5" (2,850 dots)	96.34mm 3.785" (1,137 dots)	232.8mm 9.16" (2,750 dots)	↑	↑
D L	110.1mm 4.33" (1,299 dots)	221mm 8.66" (2,598 dots)	101.64mm 3.99" (1,199 dots)	211.5mm 8.33" (2,498 dots)	↑	↑

(Note that the paper sizes indicated here should conform to the nominal dimensions specified by JIS.)

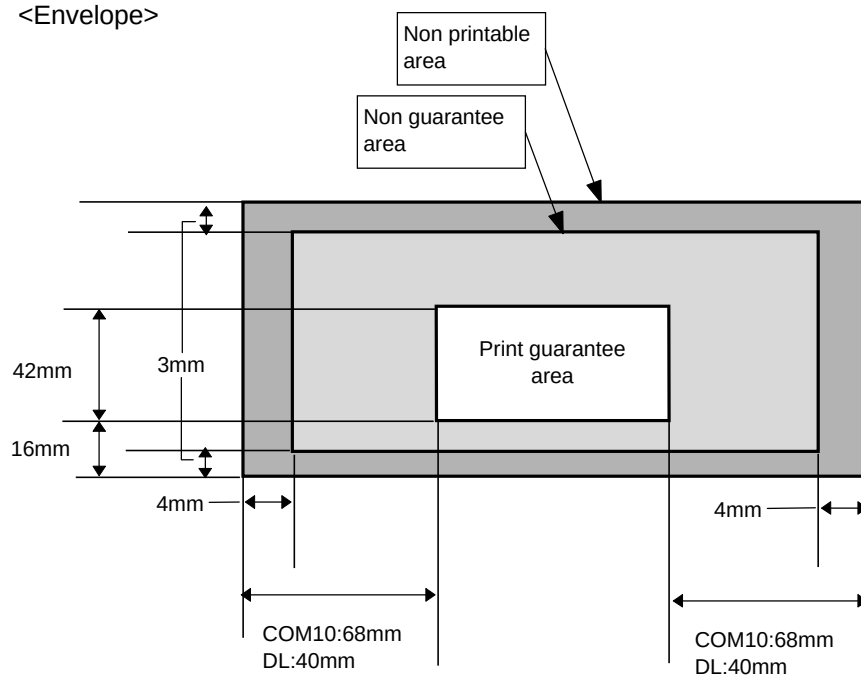
A4 paper must accommodate 80 characters printed in pica pitch (203.2 mm).

The dot size is based on 300 dpi resolution.

- (2) Print guarantee area
<Plain paper>



<Envelope>



2.4.5 Paper Feed Jam Rate

Less than 1 misfeed per 2000 pages under normal environmental conditions.

Less than 1 misfeed per 1000 pages outside the normal environmental conditions.

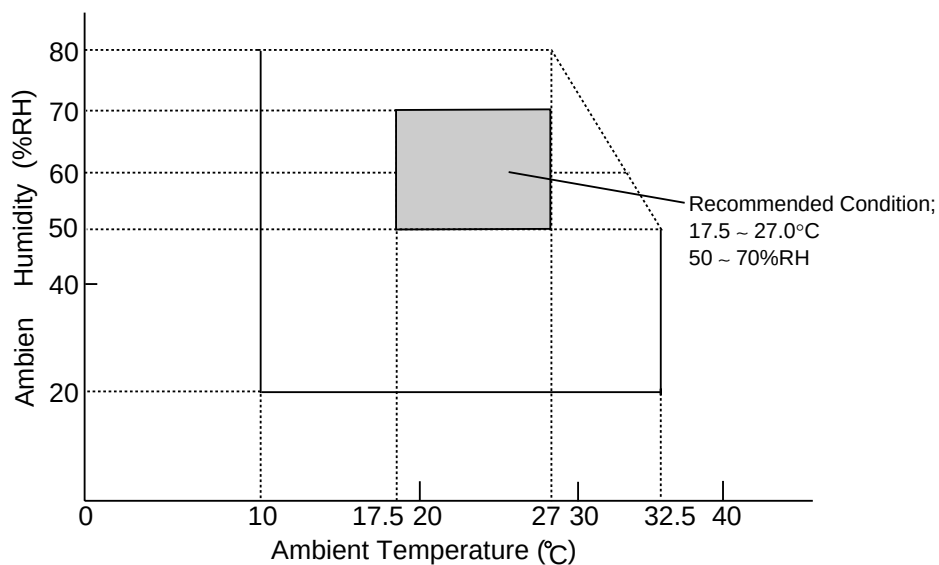
Note:

These figures are based on the paper whose specification is recommended. For the recommended specifications, refer to Section 2.4.3 of this chapter.

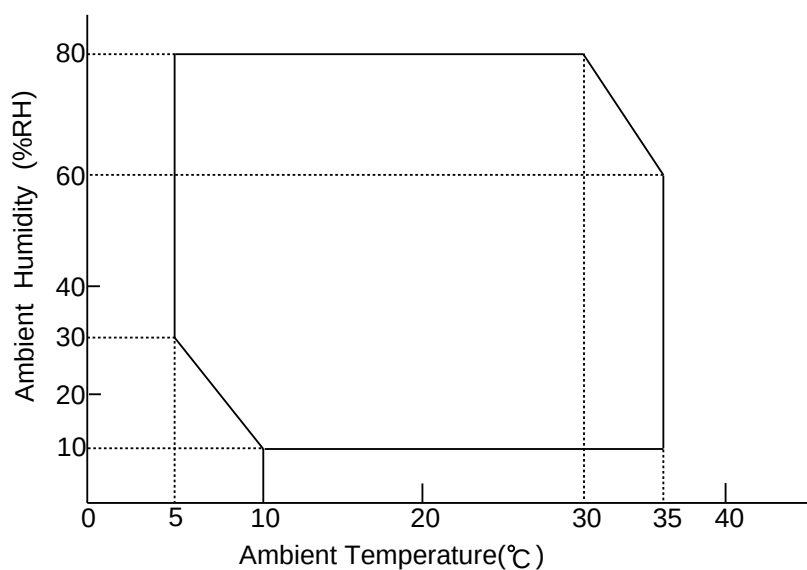
3. ENVIRONMENTAL CONDITION

3.1 Ambient Temperature / Humidity / Altitude

- (1) Under Operational conditions: 10.0 ~ 32.5°C, 20 ~ 80%RH (See the figure below.)



- (2) Under Non Operational conditions: 5.0 ~ 35.0°C, 10 ~ 80%RH (See the figure below.)



(3) Storage and Transportation Environment of Printer

The following defines the storage and transportation environment of printers that have been packed according to Brother specification. However, this section does not cover the OPC belt cartridge and toner cartridges.

Temperature	Normal Conditions	0°C ~ 35°C (35°F ~ 95°F)
	Severe Conditions	High Temperature: 35°C ~ 40°C (95°F ~ 104°F) Low Temperature: -10°C ~ 0°C (14°F ~ 32°F)
Humidity	10% ~ 90%RH	
Period of Storage	One Year	
Other	No Condensation	
Atmosphere	613 ~ 1,067hpa (460 ~ 880mmHg)	

The period under the severe conditions should not be continuous, and is assumed as an accumulation of intermittent time. However, an individual period of intermittent time under severe conditions should not be allowed to exceed 48 hours.

Note:

Normal conditions should occupy more than 90% of total storage period.

Severe conditions should be less than 10% of total storage period.

CHAPTER III

INSTALLATION

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CHAPTER III INSTALLATION III-1

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CHAPTER III INSTALLATION

1. CONDITIONS REQUIRED FOR INSTALLATION

Any Laser beam printer is likely to be influenced by the environment of the set-up location. If the printer is set-up in an inappropriate location, the printer may not perform as expected. Therefore, the following factors should be taken into consideration before deciding where to set-up the printer.

1.1. Environmental Conditions

The printer should not be set up in the locations referred to in the following items (a) through (d) which specify inappropriate locations for set-up.

- (a) Where it is likely to receive direct sunlight or similar light. (For example, next to a window)
- (b) Where it is likely to suffer a big difference in temperature and humidity between the maximum and minimum levels. (Normal operation environment is within 10°C ~ 32.5°C, 20 ~ 80%RH and without any condensation.)
- (c) Where it is likely to be in a draft of cold air from an air-conditioner or warm air from a heater, or to receive direct radiant heat.
- (d) Where it is likely to be excessively dusty or be subject to corrosive gases such as ammonia.
- (e) Users should select a location with good ventilation and set the printer on a flat surface.
- (f) Users should check that the maximum angle of the set-up location is horizontal to within $\pm 1^\circ$.

1.2. Basic Layout of Printer Set-up Location

Fig.3-1 shows the basic layout of the printer set-up location that is suitable for smooth operation and maintenance of the printer.

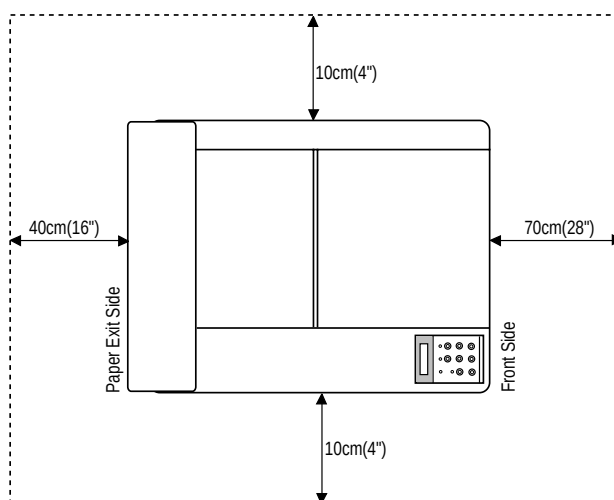


Fig.3-1

- The space in front of the printer (70cm) is necessary to open the front cover.
- The space at back of the printer (40cm) is necessary to open / close the rear access cover.
- The space on both sides of the printer (10cm) is necessary for general access.

2. UNPACKING



WARNING

- *The package containing a printer weighs approximately 40kg (80lbs), so it is too heavy for one person to carry. It needs two adults to move the printer. Since the printer is a precision machine, make sure that it is carried slowly with care so that no impact occurs to the printer while moving it.*
- *Do not attempt to lift a printer when it is covered by the vinyl bag because it is slippery and may result in damage and injury if dropped.*

2.1 Unpacking the Printer

Refer to Fig.3-2 on the next page.

- 1) Remove the binding tape from the top of the package.
- 2) Open the top of the package and take the starter kit out.
- 3) Remove the upper packing.
- 4) Take the customize kit** out.
- 5) Remove the plastic joints (4 locations).
- 6) Lift the outer box up from around the printer.
- 7) Take the power cable. (for US / Canada only).
- 8) Open up the vinyl bag enclosing the printer.
- 9) Lift up the printer with another person's help, and move it away from the vinyl bag.
- 10) Set up the printer in a suitable location.

** For USA/Canada, it contains the user's guide and printer driver disks.
For other countries, it contains the user's guide, printer driver disks and the power cable.

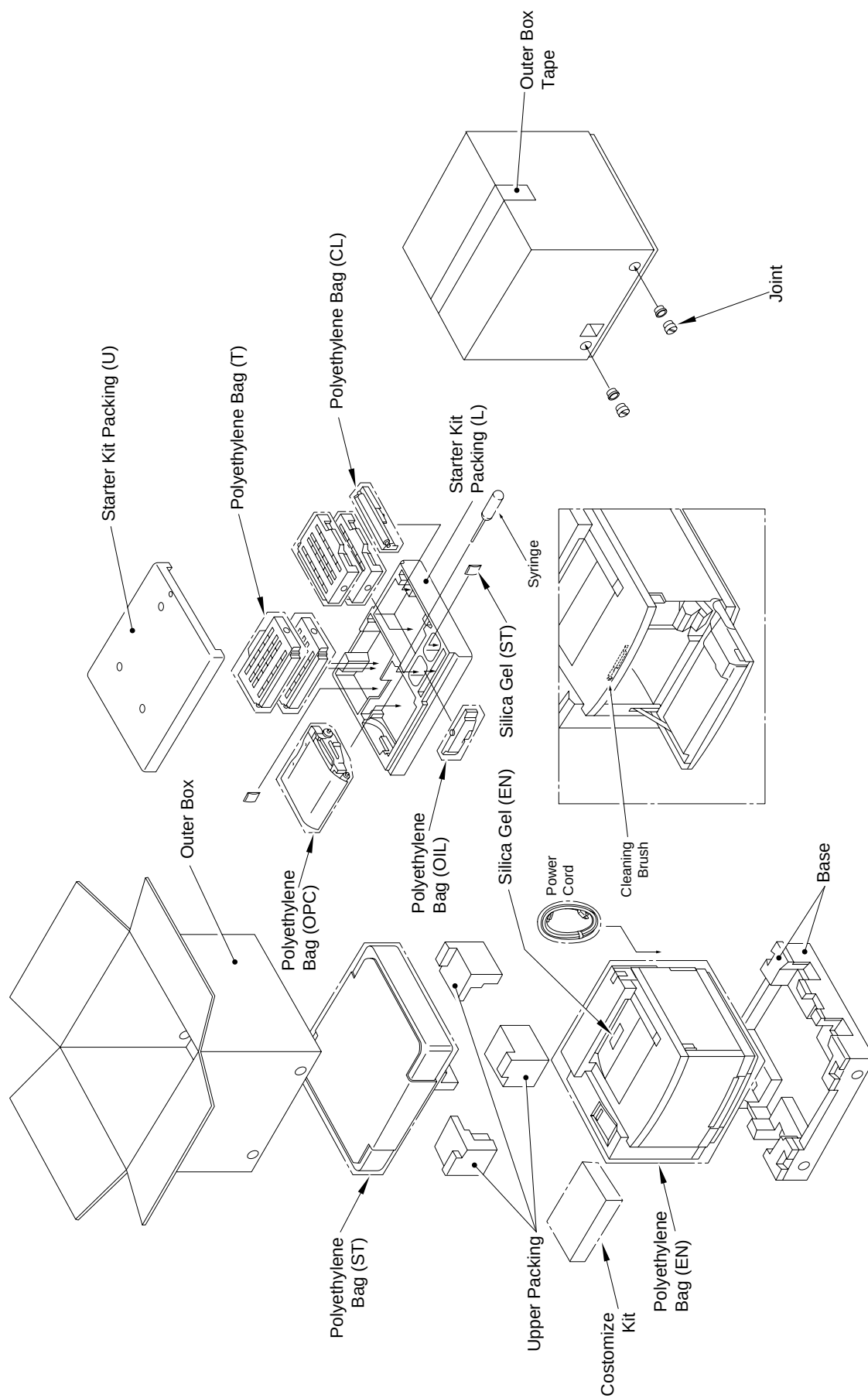
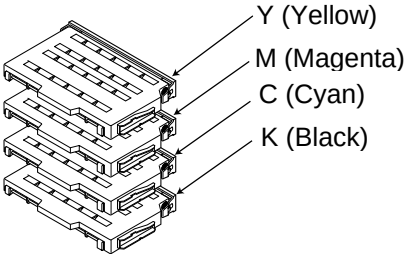
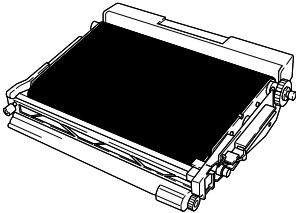
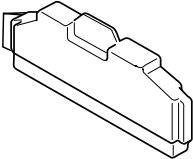
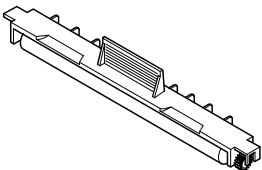
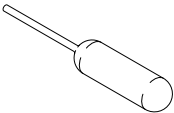


Fig.3-2

2.2 Unpack the Starter Kit

<Unpacking Procedure>

- 1) Open the vinyl bag and slide off the cardboard sleeve covering the starter kit.
- 2) Confirm all of the following parts are inside the starter kit packing box.

No.	Kit Name	Appearance	Quantity
1	Toner Cartridge (Y,M,C,K)		4
2	OPC Belt Cartridge		1
3	Oil Bottle		1
4	Fuser Cleaner		1
5	Syringe		1



PRECAUTION

When shipping the printer, remove the oil bottle and the fuser cleaner from the fusing unit. After removing the oil bottle, be sure to remove the oil remaining in the fusing unit with the supplied syringe. Failure to do so will cause severe damage to the printer.

3. INSTALLATION WORK

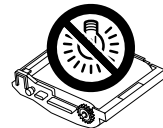
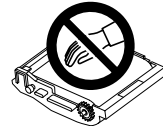
Install the unit parts of the starter kit into the printer according to the following procedures:

3.1 Install the OPC Belt Cartridge



PRECAUTION

- Do not directly touch the OPC belt surface with bare hands or gloves.
- If the belt is exposed for more than two minutes to a light source of 800 lux, the belt may be damaged.



- 1) Open the front cover and the top cover by releasing the latches.



CAUTION

When installing or removing the OPC belt, be sure to open the front cover first. Failure to do so will cause the OPC belt to be damaged due to contact with the toner cartridges.

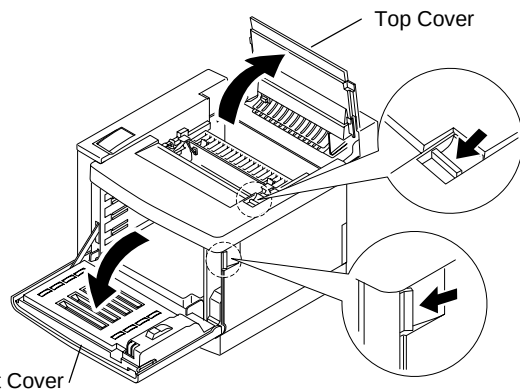


Fig.3-3

- 2) Release the belt cartridge lock levers (left & right).

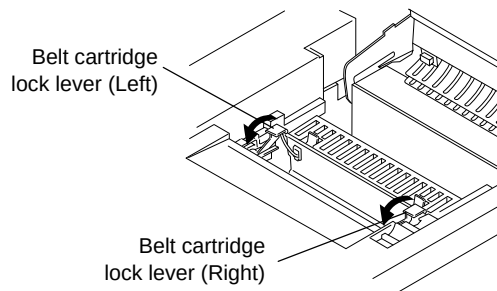


Fig.3-4

- 3) Pull and remove the tension release pins on both sides (left & right) of the OPC belt cartridge.
- 4) Remove the protective sheet from the new OPC belt cartridge.

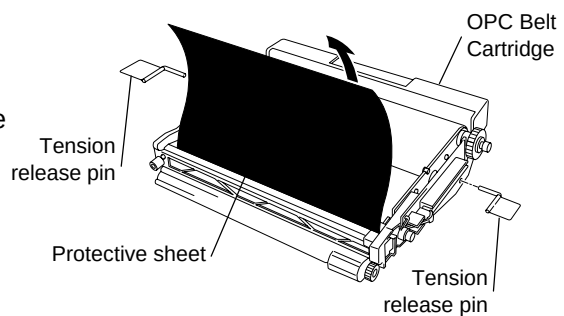


Fig.3-5

- 5) Install the new OPC belt cartridge into the guides at both sides in the printer.

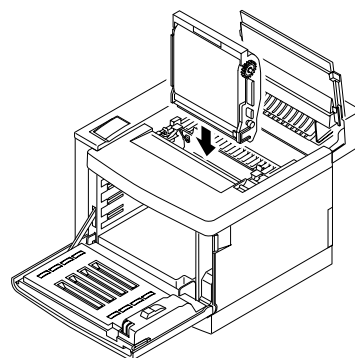


Fig.3-6

- 6) Set the belt cartridge lock lever at both sides (left and right).

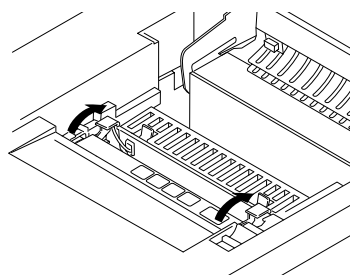


Fig.3-7

3.2 Install the Toner Cartridges into the Printer

- 1) Rock each of the cartridges 3 to 4 times through 30° to the horizontal.

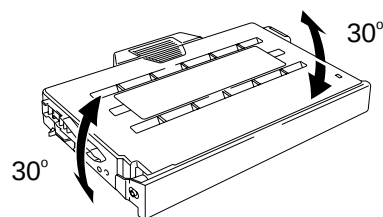


Fig.3-8

- 2) Remove the tape fixing the protective cover and remove the protective cover from the new toner cartridge.

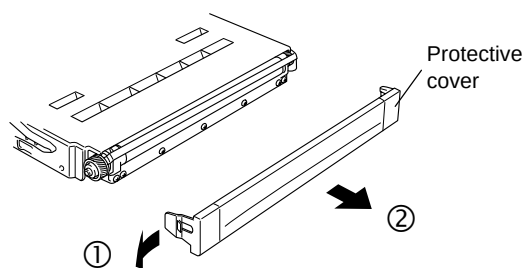


Fig.3-9

- 3) Install the new toner cartridge along the guide into the printer.

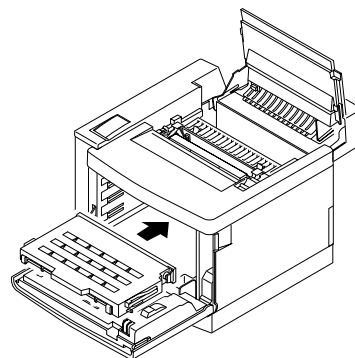


Fig.3-10

Note:

The installation order of the four toner cartridges should be from the bottom to the top, in terms of colors this is in the order Cyan (C), Magenta (M), Yellow (Y), and Black (K).

- 4) Close the front cover.

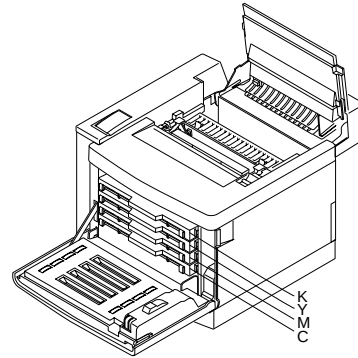


Fig.3-11

3.3 Install the Oil Bottle and Fuser Cleaner

- 1) Pull out and remove the orange protective parts fitted between the rollers of the fusing unit.

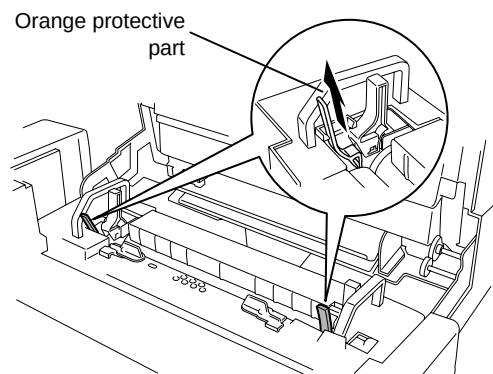


Fig.3-12

- 2) Install the oil bottle into the fusing unit.

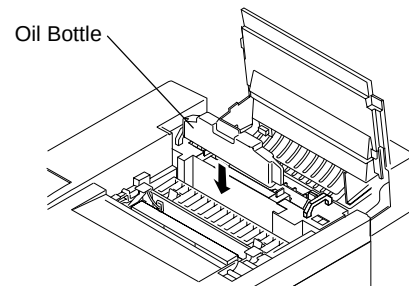


Fig.3-13

- 3) Install the fuser cleaner into the fusing unit.
- 4) Secure the oil bottle and the fuser cleaner with the retainer lock levers.
- 5) Close the top cover.

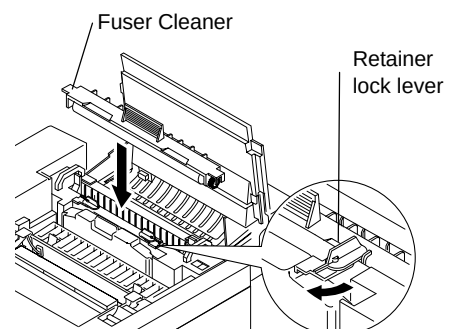


Fig.3-14

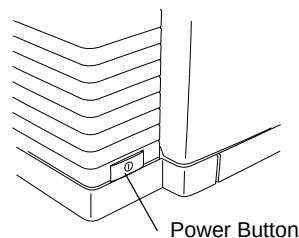
3.4 Test Print

After completing the installation work, perform a test print. The test print should be done in the Video Controller Mode and checked for correct print output. If there appear to be any print problems then the test print in the Engine Controller Mode should be used if necessary.

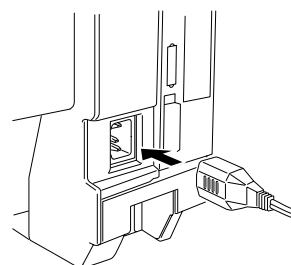
Note: The test print pattern differs between these two modes.

3.4.1 Test Print

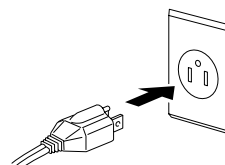
- 1) Before connecting a power cable to the printer, ensure that the power button located on the front of the printer projects from the cover surface. This means that the printer is in the power-off status.



- 2) Connect the connector of the power cable to the printer.

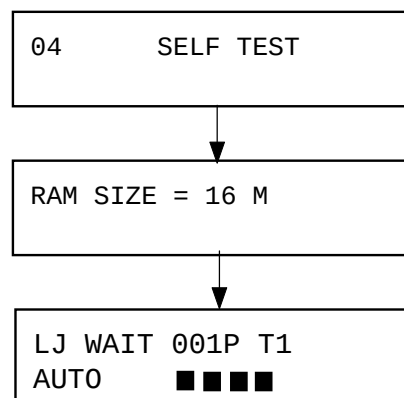


- 3) Insert the plug of the power cable into the power outlet.



- 4) Press the power button, and confirm that the SELF TEST LCD panel screen is displayed during printer initialization.

The printer checks the RAM size and then goes into warming-up mode.



- 5) The Ready LED lights within 210 seconds maximum, before which the screen shown on the right appears on the control panel display.
- 6) Press the Select button to set the printer off-line.
- 7) Hold down the Shift button and press the Test button so that the printer enters the test mode.
- 8) The printer has built-in print patterns for test printing. The display shows the first test mode item.
- 9) Press the ▲ or ▼ button until the desired test mode appears on the display, then press the SET button to print the desired test page.

Note: Refer to the table below for each test mode item.

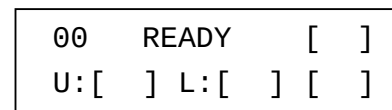
Display Message	Test Mode Description
DEMO PAGE	Prints out the demonstration.
TEST PRINT	Performs the printer test and prints out the test pattern.
PRINT CONFIG	Prints out a list of panel button settings you have configured as user settings for the printer.
PRINT FONTS I	Prints out a list of internal or resident fonts.
PRINT FONTS C	Prints out a list of optional fonts stored in the font cartridge/card.
PRINT FONTS P	Prints out a list of permanent download fonts.
exit	Exits from the test mode. The printer does not perform any test.

10) Push the power button in order to shut off the power supply to the printer.

Note: use the following procedures to identify the problem if the test print is incorrect.

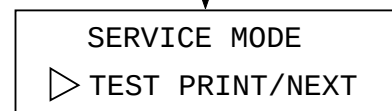
11) Press and hold down the Mode, Set and ▼ buttons and press the power button to go into the Engine Controller Mode. The Ready LED lights within 210 seconds maximum, when the screen (a) on the right appears on the control panel display.

(a)



12) Press the Select key, then the screen (b) on the right appears on the control panel display.

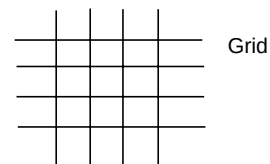
(b)



13) The printer has two built-in print patterns for test printing in the Engine Controller Mode as follows. Use the Set or ▼ button to scroll through the menu options and then press the Continue key to perform the selected test print. Press Font to stop the test print.

1. Grid Pattern:

Available in mono color print of Y, M, C, K, and two color print of R, G, B.



Grid

2. Stripe Pattern:

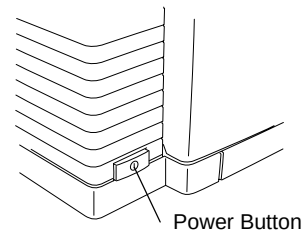
Available in color print of Y, M, C, K, R, G, B.



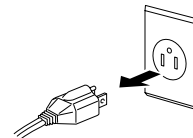
Stripe

- 14) Press the Font button to stop the test print and then push the power button in order to shut off the power supply to the printer.

(This switch is push-on/push-off type.)



- 15) Unplug the power cable from the outlet.



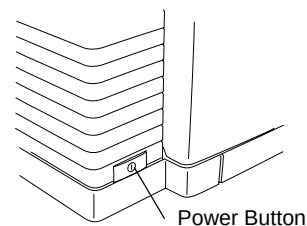
PRECAUTION

- Before unplugging the power cable, confirm that the main power button located on the front of the printer is set to Off.
- Under no circumstances power off or unplug the printer while it is performing any printing operations.
- Do not turn the printer power back on until at least 5 seconds after powering off.

3.4.2 On-line Printing (Video Controller Mode only)

Upon confirmation of correct printing by the test print modes, proceed with normal On-Line Printing according to the following procedures. Since this service manual does not refer to the interface connection or operation of the host computer, read the printer User's Guide and any manuals detailing the operation procedure of the host computer before starting normal On-Line Printing.

- 1) Connect the interface cable to the host computer.
- 2) Push the power button to turn on the printer.



- 3) Confirm that the printer is set to the On-Line mode. (On Line LED is lit.)
- 4) Upon completion of the warming-up process, the Ready LED lights.

This warming-up process takes 210 seconds maximum.

- 5) The printer starts printing upon receipt of print data transmitted from the host PC.

**** Confirm what is indicated on the control panel.**

LJ WAIT 001P T1
AUTO ■ ■ ■ ■

CHAPTER IV

STRUCTURE OF SYSTEM COMPONENTS

CONTENTS

CHAPTER IV STRUCTURE OF SYSTEM COMPONENTS..... IV-1

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CHAPTER IV STRUCTURE OF SYSTEM COMPONENTS

1. BASIC STRUCTURE

<Mechanical & Electrical Structures>

This laser beam color printer (hereinafter called "Printer") consists of five mechanical systems; Print, Transfer, Scanning, Paper Transport and Control System. The printer produces color printing through the interactive operations of these five systems as shown in Fig.4-1.

(1) Print System

The print system consists of the following 6 (six) functional parts located around the OPC belt which form a toner image on the OPC Belt.

- Charger Part
- Exposure Part
- Development Part
- First Transfer Part
- Discharger Part
- Cleaner Part

(2) Scanning System

The scanning system consists of the following 2 (two) functional parts which form an electrostatic latent image on the OPC Belt by scanning it with a laser beam.

Scanner Unit

Scanner Motor (SCM)

(3) Transfer System

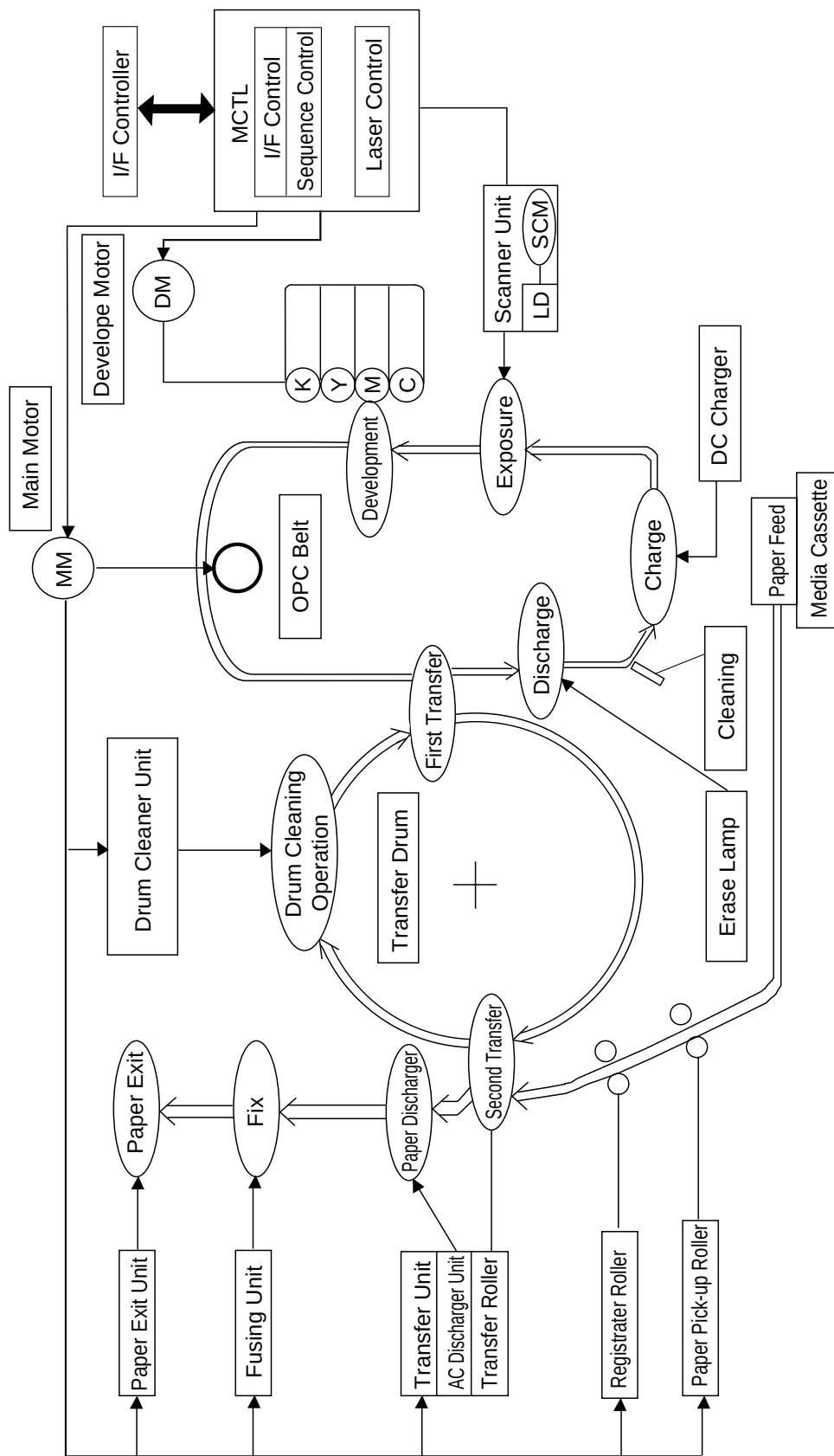
The transfer system consists of the following 3 (three) functional parts and transfers the toner image formed on the transfer drum onto the page.

- Transfer Drum
- Second Transfer Part
- Drum Cleaner Unit

(4) Paper Transport System

The paper transport system consists of the following 5 (five) functional parts and picks up paper from the media cassette, separates the paper from the transfer drum and exits it from the printer body after fusing the toner image on the paper.

- Media Cassette
- Transport rollers
- Paper Discharger
- Fusing unit
- Paper Exit



(5) Control System

The control system consists of the following 4 (four) control parts and runs the printer by processing the interface signals transmitted from the Host computer and interfacing to the print, transfer, scanning and transport systems.

- Sequence Control
- Laser Control
- Fusing Temperature Control
- Interface Control

<Basic Mechanism of Color Printing>

(1) Principle of Color Printing

Color printing is made through the subtractive process by combining the three primary colors, yellow, magenta, and cyan. Fig.4-2 shows the three primary colors and subtractive process:

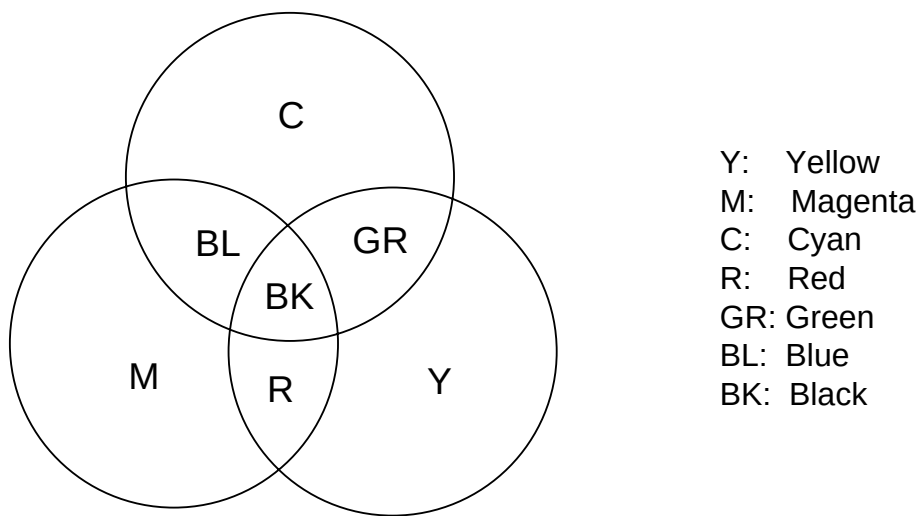


Fig.4-2

(2) Basic Color Printing Process

- The printer has a Toner Cartridge of each color yellow, magenta, cyan and black as shown in Fig.4-3.
- The toner image developed using the primary colors is transferred to the transfer drum for the printed color combination as shown in Fig.4-4 (a).
- The toner image formed on the transfer drum is transferred to the transported paper as shown in Fig.4-4 (b).
- The toner on the paper is fused by the thermal fixing unit to fix the toner image onto the paper as shown in Fig.4-4 (c).

Summarizing the above processes, a toner color layer is formed on the transported paper, and subsequently, the color image is made through the subtractive process.

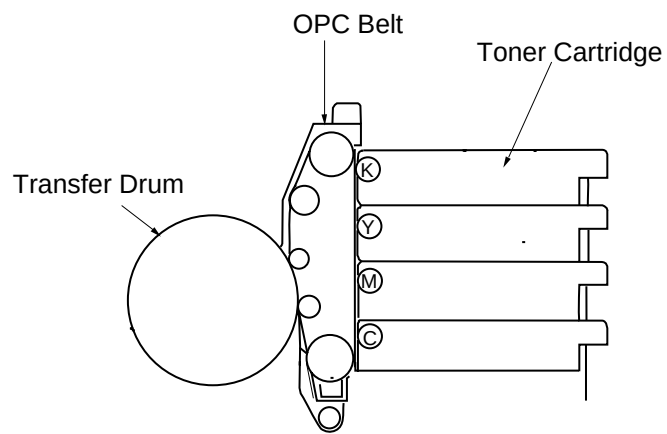


Fig.4-3

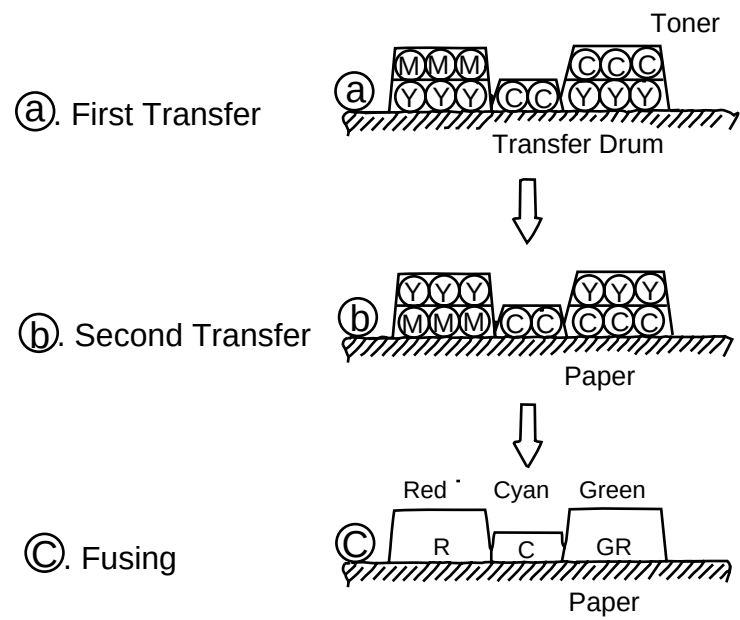


Fig.4-4

<Structure of the OPC Belt>

The OPC belt consists of a surface layer having a photoconductor (OPC) of organic material, the inner layer of an insulator material (PET / Mylar) and an aluminum deposit layer in between. The OPC belt is located as shown in Fig.4-5 as the main part of the print system.

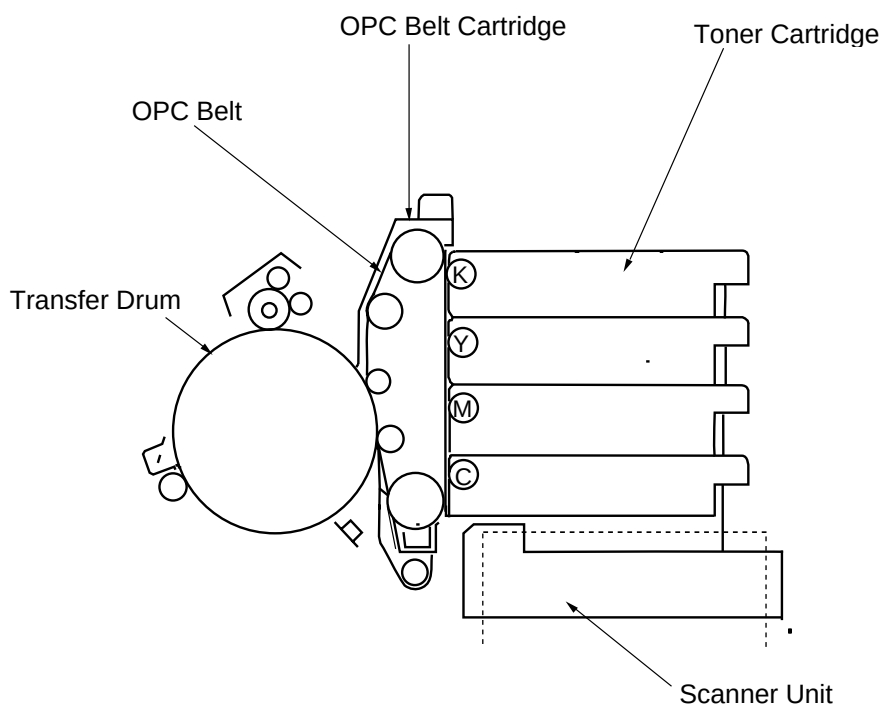


Fig.4-5

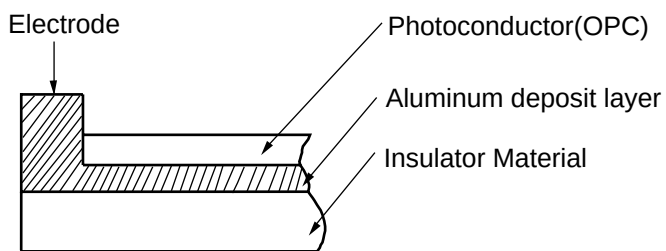


Fig.4-6

1.1 Print System and Transfer System

Fig.4-7 shows the basic structure of the print system having the OPC belt as the main part and the transfer system having the transfer drum as the main part. Color printing is achieved by actuating in sequence each process in the print system and transfer system.

4 cycles of actions 1 to 6 are required to form a full 24 bit color image on the transfer drum, only one cycle of actions 7, 8 and 9 is required to transfer the image to the paper from the transfer drum ready for fixing by actions 10 and 11.

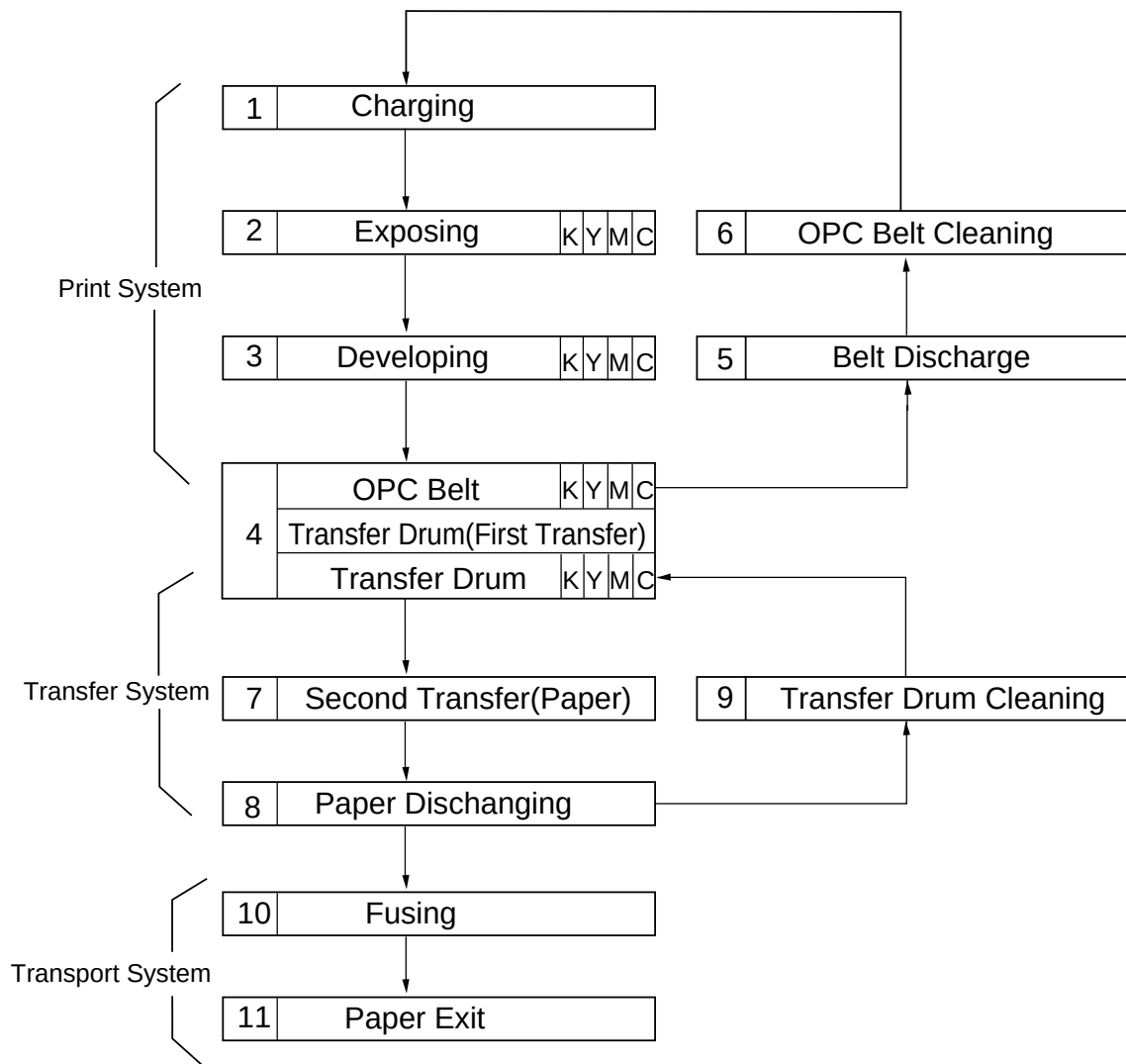


Fig.4-7

1.1.1 Structure of the Printer

No.	Component Part	Process
1	Charger	Charging
2	Scanner Unit	Exposing
3	Toner Cartridge	Developing
4	OPC Belt	Receives the Image
5	Transfer Drum	Transfers the Image
6	Belt Discharger Erase Lamp	Discharges the Belt
7	Cleaning Blade	Cleaning the Belt
8	Transfer Roller	Transferring
9	Paper Discharger	Discharges the Paper
10	Drum Cleaner	Cleans the Drum
11	Fusing Unit	Fusing
12	Paper Exit Unit	Exits the Paper
13	Register Roller	Paper Alignment

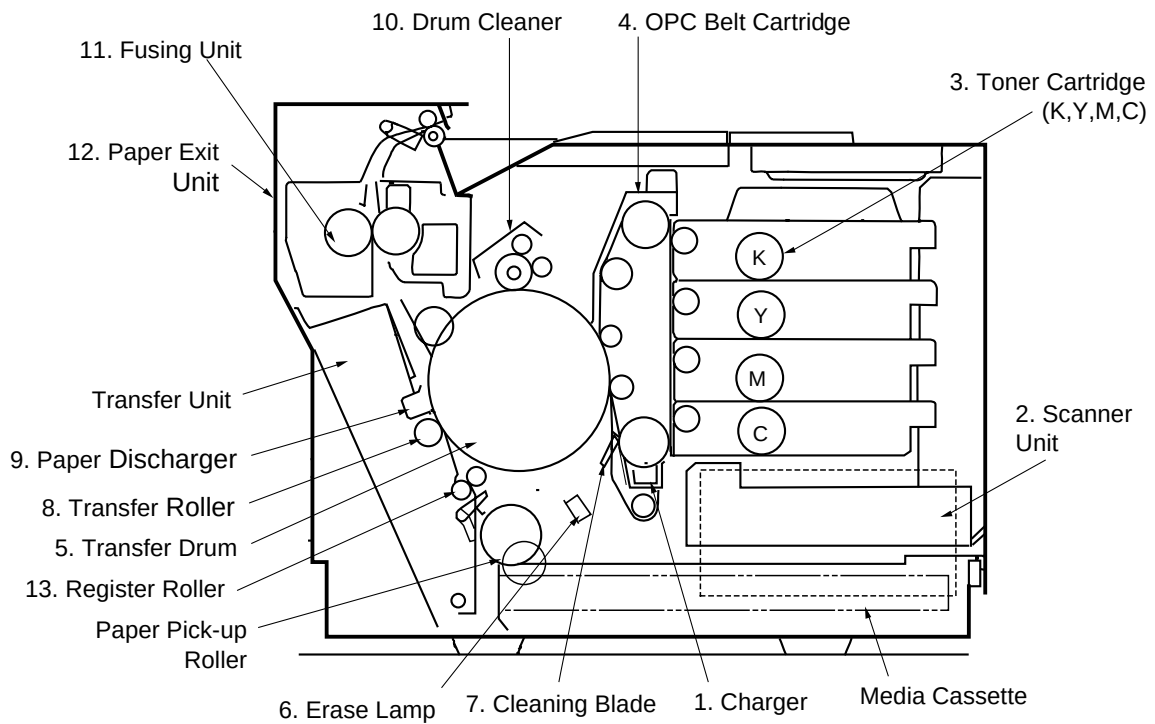


Fig.4-8

1.1.2 Basic Structure of the Printing System

A toner image is formed through the potential of the OPC belt varying in each of the charger, exposure, development, transfer and cleaning processes.

(1) Process of Print System (See Fig.4-9.)

- i) The OPC belt is biased to the voltage -CBV(V) by the power supply CBV.
- ii) A negative high voltage is applied to the charger unit by the power supply CHV, and a corona is generated as the result.
- iii) The developer magnetic roller of the toner cartridges is biased to -DBV(V) by the power supply DBV.
- iv) The frame potential of the transfer drum is GND.

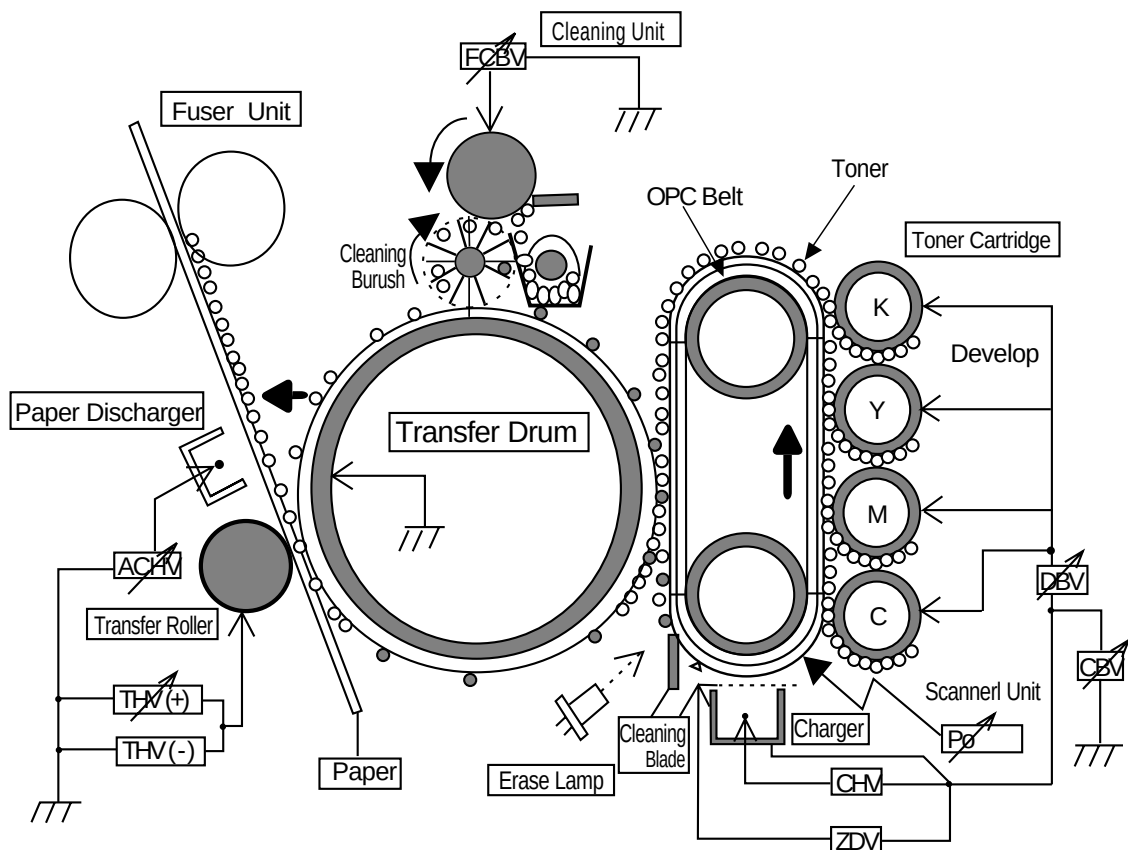


Fig.4-9

No.	Function	Power Supply (P/S)	
		P/S Name	Approx. Output Voltage
1	Charging	CHV(-)	4.6KV
		HVRD6190	619V
2	First Transfer	CBV(-)	200V ~ 900V
3	Developing	DBV(-A)	200V ~ 400V
	Bias	DBV(-B)	200V ~ 400V
4	Second Transfer	THV(+)	400V ~ 3,000V
5	Transfer Roller Cleaning	THV(-)	600V
6	Paper Discharging	ACV(-)	4.9KV
		DCV(+)	200V
7	Drum Cleaning	FCBV	200V ~ 1,500V

- (2) Variation of OPC Belt Potential (See Fig.4-10.)
- The OPC belt is initially biased to $-CBV(V)$.
 - The OPC belt surface is evenly charged to $V_0(V)$ in the charging process.
 - The potential of the exposure part of the OPC belt is reduced to $-VR(V)$ as it is exposed to the laser beam in the process of exposing, and an electrostatic latent image is formed on the OPC belt as the result.
 - Negatively charged toner is moved onto the exposed part of the OPC belt in the development process due to the difference of potential between $-VR(V)$ (the latent image) and $-DBV(V)$, and a visible toner image is formed as the result.
 - Negatively charged toner on the OPC belt moves to the transfer drum surface in the transfer process because the GND potential of the transfer drum is greater than $-VR(V)$ of the OPC belt.
 - The OPC belt is discharged by the erase lamp.

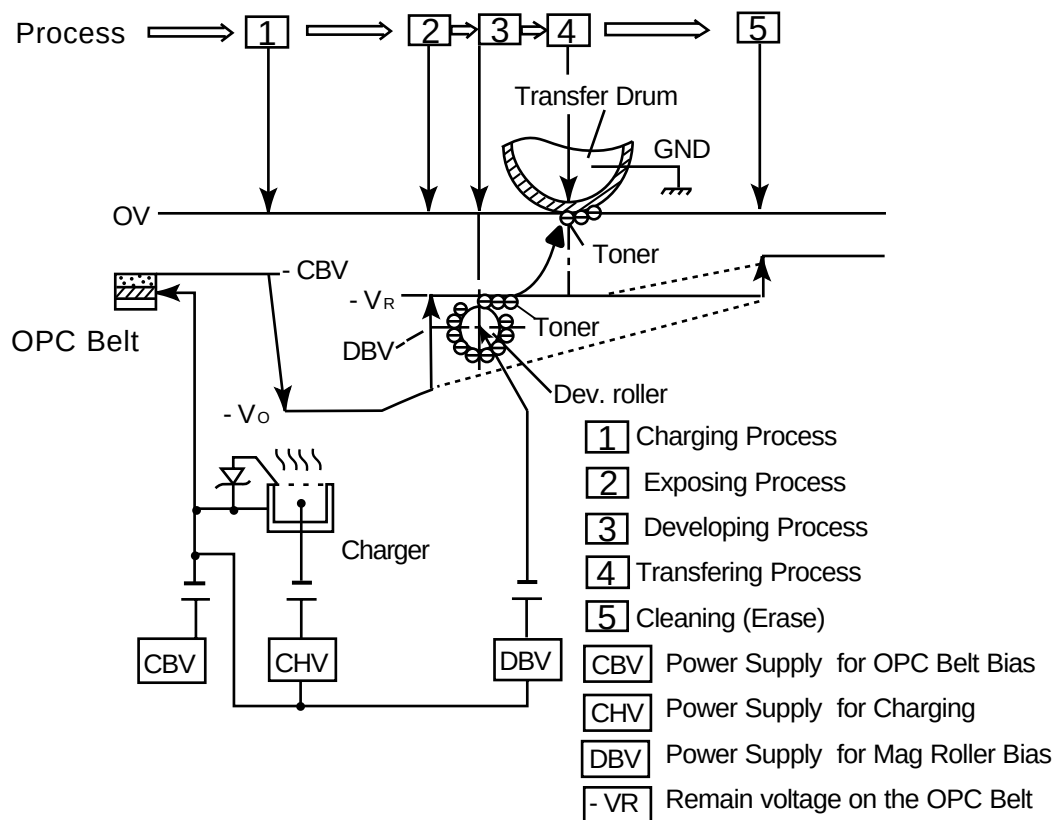


Fig.4-10

1.1.3 Details of Each Process

1	Charging

The charging process ensures that the OPC belt is evenly charged by the charger system.

- (1) Structure of the Charger Unit (Refer to Fig.4-8 and Fig.4-11)
 - i) The charger unit is located as shown in Fig.4-8.
 - ii) The charger unit consists of the case, corona wire and grid.
 - iii) The charger unit charges the OPC belt surface to the potential $-V_0(V)$ with the corona charge.
 - iv) The charger unit has the grid controlled to the constant voltage $ZD(V)$ for even charging.
- (2) Process of Charging (Refer to Fig.4-12.)
 - i) The status of the OPC belt surface before charging is $-CBV(V)$.
 - ii) The charger unit charges the OPC belt surface evenly to $-V_0(V)$ by generating a negative charge.

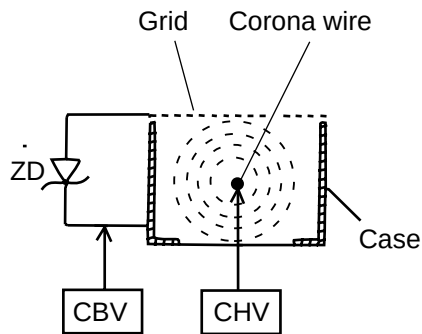


Fig.4-11

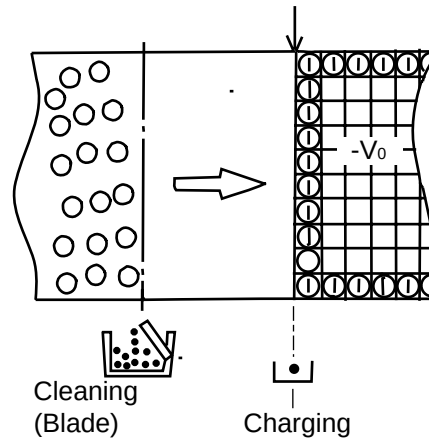


Fig.4-12

2	Exposing

The exposing process means that the OPC belt surface is exposed to the laser beam to form an electrostatic latent image.

- (1) Structure of Scanner Unit
 - i) The scanner unit is located as shown in Fig.4-8.
 - ii) The source of the laser beam is a semiconductor laser.
 - iii) The laser light is scanned onto the OPC belt by converting the laser light to a beam of light through the lens and reflective mirror to form an electrostatic latent image.
- (2) Process of Exposing (Refer to Fig.4-13.)
 - i) The OPC belt surface has been charged to the potential $-V_o(V)$ in the charging process.
 - ii) The laser light is scanned at right angles to the forward direction of the OPC belt.
 - iii) High speed switching of the laser is made according to the transmitted image data.
 - iv) The charge of the areas radiated by the laser light is reduced to the potential $-V_R(V)$.
 - v) An invisible electrostatic latent image is formed on the OPC belt as shown in Fig. 4-13.

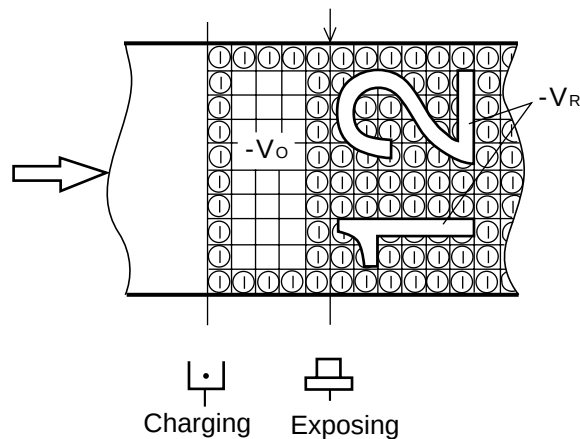


Fig.4-13

The developing process means that an electrostatic latent image on the OPC belt is made visible by depositing toner onto the exposed areas of the OPC belt.

- (1) Structure of the Toner Cartridge (Refer to Fig.4-8 & 4.14.)
 - i) The toner cartridge is located as shown in Fig.4-8.
 - ii) Four toner cartridges are made available from the top to bottom in the order black, yellow, magenta and cyan.
 - iii) Each color toner is loaded in the corresponding toner cartridge.
- (2) Process of Developing (Refer to Fig.4-8, 4-14, 4-15, and 4-16)
 - i) Toner adheres to the developer roller of the toner cartridge.
Developing is processed by this roller contacting the OPC belt surface.
 - ii) The developer roller has been biased to the potential $-DBV(V)$. Fig.4-15 describes the relationship established between the potential of the toner, the potential $-V_o(V)$ at the non-exposed area of OPC belt and the potential $-VR(V)$ on the exposed area of the OPC belt.
 - iii) Developing is processed by the toner adhering to the OPC belt due to the attraction between the potential of the toner and the potential $-VR(V)$ on the exposed area of the OPC belt. A visible Toner image is formed on the OPC belt.
 - iv) No developing takes place on the non-exposed area because the potential of the toner and that of the OPC belt is the same polarity and therefore repel each other.

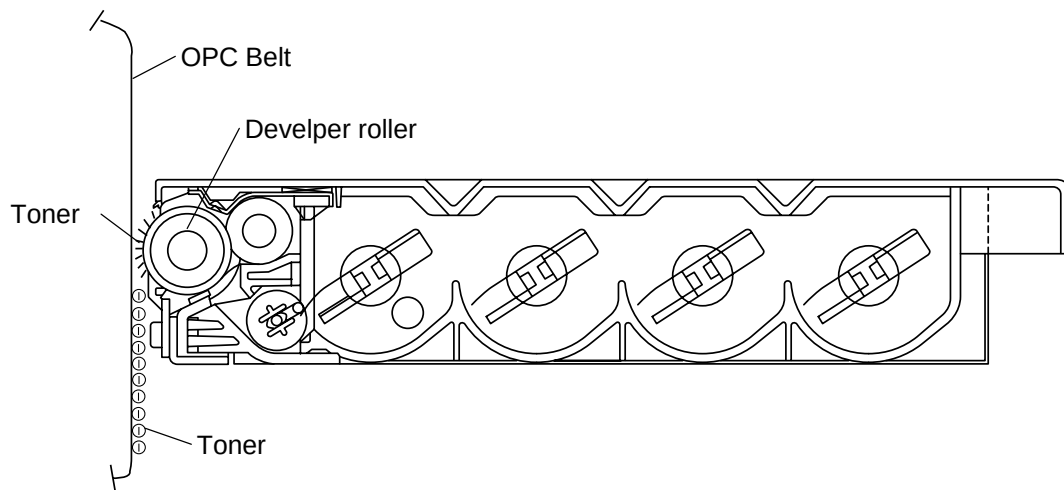


Fig.4-14

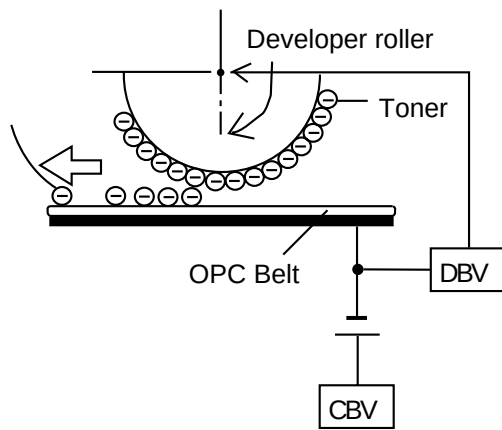


Fig.4-15

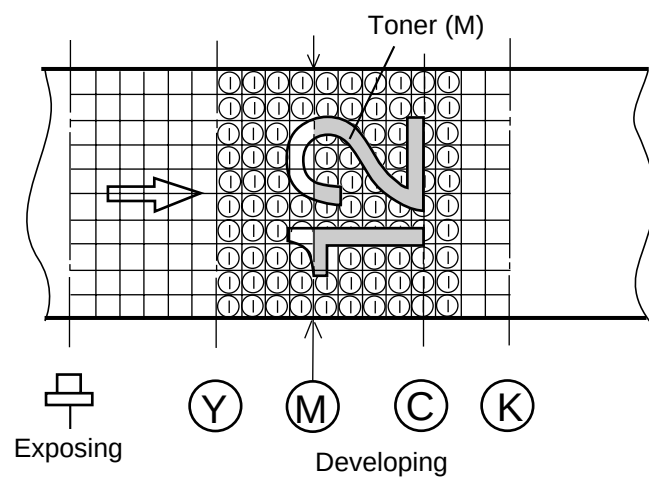


Fig.4-16

4	First Transfer (Drum)

The first transfer process means that the toner image on the OPC belt is transferred onto the transfer drum.

- (1) Structure of the Transfer Drum (Refer to Fig.4-8.)
 - i) The drum is located as shown in Fig.4-8.
 - ii) Material of the drum is aluminum.
 - iii) Semiconductor rubber is used to provide the drum surface as shown in Fig.4-17.
 - iv) The transfer drum rotates by contacting and synchronizing with the OPC belt.

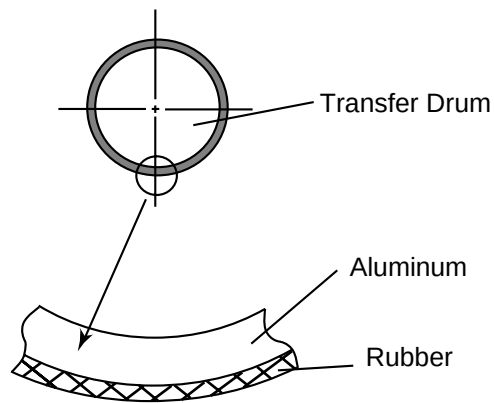


Fig.4-17

- (2) First Transfer Process (Refer to Fig.4-18.)
- i) The OPC belt has been through the development process and contacts and synchronizes with the transfer drum.
 - ii) The OPC belt has been biased to the potential of $-CBV(V)$. The potential of the transfer drum is nearly GND.
 - iii) Toner on the OPC belt is moved onto the transfer drum due to the difference of potential between the OPC belt and the transfer drum.
 - iv) Toner that has been developed by each color in sequence is moved from the OPC belt onto the transfer drum and the color toner images overlap on the transfer drum.
 - v) Upon completion of the drum transfer process, the complete toner image is transferred onto paper in the paper transfer process.

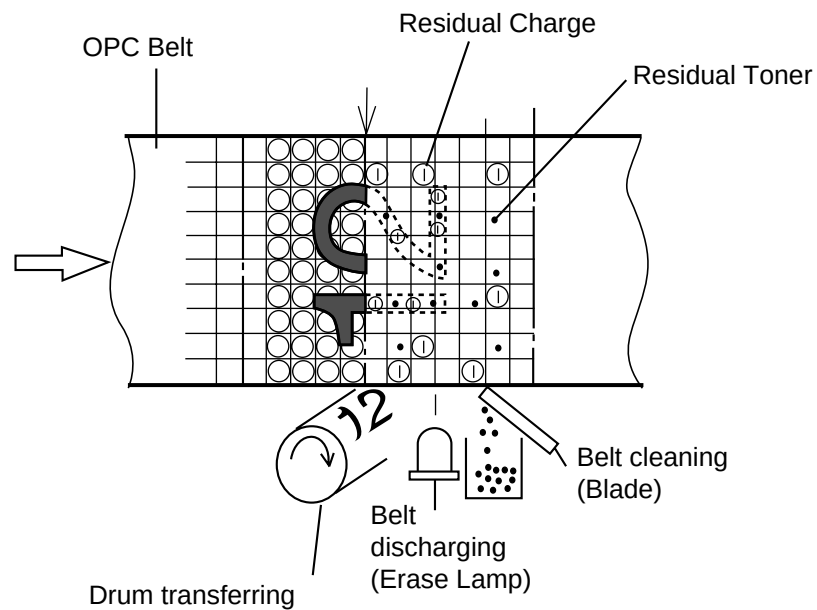


Fig.4-18

5	Belt Discharging (Erase Lamp)

The belt discharging process means that upon completion of the drum transfer process, an LED light is radiated onto the OPC belt prior to mechanically cleaning the belt to discharge the residual charge.

- (1) Structure of Erase Lamp
 - i) The erase lamp is located as shown in Fig.4-8.
 - ii) The light source of the erase lamp is 24 light emitting diodes (LEDs).
- (2) Process of Discharging (Refer to Fig.4-19.)
 - i) Though the toner image was transferred to the transfer drum in the drum transfer process, there is still a residual charge on the OPC belt.
 - ii) The residual charge (-VR) on the OPC belt is discharged by the radiation of the erase lamp light prior to cleaning the belt.

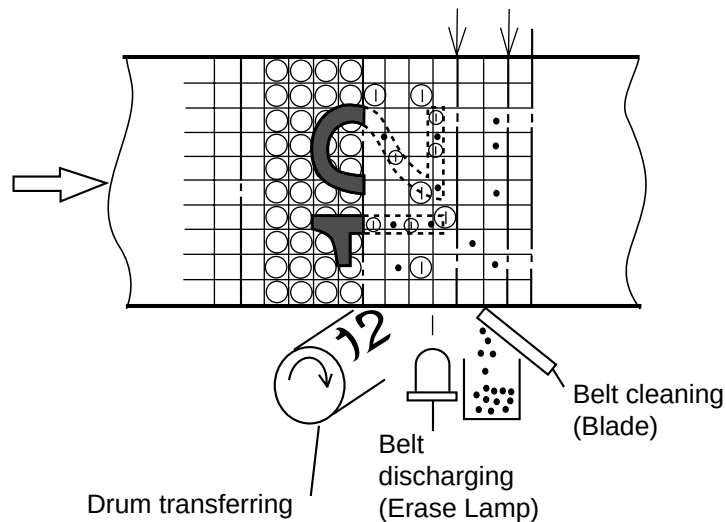


Fig.4-19

The belt cleaning process means that the residual toner adhering to the OPC belt surface is mechanically scavenged.

(1) Structure of Belt Cleaning

The blade for the belt cleaning is located relative to the OPC belt cartridge as shown in Fig.4-8.

(2) Process of Belt Cleaning (Refer to Fig.4-20.)

There is residual toner on the OPC belt as it has not been completely transferred in the drum transfer process.

Residual toner is mechanically scavenged by the blade edge.

The scavenged residual toner is collected in the waste toner pack by the waste toner feeder.

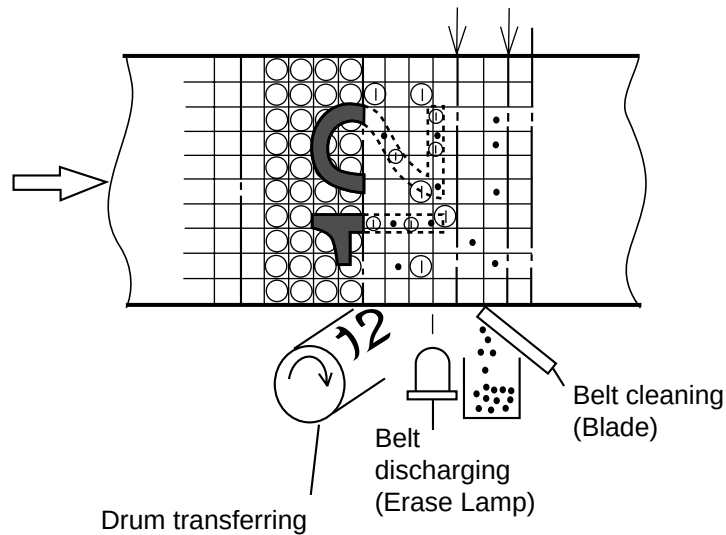


Fig.4-20

The second transfer process is where the toner image on the transfer drum is transferred onto the transported paper.

(1) Second Transfer Structure

- i) The transfer roller for the paper transfer is located as shown in Fig.4-8.
- ii) The transfer roller is normally kept out of contact with the transfer drum until the second transfer process starts.
- iii) The transfer roller is positively biased by the power supply THV.
- iv) The transfer roller is in contact with the transfer drum only in the second transfer process.
- v) Transported paper passes between the transfer roller and transfer drum.

(2) Second Transfer Process (Refer to Fig.4-21.)

- i) Paper is transported and is synchronized with the transfer drum.
- ii) The transfer roller operates and is synchronized with the transported paper and is in contact with the transfer drum through the transported paper.
- iii) The transported paper passes between the transfer roller and transfer drum.
At this time the positive high voltage (THV) is fed to the transfer roller.
- iv) Negatively charged toner on the transfer drum is moved to the positively charged paper.
- v) The transported paper with the toner transferred to it is moved to the paper discharging process.

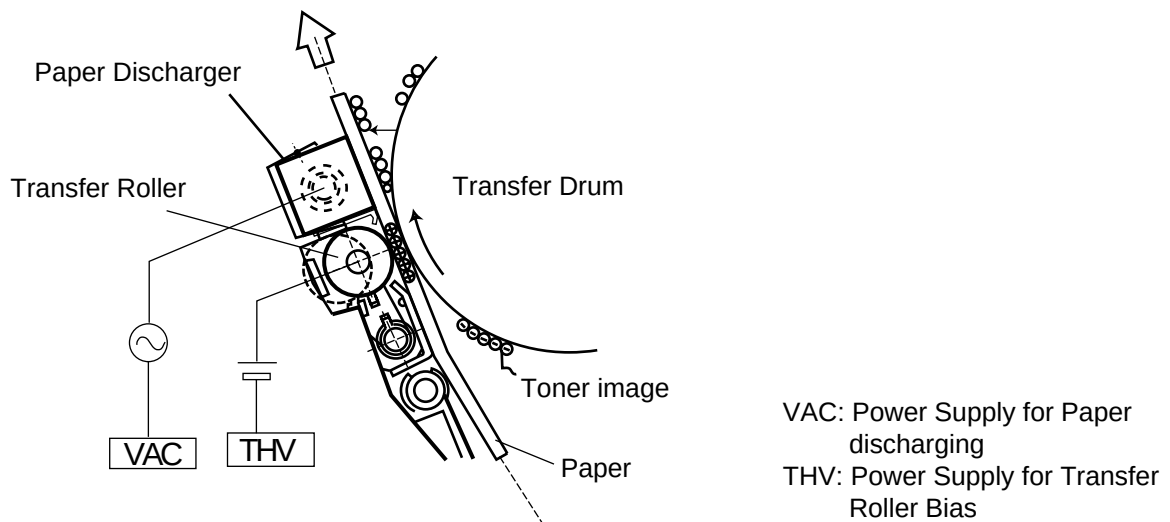


Fig.4-21

The paper discharging process is where the transported paper onto which the toner transfer has been completed is separated from the transfer drum by applying an AC charge to the paper.

- (1) Structure of Paper Discharger (Refer to Fig.4-22.)
 - i) The AC charger unit for discharge the paper is located as shown in Fig.4-8.
 - ii) The AC charger unit consists of the case and a charger wire.
 - iii) A high alternating voltage (VAC) is fed to the AC charger unit.
- (2) Process of Paper Discharging (Refer to Fig.4-22.)
 - i) The paper adheres to the transfer drum in the transfer process.
 - ii) The paper is neutralized (discharged) in terms of any electrical charge by the alternate voltage generated by the discharger.
 - iii) Paper is separated from the transfer drum and subsequently transported to the fusing (fixing) process.

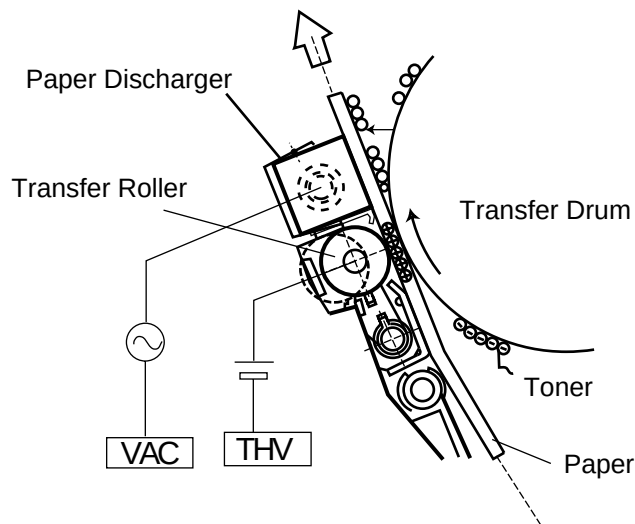


Fig.4-22

The drum cleaning process is where the residual toner on the transfer drum is removed.

- (1) Structure of Drum Cleaning (Refer to Fig.4-23.)
 - i) The drum cleaning unit is located as shown in Fig.4-8.
 - ii) The drum cleaning brush is a semiconductor type so that the brush can clean the surface of the rotating transfer drum. The Drum cleaning brush is kept out of contact with the transfer drum when the print image on the transfer drum is being created.
 - iii) The drum cleaning roller is positively biased by the positive voltage FCBV(V).
 - iv) FCBV(V) is fed to the cleaning brush in contact with the roller and the cleaning brush is self-biased by the resistance of the brush.
 - v) The drum cleaning roller rotates in contact with the drum cleaning brush.
- (2) Process of Belt Cleaning (Refer to Fig.4-23.)
 - i) There is residual toner on the surface of the transfer drum after the paper transfer process.
 - ii) The Drum cleaning brush is positively self-biased and so the negatively charged residual toner is removed from the surface of the transfer drum onto the drum cleaning brush.
 - iii) The Drum cleaning roller has been biased to the positive voltage FCBV(V). As the cleaning brush rotates, the residual toner absorbed into the brush from the transfer drum is attracted by the positive FCBV(V) voltage on the roller and adheres to the surface of the drum cleaning roller.
 - iv) Waste toner adhering to the surface of the drum cleaning roller is scavenged by the cleaning blade and collected into the waste toner pack by the waste toner feeder.

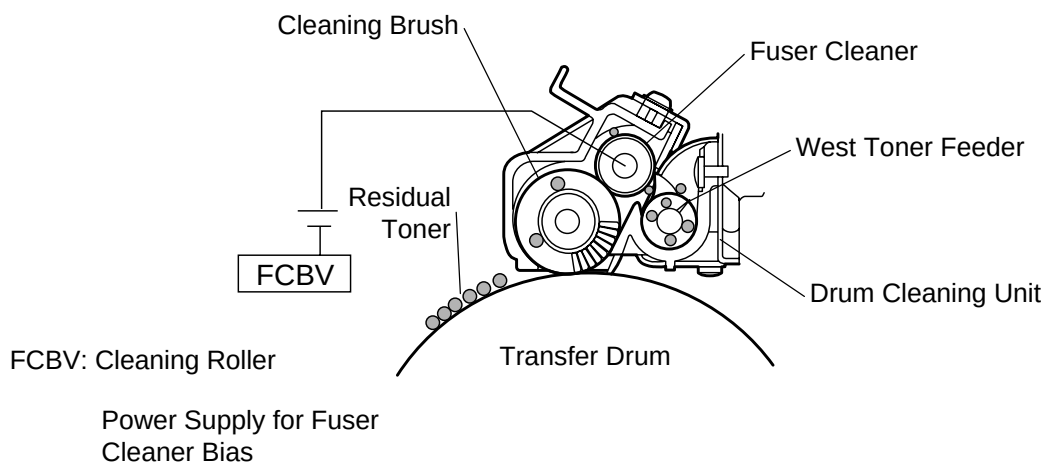


Fig.4-23

1.2 Scanning System

This printer employs a semiconductor laser diode as a light source. This laser diode is switched according to the transmitted image data (video signal).

The generated laser light scans over the OPC belt through a polygon mirror and lens, by which method electrostatic latent images will be formed on the OPC belt.

(1) Structure of the Scanning System (Refer to Fig.4-24.)

The scanner unit is located as shown in Fig.4-8.

The scanner unit consists of the following parts;

①	Laser Unit:	Light emitting source incorporating a laser diode.
②	Cylinder Lens:	Condenser for the laser beam.
③	Polygon Mirror:	Hexahedral mirror for scanning the laser beam.
④	F- θ Lens:	Focus lens for the laser beam.
⑤	Scanner Motor:	Motor to rotate the polygon mirror.
⑥	Mirror:	Reflecting mirror for the laser beam path.
⑦	LDC:	Laser diode control circuit.
⑧	PD:	Beam detector.
⑨	BTD Mirror:	Beam timing detector mirror to guide the laser beam to the PD sensor.

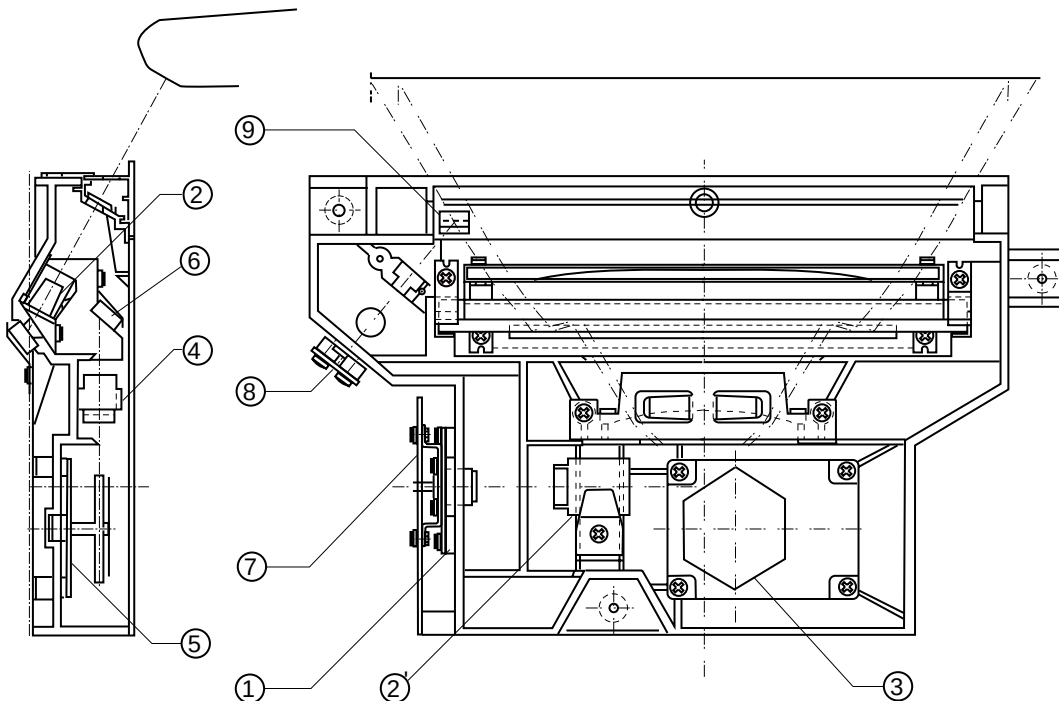


Fig.4-24

- (2) Specification:
Specification of the Scanner Unit is as follows;

Item	Specifications
Rated Output of Laser Diode	5mW.
Wave Length of Laser Beam	Approx.785nm.
Scanning Density	600dpi
Scanning Width	220mm
Scanner Motor speed	23,936rpm
Number of Polygon Mirror Faces	6

1.3 Paper Transportation System

(1) Outline

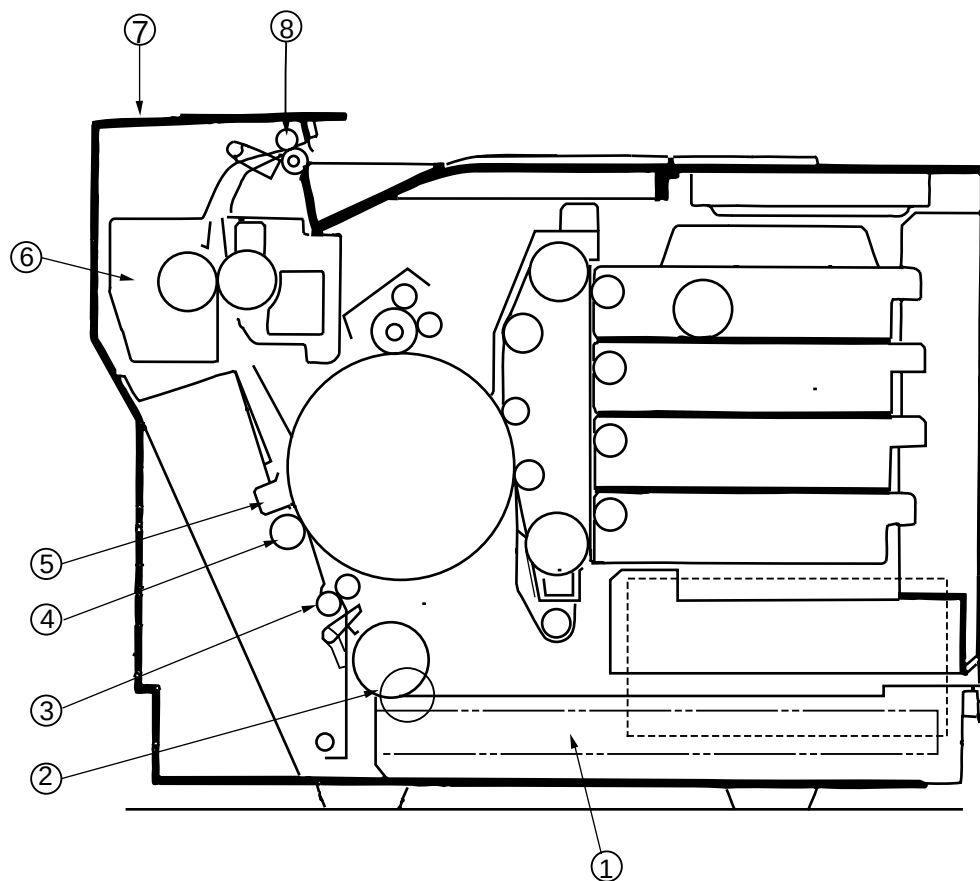
This printer employs automatic paper feeding from the media cassette.

When toner images are formed on the transfer drum through the operations of the print system and transfer system, paper is fed by the pick-up roller and transported to the register roller. The transported paper is further transported to the transfer, fuser and exit parts by the register roller synchronizing with the rotation of the transfer drum.

(2) Structure of Paper Transportation System (Refer to Fig.4-25.)

The paper transportation system consists of the following parts;

① Media Cassette:	Case to accommodate paper to be fed automatically.
② Paper Pick-up Roller:	Roller to feed sheets of paper one by one, preventing multi-feed.
③ Register Roller:	Roller to transport papers synchronized with the transfer drum.
④ Transfer System:	Print processing part consisting of transfer drum and transfer roller to transfer the toner image onto the paper.
⑤ Paper Discharger Unit:	Corona generator to generate AC corona for separating paper from the transfer drum.
⑥ Fusing Unit:	Mechanical part to fuse the toner image with heat rollers and fix it on the paper.
⑦ Paper Exit Unit:	Mechanical part to exit the fused paper from the printer.
⑧ Paper Exit Roller:	Roller to feed paper from the printer.



① Media Cassette	⑤ Paper Discharger Unit
② Paper Pick-up Roller	⑥ Fusing Unit
③ Register Roller	⑦ Paper Exit Unit
④ Transfer Part	⑧ Paper Exit Roller

Fig.4-25

1.4 Fusing Unit

The fusing unit employs a thermal fusing system using heater lamps in the rollers. Paper carrying the combined toner image passes between the heat rollers. Heat and pressure is applied to the paper when passing between the heat rollers so that the toner image is melted and fused onto the paper.

(1) Structure

The fusing unit consists of the following component parts; (Refer to Fig.4-26.)

①	Back-up Roller:	is a pressure roller and incorporates a heater lamp.
②	Fuser Roller:	incorporates a heater lamp.
③	Fusing Heaters:	halogen lamps to heat the rollers.
④	Thermal Fuse:	prevent the fuser roller from being excessively heated up.
⑤	Thermistor:	is a sensor to detect the temperature of the fuser roller's surface.
⑥	Oil Bottle:	contains silicone oil for fusing.
⑦	Fuser Cleaner:	cleans the fuser roller.

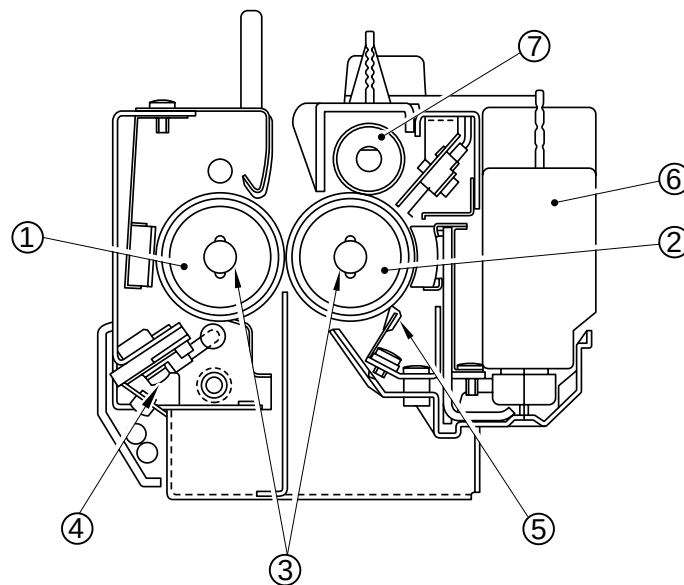


Fig.4-26

(2) Fusing Process (Refer to Fig.4-27.)

- ① Silicone oil supplied from the oil bottle is applied to the surface of fuser roller.
- ② The toner image has been transferred onto the paper, but not yet fused.
- ③ Transported paper passes between the heater roller and back-up roller.
- ④ Each roller is heated up to approx.140°C, and receives approximately 156N pressure from the opposite heat roller.
- ⑤ When the paper carrying the toner images passes between the two heat rollers, the toner images are melted and fused on the transported paper.
- ⑥ The paper carrying the fused image is separated from the heat rollers, and ejected from the printer.

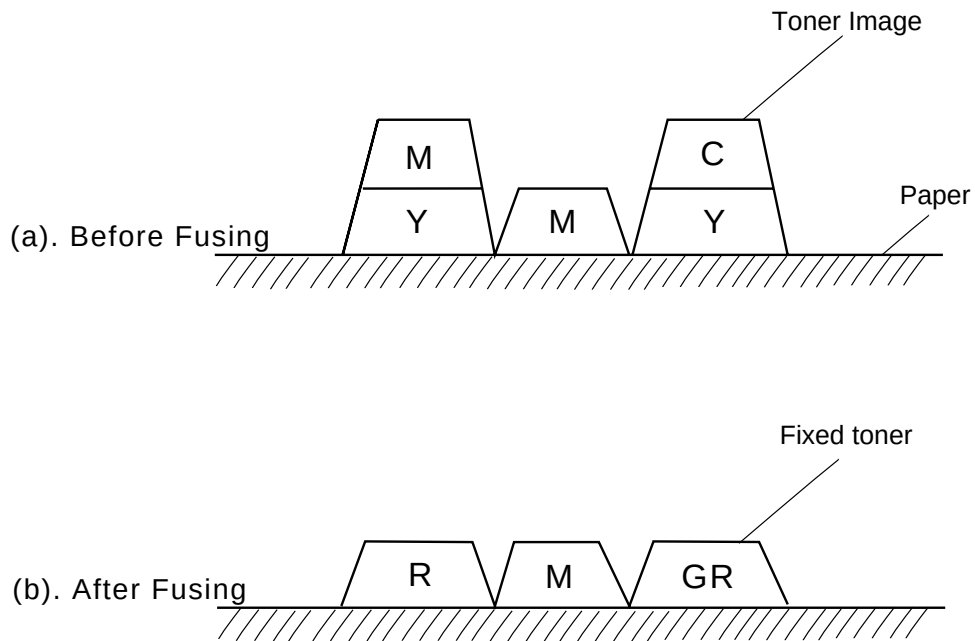


Fig.4-27

2. STRUCTURE OF THE CONTROL SYSTEM

2.1 Basic Structure

2.1.1 Electrical System and Functions

Most of the main electrical parts of this printer are controlled by the MCTL (engine controller) PCB.

<Structure of the Sequence Control>

The basic structure of the sequence control is shown in Fig.4-28.

①	Print Process Control:	To control the print process from the paper feed through to the paper exit.
②	Laser Output Control:	To automatically control the laser output.
③	Fuser Temperature Control:	To control the fixer heater so that the temperature of the fuser roller and back-up roller will be correct.
④	Toner Sensing Control:	To control the sensing of the toner empty status.
⑤	Interface Control: (Video Signal)	To process the input and output signals to and from the external controller (host).
⑥	Control Panel Indicator:	To display the printer operational status on the control panel indicator.
⑦	Error Control:	To control the safety stop procedures when errors occur in the printer.

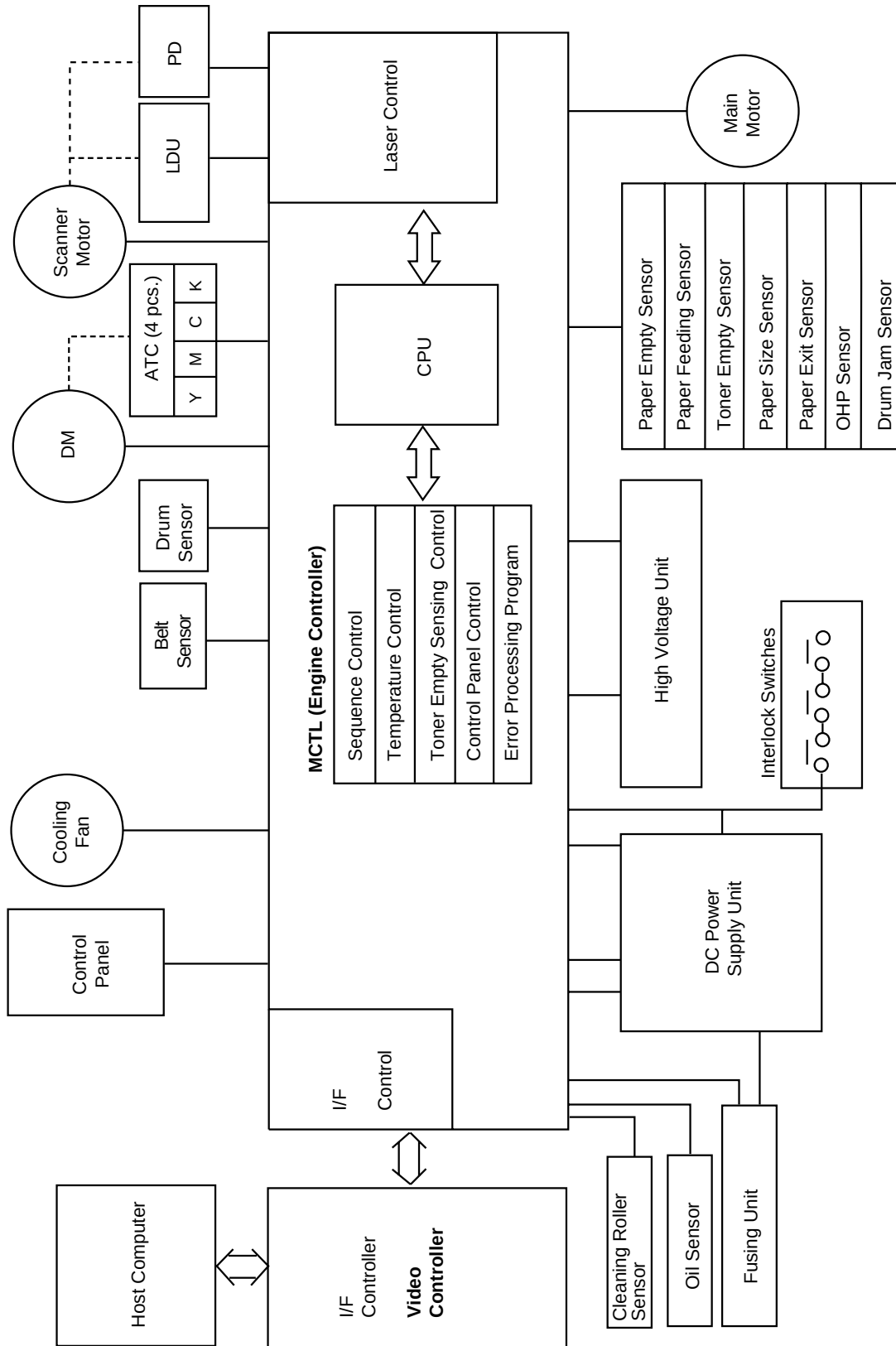


Fig.4-28

<Layout & Function of the Electrical Parts>

(1) Print PCB (Refer to Fig. 4-29.)

No.	Name	Function
1	Video Controller PCB	To receive the print data from the host computer, convert it into image data and then send the printing image data to the MCTL PCB.
2	Engine Controller (MCTL) PCB	To control the sequence of processes of the printer: Fusing Temperature Control, Laser Output Control, Control Panel Indications, Toner Empty Sensing Control, Error Processing Control, Interface Control.
3	Control Panel PCB	To display the printer's operation status and support the control panel switches.
4	LDU PCB	To control the drive and output to the laser diode in the scanner unit.
5	PDU PCB	To sense the emission of the laser diode and the beam position in the scanner unit.
6	Erase Lamp	To discharge the OPC belt with the LEDs.
7	IOD1 PCB	To send the signals from the sensors to the MCTL PCB, and to drive the outputs from the MCTL PCB to the motors, clutches and solenoids.
8	IOD2 PCB	- Ditto -
9	DC Power Supply (LVPS) PCB	To provide the printer with the power for printer control.
10	High-voltage Power Supply (HVU) PCB	To provide the printer with the high voltage power supplies necessary for the printing process.

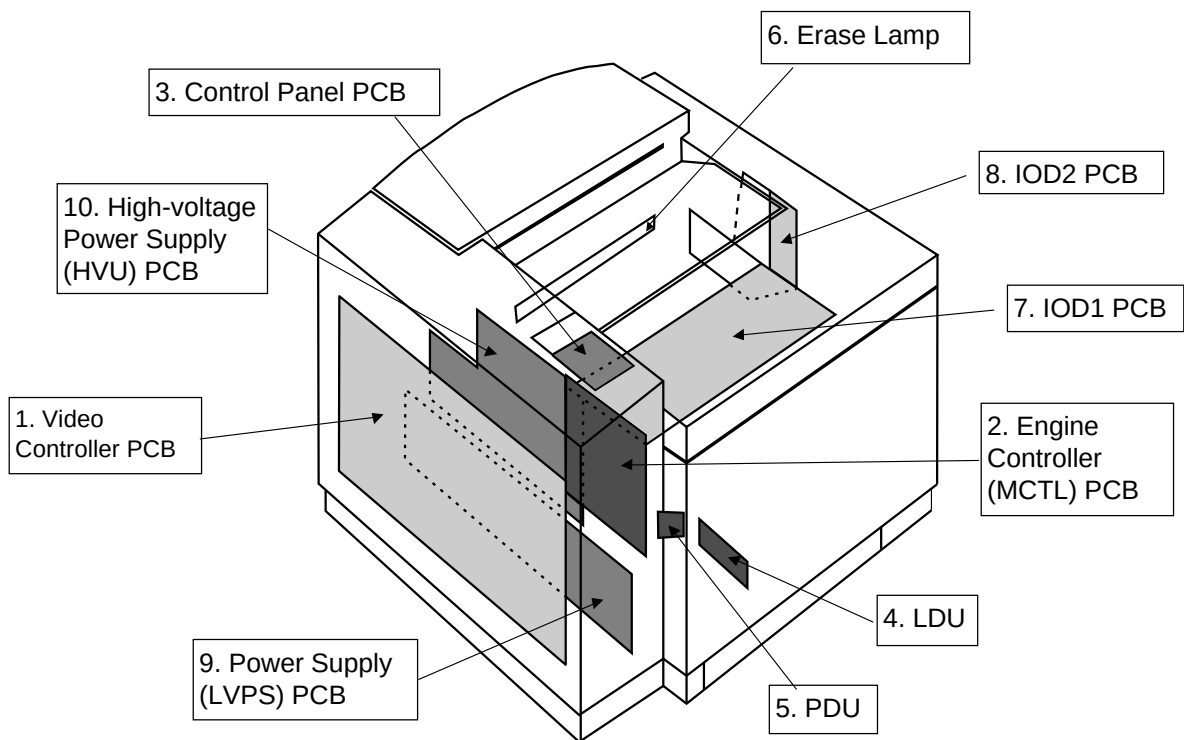


Fig.4-29

(2) Motors (Refer to Fig.4-30.)

No.	Name	Code	Function
1	Main Motor	MM	To drive the OPC belt and the paper transport system.
2	Developing Motor	DM	To drive the toner cartridge and the developing system.
3	Scanner Motor	SCM	To scan the laser beam
4	Ozone Fan Motor	OZFAN	To exhaust the ozone from the printer (charger unit).
5	Heater Fan Motor	HTFAN	To exhaust the heat of the fusing unit.
6	Controller Fan Motor	CTLFAN	To exhaust the heat of the power supply unit and Interface Controller.

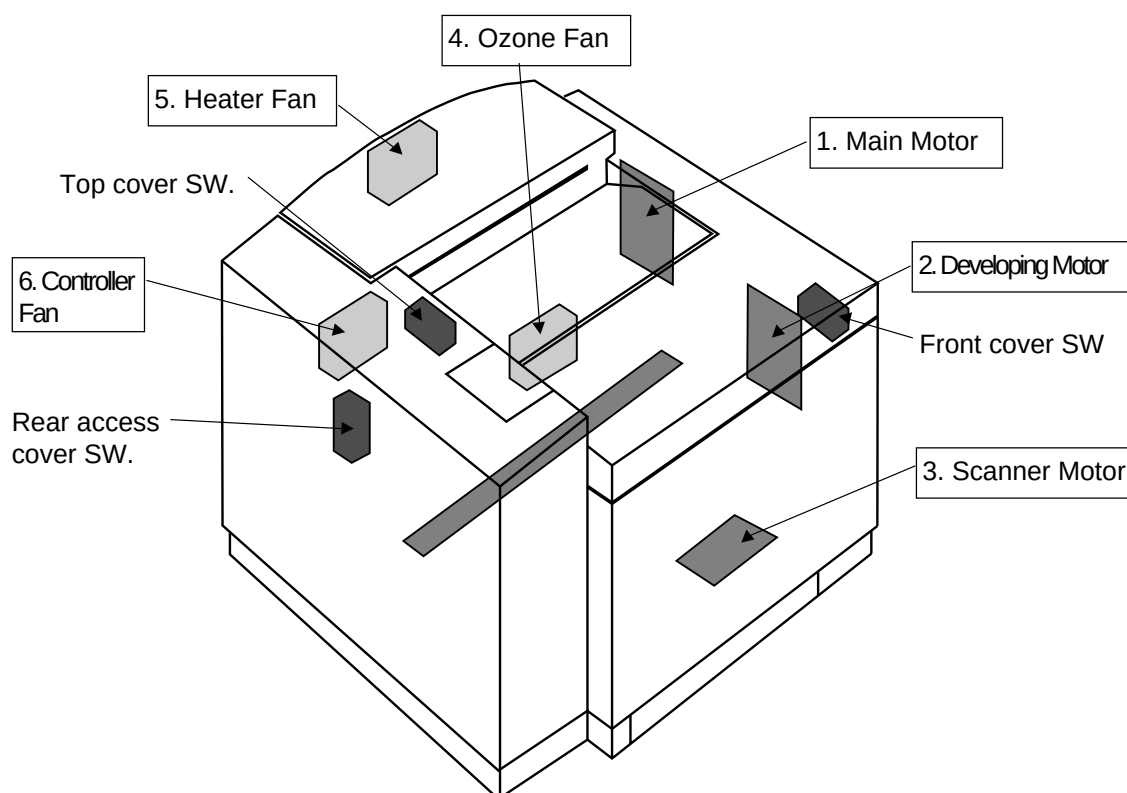


Fig.4-30

(3) Clutches and Solenoids (Refer to Fig.4-31.)

No.	Name	Code	Function
1	Paper Feed Clutch	PCLU	To feed paper by coupling the feeding roller to the main gear unit at the correct timing for paper feeding.
2	Registration Clutch	RECL	To transport paper by coupling the register roller to the main gear unit synchronized with the rotation of the transfer drum.
3	Fuser Clutch	FUCL	To drive the fusing rollers by coupling the fusing unit to the main gear unit.
4	Cleaner Clutch	FBCL	To drive the brush of the drum cleaner by coupling the cleaner clutch to the main gear unit at the correct timing for drum cleaning.
5 ~ 8	Developer Clutch	DVCL (Y,M,C,K)	To drive the magnetic roller of the desired color toner cartridge by coupling that toner cartridge to the developer gear unit during developing.
9	Developer Solenoid Unit	DVSOL	To position the desired color toner cartridge in the developing position during developing.
10	Transfer Solenoid	TRSOL	To make the transfer roller contact the transfer drum surface at the time of the second transfer.
11	Drum Cleaner Solenoid	FBSOL	To make the drum cleaner contact the transfer drum surface at the correct timing for drum cleaning.

Layout of Clutches and Solenoids

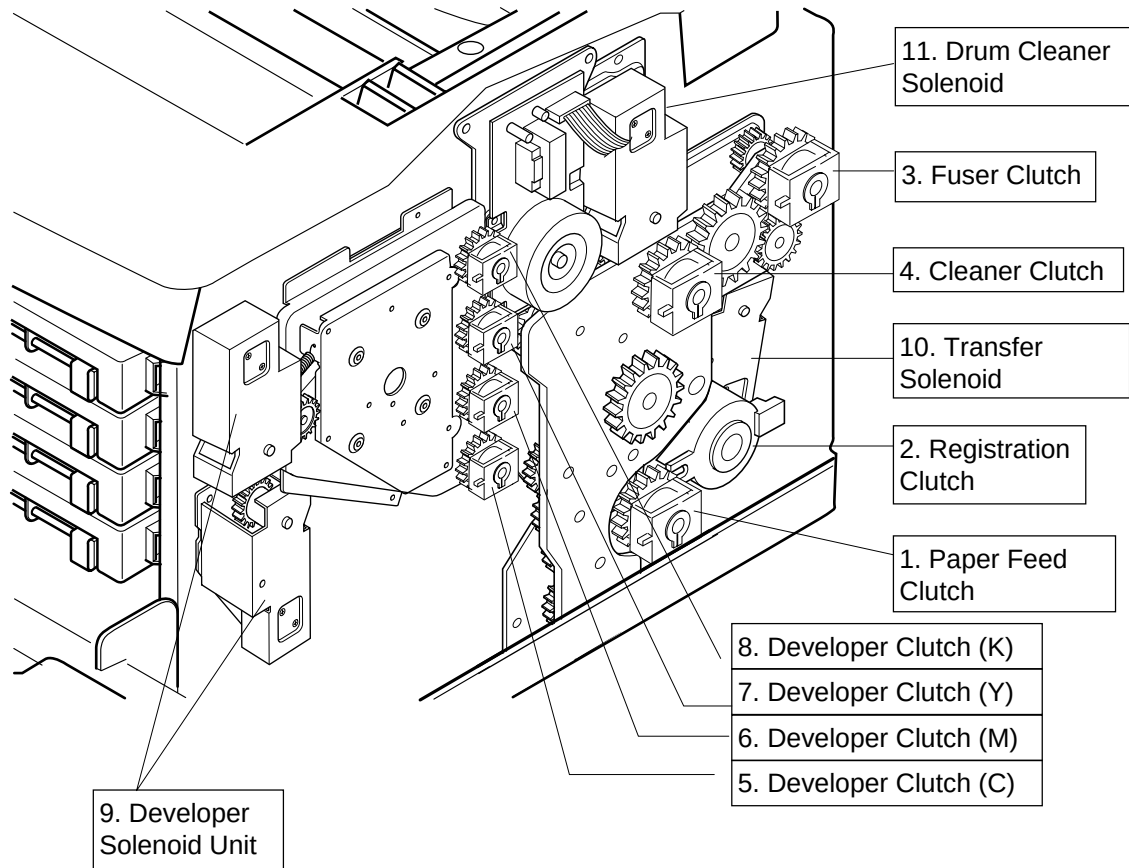


Fig.4-31

(4) Sensors

No.	Name	Code	Function
1	Paper Size Sensor	PSU	Photo sensor to detect the paper size.
2	Paper Feeding Sensor	PT1	Photo sensor to detect when paper is fed from the media cassette.
3	Paper Exit Sensor	PT2	Photo sensor to detect that paper is exited from the paper exit unit.
4	Paper Empty Sensor	PE	Photo sensor to detect if paper is loaded in the media cassette.
5	Oil Sensor	OIL	Photo sensor to detect if the fusing unit oil is empty.
6	OHP Sensor	OHP	Photo sensor to detect if media in the media cassette is an OHP.
7	Drum Jam Sensor	DPJ	Photo sensor to detect if paper is wound around the transfer drum.
8	Drum Encoder Sensor	EN	Photo sensor to detect rotation of the transfer drum.
9	Belt Sensor	PBS	Photo sensor to detect the home position of the OPC belt.
10	Toner Empty Sensor	TPD/TTR	Photo sensor to detect if the toner is empty for each toner cartridge.
11	Waste Toner Sensor	WTS	Photo sensor to detect if the waste toner bottle is full of toner.
12	Developing Photo Sensor	DHP1, DHP2	Photo sensor to detect the position of the toner cartridge.
13	Cleaning Roller Sensor	CRS	Photo sensor to detect if the fuser cleaner is fitted in the fixing unit.
14	Temperature Sensor for Fusing Unit	TH	Thermistor to detect the fuser temperature.

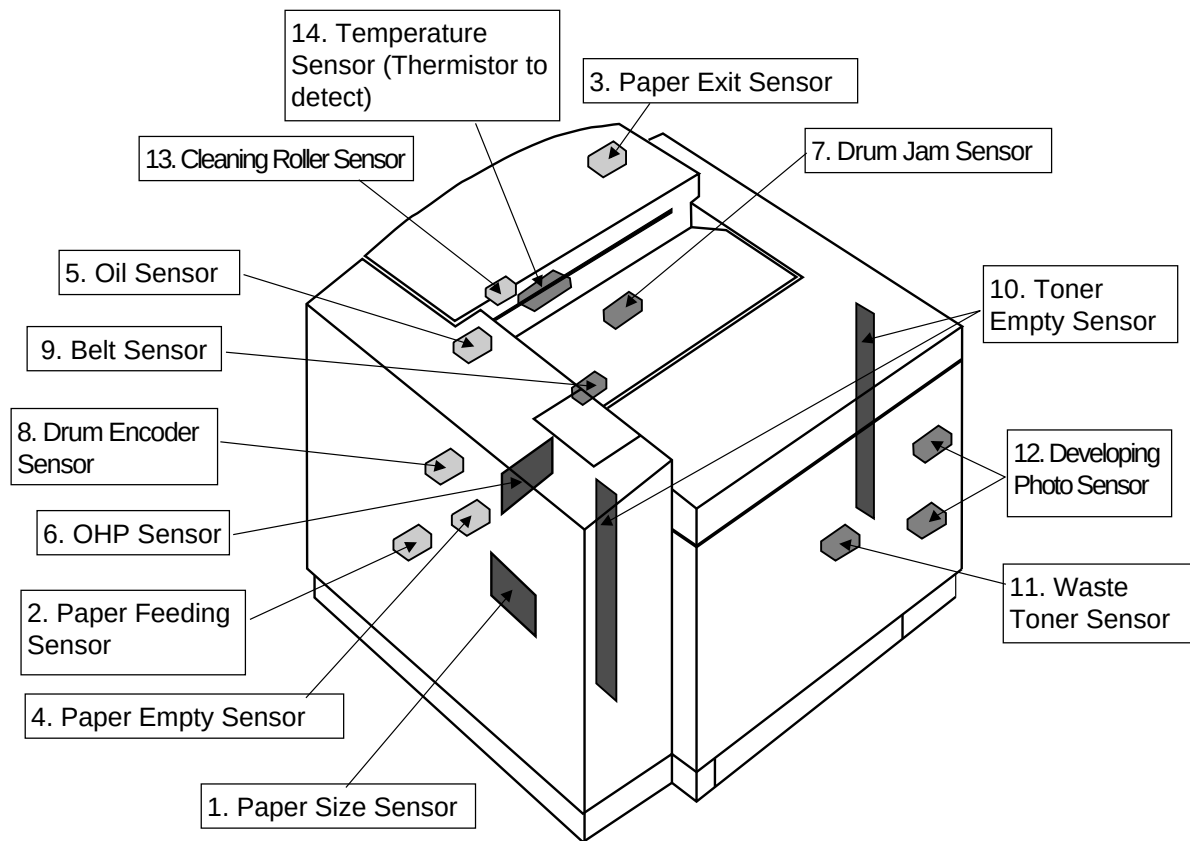


Fig.4-32

2.2 Control System

2.2.1 Control of the Print Process

A Micro CPU mounted on the MCTL PCB controls the print processes.

<Print Sequence Diagram>

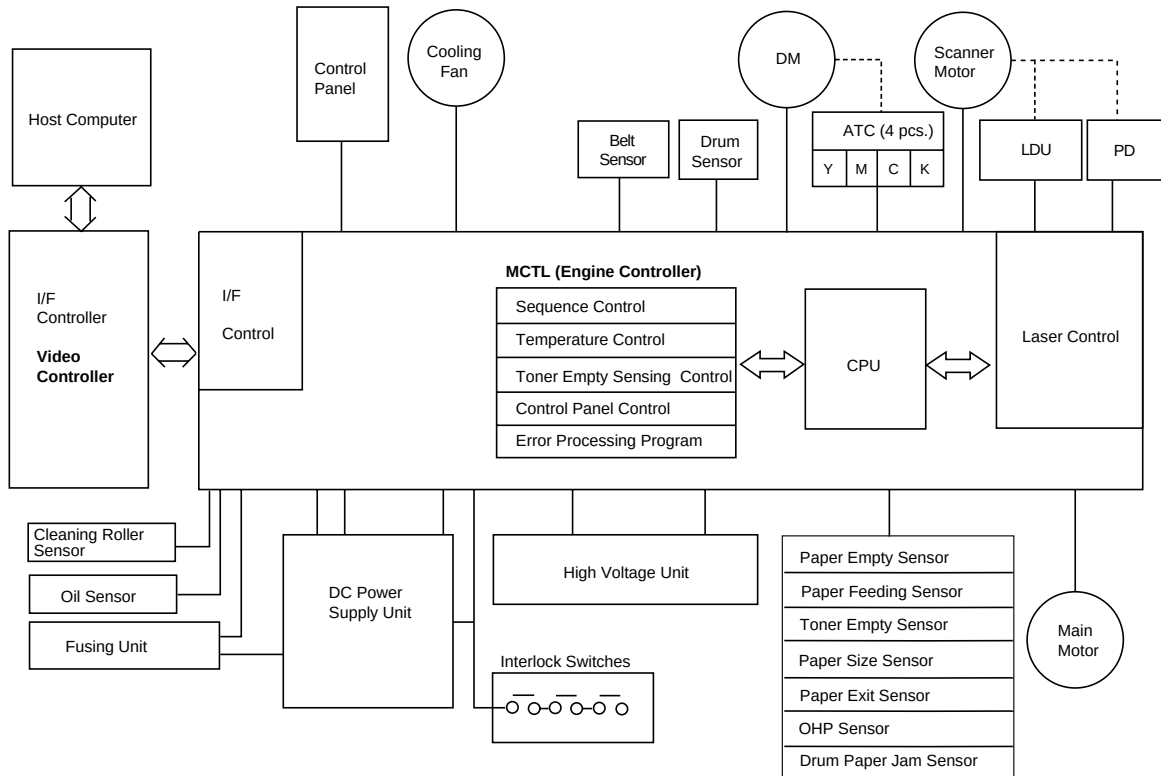


Fig.4-33

(1) Control Block Diagram (Refer to Fig.4-33.)

No.	Name	Function
1	Sequence Control	To control the sequence of printer operations.
2	Temperature Control	To control the temperature of the fixing unit.
3	Toner Empty Sensing Control	To detect the toner empty status of each toner cartridge.
4	Control Panel Control	To control the control panel indications and the operational signals.
5	Error Processing Control	To sense errors occurring in the printer and control the stop procedures.
6	Interface Control	To control the receipt and transmission of the interface signals from the external controller.
7	Laser Control	To control laser scanning and laser power.

(2) Laser Drive Control Circuit

Laser Drive Control Circuit (LDC) consists of the video signal input circuit, laser drive circuit, laser diode, output sensing circuit and output control circuit, as shown in Fig.4-34.

<Operation>

- (1) When the video signal is received, the laser drive control circuit switches the laser diode according to the video signal data.
- (2) The radiated laser beam is sensed by the photo detector (PD) and the signal is fed back to the output control circuit.
- (3) The output control circuit controls the laser output to make the level constant by comparing the laser output with the feed-back value transmitted from the output sensing circuit.
- (4) The scanning laser beam is sensed by the beam detector (PD), then the beam detecting timing (BDT) signal is output.

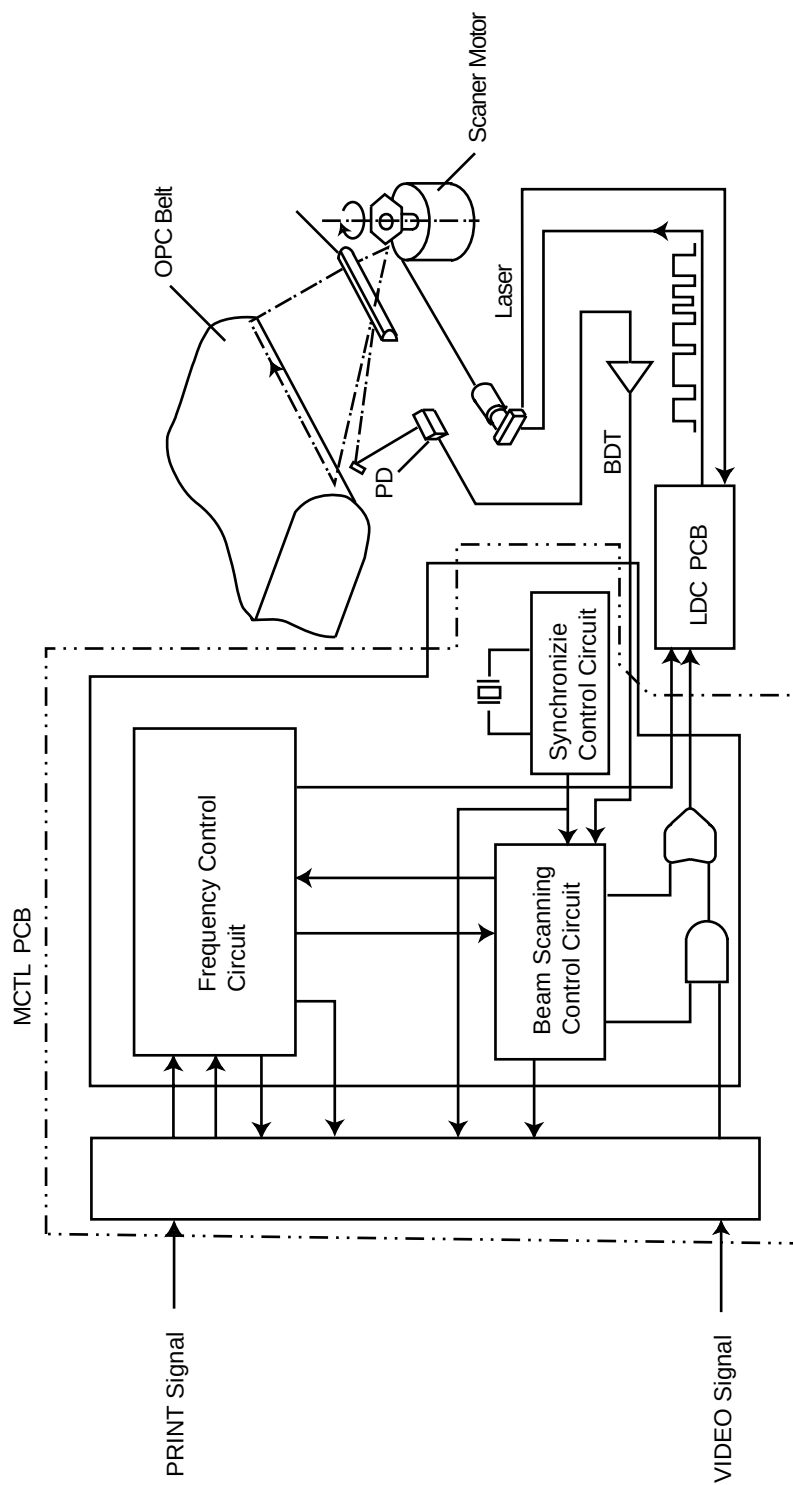


Fig.4-34

(3) Control of the Fusing Temperature

Each roller of the fusing unit is controlled to maintain the appropriate temperature so that toner will be fixed correctly onto the print paper.

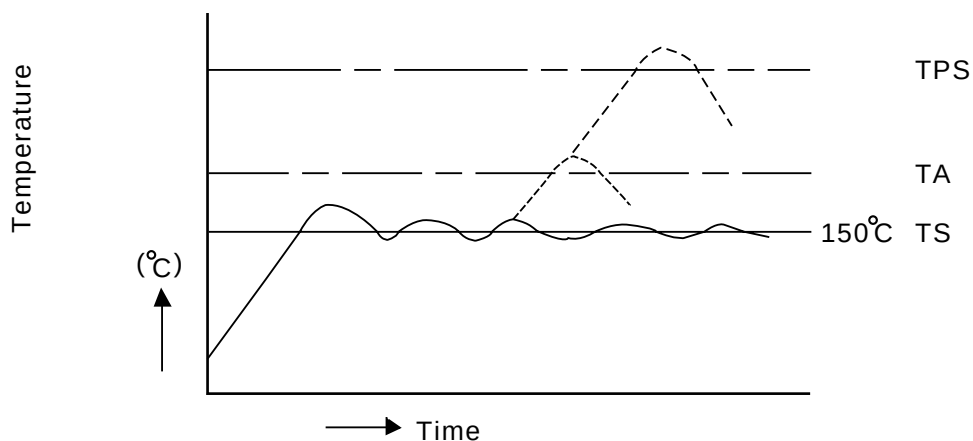
<Basic Structure of Temperature Control (Fig.4-35)>

FLS:	Thyristor to switch the power supply to the heat lamp.
TFU1/TFU2 :	Temperature fuse to shut down the circuit for safety when the temperature becomes too hot within the fixing unit.
TH:	Temperature sensor to detect the surface temperature of the heat roller (HR).
RY:	Relay to prevent further heating when it becomes hotter than the set temperature within the fixing unit.
GA/CPU:	Process circuit to control the temperature signal (micro computer).
CM1:	Sensor circuit for temperature signal (for ACOFF signal).
CM2:	Sensor circuit for temperature signal (for HON signal).
CM3:	Sensor circuit for temperature signal (for processing).
Q:	Sensor circuit for shut-down by the thermistor (for THERR signal).
HR:	Heat lamp for the heat roller.
BR:	Heat lamp for the back-up roller.

< Signal Functions >

HON-N	To turn on/off the heater inside the fuser roller.
ACOFF	To turn off the relay RY1 if overheat occurs.
THERR	To detect the shut-down by the thermistor.
AD	To convert the temperature sensing signal to AD.

<Controlled Temperature and Safety>



<Basic Structure of Fuser Control>

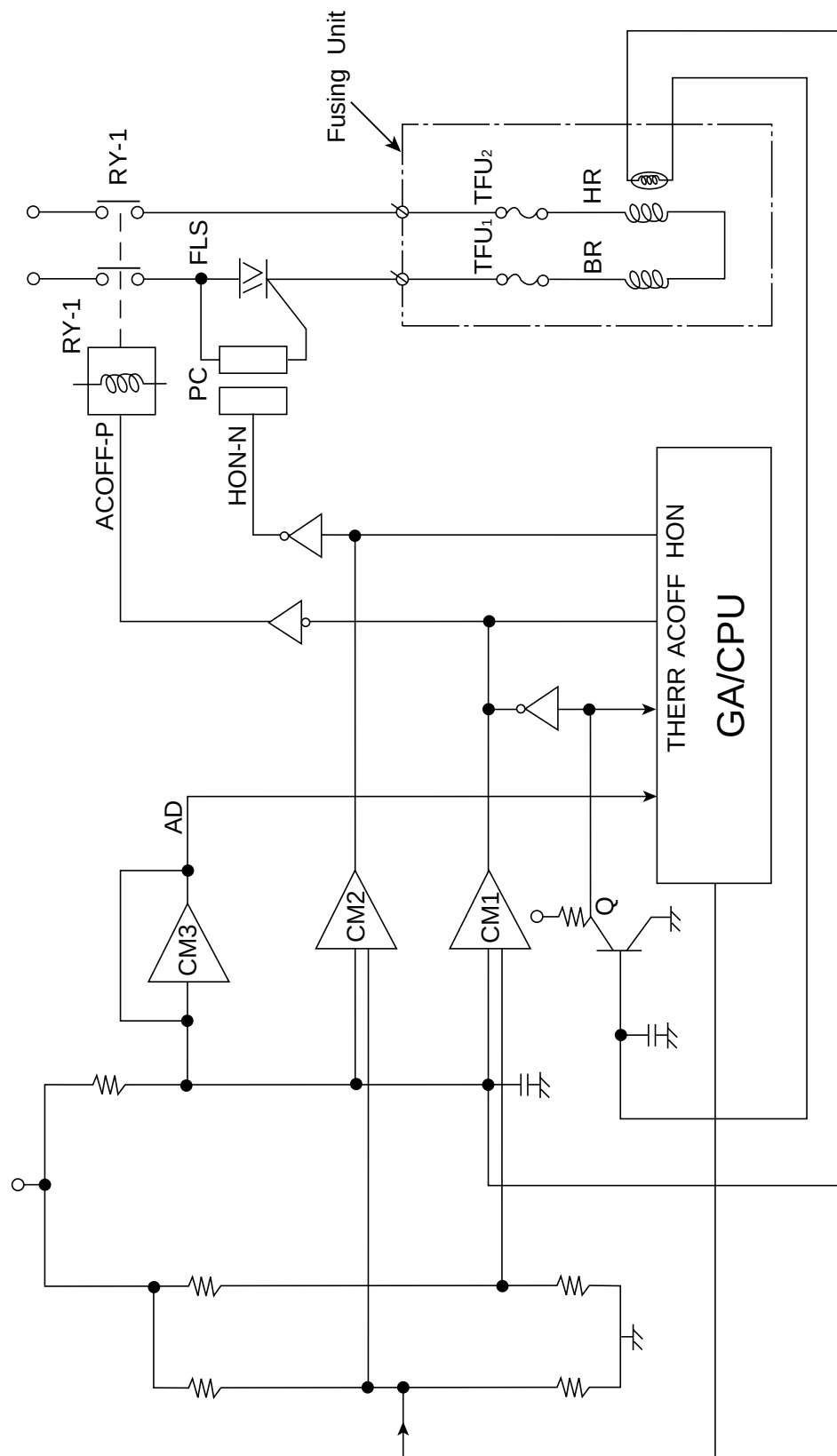


Fig.4-35

- TS: To maintain the temperature for fixing of the toner at 140°C by turning the thyristor on and off.
- TA: Reference temperature (°C) to identify that it is excessively hot inside the fusing unit. When it reaches this point (°C), the relay RY turns off, the power supply to the heat lamp is shut down and the printer stops operating.
- TPS: Limit temperature when the thermal fuse will start to melt and shut down the power supply to the heat lamp if the temperature control circuit should break down. When the thermal fuse melts, the printer will stop operating.

<Safety Control by Temperature Control Signal>

- H0: When the THERR signal is input, the control panel indicates "H0", and the printer will stop operating.
- H2: If the temperature of the fixing unit does not reach the required point "T1" after a certain time, the control panel indicates "H2" and the printer will stop operating.
- H3: If the "Heater On" signal still continues after a certain time, the control panel indicates "H3", and the printer will stop operating.
- H4: If the temperature within the fusing unit becomes unusually hot and when ACOFF signal is input, the control panel indicates "H4", and the printer will stop operating.

(4) Interface Control

<General>

(a) Interface Type

The video interface handles laser image data that corresponds to dots for printing but does not store image data in a buffer. The video data signals of the input image data switches the semiconductor laser diode to form a print image.

(b) Interface Connection

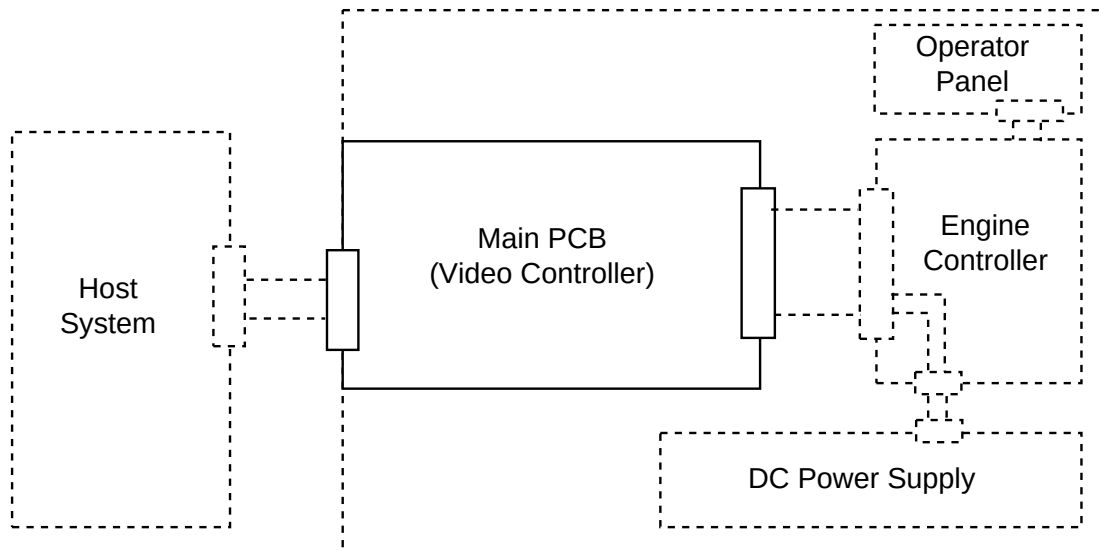
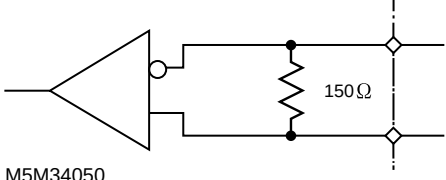
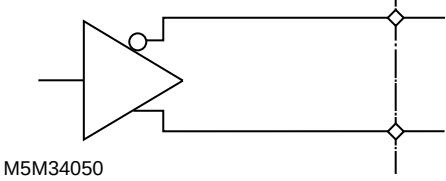
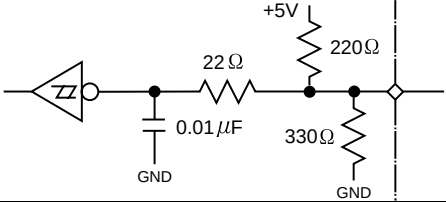
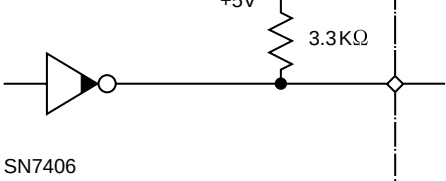


Fig.4-36

The interface connector of this laser printer is connected to the host system as shown in Fig.4-36.

(c) Interface Circuit (Printer side)

Table 4-1: Interface Circuit

No.	Interface Circuit	Signal Name
1	 M5M34050	• VIDEO-N • VIDEO-P
2	 M5M34050	• HSYNC-N • HSYNC-P
3		• PRREQ-N • COMMAND-N • ID1-N • ID2-N
4	 SN7406	• VSYNC-N • IREADY-N • STATUS-N • KEY-STATUS-N

(d) Connector Pin Assignment

The connector in the printer to connect to the controller board is type 128A-064S2B-:13A(DDK) or the equivalent.

Table 4-2: Connector Pin Assignment

Pin No.	Signal Name	Pin No.	Signal Name
1A	PSGND	1B	+5V
2A	PSGND	2B	+5V
3A	PSGND	3B	+5V
4A	PSGND	4B	+5V
5	PSGND	5B	+5V
6A	PSGND	6B	+5V
7A	PSGND	7B	+5V
8A	PSGND	8B	+5V
9A	VIDEO-P	9B	VIDEO-N
10A	RET(GND)	10B	Reserve
11A	HSYNC-P	11B	HSYNC-N
12A	ID2-N	12B	Reserve
13A	RET(GND)	13B	VSYNC-N
14A	RET(GND)	14B	Reserve
15A	RET(GND)	15B	STATUS
16A	RET(GND)	16B	IREADY-N
17A	RET(GND)	17B	Reserve
18A	RET(GND)	18B	COMMAND
19A	RET(GND)	19B	PRREQ-N
20A	RET(GND)	20B	Reserve
21A	ID1-N	21B	Reserve
22A	RET(GND)	22B	KEY_STATUS-N
23A	Reserve	23B	Reserve
24A	Reserve	24B	Reserve
25A	RET(GND)	25B	Reserve
26A	RET(GND)	26B	Reserve
27A	RET(GND)	27B	Reserve
28A	RET(GND)	28B	Reserve
29A	RET(GND)	29B	Reserve
30A	RET(GND)	30B	Reserve
31A	RET(GND)	31B	Reserve
32A	RET(GND)	32B	Reserve

2.3 Main PCB (Video Controller PCB)

2.3.1 Outline

The Main PCB consists of the circuits which perform the following functions;

- Receive the printing data from the computer.
- Convert the received data to the bitmap data such as characters or graphics.
- Control the engine and send the generated bitmap data as a video signal.

The control panel is controlled by communicating with the engine CPU to display LCD messages, light the LEDs and display the button status, etc.

The power for the Main PCB is supplied from the engine through the engine interface connector.

<Main PCB Block Diagram>

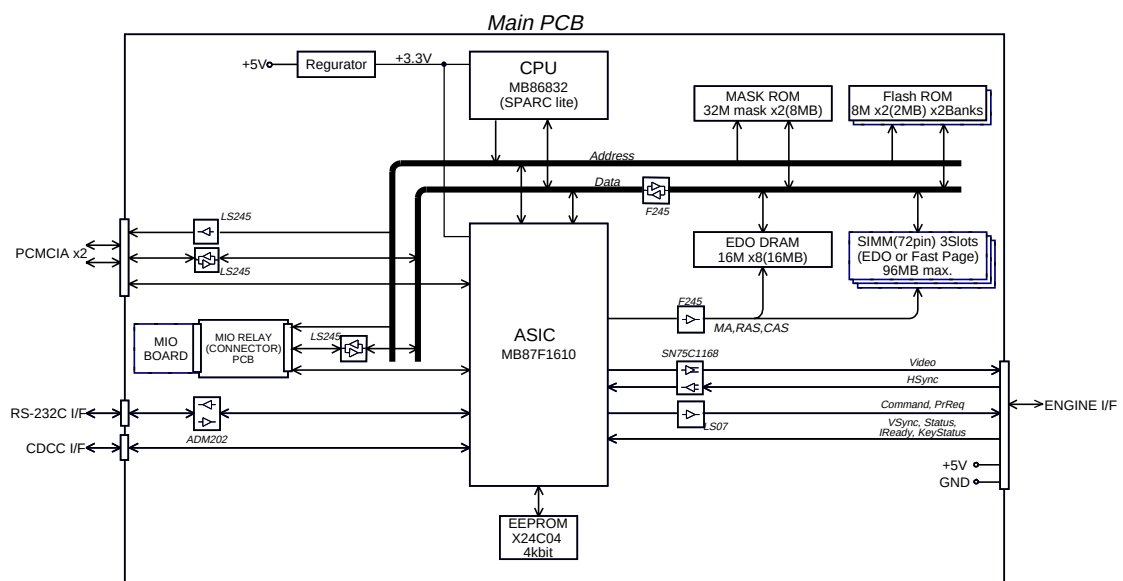


Fig.4-37

2.3.2 Circuit

(1) CPU block

- Model name: MB86832-100 (SPARC lite), RISC CPU manufactured by Fujitsu
- Clock speed: 33.1776MHz (external) / 99.5328MHz (internal)
- Cache memory: 8KB (Command cache) / 8KB (Data cache)
- Appearance: 176-pin QFP

(2) ASIC block

- Model name: MF87F1610 manufactured by Fujitsu
- Appearance: 240-pin QFP
- Functions:
 - * Controls CPU
 - * Controls memory
 - * Controls interrupts
 - * Timer
 - * External interfaces (Centronics, RS-232C, PCMCIA, MIO)
 - * Engine interface (Engine control, Video signal control)
 - * Supports Software

(3) ROM block

The ROM stores the CPU control program and font data. ROMs used are an 8Mbytes masked ROM, and a 2 Mbytes flash ROM which can be rewritten on the board.

<Masked ROM>

- Access time: less than 120nsec.
- Appearance: 42-pin DIP

<Flash ROM>

- Model name: MBM29F800T-120 manufactured Fujitsu
- Access time: less than 120nsec.
- Appearance: 48-pin TSOP

(4) DRAM block

DRAMs are used for the receiving buffer and the working area of the CPU. The DRAM block contains eight 16Mbit EDO RAM, thus having 16MB memory capacity in total.

- Model name: M5M41705CJ-6 manufactured Mitsubishi (or equivalent).
- Type: 16Mbit EDO DRAM (4x4, 164,304bit)
- Access time: less than 80nsec.
- Appearance: 26-pin SOJ

(5) SIMM block

SIMM (Single-Inline-Memory-Module) allows memory extension by up to 96MB.

3 SIMM sockets are available.

The following type of SIMM can be installed into each slot.

- Appearance: 72-pin
- Memory type: Fast page or EDO (automatic selection)
- Access time: less than 80nsec.
- Parity: either Parity or Non-parity can be used
- Memory capacity: 1MB, 2MB, 4MB, 8MB, 16MB, 32MB

<Recommended SIMM type>

- * 1MB: HITACHI HB56D25632B-6A, -7A, -8A
MITSUBISHI MH25632BJ-7, -8
- * 2MB: HITACHI HB56D51232B-6A, -7A, -8A
MITSUBISHI MH51232BJ-7, 8
- * 4MB: HITACHI HB56A132BV-7A, -7AL, -7B, -7BL, -8AL, -8B, -8BL
MITSUBISHI MH1M32ADJ-7, -8
- * 8MB: HITACHI HB56A232BT-7A, -7AL, -7B, -7BL
MITSUBISHI MH1M32ADJ-7, -8
- * 16MB: TOSHIBA THM324000BSG-60, -70, -80
- * 32MB: TOSHIBA THM328020BSG-60, -70, -80

Any combination of SIMM size can be installed into any slot in any order.

Note:

Fast page type and EDO type can be used together although it is not recommended.

(6) External interface block

- Centronics Interface
- RS-232C Interface
- PCMCIA Interface
- MIO Interface

(7) Engine interface block

The engine interface consists of the following signals;

<IREADY>

The signal indicating the engine is ready

<PRREQ>

Signal requesting printing from the controller

<KEY_STATUS>

Signal indicating that a key switch status on the control panel has changed.

<VSYNC>

Vertical synchronization signal for printing

<HSYNC>

Horizontal synchronization signal for printing

<VIDEO>

Video data signal

<COMMAND>

Command signal sent from the controller to the engine

<STATUS>

Status signal sent from the engine to the controller

Fig.4-38 shows the timing of each signal after the power switch is turned on.

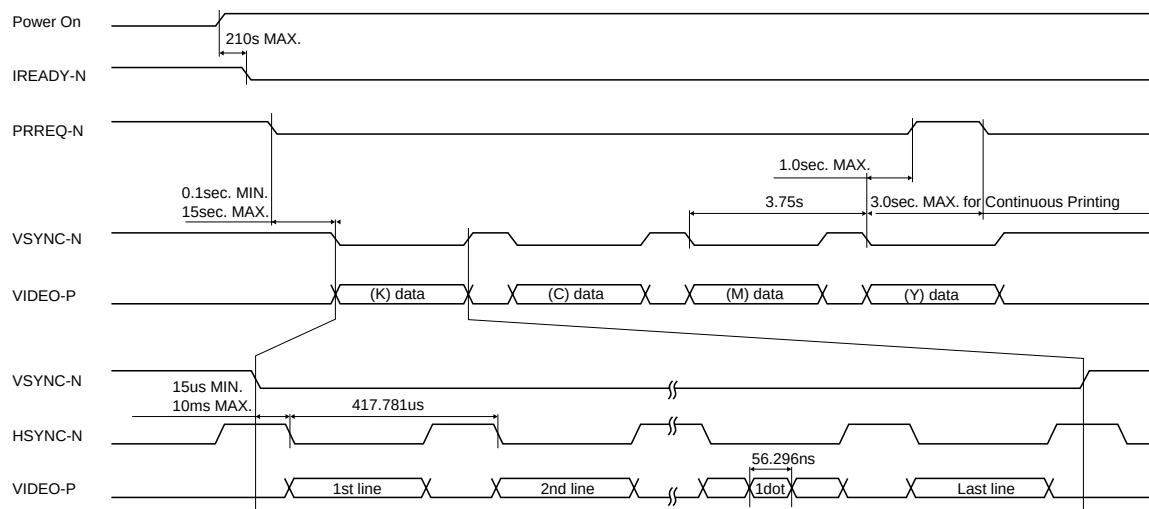


Fig.4-38

The COMMAND signal and STATUS signal are the signals that are used to transfer the data between the controller and the engine, which perform as a half-duplex asynchronous serial communication. Refer to Fig.4-39.

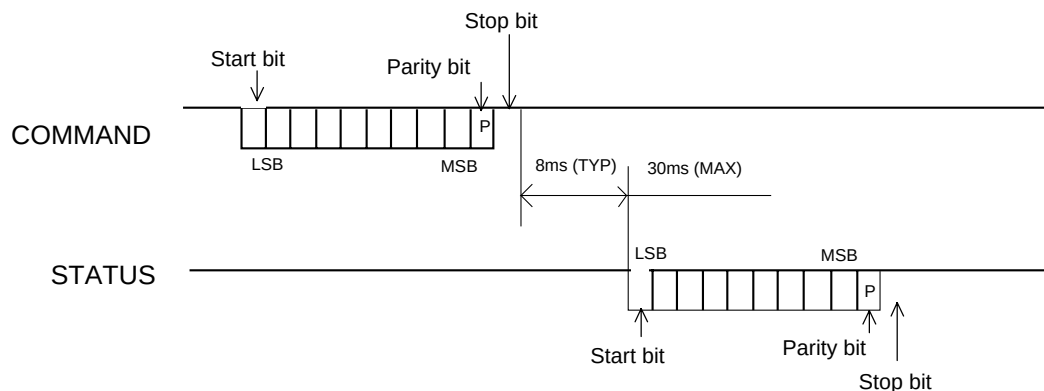


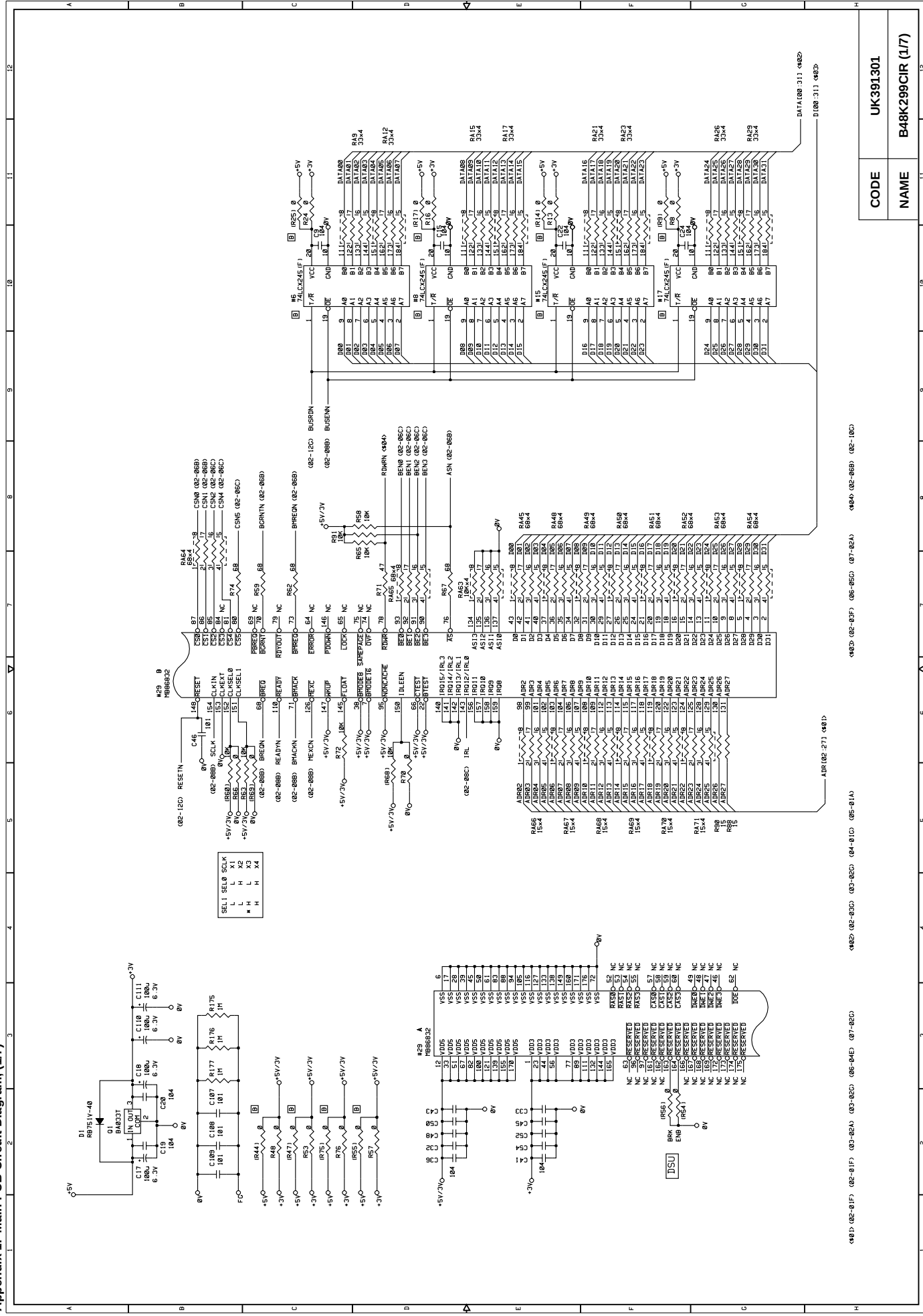
Fig.4-39

Note:

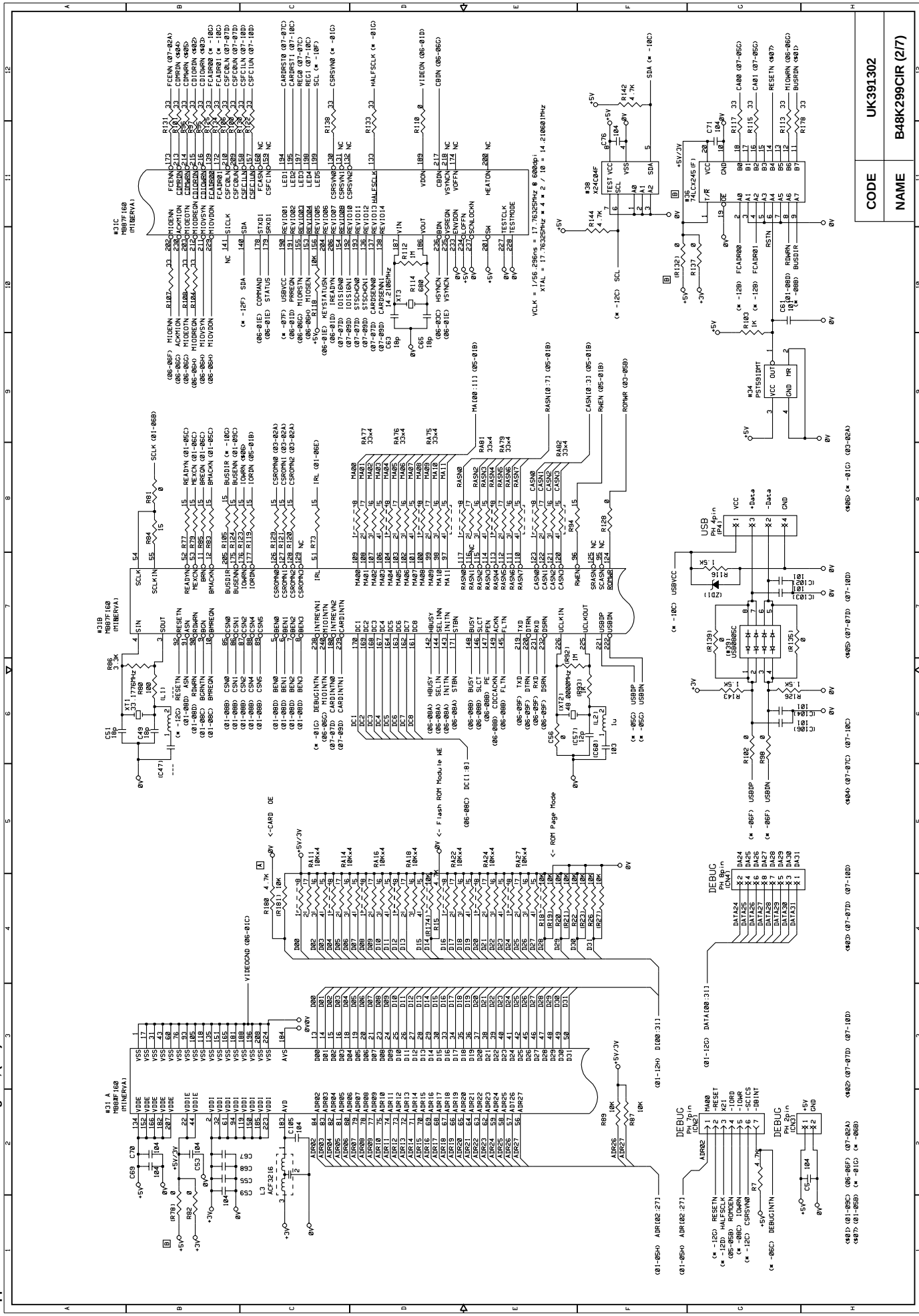
- *Based on "Asynchronous Communication" method.*
- *Command/Status communication must keep the "Handshake Rule".*
- *Baud rate is 9600 bps.*
- *Frame format:*
 - *one (1) start bit,*
 - *eight (8) data bits*
(Start bit side is LSB, Parity bit is MSB),
 - *one (1) odd parity bit,*
 - *one (1) stop bit.*
- *The video controller has to send an "Initialize Command" to the engine controller after power on in order to establish communication.*

The power for the Main PCB is supplied through the engine interface connector.

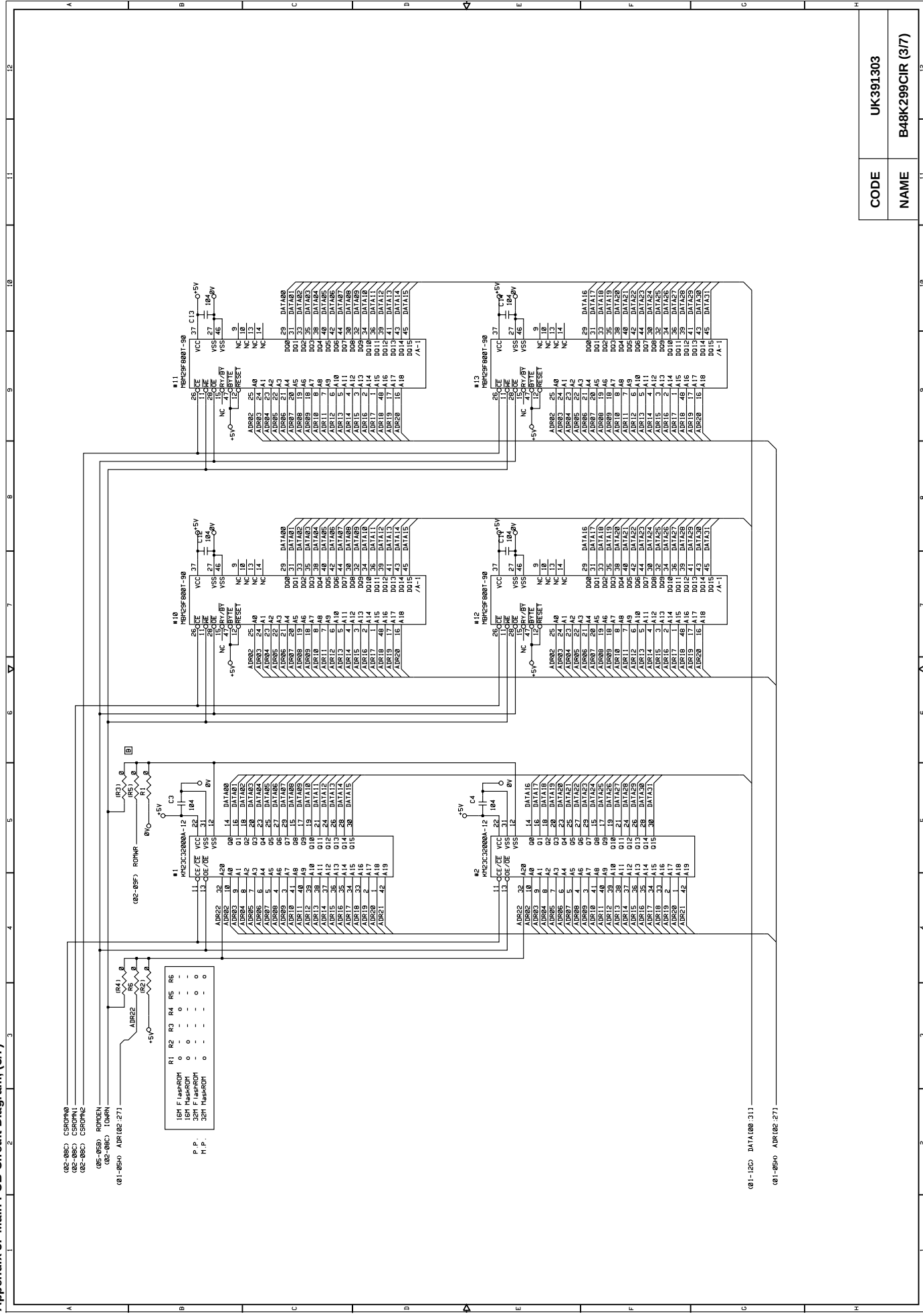
Appendix 1. Main PCB Circuit Diagram, (1/7)



Appendix 2. Main PCB Circuit Diagram, (2/7)

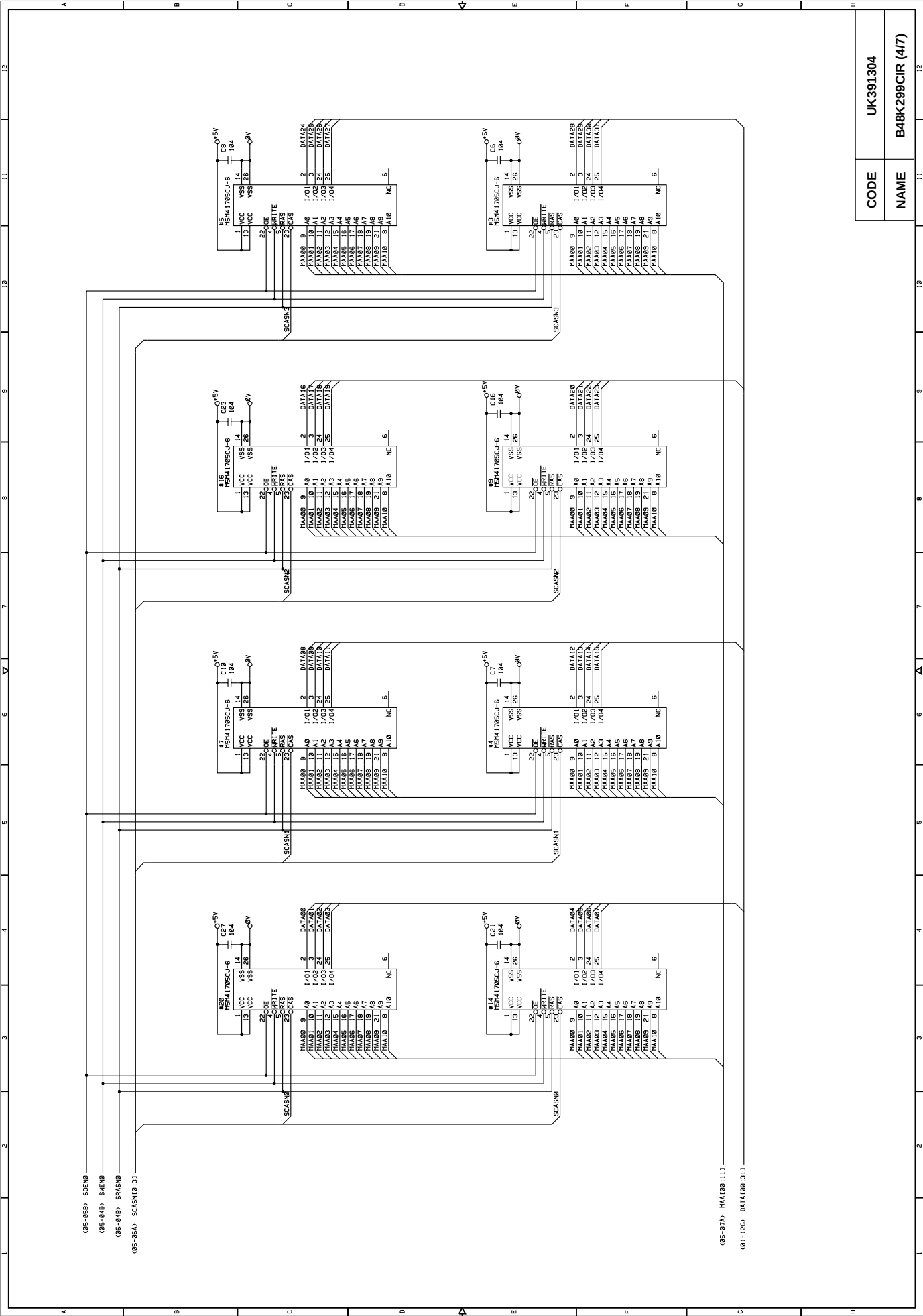


Appendix 3. Main PCB Circuit Diagram, (3/7)

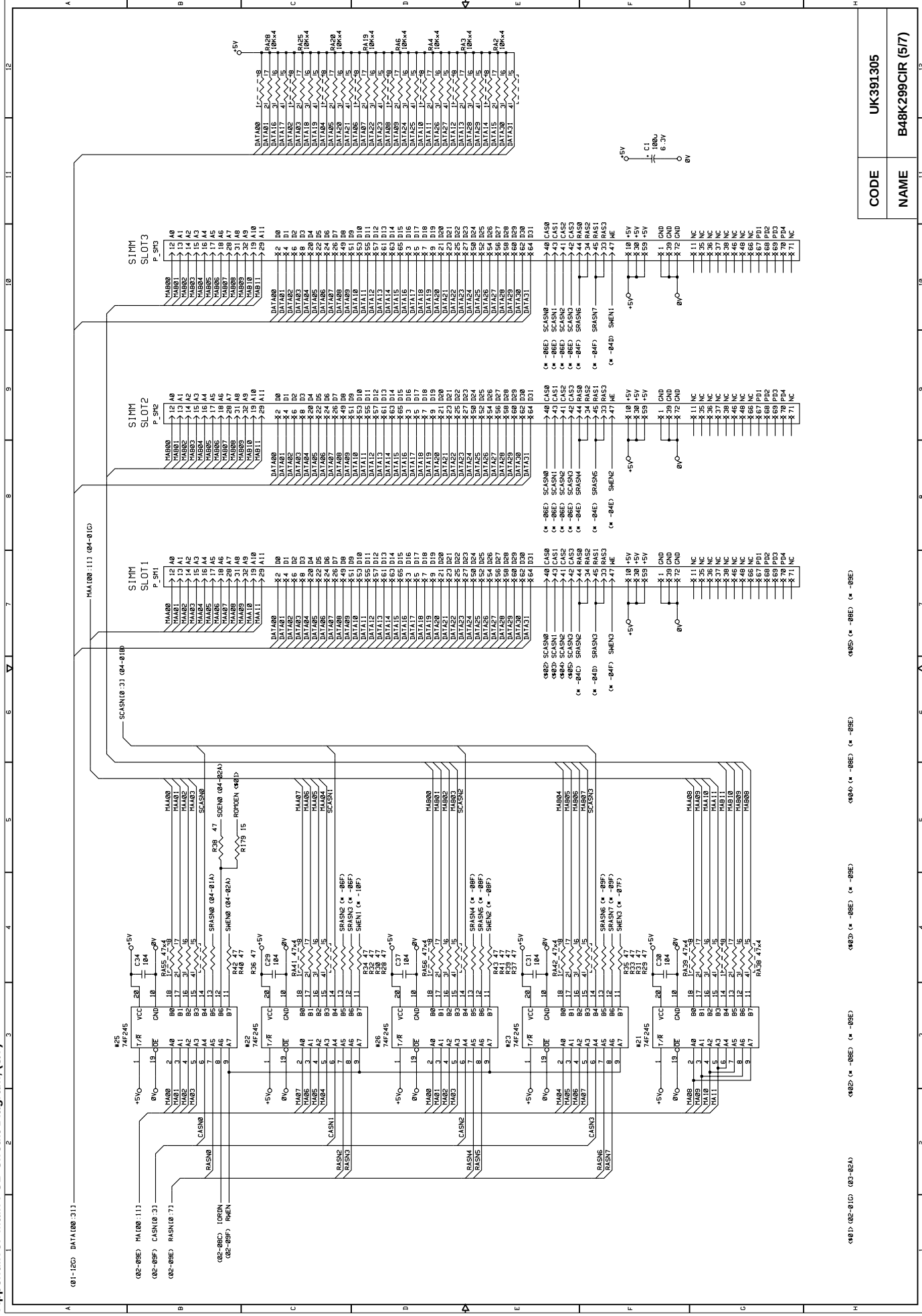


CODE	UK391303
NAME	B48K299CIR (3/7)

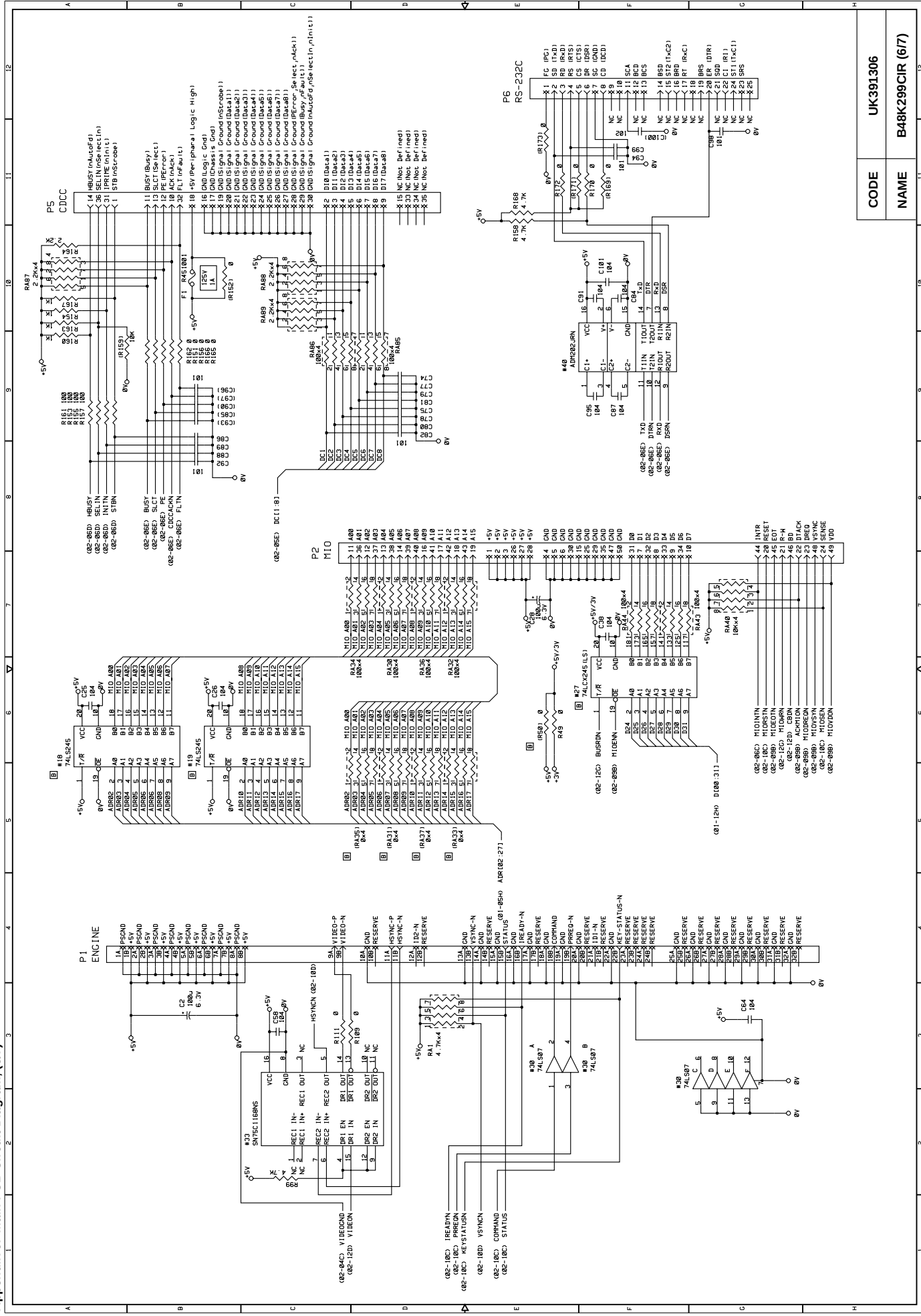
Appendix 4. Main PCB Circuit Diagram. (4/7)



Appendix 5. Main PCB Circuit Diagram, (5/7)

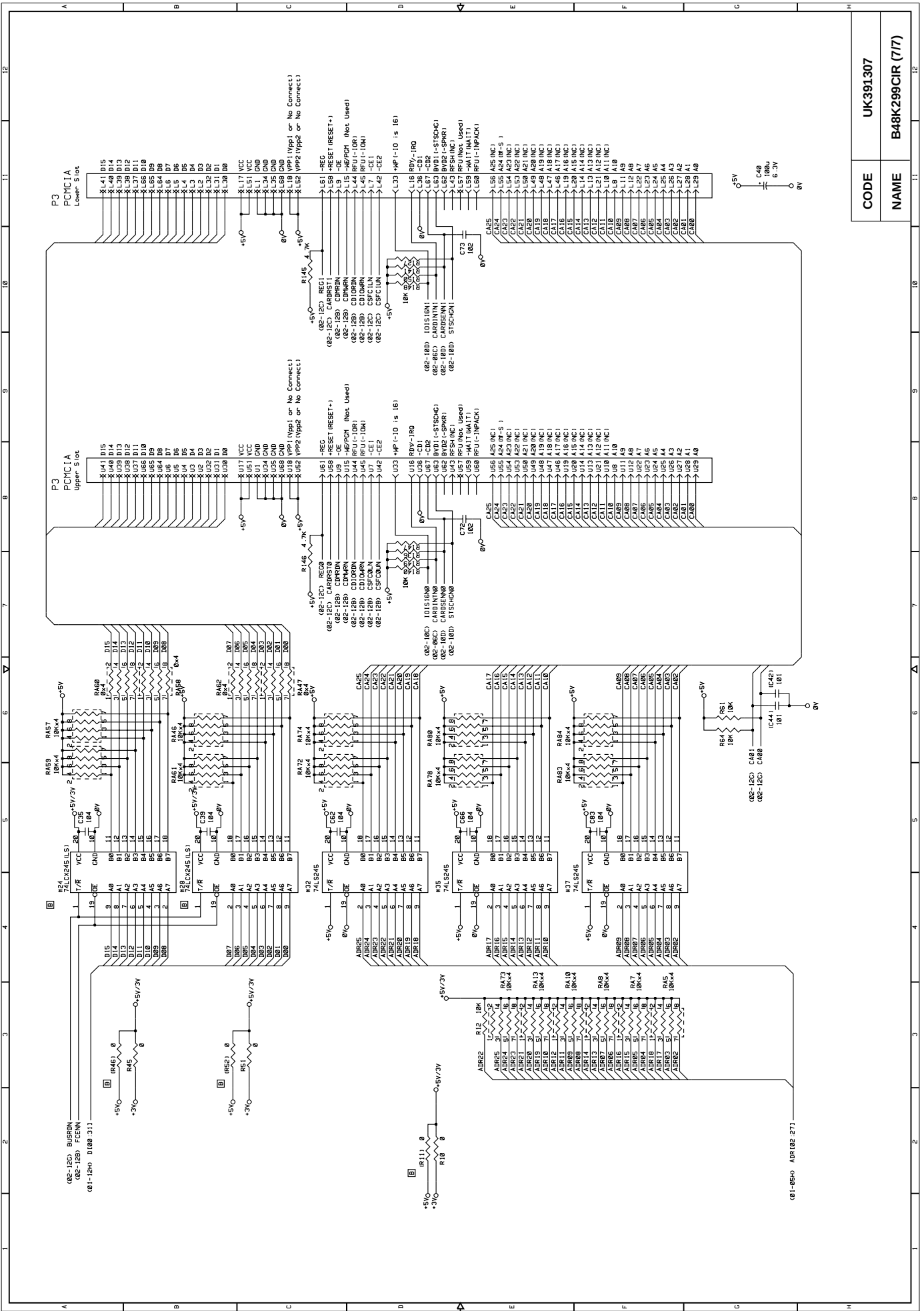


Appendix 6. Main PCB Circuit Diagram, (6/7)



CODE	UK391306	1.1
NAME	B48K299CIR (6/7)	1.2

Appendix 7. Main PCB Circuit Diagram, (7/7)



CODE	NAME
UK391307	B48K299CIR (7/7)

2.4 Power Supply Unit

(1) Outputs and Use

Output Terminal	Rated Output	Use
+5V-1	4.8 ~ 5.3V, 7.5A	For control of the printer
+5V-1R		For control of the laser
+5V-2		For control of the interface
+24V-1	+24V, 4.5A	For control of printer charging.
HP HN	120V, 8A (For USA) 220V, 5A (For Europe)	For connection of the fuser heater (HP). For connection of the fuser heater (HN).

(2) Layout of Connector Pin Assignment

See Fig.4-40 on the following page.

Layout of Connector Pin Assignment - Power Supply Unit -

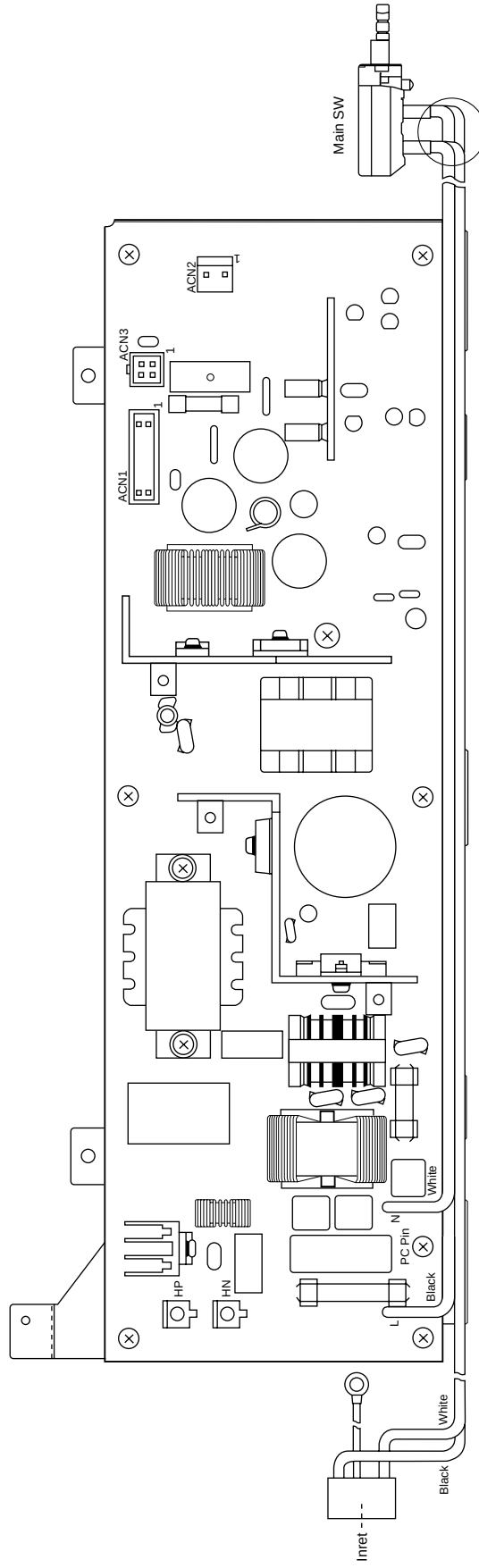


Fig.4-40

(3) Connector Pin Assignment

ACN1

Manufacture: MoLex
Type: 53313-2215

Pin #	Signal Name	Interface
1	+5V-1	+5V-1 Output
2	SGND	Signal Ground (+5V type ground)
3	+5V-1	+5V-1 Output
4	SGND	Signal Ground (+5V type ground)
5	ACSYNC-N	AC Zero-Cross Signal (Open Collector Output)
6	SGND	Signal Ground (+5V type ground)
7	+24V	+24V Output not through Door Switch
8	SGND	Signal Ground (+5V type ground)
9	+5V-1R	+5V through the relay when +24V-1 is shut down,
10	ACOFF-P	AC Forced Shut-Down Signal(Pull-up required)
11	HON-N	Heater On Signal (Pull-up required)
12	Test I2	Terminal for Dielectric Strength Test
13	+24V-1	+24V Output corresponding to Door Switch.
14	Test O2	Terminal for Dielectric Strength Test
15	+24V-1	+24V Output through Door Switch
16	Test I1	Terminal for Dielectric Strength Test
17	+24V-1	+24V Output through Door Switch
18	Test O1	Terminal for Dielectric Strength Test
19	PGND	Power Ground (+24V type ground)
20	PGND	Power Ground (+24V type ground)
21	PGND	Power Ground (+24V type ground)
22	PGND	Power Ground (+24V type ground)

ACN2

Manufacture: MoLex
Type: 5277-02A

Pin #	Signal Name	Interface
1	DSW-O	+24V Output through Door Switch
2	DSW-I	+24V Output through Door Switch

ACN3

Manufacture: MoLex
Type: 5566-04A

Pin #	Signal Name	Interface
1	+5V-2	+5v-2 Output
2	+5V-2	+5v-2 Output
3	SGND	Signal Ground (+5V type ground)
4	SGND	Signal Ground (+5V type ground)

2.5 High Voltage Power Supply Unit

(1) Outputs and Function

No.	Function		Power Supply (P/S)	
			P/S Name	Approx. Output Voltage
1	Charging		CHV(-)	4.6KV
			HVRD6190	619V
2	First Transfer		CBV(-)	200V ~ 900V
3	Developing Bias	Y,M	DBV(-A)	200V ~ 400V
		C,K	DBV(-B)	200V ~ 400V
4	Second Transfer		THV(+)	400V ~ 3,000V
5	Transfer Roller Cleaning		THV(-)	600V
6	Paper Discharging		ACV(~)	4.9KV
			DCV(+)	200V
7	Drum Cleaning		FCBV	200V ~ 1,500V

(2) Layout of Connector Pin Assignment

See Fig.4-41 on the following page.

Layout of Connector Pin Assignment - High Voltage Power Supply Unit -

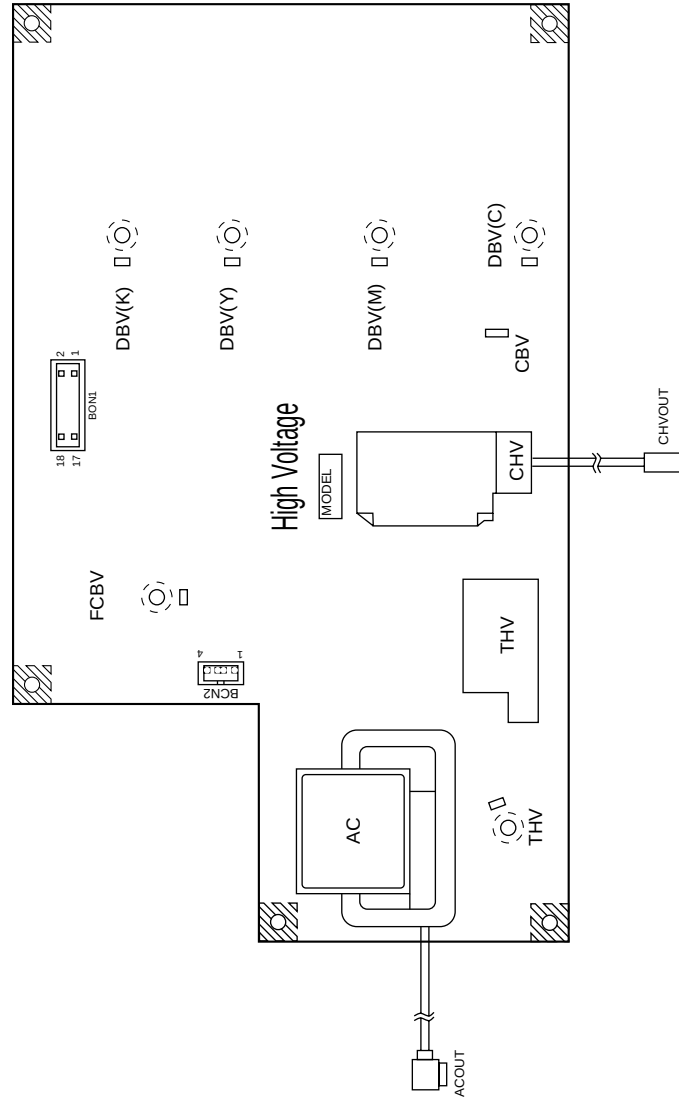


Fig.4-41

(3) Connector Pin Assignment

BCN1

Manufacture: MoLex

Type: 53313-1815

Pin #	Signal Name	Interface
1	+24V-1	+24V-1
2	PGND	PGND
3	FUCHK	Sensor Signal of Fusing Unit Installation.
4	PGND	PGND
5	ACVON-N	AC Output ON Signal
6	PWMON-N	PWM Control ON Signal
7	CHVON-ON	CHV Output ON Signal
8	CHVERR	CHV ERROR Sensor Signal
9	CBVPWM-N	CBV PWM Control Signal
10	THVRON-N	THV ON Signal
11	DBVMPWM-N	DBV PWM Control Signal
12	THVPWM-N	THV PWM Control ON Signal
13	DBVCKPWM-N	CBV PWM Control Signal
14	THV-1	Transfer Voltage Select Signal
15	FCBVPWM-N	FCBV PWM Control Signal
16	TH1	Termistor Temperature Sensor
17	NC	NC
18	TH2	Termistor Temperature Sensor

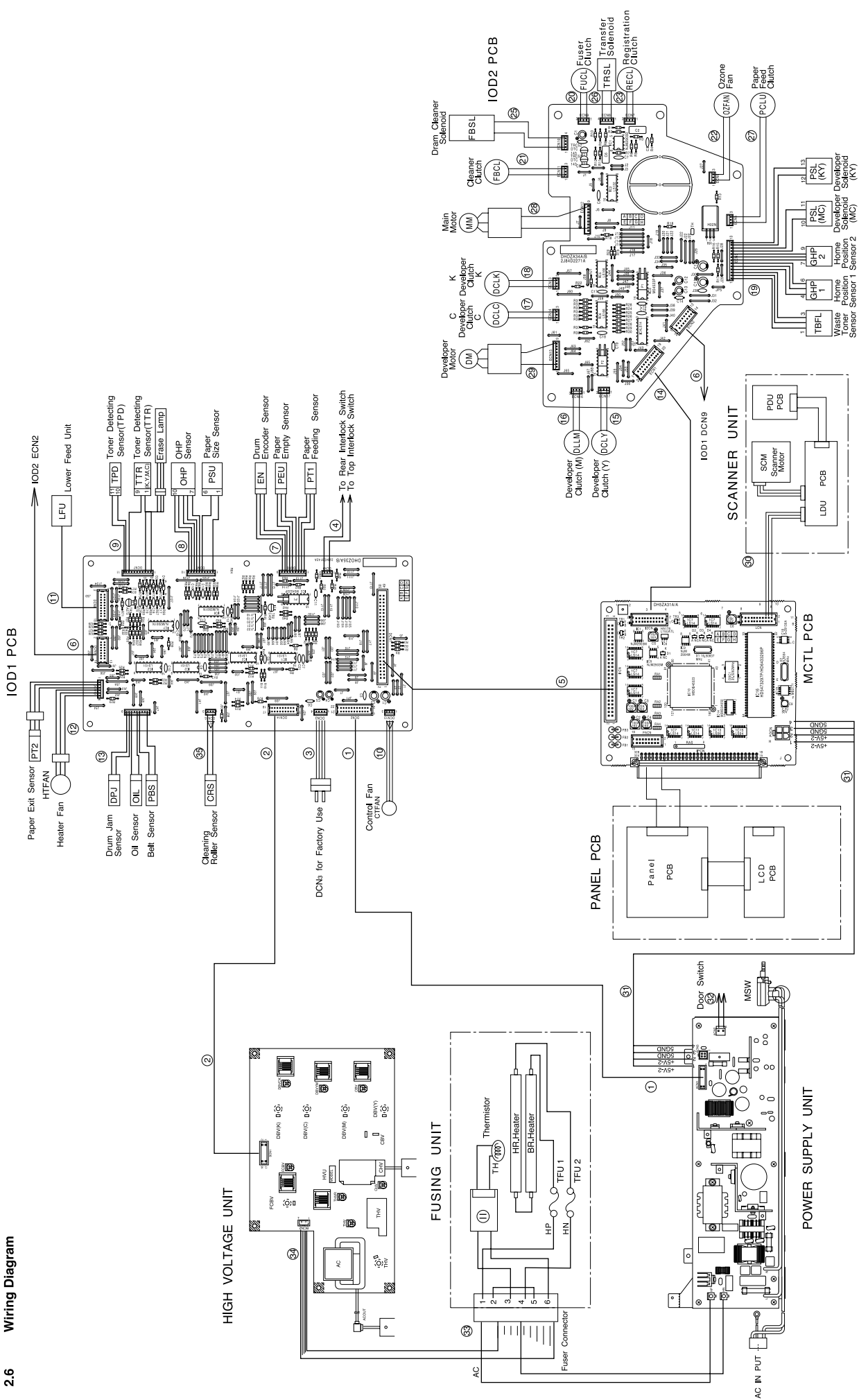
BCN2

Manufacture: MoLex

Type: 53324-0410

Pin #	Signal Name	Interface
1	TH1	Thermistor 1
2	TH2	Thermistor 2
3	FUCHK	Fuser Check
4	FUCHKGND	GND

2.6 Wiring Diagram



(1) DCN2: IOD1 PCB - Power Supply Unit (22 pins)

Pin No.	Signal	Pin No.	Signal
1	+5v - 1	2	SGND
3	+5v - 1	4	SGND
5	ACSYNC - N	6	SGND
7	+24V	8	SGND
9	+5v - 1R	10	ACOFF - P
11	HON - N	12	TESTI2
13	+24V - 1	14	TESTO2
15	+24V - 1	16	TESTI1
17	+24V - 1	18	TESTO1
19	PGND	20	PGND
21	PGND	22	PGND

(2) DCN14: IOD1 PCB - High Voltage Unit (18 pins)

Pin No.	Signal	Pin No.	Signal
1	+24v - 1	2	PGND
3	FUCHK	4	PGND
5	ACVON - N	6	PWMON - N
7	CHVON - N	8	CHVERR
9	CBVPWM - N	10	THVRON - N
11	DBV(MC)PWM - N	12	THVPWM - N
13	DBV(KY)PWM - N	14	THV - I
15	FCBVPWM - N	16	TH1
17	NC	18	TH2

(3) DCN3: For Factory Use Only (4 pins)

Pin No.	Signal
1	TESTO1
2	TESTI1
3	TESTO2
4	TESTI1

(4) DCN4: IOD1 - Interlock Switch

Pin No.	Signal
1	REARDOPEN - P
2	NC
3	TOPDOPEN - P

(5) DCN1: MCTL PCB - IOD1 PCB (50 pins)

Pin No.	Signal	Pin No.	Signal
1	SGND	2	PGND
3	SGND	4	PGND
5	+5v - 1	6	+24v - 1
7	+5v - 1	8	HON - N
9	+5v - 1	10	SGND
11	+5v - 1	12	ACOFF - P
13	I/OAD2	14	+5v - 1R
15	I/OAD1	16	+24v
17	I/OAD0	18	RHSON
19	I/ODATA3	20	AHUMB
21	I/ODATA2	22	ACVON - N
23	I/ODATA1	24	CHVON - N
25	I/ODATA0	26	PWMON - P
27	TMLEDON - P	28	CBVPWM - N
29	LEDON - N	30	DBV(MC)PWM - N
31	TRSLON - P	32	DBV(KY)PWM - N
33	FBSLON - P	34	FCBVPWM - N
35	FBCLON - P	36	THVRON - N
37	SPSLLON - P	38	THVPWM - N
39	PKCLLON - P	40	THV - I
41	ELON - P	42	TH2
43	PBSEN - N	44	TH1
45	HPSEN - N	46	OILLES - P
47	CTFANON - P	48	TMASEN1
49	HTFANON - P	50	TMASEN2

(6) DCN9: IOD1 PCB - IOD2 PCB (14 pins)

Pin No.	Signal
1	FBCLON - P
2	FBSLON - P
3	TRSLON - P
4	OZFANERR
5	+24v - 1
6	+24v - 1
7	+24v - 1
8	PGND
9	PGND
10	PGND
11	+5v - 1
12	SGND
13	PHSON - P
14	AHUMB

(7) DCN5: IOD1 - Upper Paper Empty Sensor

IOD1 - Paper Feeding Sensor

IOD1 - Drum Encoder Sensor

Pin No.	Signal
1	+5v - 1
2	HPSEN - N
3	SGND
4	+5v - 1
5	PEU - P
6	SGND
7	+5v - 1
8	PT1 - N
9	SGND

(8) DCN6: IOD1 - Upper Paper Size Sensor

IOD1 - OHP Sensor

Pin No.	Signal
1	+5v - 1
2	PSU1
3	PSU2
4	PSU3
5	PSU4
6	SGND
7	+5v - 1
8	OHPSENU
9	SGND
10	SGND

(9) DCN7: IOD1 PCB - Toner Empty Sensor(Y,M,C,K)

Pin No.	Signal
1	TLES(K) - P
2	TLES(Y) - P
3	TLES(M) - P
4	TLES(C) - P
5	TLES - G
6	SGND
7	LEDON - P
8	TLESCHK
9	SGND
10	+24v - 1
11	ELON - N

(10) DCN13: IOD1 PCB - Controller Fan

Pin No.	Signal
1	CTFANON - P
2	PGND
3	CTFANERR

(11) DCN8: IOD1 - Lower Feeder Unit

Pin No.	Signal
1	+24v - 1
2	+24v - 1
3	PKCLLON - N
4	SPSLLON - N
5	+5v - 1
6	+5v - 1
7	PEL - P
8	PSL1
9	SGND
10	PSL2
11	+5v - 1
12	PSL3
13	OHPSENL
14	PSL4
15	SGND
16	SGND
17	OCST - N
18	NC

(12) DCN10: IOD1 PCB - Paper Exit Sensor

IOD1 PCB - Heater Fan

Pin No.	Signal
1	+5v - 1
2	PT2 - N
3	SGND
4	HTFANON - P
5	PGND
6	HTFANERR

(13) DCN11: IOD1 PCB - Belt Sensor

IOD1 PCB - Oil Sensor

IOD1 PCB - Drum Paper Jam Sensor

Pin No.	Signal
1	PBSEN - N
2	+5v - 1
3	SGND
4	OILLES - P
5	+5v - 1
6	SGND
7	E4SEN - N
8	+5v - 1
9	SGND

(14) ECN1: MCTL PCB - IOD1 (20 pins)

Pin No.	Signal
1	DCL(C)ON - P
2	DCL(M)ON - P
3	DCL(Y)ON - P
4	DCL(K)ON - P
5	PSL(KY)ON - P
6	PSL(MC)ON - P
7	MMCLK
8	MMON - N
9	MMREV - N
10	MMENC
11	DMCLK
12	DMON - N
13	ISCK
14	IDATA
15	ILOAD
16	PKCLUON - P
17	RECLON - P
18	SPSLUON - P
19	OZFANON - P
20	FUCLON - P

(15) ECN17: IOD2 - Developer Clutch (Y)

Pin No.	Signal
1	+24v - 1
2	NC
3	DCL(Y)ON - N

(16) ECN16: IOD2 - Developer Clutch (M)

Pin No.	Signal
1	+24v - 1
2	NC
3	DCL(M)ON - N

(17) ECN14: IOD2 - Developer Clutch (C)

Pin No.	Signal
1	+24v - 1
2	NC
3	DCL(C)ON - N

(18) ECN13: IOD2 - Developer Clutch (K)

Pin No.	Signal
1	+24v - 1
2	NC
3	DCL(K)ON - N

(19) ECN3: IOD2 - Developer Solenoid

Pin No.	Signal
1	+5v - 1
2	TBFL2 - N
3	SGND
4	+5v - 1
5	GHPSEN1
6	SGND
7	+5v - 1
8	GHPSEN2
9	SGND
10	PSL(YM)
11	+24v - 1
12	+24v - 1
13	PSL(KC)

(20) ECN9: IOD2 - Fuser Clutch

Pin No.	Signal
1	+24v - 1
2	NC
3	FUCLON - N

(21) ECN11: IOD2 - Cleaner Clutch

Pin No.	Signal
1	+24v - 1
2	NC
3	FBCLON - N

(22) ECN6: IOD2 - Ozone Fan

Pin No.	Signal
1	OZFANON - P
2	PGND
3	OZFANERR

(23) ECN7: IOD2 - Registration Clutch

Pin No.	Signal
1	+24v - 1
2	NC
3	NC
4	RECLON - N

(25) ECN10: IOD2 - Cleaner Solenoid

Pin No.	Signal
1	+24v - 1
2	NC
3	NC
4	FBSLON - N

(26) ECN8: IOD2 - Transfer Solenoid

Pin No.	Signal
1	+24v - 1
2	NC
3	NC
4	TRSLON - N

(27) ECN5: IOD2 - Paper Feeding Clutch

Pin No.	Signal
1	+24v - 1
2	NC
3	PKCLUON - N

(28) ECN12: IOD2 - Main Motor

Pin No.	Signal
1	MMRDY - N
2	MMON - N
3	MMCLK
4	PGND
5	+24v - 1
6	SGND
7	+5v - 1
8	MMENC
9	MMREV - N

(29) ECN15: IOD2 - Developer Motor

Pin No.	Signal
1	DMRDY - N
2	DMON - N
3	DMCLK
4	PGND
5	+24v - 1
6	SGND
7	+5v - 1
8	NC
9	DMREV - N

(31) ACN3: Power Supply Unit - MCTL

Pin No.	Signal
1	+5v - 2
2	+5v - 2
3	SGND

(32) ACN2: Power Supply Unit - Interlock Switch (2 pins)

Pin No.	Signal
1	DSW - O
2	DSW - I

(33) Fusing Unit - MCTL PCB POCN(6 pins)

Pin No.	Signal
1	ACOUT - HP
2	FUCHKGND
3	TH2
4	ACOUT - HN
5	FUCHK
6	TH1

(34) BCN2: High Voltage Unit - Fusing Unit(4 pins)

Pin No.	Signal
1	TH1
2	TH2
3	FUCHK
4	FUCHKGND

(35) DCN15: IOD1 - Cleaning Roller Sensor

Pin No.	Signal
1	+5v - 1
2	CLROL - N
3	SGND

(30) LCN: MCTL - LDU (20 pins)

Pin No.	Signal
1	+5v - R
2	LDREF2
3	LDREF3
4	+5v - 1
5	LDREF1
6	LDREF0
7	LREADY
8	LCONT2
9	LCONT1
10	VIDEO - P
11	VIDEO - N
12	BDT - P
13	BDT - N
14	SGND
15	SGND
16	SCMCLK
17	SCMRDY - N
18	SCMON - N
19	PGND
20	+24v - 1

CHAPTER V

CONTROL PANEL OPERATION

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CHAPTER V CONTROL PANEL OPERATION

1. PANEL LAYOUT

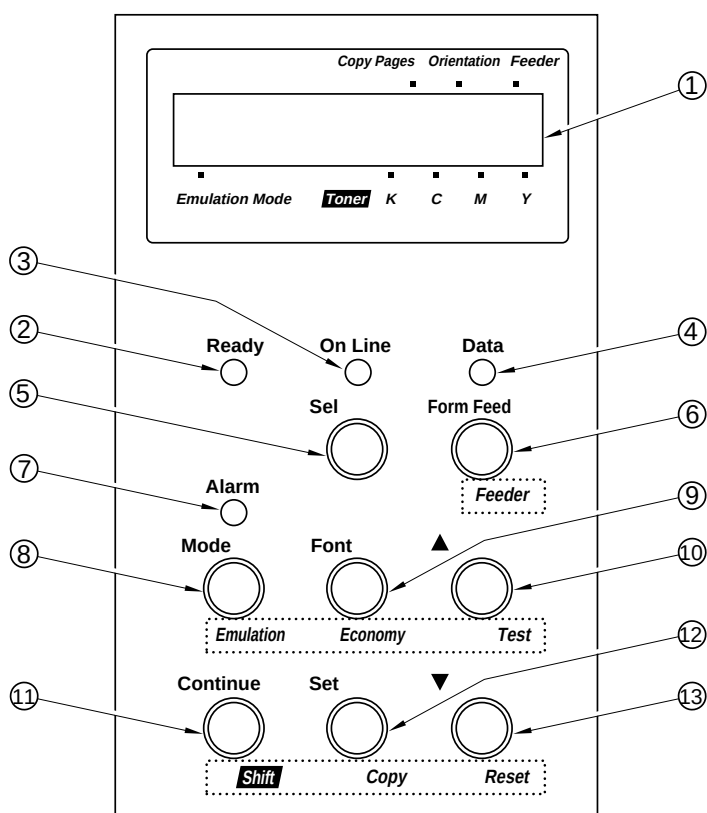


Fig.5-1

No.	LED / Button Name
1	LCD: 16 character by 2 lines
2	Ready LED
3	On Line LED
4	Data LED
5	Sel button
6	Form Feed / Feeder button
7	Alarm LED
8	Mode / Emulation button
9	Font / Economy button
10	▲ / Test button
11	Continue / Shift button
12	Set / Copy button
13	▼ / Reset button

2. VIDEO CONTROLLER MODE

This section describes the operation and maintenance functions in the Video Controller Mode.

2.1 Configuration of Operational Mode

This printer has various functions as set out in Table 5-1 for users to easily perform general test printing, general settings and some maintenance work.

- (1) Normal Mode: After turning on the printer, the printer goes into Normal Mode. This mode provides normal printing for the end user. The following section describes the toner save mode and the power save mode. For other modes, refer to the user's guide.
- (2) Line Test Mode: This mode provides a self-test for each function in the Video Controller Mode mainly for use when replacing the main (video controller) PCB.
Whenever the video controller is replaced, these checks should be carried out.
This mode provides performance tests for the engine LCD, control panel buttons and various sensors.
- (3) DRAM Test Mode: This mode is provided to test the memory and any installed SIMM(s) on the main (video controller) PCB.
- (4) Program Version Display Mode
This mode displays the firmware version of the video controller and engine controller.
- (5) Test Print Mode: This mode allows you to print the selected test pattern continuously in order to check the engine.
- (6) NVRAM Reset Mode:
This mode forces the NVRAM values of the video controller to be reset to the factory settings.
When replacing the main PCB, the NVRAM value is automatically reset to the factory setting. However, this mode is effective when the video controller does not work due to errors.

Table 5-1

Power on	→	Normal Mode
 + Power on	→	Line Test Mode
 + Power on	→	DRAM Test Mode
 + Power on	→	Program Version Display Mode
 +  Power on	→	Test Print Mode
 + Power on	→	NVRAM Reset Mode

2.2 Toner Save Mode / Power Save Mode

The toner save mode allows you to reduce the printer running cost and improve the life expectancy of the toner cartridge.

The power save mode allows you to save electricity when the printer is on but not being used.

<Procedure>

- 1) Turn on the printer to enter normal mode.
- 2) Press the Shift and Economy buttons at the same time.
- 3) The display shows the menu as follows;

ECONOMY TONER SAVE MODE

- 4) Select the toner save mode or the power save mode using the scroll buttons or by pressing the Shift and Economy buttons again. Then, press the Set button.
- 5) Select the setting (ON/OFF) with the scroll buttons, then press the Set button.
- 6) When turning on the power save mode, the display shows the next sub-setting menu as follows;

POWER SAVE=ON TIME OUT=30m

- 7) You need to set the time out from 1 to 99 minutes with the scroll buttons. (The factory setting is 30 minutes.)

Note:

The time out is the duration after which the fusing unit of the print engine is turned off to save power.

2.3 Line Test Mode

This mode tests the following items;

Item	Self-test Description
LCD TEST	Displays the checker pattern
LED TEST	Checks that all LEDs are on / off.
SW TEST	Checks that all buttons work correctly.
SENSOR TEST	Checks that all sensors work correctly.
RAM SIZE TEST	Displays the NVRAM size
TRAY 1 CHECK	Displays the paper size of the upper cassette (Tray 1).
TRAY 2 CHECK	Displays the paper size of the lower cassette (Tray 2).
FLASH CARD1 R/W TEST	Check/delete/import/export (read/write) on Card 1 ID.
FLASH CARD2 R/W TEST	Check/delete/import/export (read/write) on Card 2 ID.
MIO TEST	Checks that the installed MIO card is initialized.

<Procedure>

Note:

If any errors occur during the following procedures, an error message appears. By pressing the Continue button, it is possible to proceed with the tests.

- 1) Install flash memory cards 1 & 2 and an MIO card into the printer.
- 2) Turn on the power while holding down the ▲ button. When the message below appears, release the ▲ button.

LINE TEST

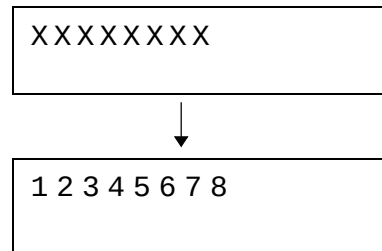
- 3) Press the Set button to make the printer start the self-test.
- 4) Press the Continue button to implement the LCD TEST.
Check that the LCDs are all displayed correctly and none of the dots have dropped out.



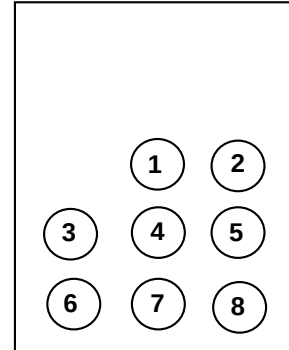
Also, check that the LEDs are all on.

5) Press the Continue button to implement SW TEST.

The LEDs are all off, and then the following display appears. Check that the corresponding number appears when pressing the buttons on the control panel.

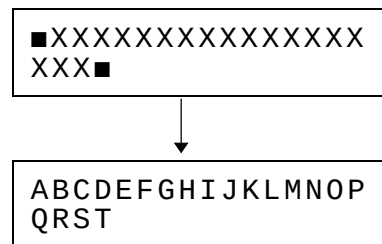


Corresponding button number on the panel



6) Press the Continue button to implement the SENSOR TEST.

The LEDs are all off, then the following display appears.



Corresponding sensor code

A:	Front Cover
B:	Top Cover
C:	Rear Cover (Transfer Unit)
D:	Toner Cartridge (K)
E:	Toner Cartridge (C)
F:	Toner Cartridge (M)
G:	Toner Cartridge (Y)
H:	OPC Belt Cartridge
I:	Fuser Cleaner
J:	Fusing Unit
K:	Waste Toner
L:	Upper Cassette
M:	Lower Cassette
N:	Upper Cassette Paper
O:	Lower Cassette Paper
P:	Upper Cassette Media
Q:	Lower Cassette Media
R:	Paper Sensor 1
S:	Paper Sensor 2
T:	Paper Sensor 3

Check that the display of each sensor is changed to the corresponding character.

<Ex. Toner cartridge (K)>

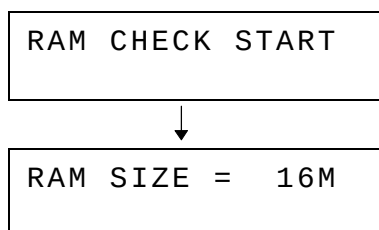
■ → (Open the cover) → (Remove the toner cartridge.) → (Close the cover **and wait for 20 seconds.**) → (Open the cover.) → (Install the toner cartridge.) → (Close the cover **and wait for 20 seconds.**) → 'D'

Note:

- Since the sensors respond only when the cover is closed, be sure to close the cover before re-installing any items.
- The sensors tests, especially the OPC test, require time to respond on the LCD panel. Operate a sensor in one sense for at least **20 seconds** before restoring it to the original condition for reliable operation of these tests.

- 7) Press the Continue button to implement the RAM SIZE CHECK.

The RAM size installed into the printer is displayed as follows;

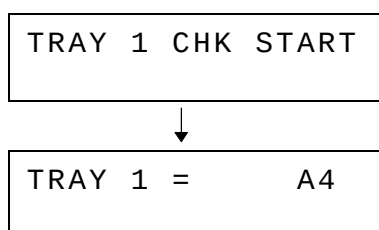


Standard Model: RAM SIZE = 16 MB

Network Model: RAM SIZE = 32 MB

- 8) Press the Continue button to implement the TRAY 1 CHECK.

The paper size of the installed cassette is displayed.



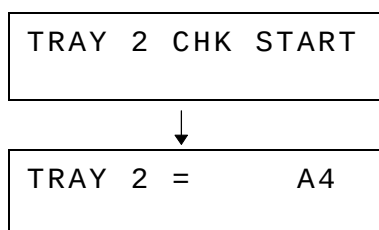
TRAY 1 = A4: A4 size cassette is installed.

TRAY 1 = LETTER: Letter size cassette is installed.

TRAY 1 = NO: The upper cassette is not installed.

TRAY 1 = SIZE ERR: The paper size is other than A4 or Letter size.

- 9) Press the Continue button to implement the TRAY 2 CHECK.



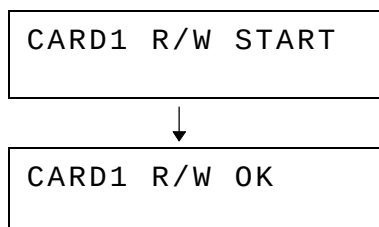
TRAY 2 = A4: A4 size cassette is installed.

TRAY 2 = LETTER: Letter size cassette is installed.

TRAY 2 = NO: The lower cassette is not installed.

TRAY 2 = SIZE ERR: The paper size is other than A4 or Letter size.

- 10) Press the Continue button to implement the FLASH CARD1 R/W TEST.



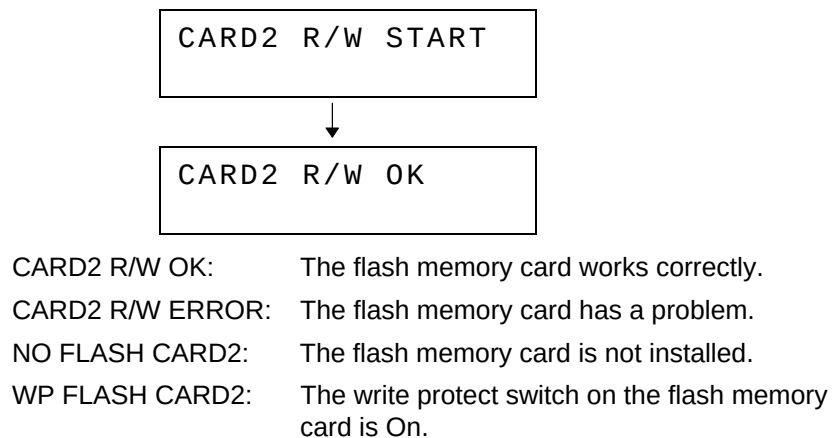
CARD1 R/W OK: The flash memory card works correctly.

CARD1 R/W ERROR: The flash memory card has a problem.

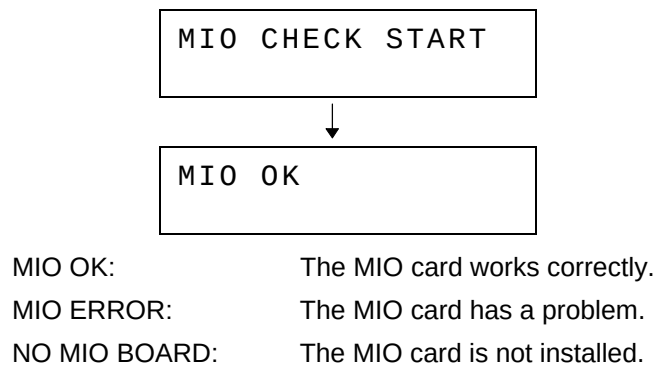
NO FLASH CARD1: The flash memory card is not installed.

WP FLASH CARD1: The write protect switch on the flash memory card is On.

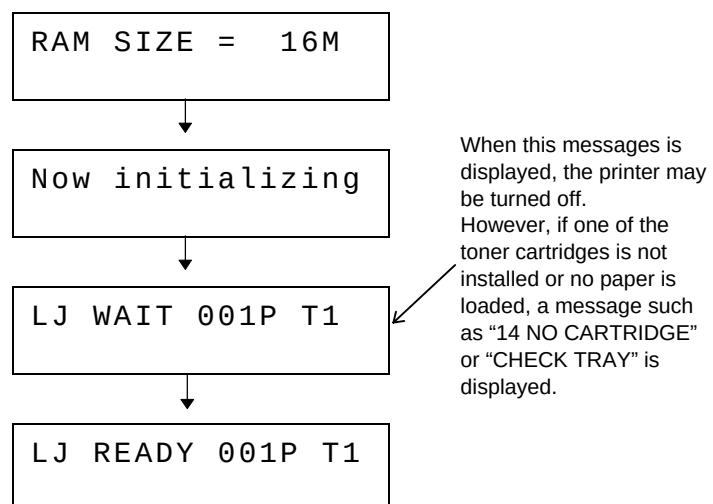
11) Press the Continue button to implement FLASH CARD2 R/W TEST.



12) Press the Continue button to implement the MIO CHECK.



13) Press the Continue button to exit the Line Test Mode. The printer is reset as follows;



14) Turn off the power.

2.4 DRAM Test Mode

This mode tests the memory and optional SIMMs installed on the main (video controller) PCB.

<Procedure>

- 1) To start the test program:

While holding down the ▼ button, turn on the power. “DRAM CHECK START” will be displayed. Press the Continue button to start the DRAM check.

- 2) The LCD will display “START DRAM TEST”, and the Data LED blinks.
- 3) On satisfactory completion of all the RAM tests, the LCD will display: “DRAM OK!!”, and the Alarm LED is on.
- 4) If any DRAM error has occurred, the LCD will display a fail message as follows;



- 5) Enter the hidden menu mode as follows to confirm the current memory map;
 - i) Press the Form Feed, Mode and Continue buttons at the same time in the off-line status.
 - ii) The LCD will display “HIDDEN PANEL”
 - iii) Select the “DRAM ADDRESS” menu using the scroll buttons.
 - iv) Whenever the Set button is pressed, the LCD will display the DRAM error address on the main PCB, Slot 1, Slot 2, and Slot 3 in turn.
- 6) If a SIMM DRAM has an error, replace the SIMM corresponding to the above memory map information.

If the DRAM on the main PCB has an error, replace referring to the table below;

Lower order address (where an error occurs)	DRAM chip to be replaced	
	*A	*B
0, 4, 8, C	#3	#5
1, 5, 9, D	#9	#16
2, 6, A, E	#4	#7
3, 7, B, F	#14	#20

*A: If the upper digit of the data is wrong.

*B: If the lower digit of the data is wrong.

Note:

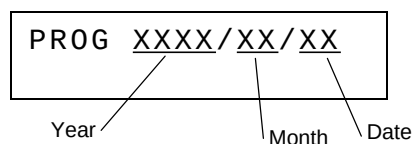
- There may be a case where the above sequence does not work correctly due to complete RAM failure, or in faulty assembly such as a solder bridge or ineffective soldering etc.
- “PRINT CHECK” may be displayed when exiting from the Test mode. It will disappear in 20 or 30 seconds, displaying “READY” on the LCD. It is not a fault.

2.5 Program Version Display Mode

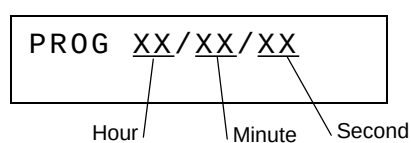
This mode displays the firmware version of the controllers.

<Procedure>

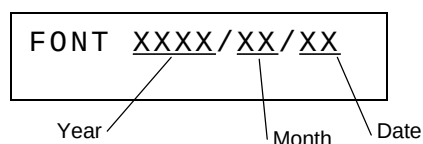
- 1) While holding down the Font button, turn on the power.
- 2) Hold down the Font button until Year/Month/Date of the program is displayed.



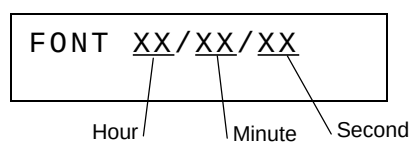
- 3) Press the Continue button. Hour/Minute/Second of the program is displayed.



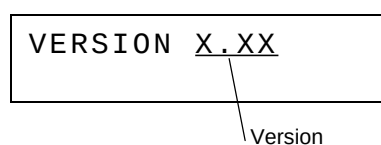
- 4) Press the Continue button. Year/Month/Date of the font data is displayed.



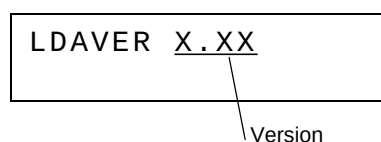
- 5) Press the Continue button. Hour/Minute/Second of the font data is displayed.



- 6) Press the Continue button. The version of the program and font data is displayed.



- 7) Press the Continue button. The version of the engine firmware is displayed.



2.6 Test Print Mode

This mode prints the specified pattern continuously in order to check the engine.

<Procedure>

- 1) Turn the printer to off-line.
- 2) While holding down the Shift button, press the Sel button. The message 'TEST PATTERN' appears. Press the SET button to enter the test mode and use the ▲ and ▼ buttons to select a test. One of the following menu displays appears;

LCD Display	Check item
TEST PRN = A - H	Halftone reproduction
TEST PTN = G - H	Line reproduction
TEST PTN = K2	Color reproduction, registration and jitter
TEST PTN = STRIPE	Fusing

2.7 NVRAM Reset Mode

This mode forces the NVRAM value of the video controller to be reset to the factory settings.

<Procedure>

- 1) While holding down the Set button, turn on the power.
- 2) Hold down the Set button until "RAM SIZE" is displayed on the LCD panel and the LEDs are all on momentarily.
- 3) The printer is reset to the factory setting.

3. ENGINE CONTROLLER MODE

This section describes the operation and setting procedures for each engine test in the Engine Controller Mode.

In order to go into the Engine Controller Mode, turn on the printer while holding down the Mode, Set and ▼ buttons.

3.1 Configuration of Operational Mode

This printer has the various functions as set out in Table 5-2 for the user to easily understand the operation status of the printer engine during maintenance work.

- (1) Normal Mode: After removing the main PCB from the printer and pressing the On Line button under the Engine Controller Mode, the printer goes into the Engine Normal Mode.

This mode provides functions to indicate the operation status of the printer and also messages relating to normal operations which the operator is controlling.

Note:

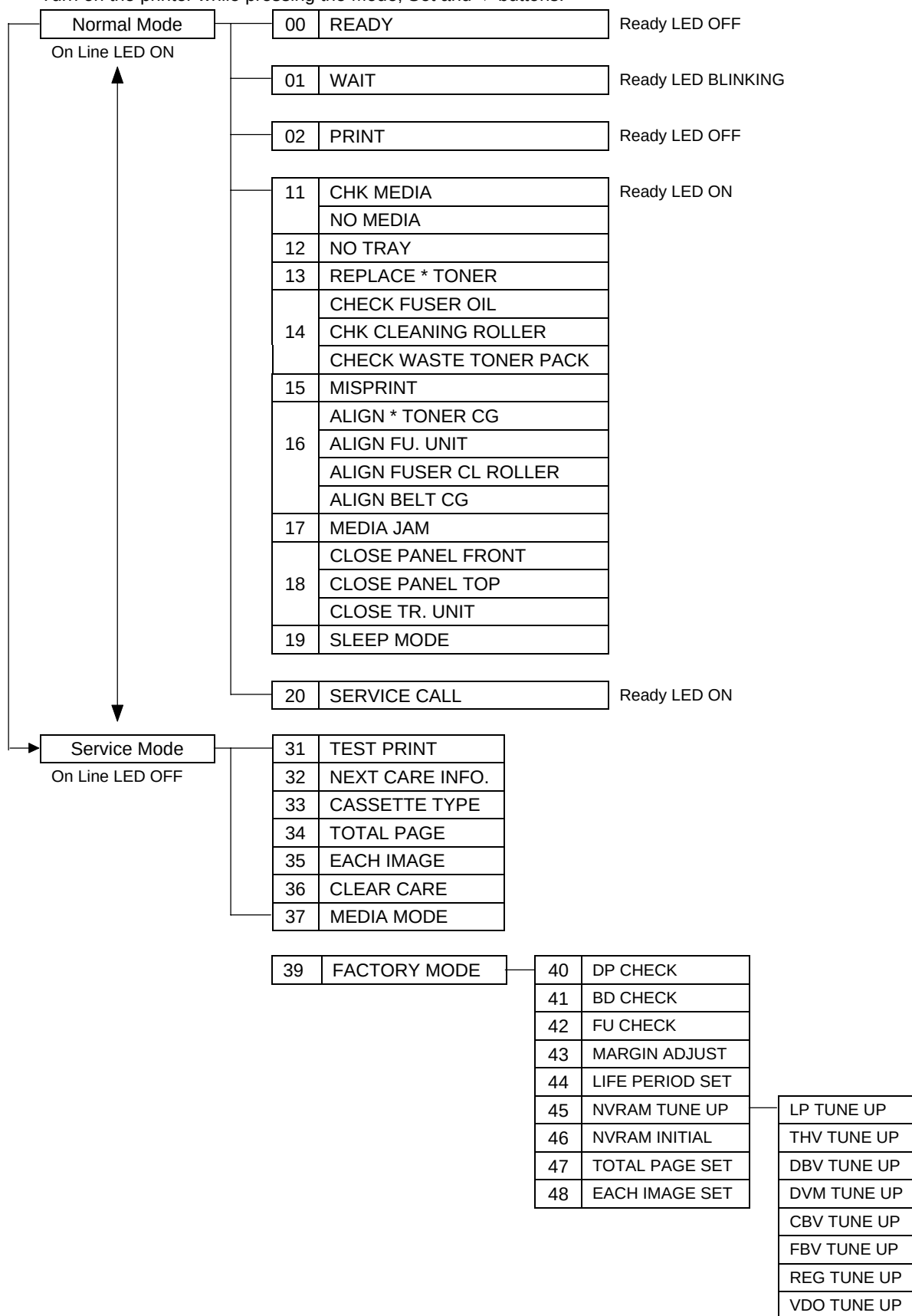
Be sure to remove the main PCB before the printer goes into the Engine Normal Mode. If you fail to do so, the printer goes into the sleep mode.

- (2) Service Mode: After turning on the printer in the off-line status, the printer goes into Service Mode.

This mode is a unique mode for the serviceman only and provides additional functions (codes 31 through 37) to confirm the operational status during maintenance work and '39 FACTORY MODE' to confirm and set the operational status of the main components.

Table 5-2

Turn on the printer while pressing the Mode, Set and ▼ buttons.



3.2 Operation of Normal Mode

Normal Mode displays on the control panel the operational status of the printer when in the "ONLINE" state and the necessary information for the operator to implement ordinary maintenance work.

Operation Procedures

- 1) Press the power button to turn on the printer while holding down the Mode, Set and ▼ buttons. Refer to Fig.5-1.
- 2) Press the On Line button so that the printer is on-line and the Ready LED starts to flash.
- 3) The Ready LED lights approximately 250 seconds after power-on and the printer is ready to print.

Normal Mode

See Table 5-2 for details of indications available in normal mode.

Code No.	LCD Message	Description of Message
00	00 READY [*1] U: [*2] L: [*3] [*4]	- The Ready LED is lit. - The engine has completed the warming-up process and is now ready to print. [*1]: Applicable paper feeder is indicated as follows; /UPP: Upper Cassette /LOW: Lower Cassette [*2] / [*3]: Size of the paper loaded in the upper or lower cassette is indicated as follows; LT: Letter size DL: Envelope EX: Executive size CM: Envelope Commercial #10 LG: Legal size FR: Free size A4: A4 size UK: UK Quarto B5: B5 size FO: OHP [*4]: The code numbers of consumables or periodical replacement parts will be indicated if they have reached their life or should be replaced now. If no periodical replacement is required, there will be no indication in the LCD. For details of the periodical replacement parts, see 36. CLEAR CARE in the next section.
01	01 WAIT [*1] U: [*2] L: [*3] [*4]	- The Ready LED is lit. - The engine is in the process of warming-up. - For messages [*1], [*2], [*3] and [*4] that appear on the LCD, see the description for code number 00 above.
03	02 PRINT [*5] [*1] U: [*2] L: [*3] [*4]	- The Ready LED lit. - The engine is ready to print. - For messages [*1], [*2], [*3] and [*4] that appear on the LCD, see the description for code number 00 above. [*5]: Print color is indicated as follows; Y: Yellow M: Magenta C: Cyan K: Black YM: Yellow & Magenta YMCK Full Color

Code No.	LCD Message	Description of Message
11-1	11 CHK MEDIA [*1] [*4]	- The engine is idling. - The Ready LED is lit. [*1]: Applicable paper feeder is indicated as follows; /UPP: Upper Cassette /LOW: Lower Cassette - Confirm whether the applicable paper cassette is loaded with paper. - Press the Feeder button if the media needs to be changed.
11-2	NO PAPER 11 NO MEDIA [*1] [*4]	- The engine is idling. - The Ready LED is lit. [*1]: Applicable paper feeder paper empty condition is indicated as follows; /UPP: Upper Cassette /LOW: Lower Cassette - Replenish the empty cassette with paper. - Press the Form Feed button if the media needs to be changed.
12	NO TRAY 12 NO TRAY [*1] [*4]	- The engine is idling. - The Ready LED is lit. [*1]: Paper feeder without the paper cassette is indicated as follows; /UPP: Upper Cassette /LOW: Lower Cassette - Install the applicable media cassette to the paper feeder indicated on the LCD.
13	REPLACE TONER 13 REPLACE [*5] TONER [*4]	- The engine is ready to print. - The Ready LED is lit. [*5]: The toner empty condition is indicated by the color code as follows; Y: Yellow M: Magenta C: Cyan K: Black - Replace the indicated toner cartridge with a new one of the correct color.

Code No.	LCD Message	Description of Message
14-1	CHECK FUSER OIL 14 CHECK [*5] FUSER OIL [*F0]	- The engine is idling. - The Ready LED is lit. - Replace the fuser oil bottle with a new one. - This message will be automatically cleared by opening & closing the paper exit cover.
14-2	14 CHECK CLEANING ROLLER [*4] [*FC]	- The engine is idling. - The Ready LED is lit. - Replace the cleaning roller with a new one. - Execute the Clear Care Mode after the replacement of the cleaning roller to clear the Care Code [FC].
14-3	CHECK WASTE TONER PACK 14 CHECK TONER PACK [*4]	- The engine is idling. - The Ready LED is lit. - Replace the waste toner pack with a new one. - This message will be automatically cleared by opening & closing the front cover while replacing the waste toner pack. The message can also be cleared by pressing the Font button.
15	MISPRINT 15 MISPRINT [*6] [*4]	- The engine is idling. - The Ready LED is lit. [*6] The type of misprint error is indicated as follows; NOPQR: No PRREQ-N signal is available. PAPER: No paper is available in the feeder while executing the print operation after receipt of the print command. - This message can be cleared by pressing the Font button.
16-1	16 ALIGN FU.UNIT [*4]	- The engine is stopped. - The Ready LED is lit. - The fusing unit is not installed. Reconfirm the installation status of the fusing unit. - This message will be automatically cleared by opening & closing the paper exit cover. The message can also be cleared by pressing the Font button.

Code No.	LCD Message	Description of Message
16-2	ALIGN FUSER CL ROLLER 16 ALIGN FUSER CL ROLLER [*4]	- The engine is idling. - The Ready LED is lit. - The cleaning roller is not installed. Reconfirm the installation status of the cleaning roller. - This message will be automatically cleared by opening & closing the paper exit cover. The message can also be cleared by pressing the Font button.
16-3	ALIGN TONER CG 16 ALIGN [*5] TONER CG [*4]	- The engine is ready to print. - The Ready LED is lit. [*5]: The color of the incorrectly installed toner cartridge will be indicated as follows; Y: Yellow M: Magenta C: Cyan K: Black - Reinstall the toner cartridge correctly. - This message will be automatically cleared by opening & closing the front cover.
16-4	16 ALIGN BELT CG [*4]	- The engine is stopped. - The Ready LED is lit. - The OPC belt cartridge is not installed. Reconfirm the installation status of the OPC belt cartridge. - This message will be automatically cleared by opening & closing either the paper exit cover or front cover.
17	PAPER JAM 17 PAPER JAM [*7] [*4]	- The engine is stopped. - The Ready LED is lit. [*7]: The kind of jam (location of jam) is indicated as follows; FEED: Yellow INNER: Magenta OUTER: Cyan DRUM: Black - This message can be cleared by pressing the Font button after opening & closing the front cover, back cover and paper exit cover.

Code No.	LCD Message	Description of Message
18-1	CLOSE PANEL 18 CLOSE PANEL [*8] [*4]	- The engine is in standby. - The Ready LED is lit. [*8]: The open cover is indicated as follows; FRONT: Front Cover TOP: Paper Exit Cover - This message can be cleared by opening & closing the indicated cover.
18-2	SET TR.UNIT 18 CLOSE TR.UNIT [*4]	- The engine is stopped. - The Ready LED is lit. - The transfer unit is open. Reconfirm the installation status of the transfer unit. - This message can be cleared by opening and closing the rear access cover.
19	SLEEP MODE 19 SLEEP MODE [*4]	- The engine is idling. - The Ready LED is lit. - This mode is cleared by sending a WAKE-UP command (EC24) from the video controller. - The printer is ready to print after the warming-up process of the engine.
20	SERVICE CALL 20 SERVICE CALL [*9]	- The engine is in standby. - The Ready LED is lit. [*9]: Service Call error code is indicated as follows; For the details of error codes, refer to Chapter VIII "Troubleshooting" in this manual.

3.3 Service Mode

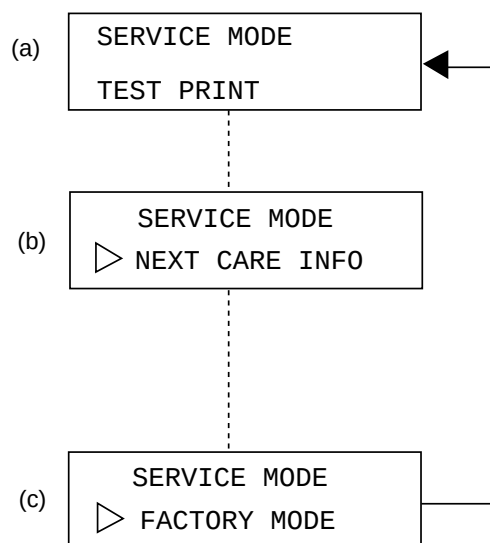
Service mode is a unique mode for the maintenance of the printer only, without the video controller card. In this mode, you can check the operation status of the printer engine Off-line and also carry out maintenance work for each of the printer components.

Procedure

- 1) Hold down the Mode, Set and ▼ buttons and turn the printer Power on.
- 2) Using the Font, Continue, Set and ▼ buttons, select the mode necessary for the maintenance work from the test list shown in Table 5-2.

How to designate the necessary mode

- 1) Press the Set or ▼ button so that service modes (a), (b) and (c) show up in sequence to be selected.
- 2) After selecting the desired mode, execute the selected mode by pressing the Continue button.
- 3) Press the Font button to exit the mode.



31	GRID PRINT

A single color or two color (R,G,B) Grid Pattern and a full color Stripe Pattern can be printed as Test Prints.

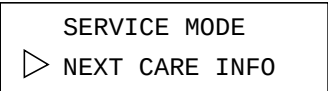
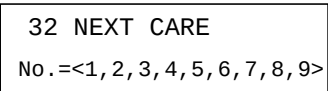
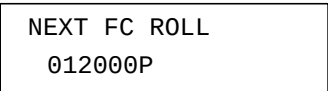
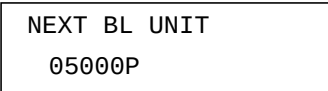
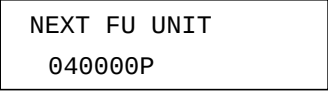
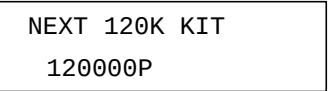
Procedure

Description of Procedures	LCD Message
1) Press the Continue button. (a) → (b)	a) SERVICE MODE ▷ TEST PRINT/NEXT
2) Using the Set or ▼ button, select the desired pattern (ex. grid pattern), and then press the Continue button. (b) → (c)	b) 31 GRID PRINT ▷ GRID PRINT/STRIPE
3) Using the Set or ▼ button, select the desired color (ex. red color), and then, press the Select button. (c) → (d)	c) 31 GRID PRINT ▷ Y/M/C/K/R/G/B
4) After completion of the warming-up process, the desired pattern of the selected color will be continuously printed. (d)	R:YM G:YC B:MC
5) Print operation is suspended by pressing the Font button. (d) → (e)	d) 31 GRID PRINT [YM] U:[] L:[] []
If it is desired to return to the previous screen (message), press the Font button one more time. (e) → (d)	e) 31 GRID PRINT ▷ Y/M/C/K/R/G/B
6) If it is desired to return to On-line mode, press the On Line button. (f) → (g)	f) SERVICE MODE TEST PRINT
	g) 01 WAIT [] U:[] L:[] []

32	NEXT CARE INFORMATION

Information relating to the replacement timing of periodical replacement parts can be obtained. This is the life for each of the components in images or pages.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NEXT CARE INFO". (a) → (b) 2) Using the Set or ▼ button, select the care code for which you need the information. 2: Fuser Cleaner (FC) 7: OPC Belt Cartridge (BL) 8: Fusing Unit (FU) 9: Replacement Kit 120K (120K) (b) 3) After selecting the code, press the Continue button. Then, the number of images or printouts corresponding to the selected code is displayed. (b) → (c) through (f) 4) Screen (c) through (f) can be cleared by pressing the Font button. (f) → (e) → (d) → (c) → (b) Press the Font button one more time at screen (b) to return to the service mode. (b) → (a)	a)  b)  c)  d)  e)  f) 

33	CASSETTE TYPE

The type of paper feeding cassette can be selected. Type A is for the USA, type B is for Europe and type C is for Japan.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "CASSETTE TYPE". (a) → (b)	a) SERVICE MODE ▷ CASSETTE TYPE
2) Using the Set or ▼ button, select the code of the desired cassette (A, B or C), and then press the Continue button.	b) 33 CASSETTE TYPE TYPE=<A / B / C>
3) Press the Font button to exit the mode from screen (b). (b) → (c)	c) SERVICE MODE ▷ CASSETTE TYPE

34	TOTAL PAGE

The total number of printouts can be confirmed.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "TOTAL PAGE" mode. (a) → (b)	a) SERVICE MODE ▷ TOTAL PAGE
2) A 6 digit number is displayed. This number represents the total number of pages that have been printed out. (b)	b) 34 TOTAL PAGE 003600 P
3) Press the Font button to exit the mode from screen (b). (b) → (c)	c) SERVICE MODE TEST PRINT

35	EACH IMAGE

Number of created images for each color used in printing can be confirmed.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "EACH IMAGE" mode. (a) → (b)	a) SERVICE MODE ▷ EACH IMAGE
2) Using the Set or ▼ button, select the required color and then press the Continue button. (b) → (c)	b) 35 IMAGE OF ▷ Y/M/C/K
3) The number of images created in the selected color is displayed. (Ex. Yellow) (c)	c) 35 IMAGE OF Y 000098P
4) Press the Font button to exit this mode from screen (c). (c) → (d)	d) 35 IMAGE OF ▷ Y / M / C / K
5) Using the Set or ▼ button, select another color and then press the Continue button to confirm the number of images created in that color.	e) SERVICE MODE ▷ TEST PRINT
6) Press the Font button to return to the Service mode. (d) → (e)	

Care Code counters displayed on the LCD can be cleared. Make sure that you clear the relevant CLEAR CARE mode whenever replacing periodical replacement parts with new ones. This mode should only be used to reset the counters after replacement of faulty consumables before their life expectancy is reached. For normal life replacement use the resets available in the Video controller mode

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "CLEAR CARE" mode. (a) → (b)	a) SERVICE MODE ▷ CLEAR CARE
2) Using the Set or ▼ button, move the cursor to select the applicable CARE code and then press the Continue button. (b) → (c)	b) 36 CLEAR CARE No.=<1, 2, 3, 4, 5, 6, 7, 8, 9>
3) To clear the counter in CLEAR CARE, use the Set or ▼ button to select YES and then press the Continue button.	c) CARED FC ROLL ▷ YES/NO
Fuser cleaner (c) OPC belt cartridge (d) Fusing Unit (e) 120K replacement kit (f) → (g)	d) CARED BC UNIT ▷ YES/NO
6) Press the Font button to exit the CLEAR CARE mode. (g) → (h)	e) CARED FU UNIT ▷ YES/NO
	f) CARED 120K UNIT ▷ YES/NO
	g) 36 CLEAR CARE No.=<1, 2, 3, 4, 5, 6, 7, 8, 9>
	h) SERVICE MODE ▷ TEST PRINT

37	MEDIA MANAGE

The signal from the OHP sensor can be ignored when the media is selected to OHP. However, this mode should not be used under normal circumstances.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "MEDIA MANAGE". (a) → (b)	a) SERVICE MODE ▷ MEDIA MANAGE
2) Select DEFIANCE and then press the Continue button if the OHP sensor signal should be ignored. (b) → (c) In normal operation, the mode is preset to MANAGE.	b) 37 MEDIA MANAGE ▷ MANAGE/DEFIANCE c) SERVICE MODE DP CHECK

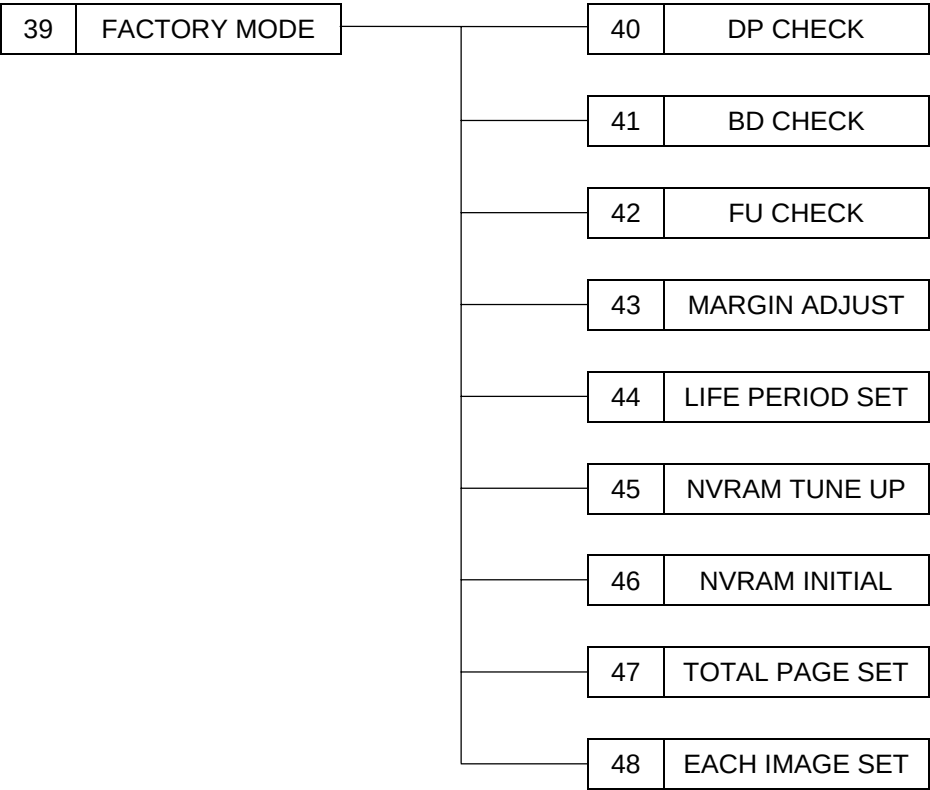
39	FACTORY MODE

This mode consists of 9 (nine) modes for the confirmation of operation and the resetting functions necessary for maintenance work.


CAUTION

Before using this mode, ensure that you have the information available to reset the Page and Image counters to the correct values. See 34 TOTAL PAGES and 35 EACH IMAGE for information on how to get the readings before starting working with these functions.

Basic Configuration



40	DP CHECK

Each individual colour Toner cartridge can be driven.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "DP CHECK". (a) → (b)	a) 39 FACTORY MODE ▷ DP CHECK
2) Using the Set or ▼ button, select the desired color and then press the Continue button. (b) → (c)	b) 40 DP CHECK ▷ Y/M/C/K
3) The selected color toner cartridge starts to drive. If no error occurs in driving, the message "GOOD" is displayed in the LCD, otherwise "FAIL". (c) Toner cartridge drive will automatically stop after 60 seconds. (c) → (d)	c) 40 DP CHECK Y GOOD
4) Press the Font button to stop the DP CHECK mode. (d) Press the Font button one more time to return to screen (a). (d) → (e)	d) 40 DP CHECK ▷ Y/M/C/K e) FACTORY MODE ▷ DP CHECK

41	BD CHECK

Laser beam position and laser power can be checked.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting screen (a) "BD CHECK". (a) → (b)	a) 39 FACTORY MODE ▷ BD CHECK
2) The scanner motor scans the laser beam as it is rotating. If the scanning position of the laser beam is normal, "GOOD" is displayed on the LCD, otherwise "FAIL". (b) or (c) Scanner motor automatically stops rotating after 60 seconds. (d)	b) 41 BD CHECK GOOD
3) Press the Font button to exit the BD CHECK mode. (b) → (d)	c) 41 BD CHECK FAIL
	d) 39 FACTORY MODE ▷ DP CHECK

42	FU CHECK

Availability of oil in the fusing unit can be checked.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting screen (a) "FU CHECK". (a)	a) 39 FACTORY MODE ▷ FU CHECK
2) The fusing unit starts the heat-up process, and checks the availability of fuser oil. If oil is available in the fusing unit, "GOOD" is displayed in the LCD, otherwise, "FAIL". (b)	b) 43 FU CHECK OIL:GOOD
3) Press the Font button to exit the FU CHECK mode. (c)	c) 39 FACTORY MODE ▷ DP CHECK

43	MARGIN ADJUST

The position of the top margin and left margin can be confirmed and adjusted within the range -3.5mm max. and +3.5mm max.

Note:

It is recommended to use the default value in normal use. Do not perform this mode frequently.

Procedure

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "MARGIN ADJUST". (a) → (b)	a) 39 FACTORY MODE ▷ MARGIN ADJUST
2) Using the Set or ▼ button, select either TOP or LEFT and then press the Continue button. (b) → (c)	b) 43 MARGIN ADJUST ▷ TOP/LEFT/LEFT2
3) The margins can be adjusted by up to 3.5mm left and right in 0.5mm steps from the reference value "0". Using the Set or ▼ button, select the amount of adjustment by selecting a number displayed in screen (c) or (d). The amount of adjustment selected will be displayed at the upper right corner of Screen (c) or (d). After confirming the desired amount of adjustment is displayed, press the Continue button to set the adjustment.	c) 43 TOP -2.0mm -<765432101>+
	d) 43 TOP +2.5mm -<101234567>+
4) Press the Font button to exit the MARGIN ADJUST mode. (b) → (d)	e) 43 MARGIN ADJUST ▷ TOP/LEFT/LEFT2
5) Press the Font button one more time to return to FACTORY MODE. (e) → (f)	f) 39 FACTORY MODE ▷ DP CHECK

44	LIFE PERIOD

Replacement life of the periodical replacement parts can be set.

Note:

It is recommended to use the default value in normal use. Do not adjust these settings without authorization.

Procedure

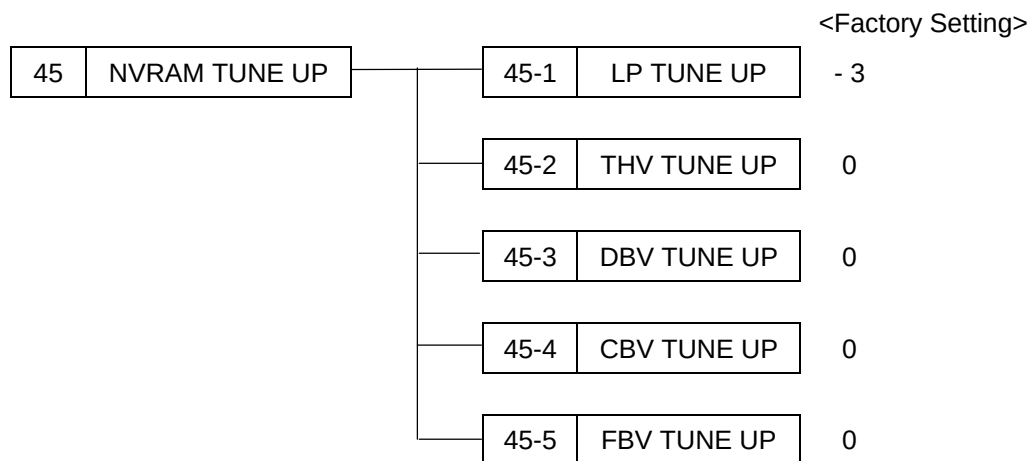
Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "LIFE PERIOD" mode. (a) → (b)	a) 39 FACTORY MODE ▷ LIFE PERIOD SET
2) Using the Set or ▼ button, select the desired code to be set and then press the Continue button. 2: Fuser Cleaner (a) → (b) 7: OPC Belt Cartridge (d) 8: Fusing Unit (e) 9: 120K Replacement Kit (f)	b) 44 LIFE PERIOD No.=<123456789> c) PERIOD FC ROLL 012000 P SET d) PERIOD BC UNIT 05000 P SET e) PERIOD FU UNIT 040000 P SET f) PERIOD 120K UNIT 120000 P SET
3) Use the Set or ▼ button to select the desired digit. Use the Continue button to input a new value to the selected (blinking) digit. Upon completion of inputting the values to be set, use the Set or ▼ button to select SET on the LCD and then press the Continue button to register the set value.	g) 44 LIFE PERIOD No.=<123456789>
4) Press the Font button to complete the setting work. (g)	h) 39 FACTORY MODE ▷ DP CHECK
5) Press the Font button one more time to return to FACTORY MODE. (g) → (h)	

45	NVRAM TUNE UP

This mode is not used in normal operations, but is used when fine adjustment of the HVPSU voltage values is required. Do not use this mode unless you are sure that you understand the effects of making adjustments to the various charge voltages in the HVPSU.

This mode consists of following 5 (five) subordinate modes:

Configuration of NVRAM TUNE UP



Note:

After performing NVRAM INITIAL in the next section, be sure to set the LP TUNE UP value to '- 3'

45-1	LP TUNE UP

This mode should be used when optical density, line thickness and/or color reproduction needs to be adjusted. The adjustment is made by changing the laser power against the reference value 0 (zero) in the range -4 to +4.

Note: Do not perform this mode frequently.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NVM TUNE UP".(a) → (b)	a) 39 FACTORY MODE NVM TUNE UP
2) After selecting LP TUNE UP Code 1, press the Continue button. (b) → (c)	b) 45 NVM TUNE UP No. =<123456789>
3) After selecting the color to be adjusted, press the Continue button. (Ex. Yellow). (c) → (d)	c) 45 LP TUNE UP Y/M/C/K
4) The adjustment value can be adjusted in 8 steps between the -4 and +4. After selecting the required number press the Continue button. (d)	d) 45 YELLOW [0] -<432101234>+
5) Press the Font button to finish the adjustment for yellow. (d) → (e) Repeat steps 3 to 5 if adjustment work is required for another color.	e) 45 LP TUNE UP Y/M/C/K
6) Press the Font button to finish the adjustments. (e) → (f)	f) 45 NVM TUNE UP No. =<123456789>

45-2	THV TUNE UP

This mode shall be used when the transfer voltage needs to be adjusted due to errors such as transfer failure onto the media. The adjustment is used to change the transfer voltage, subject to the media to be used, against the reference value 0 (zero) in the range -4 to +4.

Note: Do not perform this mode frequently.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NVM TUNE UP".(a) → (b)	a) 39 FACTORY MODE NVM TUNE UP
2) After selecting THV TUNE UP Code 2, press the Continue button. (b) → (c)	b) 45 NVM TUNE UP No. =<123456789>
3) After selecting the media to be adjusted, press the Continue button. (Ex. PPC). (c) → (d)	c) 45 THV TUNE UP PPC/OHP/LABEL
4) Adjustment can be made in 8 steps between -4 and +4. After selecting a given number, press the Continue button. (d)	d) 45 THV PPC [] -<432101234>+
5) Press the Font button to finish the adjustment for PPC. (d) → (e) Repeat steps 3 to 5 for other media such as OHP or Labels.	e) 45 THV TUNE UP PPC/OHP/LABEL
6) Press the Font button to finish the adjustments. (e) → (f)	f) 45 NVM TUNE UP No. =<123456789>

45-3	DBV TUNE UP

This mode shall be used when the image optical density needs to be adjusted.
Adjustment of the developer bias voltage against the reference value 0 (zero) in the range -4 and +4.

Note: Do not perform this mode frequently.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NVM TUNE UP".(a) → (b)	a) 39 FACTORY MODE NVM TUNE UP
2) After selecting DBV TUNE UP Code 3, press the Continue button. (b) → (c)	b) 45 NVM TUNE UP No. =<123456789>
3) After selecting the color to be adjusted, press the Continue button. (Ex. Magenta). (c) → (d)	c) 45 DBV TUNE UP Y/M/C/K
4) The adjustment value can be adjusted in 8 steps between -4 and +4. After selecting a given number, press the Continue button. (d)	d) 45 MAGENTA [] -<432101234>+
5) Press the Font button to finish the adjustment work for Magenta. (d) → (e) Repeat steps 3 to 5 for each color.	e) 45 DBV TUNE UP Y/M/C/K
6) Press the Font button to finish the DBV adjustment work. (e) → (f)	f) 45 NVM TUNE UP No. =<123456789>

45-4	CBV TUNE UP

This mode should be used when image defects attributed to the OPC belt need to be improved. Adjustment is to alter the OPC belt bias voltage against the reference value 0 (zero) in the range -4 to +4.

Note: Do not perform this mode frequently.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NVM TUNE UP".(a) → (b)	a) 39 FACTORY MODE NVM TUNE UP
2) After selecting CBV TUNE UP Code 5, press the Continue button. (b) → (c)	b) 45 NVM TUNE UP No. =<123456789>
3) The adjustment value can be adjusted in 8 steps between -4 and +4. After selecting a given number, press the Continue button. (c)	c) 45 CBV TUNE UP -<432101234>+
4) Press the Font button to finish the adjustment work for CBV. (c) → (d)	d) 45 NVM TUNE UP No. =<123456789>

45-5	FBV TUNE UP

This mode should be used when image defects attributed to the transfer drum need to be improved. Adjustment is to adjust the drum cleaner bias voltage against the reference value 0 (zero) in the range -4 and +4.

Note: Do not perform this mode frequently.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NVM TUNE UP".(a) → (b)	a) 39 FACTORY MODE NVM TUNE UP
2) After selecting FBV TUNE UP Code 6, press the Continue button. (b) → (c)	b) 45 NVM TUNE UP No.=<123456789>
3) The adjustment value can be adjusted in 8 steps between -4 and +4. After selecting a given number, press the Continue button. (c)	c) 45 FBV TUNE UP -<432101234>+
4) Press the Font button to finish the adjustment work for FBV. (c) → (d)	d) 45 NVM TUNE UP No.=<123456789>

46	NVRAM INITIAL

This mode can initialize (data clear) all the data in the NVRAM on the MCTL PCB.



CAUTION

BEFORE USING THIS MODE, THE VALUES FROM '34 TOTAL PAGES' AND '35 EACH IMAGE' MUST BE READ TO ENABLE THE CORRECT VALUES TO BE RESET USING FUNCTIONS 47 AND 48.

Note:

- Do not perform this mode other than when replacing the MCTL PCB.
- After performing this mode, be sure to set the LP TUNE UP value to '- 3'.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "NVRAM INITIAL". (a) → (b)	a) 39 FACTORY MODE NVM TUNE UP
2) Select YES if NVRAM INITIAL should be executed. If not select NO. Press the Continue button so that the RAM INITIAL will be executed. (All the data will be cleared.) (b) → (c)	b) 46 NVRAM INITIAL YES / NO
3) For the RAM data setting information, refer to Section 3.4.5 "Initial Setting of NVRAM" in this chapter.	c) 39 FACTORY MODE DP CHECK

47	TOTAL PAGE SET

This mode can reset the number of total pages in the NVRAM whenever NVRAM INITIAL has been executed or the MCTL PCB is replaced.

Note: Do not perform this mode other than when replacing the MCTL PCB.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "TOTAL PAGE SET". (a) → (b)	a) 39 FACTORY MODE TOTAL PAGE SET
2) Use the Set or ▼ button to select the desired digit. Use the Shift button to input values to the selected (blinking) digit. Upon completing the input of the values, use the Set or ▼ button to select SET displayed on the LCD and then press the Continue button to store the set value.	b) 47 TOTAL PAGE 0 1 2 3 4 5 P SET
	c) 39 FACTORY MODE DP CHECK

48	EACH IMAGE SET

This mode can reset the number of total pages of each color in the NVRAM whenever NVRAM INITIAL is executed or the MCTL PCB is replaced.

Note: Do not perform this mode other than when replacing the MCTL PCB.

Description of Procedures	LCD Message
1) Press the Continue button after selecting Screen (a) "EACH IMAGE SET". (a) → (b)	a) 39 FACTORY MODE EACH IMAGE SET
2) Select the desired color to reset in EACH IMAGE SET. (b) → (c)	b) 48 IMAGE OF Y/M/C/K
3) Use the Set or ▼ button to select the desired digit. Use the Continue button to input values to the selected (blinking) digit. Upon completing the input of the values, use the Set or ▼ button to select SET on the LCD and then press the select button to store the set value. (c) → (d)	c) 48 IMAGE OF C 005432 P SET
	d) 48 IMAGE OF Y/M/C/K
4) Press the Font button to exit the EACH IMAGE SET mode.	e) 39 FACTORY MODE DP CHECK

3.4 Adjustment Work Procedures

3.4.1 Adjustment of Top and Left Margin

The top and left margins can be adjusted by button operation on the control panel.

<Purpose>

If there is no top margin or left margin set for the print guarantee area or when the MCTL PCB is replaced, the adjustment of top and left margin will be required.

<Adjustment Method>

- 1) Execute "GRID PRINT" in Service Mode.
- 2) Measure the position 'A' and 'B' of top margin.
[Leading edge] $(A + B) / 2 \leq \text{Specification Value } 4.5 \pm 1.5\text{mm}$
- 3) Measure the position 'C' and 'D' of left margin.
[Left edge] $(C + D) / 2 \leq \text{Specification Value } 3.5 \pm 1.5\text{mm}$
- 4) If the specification value is not met, implement the adjustment.
 - i) Execute "43 MARGIN ADJUST" in the FACTORY MODE.
- 5) After adjustment execute "GRID PRINT" and confirm the margins.

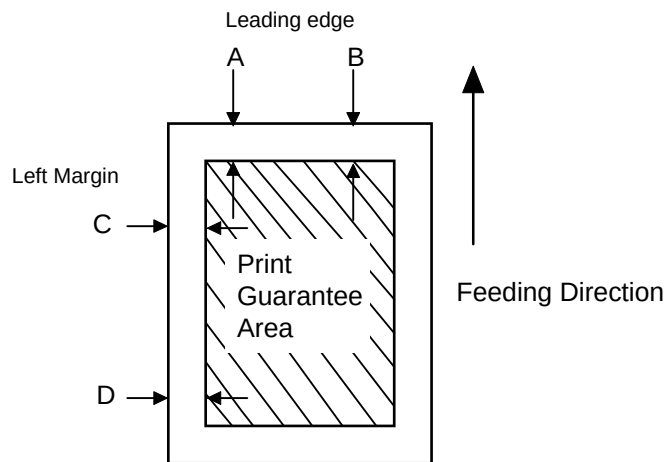


Fig.5-2

3.4.2 Setting of Engine NVRAM Data

As data in the NVRAM has been preset to the optimum value at the factory, it is not necessary to change the preset values under normal conditions. However, fine adjustment may be required subject to the media or operational conditions.

<Purpose>

Print quality can be improved by changing the preset value in the engine NVRAM.

<Procedures of Setting>

- 1) Follow the procedures set out in Section 2.3 'Service Mode' in this chapter.
- 2) Select RAM TUNE UP mode.
- 3) Select the desired TUNE UP mode.
- 4) Adjust the preset value to the appropriate value (step).
- 5) Carry out a test print to confirm the print quality.

<Subject TUNE UP Mode>

Mode	Subject of Adjustment	Purpose
LP TUNE UP	Adjustment of laser power	Optical density
THV TUNE UP	Adjustment of transfer voltage	Transfer efficiency
DBV TUNE UP	Adjustment of developer bias	Optical density
CBV TUNE UP	Adjustment of OPC belt bias	Optical density
FBV TUNE UP	Adjustment of cleaning roller bias	Drum cleaning efficiency

3.4.3 Confirmation and Setting of Total Number of Printouts

The total number of printouts is stored in the RAM. Confirmation and setting of total number of printouts can be carried out on the control panel.

<Purpose>

Total number of printouts will be reset when changing the MCTL PCB or executing an NVRAM INITIAL.

<Procedures of Setting>

- 1) Execute 47 TOTAL PAGE in the Factory Mode.
- 2) Reset the total number of printouts.
- 3) After making the setting, execute 34 TOTAL PAGE to confirm that the desired number of printouts is now set.

3.4.4 Setting of Number of Images for Each Color

The number of printouts for each color (4 colors) is stored in the RAM. Confirmation and setting of the number of images for each color can be carried out on the control panel.

<Purpose>

Number of images for each color will be reset when changing the MCTL PCB or executing NVRAM INITIAL.

<Procedures of Setting>

- 1) Execute 48 EACH IMAGE in the Factory Mode.
- 2) Reset the number of printouts for each color.
- 3) After making the setting, execute 35 EACH IMAGE SET to confirm that the desired number of images is now set.

3.4.5 Initial Setting of Engine NVRAM

Implement the initial setting at the replacement of MCTL PCB after clearing the contents of NVRAM.

<Purpose>

The number of images for each color will be reset when changing the MCTL PCB or executing NVRAM INITIAL.

<Procedures of Setting>

- 1) Before replacing the MCTL PCB, confirm the contents of the NVRAM for the following items.

“Factory Mode”

Code	Subject	Confirmation Value
43	MARGIN ADJUST	Top Margin Set Value (Default in ordinary case)
43	MARGIN ADJUST	Left Margin Set Value(Default in ordinary case)
44	LIFE PERIOD SET	Life Period Set Value(Default in ordinary case)
45	LP TUNE UP	Adjustment Value (“-3” in ordinary case)
45	THV TUNE UP	Adjustment Value (“0” in ordinary case)
45	DBV TUNE UP	Adjustment Value (“0” in ordinary case)
45	CBV TUNE UP	Adjustment Value (“0” in ordinary case)
45	FBV TUNE UP	Adjustment Value (“0” in ordinary case)
47	TOTAL PAGE SET	Total Print Count
48	EACH IMAGE SET	Image Count of 4 Colors

- 2) Execute 46 NVRAM INITIAL in the Factory Mode.
- 3) After implementing the NVRAM INITIAL, input the values obtained in procedure 1) into the NVRAM to complete the settings.

CHAPTER VI

PERIODIC MAINTENANCE

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CHAPTER VI PERIODIC MAINTENANCE

1. GENERAL

1.1 Handling Precautions

Since this high quality laser printer is a precision equipment, daily checking and periodic maintenance is indispensable to maintain the expected high performance.

The following is the list of important precautions & action items for maintenance and periodic replacement parts:

- 1) Refrain from any operation, disassembly or modification that is not set out in this manual.
- 2) When assembling or disassembling the printer, turn off the power supply and unplug the power cable from the power outlet before commencing any work.
- 3) Whenever any parts are replaced, confirm that all the removed and replaced parts are re-installed correctly prior to testing the printer.
- 4) Read carefully and take note of any precaution or warning labels affixed to any parts.
- 5) Unless otherwise specified, follow exactly the reverse order of the disassembly procedures for re-assembly. Do not get the types of removed screws mixed up and check that the screw is the correct length.
- 6) Do not use any solvent for cleaning, both inside and outside the printer.
- 7) It is strictly forbidden to dump waste toner with flammable substances or throw it into a fire. This is a very important caution to respect.

1.1.1 List of Maintenance Tools

Table 6-1 below lists the maintenance tools required for the printer.

Table 6-1

No.	Tool Name	Function
1	Phillips Screwdriver #1	For M3
2	Phillips Screwdriver #2	For M4
3	Phillips Screwdriver (short shank) #2	For M4
4	Slotted Screwdriver #1	For slotted head screw (M3)
5	Slotted Screwdriver #2	For slotted head screw (M4, M5)
6	Long-Nose Pliers	For general use
7	Pincette	For general use
8	Precision Driver Set (#1 ~ #6)	For general use
9	Pliers for C Ring	C Ring
10	Ruler (150mm)	For general use
11	Slide Caliper	For general use
12	Digital Meter	For general use
13	Handy Type Cleaner unique for toner	For cleaning
14	Soft Fur Brush	For cleaning

1.1.2 List of Consumables for Maintenance

Table 6-2 below lists the consumables for maintenance.

Table 6-2

No.	Tool Name	Quantity	Function
1	Toner Cartridge (Y)	1 piece	Test Print
2	Toner Cartridge (M)	1 piece	Test Print
3	Toner Cartridge (C)	1 piece	Test Print
4	Toner Cartridge (K)	1 piece	Test Print
5	Fuser Cleaner / Oil Bottle	1 piece	Test Print
6	OPC Belt Cartridge	1 piece	Test Print
7	Recommended Paper (A4 or letter)	5 sheets	Test Print
8	Recommended Paper (Transparency)	2 sheets	Test Print
9	Cotton Cloth	10~15 pcs	Cleaning
10	Cotton Swab	10~15 pcs	Cleaning
11	Grease	10 gram	M.G** PS265
12	Vinyl Bag	2 bags	Disposal

** M.G stands for Molybdenum Grease.

1.2 Periodic Maintenance Cleaning

See Table 6-3 for details of periodic maintenance cleaning for the following parts.

- 1) Register Roller
- 2) Paper Guide
- 3) Paper Exit Roller
- 4) Transfer Roller
- 5) Paper Discharger
- 6) OPC Belt Cartridge
- 7) Transfer Drum
- 8) Dustproof Glass of the Scanner Unit
- 9) Printer Interior



WARNING

- *Before starting any maintenance work, make sure you have unplugged the power cable from the power outlet*
- *There is a risk of electric shock working on the printer with the power connected.*

Periodic Maintenance Cleaning Work

Table 6-3

No.	Parts Name	Cleaning Work		Cleaning Cycle *1 (Condition or Case)
		Description	Section	
1	Register Roller	1. Open the transfer unit. 2. Clean roller and surrounding area using a dry cloth.	1.2.1	- Defective image - Smeared paper 20K prints
2	Paper Guide	1. Remove the media cassette from the printer. 2. Clean the paper guide using a dry cloth.	1.2.2	20K prints
3	Paper Exit Roller	1. Open the top cover. 2. Clean the paper exit roller using a dry cloth.	1.2.3	20K prints
4	Transfer Roller	1. Open the transfer unit. 2. Clean roller and surrounding area using a dry cloth.	1.2.4	- Defective image - Smeared paper - Periodic maintenance
5	Paper Discharging Roller	1. Open the transfer unit. 2. Remove the paper discharger unit. 3. Clean the corona wire and case, using a cotton swab.	1.2.5	- Defective image - Paper jam - Periodic maintenance
6	OPC Belt Cartridge	1. Remove the OPC belt cartridge. 2. Clean up split toner around the OPC belt cartridge and cleaning blade. 3. Clean the charger unit.	1.2.6	- Defective image - Periodic maintenance

Periodic Maintenance Cleaning Work

Table 6-3

No.	Parts Name	Cleaning Work		Cleaning Cycle *1 (Condition or Case)
		Description	Page	
7	Transfer Drum	1. Remove the transfer drum. 2. Clean the dirt from the transfer drum surface using a cloth.	1.2.7	- Defective image - Periodic maintenance
8	Dustproof Glass of Scanner Unit	1. Remove the toner cartridges and the OPC belt cartridge. 2. Remove the dust-proof glass. 3. Using a dry cloth and swab, clean the dirt from the dust-proof glass.	1.2.8	- Defective image - Periodic maintenance
9	Printer Interior Unit	1. Remove the toner cartridges and OPC belt cartridge. 2. Clean the printer's base, using a toner vacuum cleaner and dry cloth.	1.2.9	- Defective image - Periodic maintenance
[Note] *1: If a periodic maintenance agreement has been made, checks will be made at every periodic maintenance service to prevent any problems from occurring.				



CAUTION

The register roller, paper guide, and paper exit roller should be cleaned every 20K prints. Failure to do so may cause paper jams inside or outside of the printer.

1.2.1 Cleaning the Register Roller

The register roller should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

Cotton cloth (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Turn off the power supply, and unplug the power cable.
- 2) Open the rear access cover (transfer unit).
- 3) Using a cotton cloth, clean the register roller incorporated in the transfer unit to remove the paper dust.

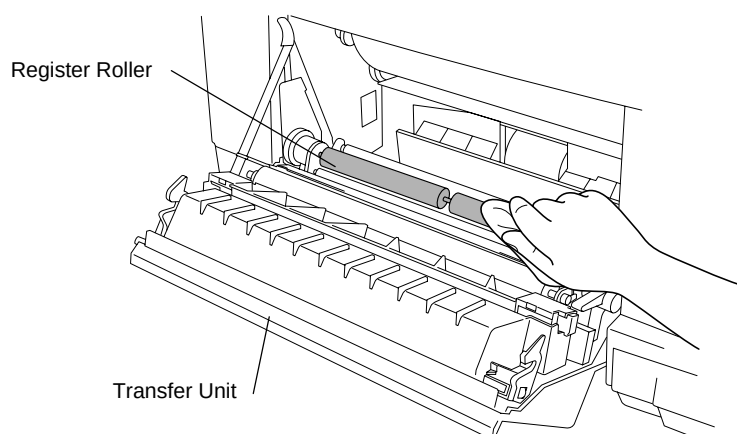


Fig.6-1



NEVER use alcohol or similar solvents for cleaning the register roller.

1.2.2 Cleaning the Paper Guide

The paper guide should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

Cotton cloth (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Remove the media cassette from the printer.
- 2) Remove paper in the media cassette.
- 3) Using a dry cotton cloth, clean the paper guide to remove paper dust.

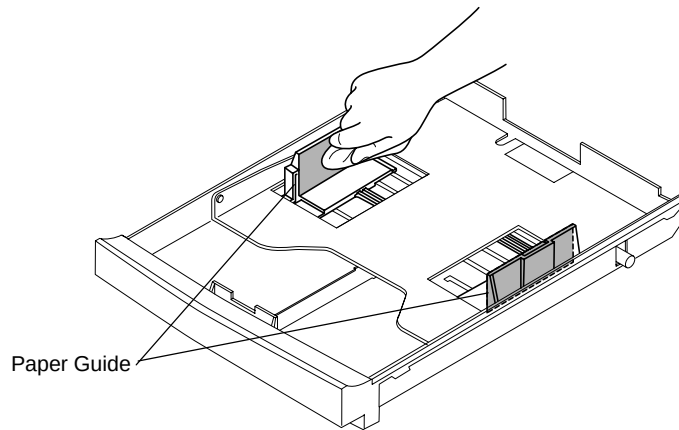


Fig.6-2

1.2.3 Cleaning the Paper Exit Roller

The paper exit roller should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

Cotton cloth (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Turn off the power supply, and unplug the power cable.
- 2) Open the top cover (paper exit unit).
- 3) Using a dry cotton cloth, clean the paper exit roller to remove paper dust.

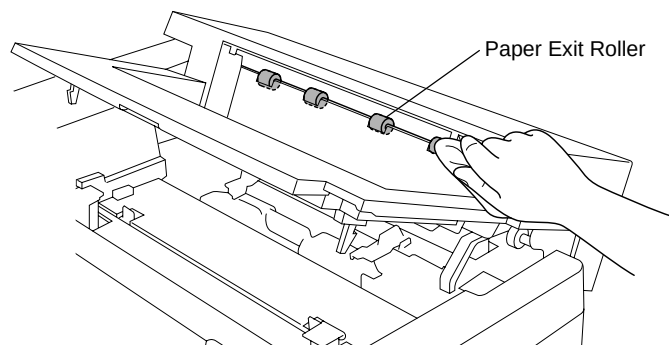


Fig.6-3

1.2.4 Cleaning the Transfer Roller

The transfer roller should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

Cotton cloth (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Turn off the power supply, and unplug the power cable.
- 2) Open the rear access cover (transfer unit).
- 3) Using a cotton cloth, clean the transfer roller.

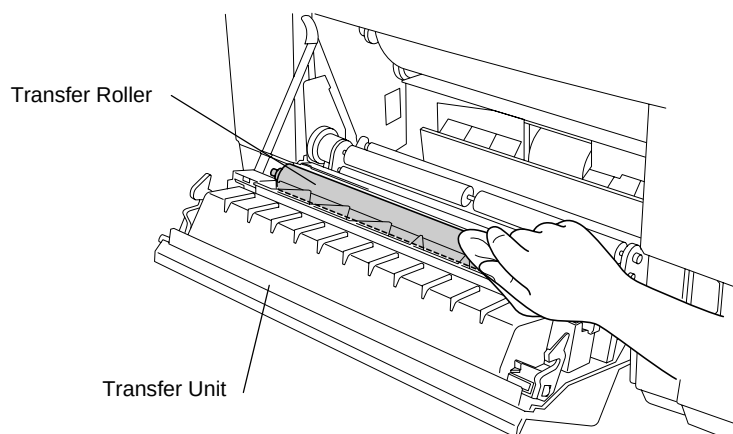


Fig.6-4



NEVER use alcohol or similar solvents for cleaning the transfer roller.

1.2.5 Cleaning the Paper Discharger

The paper discharger should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

- 1) Cotton cloth (2 ~ 3 pieces)
- 2) Cotton swab (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Turn off the power supply, and unplug the power cable.
- 2) Open the transfer unit.
- 3) Remove the paper discharger unit.
(Fig.6-5)

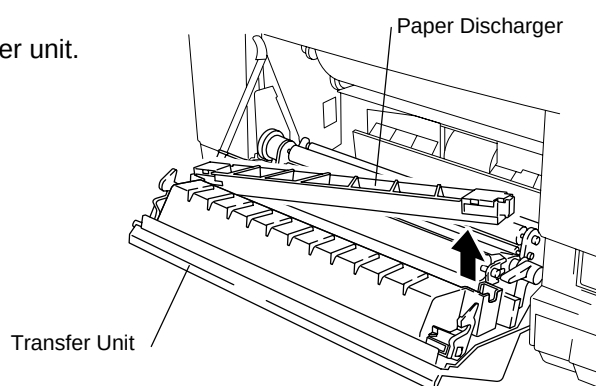


Fig.6-5

- 4) Clean the discharger case housing with a cotton cloth.
- 5) Clean the corona wire and the inside of the charger case with a cotton swab. (Fig.6-6)
- 6) Re-install the charger unit into the transfer unit.

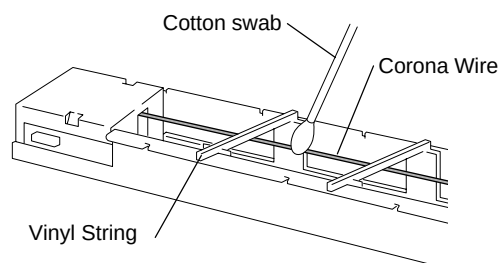


Fig.6-6



- Do not break the vinyl string on top of the case when cleaning the discharger unit.
- Do not break the corona wire.

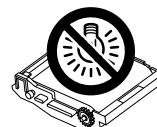
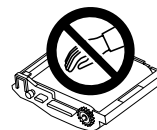
1.2.6 Cleaning the OPC Belt Cartridge

The OPC belt cartridge should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.



PRECAUTION

- Do not directly touch the OPC belt surface with bare hands or gloves.
- If the belt is exposed for more than two minutes to a light source of 800 lux, the belt may be damaged.



<Tools to Prepare>

- 1) Cotton cloth (2 ~ 3 pieces)
- 2) Cleaning brush (supplied with the printer)

<Cleaning Procedure>

- 1) Turn off the power supply.
- 2) Open the top cover and the front cover.
- 3) Release the belt cartridge lock levers to pull out the OPC belt cartridge.
- 4) Clean the OPC belt cartridge.
 - i) Remove any toner on the corona wire with the brush supplied with the printer. (Fig.6-7)
 - ii) Clean the OPC belt cartridge case with a cotton cloth.

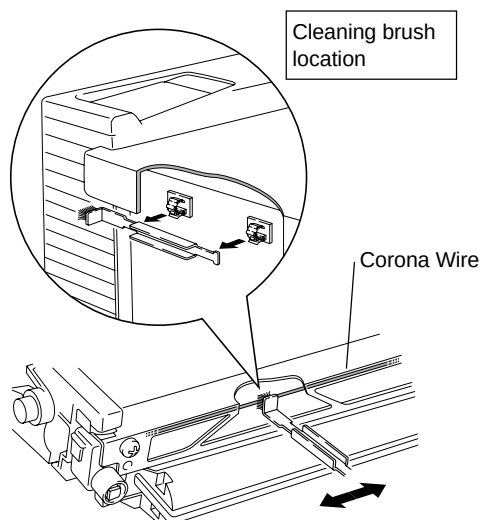


Fig.6-7



CAUTION

- Be sure to dry the OPC belt cartridge completely when cleaning it with a damp cotton cloth.
- Do not clean the OPC belt cartridge by using any solvents.

1.2.7 Cleaning the Transfer Drum

The transfer drum should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

Cotton cloth (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Turn off the power supply.
- 2) Open the rear access cover.
- 3) Clean the surface of the transfer drum with a dry or damp cotton cloth.

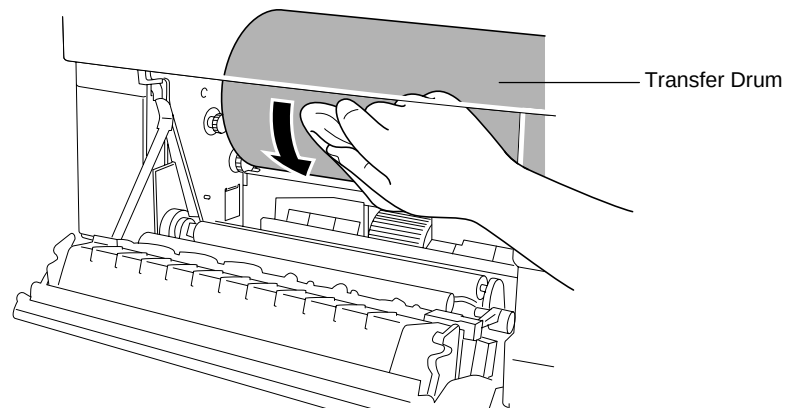


Fig.6-8

CAUTION

- Be sure to dry the transfer drum completely after cleaning it with a damp cotton cloth.
- Do not clean the transfer drum by using solvent.
- Do not touch the transfer drum surface with bare hands, or scratch it.

1.2.8 Cleaning the Dustproof Glass in the Scanner Unit

The dustproof glass in the scanner unit should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

- 1) Cotton cloth (2 ~ 3 pieces)
- 2) Cotton swab (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Turn off the power supply.
- 2) Open the top cover and the front cover.
- 3) Remove the toner cartridges and the OPC belt cartridge.
- 4) Remove the dust-proof glass from the scanner unit.
- 5) Clean the surface of the dustproof glass with a cotton swab.
- 6) Replace the dustproof glass by aligning the ▲ marks on the scanner unit and the dustproof glass, ensuring it is locked correctly into place and cannot move.



CAUTION

NEVER use alcohol or similar solvents for cleaning the dustproof glass, otherwise it will be a cause of image failures.

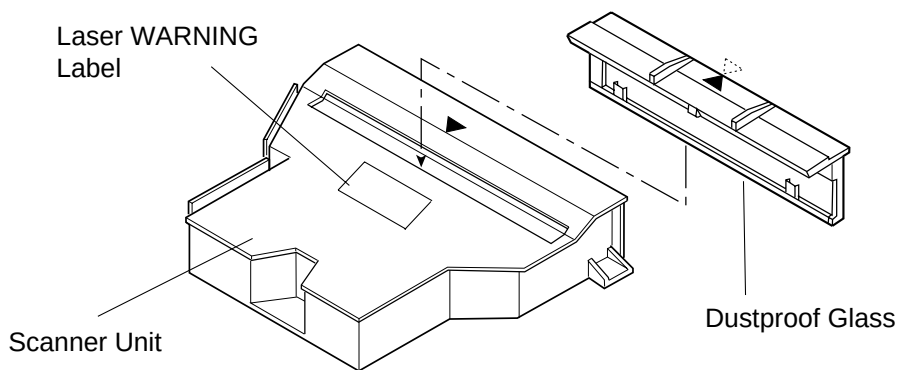


Fig.6-9

1.2.9 Cleaning the Printer Interior

The printer interior (bottom) should be cleaned according to the periodic maintenance cleaning cycle set out in Table 6-3.

<Tools to Prepare>

- 1) Toner vacuum cleaner
- 2) Cotton cloth (2 ~ 3 pieces)

<Cleaning Procedure>

- 1) Open the top cover and the front cover.
- 2) Remove the toner cartridges and the OPC belt cartridge.
- 3) Vacuum up toner scattered on the bottom of printer interior with a vacuum cleaner designed to handle toner particles.
- 4) Clean the printer interior with a cotton cloth and swab.
- 5) Replace the removed items.



CAUTION

Be sure not to contact the nozzle of the vacuum cleaner with the terminals of the interior. Failure to do so will cause damage to the electrical parts in the printer.

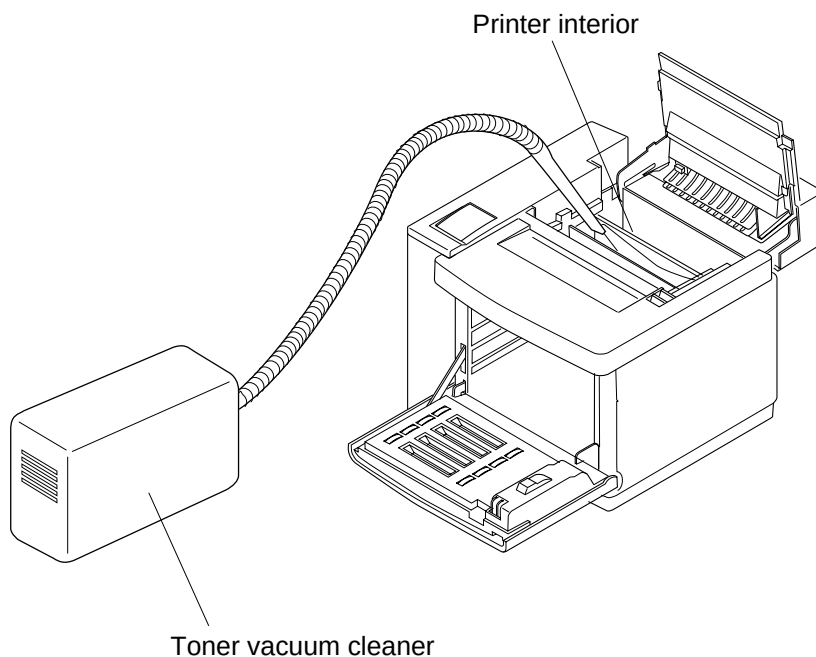


Fig.6-10

1.3 Periodic Maintenance Parts and Maintenance Cycle

Maintenance Work should be implemented according to the “Periodic Maintenance Parts and Maintenance Cycle” set out in Table 6-4.

Table 6-4: Periodic Maintenance Parts and Maintenance Cycle

No.	Maintenance Parts		Description		Replacement Cycle *1 (Condition or Case)
	Parts Name	No.	Function	Section	
1	OPC Belt Cartridge	Accessory	Consists of the OPC belt and forms an electrostatic latent image.	2.1	50K images or 12 months whichever comes first.
2	Fusing Unit *2	UH3470001(US) UH3471001(EC)	Fixes the toner image onto the transported paper.	2.2	40K prints
3	Transfer Roller *3	UH3480001	Transfers the toner image from the transfer drum onto the transported paper.	2.3	120K prints
4	Paper Discharger Unit *3	UH3481001	Separates paper from the transfer drum.	2.4	120K prints
5	Drum Cleaner *3	UH3483001	Cleans residual toner from the transfer drum.	2.5	120K prints
6	Ozone Filter *3	UH1945001	Absorbs ozone.	2.6	Every 12 months
7	Paper Feeding Roller / Separator Pad *3	UH3485001 UH3486001	Picks up sheets of paper one by one from the media cassette.	2.7	120K prints
8	Transfer Drum *3	UH3484001	Forms the toner image and transfers it onto paper.	2.8	300K images (120K prints)

*1:	These figures are based on an average of 5% coverage of the printable area for one color using laser paper. The frequency of replacement will vary, depending on the complexity of the prints, the percentage of coverage, and the type of media. Transparencies, glossy coated paper, and other specialty media will result in shortened consumable life.
*2:	You can order it as a 40K Kit (UH3508001 (US) / UH3509001 (EC))
*3:	You can order these item as a 120K Kit (includ. transfer roller / paper discharger unit / drum cleaner / ozone filter / paper feeding roller / separator pad / transfer drum) (UH3510001)

** After completing maintenance work, clear the message displayed on the control panel. (Refer to the list below.)

LCD Maintenance Message	Consumables
(Toner nearly empty) K C M Y	Toner cartridge Black
(Toner nearly empty) K C M Y	Toner cartridge Cyan, Magenta, or Yellow
FUSER OIL LOW	Oil Bottle
REPLACE FCR	Fuser Cleaner
REPLACE OPC BELT	OPC Belt Cartridge
REPLACE FUSER	Fusing Unit
REPLACE 120K KIT	Drum Cleaner / Paper Discharger / Transfer Roller / Paper Feed Roller / Separator Pad
REPLACE FILTER	Ozone Filter

LCD Operator Call Message	Consumables
TONER EMPTY K COLOR	Toner cartridge Black
TONER EMPTY CMY COLOR	Toner cartridge Cyan, Magenta, or Yellow
22 WASTE TONER	Waste Toner Pack
23 OIL EMPTY	Oil Bottle
24 CHANGE FCR	Fuser Cleaner
72 CHANGE FILTER	Ozone Filter

2. PERIODIC MAINTENANCE PROCEDURES

The printer displays messages on the control panel screen to indicate replacement is due for most of the periodic maintenance parts in both the Video Controller Mode and the Engine Controller Mode.

However, the procedure to clear the message differs between the two modes. The following sections describe the Video Controller Mode messages only and should be used when replacing parts that have reached their life.

If replacement parts have to be replaced for Service reasons before their life cycle is completed then the Engine Controller Mode should be used to reset the part life.

2.1 OPC Belt Cartridge Replacement

<Criterion of Replacement>

The OPC belt cartridge should be replaced with a new one at 50,000 images or 12 months whichever comes first.

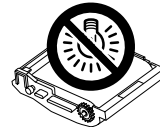
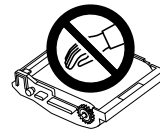
When time is due for replacement of the OPC belt cartridge, the following message appears on the control panel.

LJ READY 001P T1
REPLACE OPC BELT



PRECAUTION

- *Do not directly touch the OPC belt surface with bare hands or gloves.*
- *If the belt is exposed for more than two minutes to a light source of 800 lux, the belt may be damaged.*



<Replacement Procedure>

- 1) Press the power button to turn off the printer.
- 2) Open the front cover and the top cover.



CAUTION

When installing or removing the OPC belt, be sure to open the front cover first. Failure to do so will cause the OPC belt to be damaged due to contact with the toner cartridges.

- 3) Release the belt cartridge lock levers at both sides (left & right). (Fig.6-11)
- 4) Pull out the OPC belt cartridge.

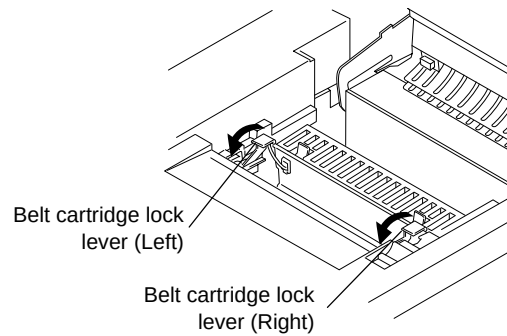


Fig.6-11

- 5) Prepare a new belt cartridge.
Remove the protective sheet from a new OPC belt cartridge, and then pull and remove the tension release pins from both sides (left & right). (Fig.6-12)

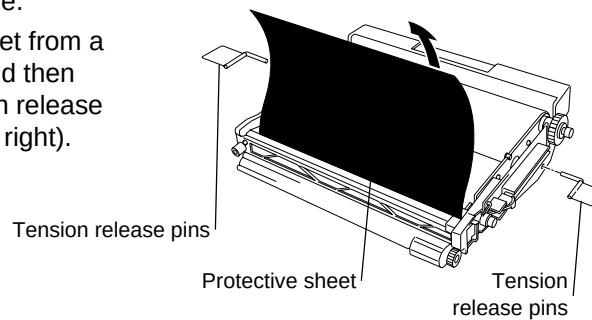


Fig.6-12

- 6) Install the new OPC belt cartridge into the guides at both sides in the printer. (Fig.6-13)

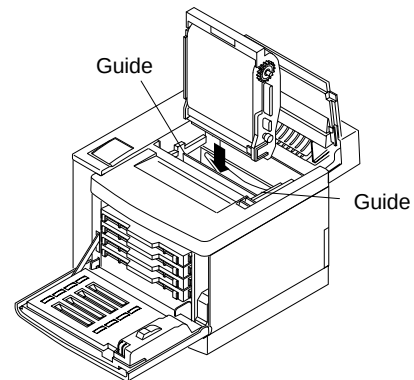


Fig.6-13

- 7) Set the belt cartridge lock levers at both sides (left and right).
- 8) Close the top cover and the front cover.
- 9) Press the power button to turn on the printer.
- 10) The printer starts the warming-up process.
- 11) When the printer has completed warming up, press the Reset button while holding down the Shift button, and select "RESET PARTS LIFE" and then "OPC BC".

2.2 Fusing Unit Replacement

<Criterion of Replacement>

The fusing unit should be replaced with a new one according to the periodical maintenance cycle set out in Table 6-4.

When the time is due for replacement of the fusing unit, the following message appears on the control panel.

LJ READY 001P T1
REPLACE FUSER

<Purpose of Replacement>

To prevent the print quality from declining due to the deterioration of the fixing unit's fuser rollers.



WARNING

The fusing unit and its surrounding area are very hot. Make sure prior to starting the replacement work that the fusing unit and its surrounding area are well cooled down, otherwise you may get burned.

<Necessary Tools and Replacement Materials>

- 1) Two or three pieces of cotton cloth for cleaning
- 2) Fusing Unit (one unit)

<Work Procedure>

Sequence of Disassembling

- 1) After turning off the printer, unplug the power cable from the power outlet.
- 2) Open the top cover.
- 3) Open the rear access cover and slacken the fusing unit securing screws (2 pcs.). (Fig.6-14)

Note:

Place paper on the transfer drum surface to protect it when slackening the screws.

- 4) Holding the handles at both ends of the fusing unit and remove the fusing unit from the printer. (Fig.6-15)
- 5) Remove the oil bottle and the fuser cleaner.

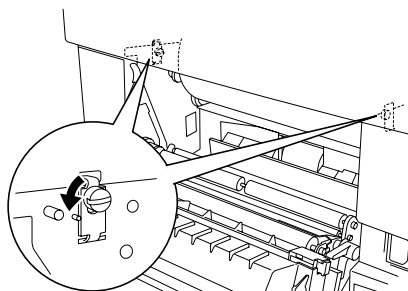


Fig.6-14

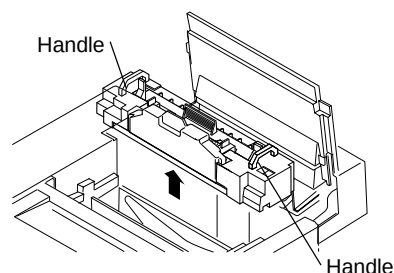


Fig.6-15

CAUTION

- When removing the fusing unit, take care to keep the unit level so that no oil leakage or spillage occurs.
- When shipping the printer, remove the oil bottle and the fuser cleaner from the fusing unit. After removing the oil bottle, be sure to remove the oil remaining in the fusing unit with the supplied syringe. Failure to do so will cause severe damage to the printer.

Sequence of Replacement

- 1) Prepare a new fusing unit before starting the replacement work.
- 2) Pull out the orange protective parts fitted between the rollers of the fusing unit out. (Fig.6-16)
- 3) Install the oil bottle and fuser cleaner to the new fusing unit.

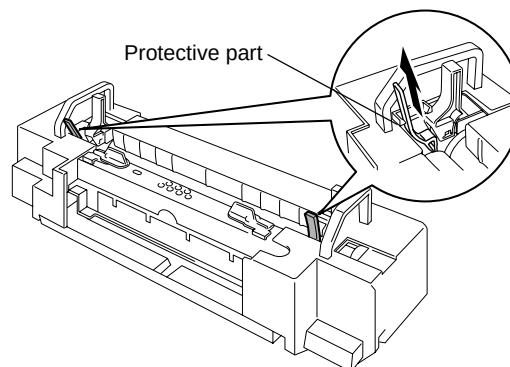


Fig.6-16

Sequence of Assembling

- 1) Install the new fusing unit onto the printer.
 - i) After setting the fusing unit in place, lightly press down the unit to firmly connect to the connector on the base. (Fig.6-17)
 - ii) Tighten the securing screws while pressing down the fusing unit. Check the metal hook of the screw at the left hand secures the fusing unit correctly.
 - iii) Close the rear cover and top cover.

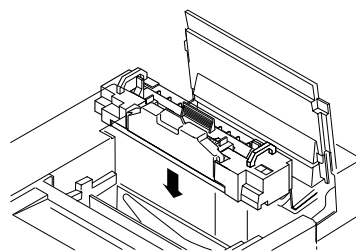


Fig.6-17

PRECAUTION

When replacing the fusing unit, take time and great care to complete the job properly. Application of strong force to the fusing unit may result in the failure of the fusing unit and other parts.

- 2) Plug the power cable into the power outlet and turn on the printer.
- 3) Upon completion of the warming-up process;

Press the Reset button while holding down the Shift button, and select "RESET PARTS LIFE" and then "FUSING UNIT".

Note:

When installing the new fusing unit into the printer, you have to wait approximately for 30 minutes after the unit is installed to allow the fusing oil to circulate in the unit.

2.3 Transfer Roller Replacement

<Criterion of Replacement>

The transfer roller should be replaced at the same time as a new discharger unit according to the periodical maintenance cycle set out in Table 6-4.

When time is due for replacement of the transfer roller, the following message appears on the control panel.

LJ READY 001P T1
REPLACE 120K KIT

<Purpose of Replacement>

To prevent the transfer efficiency declining due to deterioration of the transfer roller.

<Necessary Tools and Replacement Materials>

- 1) Two or three pieces of cotton cloth for cleaning.
- 2) Transfer roller (one unit)

<Work Procedures>

Sequence of Disassembling

- 1) After turning off the printer, unplug the power cable from the power outlet.
- 2) Open the rear access cover. (Fig.6-18)

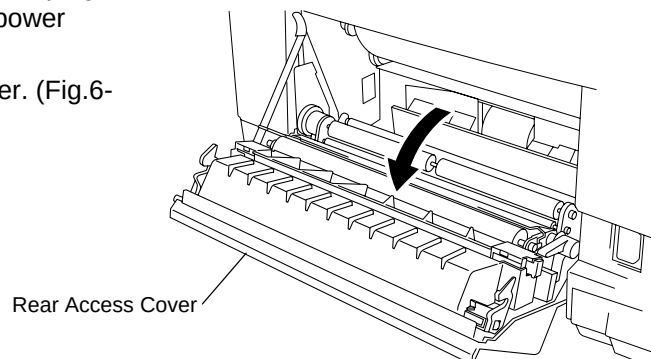


Fig.6-18

Sequence of Replacement

- 1) Lift the transfer roller lock lever to release the right hand end of the roller. The angle of lifting the lock lever is approx. 80° from the horizontal. (Fig.6-19)

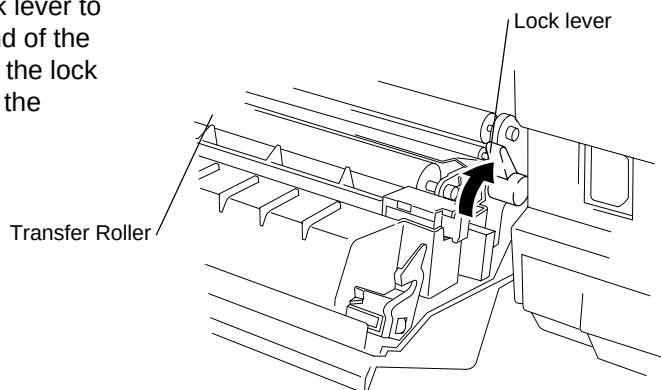


Fig.6-19

- 2) Push the tab of the left hand side to remove the shaft from the installation hole at the right side first, then remove the transfer roller. (Fig.6-20)
- 3) Install a new transfer roller into the printer.
- 4) Fix the transfer roller with the lock lever.

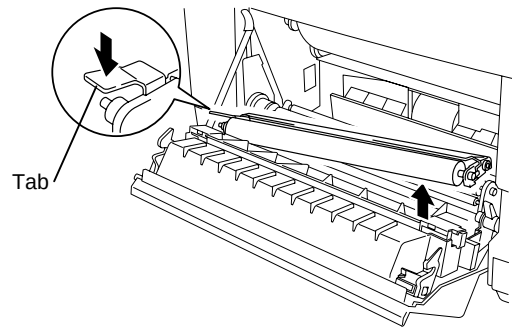


Fig.6-20

Sequence of Assembling

- 1) Close the rear access cover.
- 2) Plug the power cable into the power outlet and turn on the printer.
- 3) Upon completion of the warming-up process;
Press the Reset button while holding down the Shift button, and select "RESET PARTS LIFE" and then "TRANSFER ROLLER".

2.4 Paper Discharger Unit Replacement

<Criterion of Replacement>

The paper discharger should be replaced with a new discharger unit at the same time as the Transfer roller according to the periodical maintenance cycle set out in Table 6-4.

When time is due for replacement of paper discharger unit, the following message appears on the control panel.

LJ READY 001P T1
REPLACE 120K KIT

<Purpose of Replacement>

To prevent the discharging efficiency from declining due to deterioration of the paper discharger unit.



PRECAUTION

Do not touch the corona wire of the paper discharger unit.

<Necessary Tools and Replacement Materials>

- 1) Two or three pieces of cotton cloth for cleaning
- 2) Paper discharger (one unit)

<Work Procedures>

Sequence of Disassembling

- 1) After turning off the printer, unplug the power cable from the power outlet.
- 2) Open the rear access cover. (Fig.6-21)

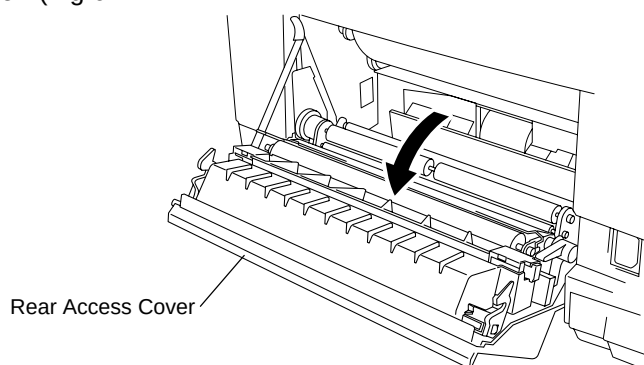


Fig.6-21

Sequence of Replacement

- 1) Pull the right hand side of the paper discharger slightly, then lift it out of the transfer unit to remove the paper discharger. (Fig.6-22)

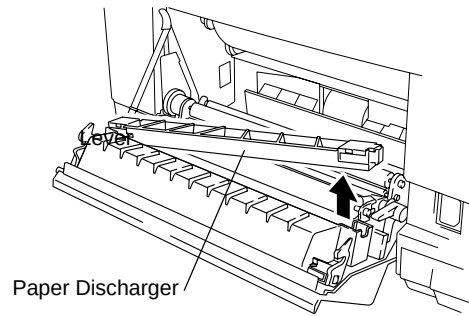


Fig.6-22

- 2) Clean the area where the paper discharger unit is mounted. (Fig.6-23)
- 3) Install the new paper discharger unit into the transfer unit.

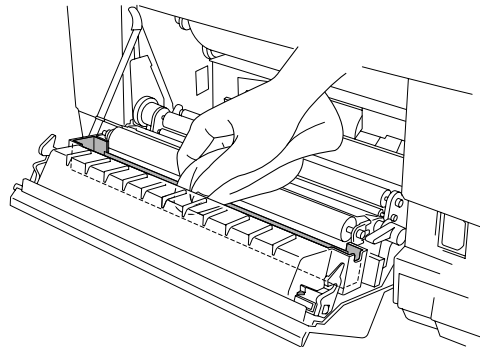


Fig.6-23

Sequence of Assembling

- 1) Close the rear access cover.
- 2) Plug the power cable into the printer, and turn on the printer.
- 3) Upon completion of the warming-up process;
Press the Reset button while holding down the Shift button, and select "RESET PARTS LIFE" and then "120K KIT".

2.5 Drum Cleaner Replacement

<Criterion of Replacement>

The drum cleaner should be replaced with a new one according to the periodical maintenance cycle set out in Table 6-4.

When time is due for replacement of the drum cleaner, the following message appears on the control panel.

LJ READY 001P T1
REPLACE 120K KIT

<Purpose of Replacement>

To prevent the cleaning efficiency from declining due to deterioration of the drum cleaner.



PRECAUTION

When installing the drum cleaner, firstly locate the bearing and the bias pole into the contacts. Reconfirm this connection prior to testing the printer.

<Necessary Tools and Replacement Materials>

- 1) Two or three pieces of cotton cloth for cleaning.
- 2) Drum cleaner (one unit)

<Work Procedure>

Sequence of Disassembling

- 1) Turn off the printer.
- 2) Open the top cover.

Sequence of Replacement

- 1) Remove the cleaner cover by releasing the two hooks.(Fig.6-24)

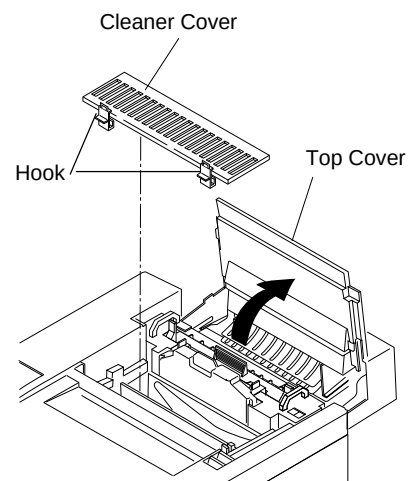


Fig.6-24

- 2) Holding the handle located on the top of the drum cleaner, push it backwards.
- 3) Remove the drum cleaner by lifting it out. (Fig.6-25)

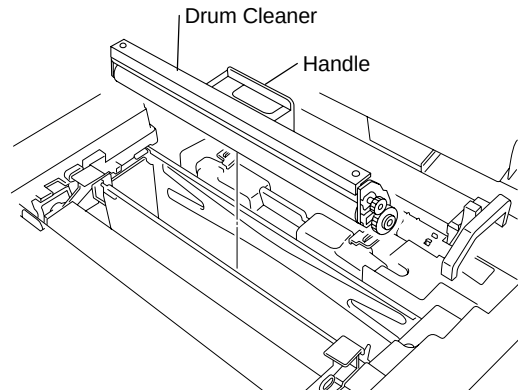


Fig.6-25

- 4) Clean the area where the drum cleaner is mounted. (Fig.6-26)
- 5) Install a new drum cleaner into the printer.

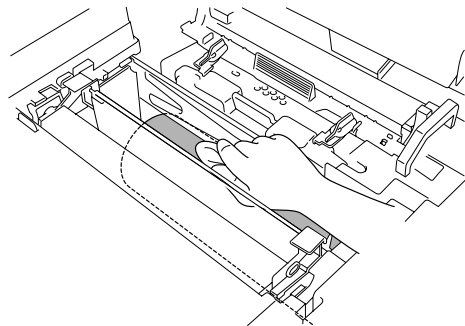


Fig.6-26



When installing the drum cleaner, be sure to put it into the printer correctly, indicated by a click.

Sequence of Assembling

- 1) Install the cleaner cover.
- 2) Close the top cover.
- 3) Press the power button to turn on the printer.
- 4) Upon completion of the warming-up process;
Press the Reset button while holding down the Shift button, and select "RESET PARTS LIFE" and then "120K KIT".

2.6 Ozone Filter Replacement

<Criterion of Replacement>

The ozone filter should be replaced with a new one according to the periodical maintenance cycle set out in Table 6-4. This is to prevent ozone from being exhausted due to the deterioration of the ozone filter.



PRECAUTION

Ozone filter should be replaced with a new filter every 12 months, otherwise it may cause an offensive smell.

<Necessary Tools and Replacement Materials>

No special tools and equipment are necessary for the replacement of the ozone filter.

<Work Procedure>

- 1) Remove the ozone filter case provided at the rear of the side cover (R).
- 2) Remove the ozone filter from the ozone filter case.
- 3) Install a new ozone filter to the filter case.
- 4) Install the ozone filter case to the side cover (R).

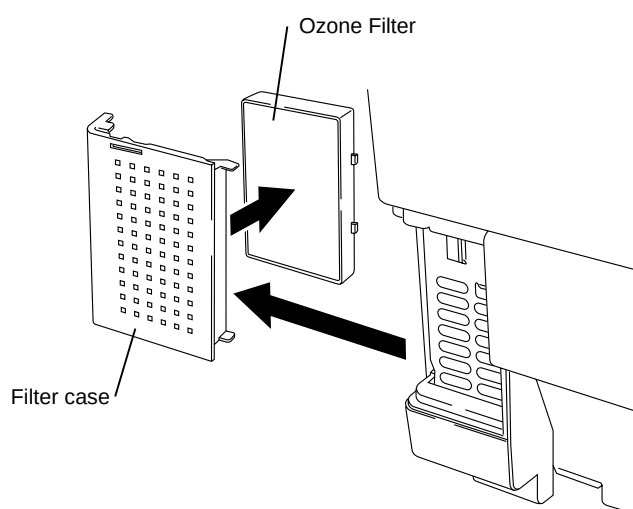


Fig.6-27

2.7 Paper Feed Roller and Separator Pad Replacement

<Criterion of Replacement>

The paper feeding roller and separator pad should be replaced with new ones according to the periodical maintenance cycle set out in Table 6-4.

When time is due for replacement of the paper feed roller and separator pad, the following message appears on the control panel.

LJ READY 001P T1
REPLACE 120K KIT

They also should be replaced when paper feed jams occur.

<Work Procedure>

- 1) Whenever paper feed jams occur, confirm the cause by following the information in Section 3 of Chapter VIII.
- 2) If the paper jam still occurs, replace the paper feeding roller and separator pad referring to Section 4.6.5 of Chapter VII.

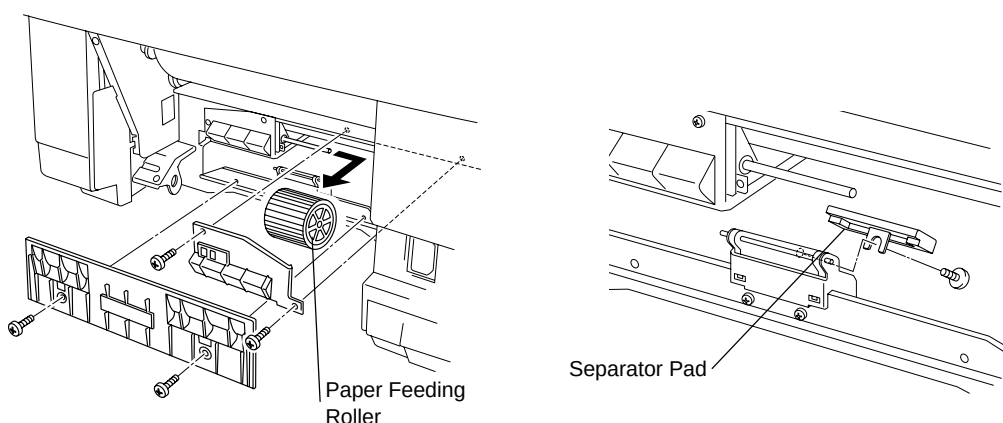


Fig.6-28

CAUTION

- *This is one of the periodic replacement items, not customer service. It should be implemented upon request of the customer or at periodic maintenance.*
- *After replacement, confirm the improvement of image failure by test printing.*

2.8 Transfer Drum Replacement

<Criterion of Replacement>

The transfer drum should be replaced with a new one according to the periodical maintenance cycle set out in the Table 6-4.

When time is due for replacement of the transfer drum, the following message appears on the control panel.

LJ READY 001P T1
REPLACE 120K KIT

It should be also replaced when an image failure occurs due to transfer drum damage.

<Work Procedure>

- 1) Whenever an image failure occurs, confirm the cause by following the information in Section 5 of Chapter VIII.
- 2) If the image failure still occurs, replace the transfer drum referring to Section 4.2.11 of Chapter VII.

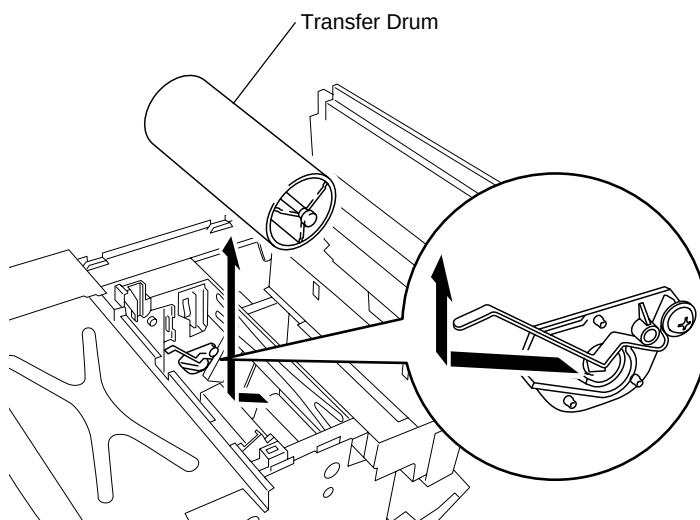


Fig.6-29



CAUTION

- *This is one of the periodic replacement items, not customer service. It should be implemented upon request of the customer or at periodic maintenance.*
- *After replacement, confirm the improvement of print quality failure by test printing.*

CHAPTER VII

DISASSEMBLY

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CHAPTER VII DISASSEMBLY

1. BEFORE STARTING DISASSEMBLY

1.1 Precautions

Follow the precautions described below during maintenance work.

- (1) Do not implement any operation, disassembly or modification which is not set out in this manual.
- (3) This printer incorporates dangerous parts subject to warnings such as “High Temperature”, “High Voltage” and “Laser Radiation”. Before starting any work on this printer, make sure you have read and understand the warnings set out in this manual.
- (4) Collect and dispose of any waste toner cartridges removed during maintenance correctly in accordance with local regulations. Do not dispose of them with inflammable materials or dispose of them into a fire.
- (5) The grounding wire is disconnected when replacing or removing the DC power supply unit. After completing the replacement work, confirm that the grounding wire is reconnected correctly to the earth mark  .
- (6) Ensure that the type and length of screws removed during replacement of maintenance parts is noted and the correct screws are used during re-assembly. (See Table 7-1.)
- (7) Do not use any solvent such as alcohol for the maintenance of this printer.
- (8) Confirm that all the parts and covers are installed or assembled correctly before starting the test run after replacement of maintenance parts.
- (9) The re-assembly order is the reverse of the dis-assembly order. In all cases, follow the flow chart in reverse to re-assemble the printer. Where there is any change to the order, this is noted in the relevant section.

1.2 Preparation of Disassembly

Follow the procedure described below for preparation before commencing any work.

- (1) Ensure that the power cable is disconnected from the power outlet.
- (2) Remove **all consumable parts** (OPC belt cartridge, fuser cleaner, oil bottle, all toner cartridges, ozone filter) and **the Main (Video Controller) PCB**, and then store them correctly before starting dis-assembly.



PRECAUTION

- *Do not directly touch the OPC belt surface with bare hands or gloves.*
- *If the belt is exposed for more than two minutes to a light source of 800 lux, the belt may be damaged.*

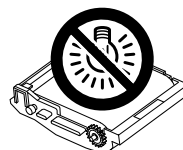
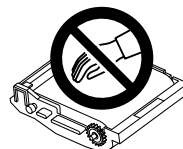
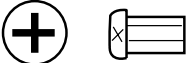
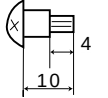
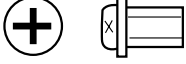
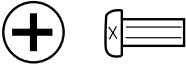


Table 7-1: Table of Screw Sizes Used in the Printer

Class Code	Name of Screw	Size and Shape of Screw			Remarks
		M-Thread TS	Length	Sharp	
BT3X8	Cross recessed head tapping screw	T3	8mm		Used for plastic parts.
BT3X12		T3	10mm		
		T4	6mm		
BT4X8		T4	8mm		
BT4X10		T4	10mm		
ST3X6	S tight screw	ST	6mm		Used for steel parts fitted to steel plates.
M4X6	Cross recessed head tapping screw (Pan head)	M4	6mm		Used for frame and GND.
SP3	Unique screw for heater connector.	M3	10mm		Used for the fusing unit connector.
F4X6	Cross recessed head screw with flange.	F4	6mm		Used for the fusing unit.
FST3X10	Cross recessed head S tight screw with flange.	FST	10mm		Used for the fusing unit.
M2X10	Cross recessed head screw (Pan head)	M2	10mm		Used for the fusing unit.

2. PARTS NAME

2.1 Cover

<Front View>

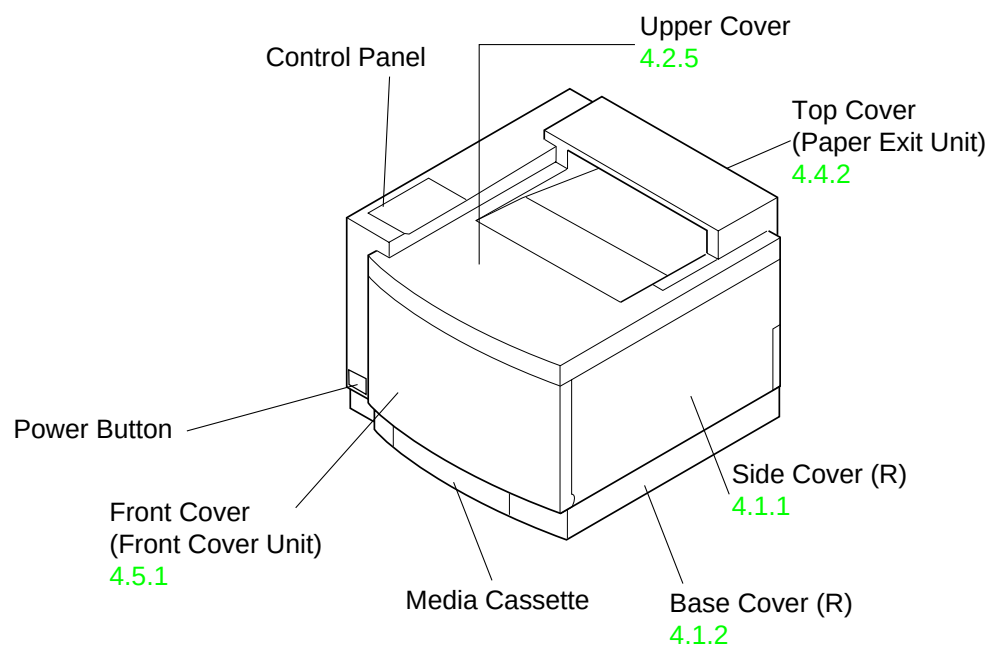


Fig.7-1

<Rear View>

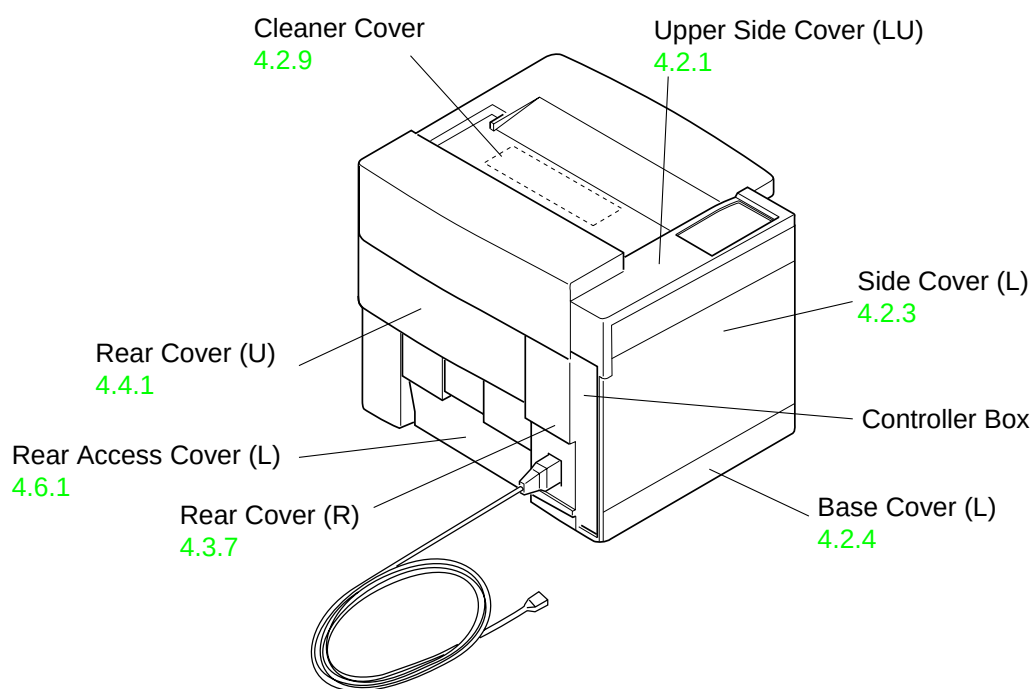


Fig.7-2

2.2 Circuit Boards (PCBs)

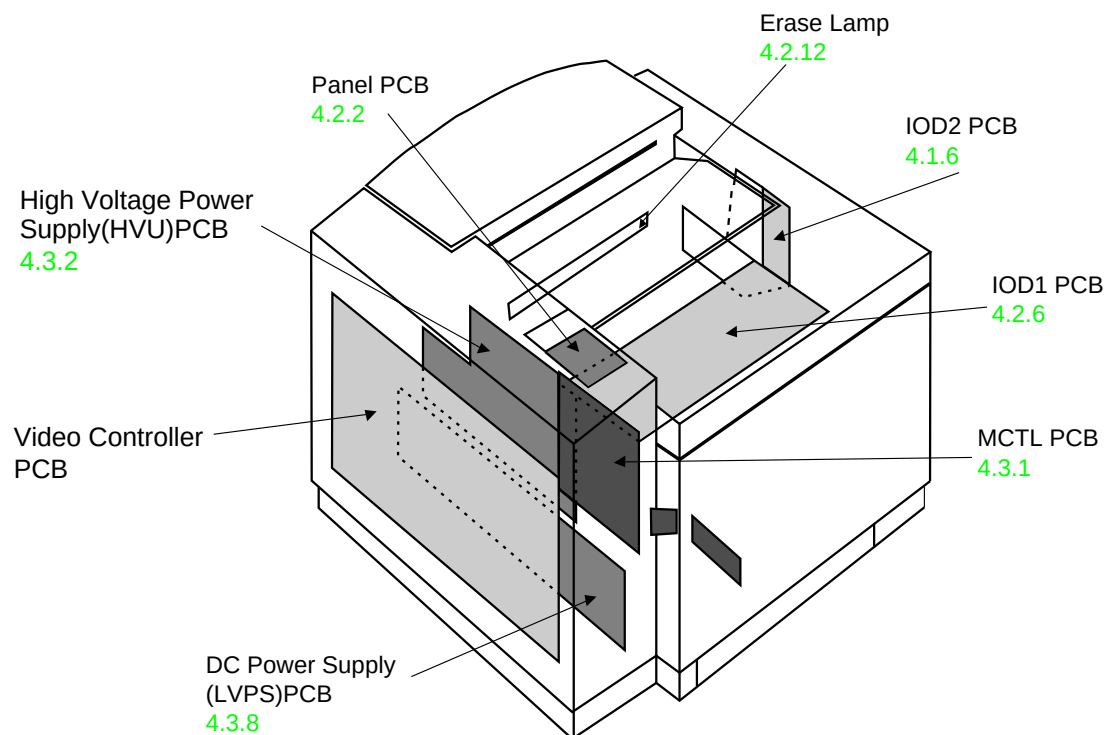


Fig.7-3

2.3 Motor Units

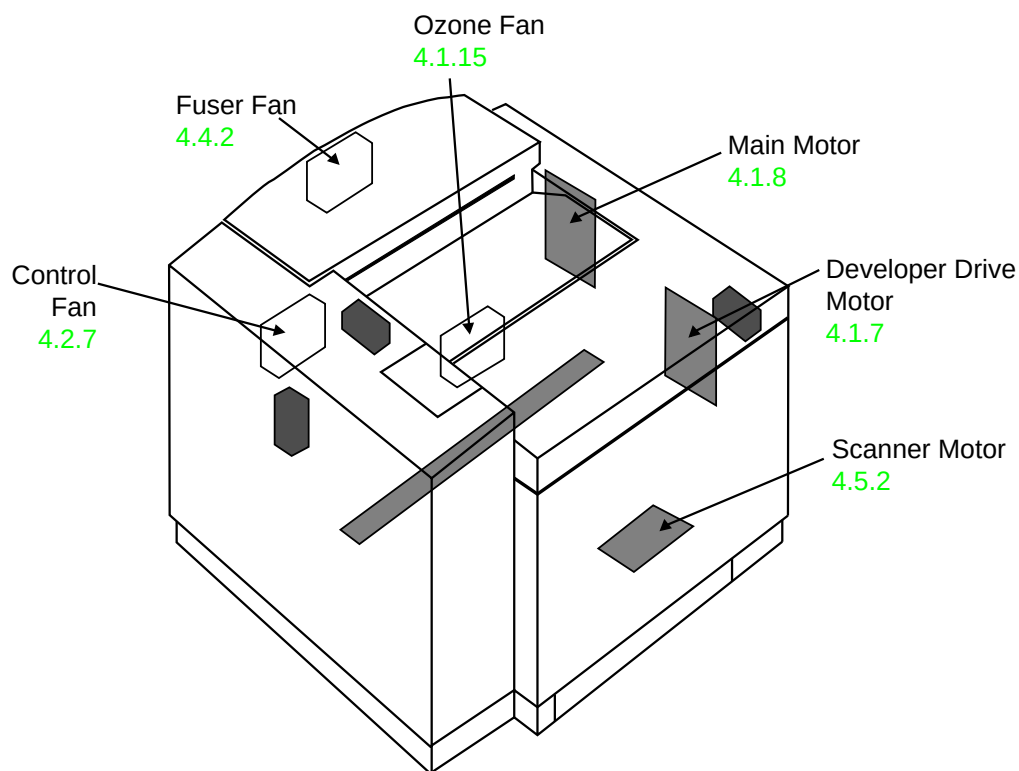


Fig.7-4

2.4 Clutches and Solenoids

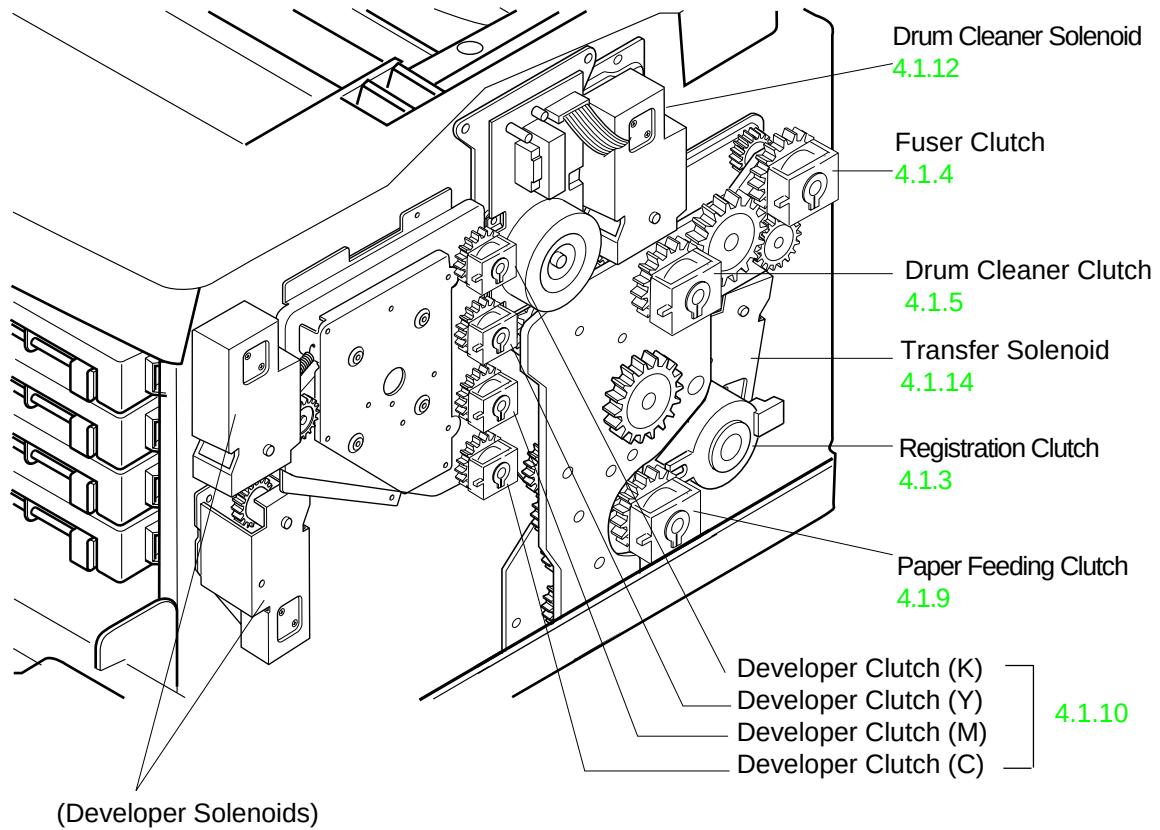


Fig.7-5

2.5 Sensors

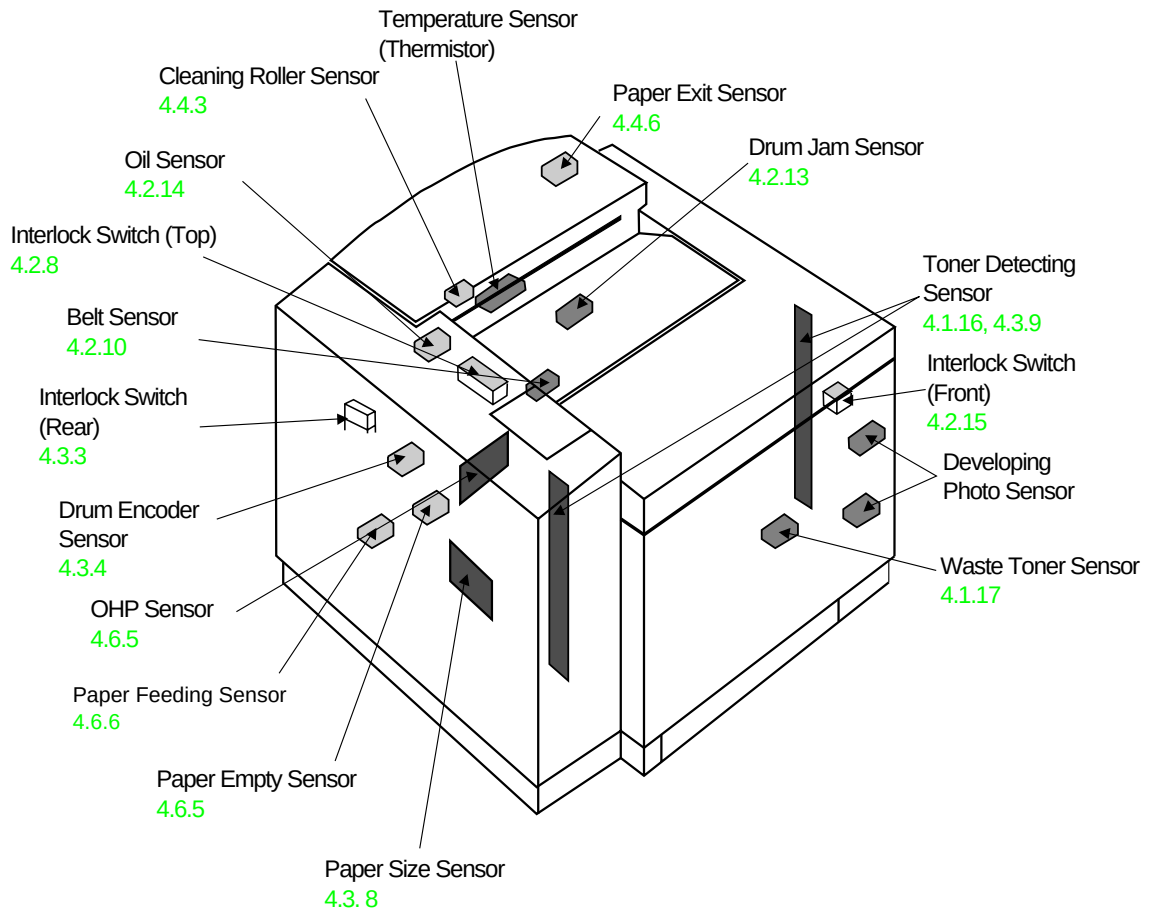
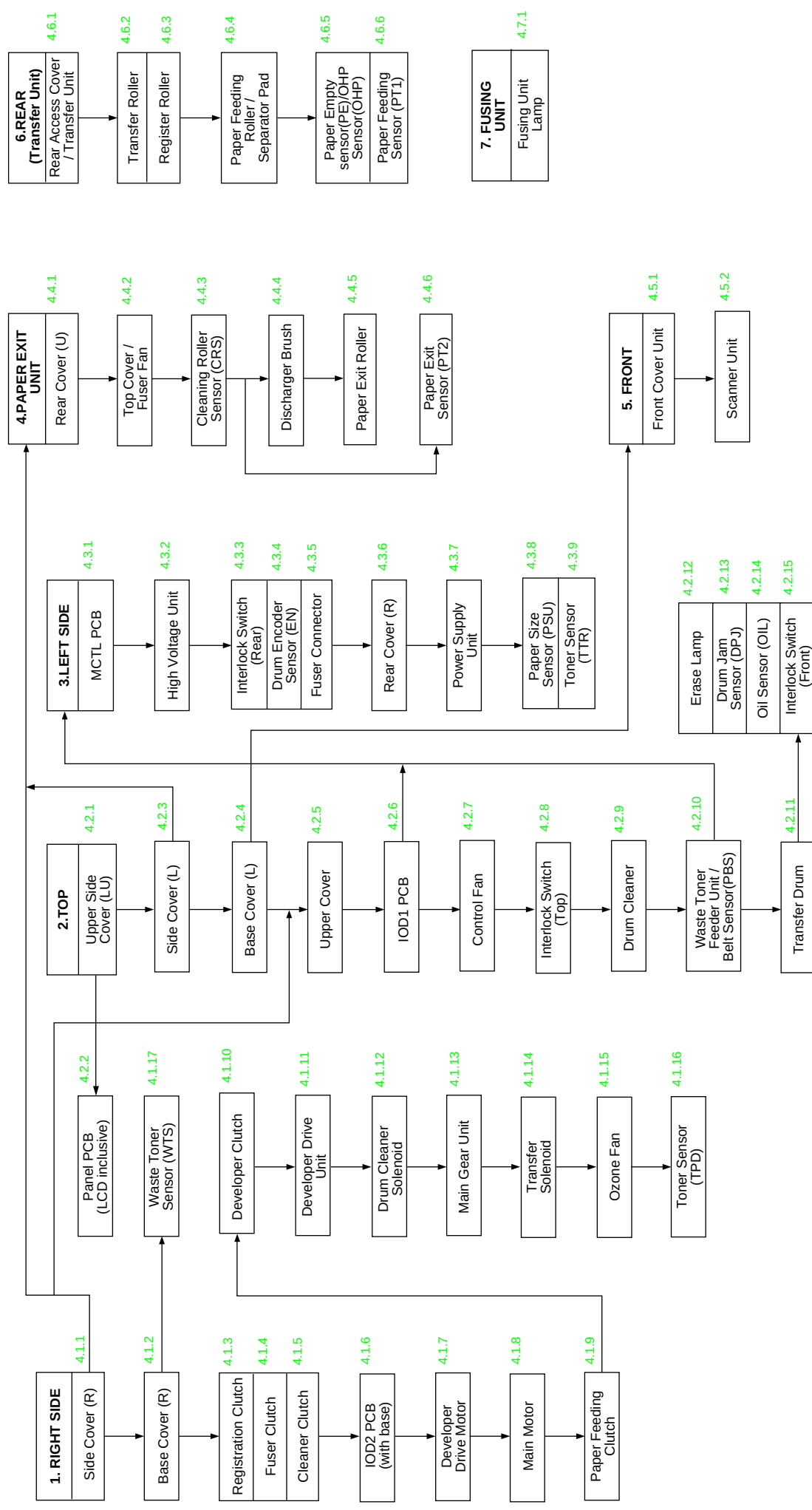


Fig.7-6

3. DISASSEMBLY FLOW



4. DISASSEMBLY PROCEDURE

4.1 Right Side of the Printer

4.1.1 Side Cover (R)

- 1) Remove the set screw BT4X8 (1 pc.) of side cover (R) at the rear of the printer.

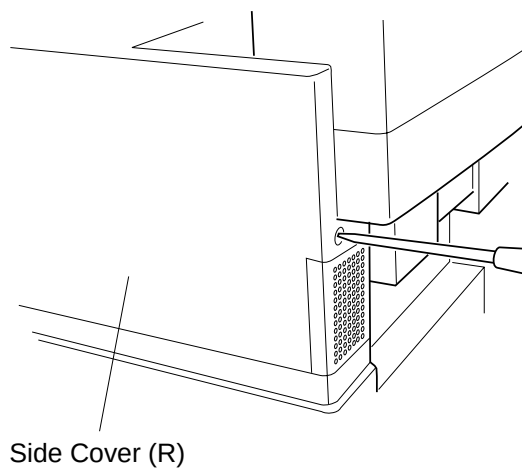


Fig.7-7

- 2) Slide the side cover (R) in the direction of the arrows as shown in Fig.7-8.
- 3) Remove the side cover (R) by releasing the two hooks.

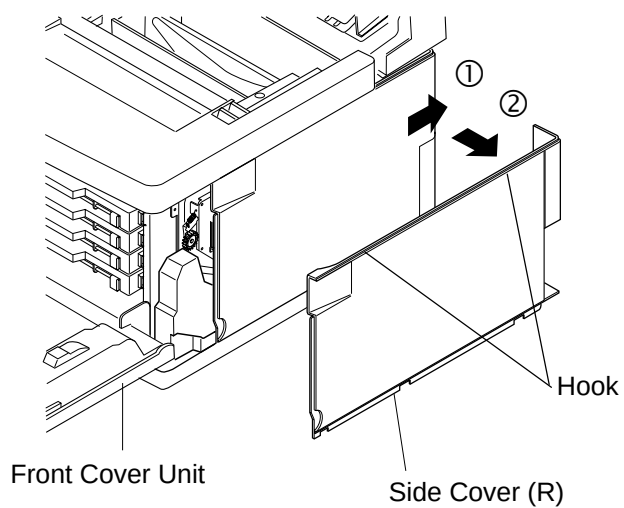


Fig.7-8

4.1.2 Base Cover (R)

- 1) Remove the set screws BT4X8 (2 pcs.) from the base cover (R).
- 2) Remove the base cover (R) from the base.

Note:

If the optional lower tray unit is fitted, it will be necessary to remove the lower tray clamp screw and locking bar to release the base cover (R).

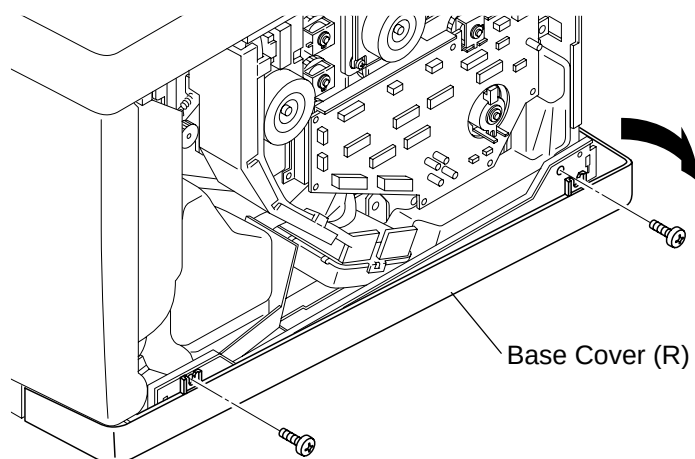


Fig.7-9



PRECAUTION

- When assembling the base cover, insert the leading edge of the base cover (R) into the hook provided at the bottom (left and right) of the base plate.
- Ensure that projecting part (□) of the base cover (R) goes into the hole in the base plate bottom.

4.1.3 Registration Clutch (RECL)

- 1) Remove the connector (1 pc.) from the IOD2 PCB.
- 2) Remove the outer plastic C ring from the shaft.
- 3) Pull out the registration clutch from the shaft.

4.1.4 Fuser Clutch (FUCL)

- 1) Remove the connector (1 pc.) from the IOD2 PCB.
- 2) Remove the outer plastic C ring from the shaft.
- 3) Pull out the fuser clutch from the shaft.

4.1.5 Drum Cleaner Clutch (FBCL)

- 1) Remove the connector (1 pc.) from the IOD2 PCB.
- 2) Remove the outer plastic C ring from the shaft.
- 3) Pull out the drum cleaner clutch from the shaft.

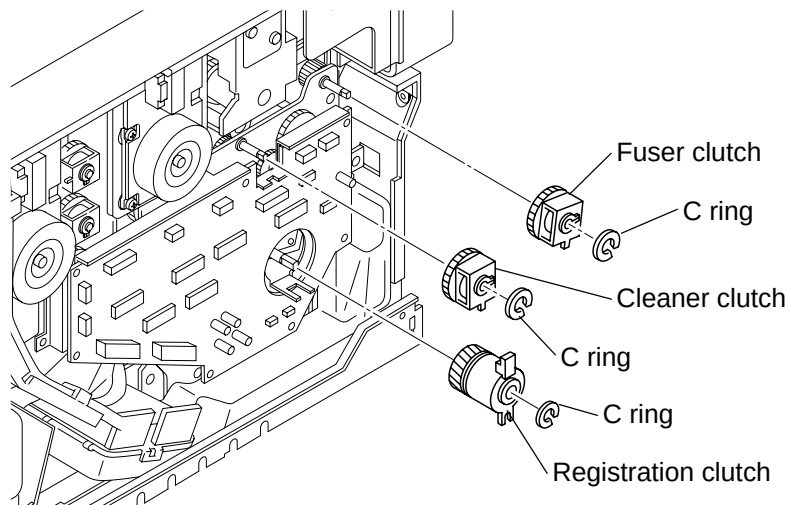


Fig.7-10

4.1.6 IOD2 PCB (with base)

- 1) Disconnect all the harness connectors (13 pcs.) connected to the IOD2 PCB.
- 2) Remove the set screws ST3X6 (2 pcs.) from the IOD2 PCB base.
- 3) Remove the IOD2 PCB (with base) from the main body.



PRECAUTION

When handling the IOD2 PCB take care not to cause electrostatic damage to the PCB.

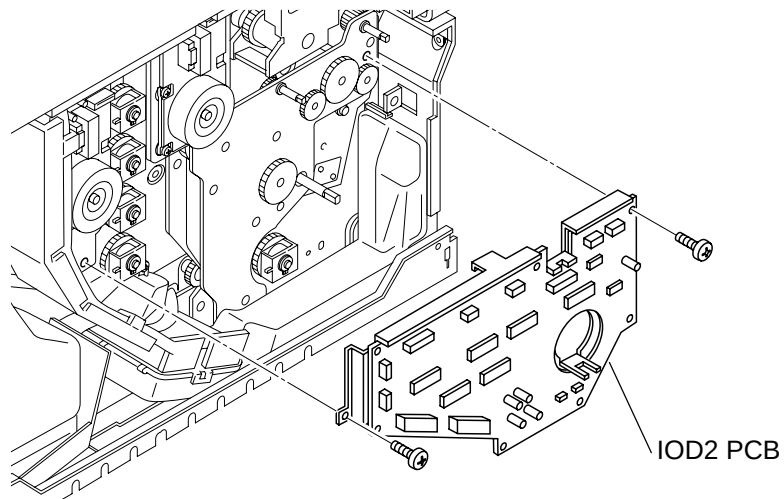


Fig.7-11

4.1.7 Developer Drive Motor (DM)



CAUTION

Take care not to stress the motor drive PCB when removing the connector or handling the motor / PCB assembly.

- 1) Remove the connector (1 pc.) from the developer drive motor PCB.
- 2) Remove the set screws ST3X6 (4 pcs.) holding the developer drive motor to the developer drive unit.
- 3) Remove the developer drive motor.

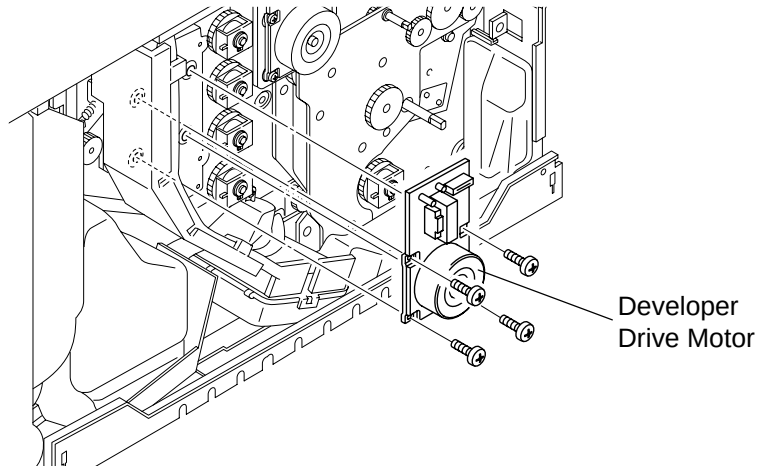


Fig.7-12

4.1.8 Main Motor (MM)

- 1) Remove the connector (1 pc.) from the main motor PCB.
- 2) Remove the screws ST3X6 (4 pcs.) holding the main motor to the mounting plate.
- 3) Remove the main motor from the mounting plate.
- 4) Remove the screws ST3X6 (3 pcs.) holding the mounting plate.
- 5) Remove the mounting plate.

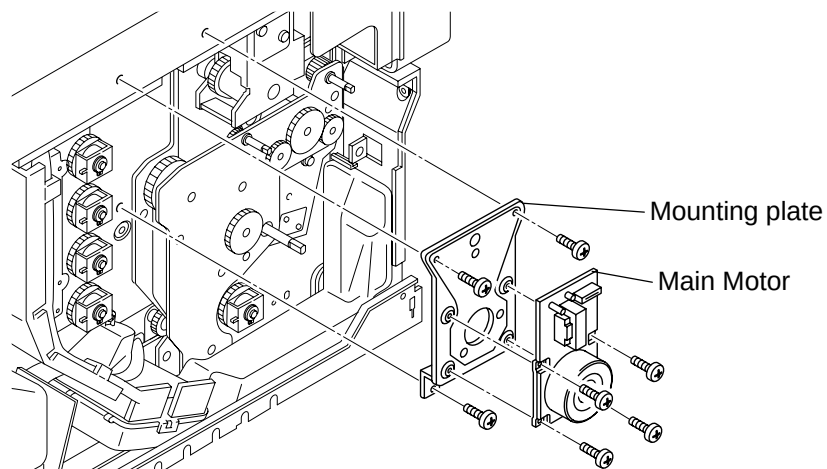


Fig.7-13

4.1.9 Paper Feeding Clutch (PCLU)

- 1) Remove the outer plastic C ring from the shaft.
- 2) Remove the paper feeding clutch from the shaft.

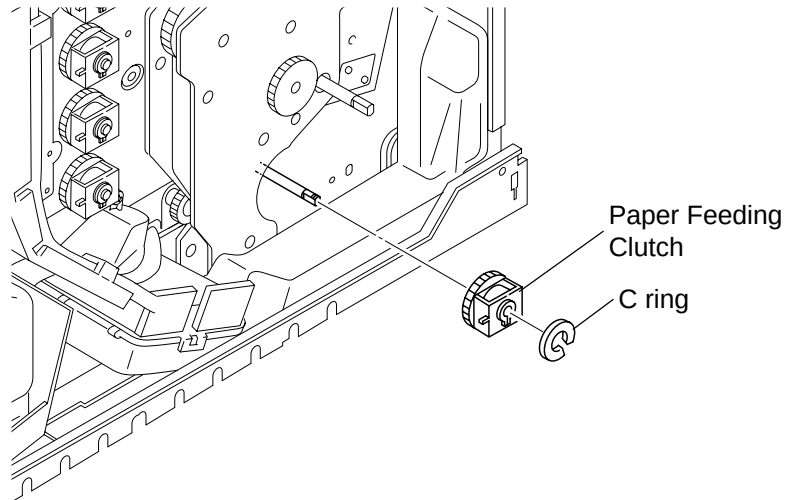


Fig.7-14

4.1.10 Developer Clutch (K, Y, M, C)

- 1) Remove the outer plastic C ring of each developer clutch from the shaft.
- 2) Pull out the developer clutch from the shaft.

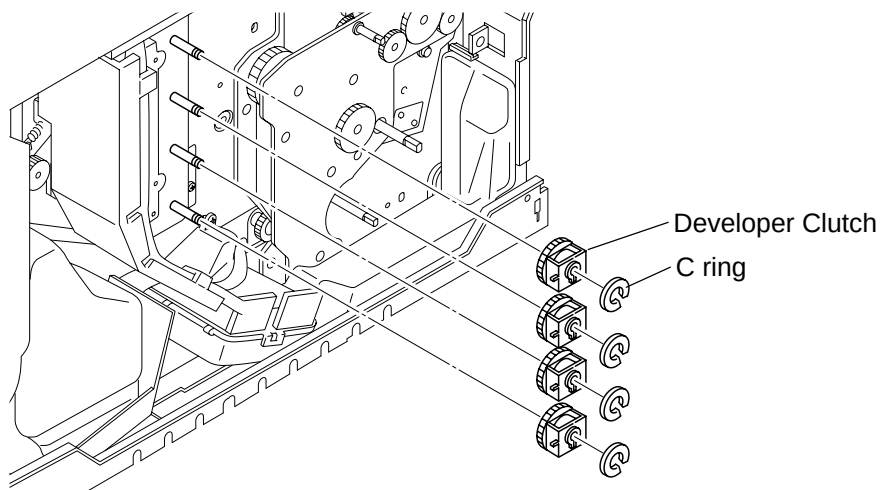


Fig.7-15

4.1.11 Developer Drive Unit

- 1) Open the front cover.
- 2) Remove the waste toner box.
- 3) Remove the harness guide.
- 4) Remove the set screws ST3X6 (4 pcs.) from the developer drive unit.
- 5) Remove the developer drive unit.

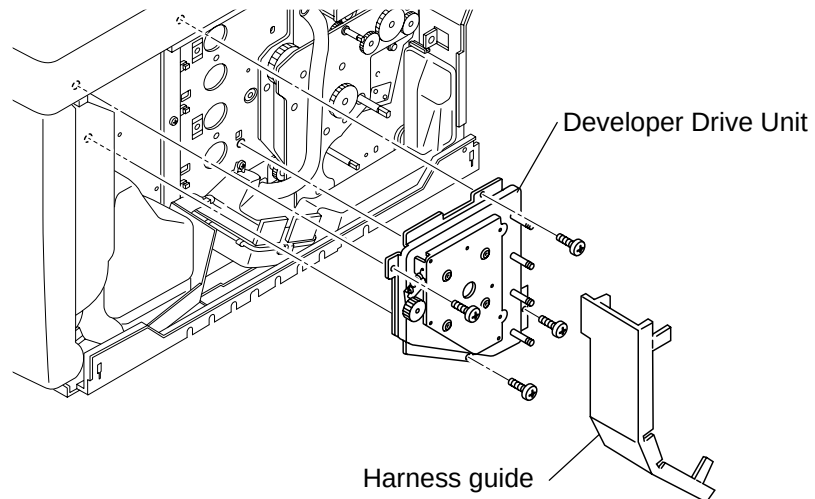


Fig.7-16

4.1.12 Drum Cleaner Solenoid (FBSOL)

- 1) Remove the set screws ST3X6 (2 pcs.) from the drum cleaner solenoid.
- 2) Remove the drum cleaner solenoid.

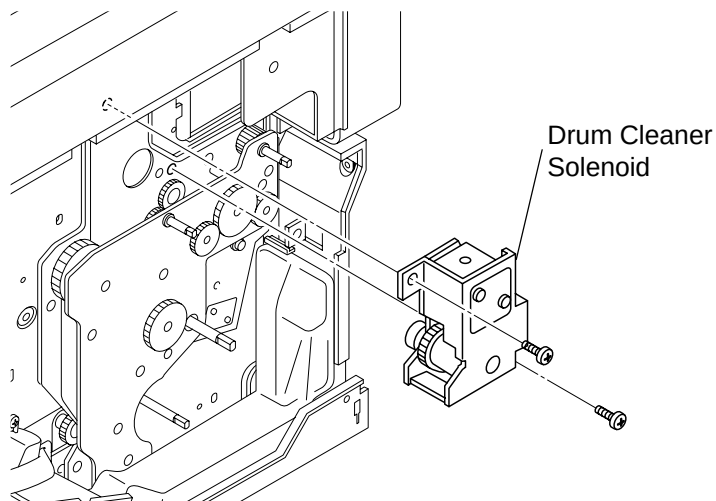


Fig.7-17

4.1.13 Main Gear Unit

- 1) Remove the screws ST3X6 (3 pcs.) and loosen the screw BT4X8 (1 pc.) holding the rear plastic cover plate and then remove the stay (R).
- 2) Remove the upper set screw ST3X6 (1 pc.) from the ozone fan case.
- 3) Remove the ozone fan duct.
- 4) Remove the set screws ST3X6 (5 pcs.) from the main gear unit.
- 5) Remove the top cover securing screw to release the top of the gear unit plate.
- 6) Remove the main gear unit from the frame.

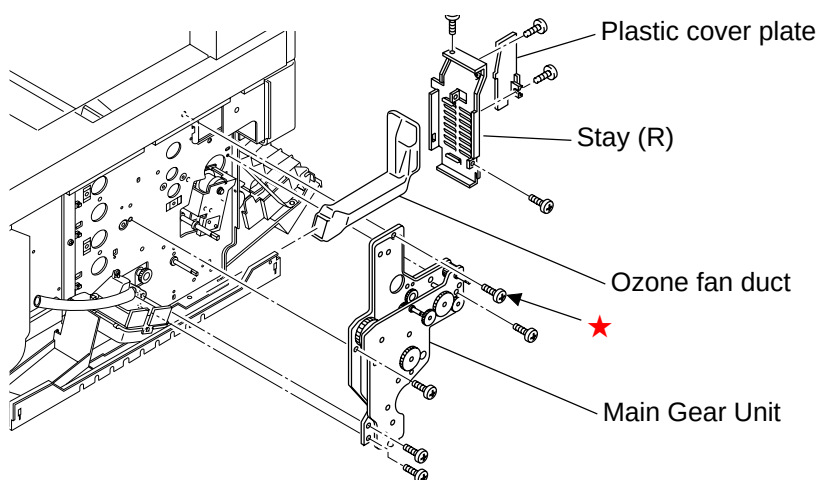


Fig.7-18

Note:

The black plastic cap covers the thread of the screw marked ★. Be sure not to lose the cap when removing the screw.

4.1.14 Transfer Solenoid (TRSOL)

- 1) Remove the set screws ST3X6 (2 pcs.) from the transfer solenoid.
- 2) Open the rear access cover.
- 3) Remove the transfer solenoid.

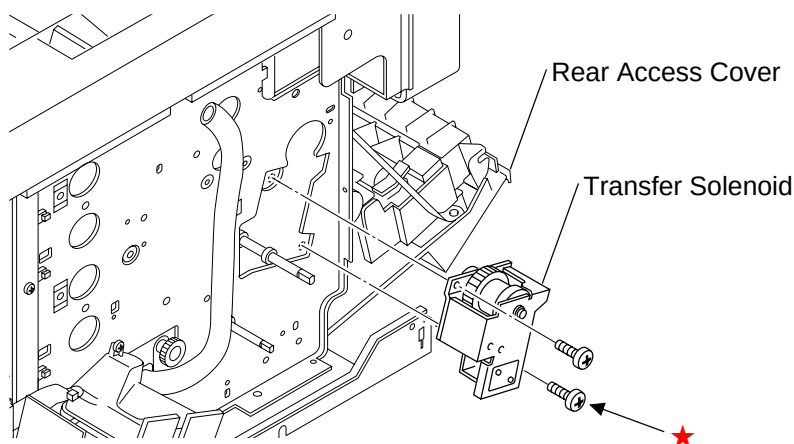


Fig.7-19

Note:

The black plastic cap covers the thread of the screw marked ★. Be sure not to lose the cap when removing the screw.

4.1.15 Ozone Fan (OZFAN)

- 1) Remove the lower set screw ST3X6 (1 pc.) from the fan case assembly. (Fig.7-20)
- 2) Remove the fan case assembly.
- 3) Remove the ozone fan from the fan case. (Fig.7-21)

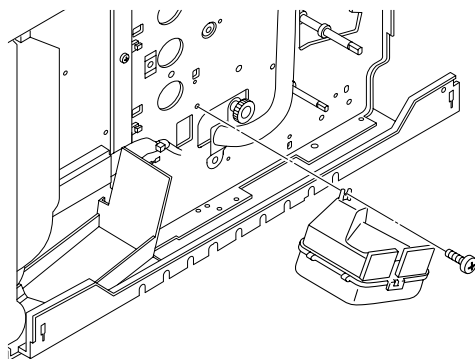


Fig.7-20

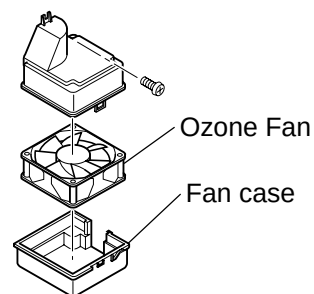


Fig.7-21

4.1.16 Toner Sensor Assembly (TPD)

- 1) Remove the set screws ST3X6 (3 pcs.) from the toner sensor PCB.
- 2) Disconnect the connector to the toner sensor PCB.

Note:

If the optional lower tray unit is fitted, remove the left hand screw of the front cross rail to release the media cassette guide.

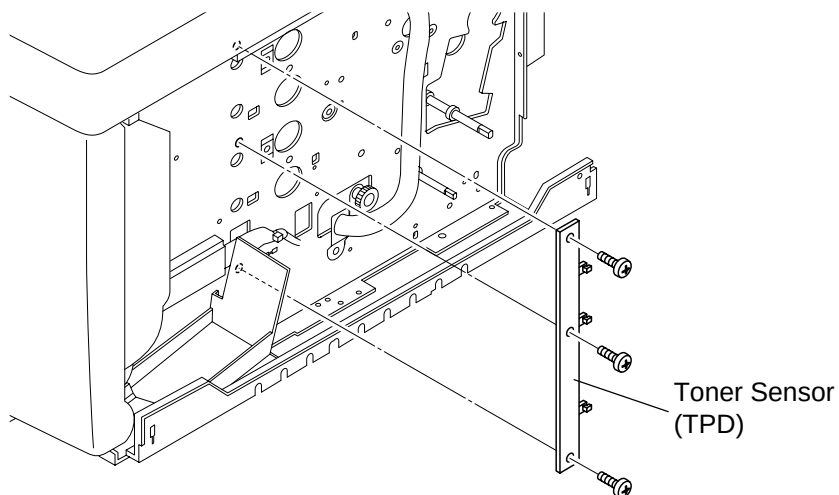


Fig.7-22

4.1.17 Waste Toner Sensor (WTS)

- 1) Lift up the bottle holder.
- 2) Remove the screws (2 pcs.) from the bottle holder and waste toner sensor assembly.
- 3) Disconnect the connector from the waste toner sensor.
- 4) Remove the sensor assembly with the bottle holder.
- 5) Remove the waste toner sensor by removing the hooked pawl.

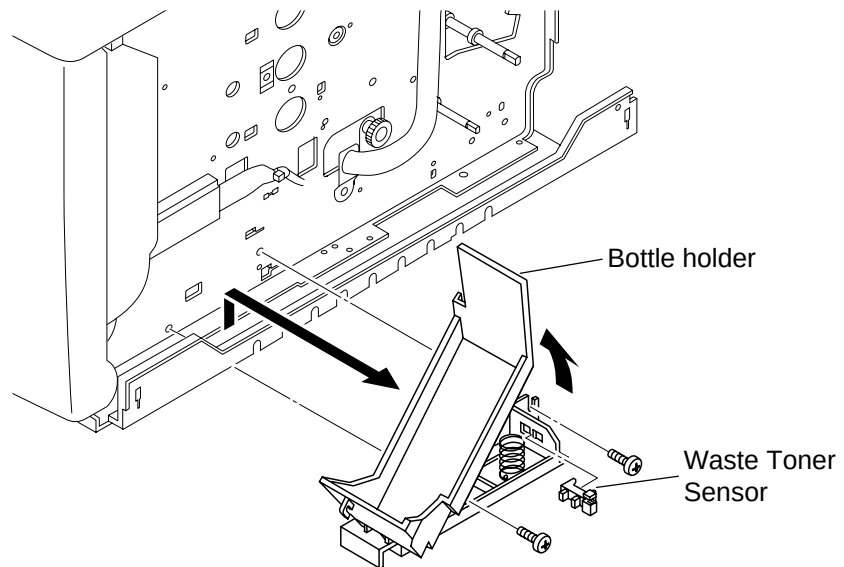


Fig.7-23

4.2 Top of the Printer

4.2.1 Upper Side Cover (LU)

- 1) Open the top cover.
- 2) Remove the set screw BT4X8 securing the side cover (LU)
- 3) Press the exterior of the side cover inwards(L) and unlock the hooks (three locations) from the side cover (LU). (Fig.7-25)

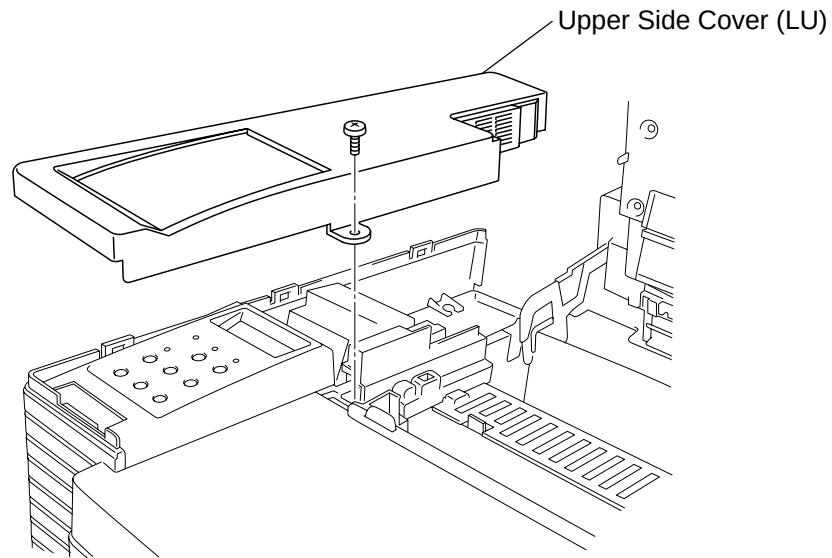


Fig.7-24

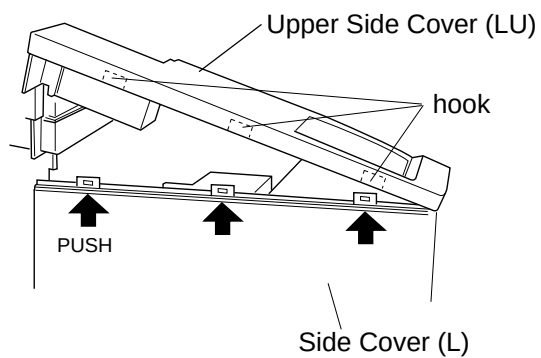


Fig.7-25

4.2.2 Panel PCB (including LCD)

- 1) Remove the set screw BT4X10 (1 pc.) from the panel case assembly and disconnect the connector. (Refer to Figure 7-26 below.)
- 2) Remove the set screws BT3X8 (4 pcs.) from the panel PCB and remove the panel shield plate, PCB and LCD from the panel case assembly.

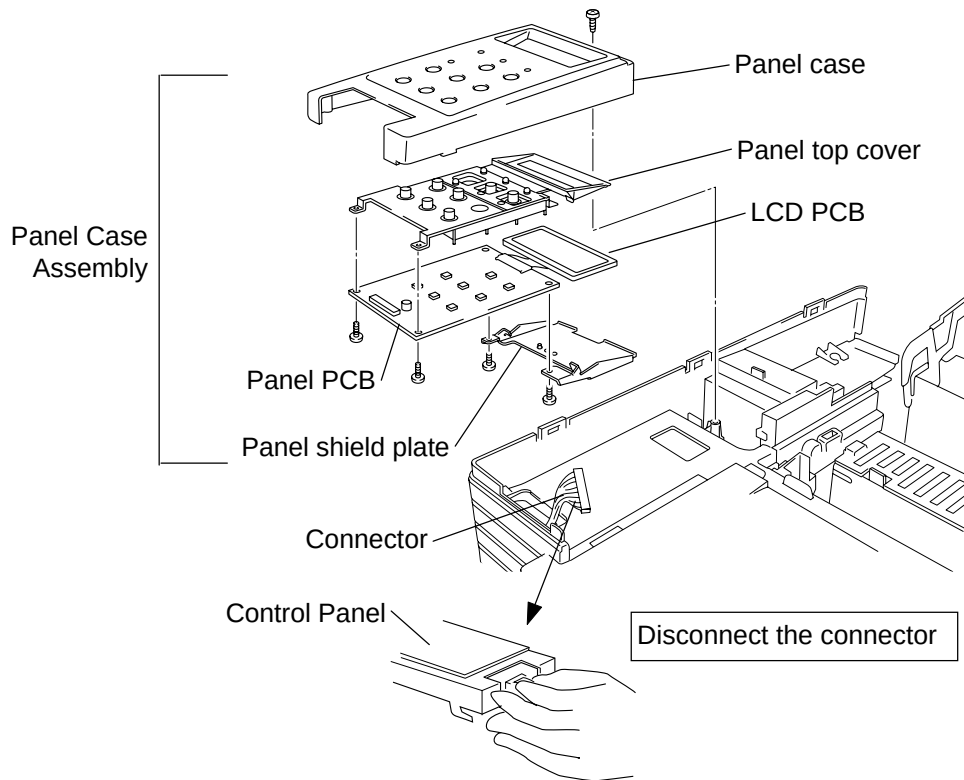


Fig.7-26

4.2.3 Side Cover (L)

- 1) Remove the set screw BT4X8 (2 pcs.) of side cover (L).
- 2) Remove the side cover (L).
(Slowly pull up the side cover (L), and release the hook from the front of the Upper cover.)

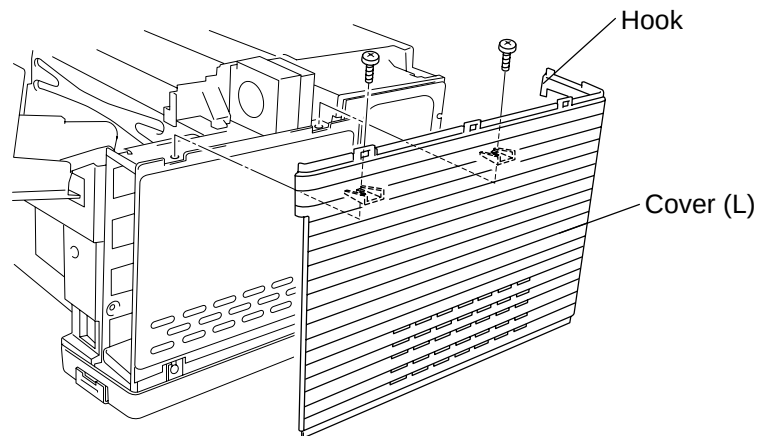


Fig.7-27

4.2.4 Base Cover (L)

- 1) Remove the set screws TS4X8 (2 pcs.) from the base cover (L).
- 2) Remove the base cover (L) from the base.

Note:

If the optional lower tray unit is fitted, it will be necessary to remove the lower tray clamp screw and locking bar to release the base cover (R). For further information, refer to the User Guide.

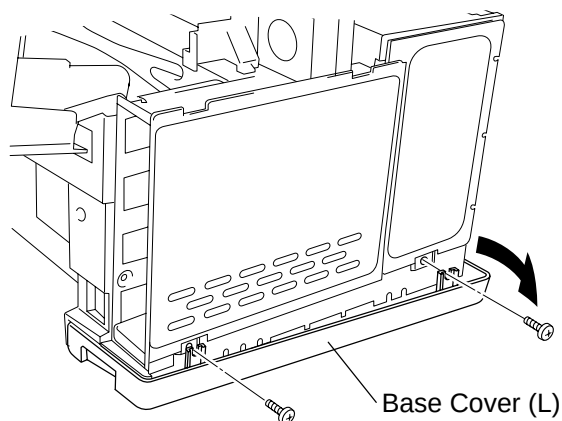


Fig.7-28



PRECAUTION

- When re-assembling the base cover, insert the leading edge of the base cover (L) into the hook provided at the bottom (left and right) of the base plate.
- Ensure that the projecting part () of the base cover (L) goes into the hole in the base plate bottom.

4.2.5 Upper Cover

- 1) Open the front cover and release the belt cartridge lock levers.
- 2) Remove the side cover (R).
- 3) Remove the set screws BT4X8 (2 pcs.) securing the upper cover. (Top X 1 and Right hand side X 1)
- 4) Slightly lift up the rear edge of the upper cover.
- 5) Pull the upper cover toward you and unhook the hook at the front of the cover from the frame.

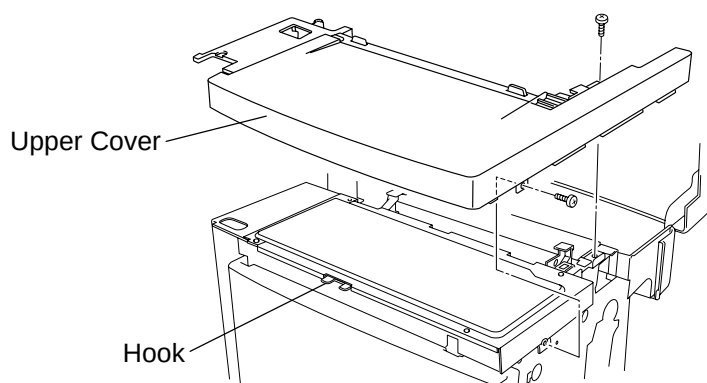


Fig.7-29

4.2.6 IOD1 PCB

- 1) Remove the set screws ST3X6 (3 pcs.) from the shield (upper).
- 2) Disconnect all the harness connectors (14 pcs.) connected to the IOD1 PCB. Note that the DCN3 connector is a link plug and need not be removed unless necessary.
- 3) Remove the set screws ST3X6 (6 pcs.) from the IOD1 PCB.
- 4) Remove the IOD1 PCB.

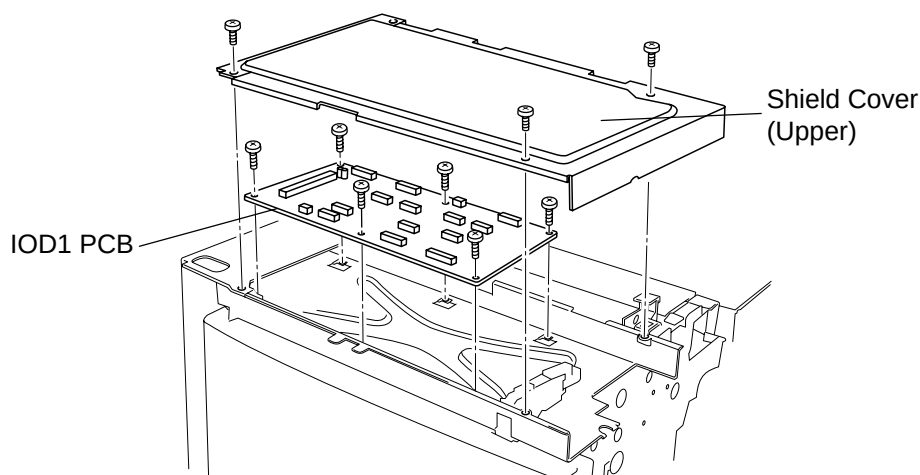


Fig.7-30



PRECAUTION

When handling the IOD1 PCB, take care that no damage is caused due to electrostatic charges.

4.2.7 Control Fan (CTFAN)

- 1) Remove the set screw BT3X8 (2 pcs) and washer holding the fan and interlock assembly. (Fig.7-31)
- 2) Remove the fan and interlock assembly.
- 3) Remove the fan motor from the fan case after releasing the fan cover plastic clips. (Fig.7-32)

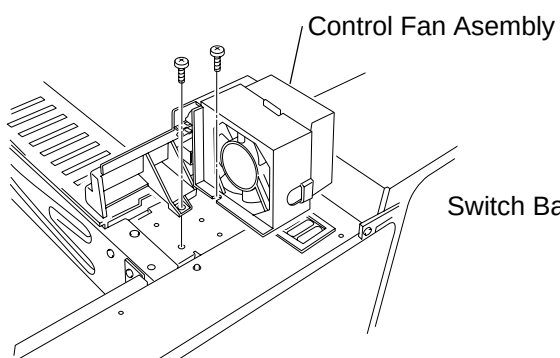


Fig.7-31

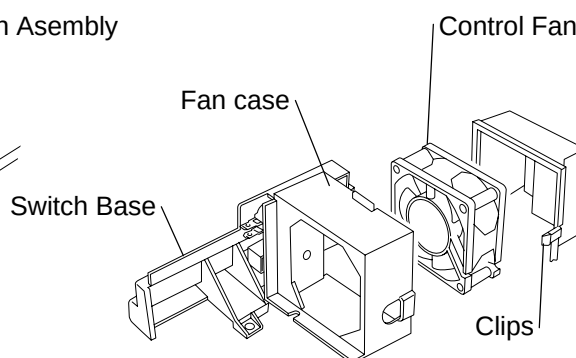


Fig.7-32

4.2.8 Interlock Switch (Top) (Paper Exit Unit)

- 1) Remove the set screw BT3X8 (1 pc.) and remove the switch base from the control fan case.
- 2) Remove the interlock switch from the switch base.



CAUTION

Since the interlock switch is an important safety item, after installation confirm that the switch operates correctly.

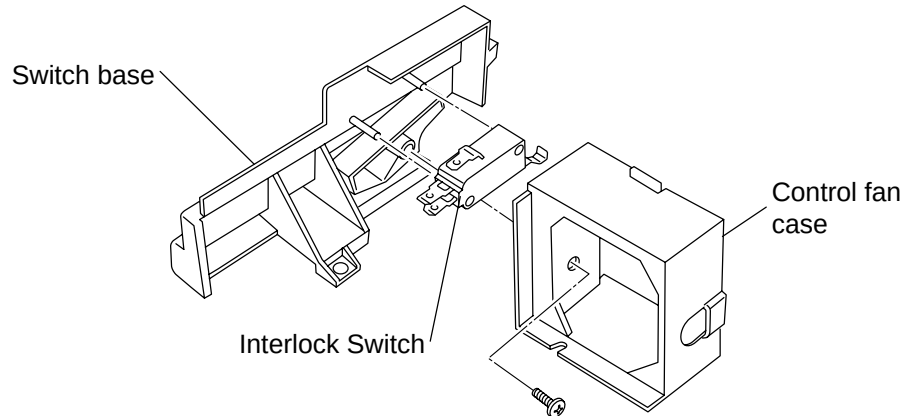


Fig.7-33

4.2.9 Drum Cleaner

- 1) Push the two hooks on the cleaner cover rearward to release them and remove the cleaner cover.
- 2) Remove the drum cleaner by pushing the handle backwards until it releases from the contacts at the left and right hand ends, then lift out the drum cleaner assembly.

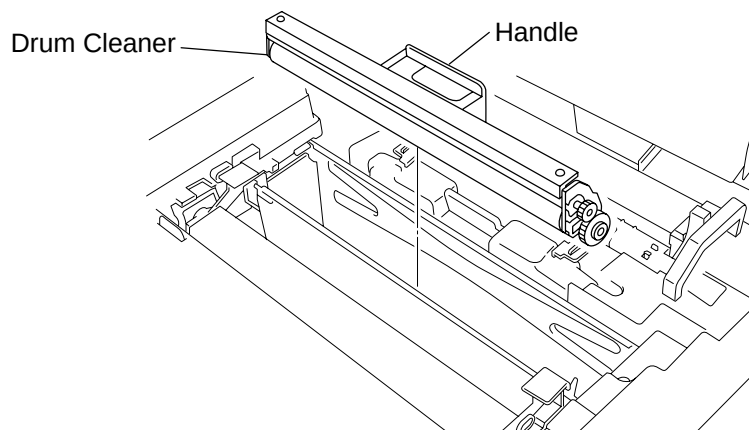


Fig.7-34

4.2.10 Waste Toner Feeder Unit / Belt Sensor (PBS)

- 1) Remove the set screws ST3X6 (2 pcs.) from the waste toner feeder unit.
- 2) Remove the waste toner feeder unit complete with the belt sensor.
- 3) Disconnect the connector (1 pc.) to the belt sensor.
- 4) Remove the belt sensor from the waste toner feeder unit.

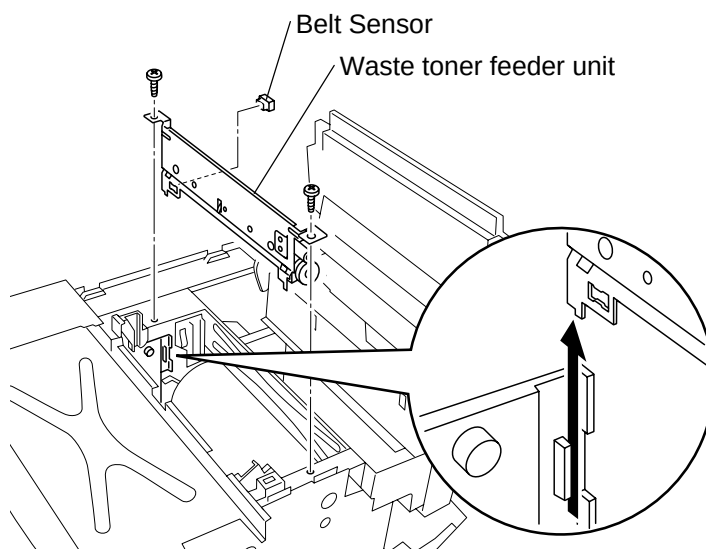


Fig.7-35

4.2.11 Transfer Drum

- 1) Open the rear access cover.
- 2) Protect the surface of the transfer drum by covering it with paper.
- 3) Push the transfer drum up and forwards from the transfer unit side. (Refer to Fig.7-36.)
- 4) Release the transfer drum from the shaft supports.
- 5) Pull up and remove the transfer drum from the top of the printer.

Note:

- For easier removal, push the drum upwards and diagonally forwards.
- When re-assembling the transfer drum, slide the drum shaft between the metal plates and ensure the drum is fully located into the correct retaining position.



PRECAUTION

Do not touch the transfer drum surface with your bare hands or scratch it. Protect the drum surface during handling.

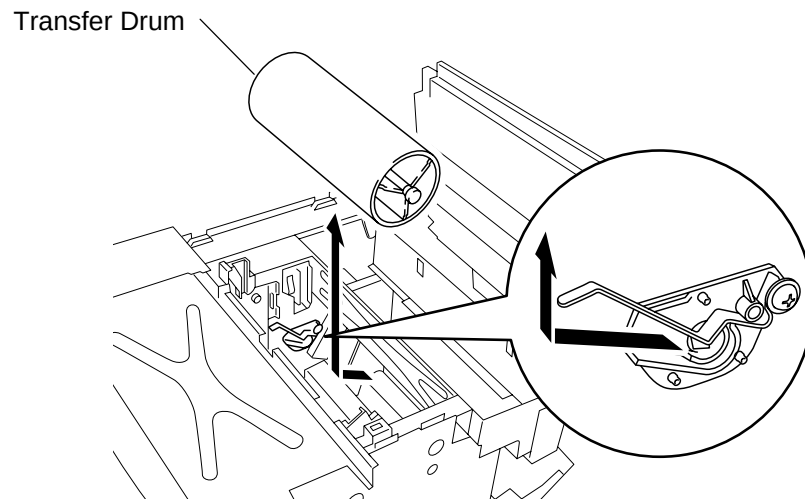


Fig.7-36

4.2.12 Erase Lamp

- 1) Disconnect the harness (1 pc.) connected to the erase lamp.
- 2) Remove the erase lamp from the holder.

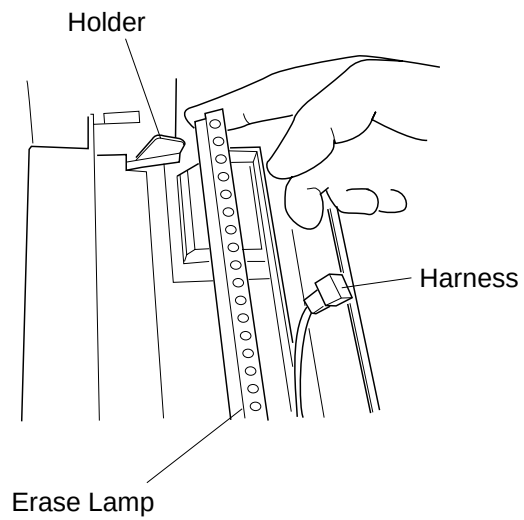


Fig.7-37

4.2.13 Drum Jam Sensor (DPJ)

- 1) Remove the cover F by lifting the left hand end of the cover and sliding the cover to the right to release the catches.
- 2) Disconnect the drum jam sensor connector.
- 3) Remove the drum jam sensor.

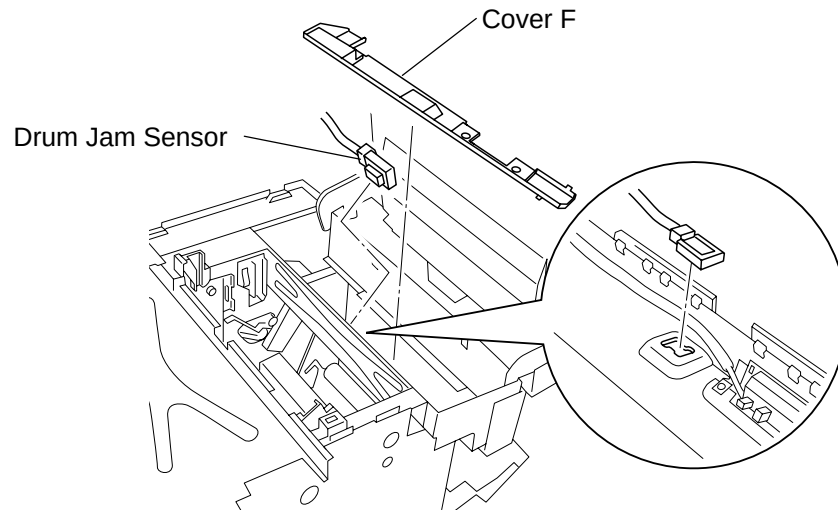


Fig.7-38

4.2.14 Oil Sensor (OIL)

- 1) Remove the set screw ST3X6 (2 pcs.) from the oil sensor.
- 2) Disconnect the oil sensor connector.
- 3) Remove the oil sensor assembly.

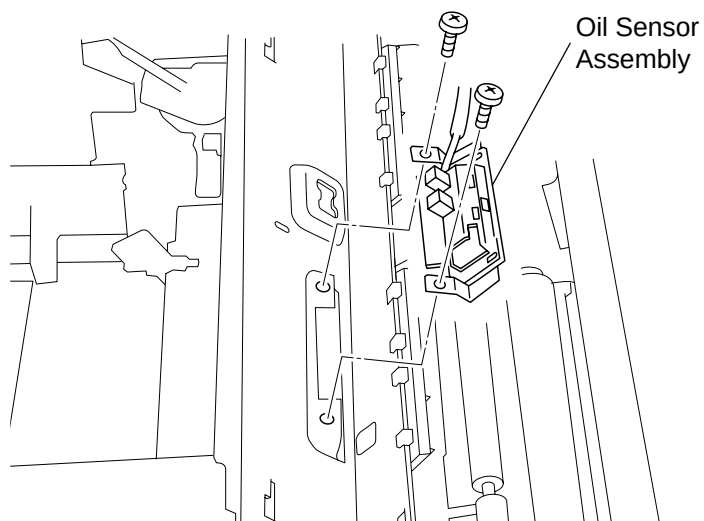


Fig.7-39

4.2.15 Interlock Switch (Front) (for Front Cover)

- 1) Remove the set screw (1 pc.) and washer to remove the switch assembly from the stay U.
- 2) Remove the connector.
- 3) Remove the interlock switch from the switch case.

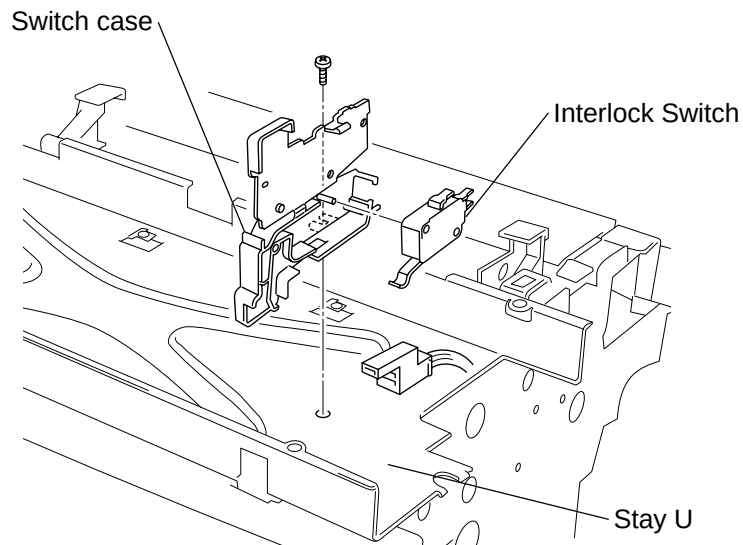


Fig.7-40



CAUTION

Since the interlock switch is an important safety item, after installation confirm that the switch operates correctly.

4.3 Left Side of the Printer

4.3.1 MCTL PCB



CAUTION

Remove the Main (Video Controller) PCB before starting this disassembly.

- 1) Remove the set screws ST3X6 (3 pcs.) from shield cover 'A'.
- 2) Remove the shield cover 'A'.
- 3) Remove the set screw ST3X6 (1 pc.) from shield cover 'B'. Slide the cover upwards and remove it
- 4) Disconnect all the harness connectors (5 pcs.) connected to the MCTL PCB.
- 5) Remove the set screws ST3X6 (4 pcs.) from the MCTL PCB.
- 6) Remove the MCTL PCB.



PRECAUTION

- *Read the internal RAM counter information from the MCTL PCB prior to replacing the MCTL PCB.*
- *When handling the MCTL PCB, ensure that no damage is caused due to electrostatic charges.*

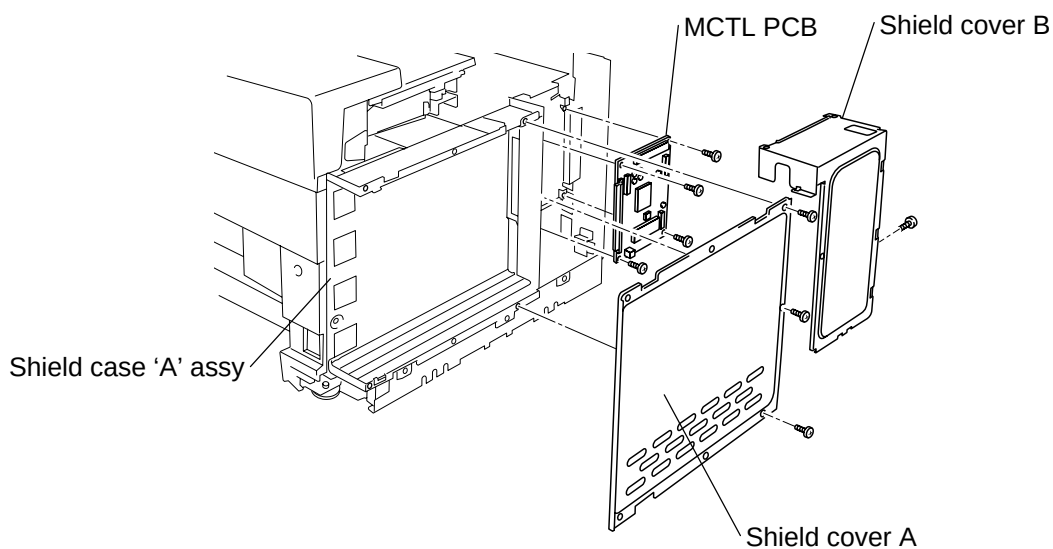


Fig.7-41

4.3.2 High Voltage Unit

- 1) Remove the Main (Video Controller) PCB guide rail (upper).

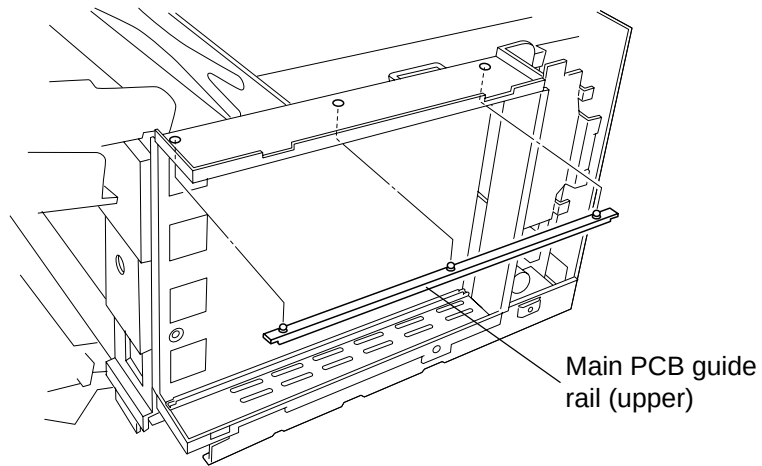


Fig.7-42

- 2) Remove the set screws ST3X6 (5 pcs.) from shield case 'A' assembly.
- 3) Remove the fan duct from the power supply.

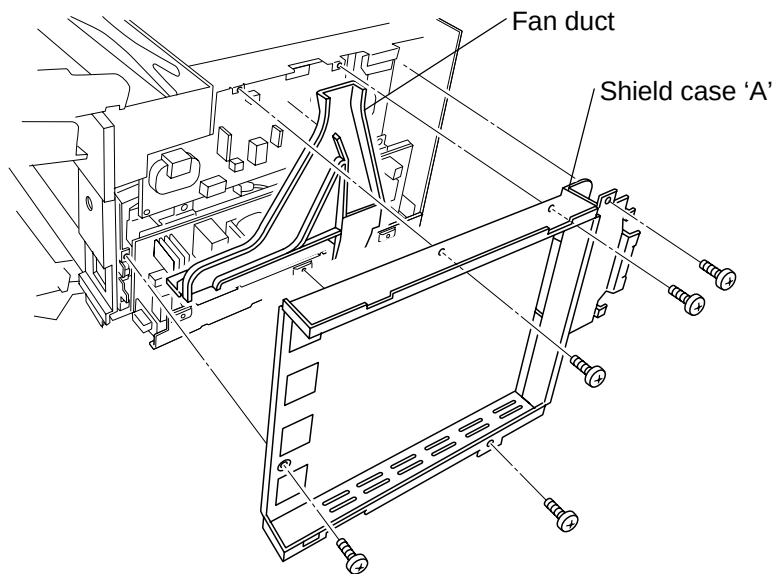


Fig.7-43

- 4) Disconnect all the harnesses (5 pcs.) connected to the high voltage unit.
- 5) Remove the set screws ST3X6 (1 pc.) and BT3X8 (6 pcs.) from the high voltage power supply unit.
- 6) Remove the high voltage power supply unit.

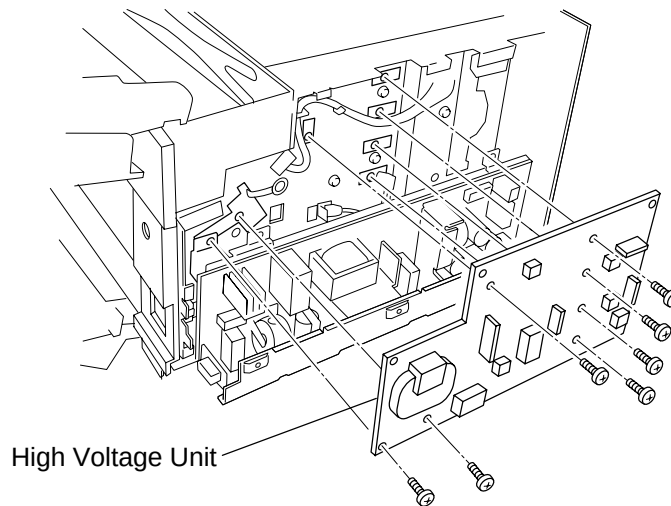


Fig.7-44



CAUTION

When disconnecting the connector from the CBV terminal, push both sides of the connector as shown in Fig.7-302. Pulling it hard may cause connector damage.



WARNING

*The high voltage power supply unit generates high voltages of up to 5KV. You can get an electric shock if you touch the unit while it is powered on.
Turn on the power to the unit only after having refitted and secured side cover (L).*

4.3.3 Interlock Switch (Rear)

- 1) Remove the set screws ST3X6 (2 pcs.) from the transfer electrode base.
- 2) Remove the transfer electrode base from the frame.
- 3) Disconnect the harness (1 pc.) connected to the interlock switch.
- 4) Remove the interlock switch from the transfer electrode base.

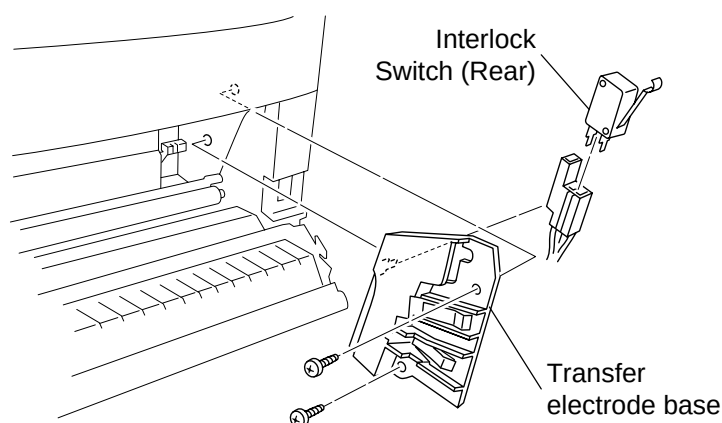


Fig.7-45



CAUTION

Since the interlock switch is an important safety item, after installation confirm that the switch operates correctly.

4.3.4 Drum Encoder Sensor (EN)

- 1) Remove the sensor case assembly from the frame (L).
- 2) Disconnect the connector (1 pc.) to the encoder sensor.
- 3) Remove the encoder sensor from the sensor holder.

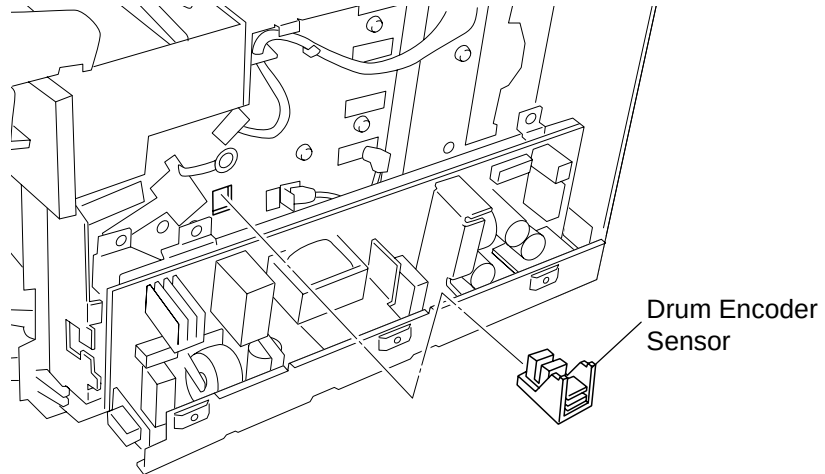


Fig.7-46

4.3.5 Fuser Connector

- 1) Remove the PN/PH connectors connected to the DC power supply unit.
- 2) Remove the shoulder screws SP3* (2 pcs.) from the fuser connector.
- 3) Remove the fuser connector.

* The set screw of the fuser connector is unique.

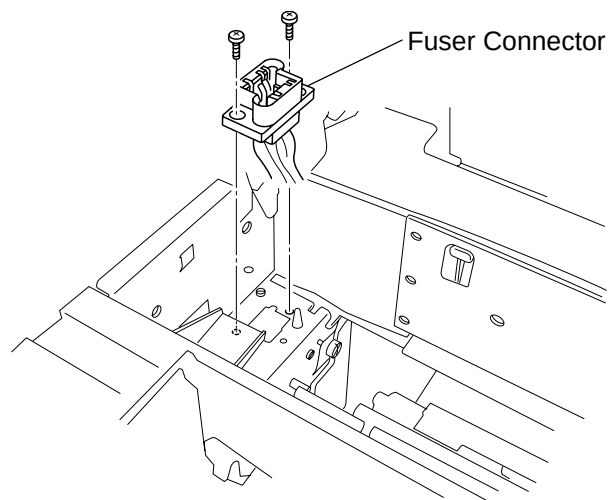


Fig.7-47

4.3.6 Rear Cover (R)

- 1) Remove the set screw BT4X8 (1 pc.) of rear cover (R).
- 2) Remove the rear cover (R).

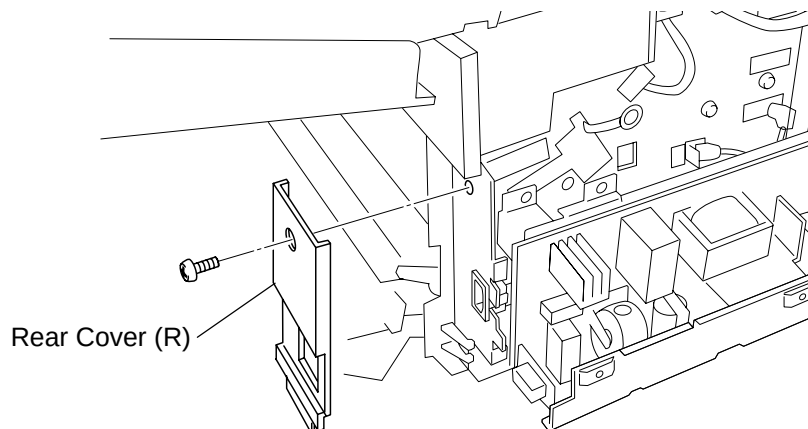


Fig.7-48

4.3.7 Power Supply Unit

- 1) Disconnect the harnesses (4 pcs.) connected to the power supply unit.
- 2) Remove the power switch key.
- 3) Remove the set screws ST3X6 (2 pcs.) holding the power switch and metal bracket to the printer.
- 4) Remove the power switch and metal switch bracket.
- 5) Remove the set screws ST3X6 (2 pcs.) holding the power switch to the switch bracket.
- 6) Remove the power switch.

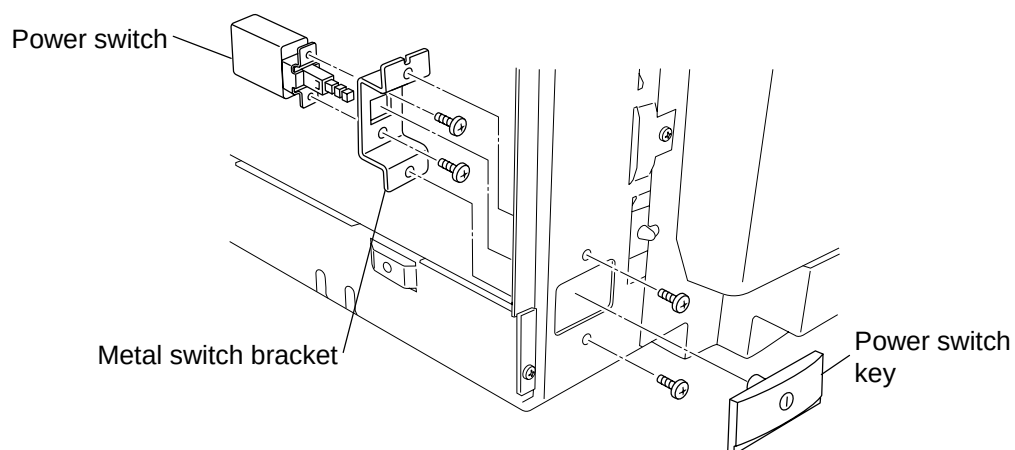


Fig.7-49

- 7) Remove the set screw M4X6 (1 pc.) complete with the shakeproof washer to release the earthing harness.
- 8) Remove the power outlet from the frame.

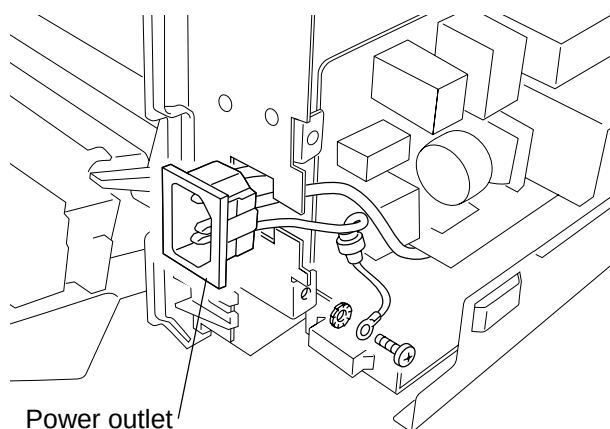


Fig.7-50

- 9) Remove the set screws ST3X6 (2 pcs.) from the power supply unit frame.
- 10) Remove the power supply unit complete with the frame.

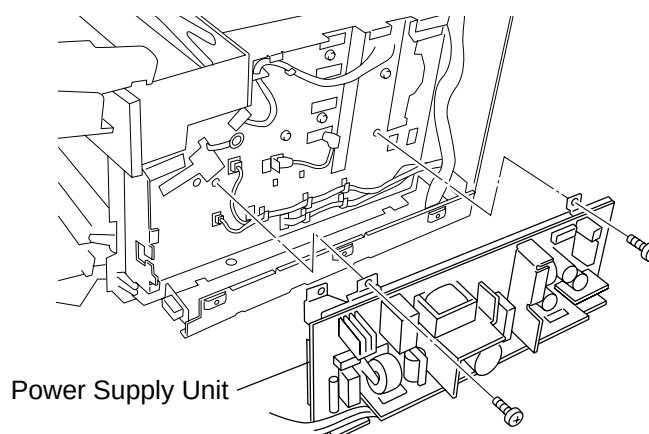


Fig.7-51



WARNING

*The earthing wire is very important for the safety of users.
Upon replacement of the power supply unit, confirm that the earthing wire (green and yellow color) is securely connected to the  connector, the shakeproof washer is fitted and the screw is tightly fastened.*

4.3.8 Paper Size Sensor (PSU)

Note:

If the optional lower tray unit is fitted, remove the left hand screw of the front cross rail to release the media cassette guide.

- 1) Remove the media cassette.
- 2) Remove the set screws ST3X6 (1 pc.) from the media cassette guide (L) assembly.
- 3) Pull the media cassette guide toward you while pushing the front catch to release the guide from the plastic catches (4 pcs.).
- 4) Remove the paper size sensor connector.
- 5) Remove the media cassette guide (L) assembly from the frame.
- 6) Remove the set screws BT3X8 (2 pcs.) holding the paper size sensor to the cassette guide (L).
- 7) Remove the paper size sensor.

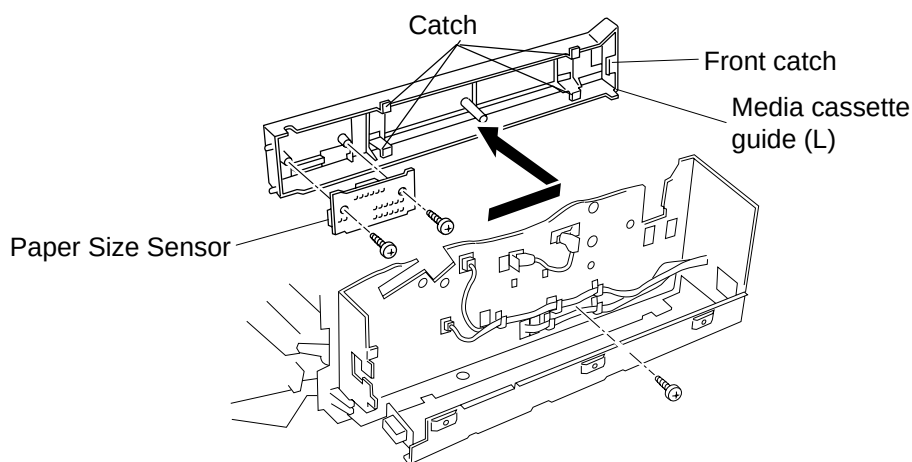


Fig.7-52

Note:

When assembling the media cassette guide, be sure to correctly locate the front catch and other 4 catches.

4.3.9 Toner Sensor (TTR)

- 1) Remove the set screws ST3X6 (3 pcs.) from the toner sensor PCB.
- 2) Disconnect and remove the toner sensor PCB.

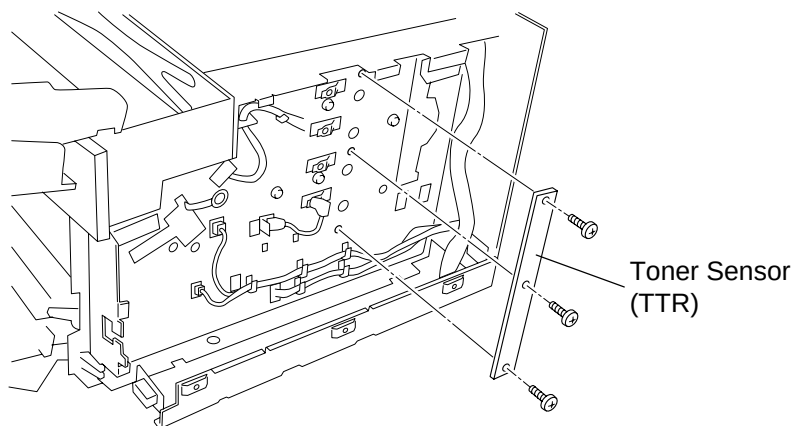


Fig.7-53

4.4 Paper Exit Unit

4.4.1 Rear Cover (U)

- 1) Remove the rear cover (R). (Refer to Section 4.3.6 in this chapter.)
- 2) Remove the set screw BT4X6 (1 pc.) of rear cover (U).
- 3) Remove the rear cover (U).

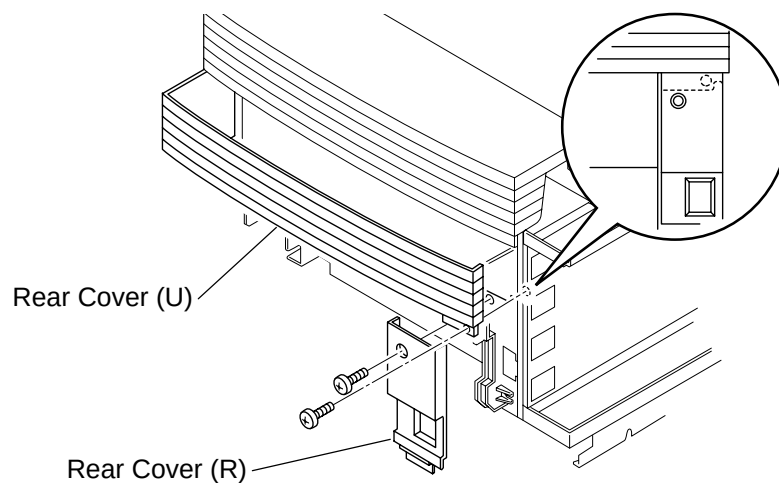


Fig.7-54

4.4.2 Top Cover (Paper Exit Cover) / Fuser Fan (FUFAN)

- 1) Remove the set screws BT4X8 (2 pcs.) that act as the paper exit unit hinges.
- 2) Remove the set screw ST3X6 (1 pc.) of the inner cover (R) and remove the inner cover (R).
- 3) Disconnect the 3 cable joint connectors in the cover assembly.
- 4) Remove the paper exit unit from the printer.
- 5) Remove the arm edge cover.

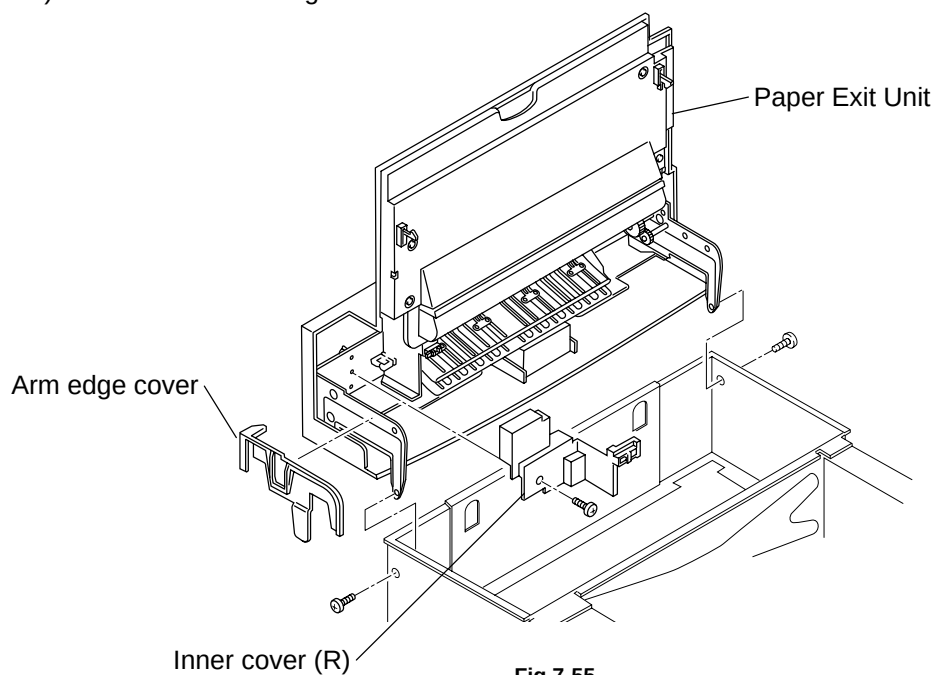


Fig.7-55

- 6) Remove the paper exit inner cover by removing the set screws BT3X8 (4 pcs.), release arm, hook (R) & (L) and spring.

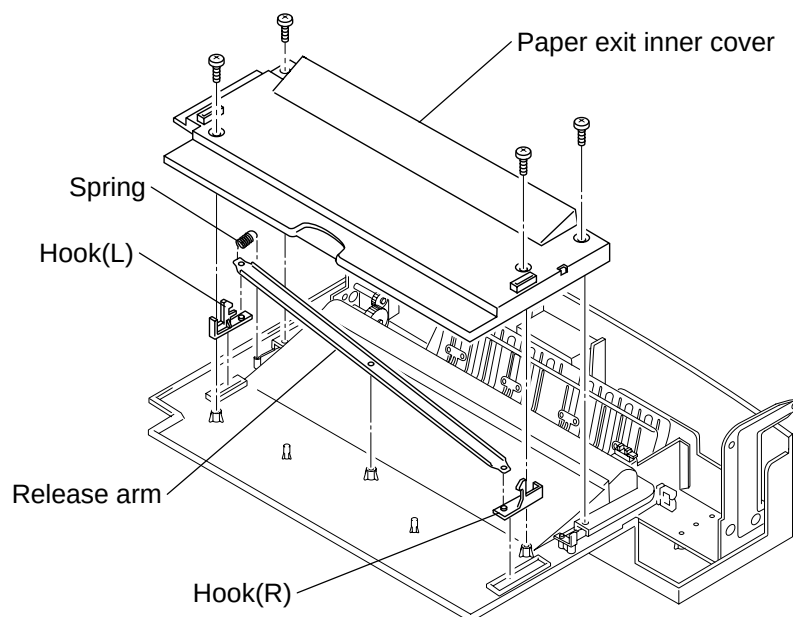


Fig.7-56

- 7) Press the sides of the fan case to release the fan motor assembly from the paper exit guide unit.
- 8) Remove the fuser fan motor from the case.

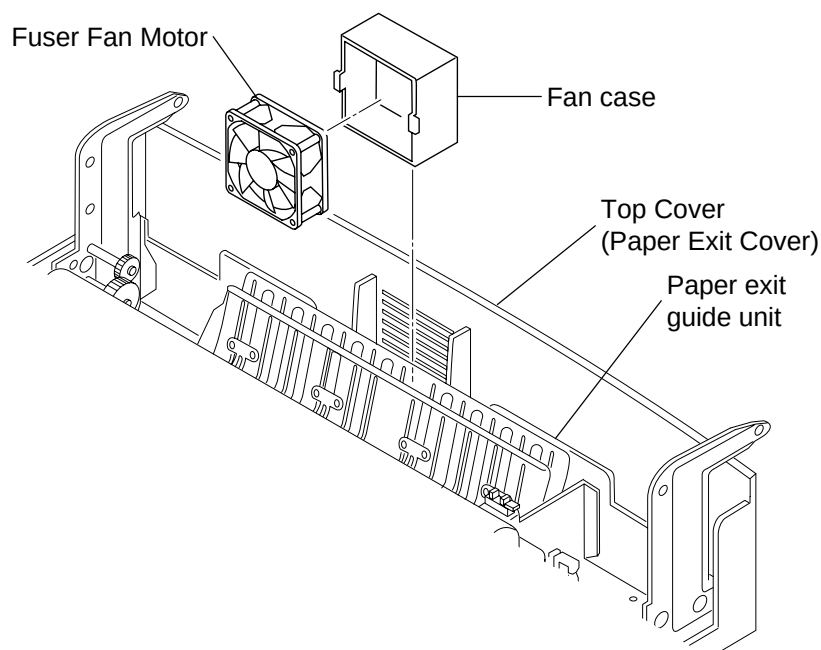


Fig.7-57

- 9) Remove the set screws BT3X8 (4 pcs.) from the paper exit guide unit.
- 10) Remove the top cover (paper exit cover) from the paper exit guide unit.

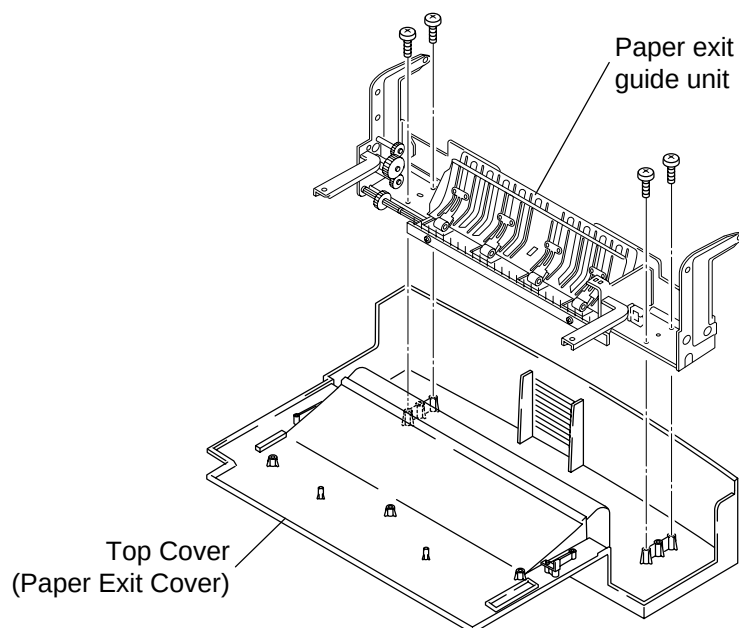


Fig.7-58

Note:

- When re-assembling, ensure the hooks are fitted facing in the correct direction on the release arm. The two hook assembly sliders are of different widths to ensure correct assembly. (Refer to Fig.7-59 below.)

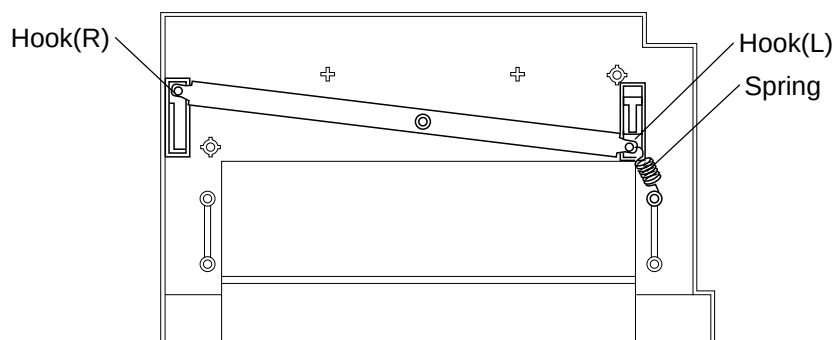


Fig.7-59

- When refitting the paper exit inner cover, fit it onto the top cover while holding the release arm in position with a screw driver for easier and correct assembly.

4.4.3 Cleaning Roller Sensor (CRS)

- 1) Disconnect the harnesses connected to the cleaning roller sensor.
- 2) Remove the cleaning roller sensor from the paper exit guide (paper exit stay).

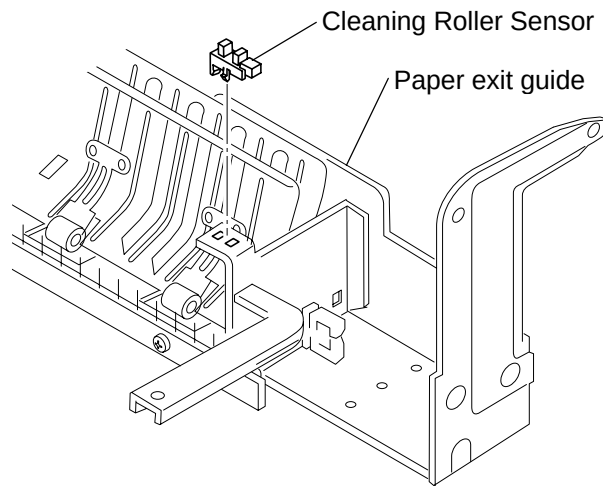


Fig.7-60

4.4.4 Discharger Brush

- 1) Remove the set screws BT4X6 (2 pcs.) from the discharger brush.
- 2) Remove the discharger brush and the plastic retainer.



PRECAUTION

Do not deform the fur brush of the discharger brush.

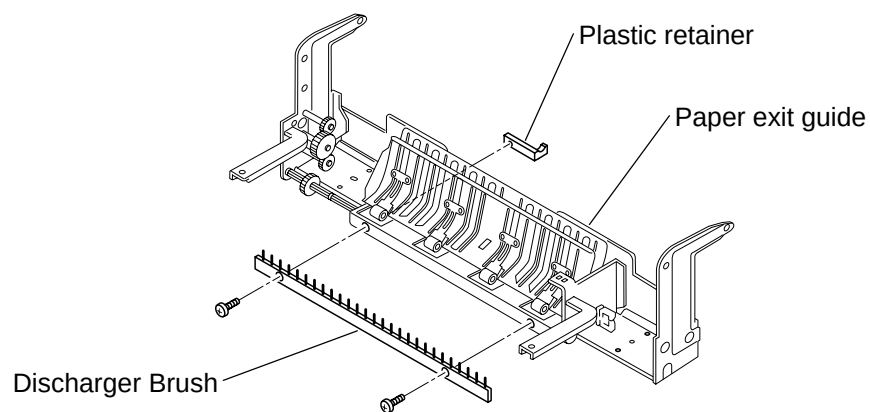


Fig.7-61

4.4.5 Paper Exit Roller

- 1) Remove the C ring, washer, and plastic bush from the left and right hand sides.
- 2) Remove the shaft support at both sides.
- 3) Remove the paper exit roller from the paper exit guide.

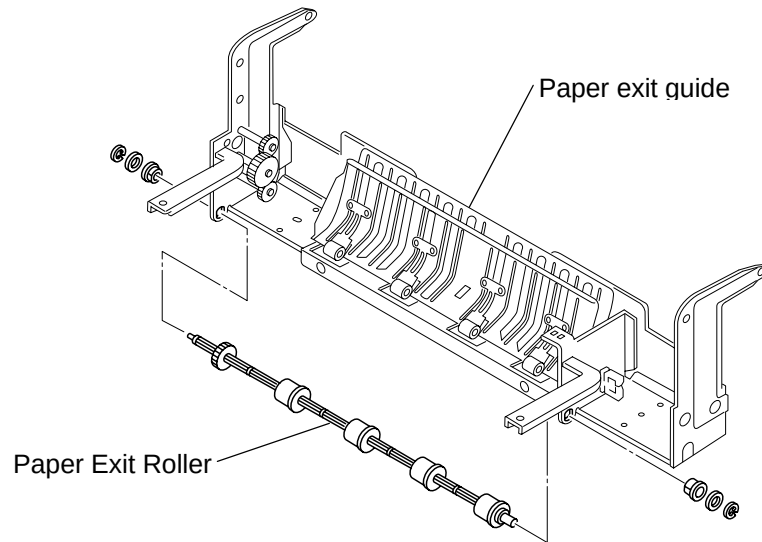


Fig.7-62

4.4.6 Paper Exit Sensor (PT2)

- 1) Disconnect the harnesses connected to the paper exit sensor.
- 2) Remove the paper exit sensor from the paper exit guide.

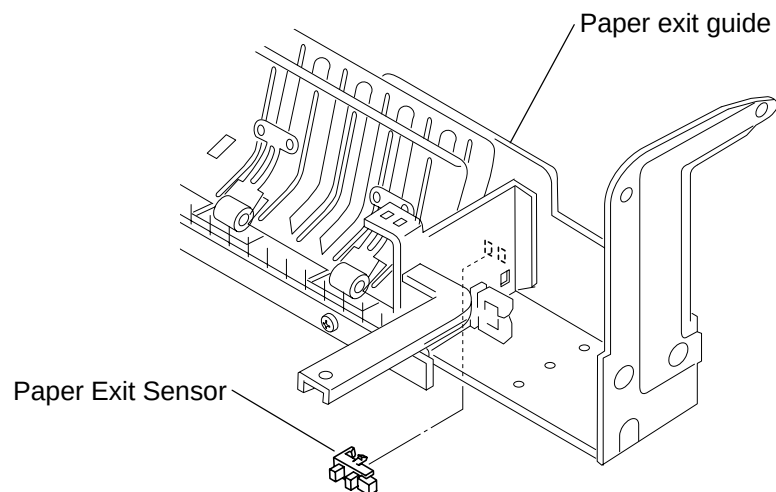


Fig.4-63

4.5 Front of the Printer

4.5.1 Front Cover Unit

- 1) Open the front cover unit.
- 2) Remove the set screws BT4X8 (2 pcs.) from the front inner cover.
- 3) Release the two hooks at the front edge of the inner cover and lift it up.
- 4) Release the hinge pin lock lever.
- 5) Pull the hinge pin slightly to the right to release the hinge arm.

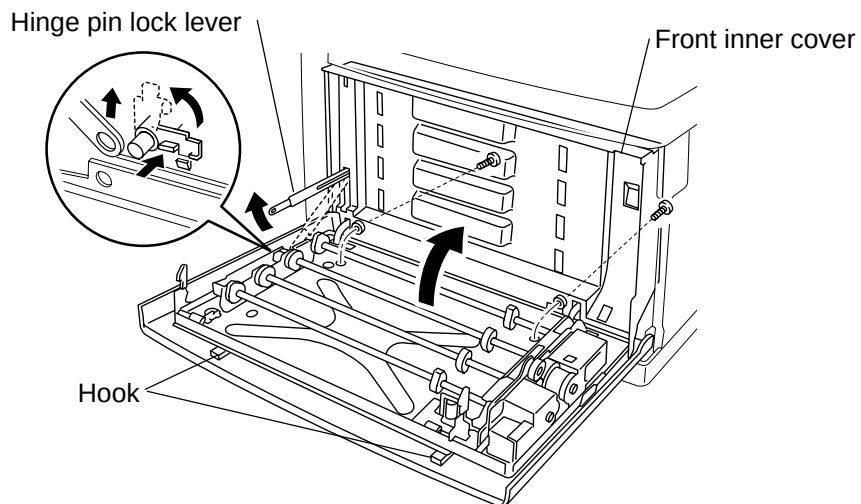


Fig.7-64

- 6) Remove the front inner cover.
- 7) Disconnect all the harnesses (4 pcs.) connected to the developer position sensor and developer solenoids.
- 8) Remove the set screws ST3X6 (2 pcs.) from the front hinge (L).
- 9) Remove the front hinge (L) from the frame.
- 10) Sliding the front cover unit to the right, release the hinge pin at the right hand side.
- 11) Remove the set screws BT4X8 (4 pcs.) to remove the front cover from the assembly base plate.
- 12) Remove the front cover.

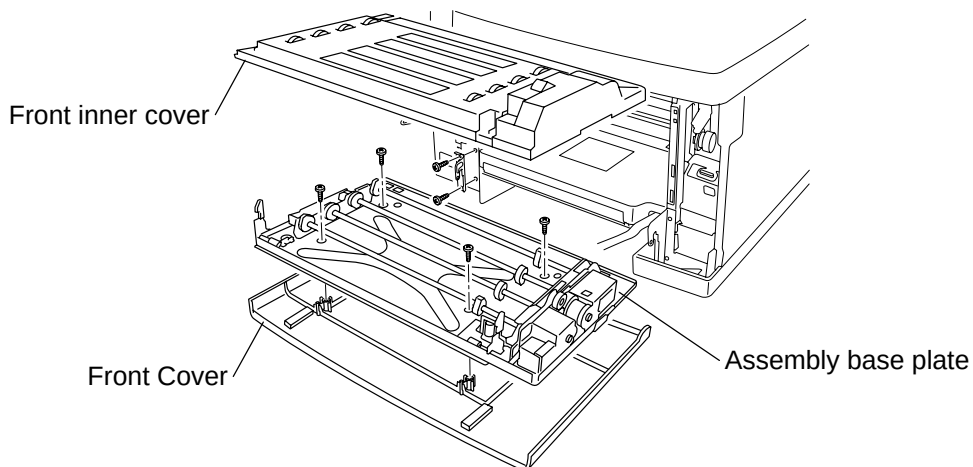


Fig.7-65

4.5.2 Scanner Unit (Scanner Motor inclusive)

- 1) Cover 'C' is fixed by plastic projections and hooks at three locations at the front and three locations at the rear. Release the hooks at the rear.
- 2) Release the fixings at the front by pulling cover 'C' forwards.
- 3) Remove the harness from the harness holder, and the cover 'C' from the printer.
- 4) Remove the set screws ST3X6 (3 pcs.) from the scanner unit.
- 5) Disconnect the harness connector (1 pc.) from the scanner unit.
- 6) Remove the scanner unit from the printer.

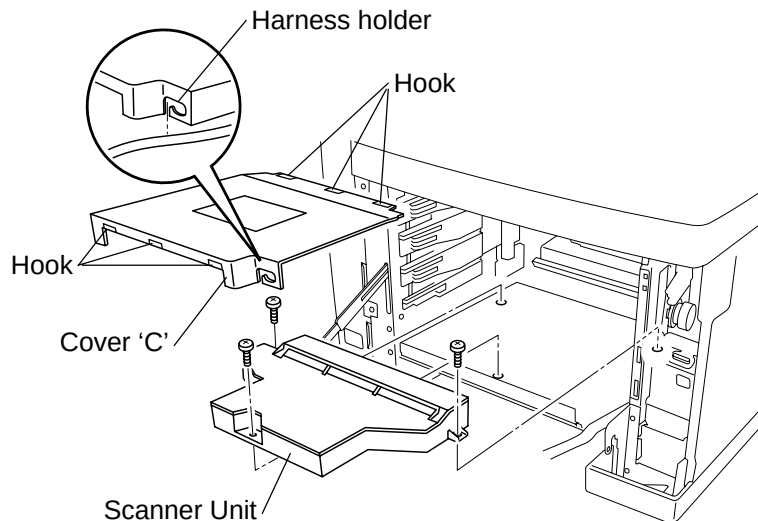


Fig.7-66



WARNING

- *There is a class IIIb laser within the scanner unit. Do not attempt to disassemble the laser.*
- *The scanner unit is replaced as a complete unit. No adjustment is required to the replacement scanner unit.*
- *Confirm that all the covers have been correctly installed prior to any test run or operation in order to prevent any laser radiation escaping from the printer.*

4.6 Rear of the Printer

4.6.1 Rear Access Cover (L) / Transfer Unit

- 1) Open the rear access cover.
- 2) Remove the upper screw of the retaining strap supporting the transfer unit to the printer body.
- 3) Remove the set screw ST3X6 (1 pc.) from the left hand side transfer unit metal retaining plate.
- 4) Remove the metal retaining plate.
- 5) Remove the support shaft from the installation hole at the right hand side while lifting the unit slightly.

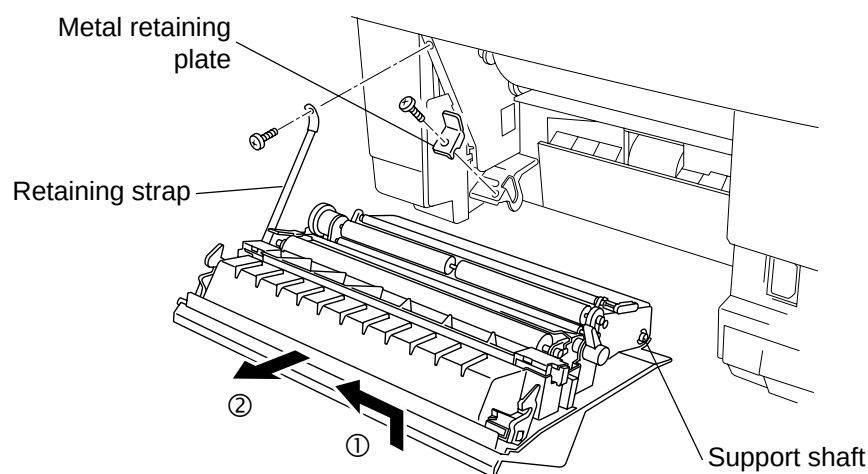


Fig.7-67

- 6) Remove the transfer unit with the rear access cover.
- 7) Remove the set screws ST3X8 (4 pcs.) from the transfer unit.
- 8) Remove the transfer unit from the rear access cover.

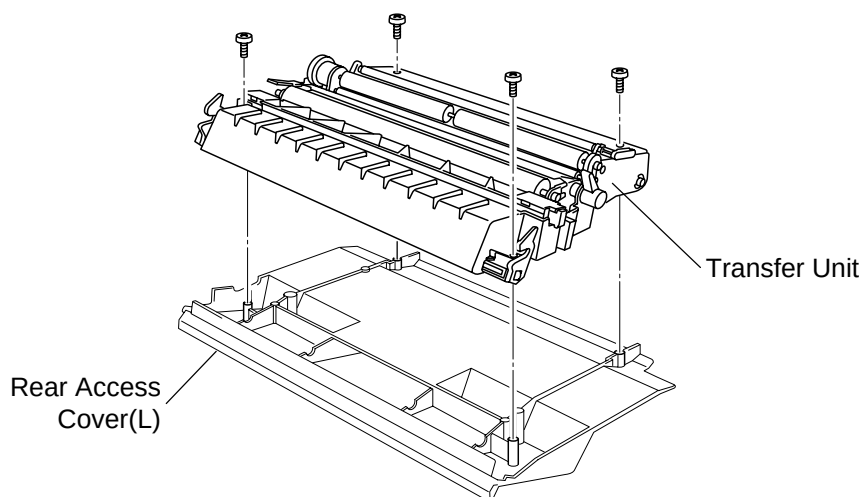


Fig.7-68

Note:

When reassembling the transfer unit, install the support shaft into the right hand hole first.

4.6.2 Transfer Roller

- 1) Lift the transfer roller lock lever to release the right hand end of the roller. The angle of lifting the lock lever is approx. 80° from the horizontal.
- 2) Push the tab of the left hand side to remove the shaft from the installation hole at the right side first, then remove the transfer roller.
- 3) Remove the transfer roller.

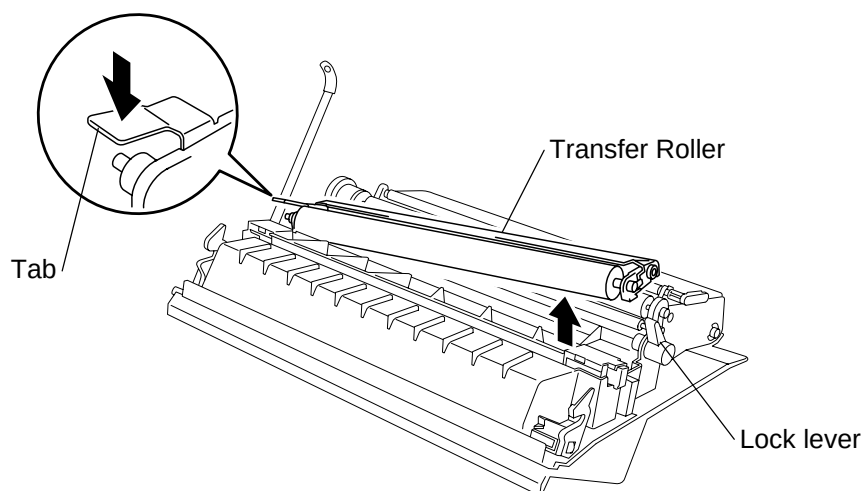


Fig.7-69

4.6.3 Register Roller

- 1) Remove the roller fixing C rings from both ends of the roller.
- 2) Remove the gear from the shaft (left hand side).
- 3) Remove the plastic bushes at both ends.
- 4) Remove the shaft support from the frame while pressing down on the pressure roller to release the pressure from the register roller.
- 5) Remove the register roller.

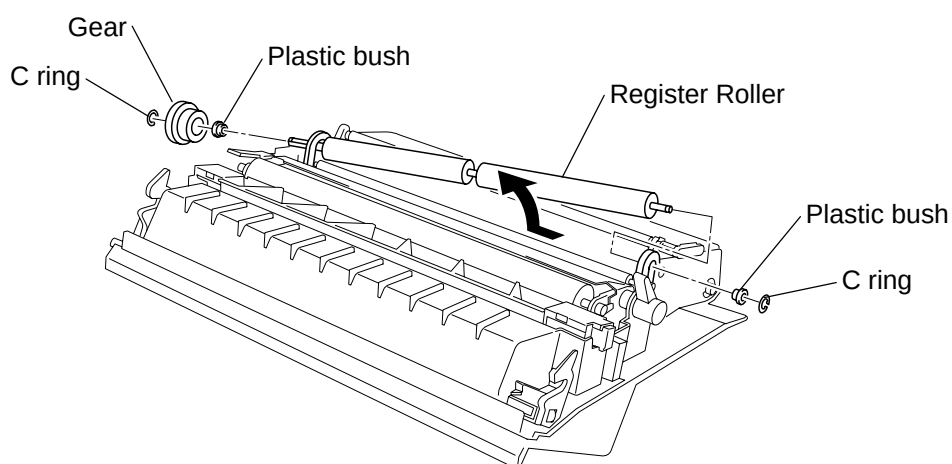


Fig.7-70

4.6.4 Paper Feed Roller / Separator Pad

- 1) Remove the media cassette.
- 2) Remove the set screws ST3X6 (2 pcs.) from the paper guide (L).
- 3) Remove the paper guide (L).
- 4) Remove the set screws ST3X6 (2 pcs.) from the paper guide (UR).
- 5) Remove the paper guide (UR).
- 6) Disconnect the harnesses (2 pcs.) connected to the OHP sensor and paper empty sensor.
- 7) Remove the paper feed roller by pushing it to the right viewed from the rear of the printer.

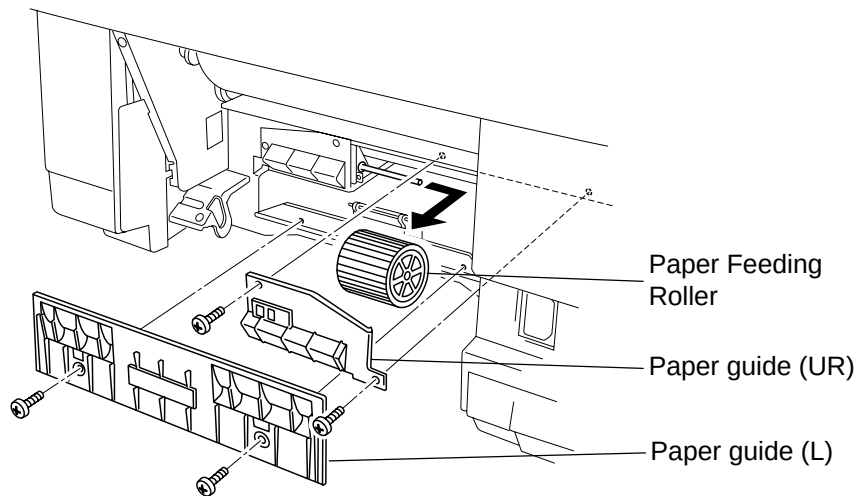


Fig.7-71

- 8) Pull up and remove the separator pad.

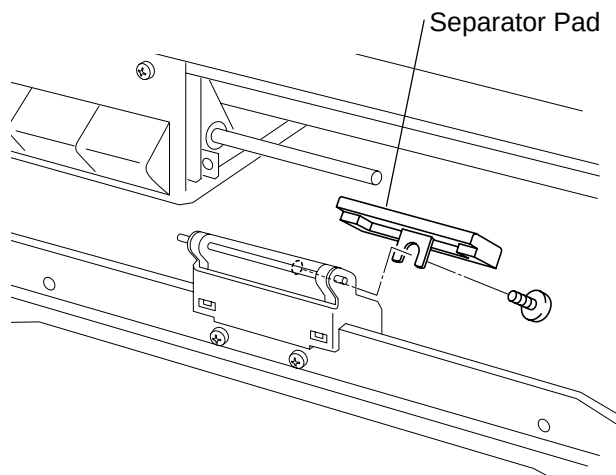


Fig.7-72



PRECAUTION

Do not touch the surface of the paper feed roller and separator pad.

4.6.5 Paper Empty Sensor (PE) / OHP Sensor (OHP)

- 1) Remove the sensor connector.
- 2) Remove the set screws BT3X8 (2 pcs.) from the OHP sensor and remove the (OHP) sensor from the paper guide assembly (UR).
- 3) Remove the paper empty sensor (PE) from the paper guide assembly (UR)

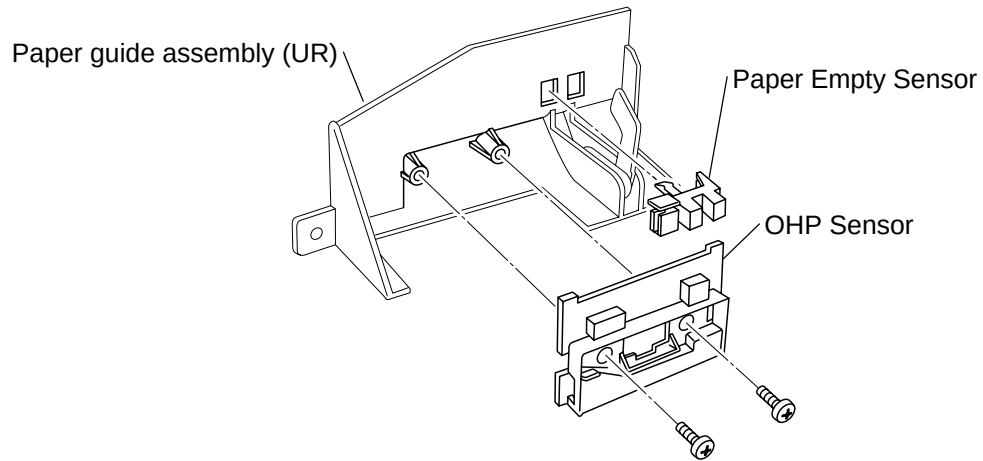


Fig.7-73

4.6.6 Paper Feeding Sensor (PT1)

- 1) Remove the paper feeding sensor from the stay feeder.
- 2) Disconnect the connector on the paper feeding sensor.

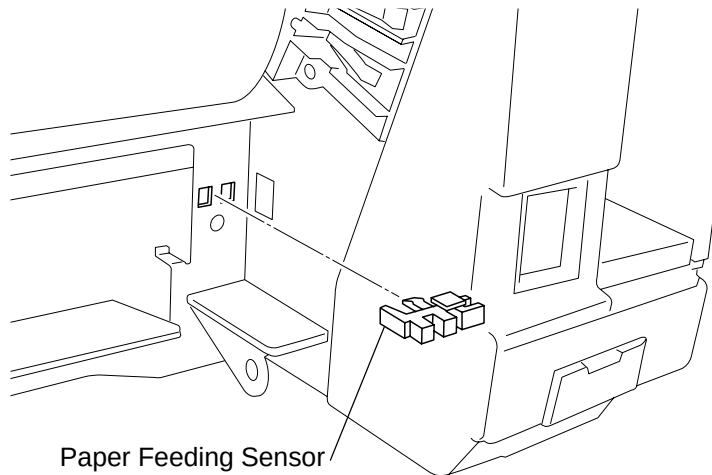


Fig.7-74

4.7 Fusing Unit



DANGER

[Note in Parts Replacement]

- *The fuser unit consists of important safety parts. Replacement of parts or disassembly and maintenance work should only be done at an appropriate service facility by skilled service personnel acquainted with electrical safety. After re-assembly the product safety should be reconfirmed.*
- *Since the fuser unit is very hot, make sure that the fuser unit and surrounding area are well cooled down prior to starting the replacement of parts. You may get burned when touching hot areas.*
- *The fusing unit contains silicone oil. Take care not to spill the silicone oil, especially on the floor, as the floor will become very slippery and dangerous.*

4.7.1 Fusing Heater Lamp

- 1) Remove the set screw ST3X6 (1 pc.) from the F. cover (L).
- 2) Remove the set screw ST3X6 (1 pc.) from the F. cover (R).

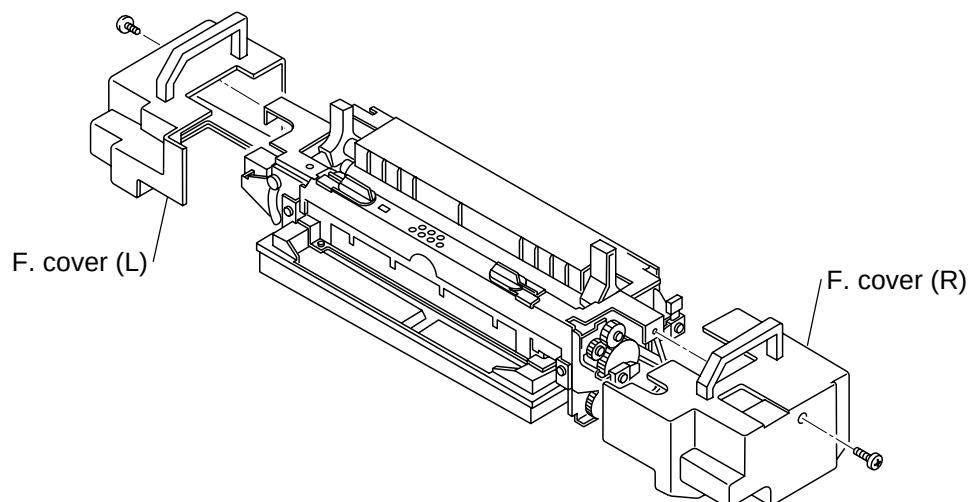


Fig.7-75

- 3) Pull the F. terminal (L) of the fuser roller side toward you and release the fusing heater lamp (400W) from the F. terminal.
- 4) Pull out the fusing heater lamp (400W) from the inside of the fuser roller.
- 5) Pull the F. terminal (L) of the back-up roller side toward you and release the fusing heater lamp (300W) from the F. terminal.
- 6) Pull out the fusing heater lamp (300W) from the inside of the back-up roller.

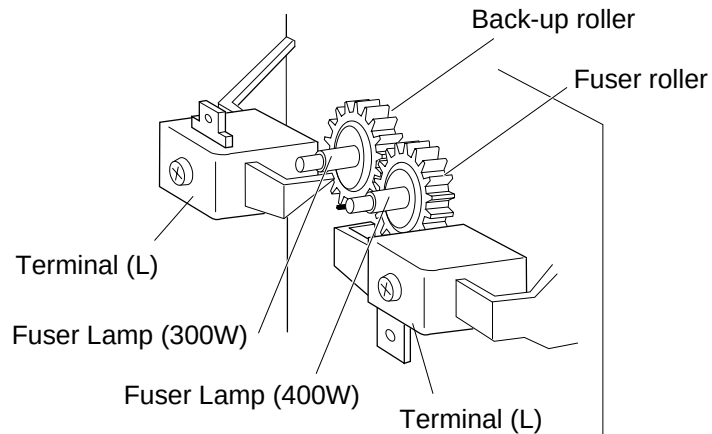


Fig.7-76

**PRECAUTION**

- Do not touch the surface of the heater lamp with your hands, the small traces of oil you leave on the lamp will affect the life of the lamp.
- The wattage and length of the heater lamp is different between the fuser roller and the back-up roller. The wattage is marked on the insulator of the lamp electrode.

Fuser roller: 400W (Length;342mm)

Back-up roller : 300W (Length;332mm)

Note:

When installing the new fusing unit into the printer, you have to wait approximately for 30 minutes after the unit is installed to allow the fusing oil to circulate in the unit.

CHAPTER VIII

TROUBLESHOOTING

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CHAPTER VIII TROUBLESHOOTING

This chapter contains troubleshooting information for both the Video Controller Mode and the Engine Controller Mode.

If any problem occurs during the normal usage of the printer, which means the printer is being used in the Video Controller Mode, clear the problem by referring to the troubleshooting information in the following sections for the Video Controller Mode or the user's guide.

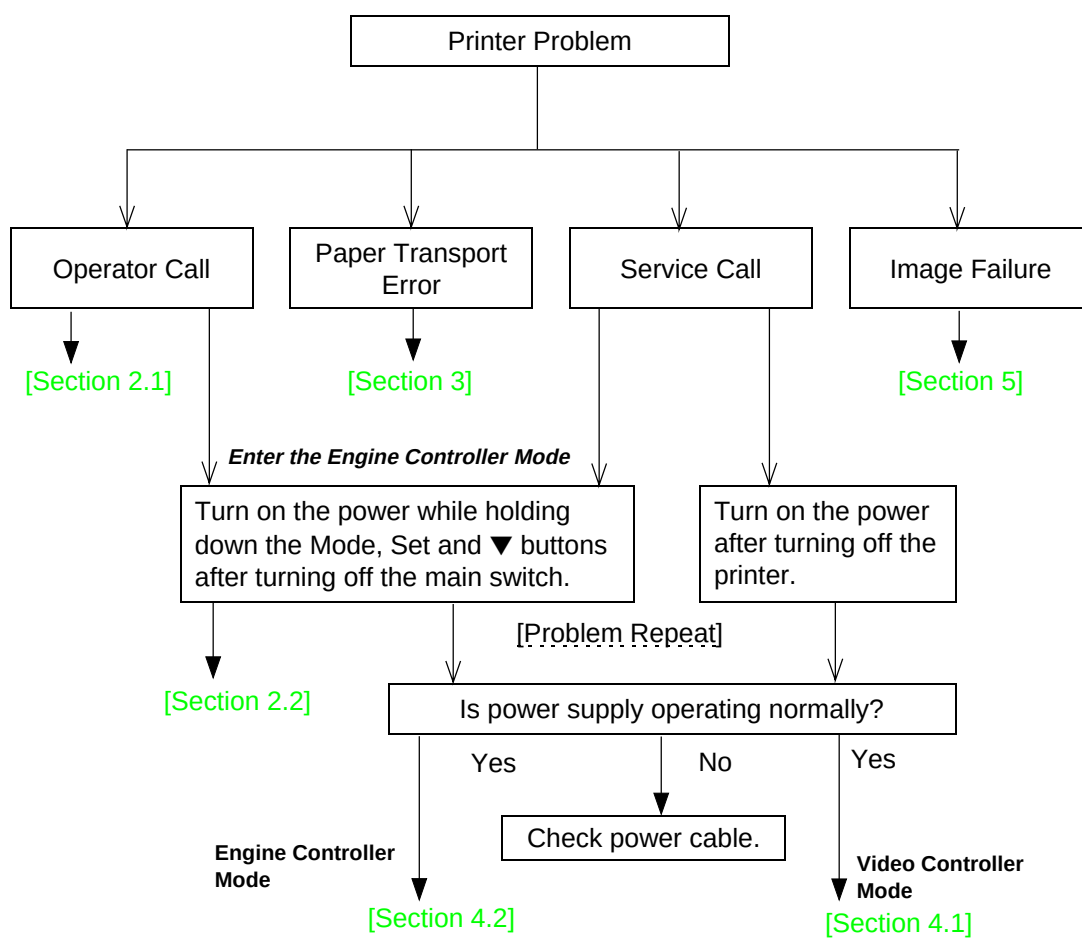
However, if a problem occurs in the video controller itself, use the Engine Controller Mode information as it may be easy to understand the cause of the problem because the Engine Controller mode can separate the problem in the video controller from the printing operations.

The error messages used in the Video Controller Mode basically contain the same ones that are used in the Engine Controller Mode. All error status messages are displayed in the Video Controller Mode other than when an error occurs in the video controller itself or in the communication between the video controller and the engine controller.

Note:

The operation of the control panel and the display on the LCD vary depending on the mode selected.

1. OUTLINE OF TROUBLESHOOTING



2. OPERATOR CALL

2.1 Video Controller Mode

The Ready LED is lit and an applicable message appears on the liquid crystal display (LCD) in the following cases;

- 1) Consumables require to be replenished.
- 2) Waste toner pack is full of waste toner.
- 3) Paper jam.
- 4) Periodic maintenance.
- 5) Maintenance work incomplete.

The above cases are not regarded as a breakdown, and should be treated in accordance with Table 8-1;

Table 8-1

Display Message	Meaning	Countermeasure
CHECK XX TRAY	No paper in the media cassette (XX is TRAY1 / TRAY2)	Check the adjustment lever at the bottom of the upper media cassette and adjust to the correct setting when the CHECK TRAY1 message appears. Load a stack of paper into the cassette.
12 COVER OPEN FRONT	The front cover is open	Close the front cover.
12 COVER OPEN TOP	The top cover is open.	Close the top cover.
12 COVER OPEN REAR	The rear access cover is open.	Close the rear access cover.
13 JAM XXXXXX	Paper jam in the printer. XXXXXX is DRUM / FEEDER / INSIDE / REAR.	Remove the jammed paper from the indicated area.
14 NO CARTRIDGE XXXX COLOR	No toner cartridge in the printer.	Install the requested toner cartridge.
XX NO CASSETTE	No media cassette. XX is T1 / T2.	Install the requested media cassette.
16 TONER EMPTY XXXX COLOR	Toner almost empty: Another 50 pages may be printed. (The Alarm LED is lit at the same time.)	Remove the toner cartridge, rock it several times by 45°, and install it again or replace the toner cartridge with a new one.
XX LOAD PAPER ***** SIZE	Incorrect size of paper in the media cassette XX. XX is T1 / T2. (The message appears alternately to show a particular size.)	Load the requested size of paper in the media cassette and press the Form Feed button.

Display Message	Meaning	Countermeasure
T1 MANUAL FEED ***** SIZE	Request to load paper manually. (The message appears alternately to show a particular size.)	Load the requested size of paper into the standard media cassette and press the Select button.
19 CHECK FONT	An error occurred in the optional font card.	Turn off the printer, and reinstall or replace the optional font card.
20 FONT REMOVAL	Font card removed while the printer is on-line.	Turn off the printer, re-install the font card, and turn on the printer. The Continue button will allow you to temporarily ignore this message.
22 WASTE TONER	Waste toner pack full of toner	Replace with a new one.
23 OIL EMPTY	No oil in the oil bottle	Replace with a new one.
24 CHANGE FCR	Change the fuser cleaner.	Replace with a new one.
25 NO FUSER UNIT	Fusing unit not installed	Remove fusing unit and then refit it. Confirm correctly installed and clamped.
27 NO OPC BC	OPC belt cartridge not installed	Remove the OPC belt cartridge and then refit it. Confirm correctly installed and locked.
28 NO FC ROLLER	Fuser cleaner not installed	Remove fuser cleaner and then refit it. Confirm correctly installed and clamped.
72 CHANGE FILTER	Change the ozone filter.	Replace with a new one.
TONER LOW XXXX	The toner of the color indicated by XXXX is nearly empty.	Replace the toner cartridge which has nearly run out.
FUSER OIL LOW	Oil in the oil bottle is almost empty.	Replace with a new one.
REPLACE FCR	Change the fuser cleaner.	Replace with a new one.
REPLACE OPC BC	Change the OPC belt cartridge.	Replace with a new one.
REPLACE FUSER	Change the fusing unit.	Replace with a new one.
REPLACE 120K KIT	Change the drum cleaner, paper discharger and transfer roller.	Replace with new ones.
REPLACE FILTER	Change the ozone filter.	Replace with a new one.

Display Message	Meaning	Countermeasure
31 PRINT OVERRUN	Print overrun	Press the Continue button to start printing the next page. Data which overran the print area on the page cannot be printed. Check your page protection setting with the Mode button. Setting page protection to the correct size could solve this problem. If printing at 600dpi, you may need to add optional SIMM memory.
32 BUFFER ERROR	Input buffer overflow	Press the Continue button to resume printing. Data lost in buffer overflow cannot be printed.
34 MEMORY FULL	Work memory overflow	Press the Continue button to resume printing. If the same error should occur after you press the Continue button, turn off the printer. Wait a few seconds, then turn it on again. Reduce the input buffer size. Turn off "KEEP PCL". Add SIMM memory with printer power off. Download font and the fonts saved in the HDD card might cause the error, for these occupy the same work area as the RAM. Memory expansion is recommended in that case.
40 LINE ERROR	Error in the communications circuit	When the serial interface is used, check the communications parameters such as baud rate, code type, parity, and handshake protocols. When the parallel interface is used, check the interface cable communication.
41 PRINT CHECK	Error in communication with the engine controller	Turn off the printer. Wait a few seconds, then turn it on again.
42 CARD 1(2) FULL	Card overflow	Delete unnecessary macros or fonts, or use a new card.
43 CARD 1(2)W ERROR	Card write error	Set the write protect button of the card to OFF if it has been set to ON. Use a new card.

Display Message	Meaning	Countermeasure
44 SIMM ERROR	Incorrect installation of SIMMs	Install SIMMs correctly, referring to the printed error message.
45 MIO ERROR	Error in communication with the MIO card	Install the MIO card correctly.
47 CARD1(2)R ERROR	Card read error	Use a new card. If the same error occurs, consult your dealer or service personnel.
XX SIZE ERROR	Paper of incorrect size is loaded into XX. XX is T1/2.	Set the correct size of paper in T1/2.
IGNORE DATA	Data is ignored because of an error in the PostScript language program.	Press the Reset button. If the same error occurs, you may need to add optional SIMM memory.

2.2 Engine Controller Mode

The Ready LED is lit, and applicable messages appear on the liquid crystal display (LCD) in the following cases;

- 1) Consumables require to be replenished.
- 2) Waste toner pack is full of waste toner.
- 3) Paper jam.
- 4) Periodic maintenance.
- 5) Maintenance work being incomplete.

The above cases are not regarded as a breakdown, and should be treated in accordance with Table 8-2;

Table 8-2

Display Message	Meaning	Countermeasure
11 NO MEDIA UPP/LOW	No paper in the upper cassette / lower cassette	Replenish paper.
11 CHK MEDIA UPP/LOW	Inconsistency of media	Change media.
12 NO TRAY UPP/LOW	No upper / lower media cassette	Install cassette(s).
13 REPLACE TONER Y/M/C/K	Toner (Y, M, C, K) empty	Replace with new toner cartridge(s).
14 CHECK WASTE TONER	Waste toner pack full of toner	Replace with a new waste toner pack.
14 CHECK FUSER OIL	Change the oil bottle	Replace with a new oil bottle.

Display Message	Meaning	Countermeasure
14 CHK CLEANING ROLLER	Change the fuser cleaner	Replace with a new fuser cleaner
15 MISPRINT PAPER/PRREQ/MEDIA	Misprinting occurred	Confirm status of media cassette. Confirm correct paper size. Confirm consistency of media.
16 ALIGN TONER CG Y/M/C/K	Toner cartridge not installed	Confirm the installation of the toner cartridge(s).
16 ALIGN FU UNIT	Fusing unit not installed	Remove the fusing unit and refit it. Confirm it is correctly installed.
16 ALIGN BELT CG	OPC belt cartridge not installed	Confirm the installation of the OPC belt cartridge.
17 MEDIA JAM FEED	Paper jam at feeding area	Remove the media cassette, and remove paper jammed at feeding entrance.
17 MEDIA JAM INNER	Paper jam inside printer	Open the transfer unit, and remove paper jammed inside.
17 MEDIA JAM OUTER	Paper jam at paper exit area	Open the transfer unit / paper exit unit and remove paper jammed inside.
17 MEDIA JAM DRUM	Paper jam wound around the transfer drum	Open the transfer unit and remove the OPC belt cartridge. Remove the paper jam by unwinding the paper from the transfer drum.
18 CLOSE PANEL FRONT/TOP	Covers open	Confirm that the covers are firmly closed.
18 CLOSE TR UNIT	Transfer unit open	Confirm that the transfer unit is firmly closed.
19 SLEEP MODE	Printer under idling condition	Printer automatically returns to the operating condition when a PRINT signal is sent.
01 WAIT	Printer warming-up	These are normal operation modes.
00 READY	Printer ready to print in standby status	
02 PRINT	Printing in progress	

3. PAPER TRANSPORT ERROR

Paper is transported through the path shown in Fig.8-1. Paper jams at the following locations are easily cleared.

- Paper Feeding Roller
- Transfer Unit
- Fusing Unit
- Paper Exit Unit

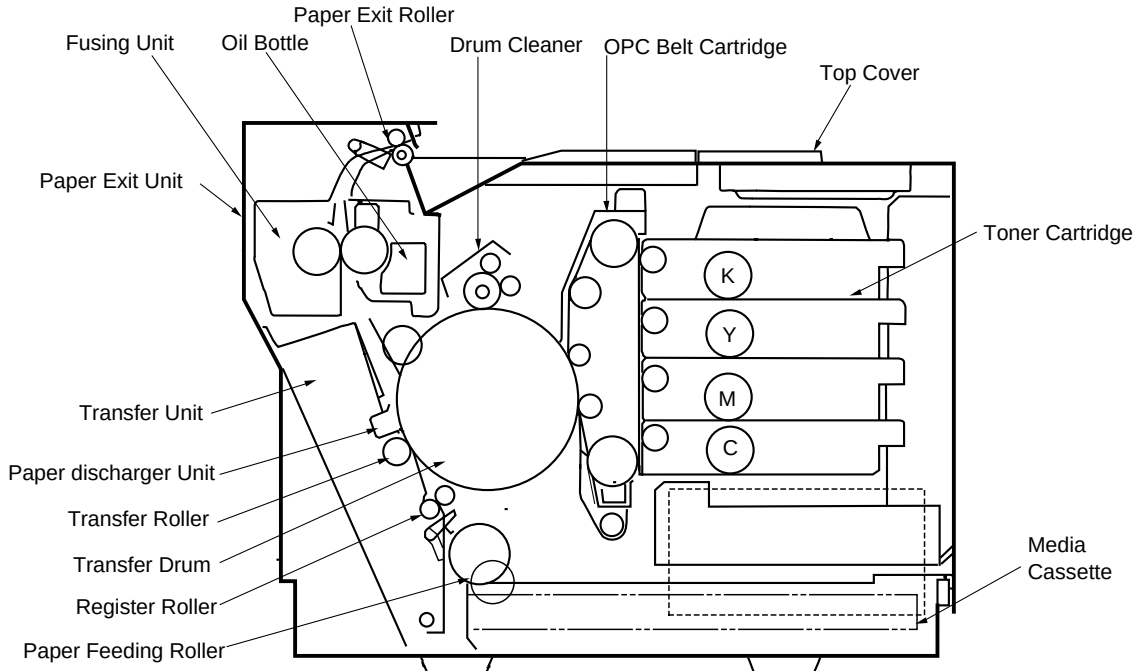


Fig.8-1

3.1 Feed Jam

Table 8-3-1

Problem Item	Step	Check Item	Result	Action
Print Paper	1	Is the print paper a recommended paper?	NO	Use a recommended paper.
	2	Is the print paper damp?	YES	Replace the existing paper with new.
	3	Was the paper fanned before loading in the media cassette?	NO	Fan the paper before loading.
Media Cassette	4	Is the print paper set in place?	NO	Set the paper in the correct place.
	5	Is the end plate properly set up?	NO	Set the end plate to meet the paper size.
	6	Is the paper stacked above the line on the paper guide?	YES	Stack the paper below the line.
	7	Is there paper dust around the paper guide?	YES	Clean the paper guide with a cotton cloth.
Pick-up Roller / Separation Pad	8	Is the print paper caught in the paper feeding part?	YES	Remove the paper.
	9	Is the pick-up roller damaged?	YES	Service call required to replace the damaged pick-up roller.

3.2 Inner Jam

Table 8-3-2

Problem Item	Step	Check Item	Result	Action
Transfer Unit		Open the transfer unit and check.		
	1	Is there any paper inside the unit?	YES	Remove the paper inside.
	2	Is the transfer roller firmly locked by the lock lever?	NO	Fix the transfer roller with the lock lever.
	3	Is the paper discharger unit installed in place?	NO	Install the paper discharger unit firmly in place.
	4	Is there paper dust around the registration roller?	YES	Clean the registration roller with a cotton cloth.
	5	Is the wire of the paper discharger unit damaged?	YES	Replace the existing paper discharger unit with a new one.
Fusing Unit	6	Is the fusing unit installed in place?	NO	Install the fusing unit firmly in place.
	7	Is there any paper trapped between the rollers?	YES	Remove the trapped paper.
	8	Is there fuser oil still in the oil bottle?	NO	Replace the existing oil bottle with a new one.

3.3 Outer Jam

Table 8-3-3

Problem Item	Step	Check Item	Result	Action
Print Paper	1	Is the print paper a recommended paper?	NO	Use a recommended paper.
Paper Exit Unit	1	Is the paper exit unit firmly locked by the lock lever?	NO	Open and close the paper exit unit again.
	2	Is there paper dust around the exit roller?	YES	Clean the exit roller with a cotton cloth.

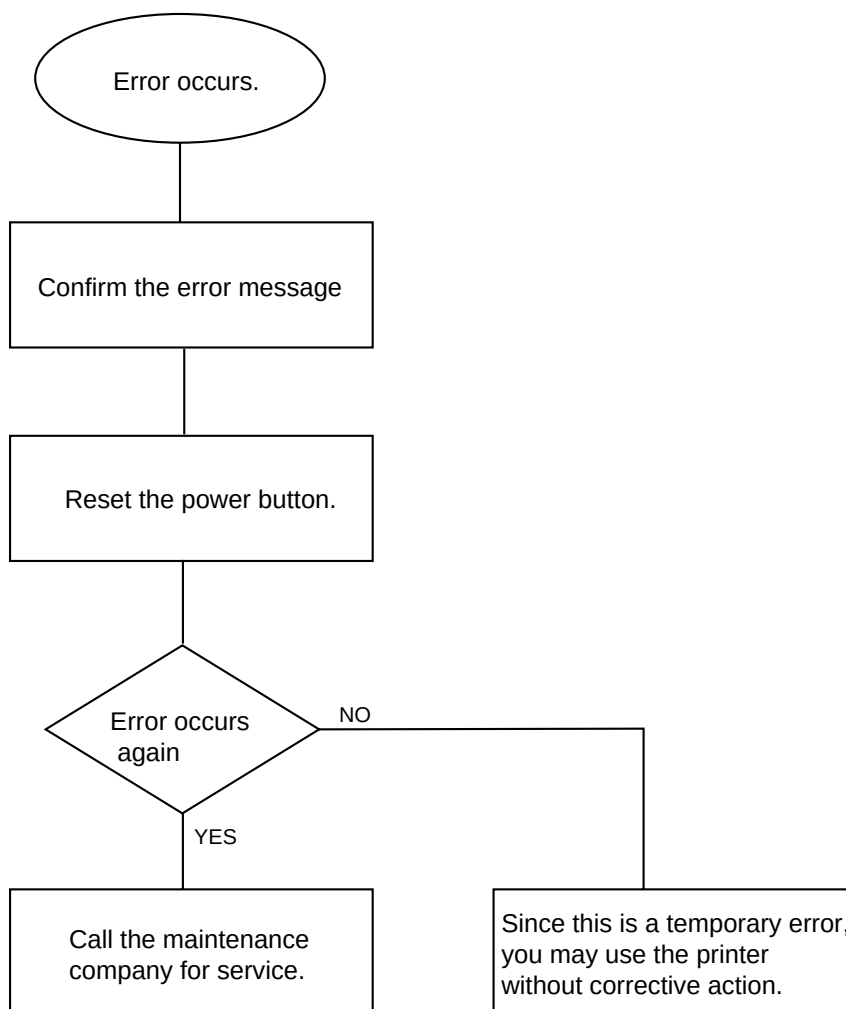
3.4 Others

Table 8-3-4

Problem Item	Cause	Result	Action
The edge of print paper is creased.	Is the curled paper edge creased when the paper is loaded through the pick-up roller?	YES	Turn over the paper in the media cassette.

4. SERVICE CALL

If errors or failures occurred inside the printer, the applicable error message will be displayed on the control panel, and the printer stops. If errors or failures repeat even after resetting the power button, confirm the error code and then call your Service provider.



4.1 Video Controller Mode

Table 8-4-1

Service Call Message	Meaning	Countermeasure
61 PROG ERROR	Program ROM checksum error	Replace with a new ROM.
62 FONT ERROR	Font ROM checksum error	Replace with a new ROM.
63 D-RAM ERROR	D-RAM error	Replace with a new SIMM.
66 NV-W ERROR	NVRAM write error	Replace with a new main (video controller) PCB.
67 NR-R ERROR	NVRAM read error	Replace with a new main (video controller) PCB.
68 NV-B ERROR	NVRAM write/read error	Replace with a new main (video controller) PCB.
60 SYSTEM ERROR	System error	Replace with a new main (video controller) PCB.
99 SERVICE 2	Instruction access error	Replace with a new main (video controller) PCB.
99 SERVICE 3	error	Replace with a new main (video controller) PCB.
99 SERVICE 4	Instruction bus error	Replace with a new main (video controller) PCB.
99 SERVICE 5	Data bus error	Replace with a new main (video controller) PCB.
99 SERVICE 6	Privileged instruction	Replace with a new main (video controller) PCB.
99 SERVICE 8	Illegal instruction	Replace with a new main (video controller) PCB.
99 SERVICE 9	No fpu	Replace with a new main (video controller) PCB.

Table 8-4-2

Service Call Message	Description
99 SERVICE C3	NVRAM Error (MCTL PCB)
99 SERVICE C4	Engine Controller MCTL PCB Hardware Error
99 SERVICE C7	Process Timing Clock Error (Main Motor Clock Error)
99 SERVICE D1	Clutch Error of the Yellow Developing Unit
99 SERVICE D2	Clutch Error of the Magenta Developing Unit
99 SERVICE D3	Clutch Error of the Cyan Developing Unit
99 SERVICE D4	Clutch Error of the Black Developing Unit
99 SERVICE D5	HPSI Signal Error (Retract Error of Black and Yellow Toner Cartridge)

Service Call Message	Description
99 SERVICE D6	HPSI Signal Error (Retract Error of Cyan and Magenta Toner Cartridge)
99 SERVICE E1	Developing Motor Error
99 SERVICE E2	Main Motor Error
99 SERVICE E3	Transfer Drum Rotational Error
99 SERVICE E4	Toner Sensor PCB Error
99 SERVICE E5	Transfer Roller Solenoid Error
99 SERVICE E6	Brush Cleaner Solenoid Error
99 SERVICE E7	Brush Cleaner Clutch Error
99 SERVICE E8	Fusing Unit Clutch error
99 SERVICE E9	Belt Sensor Error
99 SERVICE EL	Erase Lamp Error
99 SERVICE F0	Control Fan Error
99 SERVICE F2	Ozone Fan (1) Error
99 SERVICE F4	Fuser Fan Error
99 SERVICE F5	Charging HV (DC High Voltage) Error
99 SERVICE H0	Fuser Thermistor Error
99 SERVICE H2	Fusing Temperature Error (Warming-up Time Error)
99 SERVICE H3	Fusing Temperature (3) Error (Heater Continuous ON Time Error)
99 SERVICE H4	Fusing Temperature (4) Error (Heater Continuous ON Time Error)
99 SERVICE L1	Beam Sensor Error
99 SERVICE L2	Scanner Motor Error
99 SERVICE LL	Laser Power Error

Note:

For further actions for the error messages described in Table 8-4-2, refer to the flow charts later in this section.

4.2 Engine Controller Mode

Table 8-4-3

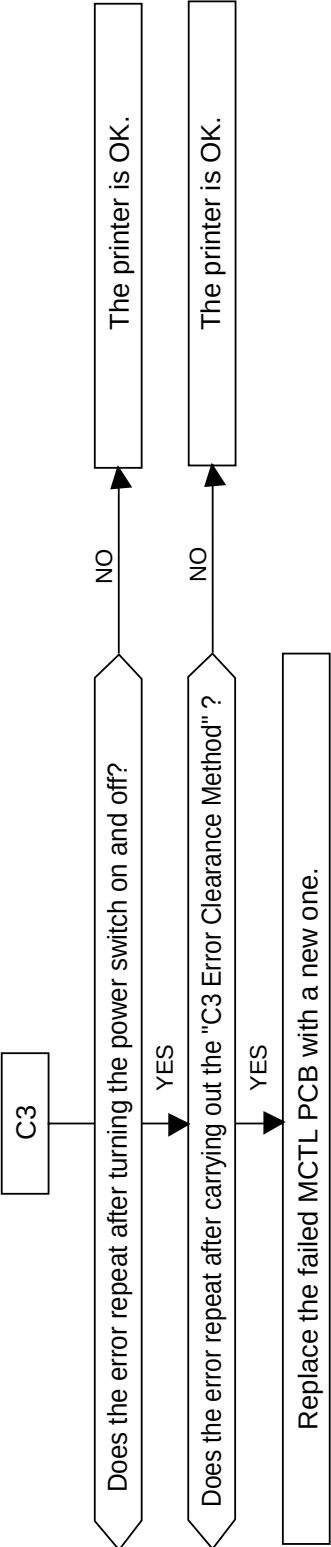
Code	Description
C3	NVRAM Error (MCTL PCB)
C4	Engine Controller MCTL PCB Hardware Error
C7	Process Timing Clock Error (Main Motor Clock Error)
D1	Clutch Error of the Yellow Developing Unit
D2	Clutch Error of the Magenta Developing Unit
D3	Clutch Error of the Cyan Developing Unit
D4	Clutch Error of the Black Developing Unit
D5	HPSI Signal Error (Retract Error of Black and Yellow Toner Cartridge)
D6	HPSI Signal Error (Retract Error of Cyan and Magenta Toner Cartridge)
E1	Developing Motor Error
E2	Main Motor Error
E3	Transfer Drum Rotational Error
E4	Toner Sensor PCB Error
E5	Transfer Roller Solenoid Error
E6	Brush Cleaner Solenoid Error
E7	Brush Cleaner Clutch Error
E8	Fusing Unit Clutch error
E9	Belt Sensor Error
EL	Erase Lamp Error
F0	Control Fan Error
F2	Ozone Fan (1) Error
F4	Fuser Fan Error
F5	Charging HV (DC High Voltage) Error
H0	Fuser Thermistor Error
H2	Fusing Temperature Error (Warming-up Time Error)
H3	Fusing Temperature (3) Error (Heater Continuous ON Time Error)
H4	Fusing Temperature (4) Error (Heater Continuous ON Time Error)
L1	Beam Sensor Error
L2	Scanner Motor Error
LL	Laser Power Error

Note:

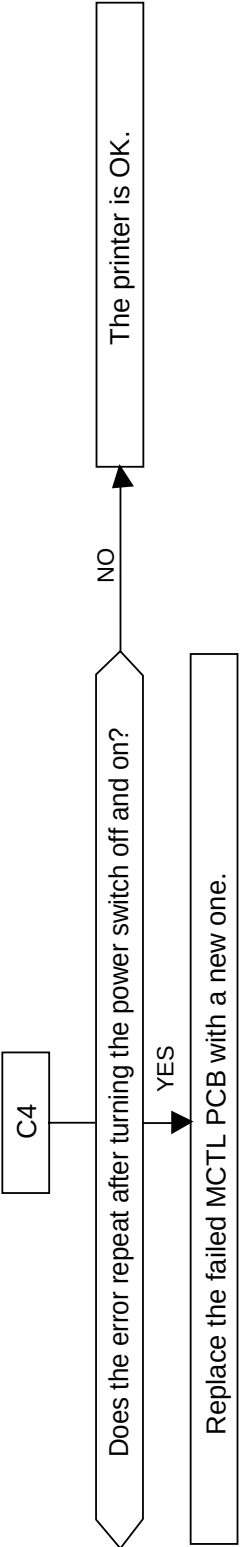
For further actions for the error messages described in Table 8-4-3, refer to [the flow charts later in this section](#).

Chart 8-4 Troubleshooting

Code	Description of Error	Cause of Error	Clearance Method
C3	NVRAM Error	1. Failure of MCTL PCB. • CPU • EEPROM	1. Turn off and on the power switch. 2. If method 1 does not work, carry out the "C3 Error Clearance Procedure". 3. Replace the failed MCTL PCB with a new one.



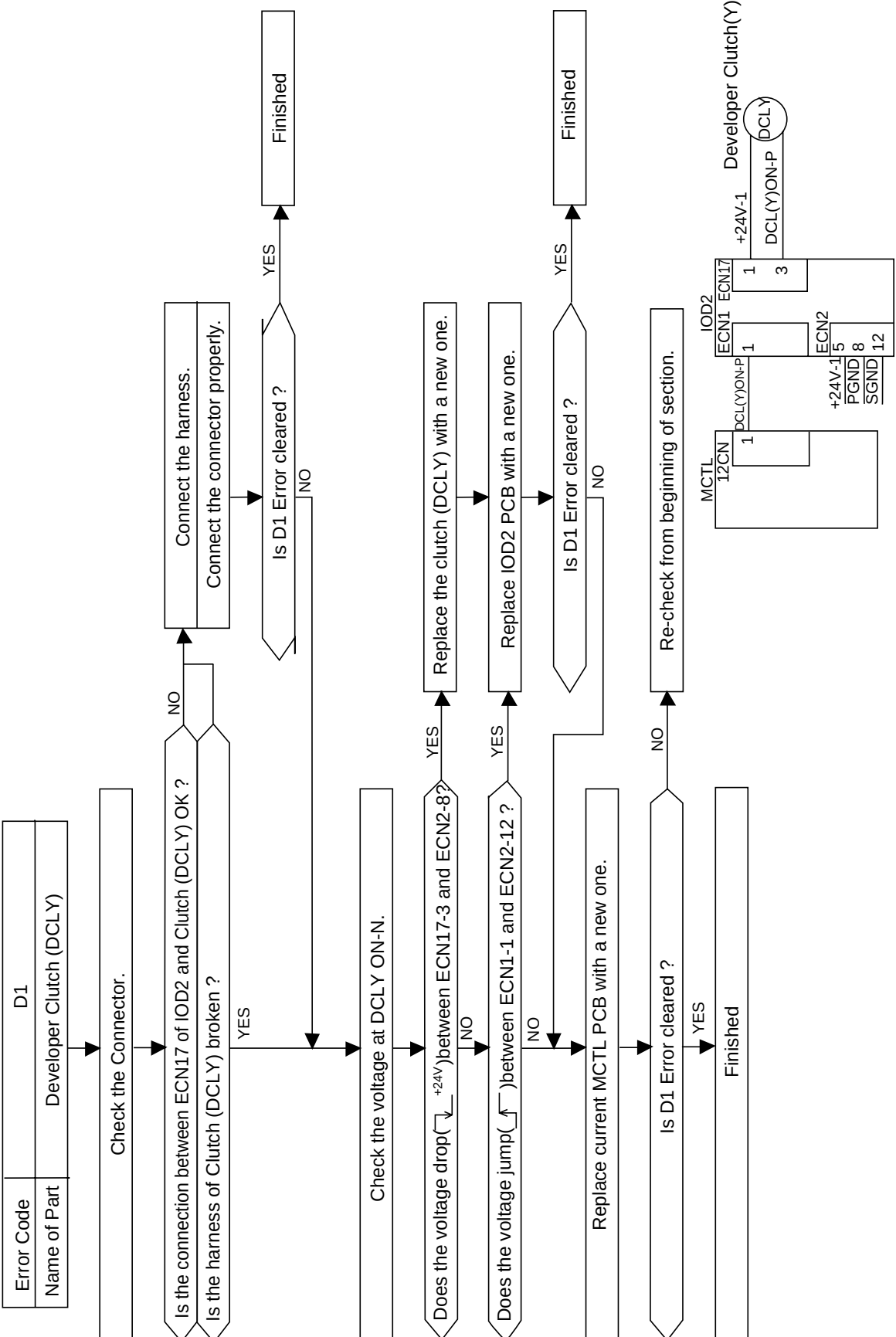
Code	Description of Error	Cause of Error	Clearance Method
C4	Hard Error of MCTL Control Circuit.	1. Failure of MCTL PCB.	1. Turn off and on the power switch. 2. Replace the failed MCTL PCB with a new MCTL PCB.

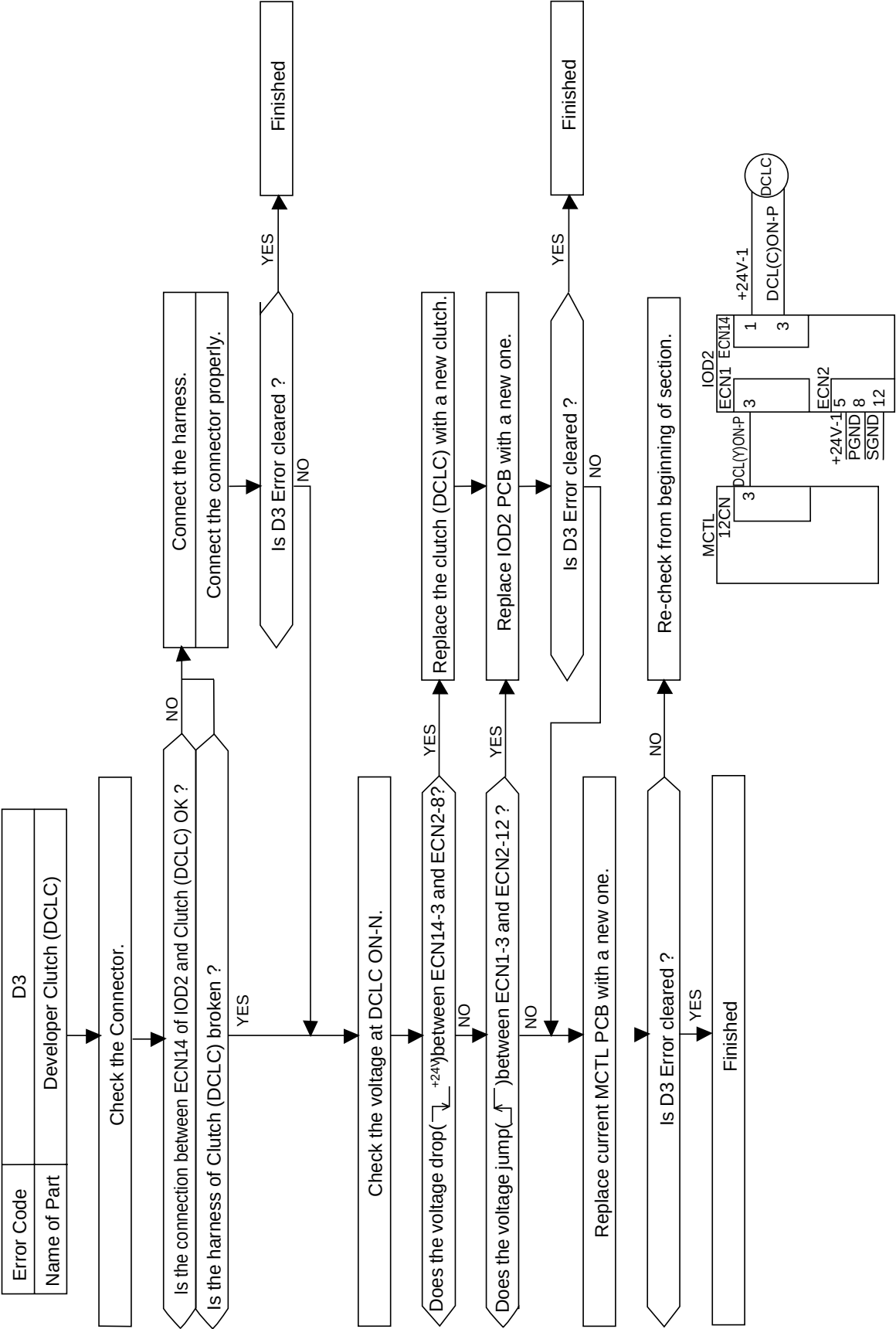


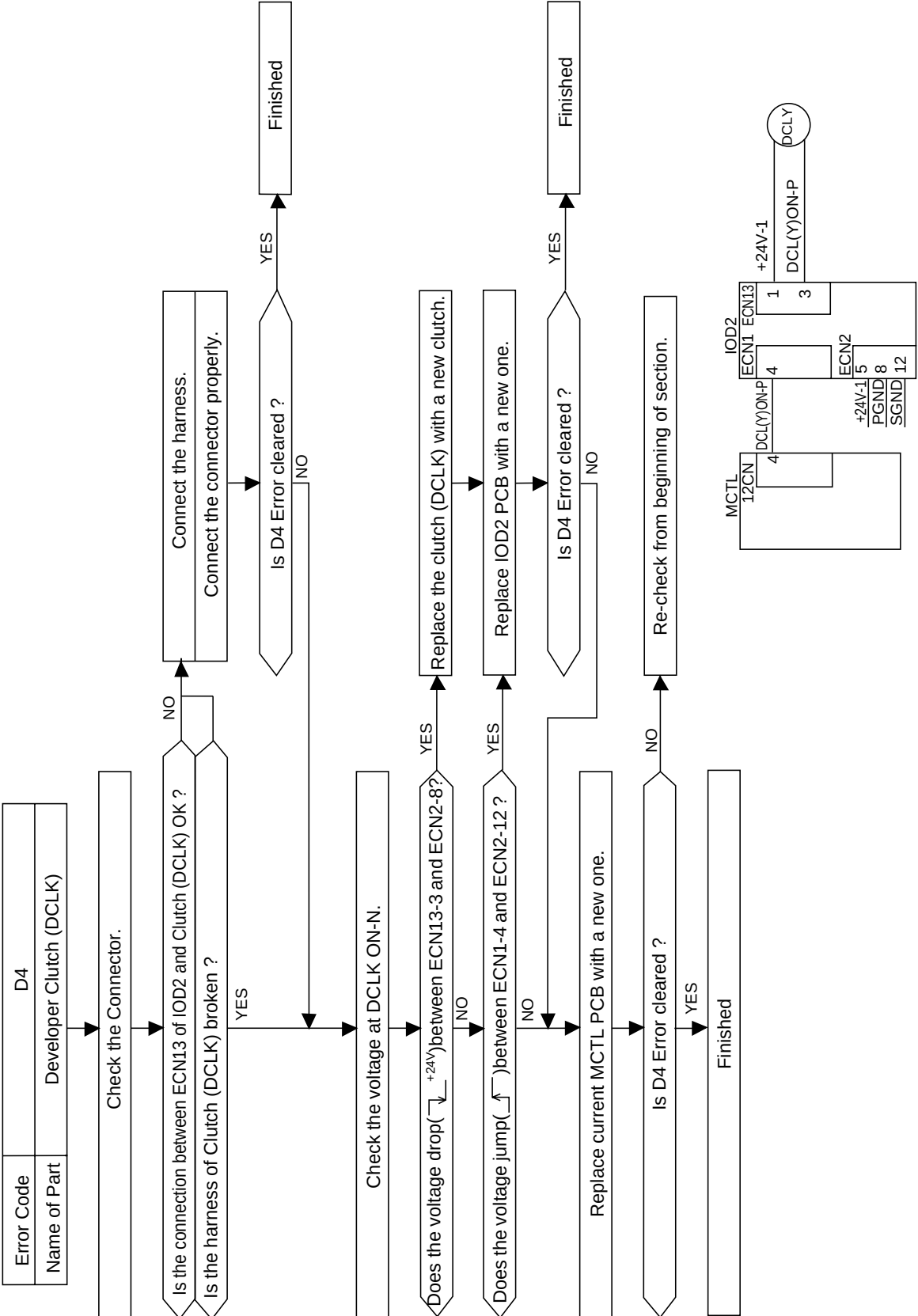
Code	Description of Error	Cause of Error	Clearance Method
C7	Process Timing Error.	1. Power Feeding Failure 2. MM Failure 3. MM Input Circuit Failure	1. Implement the same clearance procedures employed for E2 error. [Note]: MM stands for OPC Belt Drive Main Motor.

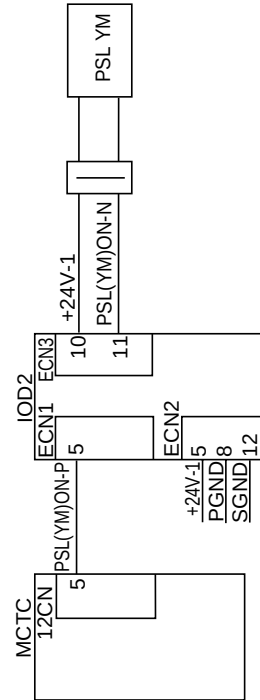
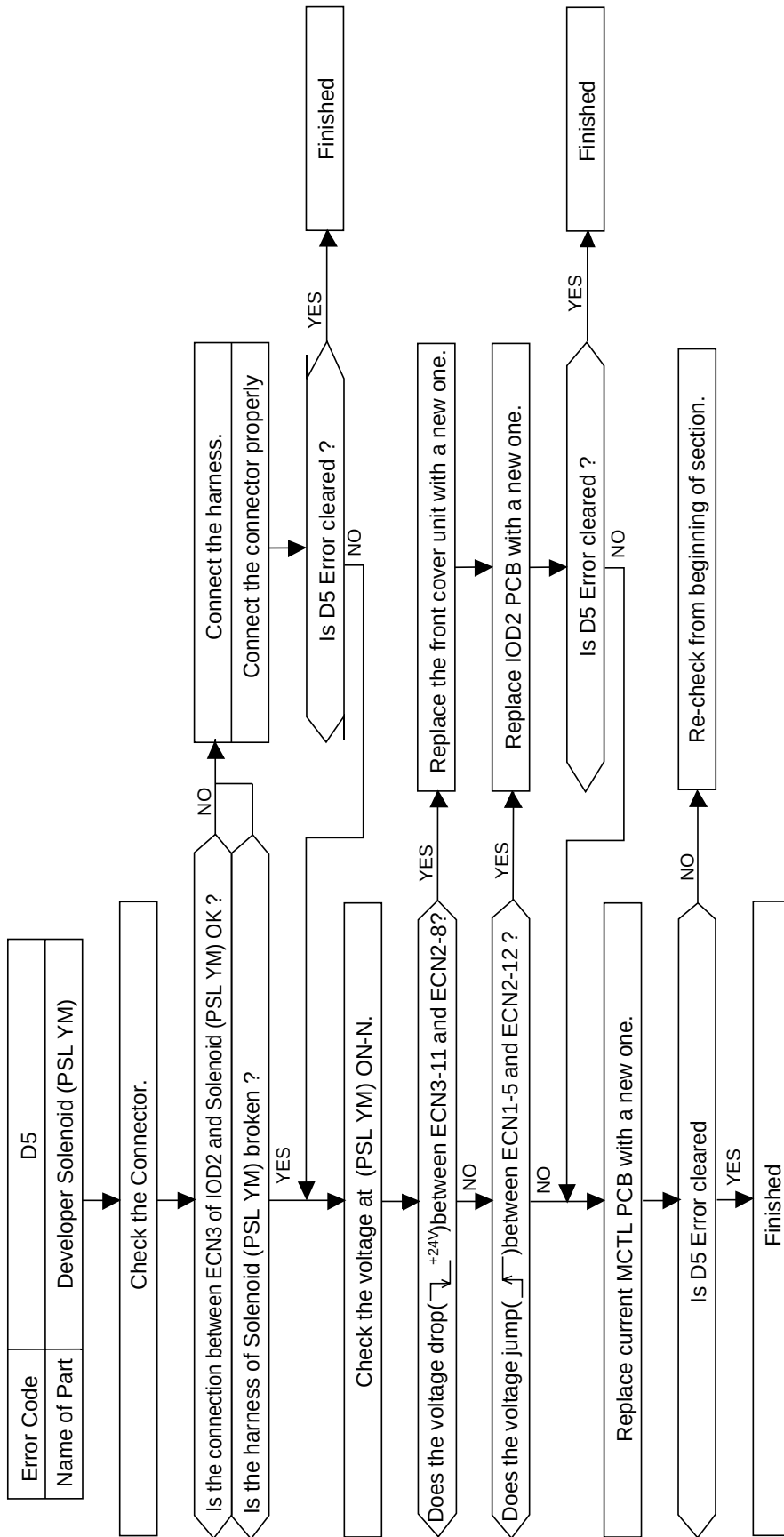
C7

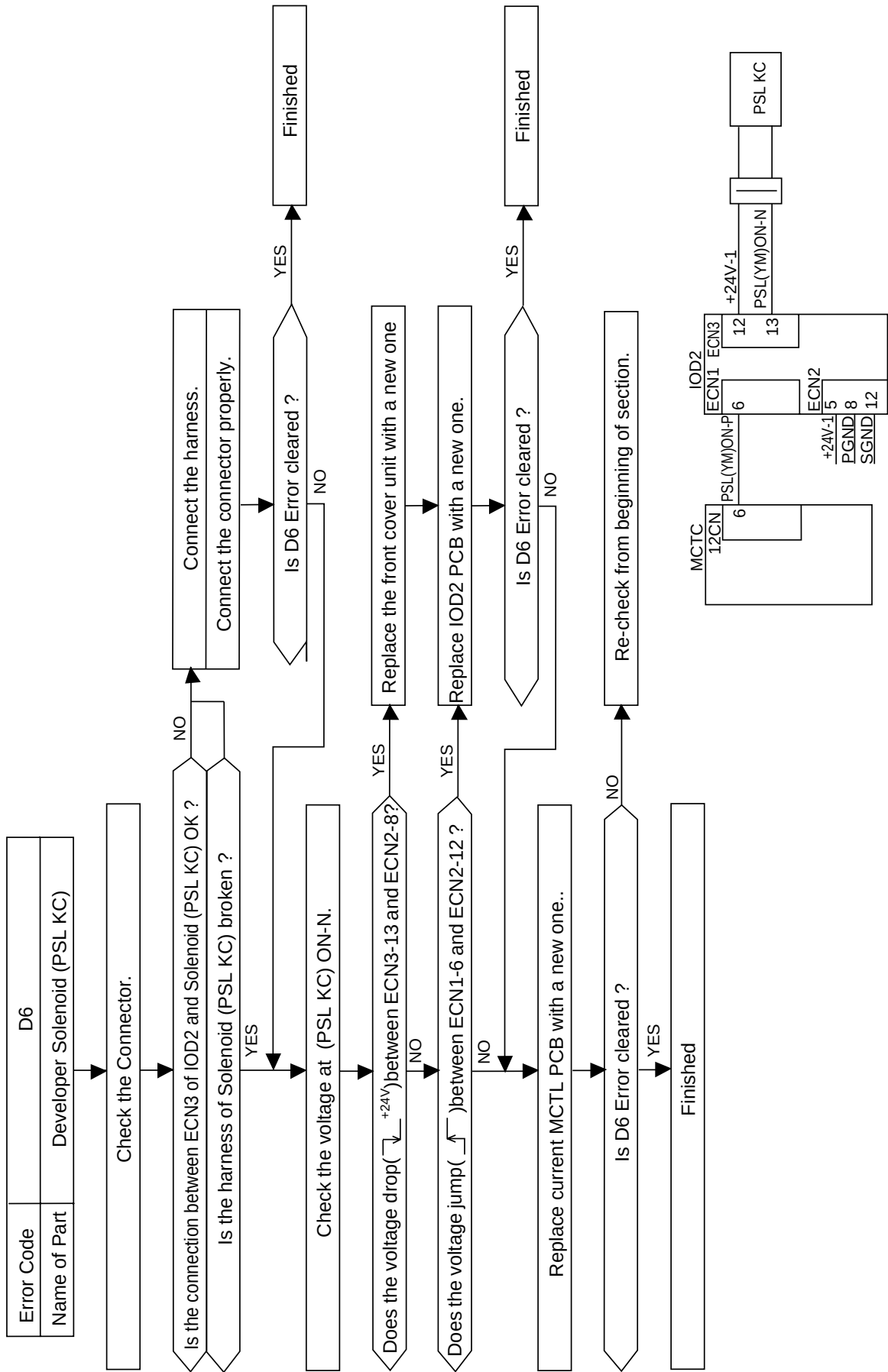
Implement the same clearance procedures employed for E2 error.

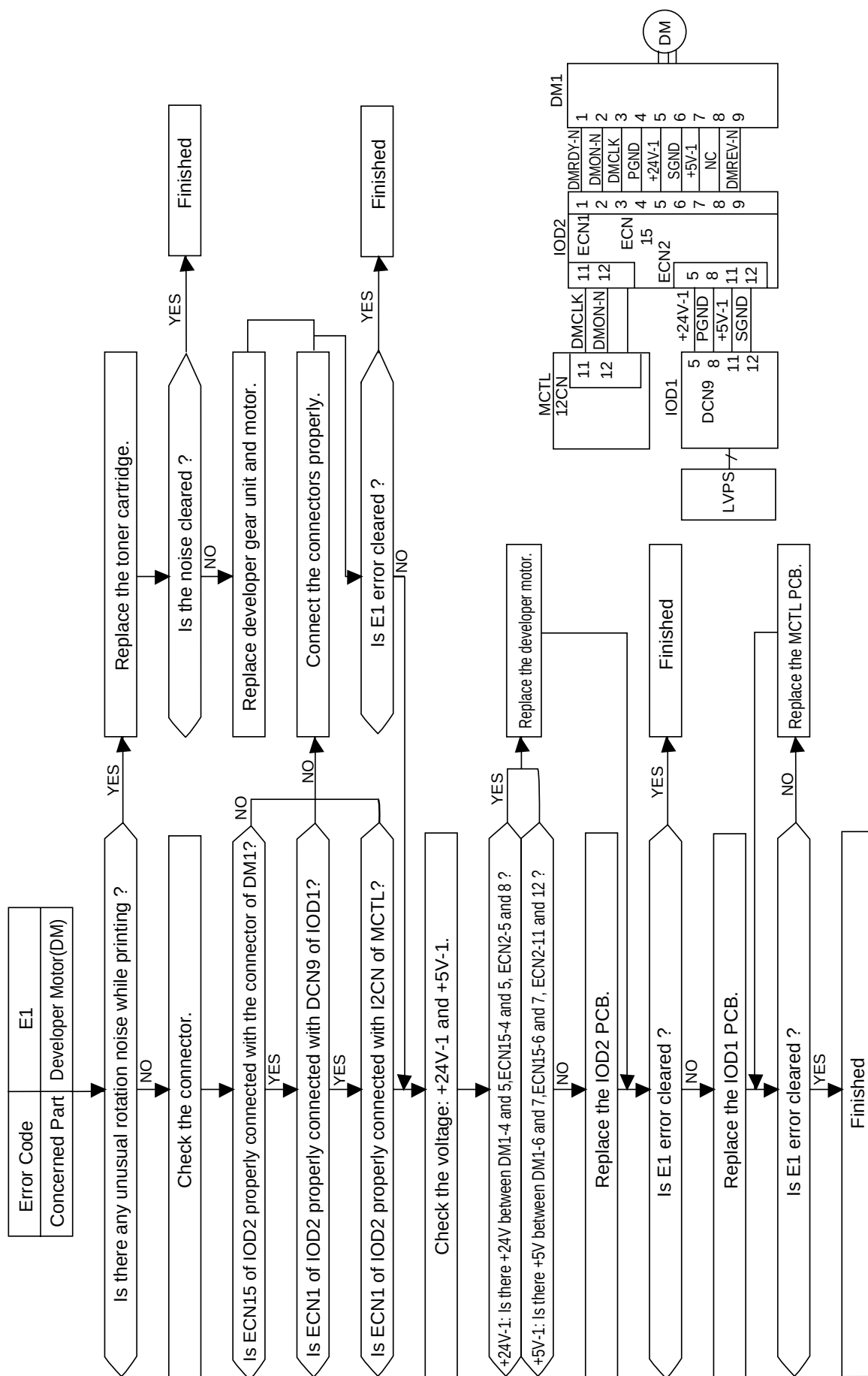




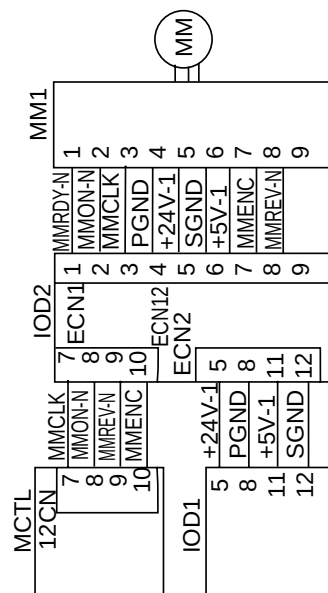
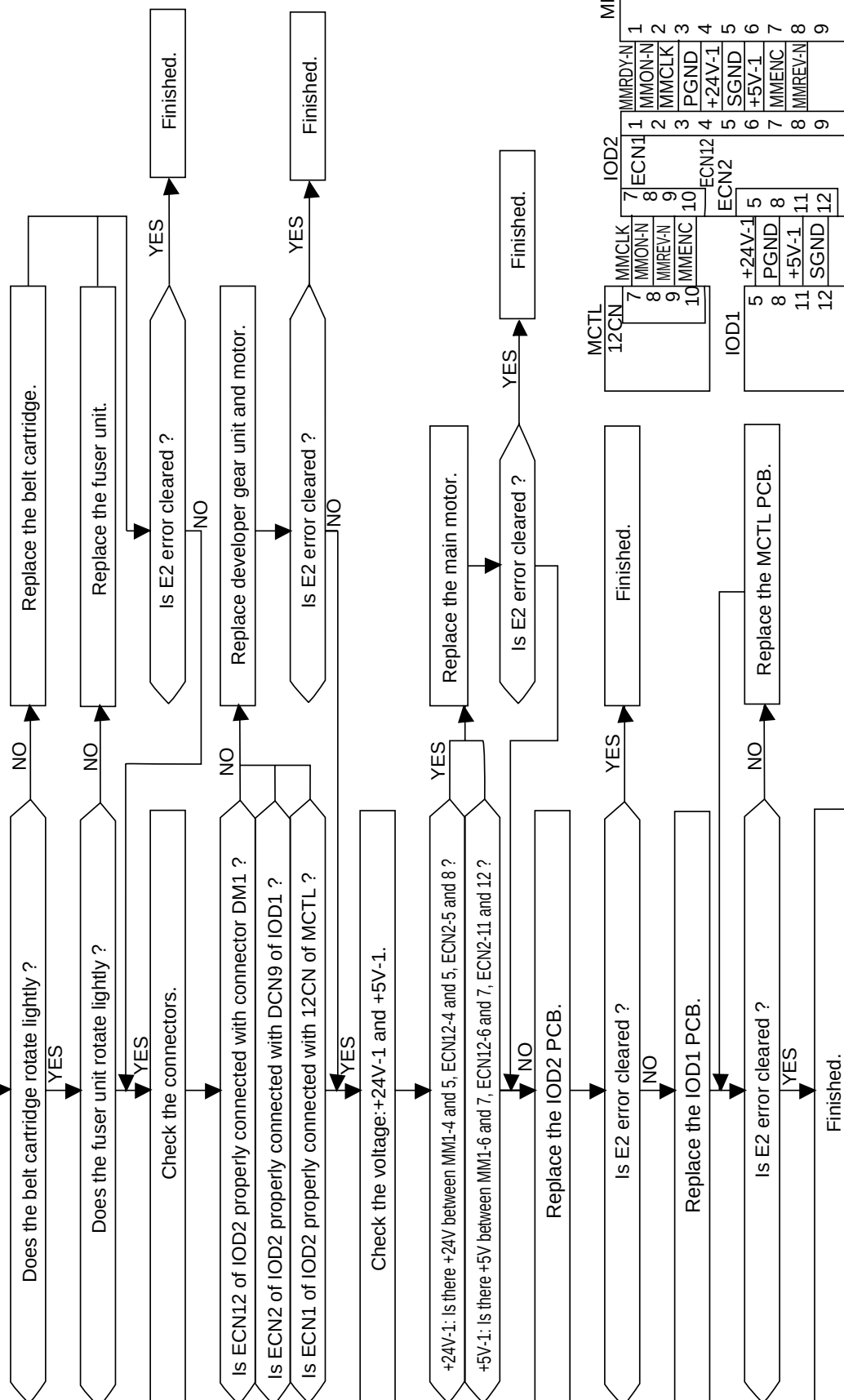




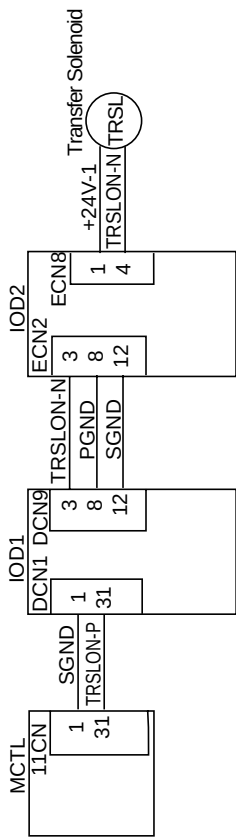
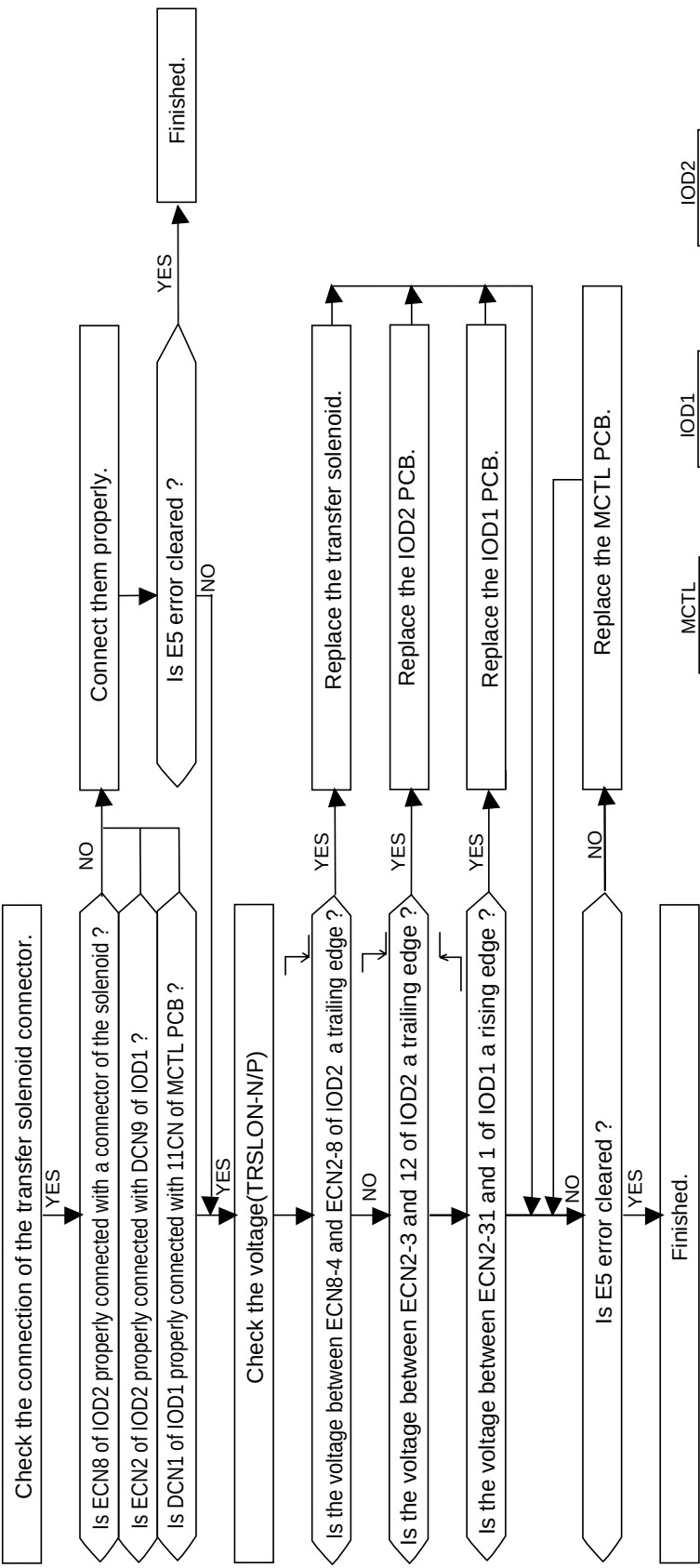


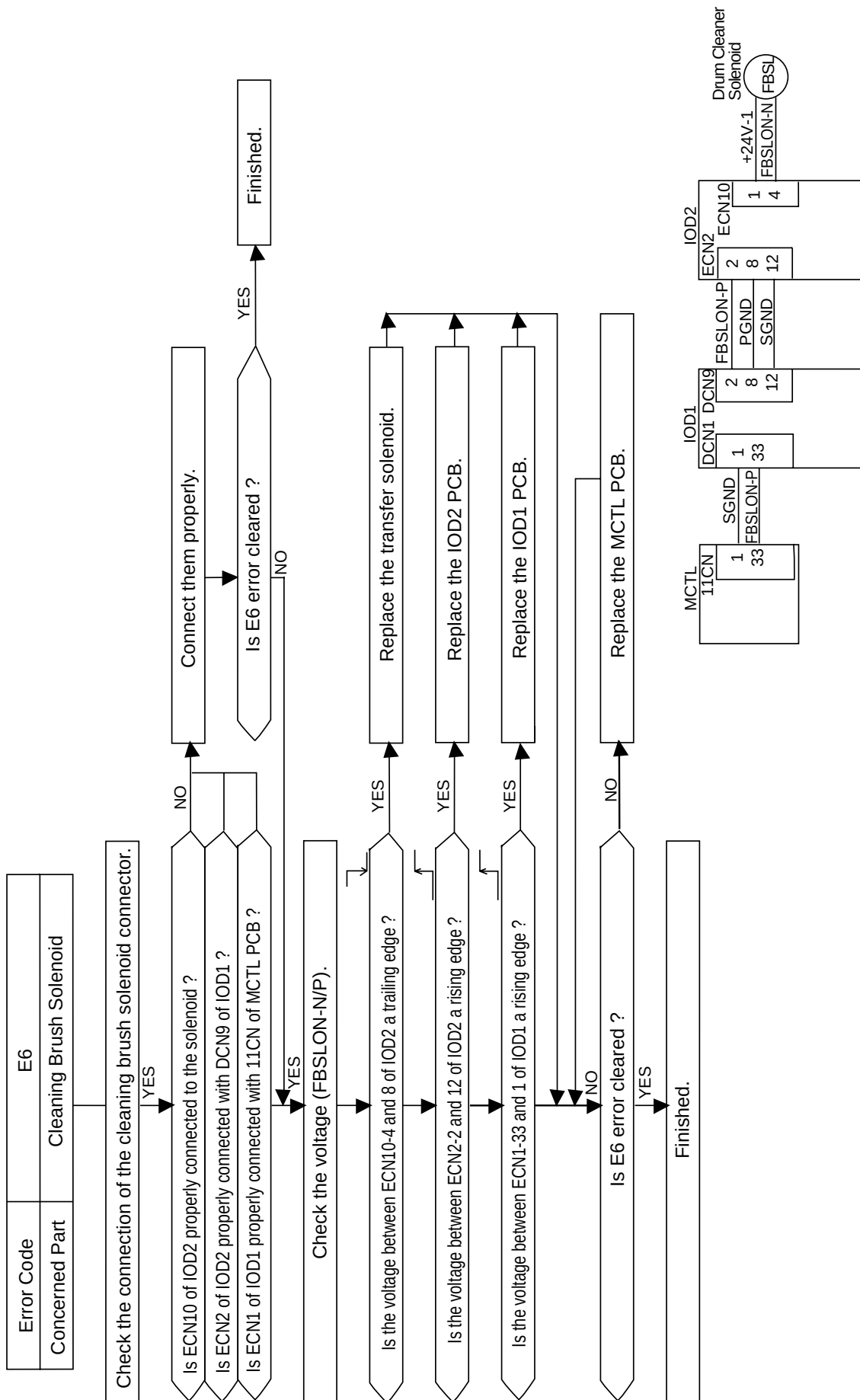


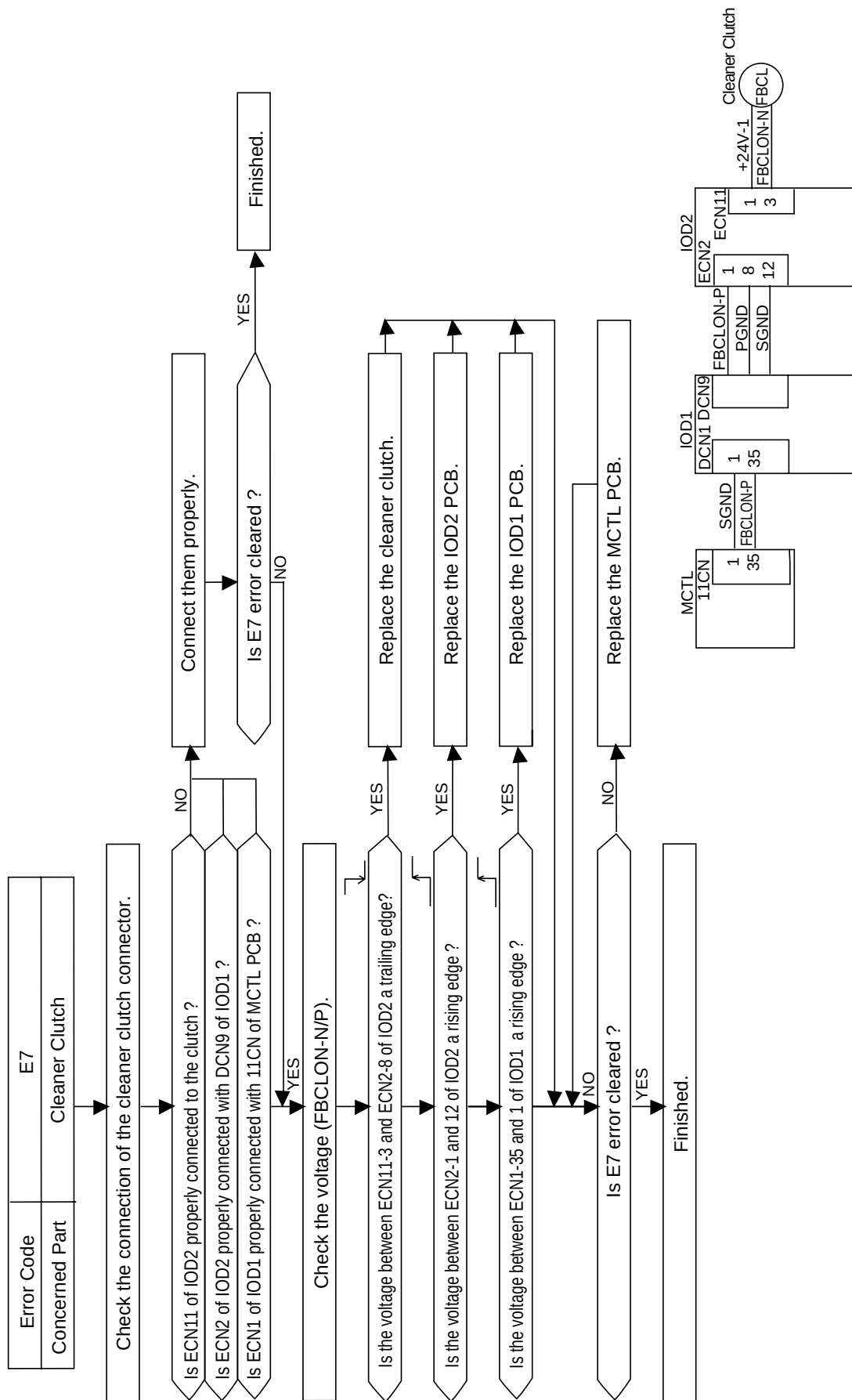
Error Code	E2
Concerned Part	Main Motor(MM)

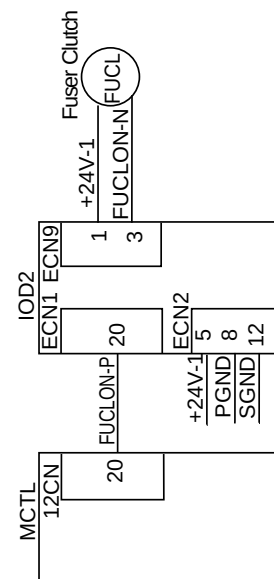
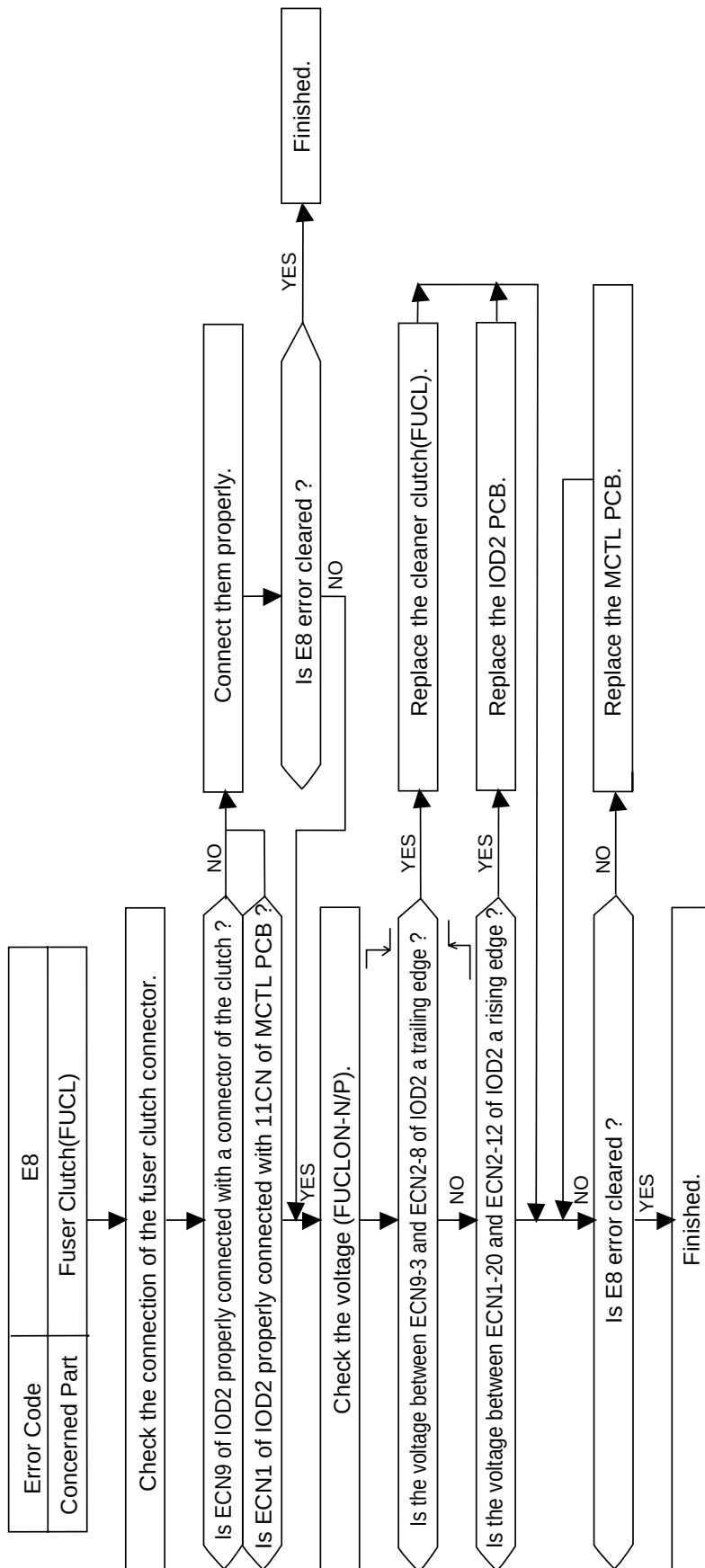


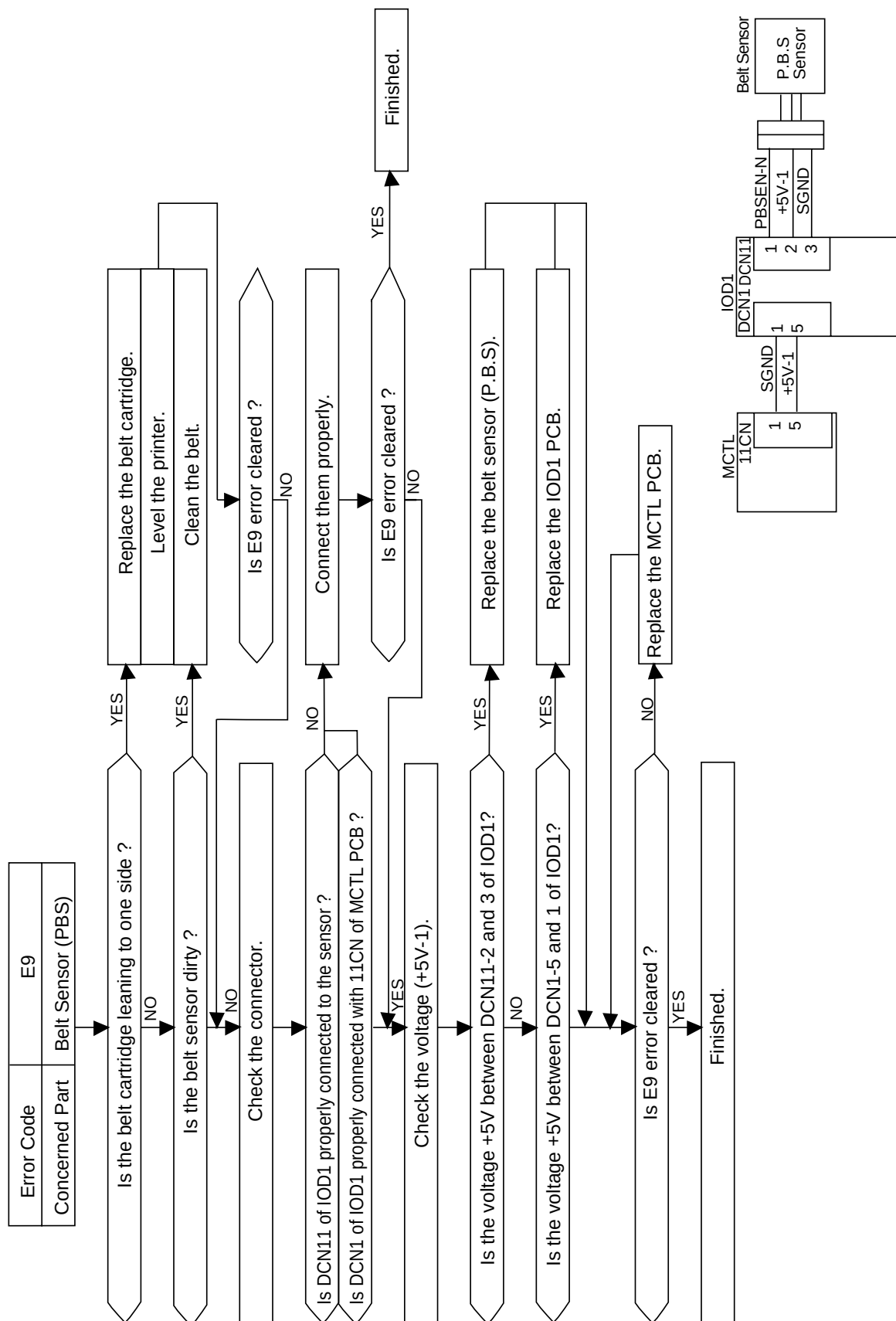
Error Code	E5
Concerned Part	Transfer Solenoid

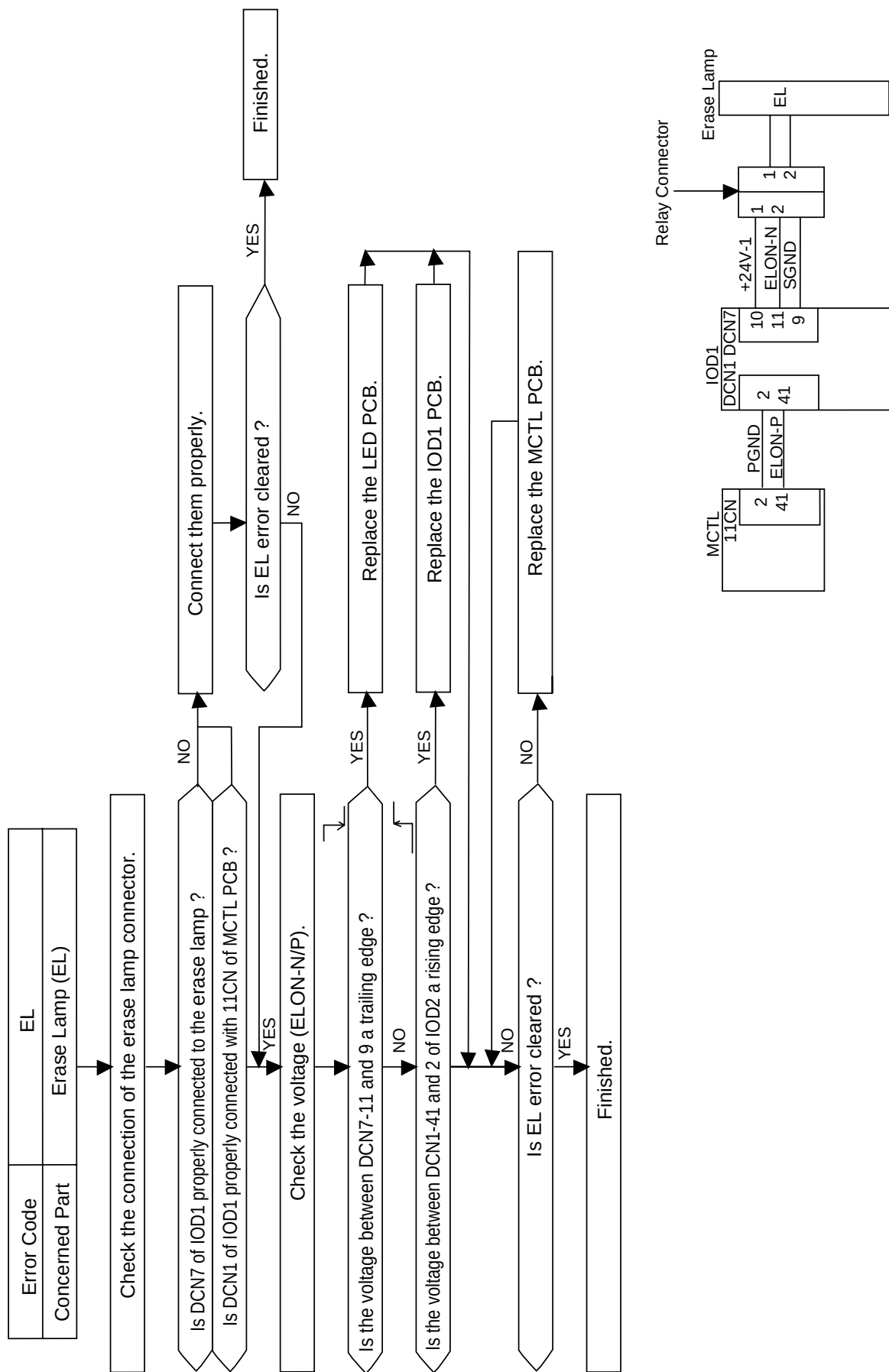


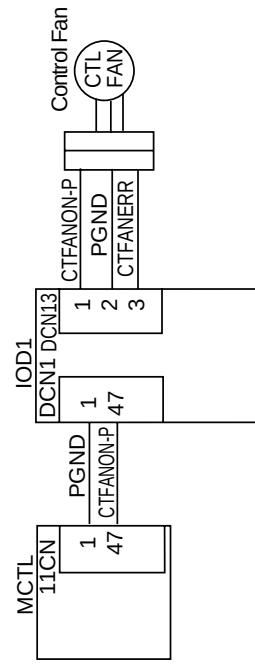
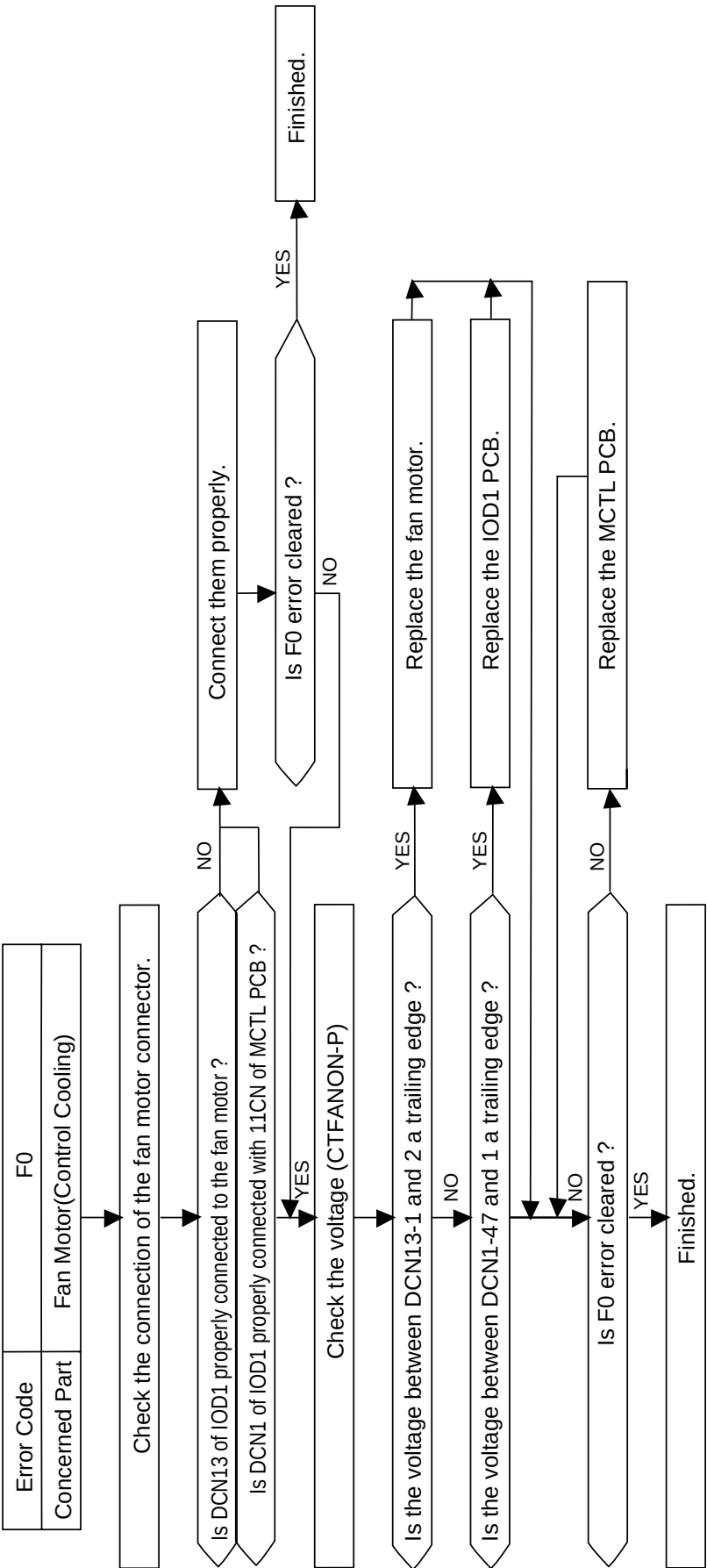


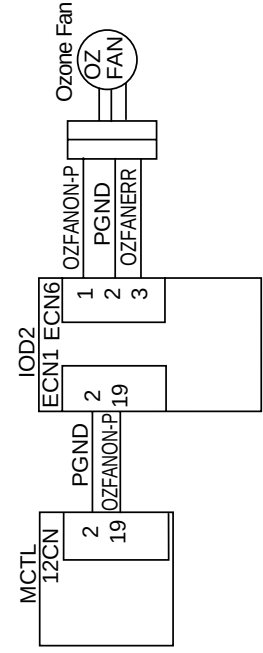
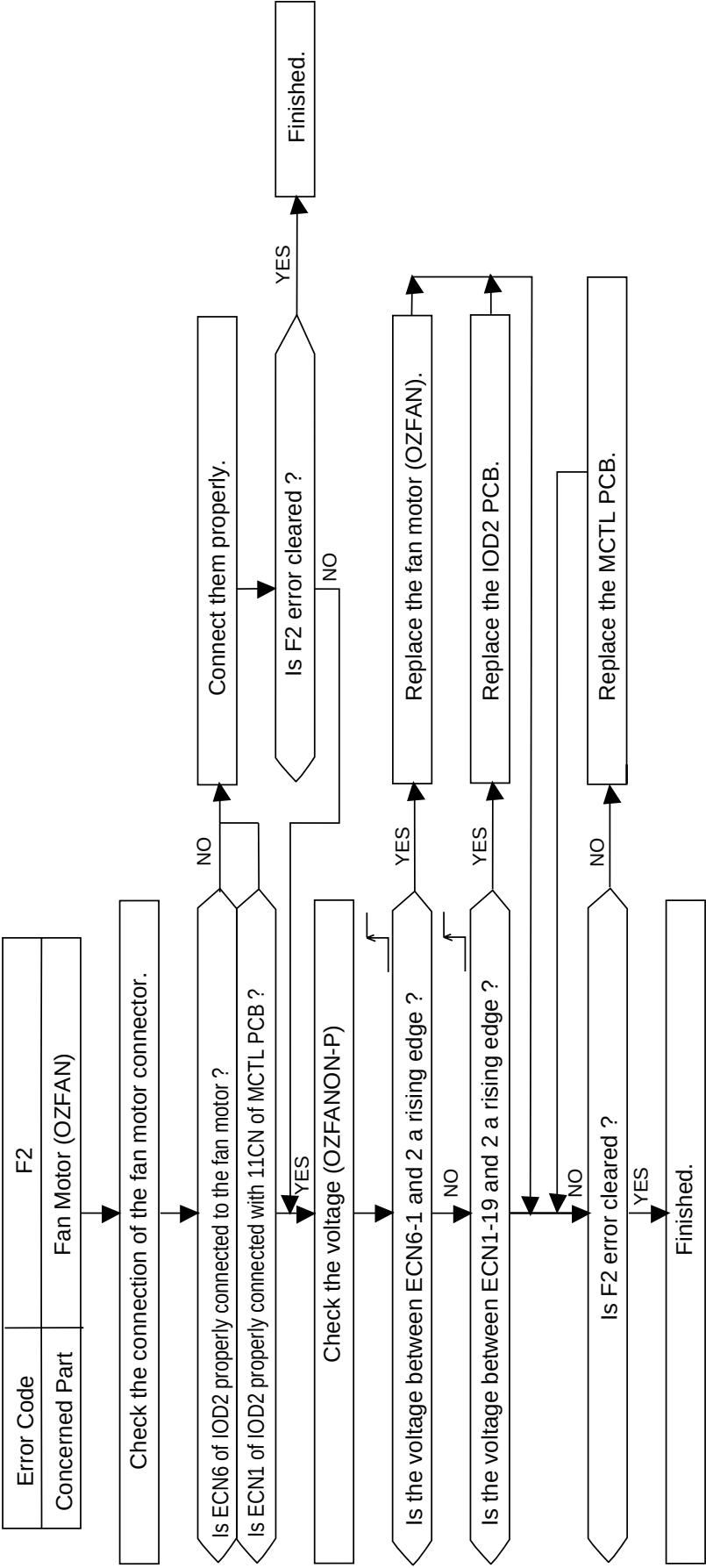


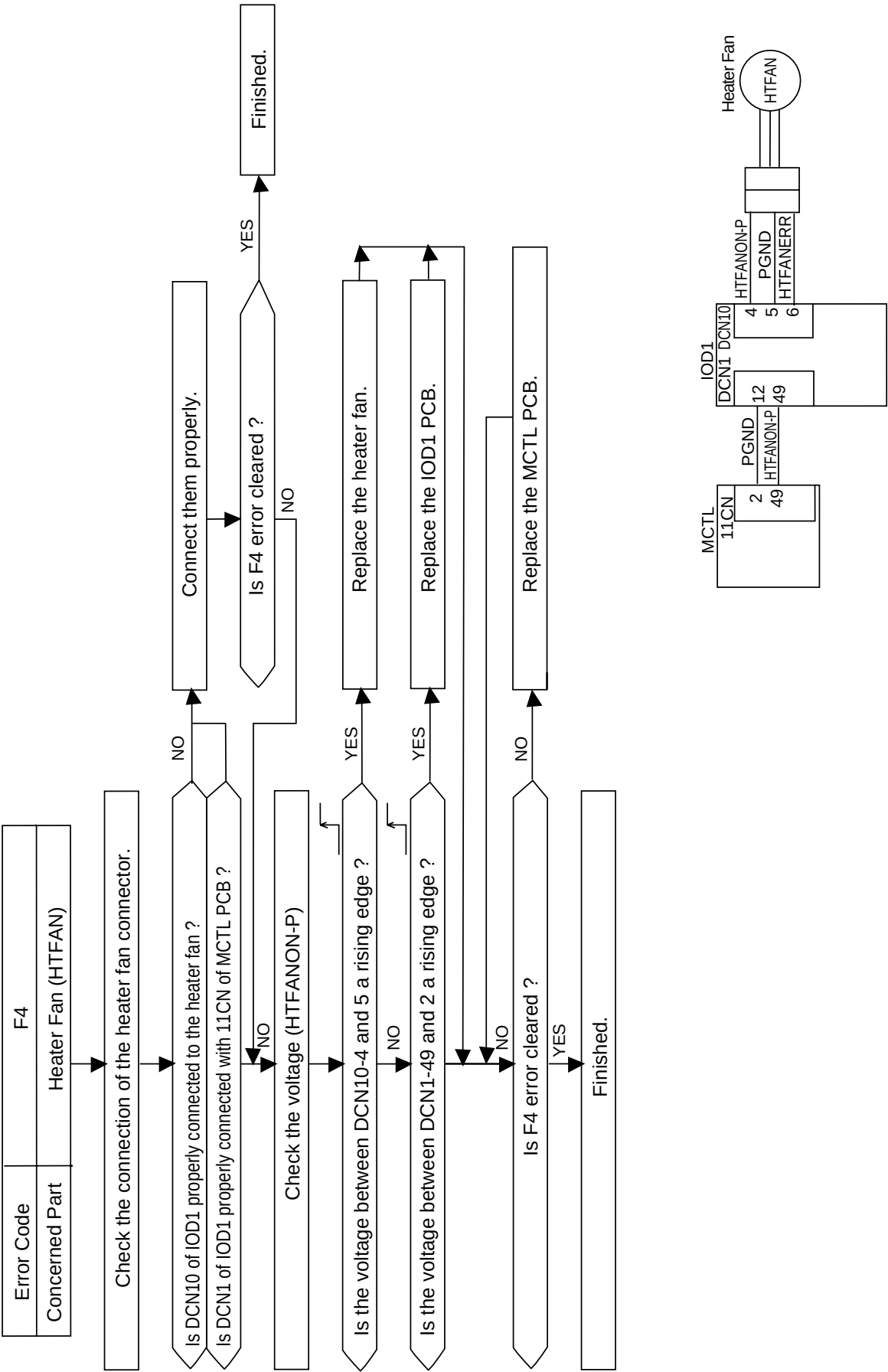




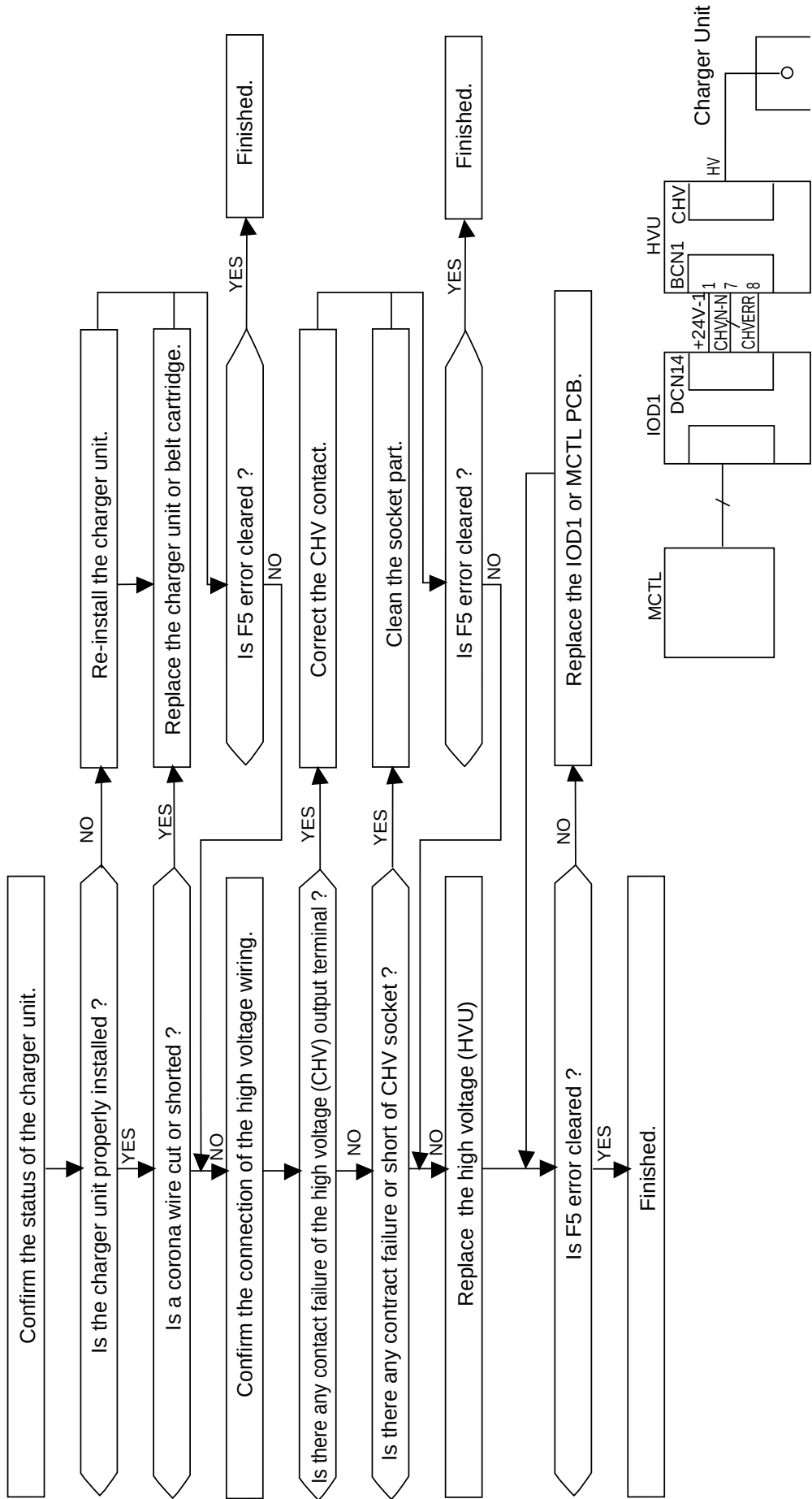


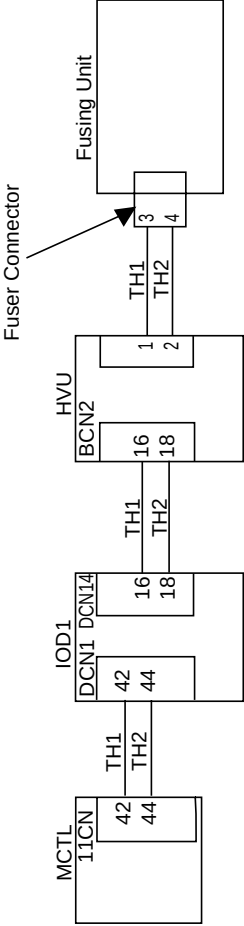
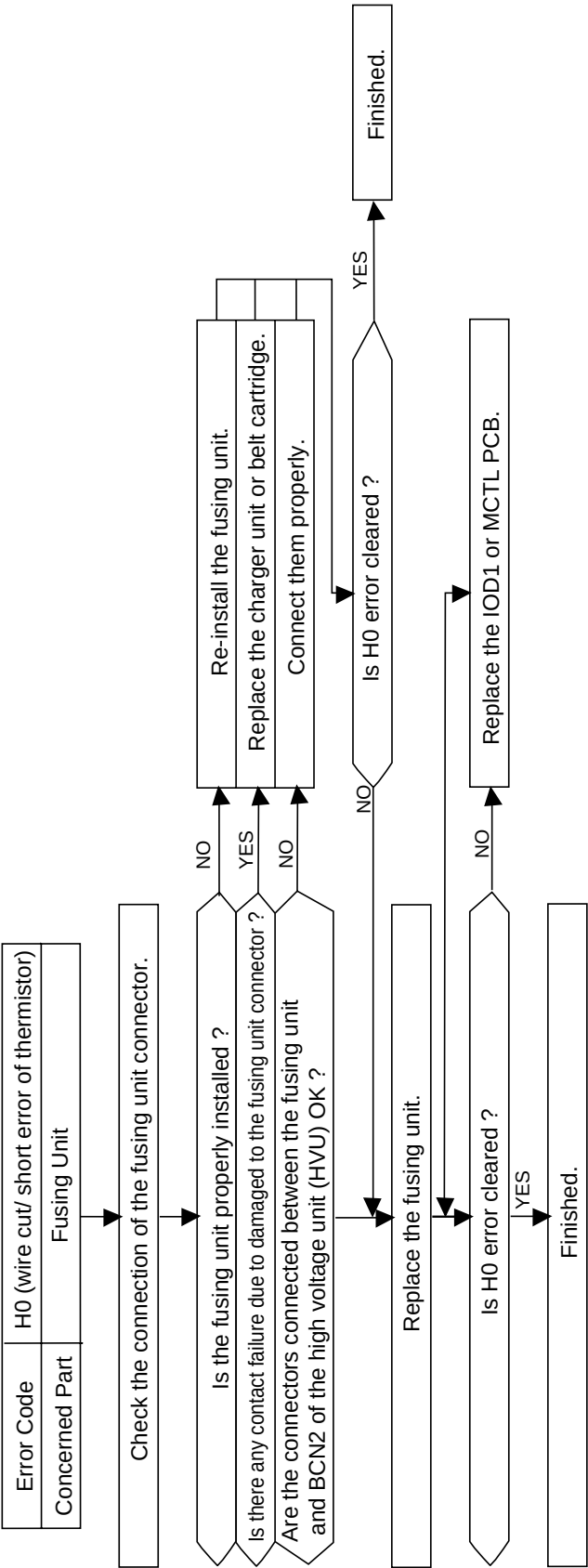




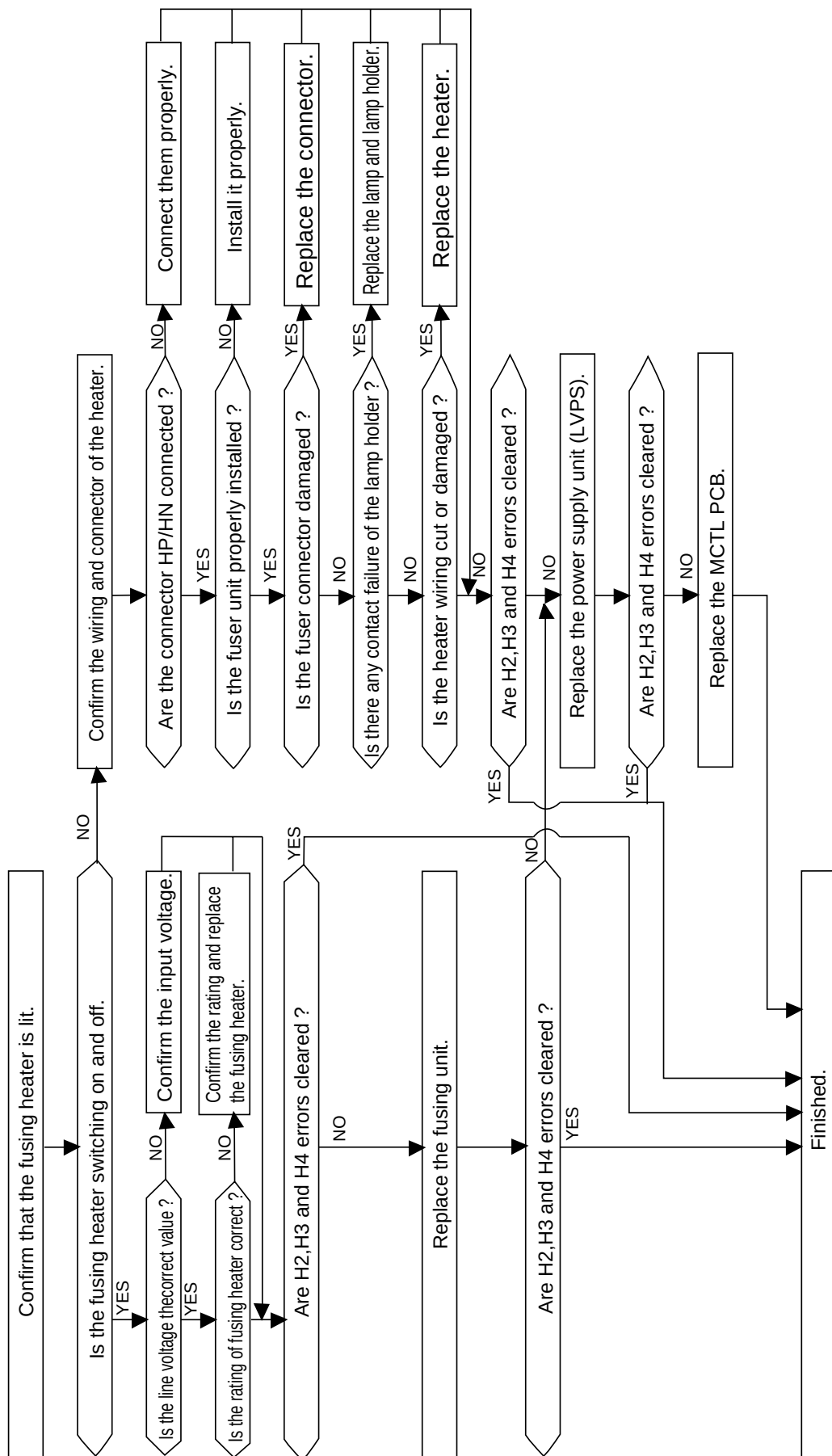


Error Code	F5
Concerned Part	High Voltage Unit (HVU)

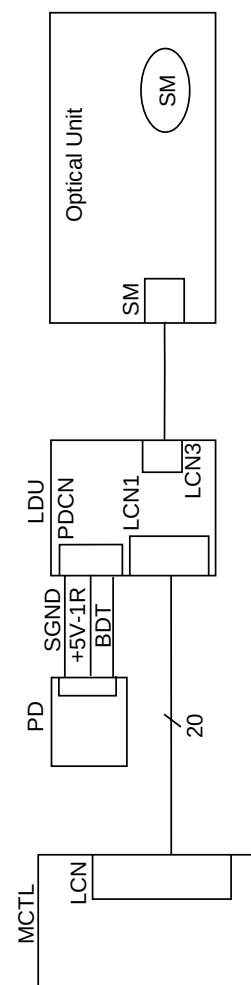
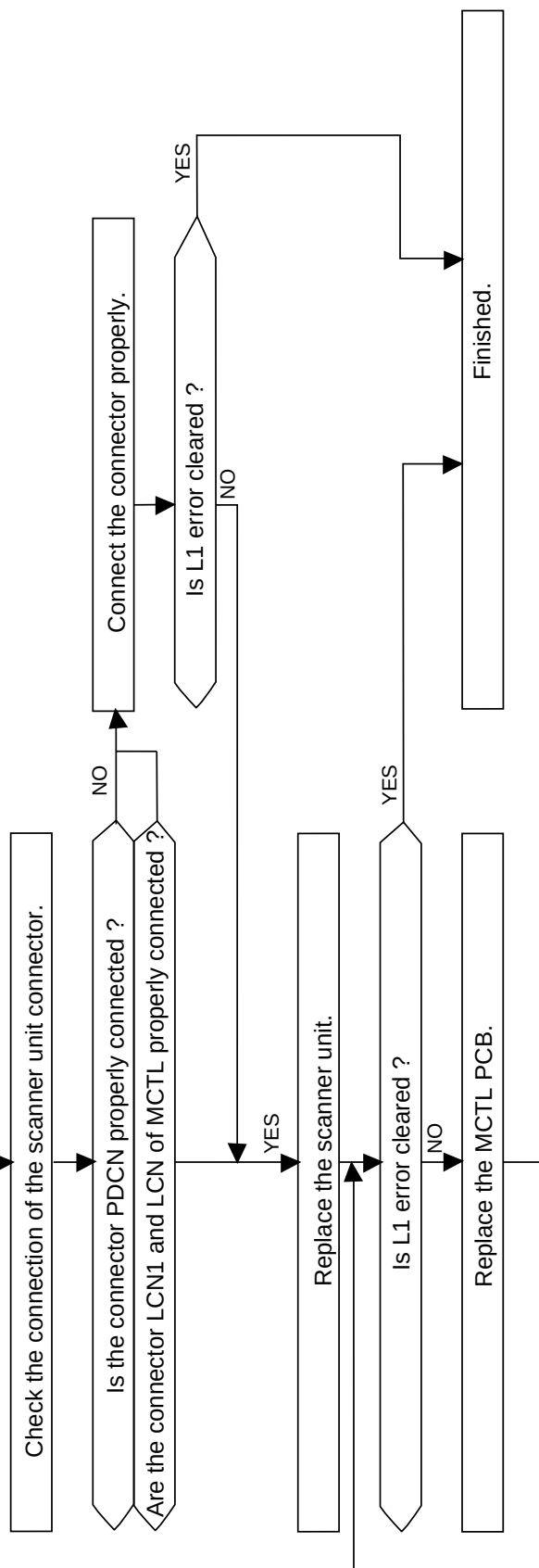


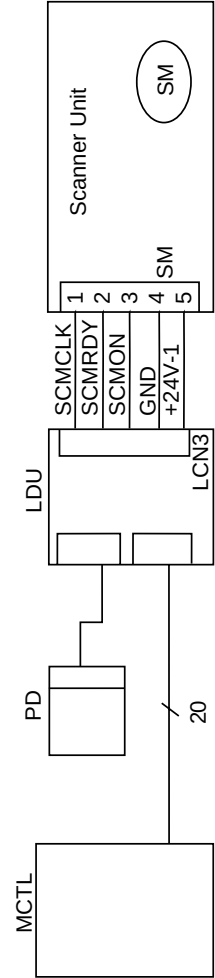
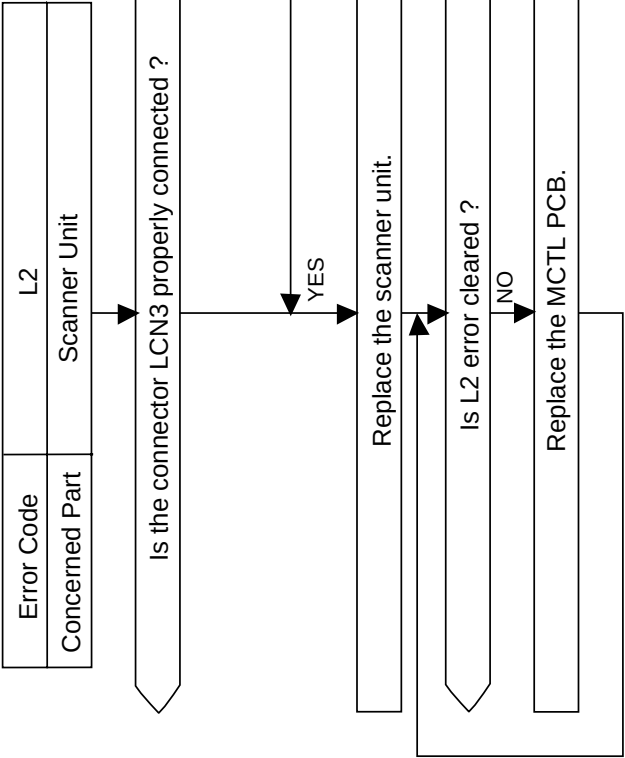


Error Code	H2,H3,H4
Concerned Part	Fusing Unit and Others

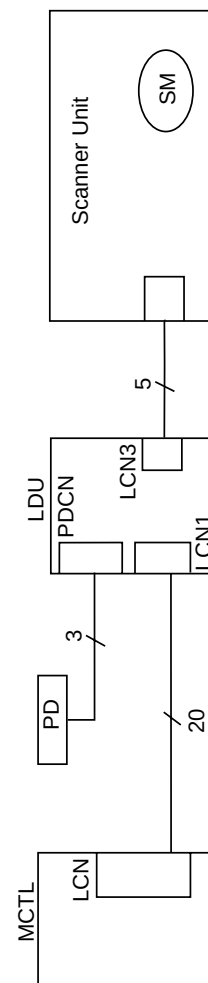
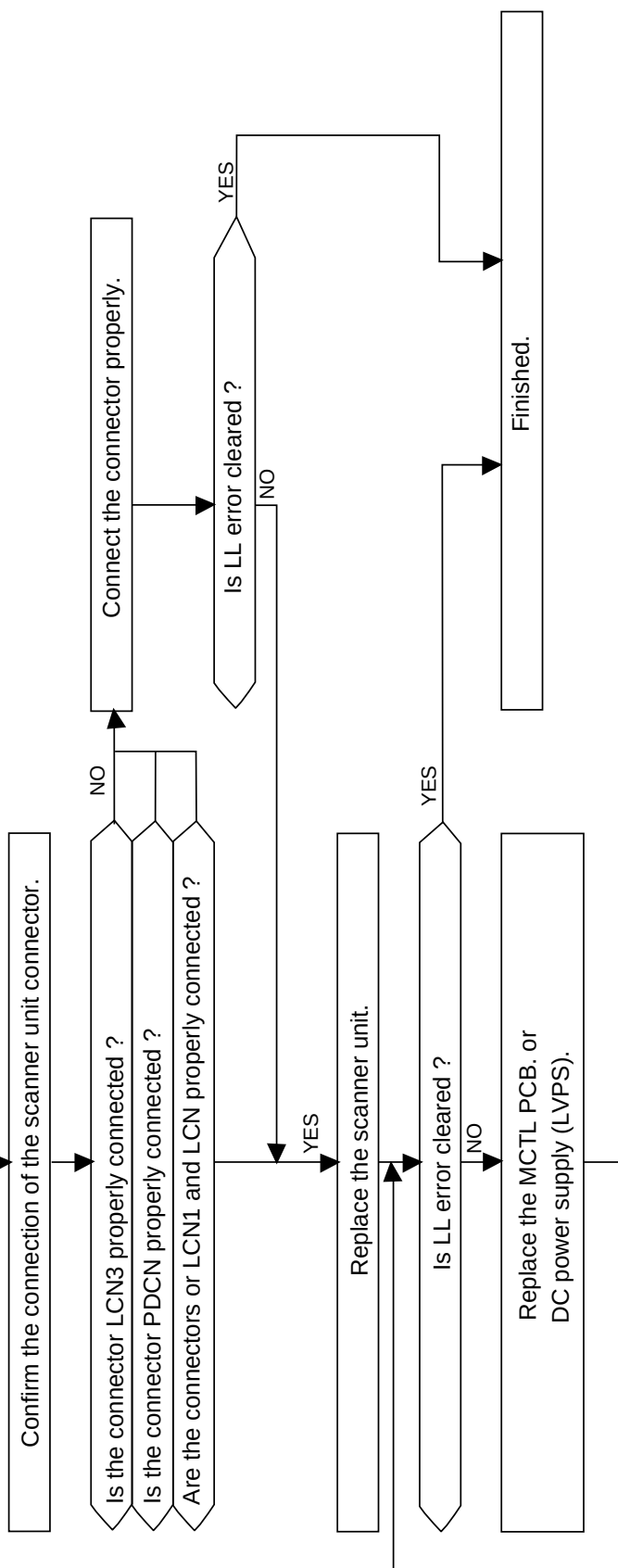


Error Code	L1 (Beam Detecting Error)
Concerned Part	Scanner Unit





Error Code	LL
Concerned Part	Scanner Unit

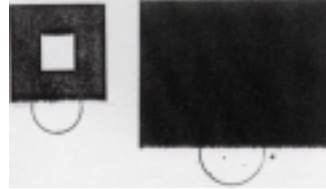


5. IMAGE FAILURE

(1)



(2)



(3)



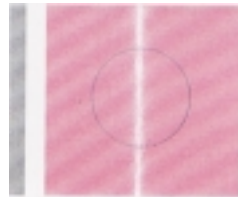
(4)



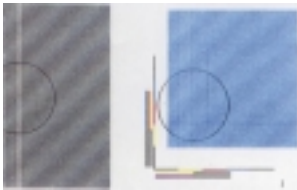
(5)



(6)



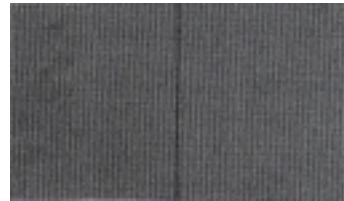
(7)



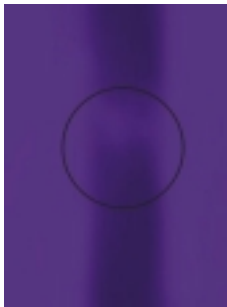
(8)



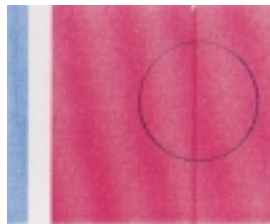
(9)-a



(9)-b



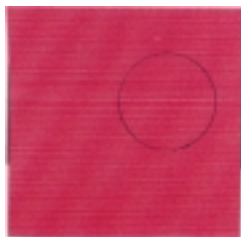
(10)



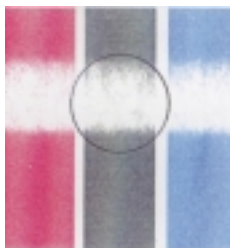
(11)



(12)



(13)



(14)



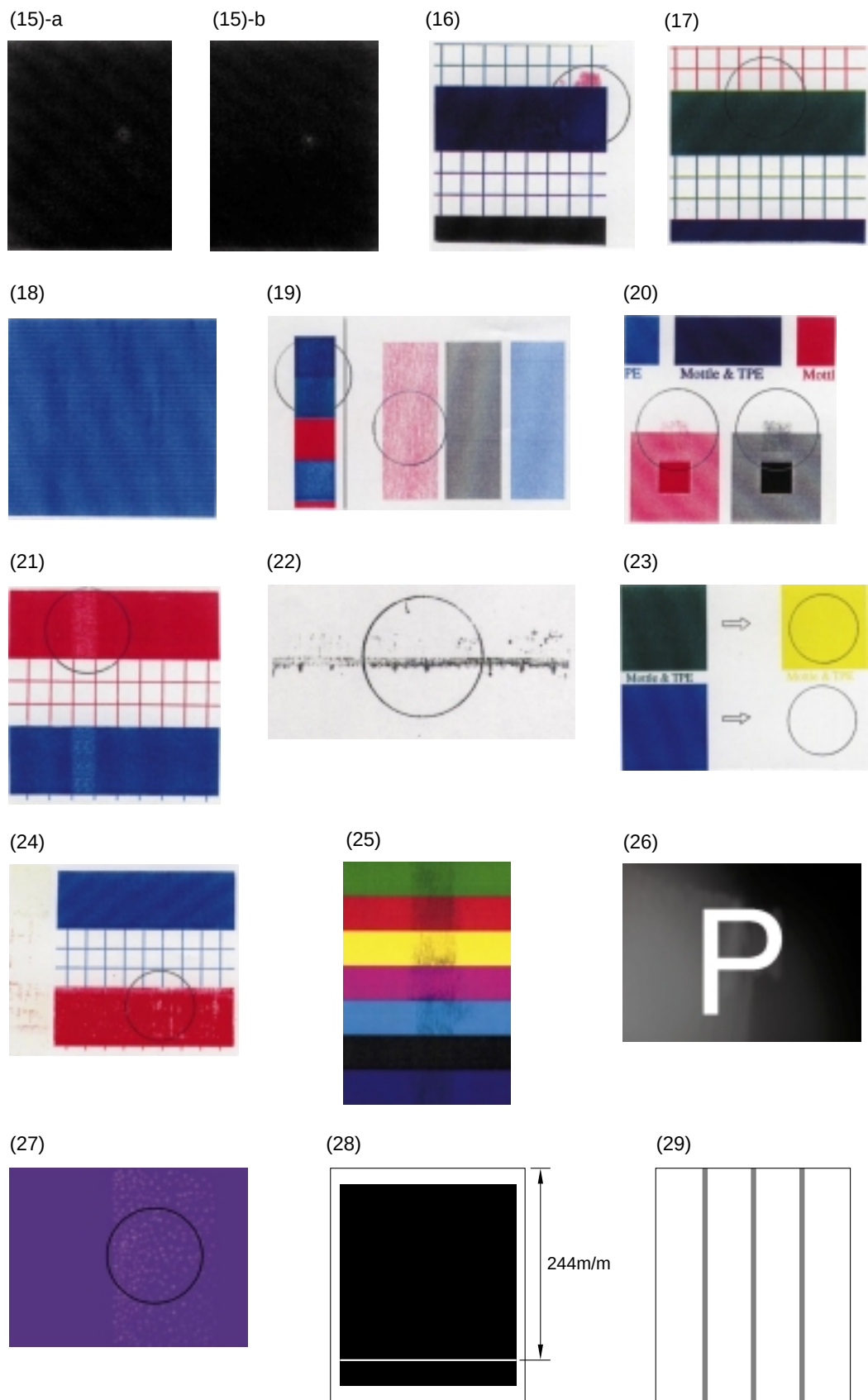


Fig.8-2

I-1	Background

Phenomenon

Background is smeared due to toner spread as shown in [print sample \(1\) of Fig.8-2](#).

Main Causes

- 1) Too small toner mass and charging level in the developing process.
- 2) Poor contact of the developer roller's bias pole.
- 3) Life expired or failure of the OPC belt cartridge.

Countermeasures

- 1) Replace the toner cartridge. (See [Section 3.2 of Chapter III](#).)
- 2) Confirm if the developer bias pole is deformed or not.
- 3) Replace the OPC belt cartridge. (See [Section 2.1 of Chapter VI](#).)

I-2	Missing Image at Edge

Phenomenon

There is missing or peeling toner found in the image at the edge as shown in [print sample \(2\) of Fig.8-2](#).

Main Causes

- 1) Too small toner mass and charging level in the developing process.
- 2) The OPC belt is deformed (waving).

Countermeasures

- 1) Replace the toner cartridge with a new one.
- 2) Replace the OPC belt cartridge with a new one.

I-3	Jitter

Phenomenon

Uneven optical density appears periodically in the horizontal direction on the printed image as shown in [print sample \(3\) of Fig.8-2](#).

Main Causes

Failure of main motor.

- 1) Irregular rotation of the drive motor.
- 2) Failure of the gears.
- 3) Variation of OPC belt running speed due to above reasons.
- 4) Too much rotational load of the OPC belt.

Countermeasures

- 1) Replace the main motor with a new one. (See [Section 4.1.8 of Chapter VII](#).)
- 2) Replace the OPC belt cartridge with a new one. (See [Section 2.1 of Chapter VI](#).)

Note:

If the print mode is set to CAPT (Color Advanced Photoscale Technology) in the driver, this problem might occur. Change the mode setting to normal mode.

I-4	Ribbing

Phenomenon

Light print occurs on the right or left hand side of the image as shown in [print sample \(4\) of Fig.8-2](#).

Main Causes

- 1) Slight tilt on the surface of printer installation table.
(Tilt should be less than 1°.)
- 2) Toner amount in the toner cartridge is insufficient.
(The amount in a full cartridge should be 175g for Y, M, & C and 275g for K.)

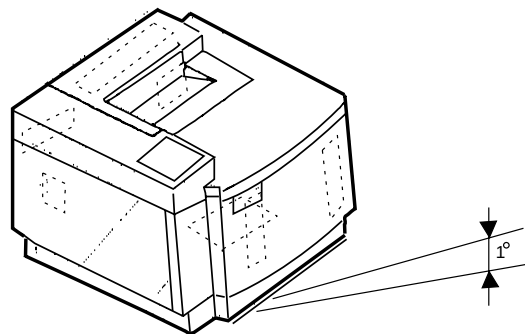


Fig.8-3

Countermeasures

- 1) Confirm that the printer installation table is flat and level.
- 2) Replace the toner cartridge with a new one.

I-5	Wrinkle / Image Migration

Phenomenon

Banding shadows of different optical density appear due to wrinkle, image migration and color misregistration occurring on the print paper as shown in [print sample \(5\) of Fig.8-2](#).

Main Causes

- 1) Print paper other than the recommended paper is being used.
- 2) The paper discharger unit of the transfer unit is not functioning.
- 3) Fuser oil in the fusing unit is nearly running out.
- 4) One side of the fusing unit is lifted up slightly.

Countermeasures

- 1) Use a recommended paper.
- 2) Confirm if the transfer unit is properly installed to the paper discharger unit and functioning normally.
 - 2-1) Confirm the installation status.
 - 2-2) Clean the paper discharger unit, or replace it with a new one. (See [Section 1.2.5](#) and [2.4 of Chapter VI](#).)
- 3) Refit the fusing unit correctly and lock it in position or replace the fusing unit with a new one. (See [Section 2.2 of Chapter VI](#).)

I-6	White Line (1)

Phenomenon

Vertical white line appears in the specific color area when test-printed in the four color mode (Stripe Mode), as shown in [print sample \(6\) of Fig.8-2](#).

Main Causes

- 1) Foreign particles adhering to the following places around the developer roller. (Refer to Fig.8-8.)
 - Between the cartridge cover and developer roller (a)
 - On the surface of the developer roller (b)
 - Between the blade fixing plate and the developer roller (c)
 - Between the blade and the developer roller (d)
- 2) Foreign particles adhering to the toner cartridge's main blade of the color in question.

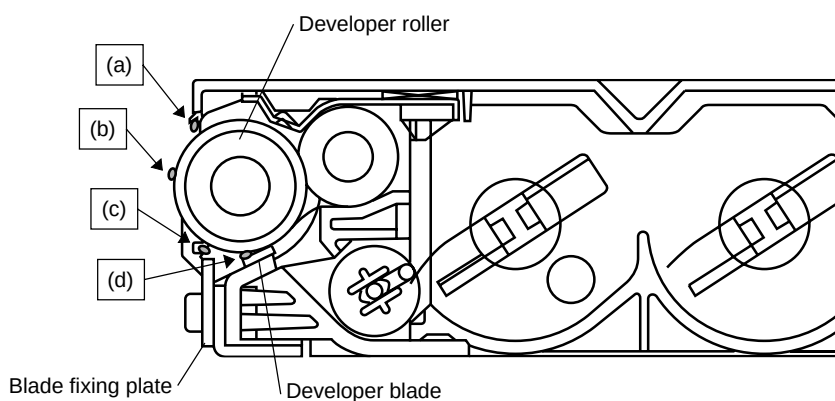


Fig.8-4

Countermeasures

- 1) Implement the test print.
- 2) Confirm the color of the toner cartridge in question that has caused the white line.
- 3) Remove the foreign particles adhering to the developer roller.

If foreign particles adhere to (d) of Fig.8-8, remove them referring to one of the figures below.

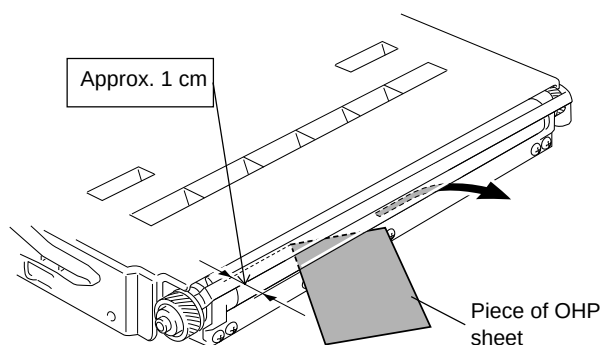


Fig.8-5

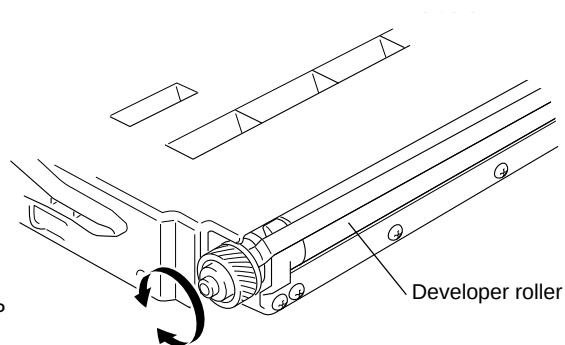


Fig.8-6

I-7	White Line (2)

Phenomenon

Vertical white line appears from the leading edge to the trailing edge of the printed image as shown in [print sample \(7\) of Fig.8-2](#).

Main Causes

The dustproof glass of the scanner unit is smeared with toner or foreign particles.

Countermeasures

Clean the dustproof glass.

- 1) Remove the OPC belt cartridge and toner cartridges. (See [Section 2.1 of Chapter VI](#).)
- 2) Remove the dustproof glass from the scanner unit.
- 3) Clean the dustproof glass. (See [Section 1.2.8 of Chapter VI](#).)

I-8	Vertical White Band

Phenomenon

White band appears in the vertical direction of printed image as shown in [print sample \(8\) of Fig.8-2](#).

Main Causes

Silicone oil adhering to the transfer drum.

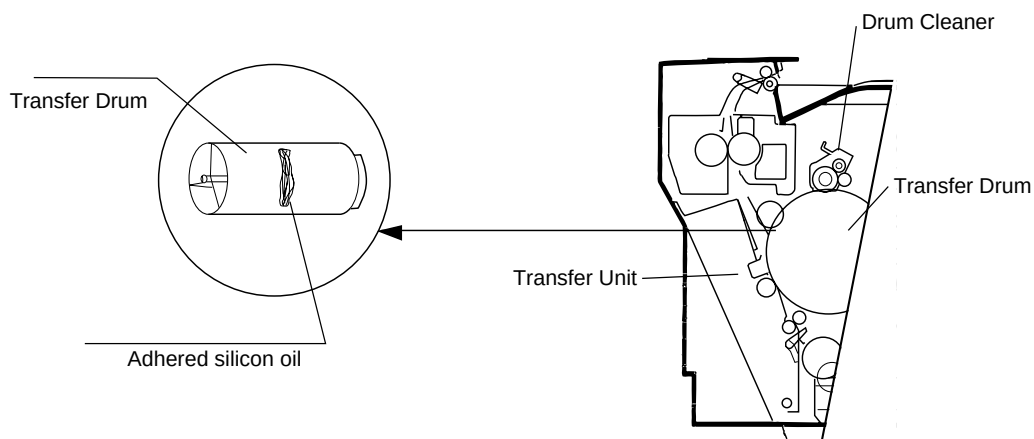


Fig.8-7

Countermeasures

- 1) Wipe off the oil adhering to the transfer unit and its perimeter.
- 2) Replace the transfer drum with a new one. (See [Section 2.8 of Chapter VI](#).)
- 3) If the oil adhesion is excessive, replace the OPC belt cartridge and drum cleaner with new ones. (See [Section 2.1 and 2.5 of Chapter VI](#).)

I-9	Black Line / Blur in the Image

Phenomenon

Fine black line or blur appears in the printed image as shown in [print sample \(9\) of Fig.8-2](#).

Main Causes

- 1) The corona wire of the charger unit is dirty.
- 2) OPC belt surface is damaged.
- 3) Foreign particles (paper dust, etc.) are stuck between the cleaning blade and OPC belt.
- 4) Debris adhering to the base of the toner cartridge's developer roller where it contacts with the OPC belt.

Countermeasures

- 1) Remove the OPC belt cartridge.
 - 1-1) Clean the charger unit (corona wire). (See [Section 1.2.6 of Chapter VI](#).)
 - 1-2) Replace the OPC belt cartridge with a new one. (See [Section 2.1 of Chapter VI](#).)
- 2) Clean the surface of the developer roller.

I-10	Vertical Line

Phenomenon

Vertical line appears in the printed image as shown in [print sample \(10\) of Fig.8-2](#).

Main Causes

- 1) Foreign particles (dust, etc.) adhering to the parts located around the transfer drum, and consequently in contact with the toner image on the transfer drum.
- 2) Damage of the OPC belt due to foreign particles adhering to the blade of the OPC belt.

Countermeasures

- 1) Clean the paper discharger unit. (See [Section 1.2.5 of Chapter VI](#).)
- 2) Clean the charger unit (corona wire) of the OPC belt cartridge. (See [Section 1.2.6 of Chapter VI](#).)
- 3) Clean the rear face of the waste toner feeder.
- 4) Replace the OPC belt cartridge with a new one.

I-11	Vertically Staggered Image

Phenomenon

Printed image staggered in the vertical direction as shown in [print sample \(11\) of Fig.8-2](#).

Main Causes

- 1) Shock or vibration applied to the printer.
- 2) Failure of the scanner unit; Vibration from rotation of the scanner motor.

Countermeasures

- 1) Do not apply shock or vibration to the printer body.
- 2) Installation location should be appropriate with no possibility of shock or vibration.
- 3) Replace the scanner unit with a new one. (See [Section 4.5.2 of Chapter VII](#).)

I-12	Banding

Phenomenon

Banding line appears in the horizontal direction as shown in [print sample \(12\) of Fig.8-2](#).

Main Causes

This is a transfer failure due to the shock caused when the OPC belt seam passes over the cleaning blade.

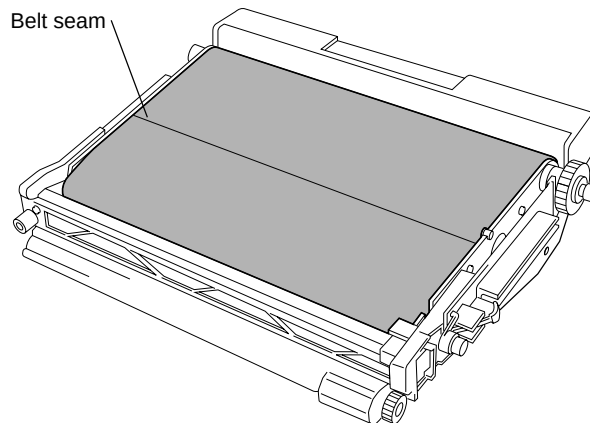


Fig.8-8

Countermeasures

Replace the OPC belt cartridge with a new one. (See [Section 2.1 of Chapter VI](#).)

I-13	White Band

Phenomenon

White banding line appears in the horizontal direction, and consequently causes a missing image as shown in [print sample \(13\) of Fig.8-2](#).

Main Causes

- 1) Installation failure of the transfer unit, and deformation of the transfer roller.
- 2) Contact failure of the transfer roller bias pole.
- 3) Transfer solenoid failure.

Countermeasures

- 1) Confirm if the transfer unit is properly locked in position and that both ends of the transfer unit are held by the hooks.
- 2) Confirm if the transfer unit is properly installed or not.
- 3) Replace the transfer solenoid with a new one. (See [Section 4.1.14 of Chapter VII](#).)
- 4) Replace the transfer unit with a new one. (See [Section 4.6.1 of Chapter VII](#).)

I-14	Toner Drop

Phenomenon

Toner spot stain is caused on the print by toner dropping within the printer engine as shown in [print sample \(14\) of Fig.8-2](#).

Main Causes

- 1) Toner drops onto the transfer drum due to the breakdown of the waste toner feeder.
 - 1-1) Mylar of the waste toner feeder is deformed.
 - 1-2) Waste toner is not properly collected by the waste toner feeder.

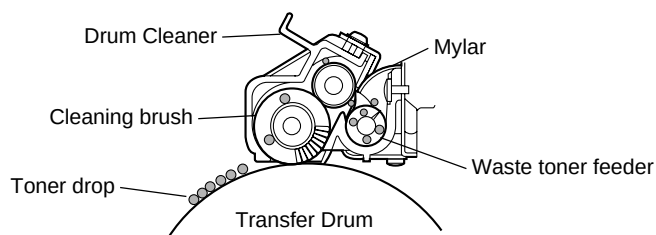


Fig.8-9

- 2) Toner adhering to the developer roller drops on the OPC belt .

Countermeasures

- 1) Check the cleaning brush and waste toner feeder.
 - 1-1) Clean the perimeter of the cleaning brush installation location.
 - 1-2) Check if the seal is deformed or damage. If there is any deformation or damage, replace the waste toner feeder with a new one.
 - 1-3) Check if waste toner is stuck in the printer engine. Remove the waste toner with a vacuum cleaner designed to manage toner.
- 2) Remove the toner cartridge.
 - 2-1) Clean the surface of the developer roller.
 - 2-2) Replace the toner cartridge with a new one.

I-15	White Spot / Black Spot

Phenomenon

White spots and black spots appear on the print as shown in [print sample \(15\) of Fig.8-2](#).

Main Causes

- 1) Foreign particles adhering to the OPC belt or transfer drum.
- 2) The OPC belt or transfer drum is damaged.
- 3) Foreign particles mixed in the toner.
- 4) Foreign particles adhering to the transfer roller, or local deformation of the transfer roller.

Countermeasures

- 1) Remove the OPC belt cartridge.
 - 1-1) Lightly wipe off the foreign particles adhering to the OPC belt using a cotton cloth.
 - 1-2) Replace the damaged OPC belt cartridge with a new one. (See [Section 2.1 of Chapter VI](#).)
- 2) Open the transfer unit, and check the transfer drum.
 - 2-1) Lightly wipe off the foreign particles adhering to the transfer drum using a cotton cloth.
 - 2-2) Replace the damaged transfer drum with a new one. (See [Section 4.2.11 of Chapter VII](#).)
- 3) Remove the toner cartridge.
 - 3-1) Clean the surface of the developer roller.
 - 3-2) Replace the toner cartridge with a new one.
- 4) Replace the transfer unit with a new one. (See [Section 4.6.1 of Chapter VII](#).)

I-16	Mixed Color Image

Phenomenon

Mixed color image appears in the print as shown in [print sample \(16\) of Fig.8-2](#).

Main Causes

- 1) Failure of toner cartridge: Blade pressure of the developer roller is incorrect or the blade is deformed.
- 2) Restitution error of toner cartridge.

Countermeasures

- 1) Confirm the toner cartridge can be inserted smoothly.
- 2) Replace the toner cartridge with a new one.
- 3) Reconfirm that the front cover unit is locked.

I-17	Color Misregistration

Phenomenon

Color misregistration is caused between two colors as shown in [print sample \(17\) of Fig.8-2](#).

Main Causes

- 1) The OPC belt cartridge is not properly installed.
 - 2) The OPC belt cartridge is deformed.
 - 3) The cleaning brush of the drum cleaner is unstable in operation.
 - 4) Rotational load on the OPC belt cartridge is excessive.
- ** This problem might occur in the first page printed in color mode immediately after printing in monochrome mode, or the first page immediately after turning on the printer.

Countermeasures

- 1) Reset the OPC belt cartridge properly.
- 2) Replace the OPC belt cartridge with a new one. (See [Section 2.1 of Chapter VI](#).)
- 3) Replace the drum cleaner with a new one.

I-18	Toner Streak

Phenomenon

Brush mark line of uneven scanning density is caused in the image as shown in [print sample \(18\) of Fig.8-2](#).

Main Causes

- 1) Main blade of the developer unit and the reset roller is not normal.
- 2) Location of the toner cartridge is not correct.
- 3) Transport paddle in the toner cartridge is deformed.
- 4) Brush mark line appears in the continuous printing of high coverage (solid) patterns.

Countermeasures

- 1) Replace the toner cartridge with a new one.
- 2) Temporarily suspending the printing, agitate the toner cartridge and stabilize the replenishment of toner.

I-19	Mottle

Phenomenon

Variation of the scanning density is found in the image as shown in [print sample \(19\) of Fig.8-2](#).

Main Causes

- 1) The transfer unit is not fixed in place.
- 2) Assembly of the transfer roller is inaccurate.
- 3) THV output of DC high voltage unit is not normal.
- 4) Failure of the toner cartridge.
- 5) Deformation of the print paper.

Countermeasures

- 1) Confirm that the transfer unit is firmly locked in place.
- 2) Confirm that the transfer roller is properly installed.
- 3) Replace the DC high voltage unit with a new one. (See [Section 4.3.2 of Chapter VII](#).)
- 4) Replace the toner cartridge with a new one.
- 5) Replace the paper with new paper from a freshly opened ream.

I-20	Residual Image

Phenomenon

Image of the preceding page appears on every other page as shown in [print sample \(20\) of Fig.8-2](#).

Main Causes

- 1) Cleaning failure due to lifting of the cleaning brush of the drum cleaner.
- 2) Contact failure of the drum cleaner's bias pole.
- 3) Failure of DC high voltage unit.

Countermeasures

- 1) Check if the drum cleaner is properly installed or not.
- 2) Replace the failed DC high voltage unit with a new one. (See [Section 4.3.2 of Chapter VII](#).)

I-21	Insufficient Gloss

Phenomenon

Gloss of the print is not sufficient as shown in [print sample \(21\) of Fig.8-2](#).

Main Causes

- 1) The fuser cleaner is stained.
- 2) The fuser roller is deteriorated.

Countermeasures

- 1) Replace the fuser cleaner with a new one. (See [Section 3.3 of Chapter III](#).)
- 2) Replace the fusing unit with a new one. (See [Section 2.2 of Chapter VI](#).)

Note:

When replacing the fusing unit, wait approximately for 30 minutes after the new unit is installed to allow the fusing oil to circulate in the new fusing unit.

I-22	Back Stain

Phenomenon

Back side of the print paper is stained as shown in [print sample \(22\) of Fig.8-2](#).

Main Causes

Fusing unit:

- 1) The cleaning pad of the fuser cleaner is stained.
- 2) Silicone oil in the oil bottle is short.
- 3) The fuser roller and back-up roller are dirty.

Countermeasures

- 1) Replace the fuser cleaner with a new one. (See [Section 3.3 of Chapter III](#).)
- 2) Clean the fuser roller and back-up roller.
- 3) Replace the fusing unit with a new one. (See [Section 2.2 of Chapter VI](#).)

I-23	White Print

Phenomenon

A blank page (no print at all) is output or a specific color is missing (not printed) as shown in [print sample \(23\) of Fig.8-2](#).

Main Causes

- 1) Laser light path is blocked by paper or other material stuck at the opening of the scanner unit.
- 2) The transfer solenoid is broken (not functioning).
- 3) There is no belt bias voltage (CBV).
- 4) There is no output from the high voltage unit (HVU) due to breakdown.

Countermeasures

- 1) Confirm that there are no foreign objects stuck in the opening of the scanner unit.
- 2) Replace the transfer solenoid with a new one. (See [Section 4.1.14 of Chapter VII](#).)
- 3) Replace the OPC belt cartridge with a new one. (See [Section 2.1 of Chapter VI](#).)
- 4) Replace the high voltage unit with a new one. (See [Section 4.3.2 of Chapter VII](#).)

I-24	Insufficient Fusing

Phenomenon

Printed image is partially missing as shown in [print sample \(24\) of Fig.8-2](#). This proves that the fusing is insufficient.

Main Causes

- 1) Wrong selection of print media (label or envelope, etc.) at the Host (driver) side.
- 2) Recommended paper is not being used.
- 3) Double-feed paper.
- 4) Failure of the fusing unit.

Countermeasures

- 1) Adjust the mode of Host side to suit the print media in use.
- 2) Use the recommended paper.
- 3) Fan the paper before loading in the media cassette.
- 4) Replace the failed fusing unit with a new one. (See [Section 2.2 of Chapter VI](#).)

I-25	Vertical Smear

Phenomenon

Printed image is smeared vertically as shown in [print sample \(25\) of Fig.8-2](#).

Main Causes

- 1) Paper dust between the cleaning blade and OPC belt.
- 2) Debris adhering to the base of a toner cartridge's developer roller where it contacts with the OPC belt.

Countermeasures

- 1) Remove paper dust between the cleaning blade and OPC belt referring to the figure below.

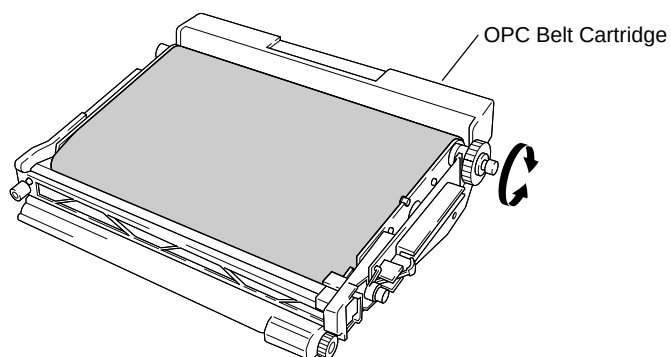


Fig.8-10

- 2) Replace the OPC belt cartridge with a new one.

I-26	Black Toner Light

Phenomenon

Black color of printed image is light as shown in [print sample \(26\) of Fig.8-2](#), and the printer clatters at the same time.

Main Causes

Black toner in the cartridge has solidified because the printer is used under high temperature circumstance or due to continuous printing.

Countermeasures

Replace the black toner cartridge with a new one.

I-27	Color Missing

Phenomenon

Color is missing in the printed image as shown in [print sample \(27\) of Fig.8-2](#).

Main Causes

Fusing failure due to using damp paper or using the printer under high humidity conditions.

Countermeasures

- 1) Use the paper immediately after open the paper bag.
- 2) Change the NVRAM setting. (Refer to 'THV TUNE UP' in Section 3.3 of Chapter V.)

I-28	Horizontal Line 244mm from the Edge of Paper

Phenomenon

A horizontal line appears 244mm from the edge of the printed paper as shown in [print sample \(28\) of Fig.8-2](#).

Main Causes

Vibration is caused when an OPC belt and the transfer drum contact.

Countermeasures

Change the resolution to 600 dpi.

I-29	Vertical Lines on OHP

Phenomenon

Vertical lines appear when printing the OHP sheet as shown in [print sample \(29\) of Fig.8-2](#).

Main Causes

Paper dust around the paper exit roller adhering to the OHP sheet.

Countermeasures

- 1) Use the recommended OHP sheet.
- 2) Clean the paper exit roller.

APPENDIX A

1. SERIAL NO. DESCRIPTIONS

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

< ID for production month of Printer >

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

< ID for production month of other parts than the printer >

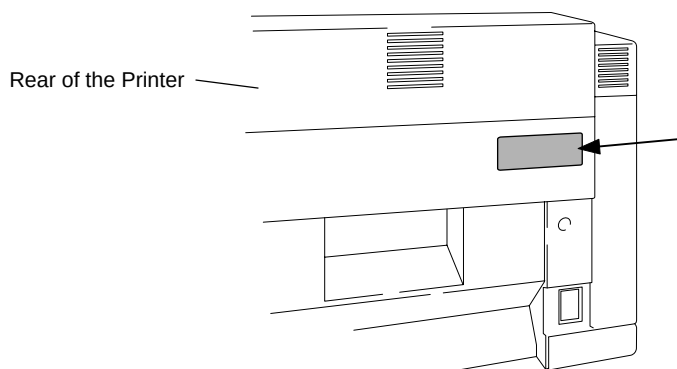
1:	January	5:	May	9:	September
2:	February	6:	June	X:	October
3:	March	7:	July	Y:	November
4:	April	8:	August	Z:	December

(1) Printer

XXXXXXL7S111101

MODEL NO. MONTH YEAR FACTORY NO. SERIAL NO.

<Location>

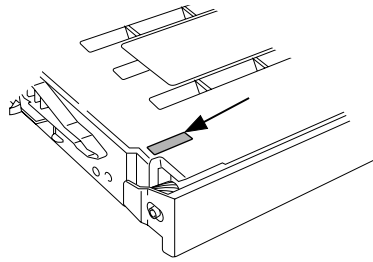


(2) Toner Cartridge

1 2 X X X X X X X X X X

YEAR MONTH SERIAL NO.

<Location>

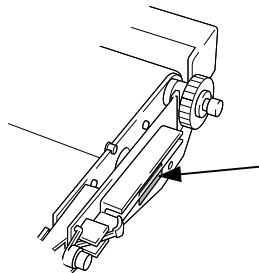


(3) OPC Belt Cartridge

1 2 X X X X

YEAR MONTH SERIAL NO.

<Location>

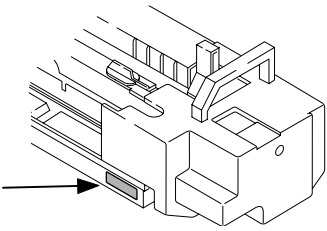


(4) Fusing Unit

XXXX 7 1 2 3 A — REV.(-, A - Z)

VOLTAGE (100V, 120V, 240V) YEAR MONTH DATE

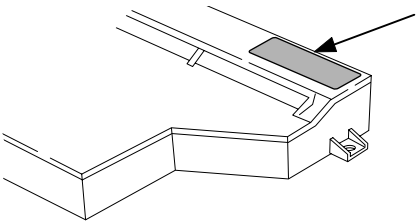
<Location>



(5) Scanner Unit

7 1 2 3 A — REV.(-, A - Z)
DATE
MONTH
YEAR

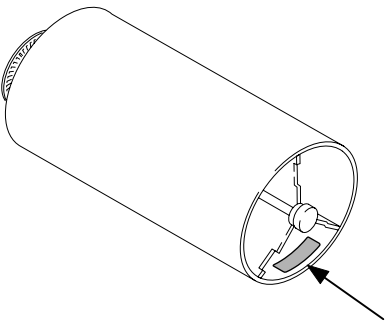
<Location>



(6) Transfer Drum (Hand-writing)

XXXXXX - 7 1 2 3
SERIAL NO. YEAR MONTH DATE

<Location>



2. DIAMETER / CIRCUMFERENCE OF ROLLERS

The diameter or circumference of each roller is listed below;

No.	Parts Name	Diameter (Circumference)
1	OPC Belt	(380 mm)
2	Developer Roller	φ 18 mm (56.52 mm)
3	Transfer Roller	φ 20 mm (62.80 mm)
4	Paper Pick-up Roller	φ 40 mm (125.60 mm)
5	Transfer Drum	φ 121 mm (379.94 mm)
6	Back-up Roller	φ 32 mm (100.48 mm)
7	Fuser Roller	φ 32 mm (100.48 mm)
8	Drum Cleaner	φ 25 mm (78.50 mm)
9	Cleaning Roller	φ 18 mm (56.52 mm)
10	Register Roller	φ 13.5 mm (42.39 mm)
11	Paper Exit Roller	φ 16 mm (50.24 mm)

3. SHELF LIFE OF EACH CONSUMABLE

Each consumable follows has its own shelf life. Shelf life varies whether the package of consumable is unpacked or not.

Consumable	Before unpacking *1	After unpacking *2
Toner cartridge (all colors)	3 years	1 year
OPC belt cartridge	3 years	1 year
Fuser cleaner	N/A	N/A

Note:

**1: It means that the consumable life is 1 year if it is stored for 2 years.*

**2: Even though shelf life is one year after unpacking, the consumable life will be getting less than one year if it is stored more than 2 years before unpacking.*

4. CONSUMABLES REPLACEMENT

Each consumable follows should be replaced according its own life.

- 1) Toner Cartridge
 Life: K = 10,000 pages, CYM = 6,000 pages
 Condition: Above figures are based on 5% coverage. Life is detected by the toner empty sensor.

Note:

Life of the starter toner cartridge is half of the above figures.

- 2) Oil Bottle
 Life: 12,000 pages
 Condition: Life is detected by the oil empty sensor.
- 3) Waste Toner Pack
 Life: 12,000 images
 Condition: Above figure is based on 5% coverage. Life is detected by the waste toner sensor.
- 4) 120K Kit
 Life: 120,000 pages
 Condition: None
- 5) OPC Belt Cartridge
 Life: 50,000 images
 Condition: Above figure varies depending on pages/job. Refer to the list below.

Pages per job	1 page	2 pages	3 pages	4 pages	5 pages	6 pages
Life	20,000	22,000	24,000	29,000	31,000	34,000

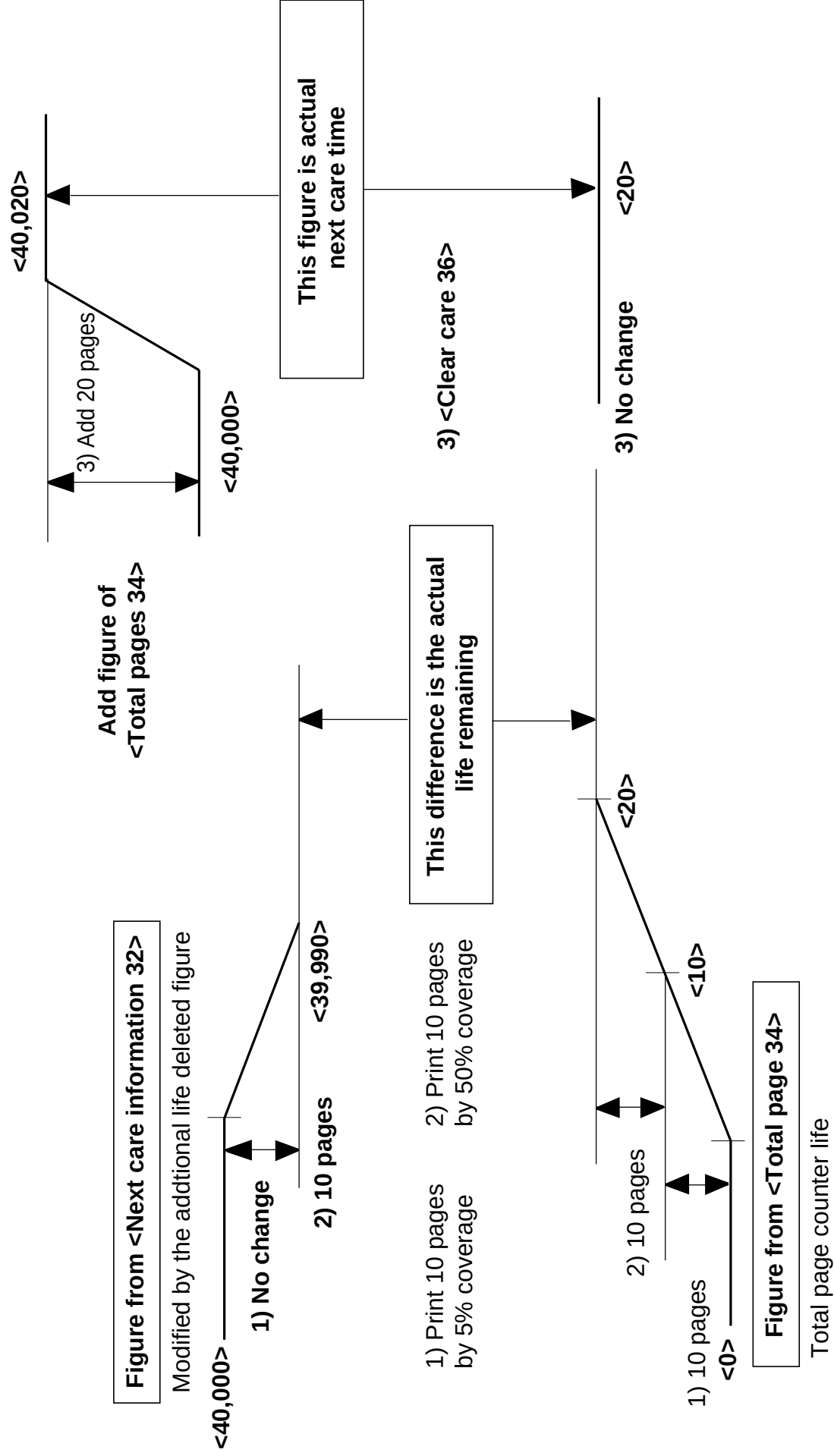
Pages per job	7 page	8 pages	9 pages	10 pages	25 pages
Life	36,000	37,000	39,000	40,000	50,000

- 5) Cleaning Roller
 Life: 12,000 pages
 Condition: Above figure varies depending on coverage. Refer to the list below.

Coverage	~ 20%	20% ~ 40%	40% ~
Additional life deleted	0	1	2
Life (pages)	12,000	6,000	4,000

- 6) Fusing Unit (40K Kit)
 Life: 40,000 pages
 Condition: Above figure varies depending on coverage. Refer to the list below.

Coverage	~ 12.5%	12.5% ~ 20%	20% ~ 40%	40% ~ 60%	60% ~
Additional life deleted	0	0.2	0.5	1	2
Life (pages)	40,000	33,333	26,666	20,000	13,333



5. HOW TO RE-ENTER ORIGINAL DATA TO THE MCTL PCB



CAUTION

Actions 1) and 2) MUST be carried out BEFORE the MCTL PCB is removed or the NVRAM initialized otherwise ALL READINGS WILL BE LOST.

- 1) Go into the Engine Controller Mode. (Refer to Section 3 "ENGINE CONTROLLER MODE" of Chapter V.)
- 2) Before initializing the NV-RAM or replacing the MCTL PCB, record the following values;
 - i) Display **TOTAL PAGE** to record the value.
(i.e.) TOTAL PAGE (T) = 412P
 - ii) Display **EACH IMAGE** to record the values.
(i.e.) EACH IMAGE (IY)=348P
(IM)=353P
(IC)=365P
(IK)=439P
 - iii) Display **NEXT CARE** to record the values.
(i.e.) FC ROLL (NC2) = 12,050P
BL UNIT (NC7) = 49,135P
FU UNIT (NC8) = 39,684P
120K KIT (NC9) = 120,000P
 - iv) Display **LIFE PERIOD SET** of FACTORY MODE to record the values.
(i.e.) FC ROLL (LP2) = 12,000P
BL UNIT (LP7) = 50,000P
FU UNIT (LP8) = 60,100P
120K KIT (LP9) = 120,000P
- 3) When you have recorded all the values above, initialize the data in the NV-RAM on the MCTL PCB or replace the MCTL PCB.

After initializing all the data in the NV-RAM on the MCTL PCB, or replacing the MCTL PCB, all the original counter values for the cleaning roller, OPC belt cartridge, fusing unit, and 120K kit should be re-entered as below;

The method used to correct the counters is to reset the page counter to a calculated TOTAL PAGE value and then to perform a CLEAR CARE for the item to reset the NEXT CARE for that item to the value recorded in 2) iii).

The basic formula used in these calculations is:-

$$\text{TOTAL PAGE} = \text{NEXT CARE} - \text{LIFE PERIOD}$$

Where this formula would result in a negative number, the LIFE PERIOD should be temporarily set to a lower value so that the result is a positive number and then this number and LIFE PERIOD used to perform the CLEAR CARE to reset the NEXT CARE counter.

- 4) Re-enter the FC ROLL (NC2) value as follows;
 - i) Enter the value of NC2 - LP2 into the TOTAL PAGE counter.
 (i.e.) $NC2 - LP2 \Rightarrow 12,050P - 12,000P = 50$
 Enter the value '50' in the TOTAL PAGE counter.
 - ii) Perform CLEAR CARE 2. (Refer to '36 CLEAR CARE' in page V-24 of Chapter V.)
 - iii) Check that the value of NEXT CARE is reset to the recorded value in 2) iii).
 (i.e.) $NC2 = 12,050P$

- 5) Re-enter the BL UNIT (NC7) value as follows;
 - i) After calculating the values so that they work in the following formula
 $(IY + IM + IC + IK) = NC7 - LP7$,
 enter each value of LP7, IY, IM, IC, IK.
 (i.e.) $(IY + IM + IC + IK) = NC7 - LP7$
 $\Rightarrow (348 + 353 + 365 + 439) = 49,135 - 50,000$
 Since the above result is minus, reduce the value of LP7 is 40,000P in order to make the result plus, then enter it into the LIFE PERIOD SET counter in FACTORY MODE.
 The formula is as follows;
 $(IY + IM + IC + IK) = NC7 - LP7$
 $\Rightarrow (348 + 353 + 365 + 439) = 49,135 - 40,000$
 $\Rightarrow (348 + 353 + 365 + 439) = 9,135$
 Change the value of IK from 439 to 8,069 so that the formula works out.
 $(348 + 353 + 365 + 8,069) = 9,135$
 Then, enter each value for IY=348, IM=353, IC=365, and IK=8,069 in the EACH IMAGE SET counter in FACTORY MODE.
 - ii) Perform CLEAR CARE 7. (Refer to '36 CLEAR CARE' in page V-24 of Chapter V.)
 - iii) Check that the value of NEXT CARE is reset correctly.
 (i.e.) $NC7 = 49,135P$
 - iv) Reset the LIFE PERIOD counter in FACTORY MODE to 50,000.

- 6) Re-enter the FU UNIT (NC8) value as follows;
 - i) Enter the value of NC8 - LP8 into the TOTAL PAGE counter.
 (i.e.) $NC8 - LP8 = 39,684 - 60,100 = - 20,416$
 Since the above result is minus, reduce the value of LP8 is 30,000P in order to make the result plus, then enter it into the LIFE PERIOD SET counter in FACTORY MODE.
 The formula is as follows;
 $NC8 - LP8 = 39,684 - 30,000 = 9,684$
 Enter the value '9,684' in TOTAL PAGE.
 - ii) Perform CLEAR CARE 8. (Refer to '36 CLEAR CARE' in page V-24 of Chapter V.)

- iii) Check that the value of NEXT CARE is reset correctly.
(i.e.) $NC8 = 39,684P$
 - iv) Reset the LIFE PERIOD counter in FACTORY MODE to 60,100.
- 7) Re-enter the 120K KIT (NC9) value as follows;
 - i) Enter the value of $NC9 - LP9$ into the TOTAL PAGE counter.
(i.e.) $NC9 - LP9 = 120,000 - 120,000 = 0$
Enter the value '0' into the TOTAL PAGE counter.
 - ii) Perform CLEAR CARE 9. (Refer to '36 CLEAR CARE' in page V-24 of Chapter V.)
 - iii) Check that the value of NEXT CARE is reset correctly.
(i.e.) $NC9 = 120,000P$
- 8) Re-enter the original TOTAL PAGE (T) value in TOTAL PAGE SET in FACTORY MODE.
(i.e.) $T = 412P$
- 9) Re-enter the original EACH IMAGE (IY, IM, IC, IK) values in EACH IMAGE SET in FACTORY MODE.
(i.e.) $(IY)=348P, (IM)=353P, (IC)=365P, (IK)=439P$
- 10) Ensure that the values in the LIFE PERIOD SET counters in FACTORY MODE are correct.
(i.e.)
 - FC ROLL (LP2)=12,000P
 - BL UNIT (LP7)=50,000P
 - FU UNIT (LP8)=60,100P
 - 120K KIT (LP9)=120,000P
- 11) Completed.

6. RE-PACKING INSTRUCTIONS

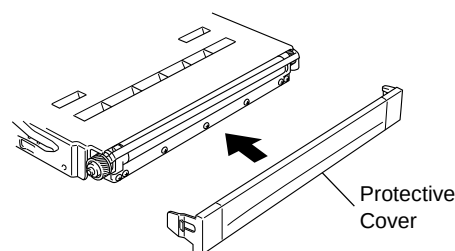


PRECAUTION

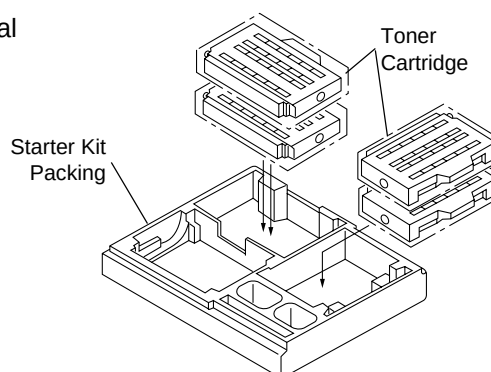
When re-packing the printer before shipping, be sure to follow the steps and cautions below. Failure to do so will cause toner or oil spill in the printer and severe damage to the printer.

6.1 Toner Cartridge

- 1) Open the front cover and remove all the toner cartridges (K, Y, M, C) from the printer.
- 2) Put the original protective cover (orange) onto each cartridge and put it into the polyethylene bag.



- 3) Put the toner cartridges into the original starter kit packing.

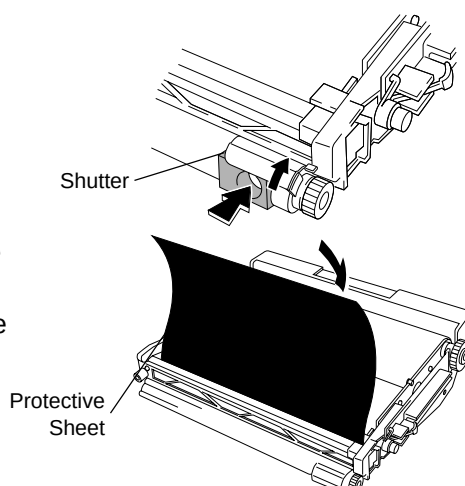


CAUTION

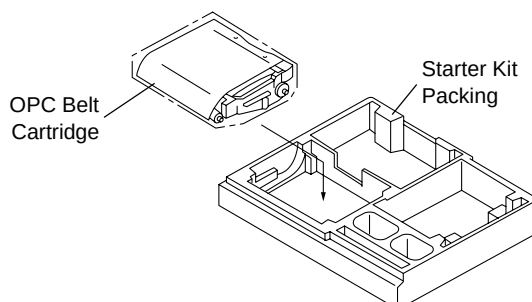
- If you do not have the original protective cover, cover each toner cartridge with bubble sheet to protect the developer roller.
- If you do not have the original starter kit packing, pack each toner cartridge firmly with bubble sheet and put them into the outer carton.

6.2 OPC Belt Cartridge

- 1) Open the top cover and remove the OPC belt cartridge from the printer.
- 2) Open the shutter on the OPC belt cartridge and remove toner in the cartridge with a vacuum cleaner.
- 3) Cover the OPC belt cartridge with the original protective sheet (black).
- 4) Put the cartridge into the polyethylene bag.



- 5) Put the OPC belt cartridge into the original starter kit packing.

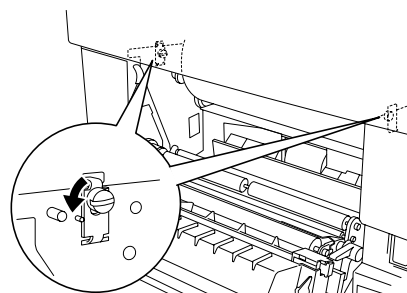


CAUTION

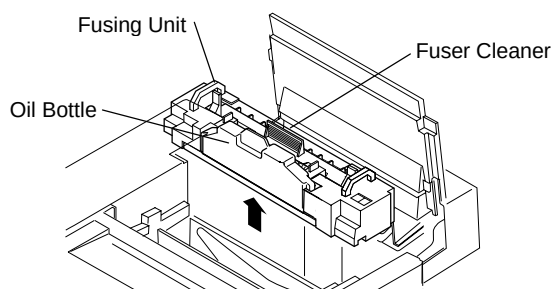
- Do not directly touch the OPC belt surface with bare hands or gloves.
- If the belt is exposed for more than two minutes to a light source of 800 lux, the belt may be damaged.
- If you do not have the original starter kit packing, pack the OPC belt cartridge firmly with bubble sheet and put it into the outer carton.

6.3 Fusing Unit

- 1) Open the rear access cover and slacken the fusing unit securing screws (2 pcs.)



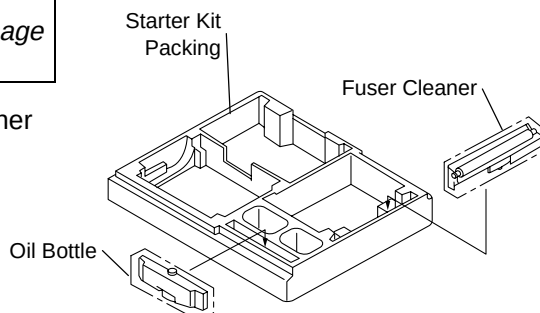
- 2) Holding the handles at both ends of the fusing unit and remove the fusing unit from the printer.
- 3) Remove the oil bottle and the fuser cleaner from the fusing unit and put each of them into the polyethylene bag.



CAUTION

Pack the oil bottle in the polyethylene bag and seal it firmly. Failure to do so will cause oil spill during shipping and damage to the printer.

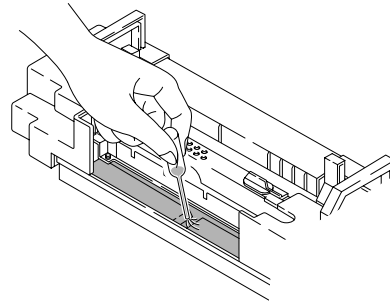
- 4) Put the oil bottle and the fuser cleaner into the original starter kit packing.



- 5) Remove the oil remaining in the fusing unit with the supplied syringe to avoid oil spill in the printer.

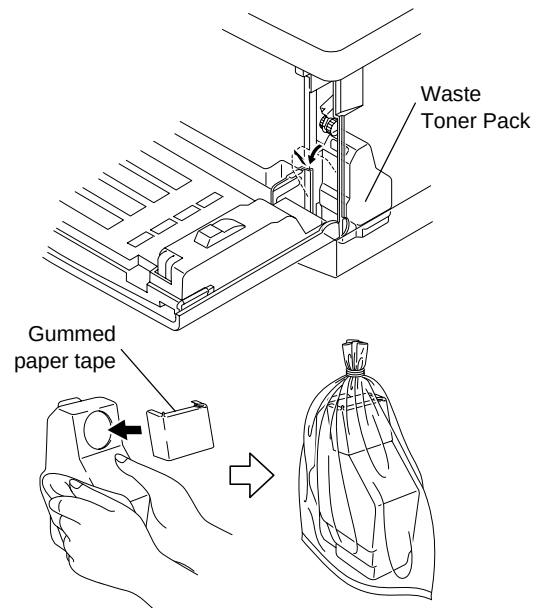
Note:

Re-install the fusing unit into the printer after cleaning the printer as instructed in the following section. For re-install of the fusing unit, see Section 6.6 'Packing'.



6.4 Waste Toner Pack

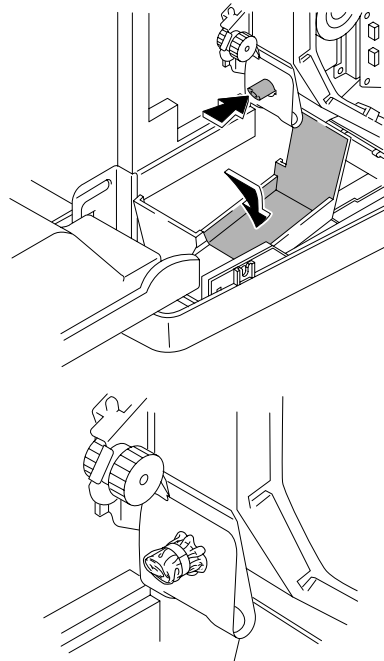
- 1) Remove the waste toner pack from the printer.
- 2) Clean toner around the pack and cover the hole of the waste toner pack firmly with gummed paper tape.
- 3) Put the waste toner pack into the polyethylene bag and seal it firmly.



6.5 Cleaning

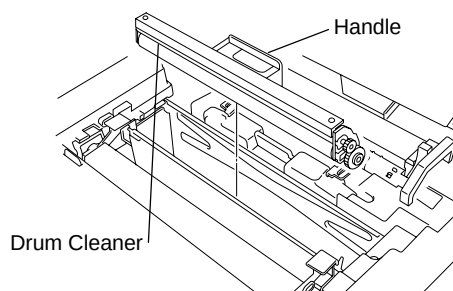
Clean the following areas with a vacuum cleaner to remove toner.

- 1) Around the waste toner pack / Waste toner feeder tube.
 - i) Remove the one screw of side cover (R) at the rear of the printer to remove the side cover (R).
 - ii) Vacuum toner from the exit of the waste toner feeder tube and around the waste toner pack holder.
 - iii) Cover the exit of the waste toner feeder tube with vinyl wrap.

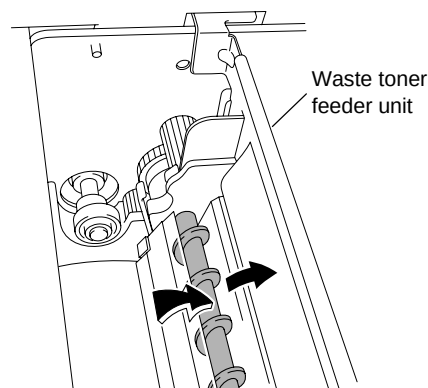


2) Drum cleaner

- i) Remove the cleaner cover by releasing the two hooks.
- ii) Holding the handle located on the top of the drum cleaner, push it backwards.
- iii) Remove the drum cleaner by lifting it out.



- iv) Clean the area where the drum cleaner is mounted with a vacuum cleaner and a cloth. (Refer to the figure as shown on the right.)



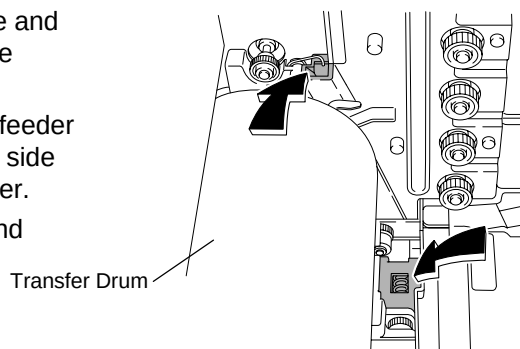
3) Inside the printer

- i) Remove the upper side cover, side cover (L), and upper cover from the printer.
- ii) Remove the control fan, and then remove the waste toner feeder unit.

- iii) Vacuum toner around the other side of the waste toner feeder tube and inside the printer. (Refer to the figure as shown on the right.)

- iv) Reassemble the waste toner feeder unit, control fan, upper cover, side cover (L), and upper side cover.

- v) Re-install the drum cleaner and cleaner cover.

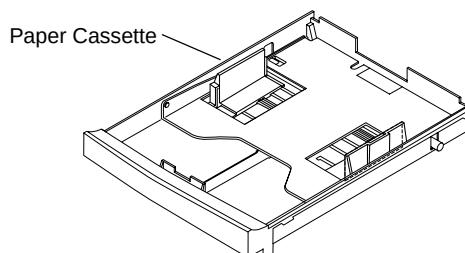


CAUTION

- Be sure not to damage the surface of the transfer drum with a vacuum cleaner when cleaning the areas around the transfer drum.
- Be sure not to contact the nozzle of the vacuum cleaner with the terminals of the interior. Failure to do so will cause damage to the electrical parts in the printer.
- It is recommended to ground the nozzle of the vacuum cleaner by using the earth wire.

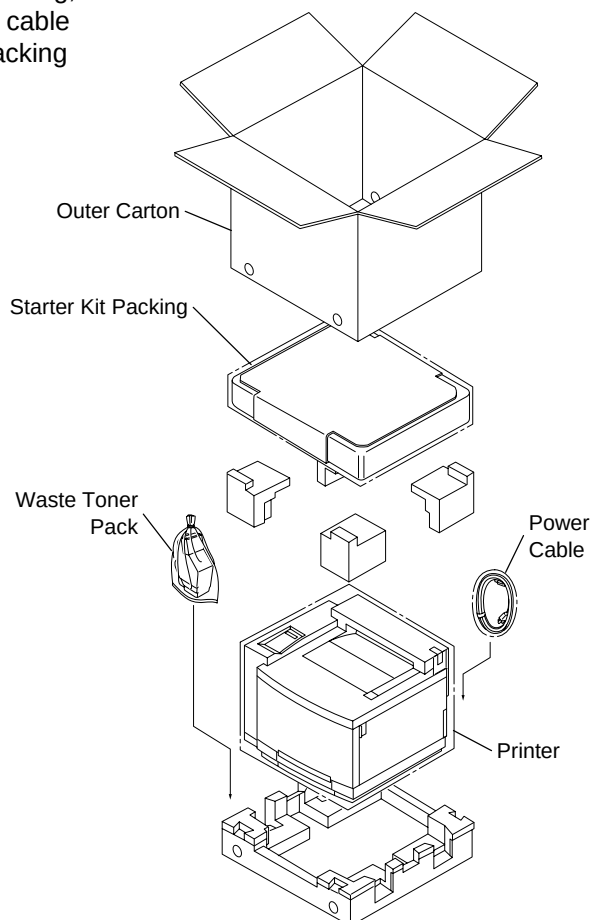
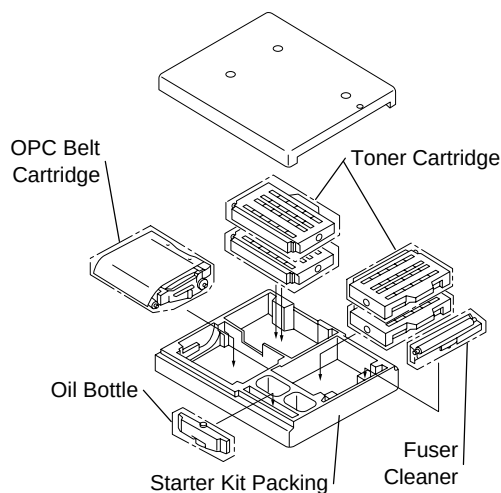
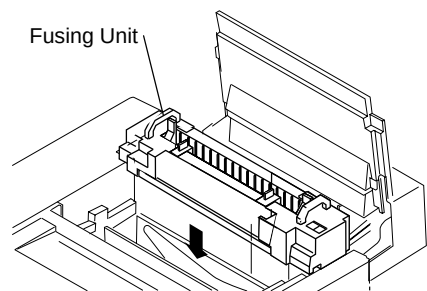
4) Paper cassette

- i) Remove the paper cassette from the printer and remove paper from the cassette.
- ii) Vacuum paper dust in the paper cassette.
- iii) Reinstall the paper cassette.

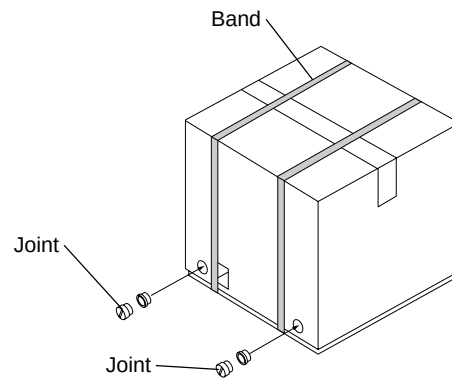


6.6 Packing

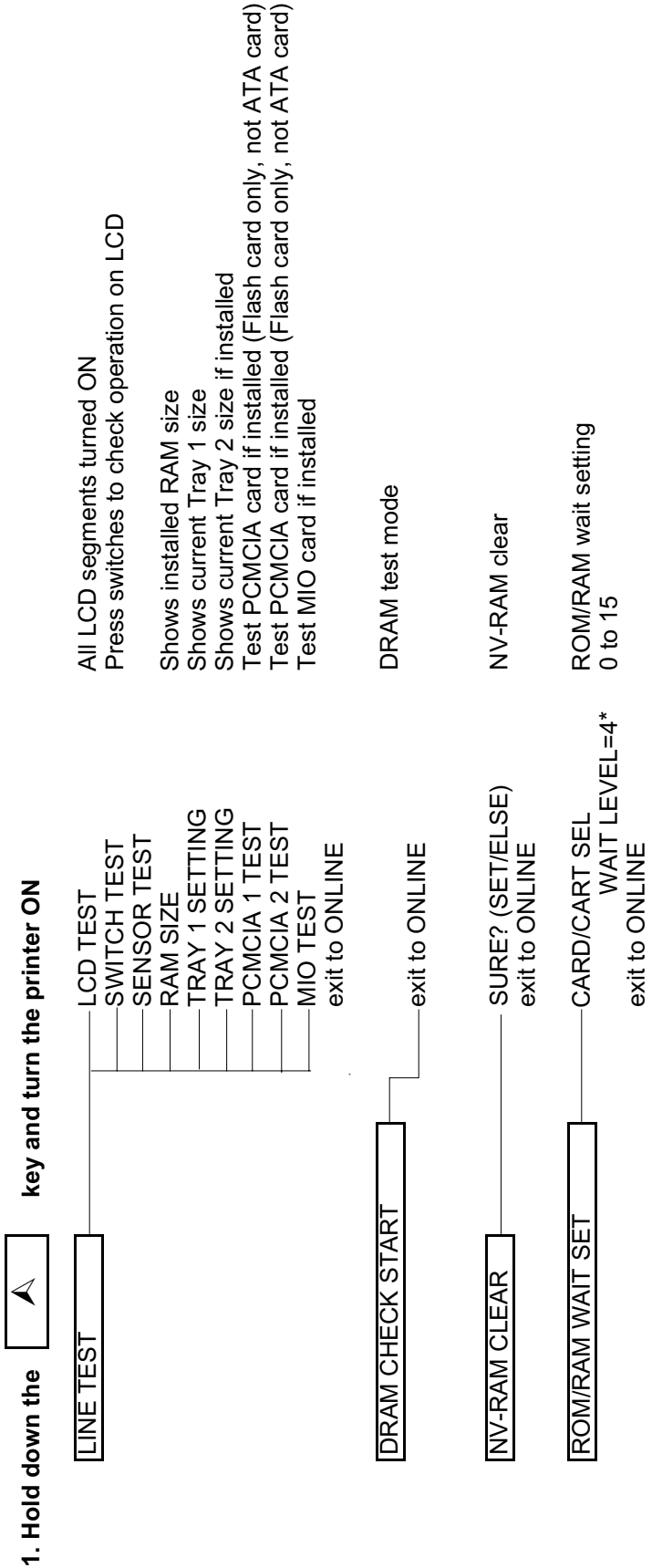
- 1) Re-install the fusing unit into the printer.
 - i) After setting the fusing unit in place, lightly press down the unit to firmly connect to the connector on the base.
 - ii) Tighten the securing screws while pressing down the fusing unit. Check the metal hook of the screw at the left hand secures the fusing unit correctly.
 - iii) Close the rear access cover and top cover.
- 2) Check the following items are packed in the starter kit packing;
Four toner cartridges (K, Y, M, C), OPC belt cartridge, Oil bottle, Fuser cleaner. (Refer to the figure as shown on the right.)
- 3) Put the printer into the polyethylene bag.
- 4) Pack the printer, the starter kit packing, the waste toner pack, and power cable in the carton using the original packing material.
- 5) Seal the outer carton firmly.



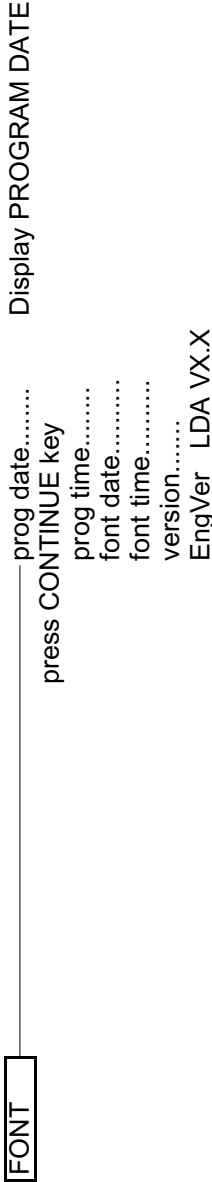
- 6) Fix the four joints, then band the carton with two plastic bands.



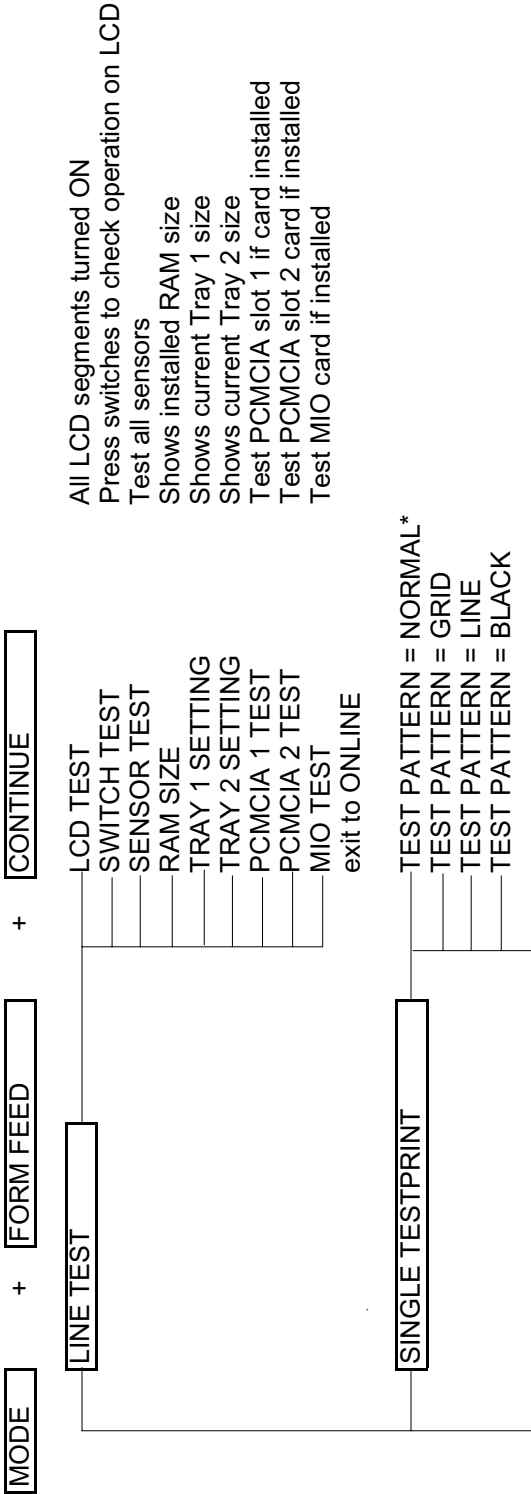
7. Hidden Function Menu



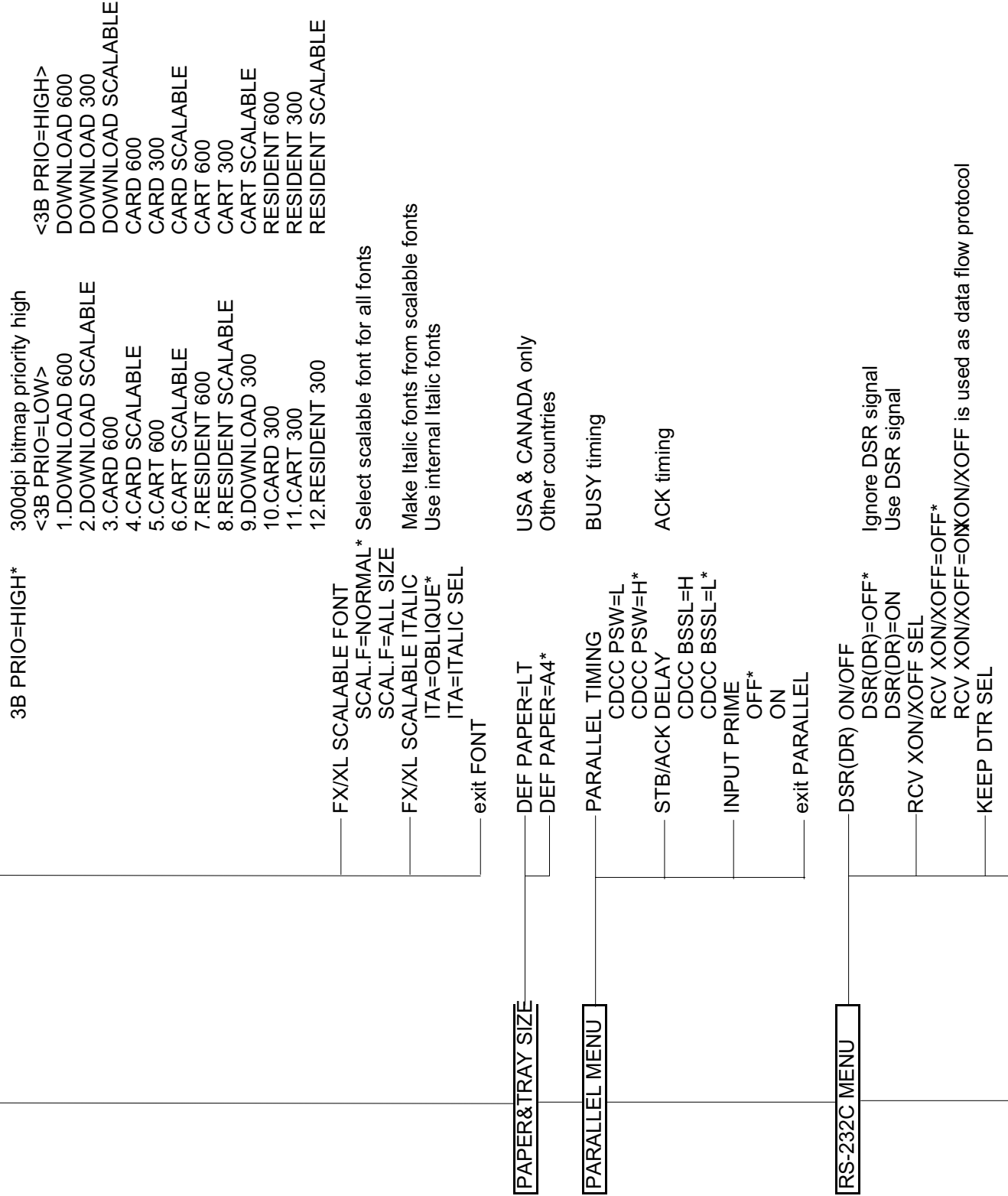
2. Hold down the following key combinations and turn the printer ON, keep the button(s) pressed until the display changes.

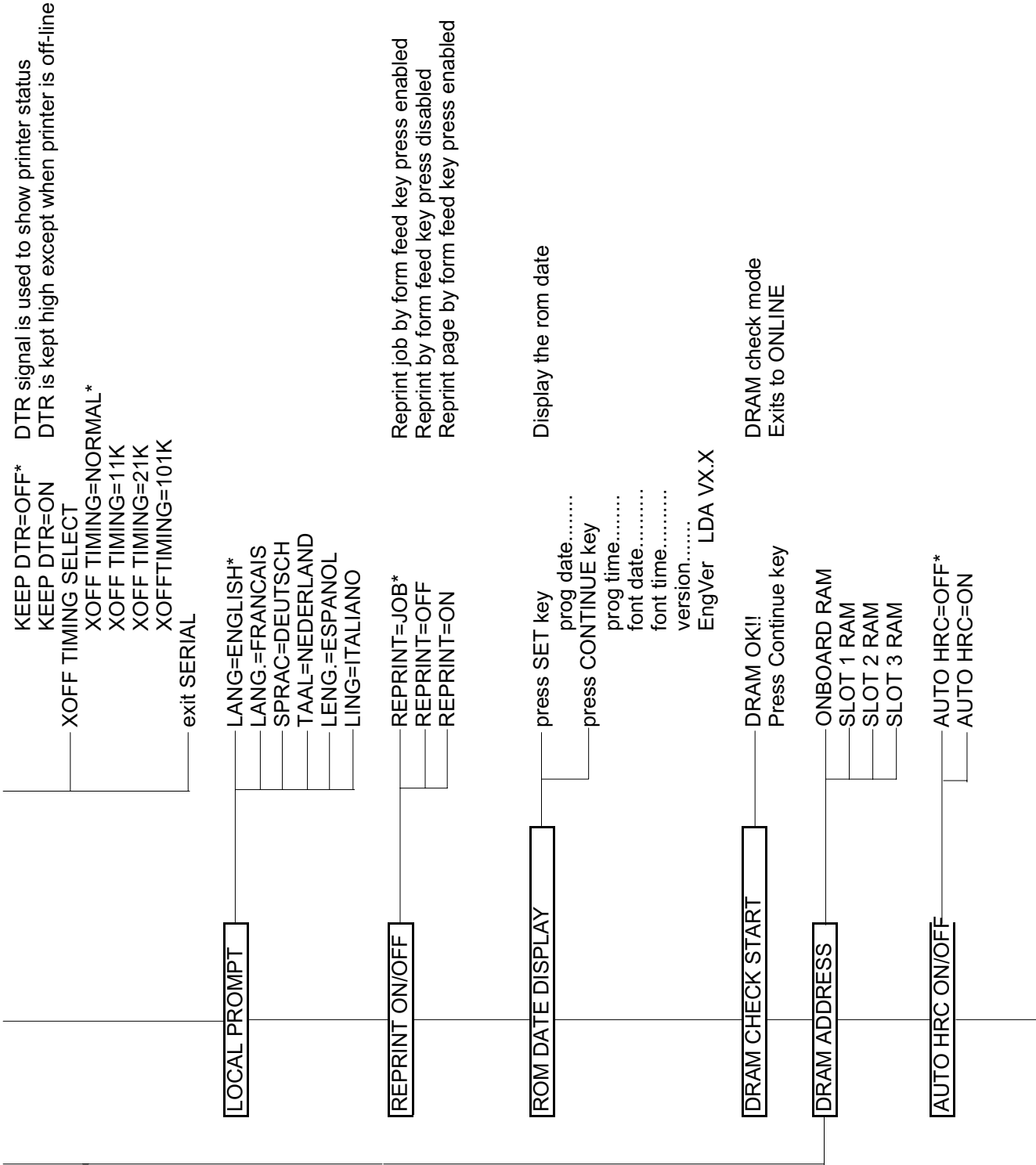


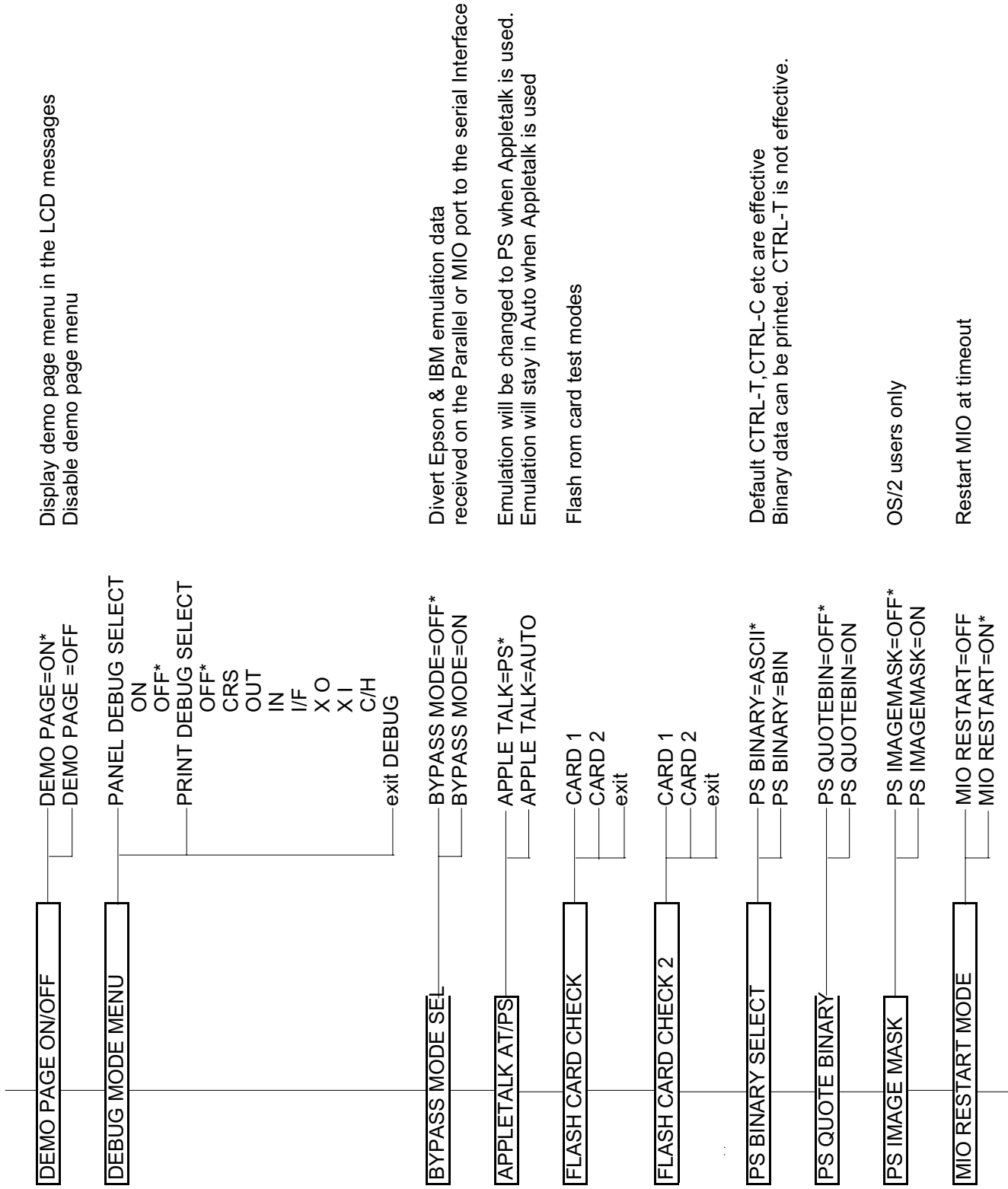
3. Go off-line and press the following keys simultaneously

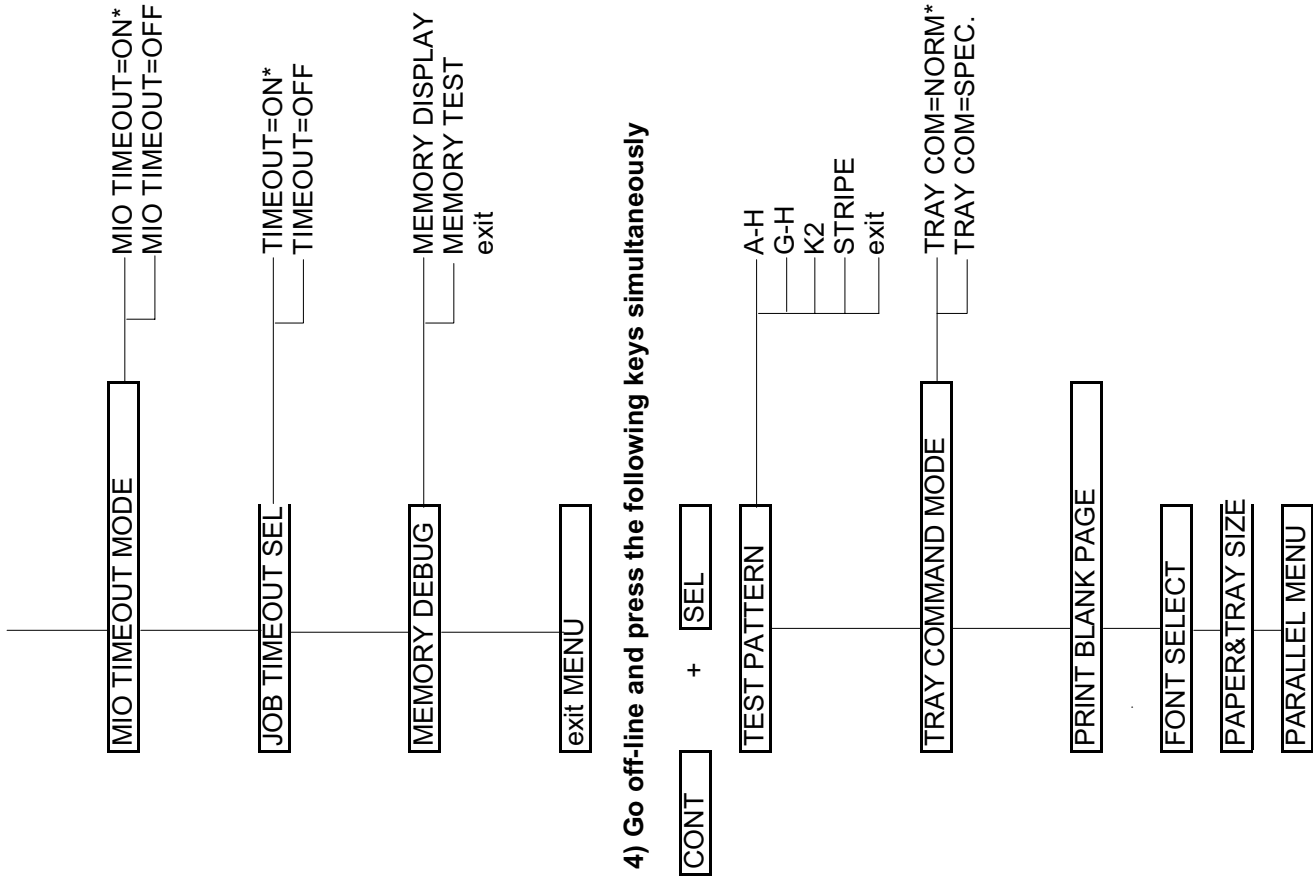


		TEST PATTERN = WHITE prints 1 page and exits to ONLINE	
REPEAT TESTPRINT	TEST PATTERN = NORMAL*		
	TEST PATTERN = GRID		
	TEST PATTERN = LINE		
	TEST PATTERN = BLACK		
	TEST PATTERN = WHITE		
		prints continuously, press SEL to stop printing (OFFLINE) press CONT to resume printing (ONLINE) press SHIFT & RESET to exit printing	
NV-RAM CLEAR	SURE? (SET/ELSE)	NV-RAM Clear	
READOUT SELECT	READOUT = ON READOUT=OFF*	Enable or Disable DC3 in Epson emulation	
FONT SELECT	IBM CHR SET MODE		
	IBM E1H=beta E1H will be printed as beta		
	IBM E1H=ESSZET* E1H will be printed as esszet		
	W BOLD ON/OFF		
	W BOLD=OFF* Disable bold in double strike printing mode in IBM & EPSON		
	W BOLD=ON Enable bold in double strike printing mode in IBM & EPSON		
	DLFNT Bd/lt		
	DLFNT Bd/lt=YES Enable bold and italic from the downloaded fonts		
	DLFNT Bd/lt=NO* Disable bold and italic from the downloaded fonts		
	B PROD ON/OFF		
	B PROD=ON* Enable bold and italic from the bit map fonts		
	B PROD=OFF Disable bold and italic from the bit map fonts		
	CONDENSE SELECT		
	CONDENSE=16.66* Set condensed print to 16.66 cpi		
	CONDENSE=17.14 Set condensed print to 17.14 cpi		
OEM FONT SELECT			
OEM FONT=DISABLE Disable OEM font selection			
OEM FONT=ENABLE Enable OEM font selection			
BRO FONT SEL			
BROBITM=DISABLE Disable internal 10/12 bit map Brougham font			
BROBITM=ENABLE Enable internal 10/12 bit map Brougham font			
ISR FONT SELECT			
ISRFONT=DISABLE*			
ISRFONT=ENABLE			
300DPI PRIORITY			
3B PRIO=LOW 300dpi bitmap priority normal			









4) Go off-line and press the following keys simultaneously

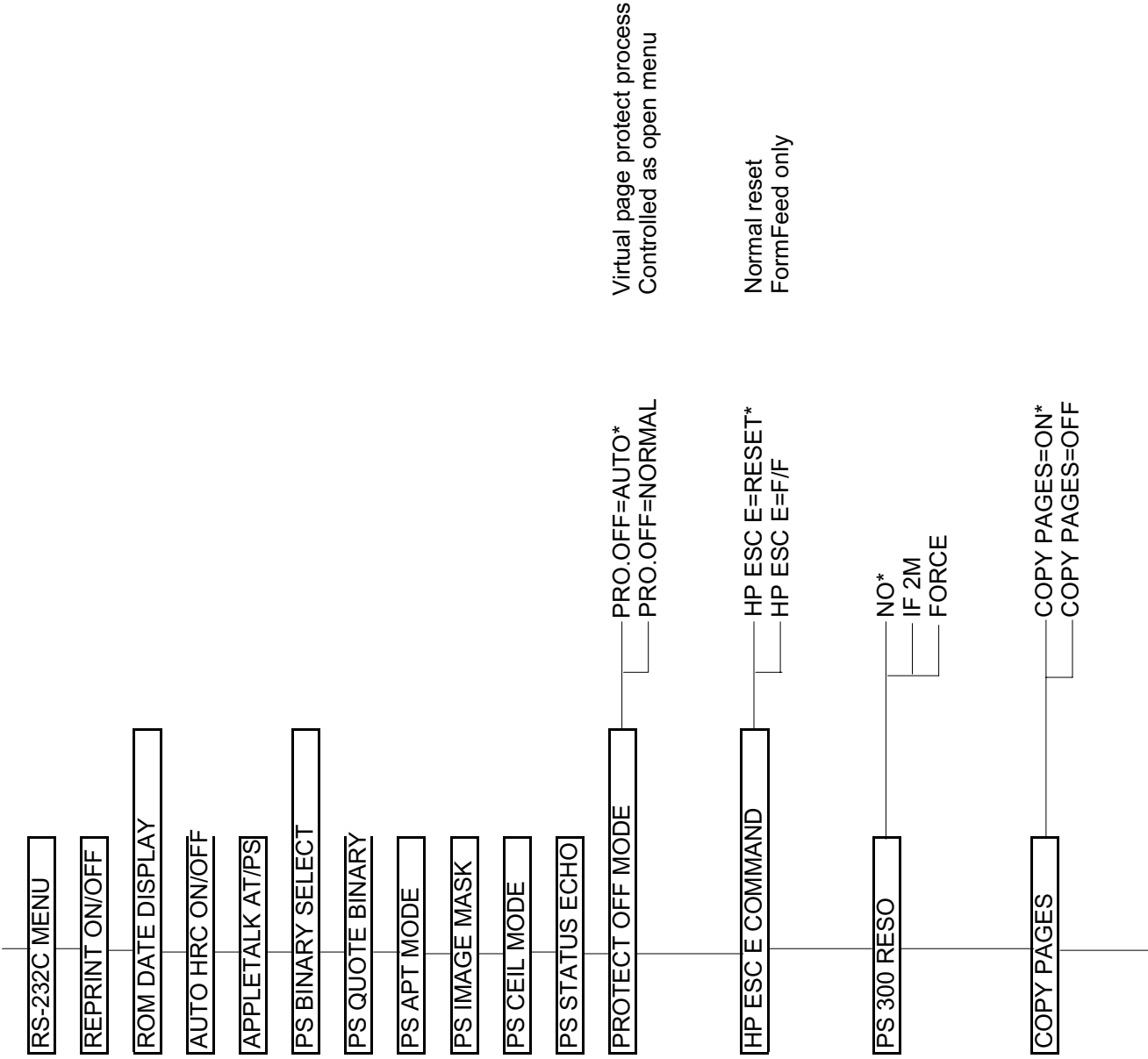
Exit the hidden function menu.

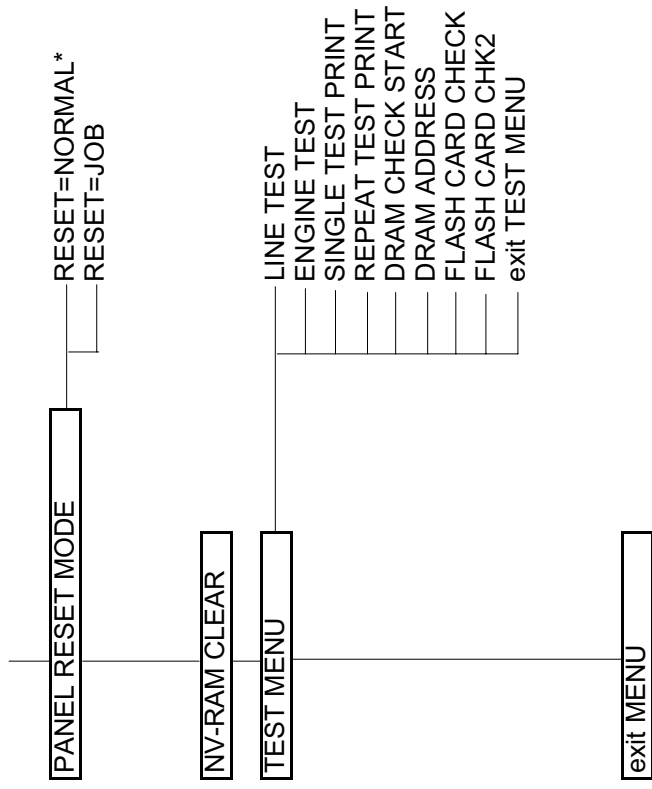
Test pattern print select

LJ4 compatible
LJ3 compatible

Prints 5 blank pages

ALL SETTINGS WITHOUT DESCRIPTIONS
ARE DESCRIBED PREVIOUSLY IN THE
DOCUMENT





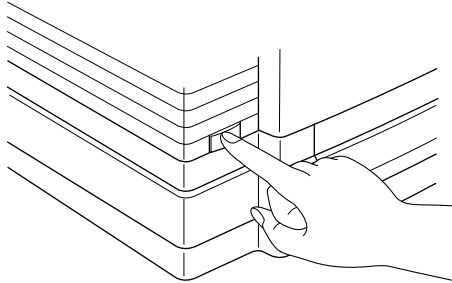
Exit the hidden function menu.

8. TO INSTALL THE PRINTER CORRECTLY

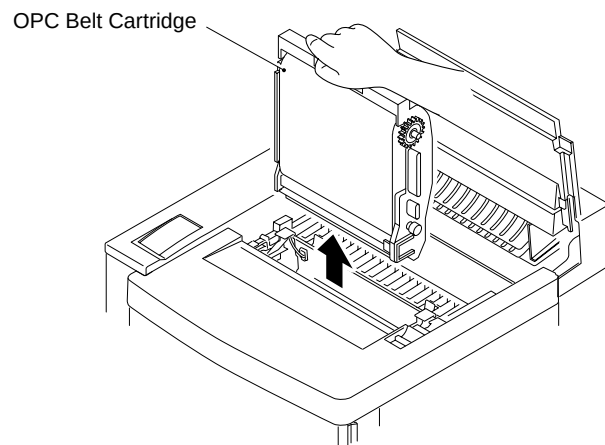
Please read the installation steps described below carefully.

If the printer is not installed correctly, image failures may occur or the life expectancy of the OPC belt cartridge may be shortened.

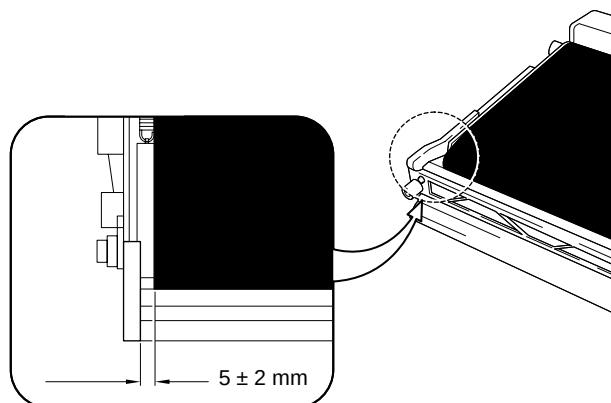
- 1) Turn ON the power switch of the printer.



- 2) After the printer has initialized, open the front cover and then the top cover of the printer and pull up the OPC belt cartridge from the printer.



- 3) Measure the gap on the OPC belt cartridge shown in the figure below. If the gap is in the range of 5 ± 2 mm, the printer is installed correctly.

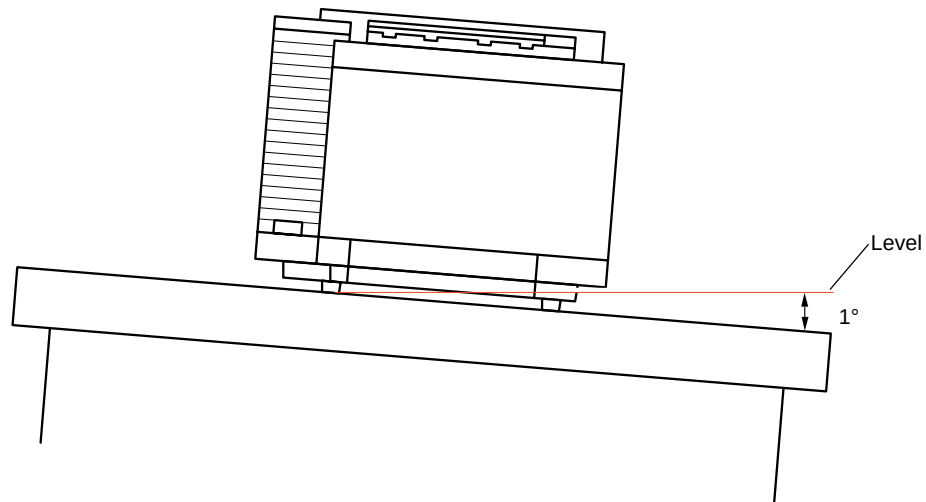


- 4) If the gap is NOT in the range of 5 ± 2 mm, check the following items;

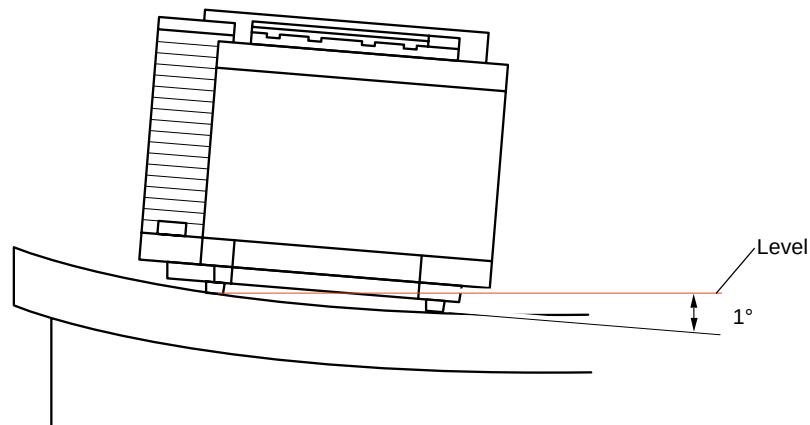
Note:

If the printer is inclined at 1° as shown in the figures below, the printer is approximately 9mm out of level from one side to the other.

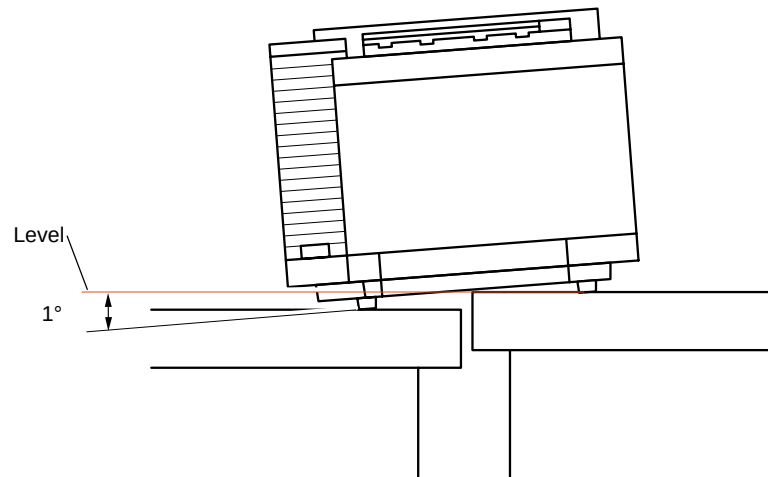
- i) Is the printer inclined because the table the printer is installed on is unlevel?



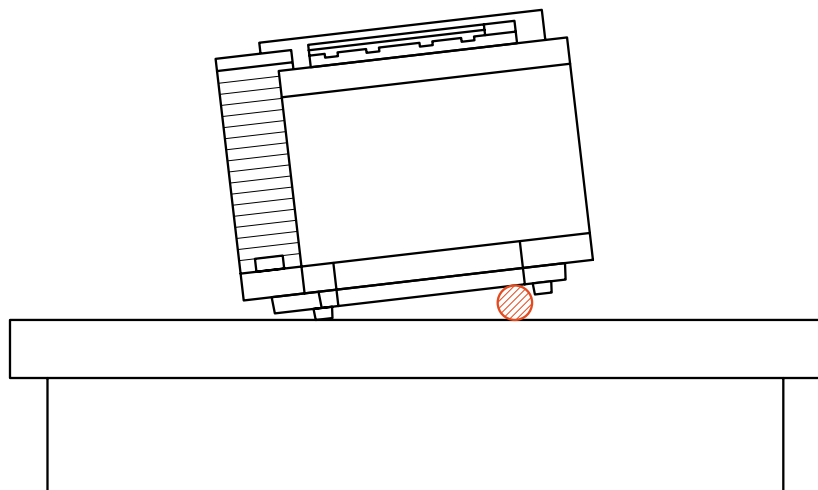
- ii) Is the printer inclined because the table surface the printer is installed on is not strong enough?



iii) Is the printer inclined because it is installed across two or more tables?



iv) Is there anything under the printer, or is there something stuck to the printer base?



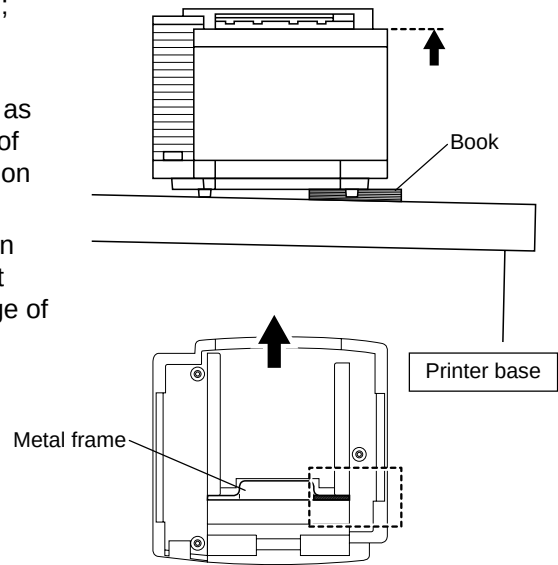
- 5) After checking these items, initialize the printer again (opening/closing the top cover automatically initializes the OPC belt cartridge), and measure the gap on the OPC belt cartridge again.
If the gap is in the range of 5 ± 2 mm, the printer is installed correctly. (Refer to the figure for Step 3.)

6) If the gap is NOT in the range of 5 ± 2 mm, follow the steps below;

- i) When the gap is more than 7 mm;
(the OPC belt has moved to the right.)

Place something 1 cm thick such as a book under the right hand side of the printer as shown in the figure on the right.

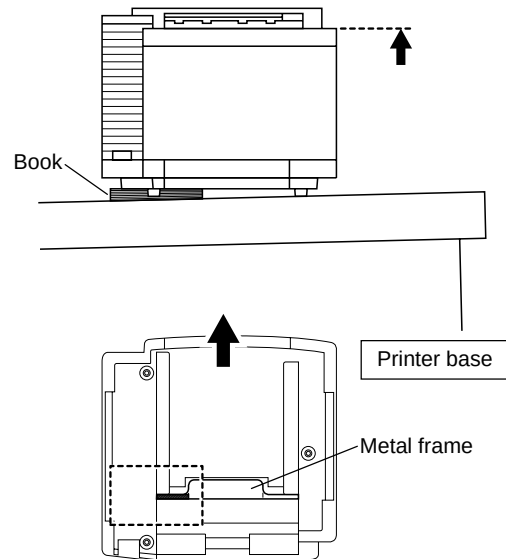
Initialize the printer again and then measure the gap on the OPC belt cartridge. If the gap is in the range of 5 ± 2 mm, the printer is installed correctly.



- ii) When the gap is less than 3 mm;
(the OPC belt has moved to the left.)

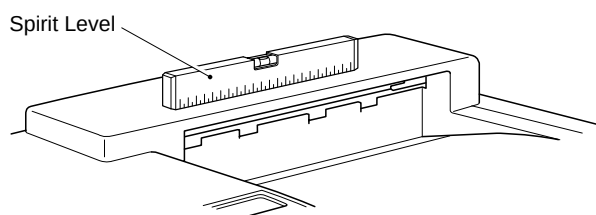
Place something 1 cm thick such as a book under the left hand side of the printer as shown in the figure on the right.

Initialize the printer again and then measure the gap on the OPC belt cartridge. If the gap is in the range of 5 ± 2 mm, the printer is installed correctly.



Note:

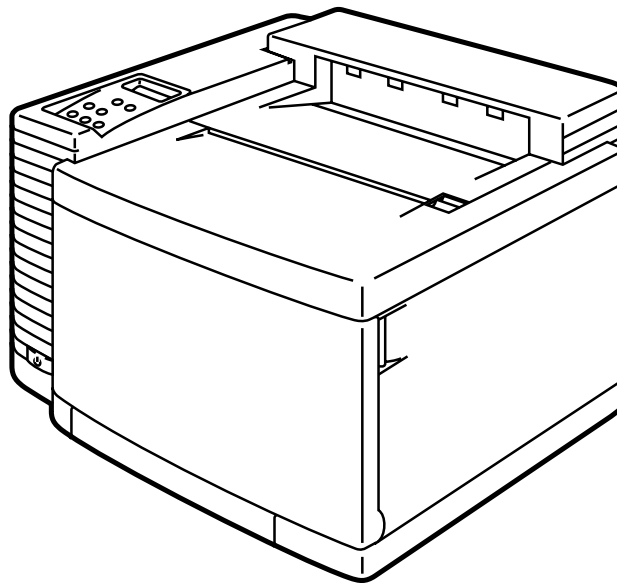
- Place the book or other object 1 cm thick under the printer metal frame as shown in the figures above. Even if the Lower Tray unit is installed onto the printer, the book should be positioned in the same position.
- If you have a spirit level, put it on the output tray and install the printer as level as possible referring to the level.
- The surface that the printer is placed on should have its level corrected properly.
- The temporary action with a 1 cm thick object should only be used to determine the correct leveling action required and should not be used as a permanent solution.



Brother Color Laser Printer

HL-2400C series

USER'S GUIDE



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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 the carrier.

WARNING

When shipping the Printer, the TONER CARTRIDGES and ALL CONSUMABLES must be removed from the Printer. **Failure to remove the CONSUMABLES during shipping will cause severe damage to the Printer and will VOID THE WARRANTY (refer to user's manual).**

(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	
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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

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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

This printer is heavy and weighs approximately 36kg (79.37lbs). When you move or lift this printer, be sure at least 2 people lift it together.



Warning

The Fusing unit is extremely hot during operation. Wait approximately 30 minutes before exchanging consumables that are in the area of the Fusing unit .

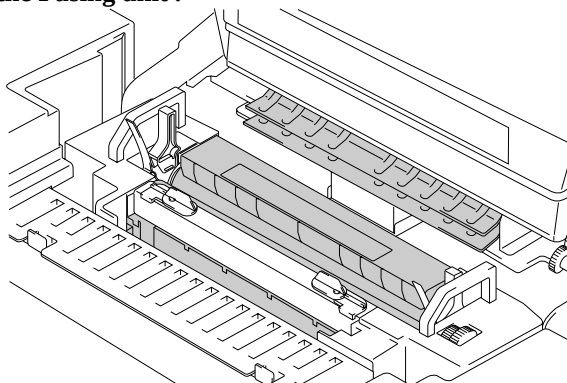


Fig. 0-1 Fusing unit



Warning

If metal objects, water or other liquids get inside the printer, turn the printer off immediately and unplug the printer. Contact your dealer.



Warning

Do not put consumables such as the Toner Cartridges and the Waste Toner Pack into a fire. Consumables are flammable under certain conditions..



Warning

Do not look at the laser beam light directly. It might cause damage to your eyesight.



Warning

Do not run the printer with the Top Cover, Front Cover and Rear Access Covers open.



Warning

Be sure to turn off the printer before you exchange consumables.



Warning

Do not put anything on the printer.



Warning

If you spill the fuser oil, carefully wipe it up completely.

Printer Do's and Don'ts for Optimum Print Quality

! Caution

When you move or lift this printer, be sure to keep the printer flat and remove the Toner Cartridges, Waste Toner Pack, Oil Bottle and Fusing Unit first so that they will not spill. Damage caused by failure to remove the supplies will void your warranty.

! Caution

Do not touch the rollers of the Fusing unit. If you do, it might cause print quality reduction.

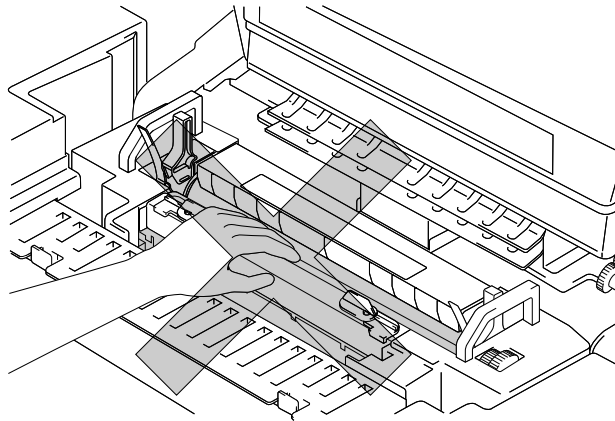


Fig. 0-2 Fusing unit Rollers

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IMPORTANT INFORMATION: REGULATIONS

Federal Communications Commission Compliance Notice (For U.S.A. 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.

International Energy Star Compliance Statement

The purpose of the International Energy Star Program is to promote the development and popularization of energy-efficient office equipment, 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.



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 le matériel brouilleur du Canada.

Laser Safety (120 V model only)

This printer is certified as a Class 1 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 (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.

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

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 interface cable with twisted-pair conductors and that is marked “IEEE1284 compliant”. The cable must not exceed 1.8 metres in length.

IEC 825 Specification (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 on the cover of 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 plug supplied must be inserted only into a standard three-pin power point which is effectively grounded through the normal household wiring.

Extension cords used with the equipment must be three-conductor and be correctly wired to provide connection to ground. Incorrectly wired extension cords are a major cause of fatalities.

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 the power completely.

Geräuschemission / Acoustic Noise Emission (For Germany Only)

$L_{pa} < 70 \text{ dB(A)}$ DIN 45635-19-01-KL2

Wiring Information (For U.K. only)

Important

If the mains plug supplied with this printer is not suitable for your socket 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 rating fuse as the original.

If a moulded plug is severed from the mains cord then it should be destroyed because a plug with cut wires is dangerous if engaged in 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 EARTHED

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

GREEN AND YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

The colours of the wires in the mains lead of this printer may not correspond with the coloured markings identifying 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 safety 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.

DECLARATION OF CONFORMITY (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).

* When used with the NC-2010h Ethernet interface card, this product complies with EN 55022 Class A.

Issued by:

Brother International Europe Ltd.
European Technical Services Division

CHAPTER 1 INTRODUCTION

ABOUT THIS MANUAL

This manual acts as your guide to the setup and operation of your printer and covers the following topics:

CHAPTER 1 INTRODUCTION provides an overview of the printer. Read this chapter first to get familiar with the printer.

CHAPTER 2 SETTING UP THE PRINTER gives you general set-up information about this printer. Be sure to read this chapter before you use the printer.

CHAPTER 3 BEFORE WORKING WITH THE PRINTER gives you important information on the printer setup to work with your computer and software. Be sure to read this chapter before you work with the printer.

CHAPTER 4 CONTROL PANEL details the functions of the panel buttons and LEDs.

CHAPTER 5 MAINTENANCE provides guidance on how to maintain your printer.

CHAPTER 6 TROUBLESHOOTING helps you troubleshoot the printer in case of problems.

APPENDICES contain detailed technical information on the printer as well as the character sets and a quick reference guide to the printer control commands.

INDEX provides an alphabetical list of the contents of this manual.

Notes

When you read this user's guide, note the following:

- This user's guide contains instructions or steps to teach you various operations of the printer. Remember that the instructions start with the factory settings, particularly in Chapter 2 and Chapter 3. If you change the settings, particularly the emulation mode, the display messages change accordingly.
- The paper size has been factory set to letter or A4, depending upon the final destination of the printer. Some display messages appear differently in accordance with this setting.

ABOUT THIS PRINTER

Features

This printer has the following standard features.

2400 x 600 DPI Class Resolution

This printer prints pages with a resolution of 600 dots per inch (dpi) as default. By utilizing the 300-dpi mode, the printer can also print 300-dpi data, if necessary. Moreover, you can get higher quality printout which is the equivalent of 2400x600 DPI resolution printout, by utilizing HRC or CAPT.

High Speed and Color Laser Printing

With this printer, you can print crisp printing in 24 bit brilliant full color. This printer can print at a speed up to 16 pages per minute in monochrome mode and 4 pages per minute in full color mode. The controller utilizes a high speed 32-bit RISC microprocessor and special hardware chips, so the process speed is very fast.

Color Advanced Photoscale Technology (CAPT)

This printer can print graphics in 256 shades for each color in HP® color printer PCL5C™ emulation and BR-Script level 2, producing nearly photographic quality. This mode is effective when you print photographic images.

High Resolution Control (HRC)

The High Resolution Control (HRC) technology provides clear and crisp printouts and improves even the 600-dpi resolution. This mode is effective when you print text.

Maintenance-Free and Economical Toner Cartridge

The toner cartridge can print up to 10,000 (Black) and 6,000 (Cyan, Magenta and Yellow) single-sided pages at 5% coverage. This printer uses one piece, easy-to-replace toner cartridges.

Universal Media Cassette

This printer loads paper automatically from the media cassette. Since the media cassette is a universal type, a number of different sizes of paper can be used. Even envelopes can be loaded from the media cassette. For detailed paper specifications, see 'Paper Handling' in Chapter 3.

Three Interfaces

This printer has a high speed bi-directional parallel interface, an RS-232C serial interface and a modular input/output (MIO) compatible interface.

If your application software supports the bi-directional parallel interface, you can monitor the printer status. It is fully compatible with the industry-standard bi-directional parallel interface.

The RS-232C serial interface is an industry standard so that you can connect it to any computer using a standard serial cable.

The MIO interface allows you to install a commercial MIO-compatible card. If you install the card, you can use one more interface port for features such as networking or printer sharing.

Automatic Interface Selection

This printer can automatically select the bi-directional parallel, RS-232C serial or MIO interface depending on the interface port through which it receives data. With this feature, the printer can be connected to more than one computer.

Five Emulation Modes

This printer can emulate the Hewlett-Packard® Color PCL® 5C (PCL6® in monochrome printing) printers, PostScript® Level 2 language emulation (Brother BR-Script Level 2) printers, the industry-standard HP-GL™ plotter as well as EPSON® FX-850™, and IBM® Proprinter XL® printers (in monochrome printing). You can print with all application programs that support one of these printers.

Automatic Emulation Selection

This printer can automatically select the printer emulation mode depending on the print commands it receives from the computer software. With this feature, many users can share the printer on a network.

Data Compression Technology

This printer can internally compress the received graphics and font data in its memory so that it can print larger graphics and more fonts without additional memory.

Various Fonts

This printer has 75 scalable and 12 bitmapped fonts. The fonts that can be used vary according to the current emulation mode.

Bar Code Printing

This printer can print the following 11 types of bar codes:

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

CCITT G3/G4

Since this printer supports the CCITT G3/G4 format in addition to HP-compatible formats, it can quickly receive and print data compressed in this format.

Lock Panel

If the panel button settings have been changed, the printer may not work as you expect. If you are an administrator of this printer, you can lock your settings to prevent changes from being made.

Power Save Mode

This printer has a power saving mode. As laser printers consume power to keep the fixing assembly at a high temperature, this feature can save electricity when the printer is on but not being used. The factory setting of the Power Save mode is ON so that it complies with the new EPA Energy Star specification. Compared with conventional laser printers, this printer consumes less power even when the power saving mode is turned off.

Toner Save Mode

This printer has an economical toner save mode. You can cut your printer running cost substantially by using this mode in addition to the improved life expectancy of the toner cartridge.

Reprint Function

You can reprint the last print job with a touch of a panel button which allows reprinting without sending the data again from the computer. When there is not enough memory to print the last job out, you can reprint the last print page.

PCMCIA Card Slot

Printer has PCMCIA card slot (TypeII:2slots, TypeIII:1slot). You can install a PCMCIA-compatible flash memory card and HDD card.

- Flash memory card: You can store fonts, macros, logos and other print data.
- HDD card: You can store fonts, macros, logos and other print data.

Saving User Settings

You can operate the printer differently from other users with your own panel button settings. Two sets of user settings can be stored.

Options

The following options are available for this printer:

Lower Tray Unit

A lower tray unit expands the paper source capacity. You can load extra paper or different sizes of paper. You can load Letter, A4, B5 (JIS and ISO) or Executive size (176x250 to 215.9x297mm) paper and Com10, DL size envelopes into this cassette.

Legal Cassette

When you want to print on Legal sized paper, you need to use this cassette.

The following commercial products can be installed into this printer:

MIO Card

A commercial modular input/output (MIO) compatible sharing/network card gives you an additional interface port for attaching the printer to a network or sharing your printer with multiple computers. Some models of this printer have an MIO Card for networking fitted as standard.

Flash Memory Card and HDD Card

A commercial flash memory card or an HDD card can be installed. You can store fonts, macros, logos, and other print data in a commercial PCMCIA-compatible flash memory card or HDD card.

RAM Expansion

Installing commercial memory modules expands the memory capacity up to 112 Mbytes.

Note

For the details about how to install the options, see the manual supplied with the option you wish to install .

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: $\pm 10\%$ of the rated power voltage

Frequency: 50/60 Hz (120V or 220-240 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, etc. If it is unavoidable that you must use the printer with these appliances, we recommend you use a voltage transformer or a high-frequency noise filter.

Use a voltage regulator if the power source is not stable.

Environment

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)

Do not block the air exit on top of the printer. Do not place objects on top of the printer, especially on the air exit.

Ventilate the room where you use the printer.

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 if the printer is unavoidably set up near a window.

Do not install the printer near devices that contain magnets or generate magnetic fields.

Do not subject the printer to strong physical shocks or vibrations. Do not expose the printer to open flames or salty or corrosive gasses.

Place the printer on a flat, horizontal surface.

Keep the printer clean. Do not install the printer in a dusty place. Do not install the printer near an air conditioner.

The following figure shows the suitable spacing around the printer for operation and maintenance.

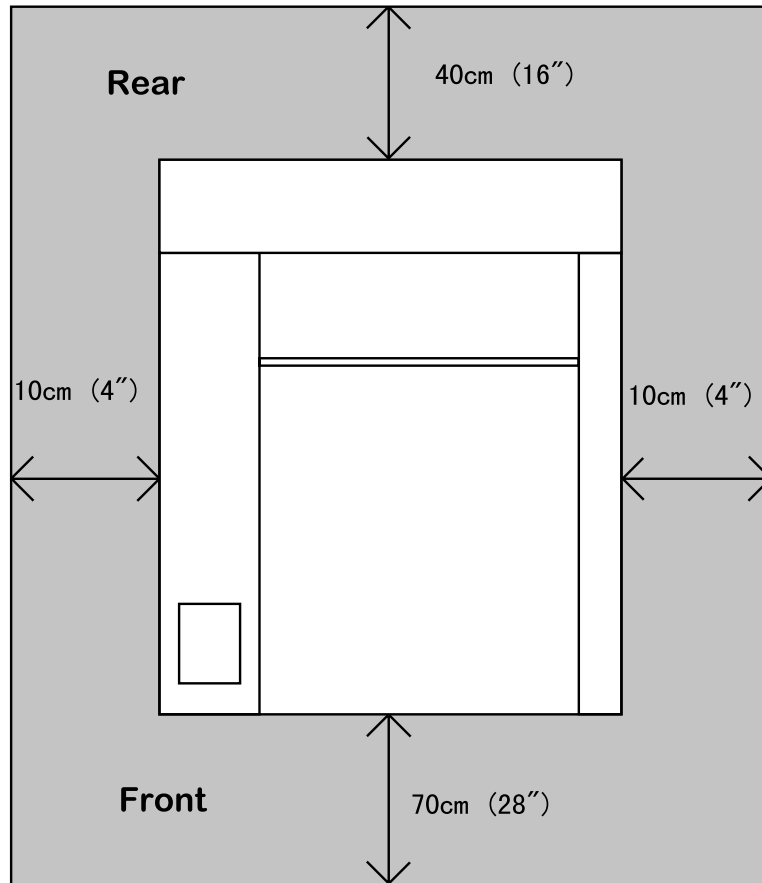


Fig. 1-1 Suitable Spacing around the Printer

Note

Ensure that there is enough space at the rear of the printer so that you can easily access the rear cover if a paper jam occurs.

CHAPTER 2 SETTING UP THE PRINTER

This chapter works as a quick setup guide, which gives you information for setting up the printer.

BEFORE USING THE PRINTER



Warning

This printer is heavy and weighs approximately 36kg (79.37lbs). When you move or lift this printer, be sure to do so with at least 2 people so that you will not hurt your back.

Checking the Components

After unpacking the printer, check to see that you have all of the following parts.

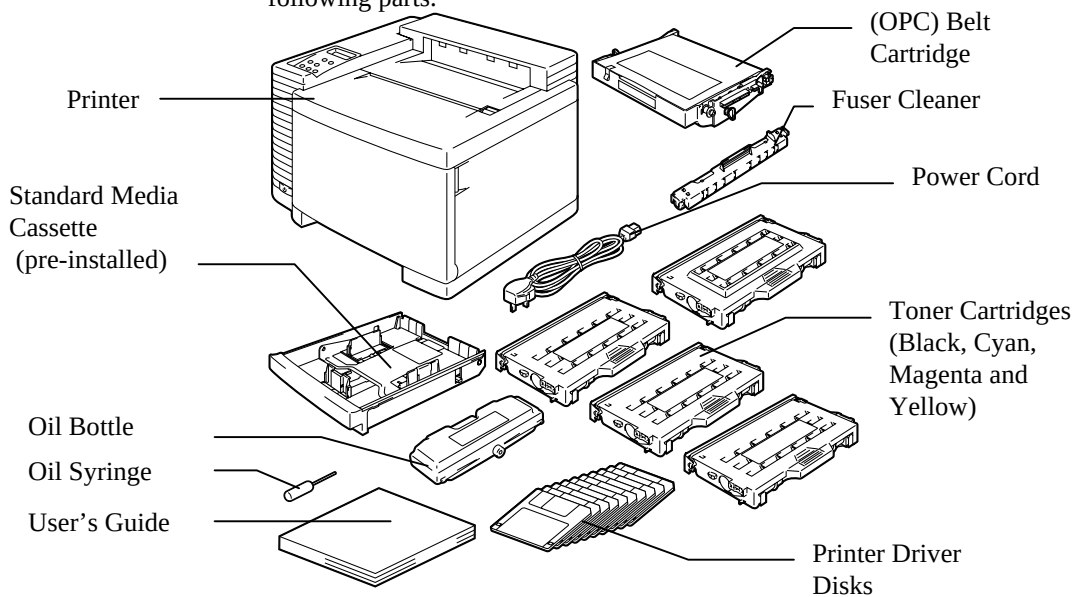


Fig. 2-1 Components in the Printer Carton



Caution

The Toner Cartridges, (OPC) Belt cartridge, Oil Bottle and Fuser Cleaner are packed inside a separate carton as a starter kit. Do not open them now. Only open them immediately before you want to install them. The (OPC) Belt Cartridge must not be exposed to light for a long time or damage will occur.

 Note

An interface cable is not a standard accessory. Please purchase an appropriate cable according to the interface you intend to use (parallel cables should not exceed 1.8meters(6 feet)). The power cord may differ slightly from this diagram depending on the country where you purchased the printer.

 Note

You may have additional parts not listed above depending on which country you live in and the HL-2400C series model you have bought.

 Note

We recommend you keep a spare of the following consumables at all times, because when the following consumables reach their life, the printer stops printing.

- * Toner Cartridges (TN-01BK, TN-01C, TN-01M, TN-01Y)
- * Waste Toner Pack (WT-1CL)
- * Oil Bottle and Fuser Cleaner (FO-1CL, CR-1CL)

General View

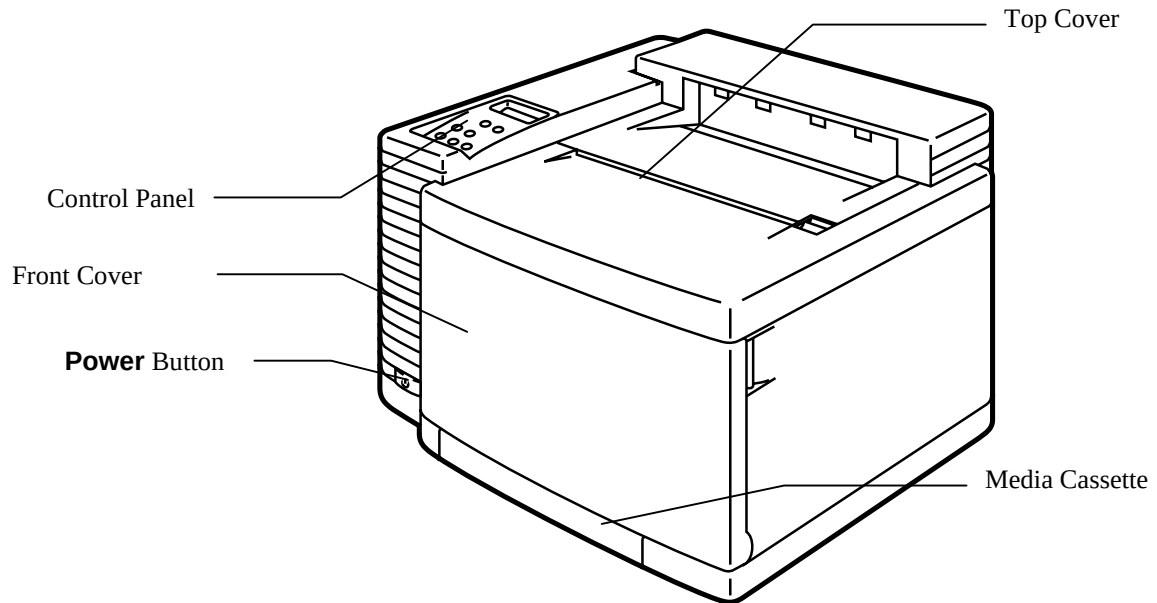


Fig. 2-2 Front View

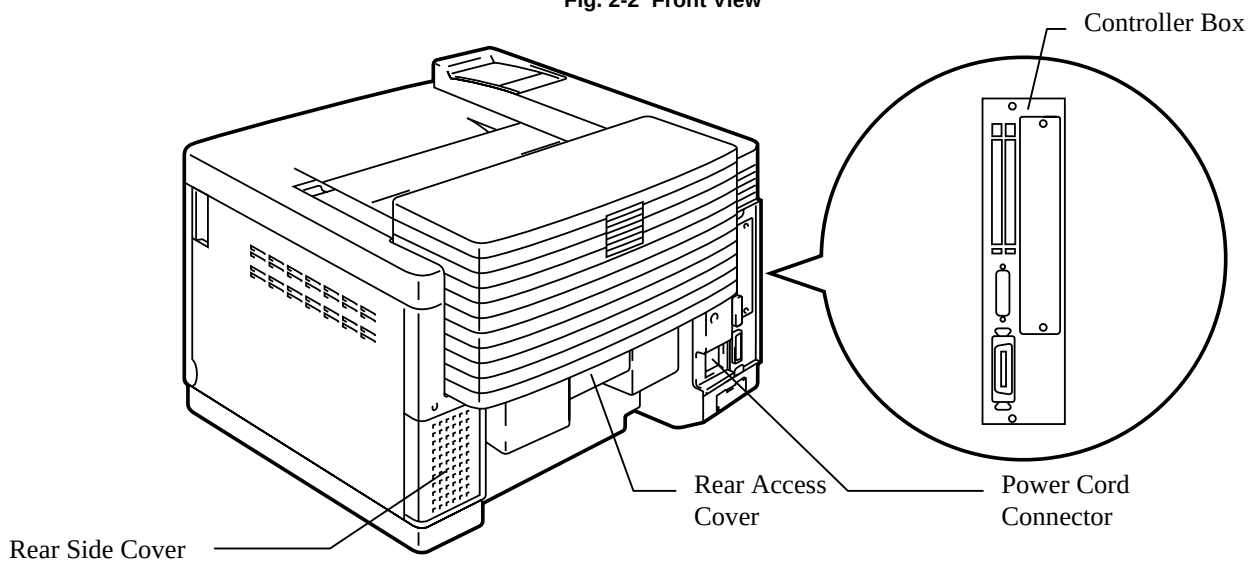


Fig. 2-3 Rear View

SETTING UP THE PRINTER

Removing the Protective Parts

After checking that you have all of the correct parts, temporarily place the printer where you can easily reach all sides. Remove the protective parts that secure the printer against damage during transportation, as shown below:

 Note

Keep all packing materials for transporting or storing the printer later.

1. Remove the protective parts as shown below.

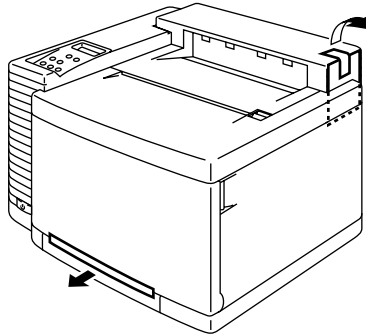


Fig. 2-4 Removing the Protective Parts

Installing the (OPC) Belt Cartridge

! Caution

- Do not touch the green surface of the (OPC) Belt Cartridge . If you do, it might cause quality reduction.
- Do not expose the (OPC) Belt to light (more than 800 lux) for more than approximately 2 minutes. It might cause damage to the (OPC) Belt Cartridge and void its warranty.

1. Open the Top Cover with the Front Cover open.

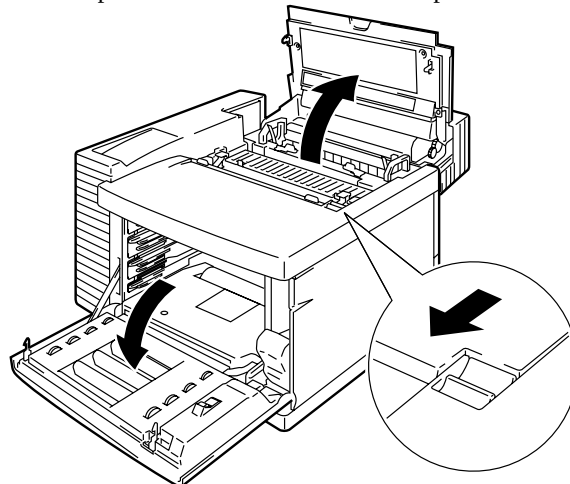


Fig. 2-5 Open the Covers

2. Release both green Belt Cartridge Lock Levers by pulling them toward you.

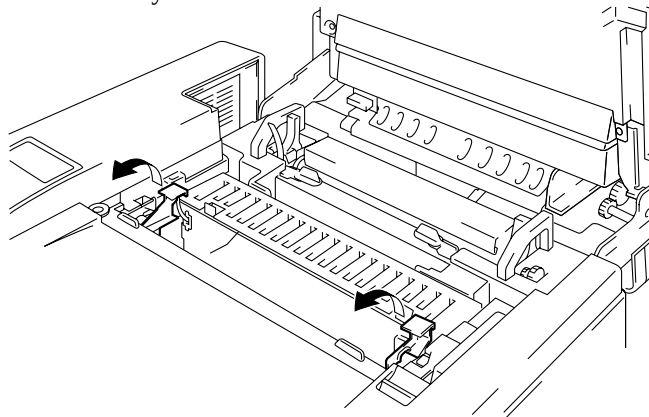


Fig. 2-6 Release the Levers

3. Remove the orange (OPC) Belt Tension Release Pins.

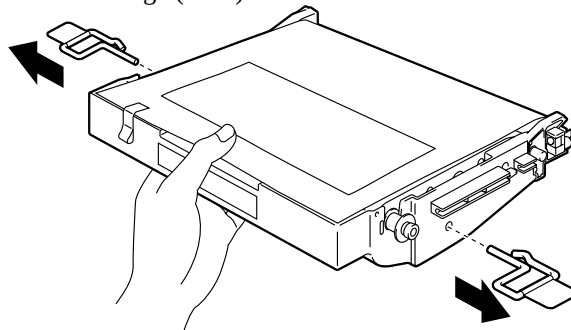


Fig. 2-7 Remove the Pins

4. Remove the Protective Sheet from the (OPC) Belt Cartridge.

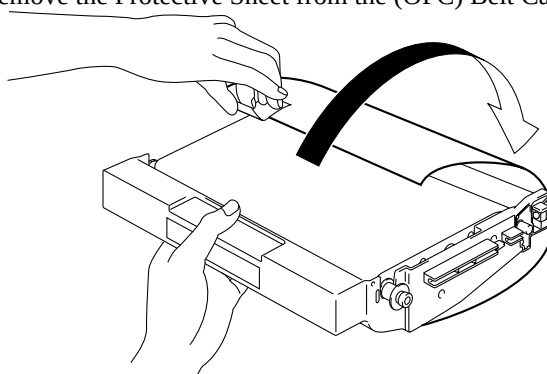


Fig. 2-8 Remove the Protective Sheet

5. Insert the (OPC) Belt cartridge into the printer along the guide with the flat side facing toward you.

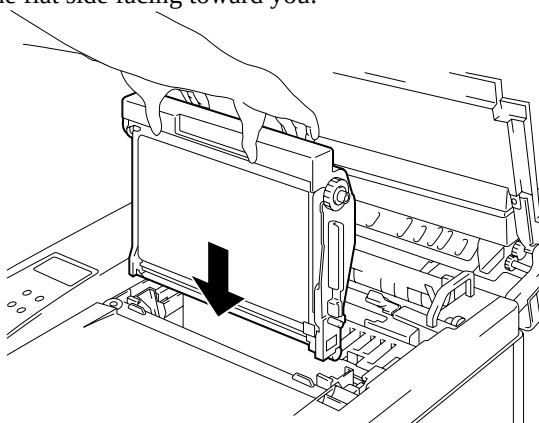


Fig. 2-9 Insert the (OPC) Belt Cartridge

6. Lock the Belt Cartridge Lock Levers by pushing them backwards until you feel them click.
7. Close the Top Cover.

Installing the Toner Cartridges

This printer uses 4 separate color (Black, Cyan, Magenta and Yellow) toner cartridges to print. You have one of each color toner cartridge supplied as standard. A new cartridge contains enough toner to print approximately 10,000 (Black); 6,000 (Cyan, Magenta, Yellow) A4 or letter-size single-sided pages at about 5% coverage. (Actual toner yield will depend on the images being printed.)

Note

The toner cartridges shipped with the printer contain only half the normal amount of toner. (5,000 pages (Black) and 3,000 pages (Cyan, Magenta and Yellow)).

To install the toner cartridges, follow these steps:

1. Open the Front Cover of the printer.
2. After rocking each of the cartridges 3 to 4 times, remove the orange Protective Cover of the Toner Cartridges.

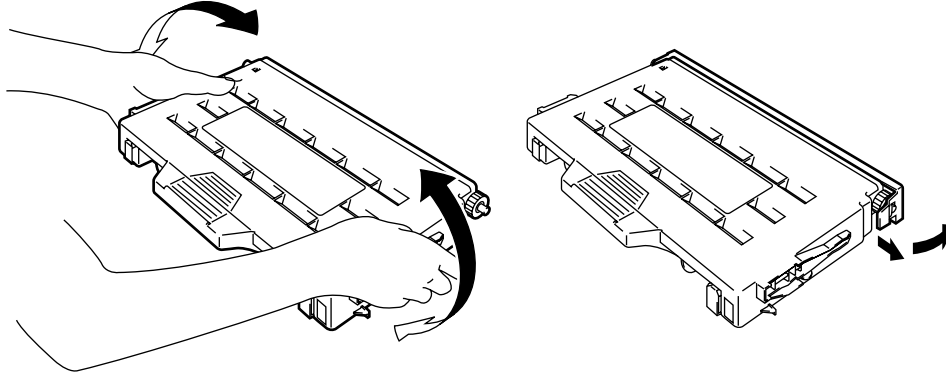


Fig. 2-10 Removing the Protective Cover

3. Install the 4 toner cartridges by positioning them in the guides. Insert the new Toner Cartridges, making sure to insert the correct color in the correct position referring to the color indications on the label in the order Cyan, Magenta, Yellow and then Black.

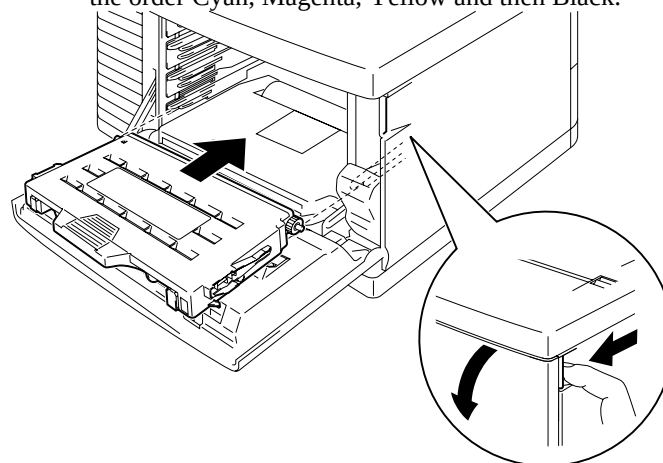


Fig. 2-11 Install the Toner Cartridges

! Caution

- Do not stand the toner cartridge on its end or turn it upside down.
- Install the toner cartridges immediately after you remove the protective part. Do not touch the shaded part shown below.

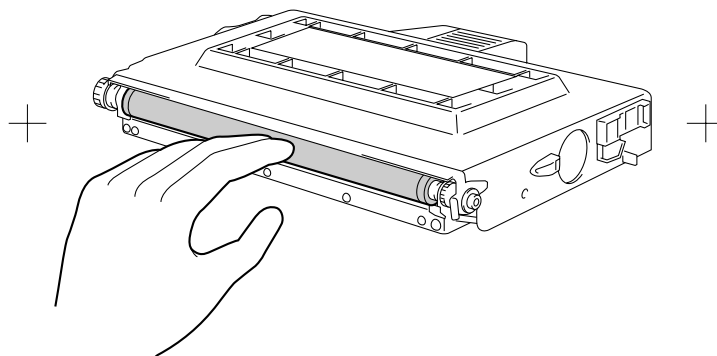


Fig. 2-12 Toner Cartridge

Installing the Oil Bottle and the Fuser Cleaner

1. Release the Fusing unit pressure a little with the Pressure Release Levers (①). Then pull the orange protective parts between the rollers of the Fusing Unit out to remove them (②). Make sure that the Pressure Release Levers are locked.

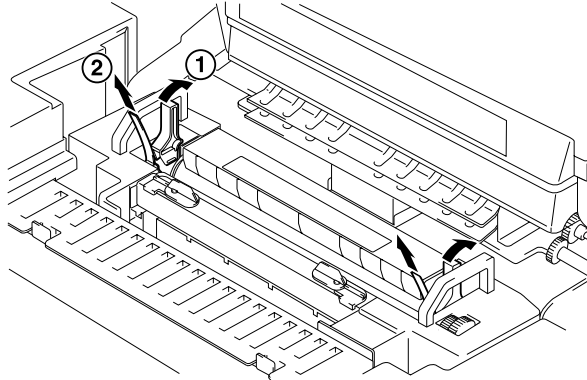


Fig. 2-13 Remove the Protective Parts

2. Install the Oil Bottle into the Fusing Unit with the label side facing the front of the printer.

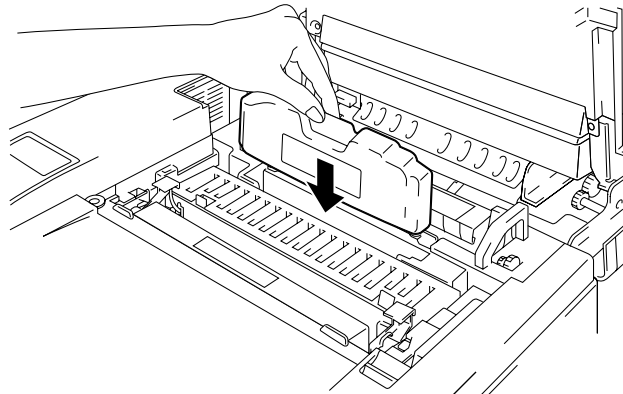


Fig. 2-14 Install the Oil Bottle

! Caution

Do not spill the oil inside the printer. If the oil does spill, it might cause damage to the printer. If you do spill any oil, consult your dealer or our authorized service representative.

3. Set the Fuser Cleaner into the Fusing Unit with the roller side facing toward you.

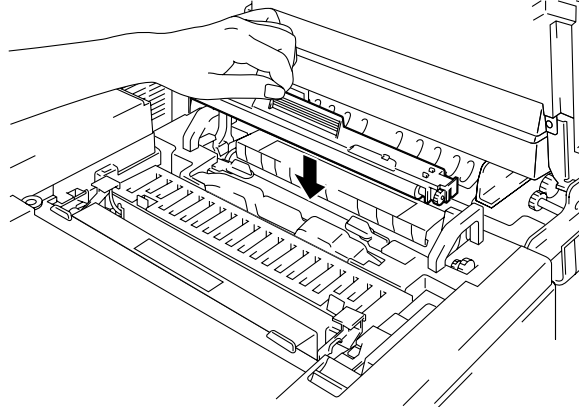


Fig. 2-15 Install the Fuser Cleaner

4. Lock the Oil Bottle and the Fuser Cleaner with the Oil Bottle Lock Levers.

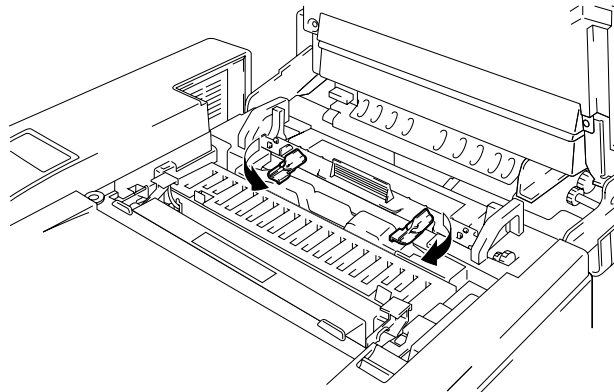


Fig. 2-16 Lock the Oil Bottle Lock Levers

5. Close the Top Cover.

Loading Paper in the Media Cassette

Note

This printer has a 250 sheet Media Cassette as standard. An additional Lower Tray Unit is available as an option.

Since the Media Cassette is a universal type, you can set letter, A4, ISO B5 or executive size cut sheet paper or COM10, or DL size envelopes in the Media Cassette.

The paper sources have the following limitations. For more information about paper, see “Paper Handling” in Chapter 3.

paper source	available size	available type and capacity
Standard Media Cassette	cut sheet : Letter, A4, B5(ISO), B5(JIS), Executive envelope: COM 10, DL other size: width 105-216mm (4.1"-8.5") length 220-297mm (8.7"-11.7")	plain paper : 250 envelope : 15 OHP film : 50 Up to approx. 250 sheets of 75g/m ² (20 lbs.) paper
Optional Legal Cassette	cut sheet : Legal, Letter, A4, B5(ISO), B5(JIS), Executive envelope: COM 10, DL other size: width 105-216mm (4.1"-8.5") length 220-355.6mm (8.7"-14")	plain paper : 250 envelope : 15 OHP film : 50 Up to approx. 250 sheets of 75g/m ² (20 lbs.) paper

Note

Do not load envelopes in the Paper cassette in the Optional Lower Tray Unit. It might cause paper jams.

Follow these steps to set paper and install the Media Cassette:

Note

- Be sure to select the same paper size as the paper to be used from your application software, or correct printing cannot be obtained.
If your application software does not support paper size selection in its print menu, you can change the paper size with the **Mode** button in the FORMAT MODE. For paper size change information, see “MODE Button” in Chapter 4.
- The paper size has been factory set to letter or A4, depending upon the final destination of the printer.
 - 120V model: Letter size paper set.
 - 220/240V model: A4 size paper set.
- Small Size Setting: See “Control Panel” in Chapter 4

Load paper into the Media Cassette as follows:

1. Pull the Media Cassette out of the printer.

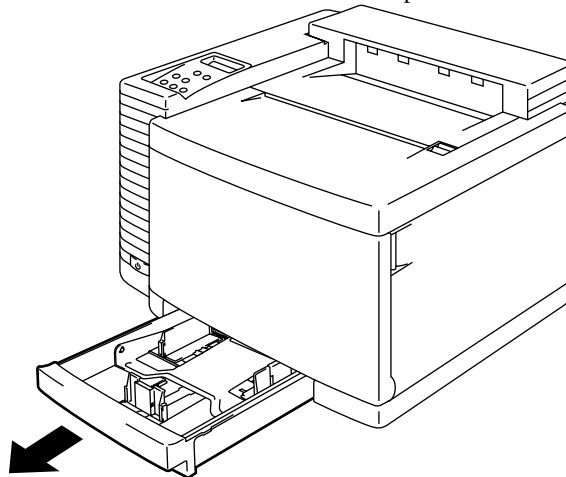


Fig. 2-17 Removing the Media Cassette

2. Adjust the Paper Guides according to the paper size you want to load.
Hold the shaded parts below and move the guides.

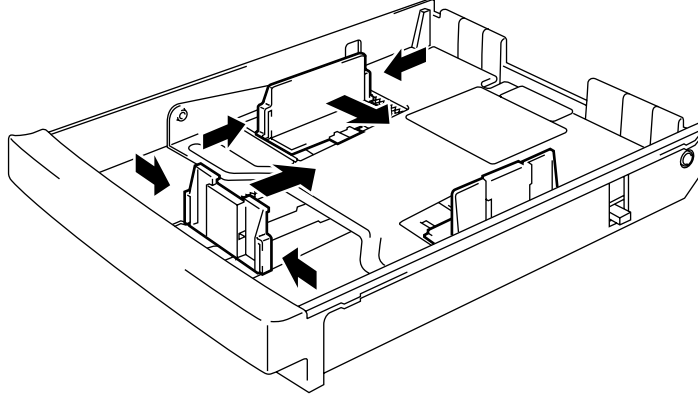


Fig. 2-18 Adjust the Paper Guides

3. Load paper into the Media Cassette.

Note

Do not load more than 250 sheets of paper (75 g/m² or 20 lbs.) in the cassette, or paper jams may occur. Paper (75 g/m² or 20 lbs.) should be loaded up to the lines on the sliding guide.

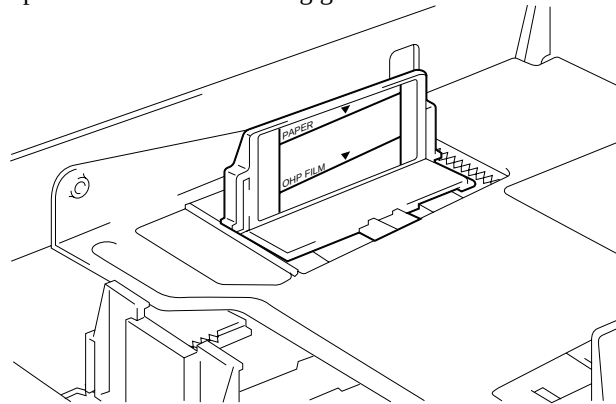


Fig. 2-19 Paper Lines

4. Install the Media Cassette into the printer.

Connecting the Printer to Your Computer

This printer has a bi-directional parallel interface and an RS-232C serial interface. They allow the printer to communicate with IBM/PC[®] or compatible computers. Before connecting the printer and computer, you need to purchase a connecting cable specifically made for the interface to be used

Since the automatic interface selection mode has been factory set, simply connect the interface cable to the printer. In some cases, you need to turn off the high-speed and bi-directional parallel communications with the **Mode** button. For further information, see “MODE Button” in Chapter 4.

When you use the serial interface, you need to have the same communications settings on both the printer and computer. Since the automatic interface selection mode has been factory set with certain factory settings (baud rate = 9600, code type = 8 bits, parity = none, stop bit = 1, Xon/Xoff = ON, DTR (ER) = ON, and Robust Xon = ON), you may simply connect the interface cable if these are the same as the settings on your computer. When necessary, set the communications parameters with the **Mode** button on the printer. For further information, see “MODE Button” in Chapter 4. For the settings on the computer, see the manual of the computer or software you use.

Connect the printer to your computer as follows:

1. Make sure that both the computer and the printer are turned off.

Caution

Always turn off the printer and computer when connecting and disconnecting the cable.

2. Connect one end of the interface cable to the interface connector located on the back of the printer.

3. Secure the connection with wire clips or screws on the printer.

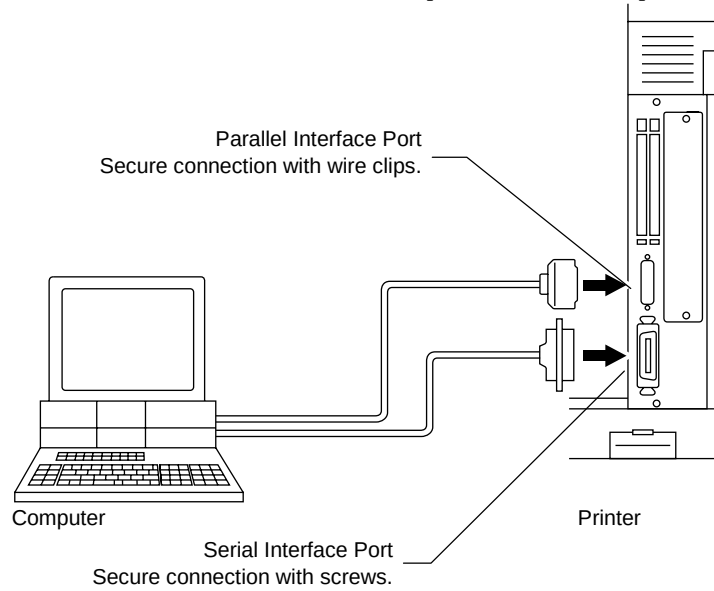


Fig. 2-20 Connecting the Printer and Computer

4. Connect the other end of the interface cable to the interface connector on your computer. Be sure to secure the connection on the computer also.

Note

When you connect to a network, refer to the Network User's Guide.

Turning the Printer On

Plugging in the Power Cord and Turn the Printer On

1. Make sure that the **Power** button is turned OFF: the button is on the front left hand side of the printer.
2. Attach the power cord to the printer and plug it into an appropriate AC outlet.

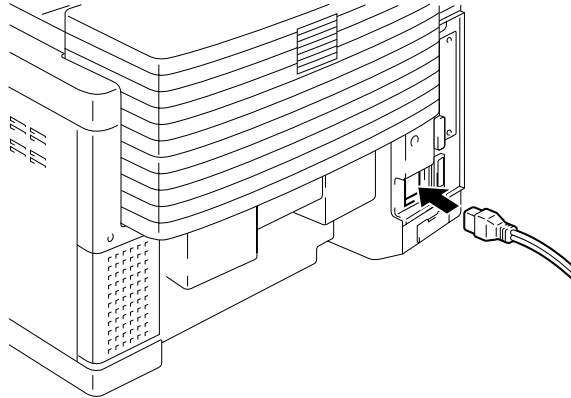


Fig. 2-21 Plugging in the Power Cord

3. Turn the printer on by pressing the **Power** Button.

! Caution

- Check the AC voltage. This printer should be operated at the specified voltage and frequency.
 - USA and Canada: AC 120 V, 50/60 Hz
 - Europe, Australia and others: AC 220 to 240 V, 50/60 Hz
- Since this printer must be electrically grounded, the power cord should be connected to a grounded AC outlet.
- The total length of the power cord, including extension cords, should not exceed 5 meters (16.4 feet). Use of a longer power cord may result in reduced voltage or malfunctions.
- Do not unplug the power cord to turn off the printer.
- The printer should be installed near a power outlet which is easily accessible.

! Caution

Always wait at least 5 seconds after turning off the power before turning it back on.

Do not turn the power off while the printer is printing as this may cause a paper jam and adversely affect the printer.

The printer performs a self-diagnosis at start-up to check its hardware and software. If the printer should find any problems, the display will change to show the corresponding error message. See “TROUBLESHOOTING” in Chapter 6.

The display shows several messages quickly at start-up. If the printer detects no errors, it automatically goes on-line and the message changes to show the current printer status and settings as shown below.

LJ	READY	001P	T1
AUTO	■	■	■
	K	C	M Y

AUTO: The auto emulation selection mode is set.

LJ : The auto emulation selection is set and currently the HP PCL5C emulation is selected.

READY : The printer is ready to print.

001 : The number of copies to print is set to 1.

P : Portrait print is selected.

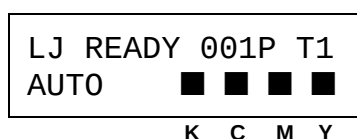
T1 : Paper is fed from Tray1.

■ : Toner cartridges are full. When the toner cartridges become nearly empty, the ■ indication blinks. The ■ indication disappears when a color toner is empty.

Printing the Test Patterns or Lists

You can check print quality and print a list of available fonts before you actually start working with the printer. To do so, follow these steps:

1. Make sure that you have already installed the toner cartridges, the (OPC) Belt Cartridge, the Oil Bottle and the Fuser Cleaner and have loaded paper into the cassette. Make sure that you have removed the protective parts on the Waste Toner Pack.
2. Turn on the printer. Wait until the display shows the message as follows.



3. Press the **Sel** button to set the printer off-line.
The **On Line** LED goes off.
4. Hold down the **Shift** button and press the **Test** button.
5. Press the **▲** or **▼** button to scroll through the display until the desired message appears. To print your selection, press the **Sel** button.
Choose from one of the following selections :

To Print Out	LCD Message in the Second Row
the Demonstration Page	DEMO PAGE
the Test Pattern	TEST PRINT
the list of printer settings	PRINT CONFIG
the list of internal or resident fonts	PRINT FONTS I
the list of optional cartridge/card fonts	PRINT FONTS C
the list of permanent download fonts	PRINT FONTS P

To exit from the test mode, select “exit”.

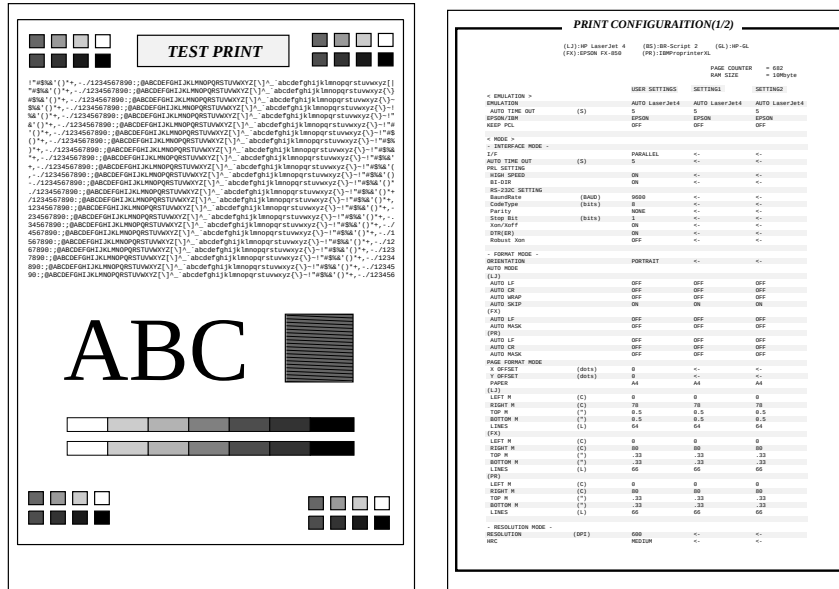
Notes

The messages “PRINT FONTS C” or “PRINT FONTS P” appear only when an optional font cartridge/card is installed in the font slot or permanent download fonts are stored in printer memory respectively.

- If the optional font cartridge/card is installed, you can print out a list of optional fonts. Since the list shows the ID numbers specific to each optional font, it helps you to select them with the **Font** button. For further information, see “FONT Button” in Chapter 4.
- If user-defined characters are already downloaded into the printer memory as permanent download fonts, you can print out a list of them. For further information, see “FONT Button” in Chapter 4.

6. Press the **Set** button.

The printer starts printing the selected test pattern or list. When the printer finishes printing, it automatically exits to the off-line state.



TEST PRINT

PRINT CONFIG

PORTRAIT LIST				INTERNAL FONT											
NUMBER	SYMBOL SET	STYLE	WEIGHT	TYPEFACE	P	G	N	T	S	A	R	P	L	E	DESCRIPTION
1000	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	PURVENO Reg (4105)	ABCDfgh123?!*%&()<>/012										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	PURVENO Reg (4105)	ABCDfgh123?!*%&()<>/012										
1002	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	PURVENO It (4105)	ABCDfgh123?!*%&()<>/012										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	PURVENO It (4105)	ABCDfgh123?!*%&()<>/012										
1004	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	DELANDRA Reg (4113)	ABCDfgh123?!*%&()<>/012										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	DELANDRA Reg (4113)	ABCDfgh123?!*%&()<>/012										
1006	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	DELANDRA It (4113)	ABCDfgh123?!*%&()<>/012										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	DELANDRA It (4113)	ABCDfgh123?!*%&()<>/012										
1008	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	CONNECT CUT (4116)	ABCDfgh123?!*%&()<>/0123456										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	CONNECT CUT (4116)	ABCDfgh123?!*%&()<>/0123456										
1010	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	CLIVELAND G2 (4140)	ABCDfgh123?!*%&()<>/0123456										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	CLIVELAND G2 (4140)	ABCDfgh123?!*%&()<>/0123456										
1012	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	PURVENO Lt (4143)	ABCDfgh123?!*%&()<>/0123456										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	PURVENO Lt (4143)	ABCDfgh123?!*%&()<>/0123456										
1014	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	UTAH Reg (4148)	ABCDfgh123?!*%&()<>/0123456										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	UTAH Reg (4148)	ABCDfgh123?!*%&()<>/0123456										
1016	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	UTAH Lt (4149)	ABCDfgh123?!*%&()<>/0123456										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	UTAH Lt (4149)	ABCDfgh123?!*%&()<>/0123456										
1018	BU ROMAN B...	P: Scalable Upright(8)	Medium(8)	UTAH It (4150)	ABCDfgh123?!*%&()<>/0123456										
	P: Scalable Italic(10)	Medium(8)	Reg(10)	UTAH It (4150)	ABCDfgh123?!*%&()<>/0123456										

PRINT FONTS I

Fig. 2-22 Test Pattern, Setting List, and Font List

*The test pattern, setting list and font list above might be changed without notice.

Installing the Printer Driver

Computer Requirements

The following are the minimum computer requirements to setup and operate the printer.

CPU:	80486 or higher (Pentium recommended)
RAM:	8 MB or more for Windows 95, 98, 3.1 / 3.11 and NT 4.0 (16 MB or more recommended)
Hard Disk Drive:	10Mbyte free space available (more space is necessary for printing)
OS:	Windows 95, 98, 3.1x, NT4.0

 Note

Use only a shielded Interface cable that is IEEE 1284 compliant and less than 1.8m (6 feet) long.

Prepare Windows 95/98 for the Printer

1. Insert the supplied disk for Windows into your floppy disk drive.
2. Click the “START” button and select “Setting”.
3. Select “Printers” and double click “Add Printer”.
4. Follow the instructions in Windows 95/98.
5. Click “Have Disk”. Then browse and select “Brother HL-2400C series”.
6. Follow the rest of the Windows 95/98 instructions.

Prepare Windows 3.1/3.11 for the Printer

1. Insert the supplied disk for Windows into your floppy disk drive.
2. Choose Run from the File menu in the Program Manager.
3. Type the drive name where you inserted the supplied disk and “SETUP” in the box: for example, A:\SETUP. Choose the OK button or press the Enter key.



4. The installer starts running. Follow the instructions on the computer screen.

Notes

- The installer automatically updates your SYSTEM.INI Windows file by adding DEVICE=bi-di.386 under the [386Enh] section. If any bi-directional parallel communications device driver has previously been installed, it will be deactivated by this new driver. If you want to use the driver that was previously installed, you should re-install your previous driver. However, re-installing the previous driver will make the HL-2400C driver inactive.
- The installer makes the installed printer driver the Windows default.
- The installer automatically sets the printer port to the parallel interface, LPT1.
- During this installation, changes have been made to the SYSTEM.INI file. It is necessary to restart Windows so that the changes become effective and the installed bi-directional parallel communications device driver can take effect.

Prepare Windows NT 4.0 for the Printer

1. Insert the supplied disk for Windows into your floppy disk drive.
2. Click the "START" button and select "Setting".
3. Select "Printers" and double click "Add Printer".
4. Follow the instructions in Windows NT.
5. Click "Have Disk". Then browse and select "Brother HL-2400C series".
6. Follow the rest of the Windows NT instructions.

Notes

For installation of other printer drivers and information on the latest printer drivers see: **<http://www.brother.com>**

CHAPTER 3

BEFORE WORKING WITH THE PRINTER

AUTOMATIC EMULATION SELECTION

This printer has an automatic emulation selection function. When the printer receives data from the computer, it automatically selects the emulation mode. This function has been factory set to ON.

The printer can select the emulation among the following combinations:

EPSON/IBM Priority	EPSON (default)	IBM
Auto Selection Mode	HP PCL 5C	HP PCL 5C
	BR-Script 2	BR-Script 2
	HP-GL	HP-GL
	EPSON FX-850	IBM Proprinter XL

To get the most out of this laser printer, we recommend you use the HP color printer emulation (PCL5C) mode automatically. Since PCL5C mode takes the highest priority in the automatic emulation selection, you can start using the printer as it is with the factory settings in most cases.

When the automatic emulation selection is active, you can check the current emulation on the display. When the printer is in ready, print, or wait states, the display reads as follows:

Emulation	Status Display in Ready State
HP PCL5C	LJ READY 001P T1
BR-Script 2	BS IDLE 001P T1
HP-GL	GL READY 001P T1
EPSON FX-850	FX READY 001P T1
IBM Proprinter XL	PR READY 001P T1

Notes

Emulation modes other than PCL5C and BR-Script 2 are monochrome emulation modes.

To select the emulation mode manually, use the **Emulation** button. For further information, see “EMULATION Button” in Chapter 4.

 Notes

When you use the automatic emulation selection, note the following:

- Once the emulation is automatically changed, it is not changed again for a short period of time. This time period is called “Time Out” and it can be set with the **Emulation** button. The factory setting is 5 seconds.
- The EPSON or IBM emulation mode priority must be selected, as the printer cannot distinguish between them. Since the factory setting is the EPSON emulation mode, you might need to select the IBM emulation mode with the **Emulation** button when you need to use this emulation..
- Try this function with your application software or network server. If the function does not work properly, select the required emulation mode manually using the printer panel buttons or use emulation selection commands from your software.

AUTOMATIC INTERFACE SELECTION

This printer has an automatic interface selection function. When the printer receives data from the computer, it automatically selects the bi-directional parallel, RS-232C serial interface or MIO interface as appropriate.

When you use the parallel interface, you can turn the high-speed and bi-directional parallel communications on or off with the **Mode** button. For further information, see “MODE Button” in Chapter 4. Since the automatic interface selection mode has been factory set to ON, simply connect the interface cable to the printer.

When you use the serial interface, you need to have the same communications settings on both the printer and computer. Since the automatic interface selection mode has been factory set with certain settings, you may be able to simply connect the interface cable to the printer if your computer has the settings listed below.

Communications Parameters	Factory Settings
Baud rate (data transfer speed)	9600
Code type (data length)	8 bits
Parity (data error check)	None
Stop bit (data separator)	1 stop bit
Xon/Xoff (handshake protocol)	ON
DTR (ER)	ON
Robust Xon	OFF

If a commercial interface card has been installed in the MIO card slot, it can be selected automatically.

When necessary, select the interface or the serial communications parameters manually with the **Mode** button (INTERFACE MODE) on the printer. For further information, see “MODE Button” in Chapter 4. For the settings on the computer, see the manual of the computer or application software you are using.

 Notes

When you use the automatic interface selection, note the following:

- Once the interface is automatically changed, it is not changed again for a short period of time. This time period is called “Time Out” and it can be set with the **Mode** button. The factory setting is 5 seconds.
- The communications parameters [baud rate, code type, parity, stop bit, Xon/Xoff, DTR(ER), and Robust Xon] must be set for the serial interface. Although they have been factory set as shown in the above table, you may need to change them with the **Mode** button.
- This function takes a few seconds to work. If you want to speed up printing, select the required interface manually with the **Mode** button.

If you constantly use only one interface, we recommend that you select that interface in the interface mode. The printer allocates all of the input buffer to that interface if only one interface is selected.

ABOUT THE CONTROL PANEL

Selecting the Local Language Display

The display usually shows the current printer status. When you operate the control panel buttons, it shows functions and settings. If any trouble occurs, it shows the corresponding error message. You can see these messages in several languages. The default language is English.

- English • German • Spanish
- French • Dutch • Italian

To change to another language:

1. Turn off the printer.
2. Hold down the **Form Feed** button and turn on the printer.

The message “SELF TEST” appears and then the message changes to “LANG.=ENGLISH * ”.

3. Press the ▲ or ▼ button until your desired language appears on the display.
4. Press the **Set** button to make the selected language messages effective.

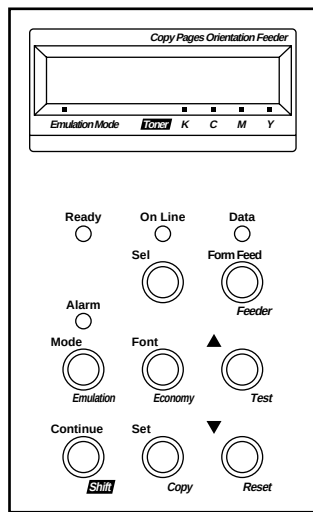
An asterisk (*) appears at the end of the display for a short time, and then the printer automatically returns to the on-line state with the selected language message on the display.

Using the Panel Buttons

The printer has a versatile control panel. It has two operation modes:

When you press the buttons, they work in the **NORMAL** mode as indicated above the buttons. When you press the buttons with the **Shift** button held down, they work in the **SHIFT** mode as indicated below the buttons. You can control the basic printer operations and make various printer settings in the **NORMAL** and **SHIFT** modes.

For further information, see “**BUTTONS IN NORMAL MODE**” and “**BUTTONS IN SHIFT MODE**” in Chapter 4.



Display – Shows various messages.

READY – Lights when the printer is ready to print.

ON LINE – Lights when the printer is in the on-line state.

DATA – Blinks when data is being received and lights when unprinted data remains in printer memory.

SEL – Selects on-line or off-line state.

FORM FEED – Prints out remaining data or reprints the same print job or page.

FEEDER – Selects paper source and media type to be used.

ALARM – Lights if any errors occur.

MODE – Sets functions in various modes.

FONT – Selects font and character set.

▲ (UP) – Forward scroll through modes and settings.

EMULATION – Selects printer emulation.

ECONOMY – Selects toner save or power save mode.

TEST – Prints self-test pattern or fonts.

CONTINUE – Ignores the error and resumes operation.

SET – Sets selected mode and functions.

▼ (DOWN) – Reverse scroll through modes and settings.

SHIFT – Shifts button operation.

COPY – Sets the number of copies to print.

RESET – Resets printer or restores to factory settings.

Fig. 3-1 Button Operation in NORMAL and SHIFT Modes

Note

When the printer is used in the BR-Script 2 mode, some buttons are not used.

Printer Settings

You may operate the printer with the panel button settings unchanged. They have been factory set. When necessary, change and store them in the printer memory as user settings.

There are two types of printer settings available on this printer:

1. User Settings
2. Factory Settings

Remember that the User Settings override the Factory Settings. The User Settings are effective until other settings are made or they are restored to the Factory Settings.

User Settings

Although the printer settings have been factory set, you can change them with the control panel buttons. Since this printer has a memory, you can store the panel button settings in the memory as “User Settings.” They are recalled every time you turn on the printer.

In addition to the current settings, you can save two more sets of User Settings with the **Mode** button and restore them with the **Reset** button. The current settings are cleared after restoring one of the saved user settings.

Factory Settings

The printer settings have been set at the factory before shipment. They are called “Factory Settings.” Although you can operate the printer with these factory settings unchanged, you can tailor the printer by making User Settings.

Note

Changing the User Settings does not affect Factory Settings. You cannot modify the preset Factory Settings.

The changed User Settings can be restored to the factory default settings with the **Reset** button. For further information, see “RESET Button” in Chapter 4.

PAPER HANDLING

Print Media

Paper Size

1. The Standard Media Cassette

Since the Media Cassette is a universal type, you can use any of the sizes of paper in the following list. The cassette can hold up to 250 sheets of paper (75 g/m² or 20 lbs.) or up to 15 envelopes (Paper should only be loaded up to the arrow head marked on the sliding guide).

- Plain paper from 105 mm x 220 mm (4.1" x 8.7") to 216 mm x 297 mm (8.5" x 11.7") [Weight = 60 to 160 g/m² (16 to 43 lbs)]
- Overhead projector (OHP) films (up to 50 sheets can be loaded)
- Envelopes of COM10, DL size

2. The Optional Legal Cassette

The cassette can hold up to 250 sheets of paper (75 g/m² or 20 lbs.). If you want to print on legal size paper, you need to use this cassette.

- Plain paper from 105 mm x 220 mm (4.1" x 8.7") to 216 mm x 355.6 mm (8.5" x 14") [Weight = 60 to 160 g/m² (16 to 43 lbs)]
- Overhead projector (OHP) films (up to 50 sheets can be loaded)
- Envelopes of COM10, DL size

The following are the specifications of paper suitable for this printer.

Item	Recommended paper specification	Xerox 4024	Hammermill Laserprint
Basis Weight (g/m ²)	82±5	75±4	90±4
Thickness (μm)	95±6	102±6	105±6
Smoothness (Bekk)	90±20	35±4	120±20
Stiffness (Clark)	100±15	100±15	90±15
Surface Resistance X10 ⁹ (Ω)	10 ¹⁰ -10 ¹¹	10-100	10-100
CIE LAB L*	————	94±2	94±2
CIE LAB a*	————	0.4±1	-0.5±1
CIE LAB b*	————	1.6±1	2.2±1
Brightness (%)	85±2	80±2	85±2
Grain Direction	Long	Long	Long

* Back side of paper

paper source	available size	available type and capacity
Standard Media Cassette	cut sheet : Letter, A4, B5(ISO), B5(JIS), Executive envelope: COM 10, DL other size: width 105-216mm (4.1"-8.5") length 220-297mm (8.7"-11.7")	plain paper : 250 envelope : 15 OHP film : 50 Up to approx. 250 sheets of 75g/m ² (20 lbs.) paper
Optional Legal Cassette	cut sheet : Legal, Letter, A4, B5(ISO), B5(JIS), Executive envelope: COM 10, DL other size: width 105-216mm (4.1"-8.5") length 220-355.6mm (8.7"-14")	plain paper : 250 envelope : 15 OHP film : 50 Up to approx. 250 sheets of 75g/m ² (20 lbs.) paper

Recommended Paper

The recommended paper type for this printer is:-

Xerox 4024 20lb Letter, Hammermill Laserprint or equivalent

Note

- To get the best output quality and to avoid any damage, use smooth white paper.
- It is recommended that you test paper, especially special sizes and types of paper, on this printer before purchasing large quantities.
- Print quality will vary depending on the paper being used.

Note

Do not load envelopes in the Paper cassette in the Optional Lower Tray Unit. It might cause paper jams.

Printable Area

The Printable Area depends on the settings in your application. The figure below shows the physically printable area and non guaranteed print area of various paper types with this printer.

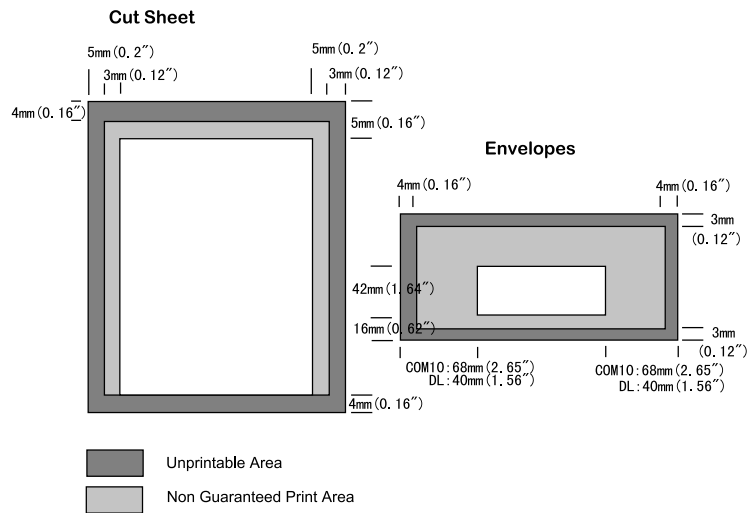


Fig. 3-2 Printable Area and Non Guaranteed Print Area

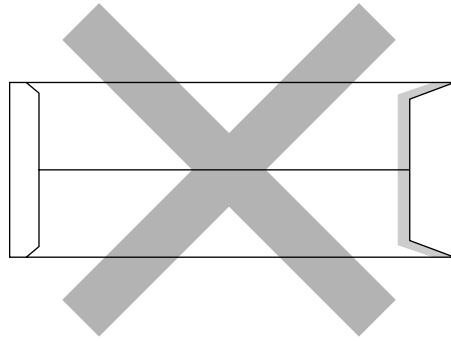
 Note

If you use paper which is not a direct equivalent for the specified paper, the life of the various consumables and parts may be reduced.

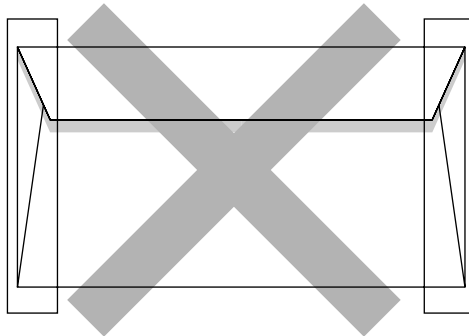
Using Envelopes

Avoid using envelopes with the following characteristics:

- Glossy or shiny surfaces
- Protection cover on the envelopes' adhesive parts
- Sealing flaps that have not been folded at purchase
- Sealing flaps as shown below



- Three or more layers of paper in the marked area



- Each side folded as shown below

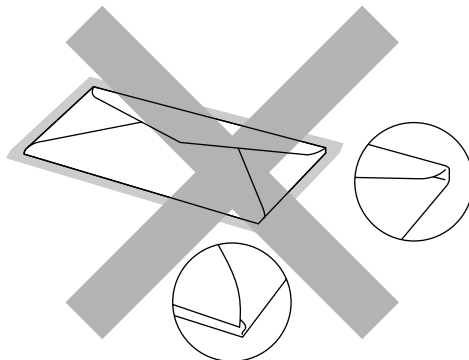


Fig. 3-3 Envelope Information

Before loading envelopes in the cassette, check the following:

- Envelopes should have a lengthwise sealing flap.
- The sealing flaps should be crisply and correctly folded (irregularly cut or folded envelopes may cause paper jams).
- Envelopes should consist of two layers of paper in the following marked area.

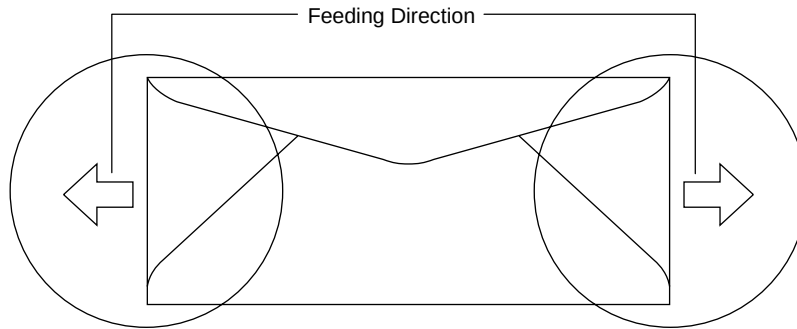


Fig. 3-4 Envelopes

- Envelope joints that are sealed by the manufacturer should be secure.
- All sides should be properly folded without any wrinkles or creases.
- Print quality may vary between different style envelopes. It may be necessary to test the envelopes you wish to use prior to purchasing large quantities.

Cassette Feed

The printer can feed paper from the Media Cassette, Optional Lower Media Cassette or Optional Legal Cassette.

Notes

When you load paper into the Media Cassette, note the following:

- If your application software supports paper size selection on the print menu, you can select it through the software. If your application software does not support it, you can set the paper size with the printer driver or with the **Mode** button on the control panel.
- The paper size has been factory set to letter for 120V models or A4 for 220/240V models. If you want to use other sizes of paper or envelopes, change the paper size in the PAGE FORMAT MODE of the FORMAT MODE with the **Mode** button. For paper size selection, see “MODE Button” in Chapter 4.
- If you use pre-printed paper in the cassettes, please note that the paper should be loaded with the printed side face up and the top of the paper to the back of the cassette.

You can set the paper size for the Media Cassette with the **Mode** button in the PAGE FORMAT mode. The printer automatically detects the paper size you set in the Media Cassette. If you load a different size of paper in the Media Cassette from the size selected with the **Mode** button or through your application software, the printer prompts you to set the proper size of paper as follows:

T1 LOAD PAPER
* * * * SIZE

(* * * * indicates the paper size you have selected with the **Mode** button in the PAGE FORMAT mode or through your application software.)

Manual Feed

This printer has no manual feed tray or multi purpose tray. Therefore you cannot feed irregular sized paper in the usual way. However, this printer has a special manual feed mode using Tray 1 (upper tray) to overcome this inconvenience.

1. When the manual feed command is selected, the printer waits until you place the paper for printing in Tray 1, as in the usual manual feed mode operation.

T1 MANUAL FEED
* * * * SIZE

2. Pull out Tray 1 and place the paper you are going to print into the tray. It will be necessary to remove some or all of the paper stack first, depending on the size of paper in the tray and the size of the paper you wish to print manually.
3. Re-install Tray 1 and press the **Continue** button. The printer then starts printing.

CHAPTER 4 CONTROL PANEL

DISPLAY AND LEDS

This printer has one liquid crystal display (LCD) and four LEDs on the control panel. The display can show various messages with up to 16 characters in two rows. The LEDs light to indicate the current printer status.

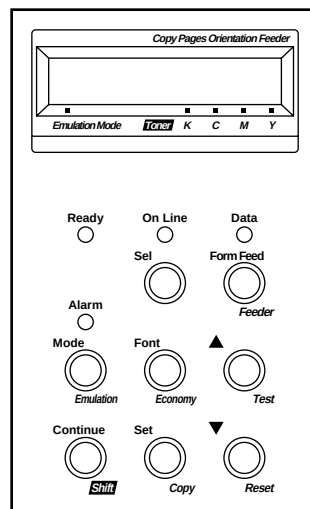


Fig. 4-1 Display and LEDs

Display

The display usually shows the current printer status and emulation mode setting and toner status. When you operate the control panel, you can change settings interactively on the display.

When you turn the printer off-line, the display changes to show the currently selected emulation and informs you that you can make settings in the current emulation.

If any problems occur, the display shows the corresponding operator call, error, or service call message to prompt you to take an action. For more information on these messages, see "TROUBLESHOOTING" in Chapter 6.

Printer Status Messages (on the upper row)

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

Printer Status Message	Meaning
00 READY 001P T1	The printer is ready to print.
00 IDLE 001P T1	The printer is idle. (BR-Script 2 mode only)
AUTO PCL5C	The printer is off-line and currently in HP PCL5C mode under AUTO emulation mode selection.
HP PCL5C	The printer is off-line and in HP PCL5C mode under HP LaserJet emulation mode selection.
00 BUSY 001P T1	The printer is busy. (BR-Script 2 mode only)
00 SLEEP 001P T1	The printer is in sleep status (power save mode).
01 PRINT 001P T1	The printer is printing.
01 PR300 001P T1	The printer is printing by decreasing the resolution from 600 dpi to 300 dpi because of insufficient memory.
02 WAIT 001P T1	The printer is warming up.
04 SELF TEST	The printer is performing self-diagnosis.
05 TEST PRINT	The printer is printing the test pattern.
06 DEMO PAGE	The printer is printing the demonstration.
06 PRINT CONFIG	The printer is printing the list of the current printer settings.
06 PRINT FONTS I	The printer is printing the list of the internal or resident fonts.
06 PRINT FONTS C	The printer is printing the list of the optional fonts stored in an installed font cartridge/card.
06 PRINT FONTS P	The printer is printing the list of the permanent download fonts.
06 CARD1 PRINT	The printer is printing the contents of a flash memory card in slot 1.
06 CARD2 PRINT	The printer is printing the contents of a flash memory card or HDD card in slot 2.

Printer Status Message	Meaning	(Continued)
07 FF PAUSE	The printer has suspended feeding forms. Pressing the Sel button resumes form feed.	
08 RESET TO USER SETTINGS	The printer is restoring itself to the user settings you selected with the panel buttons. (The message appears only momentarily.)	
08 RESET TO SETTING 1	The printer is restoring itself to the user 1 settings.	
08 RESET TO SETTING 2	The printer is restoring itself to the user 2 settings.	
09 RESET TO FACTORY SETTINGS	The printer is restoring itself to the factory settings. (The message appears only momentarily.)	
Now initializing	The printer is initializing the MIO card or initializing the printer for BR-Script 2 emulation.	
09 RESET FC ROLLER LIFE	The printer has reset the Fuser Cleaner life counter.	
09 RESET OPC BELT LIFE	The printer has reset the (OPC) Belt Cartridge life counter.	
09 RESET FUSER UNIT LIFE	The printer has reset the Fusing Unit life counter.	
09 RESET 120K KIT LIFE	The printer has reset the 120K Kit life counter.	

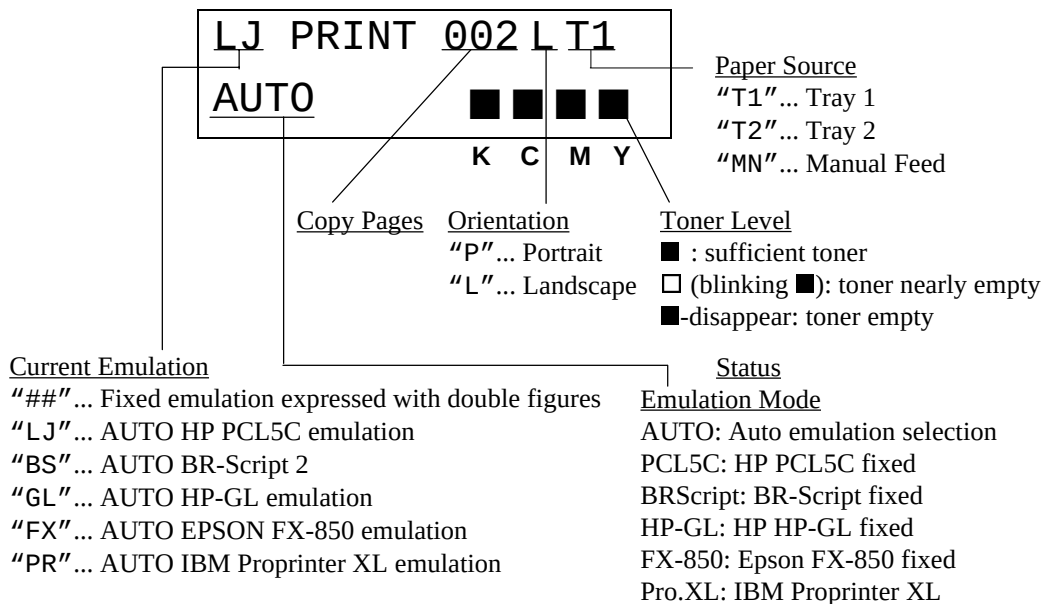


Fig. 4-2 Display

About Maintenance Messages

This printer has some maintenance parts that need replacing. The printer counts the number of printed pages and detects the life of each of the maintenance parts. When the life of a maintenance part comes close to its end, the following messages appear on the lower row of the LCD panel. These messages will over-write the Emulation Mode status information.

Maintenance Message	Meaning
■ ■ □ ■ K C M Y	When the ■ mark blinks (□), the indicated color toner is nearly empty. K: Black, C: Cyan, M: Magenta, Y: Yellow. When the toner becomes empty the ■ indication disappears.
FUSER OIL LOW	Oil in the Oil Bottle is nearly empty.
REPLACE FCR	*1 Time to replace the Fuser Cleaner.
REPLACE OPC BELT	*1 Time to replace the (OPC) Belt Cartridge.
REPLACE FUSER	*1 Time to replace the Fixing Unit.
REPLACE 120K KIT	*1 Time to replace the Drum Cleaner, the Paper discharger and the Transfer Roller.

*1 - After replacing these parts, you have to reset the parts life counter so that the printer can count the parts life correctly. See "Maintenance" in Chapter 5.

LEDs

The LEDs light or blink to indicate the current printer status.

READY

LED indication	Meaning
On	Ready to print
Blinking	Warming up

DATA

LED indication	Meaning
On	Data remains in the printer buffer. Pressing the Form Feed button prints the data and clears the buffer.
Blinking	Receiving or processing data

ALARM

LED indication	Meaning
On	Some problem has occurred in the printer.

ON LINE

LED indication	Meaning
On	The printer is on-line and ready to print
Off	The printer is off-line and stops printing.

BUTTONS IN NORMAL MODE

You can control the basic printer operations and change various printer settings in the NORMAL mode. Functions available in the NORMAL mode are shown above the panel buttons.

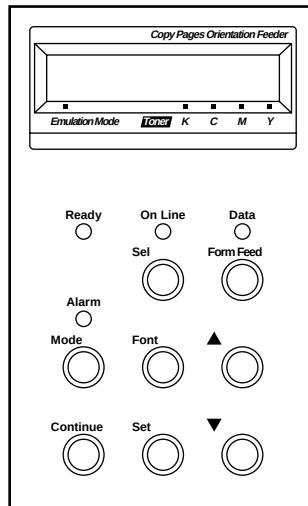


Fig. 4-3 Buttons in NORMAL Mode

Note

The factory settings are printed in bold in this section.

SEL Button

Pressing the **Sel** button changes the state of the printer between on-line and off-line. When the printer is on-line, the **On Line** LED lights and the printer is ready to receive data from the computer. When the printer is off-line, the **On Line** LED is off.

To receive data from the computer, set the printer on-line. To operate the control panel buttons, set the printer off-line.

When you press the **Sel** button when the printer is the on-line state, it turns off-line and the LCD displays the current emulation.

You can enter other emulations in the **AUTO** emulation mode by pressing the ▲ (UP) or ▼ (DOWN) button.

 Notes

When you press the **Sel** button, remember the following:

- All other buttons—except the **Sel** button—are operational only when the printer is off-line.
- If the printer is not in AUTO emulation mode, the LCD displays the current emulation by pressing the **Sel** button to take it off-line, but you cannot enter other emulation modes. To make settings in other emulation modes, press the **Emulation** button and select the emulation.
- The **Sel** button works as a “quick exit” button. If you are lost in the display menus or you want to quickly exit the display menu, press the **Sel** button. You can exit quickly from any depth of the display menu to the on-line ready state. If you have already made a setting effective by pressing the **Sel** button and then press the **Sel** button to quickly exit, your setting (whether made by accident or on purpose) will remain effective. Pressing the **Sel** button will not cancel any setting.

SET Button

Pressing the **Set** button allows you to select certain items on the display or make the displayed menu or setting effective. The button also works as an execute button to perform the displayed function.

When you press the **Set** button, the printer stores the settings you have selected into the memory as “User Settings.” Every time you turn on the printer, it is reset according to these user settings. They remain effective until you make new settings or restore them to the factory settings. For factory reset, see “RESET Button” in this chapter.

 Note

When you press the **Set** button to select a setting, an asterisk appears at the end of display for a short time. Since the asterisk indicates the selection, you can easily find the current setting when you scroll through the display.

▲ (UP) or ▼ (DOWN) Button

Pressing ▲ (UP) or ▼ (DOWN) button scrolls the menus and settings forward or backward respectively on the display. Press or keep pressing the button until you access the desired item.

MODE Button

Pressing the **Mode** button allows you to enter modes where you change settings. The mode menus and settings vary according to the current emulation mode and options.

HP PCL5C, EPSON FX-850, and IBM Proprinter XL Modes	BR-Script Mode	HP-GL Mode
INTERFACE MODE Set interface, parameters.	INTERFACE MODE Set interface, parameters.	INTERFACE MODE Set interface, parameters.
FORMAT MODE Set orientation, paper size, margins, & others.	FORMAT MODE Set horizontal & vertical offsets.	FORMAT MODE Set orientation, paper size, margins, pen setting & others.
RESOLUTION MODE Set resolution & HRC.	RESOLUTION MODE Set resolution & HRC.	RESOLUTION MODE Set resolution & HRC.
PAGE PROTECTION Protect data on a page.	 Not available.	PAGE PROTECTION Protect data on a page.
CARD OPERATION Set a flash memory card or a HDD card in HP mode.	CARD OPERATION Set a flash memory card or a HDD card	CARD OPERATION Set a flash memory card or a HDD card.
ADVANCED MODE Set network mode, print density, & others.	ADVANCED MODE Set network mode, print density, & others.	ADVANCED MODE Set network mode, print density, & others.
PAGE COUNTER Show # of printed pages.	PAGE COUNTER Show # of printed pages.	PAGE COUNTER Show # of printed pages.
exit MODE Exit to off-line ready state.	exit MODE Exit to off-line ready state.	exit MODE Exit to off-line ready state.

MODE Button Settings in HP PCL5C, EPSON FX-850, and IBM Proprinter XL Modes

The following table shows all the selections you can make with the **Mode** button in the HP PCL5C, EPSON FX-850, and IBM Proprinter XL modes.

Note

The mode menus and settings that can appear vary according to the current emulation mode, printer status, and any options that may be installed in the printer.

Mode Menu	Setting Menu	Sub-Setting Menu	Setting
INTERFACE MODE	I/F=PARALLEL	HIGH SPEED=ON	ON or OFF
		BI-DIR=ON	ON or OFF
		exit	Exit to INTERFACE MODE
	I/F=RS-232C	BaudRate= 9600	150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 baud
		CodeType=8 bits	7 or 8 bits
		Parity =NONE	NONE, EVEN, or ODD
		Stop Bit=1 bits	1 or 2 stop bits
		Xon/Xoff=ON	ON or OFF
		DTR (ER)=ON	ON or OFF
		Robust Xon=OFF	ON or OFF
		exit	Exit to INTERFACE MODE
	I/F=EXPAND I/O	Available only when a commercial MIO card has been installed.	
		MIO Setting	The settings available on the installed MIO card can appear under the sub-setting menu.
		exit	Exit to INTERFACE MODE
	I/F=AUTO	TIME OUT= 5s	1 to 99 seconds
		PRL Setting	Bi-directional settings for AUTO
		HIGH SPEED=ON	ON or OFF
		BI-DIR=ON	ON or OFF
		exit	Exit to PRL Setting
		RS-232C Setting	Parameters for AUTO mode
		BaudRate= 9600	150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 baud
		CodeType=8 bits	7 or 8 bits
		Parity =NONE	NONE, EVEN, or ODD
		Stop Bit=1 bits	1 or 2 stop bits
		Xon/Xoff=ON	ON or OFF
		DTR (ER)=ON	ON or OFF
		Robust Xon=OFF	ON or OFF
		exit	Exit to RS-232C Setting

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Mode Menu (Continued)	Setting Menu	Sub-Setting Menu	Setting
INTERFACE MODE (Continued)	I/F AUTO (Continued)	MIO Setting	Available only when a commercial MIO card has been installed. The settings available on the installed MIO card can appear under the sub-setting menu.
FORMAT MODE	ORIENTATION	ORI=PORTRAIT	PORTRAIT or LANDSCAPE
		AUTO LF=OFF	ON ... LF + CR OFF ... CR only
	AUTO MODE	AUTO CR=OFF	ON ... LF, FF, or VT + CR OFF ... LF, FF, or VT only
		AUTO WRAP=OFF	ON ... Auto wrap on OFF ... Auto wrap off
	PAGE FORMAT MODE	AUTO SKIP=ON (HP mode)	ON ... Auto FF at bottom margin OFF ... No FF at bottom margin
		AUTO MASK=OFF (EPSON & IBM modes)	ON ... Auto mask on OFF ... Auto mask off
		exit	Exit to AUTO MODE
		PAPER =LETTER (For 120V model)	LETTER, LEGAL, A4, A5, B5, EXECUTIVE, JIS B5,
		PAPER =A4 (For 220/240V model)	COM10, C5 and DL
		LEFT M = 0C	0 to 126 columns
		RIGHT M = 80C (Letter, Portrait)	10 to 136 columns
		RIGHT M = 78C (A4, Portrait)	10 to 136 columns
		TOP M =0.5" (HP mode)	0, 0.33, 0.5, 1.0, 1.5, or 2.0" (0.8.4, 12.7, 25.4, 38.1 or 50.8 mm)
		BOTTOM M=0.5" (HP mode)	0, 0.33, 0.5, 1.0, 1.5, or 2.0" (0.8.4, 12.7, 25.4, 38.1 or 50.8 mm)
		LINES = 60L (HP, Letter, Portrait)	5 to 128 lines/page
		LINES = 64L (HP, A4, Portrait)	5 to 128 lines/page
		X OFFSET= 0	-500 (left) to +500 (right) dots
		Y OFFSET= 0	-500 (down) to +500 (up) dots
		exit	Exit to PAGE FORMAT MODE
	COLOR MODE	COLOR PRINT = ON	ON...Enable color printing OFF...Monochrome print mode
		exit	Exit to FORMAT MODE
RESOLUTION MODE	RESOLUTION	RESOLUTION	300 or 600 dpi
	HRC SETTING	HRC=MEDIUM	OFF, LIGHT, MEDIUM, or DARK
	exit		Exit to RESOLUTION MODE
PAGE PROTECTION	PROTECT=AUTO		AUTO, OFF, LETTER, A4, or LEGAL
CARD OPERATION CARD1(2) (HP mode only)	When the commercial flash memory card or the HDD card has not been formatted:		
	CARD1 CARD2	FORMAT CARD	Format the flash memory card or the HDD card.
	exit		
	exit		Exit to CARD OPERATION CARD 1(2)

Mode Menu (Continued)	Setting Menu	Sub-Setting Menu	Setting
CARD OPERATION CARD1(2) (HP mode only)	EXECUTE DATA		Execute the data on the card.
		DATA ID=#####	Execute the selected data.
		exit	Exit to EXECUTE DATA
	CARD LIST		Print the contents of the card.
	SAVE	SAVE DATA	Send data to be saved.
		SET KEY--> END	End saving the data.
		DATA ID=#####	Set data ID for saved data.
		SAVE MACRO	Save a macro.
		MACRO ID=#####	Set macro ID for saved macro.
		PRIMARY FONT	Save primary font.
		FONT ID=#####	Set primary font ID for saved font.
		SECONDARY FONT	Save secondary font.
		FONT ID=#####	Set secondary font ID for saved font.
		DOWNLOAD FONT	Save download font.
		FONT ID=#####	Set download font ID for saved font.
		exit	Exit to CARD 1 (2) OPERATION
	DELETE	MACRO ID=#####	Delete the selected macro.
		DATA ID=#####	Delete the selected data.
		FONT ID=#####	Delete the selected font.
		FORMAT CARD	Format the flash card.
		SET -> DELETE ALL	Execute formatting the card.
		exit	Exit to FORMAT CARD
	exit		Exit to CARD 1(2) OPERATION
ADVANCED MODE	NETWORK MODE	LOCK PANEL=OFF	ON or OFF
		PASS NO=###	Enter pass number.
		AUTO FF=OFF	ON or OFF
		WAIT TIME= 5s	1 to 99 seconds for AUTO ON
		FF SUPPRESS=OFF	ON or OFF
		exit	exit to NETWORK MODE
	CONTINUE MODE	CONTINUE=MANUAL	AUTO or MANUAL
	SCALABLE FONT	FONT=ALL	ALL, LJ4
	INPUT BUFFER	□□□□□	Increase or decrease the input buffer capacity. (15 levels)
	SAVE SETTINGS	SAVE SETTING 1	Save the current settings as #1
		SAVE SETTING 2	Save the current settings as #2
		exit	exit to SAVE SETTING
	exit		exit to ADVANCED MODE
PAGE COUNTER	COUNT= 0		Shows the number of printed pages.
exit MODE			Exit MODE.

MODE Button Settings in BR-Script 2 Mode

The following table shows all the selections you can make with the **Mode** button in the BR-Script 2 mode.

Note

The mode menus and settings that can appear vary according to the current emulation mode, printer status, and any options that may be installed in the printer.

Mode Menu	Setting Menu	Sub-Setting Menu	Setting
INTERFACE MODE			
Same as HP PCL5C Mode			
FORMAT MODE	PAGE FORMAT MODE	PAPER=LETTER (For 120V model)	LETTER, LEGAL, A4, A5, B5,
		PAPER=A4 (For 220/240V model)	JIS B5, EXECUTIVE, COM10, C5 and DL
		X OFFSET=0	-500 (left) to +500 (right) dots
		Y OFFSET=0	-500 (down) to +500 (up) dots
		exit	Exit to PAGE FORMAT MODE
	COLOR MODE	Same as PCL5C mode	
	exit	Exit to PAGE FORMAT MODE	
RESOLUTION MODE	RESOLUTION	RESOLUTION=600	300 or 600 dpi
	CAPT SETTING	CAPT=ON	ON or OFF
	HRC SETTING	HRC=MEDIUM	OFF, LIGHT, MEDIUM, or DARK
	exit	Exit to RESOLUTION MODE	
CARD OPERATION <u>CARD1</u> (2) When the commercial flash memory card or the HDD card has not been formatted:			
	<u>CARD1</u> FORMAT CARD	Format the flash memory card or the HDD card.	
	<u>CARD2</u>		
	exit		
	exit	Exit to CARD OPERATION CARD 1 (2)	
CARD OPERATION <u>CARD1</u> (2) When the commercial flash memory card or the HDD card has been formatted:			
	<u>CARD1</u> EXECUTE DATA	Execute the data on the card.	
	<u>CARD2</u>	DATA ID=#####	Execute the selected data.
	CARD LIST	Print the contents of the card.	
	SAVE	SAVE DATA	Send data to be saved.
		SET KEY--> END	End saving the data.
		DATA ID=#####	Set data ID for saved data.
		exit	Exit to CARD OPERATION
	DELETE	MACRO ID=#####	Delete the selected macro.
		DATA ID=####	Delete the selected data.
		FONT ID=#####	Delete the selected font.
		FORMAT CARD	Format the card.
		SET -> DELETE ALL	Execute formatting the card.
		exit	Exit to FORMAT CARD OPERATION
	exit	Exit to CARD 1(2) OPERATION	

CHAPTER 4 CONTROL PANEL

Mode Menu (Continued)	Setting Menu	Sub-Setting Menu	Setting
ADVANCED MODE	NETWORK MODE	LOCK PANEL=OFF	ON or OFF
		PASS NO=###	Enter pass number.
		AUTO FF=OFF	ON or OFF
		WAIT TIME= 5s	1 to 99 seconds for AUTO ON
		FF SUPPRESS=OFF	ON or OFF
		exit	exit to NETWORK MODE
		ERROR PRINT	ERROR PRINT=OFF
		CONTINUE MODE	CONTINUE=MANUAL
		INPUT BUFFER	□□□□□ Increase or decrease the input buffer capacity. (15 levels)
		SAVE SETTINGS	SAVE SETTING 1
			SAVE SETTING 2
		exit	exit to SAVE SETTING
		exit	exit to ADVANCED MODE
PAGE COUNTER	COUNT= 0g25		Shows the number of printed pages.
exit MODE			Exit MODE

MODE Button Settings in HP-GL Mode

The following table shows all the selections you can make with the **Mode** button in the HP-GL mode.

Note

The mode menus and settings that can appear vary according to the current emulation mode, printer status, and any options that may be installed in the printer.

Mode Menu	Setting Menu	Sub-Setting Menu	Setting
INTERFACE MODE			
Same as PCL5C Mode			
FORMAT MODE	PAGE FORMAT MODE	Same as BR=Script mode	
	GRAPHICS MODE	PEN SETTING	
		SETTING=PEN1	PEN1 to 6 (Set size and gray percentage for the selected pen.)
		SIZE #=3 dots	1 to 10 dots (pen size in dots) (# is the selected pen number.)
		GRAY #=100%	15, 30, 45, 75, 90, or 100% (# is the selected pen number.)
		exit	Exit to SETTING=PEN1-6
		exit	Exit to GRAPHICS MODE
		CHARACTER SET	
		STANDARD SET	Standard character set
		ANSI ASCII	See character sets in Appendix
		ALTERNATE SET	Alternate character set
		ANSI ASCII	See character sets in Appendix.
		exit	Exit to GRAPHICS MODE
	exit	Exit to FORMAT MODE	
RESOLUTION MODE	RESOLUTION	RESOLUTION=600	300 or 600 dpi
	HRC SETTING	HRC=MEDIUM	OFF, LIGHT, MEDIUM, or DARK
	exit	Exit to RESOLUTION MODE	

CHAPTER 4 CONTROL PANEL

Mode Menu (Continued)	Setting Menu	Sub-Setting Menu	Setting
PAGE PROTECTION	PROTECT=AUTO		AUTO, OFF, LETTER, A4, or LEGAL
	exit		Exit to CARD OPERATION
CARD OPERATION			
Same as BR-Script mode			
ADVANCED MODE			
Same as PCL5C mode			
PAGE COUNTER	COUNT= 0		Shows the number of printed pages.
exit MODE			Exit MODE

Basic Operation Procedures

When you operate the **Mode** button, remember the following basic steps:

1. Press the **Sel** button to set the printer off-line.
2. Press the **Mode** button to enter the MODE menus.
 - Press the ▲ or ▼ button to scroll through the menus forward or backward. (Pressing the **Mode** button allows forward scroll.)

INTERFACE MODE ←▼ or ▲→ FORMAT MODE
←▼ or ▲→ RESOLUTION MODE ←▼ or ▲→ ...

- Press the **Set** button to enter the next lower menu level of the selected menu.

Mode Menu —SET→ Setting Menu —SET→ Sub-Setting Menu

- Press the ▲ or ▼ button to select the setting on the display.

I/F=PARALLEL ←▼ or ▲→ I/F=RS-232C ←▼ or ▲→
I/F=OPTION ←▼ or ▲→ ...

- Press the **Set** button to make the selected setting effective.

When you see “exit” and press the **Set** button, you can exit from the current level of menu to the next higher level of the menu.

3. Advance to “exit MODE” and press the **Set** button to exit from the mode menus to the off-line ready state.

Pressing the **Sel** button any time in any level of the menus allows you to exit from the mode menus to the on-line state. The settings you have made with the **Set** button before exit are effective.

Operation Example: Selecting the Parallel Interface

For this session, select the parallel interface manually as follows:

1. Press the **Sel** button to set the printer off-line.
2. Press the **Mode** button and then press the **Set** Button.

When you enter the interface mode, the display first shows the current interface with the asterisk.

3. Press the ▲ or ▼ button until the desired interface appears on the display.

Display Message	Interface Mode
I/F=PARALLEL	Parallel interface
I/F=RS - 232C	Serial interface
I/F=EXTEND I/O	Extended I/O interface
I/F=AUTO	Auto interface selection

 Note

- The Extended I/O interface is available only when a commercial MIO compatible sharing/network card has been installed.
- Some models come with the network card pre-installed.

4. Press the **Set** button to make the displayed selection effective.

An asterisk appears at the end of the display for a short time. Then the printer automatically exits from the setting menu to the interface menu.

5. Press the ▲ or ▼ button until the exit menu appears on the display.
6. Press the **Set** button.

Then the printer automatically returns to the off-line ready state.

INTERFACE MODE

The automatic interface selection has been factory set. If you want to select a specific interface manually, use interface mode to select it.

Display Message	Interface Mode
I/F=PARALLEL	Parallel interface
I/F=RS-232C	Serial interface
I/F=EXTEND I/O	Extended I/O interface
I/F=AUTO	Auto interface selection

Select the setting menu and enter the sub-setting menu to change the setting as follows:

■ Automatic Interface Selection

When you select this function with the **Set** button, the display shows the next sub-setting menu.

You need to set the time out for the auto interface selection from 1 to 99 seconds with the ▲ or ▼ button: **factory setting = 5 seconds**. This time out is the duration during which the printer will not allow another automatic change to the interface.

Even if you choose the automatic interface selection, you need to set the communications parameters for the serial interface, high speed/bi-directional communications for the parallel interface, and the optional interface settings if the installed MIO card requires them. See the tables below.

For further information about automatic interface selection, see “AUTOMATIC INTERFACE SELECTION” in Chapter 3.

■ Parallel Interface

When you use the parallel interface, you need to set the communications mode in the following sub-setting menu.

Display Message	High Speed and Bi-directional Parallel Communications
HIGH SPEED=ON	Turns on or off the high speed parallel communications.
BI - DIR=ON	Turns on or off the bi-directional parallel communications.

The above high-speed and bi-directional settings are used for the bi-directional parallel interface of this printer. The bi-directional parallel interface is compatible with the IEEE 1284 standard. Although it uses the same cable, hardware, and software as the bi-directional parallel interface, to use its enhanced capabilities—such as bi-directional communication between the computer and printer and faster transmission of data—you need a printer driver or software that supports these features. Check with your software vendor to see if your software supports bi-directional parallel features.

■ Serial Interface

When you intend to use the serial interface, be sure to select the same communications parameters on both the printer and computer. You must set them for the automatic interface selection, too.

Display Message	Parameters	Settings
BaudRate= 9600	Baud rate (Data transfer speed)	150, 300, 600, 1200, 2400, 4800, 9600 , 19200, 38400, 57600, 115200 baud
CodeType=8 bits	Code type (Data length)	7 bits or 8 bits
Parity =NONE	Parity (Data error check)	None , even, or odd
Stop Bit=1 bits	Stop bits (Data separator)	1 or 2
Xon/Xoff=ON	Xon/Xoff (Handshake protocol)	ON: DTR & Xon/Xoff handshake OFF: DTR handshake only

Display Message	Parameters	Settings
DTR(ER) =ON (Effective when Xon/Xoff=ON)	Data terminal ready (ER)	ON: Makes DTR (ER) low when the buffer is full. OFF: Does not make DTR (ER) low when the buffer is full. DTR(ER) goes low only when the printer is off-line.
Robust Xon =OFF (Effective when Xon/Xoff=ON)	Robust Xon	ON: Sends Xon while waiting. OFF: Sends Xon once, when the printer status changes from off-line to on-line.

■ Extended I/O Interface

If you have installed a commercial modular input/output (MIO) card in the printer, you can select the extended I/O interface in this mode. If the installed MIO card requires any optional interface settings, they appear under this menu. Set them, referring to the manual of the MIO card.

Note

This setting appears only when the MIO card has been installed. For installation of the MIO card, see the Network manual.
The network card may be pre-installed on some HL-2400C series models.

FORMAT MODE

ORIENTATION

When you select “ORIENTATION”, you can set portrait or landscape orientation.

 Note

The ORIENTATION selection is effective in the HP PCL5C, EPSON FX-850, and IBM Proprinter XL modes. It does not work in other emulation modes.

This printer can print pages in portrait or landscape orientation. You can check the current orientation on the display.



Fig. 4-4 Page Orientation

When you enter the setting mode, the display first shows the current orientation with an asterisk.

Press the ▲ or ▼ button until the desired orientation appears on the display.

Display Message	Orientation
ORI=PORTRAIT	Portrait
ORI=LANDSCAPE	Landscape

Press the **Set** button to make the displayed selection effective.

An asterisk appears at the end of the display for a short time. Then the printer automatically exits from the setting mode to the FORMAT MODE.

Selection	LCD message on the upper row
portrait	LJ READY 001P T1
landscape	LJ READY 001L T1

AUTO MODE **Note**

The settings in this mode menu are effective in the HP PCL5C, EPSON FX-850, and IBM Proprinter XL modes. They do not appear in other emulation modes.

The page/line termination is set in this mode.

Display Message	Setting	Auto Mode
AUTO LF =OFF	ON	CR → CR+LF
	OFF	CR → CR
AUTO CR =OFF	ON	LF → LF+CR, FF → FF+CR, VT → VT+CR
	OFF	LF → LF, FF → FF, VT → VT
AUTO WRAP =OFF	ON	Line feed and carriage return occur when the printer position reaches the right margin.
	OFF	No line feed and carriage return occur when the printer position reaches the right margin.
AUTO SKIP =ON	ON	Form feed occurs when the printer position reaches the bottom margin.
	OFF	No form feed occurs when the printer position reaches the bottom margin.
AUTO MASK =OFF	ON	The printer ignores the top and bottom margin settings you make with the control panel. The page length is automatically set to 11" for letter or A4-size paper and to 14" for legal-size paper.
	OFF	The printer operates according to the margin settings you make with the control panel.

Note on “AUTO MASK”

When you use application software in non-HP modes, be sure to set “AUTO MASK” to ON. When you use letter- or A4-size paper, the top and bottom 2 lines are masked and they do not appear on the printout.

The auto modes are subject to the current emulation mode.

○ : The auto modes can be set.

✕ : The auto modes cannot be changed and no setting appears.

— : The auto modes are not available.

AUTO Mode	Printer Emulation (Factory settings in bold print)		
	HP PCL5C	EPSON FX-850	IBM Proprinter XL
AUTO LF	○ OFF	○ OFF	○ OFF
AUTO CR	○ OFF	✕ ON	○ OFF (Note)
AUTO WRAP	○ OFF	✕ ON	✕ ON
AUTO SKIP	○ ON	—	—
AUTO MASK	—	○ OFF	○ OFF

Note

In the IBM emulation mode, FF codes are always followed by a CR code.

PAGE FORMAT MODE**Notes**

The settings in this mode menu vary as follows:

- All settings are effective in the HP PCL5C, EPSON FX-850, and IBM Proprinter XL modes.
- The X and Y (vertical and horizontal) offsets are effective in the BR-Script 2 mode. Other settings are not effective and they do not appear in this mode.
- The paper size and the X and Y (vertical and horizontal) offsets are effective in the HP-GL mode. Other settings are not effective and they do not appear in this mode.

The following settings can be made in this mode:

Display Message	Page Format Mode
PAPER =LETTER	Set cut sheet paper size to letter , A4 , legal, B5, A5 or executive, or envelope size to JIS B5, COM10, C5, or DL.
LEFT M = 0C P	Set the left margin at column 0 -126 at 10cpi.
RIGHT M = 80C P	Set the right margin at column 10-136 at 10cpi. See "List of Factory Settings" in this chapter.
TOP M =0.5" P	Set the top margin at a distance from the top edge of the paper: 0, 0.33 (Non-HP) , 0.5 (HP) , 1.0, 1.5, or 2.0 inches.
BOTTOM M=0.5" P	Set the bottom margin at a distance from the bottom edge of the paper: 0, 0.33 (Non-HP) , 0.5 (HP) , 1.0, 1.5, or 2.0 inches.
LINES = 60L P	Set the number of lines per page from 5 to 128 lines. See "List of Factory Settings" in this chapter.

The letter "P" in the display messages indicates that the page orientation is portrait. The letter "L" is displayed when it is landscape.

Display Message	Page Format Mode (Continued)
X OFFSET= 0	Move the print start position (at the upper left corner on pages) horizontally up to -500 dots to the left or +500 dots to the right in 300dpi dot unit increments: factory setting = 0.
Y OFFSET= 0	Move the print start position (at the upper left corner on pages) vertically up to -500 dots downward or +500 dots upward in 300dpi dot increments: factory setting = 0.

 Notes

When you make settings in PAGE FORMAT MODE, note the following:

- The letter size has been factory set for 120V models. The A4 size has been factory set for 220/240V models.
- When you use a smaller size of paper than that specified in the PAGE FORMAT MODE, be sure that the print area is smaller than the paper size, or the inside of the printer will get stained with toner. It is recommended that you perform a test before actual use: for this test, you could use letter or A4 size of paper to see the printed area is completely inside the paper size you are going to use. This simple test will help prevent toner from being incorrectly applied to the inside of your printer, which may cause later print jobs to be smudged with toner.
- The factory settings for the right/left margins and lines vary according to the paper size and orientation. See the tables below.
- The top and bottom margins have been factory set to 0.5" in the HP emulation mode and to 0.33" in the non-HP emulation modes.
- The setting margins are subject to the current page orientation. The display shows the current orientation with "P" for portrait and "L" for landscape.
- Images offset outside the print area are not printed.

■ About Right and Left Margins

The settings range of the right and left margins are subject to the page orientation as follows. The right margin should be placed 10 columns greater than the left margin: minimum text width = 10 columns.

If the orientation is changed, the margin settings are restored to the factory settings. If the paper size is changed and the right and left margins exceed the paper size, they are restored to the factory settings: if they do not exceed the paper size, they remain effective.

The following table shows the settings range in columns. The factory settings are printed in bold.

Paper Size	Portrait		Landscape	
	Left Margin	Right Margin	Left Margin	Right Margin
Letter	0-70	10-80	0-96	10-106
A4	0-70	10-78-80	0-103	10-113
Legal	0-70	10-80	0-126	10-136

■ About Line Settings

Setting the number of lines/page automatically sets the line spacing or line feed pitch. If the paper size is changed, the number of lines/page changes accordingly. The new setting is calculated with the following expression and the remainder, if any, is ignored. However, the line feed pitch and the top and bottom margins remain effective.

$$\# \text{ of Lines/Page} = \frac{\text{Page Length} - (\text{Top Margin} + \text{Bottom Margin})}{\text{Line Feed Pitch [Vertical Motion Index (VMI)]}}$$

The setting of lines/page is subject to the current paper size and orientation. For example, when letter-sized paper is used, the printer can print 60 lines per page in portrait orientation. If the orientation is changed, the line settings are restored to the factory settings in that orientation.

The following tables show the factory settings in each emulation mode.

In HP Mode			In Non-HP Modes		
	Orientation			Orientation	
Size	Portrait	Landscape	Size	Portrait	Landscape
Letter	60 lines	45 lines	Letter	62 lines	47 lines
A4	64 lines	43 lines	A4	66 lines	45 lines
Legal	78 lines	45 lines	Legal	80 lines	47 lines

Note

When you use application software in the non-HP modes, the recommended settings are as follows:

- Left margin = column 0
- Right margin = Max. value
- Auto MASK ON

COLOR MODE

Note

The settings in this mode menu are effective only in the HP PCL5C and BR-Script 2 modes.

Display Message	Orientation
COLOR PRINT=ON	can print in color mode
COLOR PRINT=OFF	can print only in monochrome mode

GRAPHICS MODE

 Note

The settings in this mode menu are effective only in the HP-GL mode. They do not appear in any other emulation modes.

Since the HP-GL emulation mode is for a plotter, you can select the plotter pens, the pen size and percentage of gray in this mode menu.

Display Message	Graphics Mode
PEN SETTING	Set the size and percentage of gray separately for six plotter pens.
CHARACTER SET	Set the standard and alternate character sets.

 Note

In most cases, the application software controls the above graphics mode settings, so you do not need to set them in this menu with the **Mode** button. The software or command setting overrides the button setting.

Select the setting menu and enter the sub-setting menu to make the settings as follows:

■ Pen Setting

After you select the pen, advance to the sub-setting menu for size or gray-percentage selection with the ▲ or ▼ button and enter the menu with the **Set** button.

Message appears on the lower row of the LCD	What you can adjust
SIZE 1=3 dots *	The pen size can be set from 1 dot to 10 dots
GRAY 1=100% *	The shades of gray can be set to 15, 30, 45, 75, 90 or 100%

 Notes

- When another pen is selected, the display shows the selected pen with the number after “SIZE’ or “GRAY.”
- Whichever resolution, 300 or 600 dpi, you have selected, the pen size takes effect in units of 300 dpi.

■ Character Set

When you select “CHARACTER SET,” you can select the standard and alternate character sets used in the HP-GL emulation mode.

Enter the sub-setting menu and select the menu for the standard or alternate character set with the ▲ or ▼ button and press the **Set** button.

Character Set	Message on the lower row of the LCD panel
standard character set	STANDARD SET
alternate character set	ALTERNATE SET

Character Sets in HP-GL Emulation Mode
ANSI ASCII (Factory setting)
9825 CHR. SET
FRENCH/GERMAN
SCANDINAVIAN
SPANISH/LATIN
JIS ASCII
ROMAN8 EXT.
ISO IRV
ISO SWEDISH
ISO SWEDISH:N
ISO NORWAY 1
ISO GERMAN
ISO FRENCH
ISO U.K.
ISO ITALIAN
ISO SPANISH
ISO PORTUGUESE
ISO NORWAY 2

RESOLUTION MODE

The print resolution, Color Advanced Photoscale Technology (CAPT) and High Resolution Control (HRC) can be set in this mode menu.

Display Message	Resolution Mode
RESOLUTION	Set the print resolution of the printer.
CAPT SETTING	Set the CAPT function. .
HRC SETTING	Set the HRC function.

Select the setting menu and enter the sub-setting menu to make the settings as follows:

■ Resolution

When you select “RESOLUTION,” you can choose a resolution of 300 or 600 dots per inch (dpi) on this printer. You can set the resolution in this mode according to your requirement.

The printer may not be able to print large files because of the resolution and the printer’s memory. The higher the resolution (and thus the file size), the more memory is required.

Display Message	Resolution
RESOLUTION=600	Set the resolution to 600 dpi. (Factory setting)
RESOLUTION=300	Set the resolution to 300 dpi.

Select the print resolution in this mode according to the resolution required for your print jobs as shown below:

Print Jobs	Resolution Setting in Resolution Mode	
	300 dpi	600 dpi
300 dpi	For optimum print quality	For mixing 300 dpi bitmaps with 600 dpi
600 dpi	Not recommended	For optimum print quality

 Note

- Even if you set the resolution to 600 dpi in this mode, the printer may not be able to print large and complex full color files at 600 dpi because of insufficient memory. However, it automatically decreases the resolution to 300 dpi to print them. While the printer is printing in this mode, the display prompts “01 PR300 ...”.
- If the printer cannot print files even at 300 dpi, a “MEMORY FULL” error occurs. See “TROUBLESHOOTING” in Chapter 6.
- This automatic resolution decrease function works with the page protection on. See also “PAGE PROTECTION” in this chapter.
- When you want to print large and complex full color data without decreasing the resolution, you should expand the memory capacity of the printer to 24-Mbytes or more.

■ CAPT Setting

When you select “CAPT SETTING,” you can use the Color Advanced Photoscale Technology (CAPT). This function offers photographic fine colour on graphics. CAPT setting is available only in BR-Script 2 mode and it requires 24 MB of RAM to enjoy CAPT's large and complex full color printouts. When you set CAPT=ON, the high resolution control (HRC) setting is unavailable.

Display Message	Advanced Photoscale Technology
CAPT =ON	Colour advanced photoscale technology is effective.
CAPT =OFF	Cancel the colour advanced photoscale technology. (factory setting)

 Note

In the PCL 5C mode, CAPT setting is always ON. It depends on the printer setting if the printer uses the function or not.

■ HRC Setting

When you select “HRC SETTING,” you can set the high resolution control (HRC). This function is a special function that offers improved print quality of characters and graphics that conventional laser printers cannot attain with resolutions of 300 or 600 dpi.

Display Message	High Resolution Control
HRC =OFF	Cancel high resolution control.
HRC =LIGHT	Set high resolution control to the light level.
HRC =MEDIUM	Set high resolution control to the medium level. (Factory setting)
HRC =DARK	Set high resolution control to the dark level.

The following figures show jagged print with the high resolution control set to “OFF” on the left and clear and crisp print with the control set to “MEDIUM” on the right.

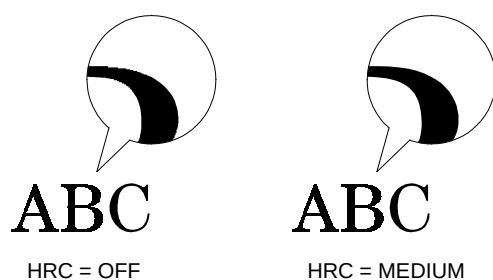


Fig. 4-5 High Resolution Control

The high resolution control has been factory set to “MEDIUM.” The “LIGHT” or “DARK” setting might be better depending on the selected print density. Choose the best setting for clear and crisp printouts.

To check the printout with the high resolution control, perform the test print with the **Test** button. For operation, see “TEST Button.” Lines in the test pattern are smoother if the high resolution control is set to LIGHT, MEDIUM, or DARK. Choose an HRC setting and perform the test print so that stepped lines become unnoticeable.

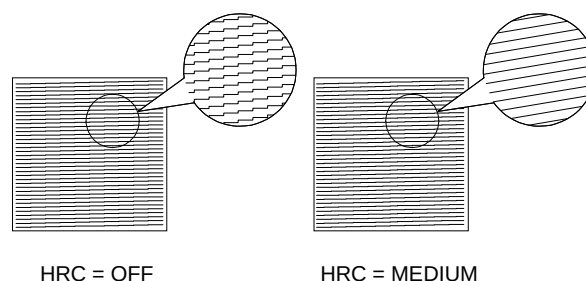


Fig. 4-6 High Resolution Control in Test Printout

PAGE PROTECTION

Note

The setting in this mode menu is effective in the HP PCL5C, EPSON FX-850, IBM Proprinter XL, and HP-GL modes. It does not appear in the BR-Script 2 mode.

If print images are too complex to print, the printer may print them out in parts or only on part of the page. If this occurs, the printer loses print data and shows a message on the LCD panel.

The page protection function reserves additional memory so that the printer can create the entire page image in memory before physically printing it out. This function can be set for letter, A4, or legal size paper. Select the paper size for page protection.

Display Message	Page Protection
PROTECT=AUTO	Page protection on only when it is necessary. (Factory setting)
PROTECT=LETTER	Page protection on for letter size paper.
PROTECT=A4	Page protection on for A4 size paper.
PROTECT=LEGAL	Page protection on for legal size paper.
PROTECT=OFF	Page protection off

To protect pages, you need the memory capacity as shown in the following table (the following are the minimum requirement):

Protection	600 dpi Color
Off	16 Mbytes
Letter or A4	20 Mbytes
Legal	24 Mbytes

Note

When you use the page protection function, note the following:

- If the function setting is changed, all download fonts and macros—including permanent ones—are cleared. If the memory is too low to protect pages, page protection does not take effect.

CARD OPERATION

Notes

- BE SURE TO TURN OFF THE PRINTER POWER BUTTON BEFORE INSTALLING OR REMOVING A FLASH MEMORY CARD OR HDD CARD, OR THE CARD WILL BE DAMAGED.
- The settings in this mode menu are effective only when you have installed a flash memory card or a HDD card in one of the card slots in the printer and you have selected the HP PCL5C, HP-GL, or BR-Script 2 mode. They do not appear when the printer has no card or is in any other emulation mode.
- If you turn the printer off or remove the flash memory card or HDD card while data is being written onto or deleted from the card, all the data on the card may be lost.
- If the write protect button of the flash memory card or HDD card is on, this mode menu does not appear.
- An HDD card will only fit into slot 2.

Be sure to install a commercial flash memory card or HDD card in the correct card slot of the printer.

When you are in this mode menu, you can save macros and fonts in the installed flash memory card or the HDD card.

The sub-setting menus displayed in this mode menu vary according to the state of the installed card.

Display Message	Card Operation
CARD 1	Select Card 1.
CARD 2	Select Card 2.

When two cards are installed, you can select the card that you want to operate.

When the installed card is not formatted:

When you enter this mode menu with a flash memory card or HDD card installed but not formatted by this printer, you must first format the card.

If CARD is selected,

Display Message	Card Operation
FORMAT CARD	Format a new flash memory card or HDD card.
exit	Exit to CARD OPERATION

When the display shows “FORMAT CARD,” press the **Set** button to format the installed card.

After the printer finishes formatting the card, you must exit to the “CARD OPERATION” menu.

 Notes

- When the card is formatted, data that has been previously written is erased.
- It takes ten or more seconds to format a 2-Mbyte flash memory card or HDD card. The larger the capacity of the card, the longer time it takes to format the card.

When the installed flash memory card or HDD card is formatted:

When you enter this mode menu with a formatted flash memory card or HDD card installed, the display shows the following menus:

Display Message	Card Operation
CARD 1	Select Card 1.
CARD 2	Select Card 2.

After you have selected the card, the display shows the following messages:

Display Message	Flash Operation
EXECUTE DATA	Select the data ID and execute the selected data. This menu appears only when data has been saved on the card.
CARD LIST	Print out the contents of the flash memory card or the HDD card. This menu appears only when anything has been saved in the card.
SAVE	Save received data, macros, and fonts.
DELETE	Delete items from the card.

 Note

A common use of the flash memory is with FORMS software packages. With these commercially available software packages you have an option to send a form to the printer without any data. After you have sent the form to the printer, you may save the form in the flash memory as a Macro. Then the next time you want to print this form, you would setup your FORMS software package to SEND DATA ONLY - USE FORM IN PRINTER. This process would save you anything from 1 to 4 minutes per print job.

Select the setting menu and enter the sub-setting menu to change the settings as follows:

■ Execute Data

 Note

This menu appears only when data has been saved on the card.

When you select “EXECUTE DATA,” you can execute any of the data saved in the SAVE DATA mode.

When you enter this sub-setting menu with the **Set** button, the printer prompts you to select the ID of the data. Select the ID with the ▲ or ▼ button and press the **Set** button again, so that the printer executes the selected data.

■ Card List

When you select “CARD LIST” and you press the **Set** button, the printer automatically loads paper and starts printing the contents of the installed flash memory card or HDD card. You can check the contents and the unused capacity of the card.

■ Save

When you select “SAVE” and you press the **Set** button, you can enter the following sub-setting menus to save the macros and fonts in the installed card:

Display Message	Save Menu
SAVE DATA	Save data that the printer will receive and set its ID.
SAVE MACRO	Save a macro. This menu appears only in the HP PCL5C emulation mode.
PRIMARY FONT	Save the primary font selected with the Font button. This menu appears only in the HP PCL5C emulation mode.
SECONDARY FONT	Save the secondary font selected with the Font button. This menu appears only in the HP PCL5C emulation mode.
DOWNLOAD FONT	Save a download font. This menu appears only in the HP PCL5C emulation mode.

Note

If the capacity of the card becomes low while macros and fonts are being saved, the display shows the “CARD FULL” error message and they cannot be saved. Use a new card or delete unnecessary macros and fonts from the card. The CARD LIST displays the contents and the used capacity.

• Save Data

You can send data and save it on the card. In this mode, any kind of data such as PCL data, BR-Script 2 data, and command strings can be saved. When you select “SAVE DATA” and you press the **Set** button, the display shows the guide menu.

The guide menu message prompts you to press the **Set** button again so that the printer exits from the data reception status when you have finished sending data.

Send the data from your computer and then press the **Set** button.

 Notes

When you send data to be saved on the card, it is temporarily stored in the RAM of the printer. Note the following:

- If the received data exceeds the RAM capacity, a memory full error occurs. You can clear this error with the **Continue** button. When this error occurs, only part of the image has been stored in RAM, therefore, you cannot save the data to the card.
- The printer is reset to ensure as much capacity as possible in RAM. If any data remains, it is printed out first.

After you have finished sending data, press the **Set** button again, so that the printer exits from the data reception status.

When you exit from the data reception status, select the data ID with the **▲** or **▼** button and press the **Set** button. The printer will then save the received data with the selected ID onto the card.

 Notes

- When you see an asterisk on the display, the ID number has been used for other data or a macro. If you select the used ID number, the old data or macro is erased and replaced with the new data.
- Once the data is saved, you can execute it with “EXECUTE DATA” or with a data execution command.
- The data saved in the SAVE DATA mode cannot be run with a macro execution command in HP PCL5C emulation.

- Save Macro

 Note

The “SAVE MACRO” menu appears only in the HP PCL5C emulation mode.

If you have downloaded a macro into the printer’s memory, you can save the macro on the installed flash memory card or HDD card.

If a macro has been downloaded into the printer’s memory and you press the **Set** button at “SAVE MACRO,” the printer prompts you to select the ID for the macro.

Select the ID with the **▲** or **▼** button and press the **Set** button again, so that the printer saves the macro with the selected ID.

 Note

When you see an asterisk on the display, the ID number has been used for another macro or data. If you select the used ID number, the old macro or data is erased and replaced with the new macro.

You can execute a macro with the macro execution command.

- Primary Font or Secondary Font

 Note

The “PRIMARY FONT” and “SECONDARY FONT” menus appear only in the HP PCL5C emulation mode.

If you have selected the primary or secondary font with the **Font** button, you can save the font on the installed flash memory card or HDD card.

When you press the **Set** button at the “PRIMARY FONT” or “SECONDARY FONT” message, the printer prompts you to select the ID of the font.

Select the ID with the ▲ or ▼ button and press the **Set** button again, so that the printer saves the font with the selected ID.

 Note

When you see an asterisk on the display, the ID number has been used for another font. If you select the used ID number, the old font is erased and replaced with the new one.

Whatever font you have selected with the **Font** button, the printer saves the font as a bitmapped font as long as the print size is no more than 24 point so that the printer can print it faster than when they are not saved. It is recommended that you save the scalable font you frequently use for faster printing.

Since the flash memory card is in card slot 1 or 2 (the HDD card can only be used in card slot 2), fonts stored in the card behave in the same way as they would if they were in a dedicated Font Card. You can select the saved fonts as “CARD1 FONT” or “CARD2 FONT” with the **Font** button or the font selection command from your software. For font selection, see “FONT Button” in Chapter 4.

You can check the saved fonts by printing the list of fonts with the **Test** button. See “TEST Button” in Chapter 4.

 Notes

When you save the primary or secondary font, note the following:

- The font is temporarily stored in the RAM of the printer before it is saved on the card. If the font data exceeds the RAM capacity, a memory full error occurs. You can clear this error with the **Continue** button. As not all the font data has been stored in RAM, you cannot save the font to the card. When the font data is saved, the printer is reset to ensure as much capacity as possible in RAM. If any data remains, it is printed out.
- If you have saved the font at 600-dpi resolution and change the printer resolution to 300 dpi, the printer cannot print the saved font.

- Download Font

 Notes

- The “DOWNLOAD FONT” menu appears only in the HP PCL5C emulation mode.
- Be sure to print out the list of download fonts with the **Test** button and check the download font ID on the list before you enter this menu. You need to select the font in this menu using the same number you see on the list.

If you have downloaded a font into the printer memory, you can save it on the flash memory card or HDD card.

The printer prompts you to select the download font ID that you can find from the font list. Press the ▲ or ▼ button to move the cursor to the ID and select it with the **Set** button.

 Note

The download font IDs do not appear when fonts have not been downloaded.

After you have selected the download font ID, press the **Set** button, so that the printer saves the selected download font. Vector or bitmapped fonts are saved in the format of the original font.

Once you save the download font in the card, you do not need to download the font every time you need it.

Since the flash memory card is in card slot 1 or 2 (the HDD card can only be used in card slot 2) of the printer, you can select the saved fonts as “CARD1(or 2) FONT” with the **Font** button or the font selection command from your software. For font selection, see “FONT Button” in Chapter 4.

You can check the fonts saved on the card by printing the list of fonts with the **Test** button. See “TEST Button” in Chapter 4.

 Note

When the fonts on the HDD card are selected in a print job, they are copied into the printer RAM. It may cause a printer memory full error because those fonts occupy some RAM space. It is recommended to install optional SIMM memory to use the downloaded fonts on the HDD card.

■ **Delete**

When you select “DELETE” and press the **Set** button, you can enter the following sub-setting menus to delete macros and fonts or format the installed flash memory card or HDD card:

Display Message	Delete Menu
MACRO ID=#####	Delete the selected ID macro.
DATA ID=#####	Delete the selected ID data.
FONT ID=#####	Delete the selected ID font.
FORMAT CARD	Format the flash memory card or HDD card.

• **Macro**

When you press the **Set** button at “MACRO ID=#####,” the cursor moves to the ID number. The printer prompts you to select the ID number of the macro to be deleted.

Select the ID number with the ▲ or ▼ button and press the **Set** button, so that the printer deletes the selected macro.

• **Data**

When you press the **Set** button at “DATA ID=#####,” the cursor moves to the ID number. The printer prompts you to select the ID number of the data to be deleted.

Select the ID number with the ▲ or ▼ button and press the **Set** button, so that the printer deletes the selected data.

• **Font**

When you press the **Set** button at “FONT ID=#####,” the cursor moves to the ID number. The printer prompts you to select the ID number of the font to be deleted.

Select the ID number with the ▲ or ▼ button and press the **Set** button, so that the printer deletes the selected font.

- Format Card

You can format the flash memory card or HDD card to delete its contents. Instructions are in the following menu:

FORMAT CARD

When you press the **Set** button in this menu, the printer asks if you want to delete all contents of the card. Then press the **Set** button to start formatting the card.

When you want to cancel formatting, move to the following menu with the **▲** or **▼** button and press the **Set** button.

ADVANCED MODE

NETWORK MODE

Display Message	Network Mode
LOCK PANEL=OFF	Turns on or off lock panel function.
AUTO FF=ON	Turns on or off auto form feed.
FF SUPPRESS=OFF	Turns on or off the form feed suppress function.

■ Lock panel

If someone other than you has changed the panel button settings and you do not know about it, the printer may not print as you expected or it may not print at all.

To cope with this problem, you can lock or unlock the panel buttons with your pass number as follows:

Display Message	Lock Panel
LOCK=OFF	Unlock the panel buttons of the printer. (Factory setting)
LOCK=ON	Lock the panel buttons of the printer.

Even if you lock the panel buttons, you can still use the **Sel**, **Form Feed**, **Copy**, **Continue**, **Reset** and **Test** buttons for their normal functions. You can only check the settings of the other buttons, you cannot change them. To change them, you need to first unlock the panel buttons.

To lock or unlock the panel buttons as above, you need to enter a 3-digit pass number.

Change the first digit of the number with the ▲ or ▼ button and move to the next digit with the **Set** button. After you finish entering your 3-digit pass number, the panel buttons are locked or unlocked.

 Note

Do not forget your pass number that you have used to lock the panel buttons. If you enter a wrong number, you cannot unlock them. The display shows the following message:

INCORRECT!!

■ **Auto Form Feed**

If unprinted data remains in the printer's memory, the **Data** LED stays on. You need to print out the remaining data with the **Form Feed** button. See "FORM FEED Button" in Chapter 4.

The auto form feed mode you can set in this menu allows you to print out the remaining data without pressing the **Form Feed** button.

You can turn on or off the auto form feed in this mode menu as follows:

Display Message	Auto Form Feed
AUTO FF=OFF	Turn off the auto form feed. You need to press the Form Feed button every time data remains in the printer's memory. (Factory setting)
AUTO FF=ON	Turn on the auto form feed. Every time data remains in the printer's memory, an auto form feed takes place after the wait time set as below.

When you turn on the auto form feed as above, you need to set the wait time in the following sub-setting menu:

Display Message	Wait Time
WAIT TIME= 1s	Set the wait time for the auto form feed.
·	The printer automatically prints out the remaining data after the set wait time.
·	
WAIT TIME=99s	The wait time can be set from 1 to 99 seconds.

■ Form Feed Suppress

You can turn on or off the form feed suppress function in this mode menu as follows:

Display Message	Form Feed Suppress
FF SUPPRESS=OFF	Turn off the form feed suppress function. (Factory setting)
FF SUPPRESS=ON	Turn on the form feed suppress function.

If pages contain no print data, the printer would normally print blank pages. When you turn this function on, you can suppress printing blank pages.

When the printer is used in a network environment, it may deliberately print a blank page at the end of each print job. When you turn on this function, the printer does not print blank pages.

ERROR PRINT

Note

The setting in this mode menu is effective only in the BR-Script 2 mode. It does not appear in any other emulation modes.

You can turn on or off the error print in this mode.

Display Message	Error Mode
ERROR PRINT=ON	Turn on the error print so that the printer prints an error if it occurs.
ERROR PRINT=OFF	Turn off the error print so that the printer does not print an error if it occurs. (Factory setting)

CONTINUE MODE

If any recoverable error occurs including “Toner Empty,” it can be cleared with the **Continue** button. The **Continue** button function is selected with this mode setting.

Display Message	Continue Mode
CONTINUE=MANUAL	Select the manual or auto error recovery mode. Press the Continue button to clear errors. (Factory setting)
CONTINUE=AUTO	Select the auto error recovery mode. The printer automatically clears recoverable errors. You need not press the Continue button.

SCALABLE FONT

Note

The setting in this mode menu is effective only in the HP PCL5C mode. It does not appear in any other emulation modes.

Since this printer has many scalable fonts, some application programs may not be able to handle them correctly. When the HP PCL5C emulation mode has been selected, the printer may print a different font rather than the font you have selected with your program (or the font selection command).

To cope with this font problem, you can restrict the font selection by this command as follows:

Display Message	Scalable Font
FONT=ALL	All scalable fonts of this printer can be selected with the font selection command. (Factory setting)
FONT=LJ	Scalable fonts of this printer other than the following can be selected with the font selection command: Atlanta, Bermuda Script, PC Brussels, Copenhagen, Germany, Portugal, Calgary, San Diego, and US Roman.

Even if you restrict the font selection as above, you can select among all the scalable fonts with the **Font** button. The setting in this mode menu merely restricts the font selection command from an application.

INPUT BUFFER

You can increase or decrease the capacity of the input buffer with the ▲ or ▼ button in this mode menu. A larger capacity allows the printer to receive data from the computer faster.

 **Note**
If the printer reports a memory full error, reduce the capacity of the input buffer.

Display Message	Input Buffer
	The more squares, the larger the capacity of the input buffer. The squares indicate the level of the capacity but not the size in Mbytes.
	
:	
:	The capacity can be set to 15 levels. (Factory setting = )
	
	

After you change the input buffer capacity (make sure you press the **Set** button), be sure to turn off the printer and then turn it on again. The setting takes effect the next time you turn on the printer.

 **Notes**

- The set capacity is not changed even if the emulation mode is changed.
- The actual capacity of the input buffer varies according to the installed RAM. If the RAM capacity is small, the input buffer capacity may not be increased.

	16M	32M	112M
1 square	30KB	30KB	30KB
5 squares	0.9MB	4.3MB	21.4MB
15 squares	3.0MB	15.0MB	75.0MB

The Input buffer size increases proportionally .

Fig. 4-7 Input buffer size

SAVE SETTINGS

Suppose you share this printer with others who want different panel button settings or you use the printer with different settings.

Since you can save the current settings in the printer's memory, you can easily reset the printer to your necessary settings after they are changed. For resetting the printer, see "RESET Button" in Chapter 4.

Use the panel buttons to set the configuration of the printer to your needs and then enter this mode menu to save your settings. Two sets of user settings can be saved in the printer as follows:

Display Message	User Setting
SAVE SETTING 1	Save the current settings as No. 1 in the printer's memory.
SAVE SETTING 2	Save the current settings as No. 2 in the printer's memory.

If you want to check the user settings, you can print out a list of the settings with the **Test** button. See "TEST Button" in Chapter 4.

Note

No user settings have been factory set.

PAGE COUNTER

You can check the total number of printed pages with this mode. When you enter this mode, the display shows the number for a short time and automatically moves to "exit MODE" menu.

EXIT MODE

When you finish setting your desired item in the mode menus, advance to the following message:

MODE
exit MODE

Press the **Set** button to exit from the mode menus to the off-line ready state.

Note

Remember that you can exit from the mode menu any time with the **Sel** button. After you make a setting effective with the **Set** button, press the **Sel** button. You will exit from the mode menu to the on-line ready state. The settings you have changed with the **Set** button are effective after a quick exit.

FONT Button

Pressing the **Font** button allows you to select fonts and symbol/character sets.

Notes

When you use the **Font** button, note the following:

- The **Font** button is effective in the HP PCL5C, EPSON FX-850, and IBM Proprinter XL modes. However the settings are subject to the current emulation mode. Note that the **Font** button does not work in the BR-Script 2 mode.
- If the application software supports font and symbol/character set selection, you do not need to set them with the **Font** button. The software or command setting overrides the button setting.
- If you want to use optional fonts other than the printer's resident fonts, be sure to install a font cartridge/card that has your desired fonts. The printer automatically selects the font that has exactly the same or similar characteristics as those you set through the software or with a command. If the installed font cartridge/card happens to have a font of similar characteristics, the printer will print with an unexpected font.
- You can store the fonts you require on a flash memory card or HDD card only in the HP PCL5C mode or BR-Script 2 mode when one is installed. See "CARD OPERATION."

Setting the Font and Symbol Set in the HP PCL5C Mode

When the HP PCL5C emulation mode has been selected, the font and symbol set can be set separately as the primary or secondary font.

When the primary font is selected;

Message on the lower row	to do;
SELECT FONT P	Set the primary font
SYMBOL SET P	Set the symbol set
TABLE PRINT P	Print the code table

When the secondary font is selected;

Message on the lower row	to do;
SELECT FONT S	Set the secondary font
SYMBOL SET S	Set the symbol set
TABLE PRINT S	Print the code table

To select the font and symbol set in the HP PCL5C mode, follow these steps:

1. Press the **Sel** button to set the printer off-line.
2. Press the **Font** button and then press the ▲ or ▼ button to select the primary or secondary font setting menu.
3. Press the **Set** button.

The display shows the font setting menu. You can skip the font setting menu and advance to the symbol set setting menu with the ▲ or ▼ button.

 Note

The last lowercase letter “p” or “s” indicates the primary or secondary font setting mode. If you select the secondary font setting mode, the display shows “s” in the following messages.

4. Press the **Set** button.

When you enter the “SELECT FONT” menu, you can select the internal font, optional slot font, or permanent download font.

Press the ▲ or ▼ button until the desired font source appears on the display.

Display Message	Font Source
INTERNAL FONT	Internal font of the printer
CARD1 FONT	Optional card font in slot 1
CARD2 FONT	Optional card font in slot 2
PERMANENT FONT	Permanent download font defined in the HP emulation mode

Since these steps instruct you how to select the standard font, select the “INTERNAL FONT” message.

 Notes

When you select the optional fonts or permanent download fonts, note the following:

- If the optional font cartridge/card is not installed, the optional font cannot be selected. No selection appears on the display.
- If permanent fonts are not downloaded in the HP emulation mode or another emulation mode is selected, they cannot be selected. No selection appears on the display.
- The list you can print out with the **Test** button helps you to select the optional fonts or permanent download fonts. See “TEST button” in this chapter or “Selecting the Optional Fonts” in Chapter 5.

5. Press the **Set** button.

When you enter the font setting mode, the display first shows the current font with an asterisk.

6. Press the ▲ or ▼ button until the desired font appears on the display. See “List of Fonts”.
7. Press the **Set** button to make the displayed selection effective.

- If you select a resident bitmapped font (Letter Gothic 16.66) or optional bitmapped fonts, the display shows the symbol set setting menu.

Go to step 8.

- If you select resident scalable fonts or optional scalable fonts, the display shows the font style setting menu and then changes to the font size menu.

Press the ▲ or ▼ button until the desired style appears on the display.

Display Message	Font Style
. Lt	Light
. Reg	Regular, Roman, Book, or Antique
. Bd	Bold or Demi
. Xb	Extrabold
. It	Italic or Oblique

 Note

The style indication appears after the font name and the style name differs according to the font name. The italic or oblique indication can appear after other style indication: “BdIt” indicates a bold italic font, “LtIt” indicates a light italic font, etc.

Press the **Set** button to make the displayed selection effective, then the display shows the font size setting menu.

 Note

When you have selected fixed-pitch fonts, you set the font size by the character pitch (width). When you have selected proportional spacing fonts, you set the font size in points (height). The display shows “PITCH” or “POINT” accordingly. The following displays show “PITCH” to simplify instructions.

Press the ▲ or ▼ button until the desired font size appears on the display.

Press the **Set** button to make the displayed selection effective. The blinking cursor then moves to the decimal part of the number.

Press the ▲ or ▼ button until the desired decimal number appears on the display.

Press the **Set** button to make the displayed selection effective. The display then shows the symbol set setting menu.

8. Press the **Set** button.

When you enter the symbol set setting mode, the display first shows the current symbol set with an asterisk.

9. Press the ▲ or ▼ button until the desired symbol set appears on the display.
See “List of Symbol/Character Sets”.

10. Press the **Set** button to make the displayed selection effective.
The display then shows the next menu.

11. Press the **Set** button to start printing the code table of the selected font, or press the ▲ or ▼ button to skip this menu.
The display shows the exit menu.

12. Press the **Set** button to exit from the setting mode.

The printer returns to the off-line state.

Setting the Font and Character Set in the EPSON FX-850 or IBM Proprinter XL Mode

When the EPSON FX-850 or IBM Proprinter XL mode has been selected, the font and character set can be selected.

Message on the lower row	to do;
SELECT FONT	Set the font
CHARACTER SET	Set the character set
TABLE PRINT	Print the code table

To select the font and character set in the EPSON FX-850 or IBM Proprinter XL mode, follow these steps:

1. Press the **Sel** button to set the printer off-line.
2. Press the **Font** button.
The display shows the font setting menu. You can skip the font setting menu and advance to the character set setting menu with the ▲ or ▼ button.
3. Press the **Set** button.
When you enter the “SELECT FONT” menu, you can select the internal font, optional slot font, or permanent download font. Press the ▲ or ▼ button until the desired font source appears on the display.

Display Message	Font Source
INTERNAL FONT	Internal font of the printer
CARD1 FONT	Optional card font in slot 1
CARD2 FONT	Optional card font in slot 2
PERMANENT FONT	Permanent download font defined in the HP emulation mode

Since these steps instruct you how to select the standard font, select the “INTERNAL FONT” message.

 Notes

When you select the optional fonts or permanent download fonts, note the following:

- If the optional font card is not installed, the optional font cannot be selected. No selection appears on the display.
- If permanent fonts are not downloaded in the HP emulation mode or another emulation mode is selected, the permanent fonts cannot be selected. No selection appears on the display.
- When you select the optional font or download font, press the **Set** button to enter the sub-menu. After you select your desired font with the **▲** or **▼** button, press the **Set** button again. The list you can print out with the **Test** button helps you to select the optional fonts or permanent download fonts. See “TEST button” in this chapter or “Selecting the Optional Fonts” in Chapter 5.

4. Press the **Set** button.
When you enter the font setting mode, the display first shows the current font with an asterisk.
5. Press the **▲** or **▼** button until the desired font appears on the display.
See “List of Fonts”.
6. Press the **Set** button to make the displayed selection effective.
The steps you follow vary according to the font type, scalable or bitmapped.

- If you select a resident bitmapped font (Letter Gothic 16.66) or optional bitmapped fonts, the display shows the character set setting menu.
Go to step 7.
- If you select the resident scalable fonts or optional scalable fonts, the display shows the font style setting menu and then changes to the font size menu..

Press the **▲** or **▼** button until the desired style appears on the display.

Display Message	Font Style
. Lt	Light
. Reg	Regular, Roman, Book, or Antique
. Bd	Bold or Demi
. Xb	Extrabold
. It	Italic or Oblique

Note

The style indication appears after the font name and the style name differs according to the font name. The italic or oblique indication can appear after any style indication: “BdIt” indicates a bold italic font, “LtlIt” indicates a light italic font, etc.

Press the **Set** button to make the displayed selection effective, then the display shows the font size setting menu.

Note

When you have selected fixed-pitch fonts, you set the font size by the character pitch (width). When you have selected proportional spacing fonts, you set the font size in points (height). The display shows “PITCH” or “POINT” accordingly. The following displays show “PITCH” to simplify instructions.

PITCH= 10.00 *

Press the ▲ or ▼ button until the desired font size appears on the display.

Press the **Set** button to make the displayed selection effective. Then the blinking cursor moves to the decimal part of the number.

Press the ▲ or ▼ button until the desired decimal number appears on the display.

Press the **Set** button to make the displayed selection effective. The display then shows the character set setting menu.

7. Press the **Set** button.

When you enter the character set setting mode, the display first shows the current character set with an asterisk.

Note

The character set varies according to the current emulation mode. The above display shows the factory setting in the EPSON FX-850 emulation mode.

8. Press the ▲ or ▼ button until the desired character set appears on the display.
See “List of Symbol/Character Sets”.

9. Press the **Set** button to make the displayed selection effective.
Then the display shows the next menu.
10. Press the **Set** button to start printing the code table of the selected font, or press the ▲ or ▼ button to skip this menu.
Then the display shows the exit menu.
11. Press the **Set** button to exit from the setting mode.
The printer returns to the off-line state.

List of Fonts

Display Message	Font
BROUGHAM	Scalable Brougham
LETTERGOTHIC	Scalable LetterGothic
OCR-A	Bitmapped OCR-A 12 cpi
OCR-B	Bitmapped OCR-B 12 cpi
LETTERGOTH16 .6	Bitmapped Letter Gothic 16.66 cpi
LTRGOTH16 LTN2	Bitmapped Letter Gothic 16.66 cpi ISO 8859-1 Latin2
LTRGOTH16 LTN5	Bitmapped Letter Gothic 16.66 cpi ISO 8859-1 Latin5
LTRGOTH16 LTN6	Bitmapped Letter Gothic 16.66 cpi ISO 8859-1 Latin6
PcTENNESSEE	Scalable PC Tennessee
OKLAHOMA	Scalable Oklahoma
CONNECTICUT	Scalable Connecticut
CLEVELAND Cd	Scalable Cleveland Condensed
PcBRUSSELS	Scalable PC Brussels
UTAH	Scalable Utah
UTAH CONDENSED	Scalable Utah Condensed
AntiqueOAKLAND	Scalable Antique Oakland
GUATEMALA	Scalable Guatemala Antique
MARYLAND	Scalable Maryland
ALASKA	Scalable Alaska
HELSINKI	Scalable Helsinki
BR SYMBOL	Scalable BR Symbol
TENNESSEE	Scalable Tennessee
W DINGBATS	Scalable W Dingbats
GERMANY	Scalable Germany
SAN DIEGO	Scalable San Diego
BERMUDA SCRIPT	Scalable Bermuda Script
US ROMAN	Scalable US Roman
ATLANTA	Scalable Atlanta
COPENHAGEN	Scalable Copenhagen
PORTUGAL	Scalable Portugal
CALGARY	Scalable Calgary

List of Symbol/Character Sets

The symbol sets and character sets are subject to the current emulation mode.

HP PCL5C	EPSON	IBM
ROMAN 8	US ASCII *	PC-8 *
ISO LATIN1	GERMAN	PC-8 D/N
ISO LATIN2	UK ASCII I	PC-850
ISO LATIN5	FRENCH I	PC-852
ISO LATIN6	DANISH I	PC-860
PC-775	ITALY	PC-863
PC-8 *	SPANISH	PC-865
PC-8 D/N	SWEDISH	PC-8 TURKISH
PC-850	JAPANESE	
PC-852	NORWEGIAN	
PC-8 TURKISH	DANISH II	
PC-1004	UK ASCII II	
WINDOWS LATIN1	FRENCH II	
WINDOWS LATIN2	DUTCH	
WINDOWS LATIN5	SOUTH AFRICAN	
WINDOWS BALTIC	PC-8	
DESKTOP	PC-8 D/N	
PS TEXT	PC-850	
VENTURA INTL	PC-852	
VENTURA US	PC-860	
MS PUBLISHING	PC-863	
MATH-8	PC-865	
PS MATH	PC-8 TURKISH	
VENTURA MATH		
PI FONT		
LEGAL		
ISO 2 IRV		
ISO 4 UK		
ISO 6 ASCII		
ISO10 SWE/FIN		
ISO11 SWEDISH		
ISO14 JISASCII		
ISO15 ITALIAN		
ISO16 POR		
ISO17 SPANISH		
ISO21 GERMAN		
ISO25 FRENCH		
ISO57 CHINESE		
ISO60 NOR v1		
ISO61 NOR v2		
ISO69 FRENCH		
ISO84 POR		
ISO85 SPANISH		
WINDOWS 3.0		
HP GERMAN		
HP SPANISH		
MC TEXT		

 Note

The factory settings are indicated by an asterisk “*” in the table above.

FORM FEED Button (REPRINT Button)

The **Form Feed** button works in two ways according to the **Data** LED status.

Form Feed

When the printer is off-line and there is data remaining in the printer memory, the **Data** LED comes on. Pressing the **Form Feed** button executes a form feed and prints out the remaining data.

If you set the number of copies with the **Copy** button and press the **Sel** button during copy printing, the printer suspends the form feed operation.

Pressing the **Sel** button again resumes the form feed operation.

When no data remains in the printer memory and you press the **Form Feed** button, the printer ignores this button operation.

Note

If you want the printer to print out the remaining data automatically, you can set the auto form feed function with the **Mode** button. See “AUTO FORMFEED” in Chapter 4.

Reprint Function

You can reprint the last print job without sending it from the computer again. When you press the **Form Feed** button with the **Data** LED off, the printer reprints the pages of the last print job. You can use this function in order to recover printing when a paper jam has occurred.

After printing is finished, set the printer off-line and press the **Form Feed** button once, so that the printer prints the pages of the last print job. However, if there is not enough memory to keep all the pages of the last print job, the printer will print only the last page of the last job.

When you press the **Form Feed** button one or more times during reprinting, you can set the number of copies to reprint. The printer reprints the last job the number of times you press the button.

Note

The reprint data remains in the printer's memory until the printer is reset or the emulation, or some settings, are changed. After you have reprinted confidential data, be sure to reset the printer to clear it from the printer memory.

CONTINUE Button

If there is a problem with the printer, it automatically suspends printing and goes off-line. Pressing the **Continue** button may ignore the error and resume printer operation.

The function of this button varies according to the CONTINUE mode set with the **Mode** button.

Since the CONTINUE mode has been factory set to MANUAL, you need to press the **Continue** button to recover from a printer error message. If you set the mode to AUTO, the printer attempts to resume the operation without pressing the **Continue** button.

For further information, see “CONTINUE MODE” in Chapter 4.

Note

The **Continue** button is not a cure-all. The printer cannot recover from some errors. Take corrective action, referring to the error message. See “TROUBLESHOOTING” in Chapter 6.

BUTTONS IN SHIFT MODE

You can control the basic printer operations and make various printer settings also in SHIFT mode. Functions available in SHIFT mode are labeled with the indications just below the panel buttons.

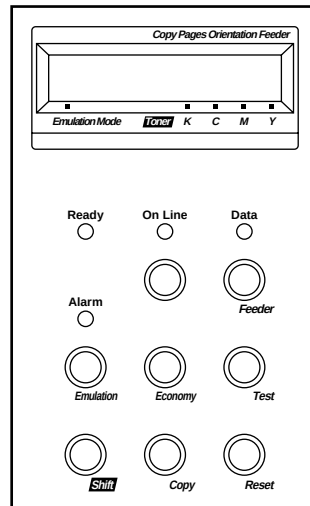


Fig. 4-8 Buttons in SHIFT Mode

Note

The factory settings are printed in bold in this section.

SHIFT Button

When you hold the **Shift** button down with the printer off-line, you can change settings with the panel buttons in SHIFT mode. Since the shift state is not locked, you need to hold it down and press the button to get access to the corresponding shifted function labeled under the button.

EMULATION Button

This printer has been factory set with the automatic emulation selection function on. The printer can select the emulation mode automatically when it receives data from the computer.

When you want to set the emulation mode manually, hold down the **Shift** button and press the **Emulation** button. Then you enter the setting mode where you can change the emulation.

To set the emulation mode, follow these steps:

1. Press the **Sel** button to set the printer off-line.
2. Hold down the **Shift** button and press the **Emulation** button.
When you enter the setting mode, the display first shows the current emulation mode with an asterisk.
3. Press the **▲** or **▼** button until the desired emulation mode appears on the display.

Display Message	Emulation Mode
AUTO	Auto Emulation Selection
HP PCL5C	HP PCL5C
BR-Script 2	BR-Script level 2 mode
HP-GL	HP-GL Plotter Mode
EPSON FX-850	EPSON FX-850
IBMProprinterXL	IBM Proprinter XL

4. Press the **Set** button to make the displayed selection effective.
When you select any specific emulation mode other than "AUTO," an asterisk appears at the end of the display for a short time. Then the printer automatically exits from the setting mode to the off-line state. When you select "AUTO," the sub-item "Time Out" for the automatic emulation selection appears on the display. Go to the next step.
5. Set "Time Out" with the **▲** or **▼** button.
This time out is the duration during which the printer will not allow an automatic emulation change. You can set it from 1 second to 99 seconds: **the factory setting is 5 seconds.**
6. Press the **Set** button.
The next sub-item "EPSON/IBM" appears on the display.

7. Select EPSON or IBM with the ▲ or ▼ button.

Since the printer cannot distinguish between the EPSON and IBM emulation modes, you need to select the EPSON or IBM emulation even in AUTO mode.

When the printer receives data from the computer, it automatically selects the emulation mode in any of the following combinations:

EPSON/IBM Priority	EPSON	IBM
Auto Selection Mode	HP PCL5C	HP PCL5C
	BR-Script 2	BR-Script 2
	HP-GL	HP-GL
	EPSON FX-850	IBM Proprinter XL

8. Press the **Set** button.

The next sub-item “KEEP PCL” appears on the display.

This function is for permanent macros and fonts downloaded in the HP PCL5C mode.

9. Turn on or off the “KEEP PCL” function with the ▲ or ▼ button.

When you do not need to keep the permanent macros and fonts used in HP PCL5C mode, turn this function off. When you want to keep them, you can turn it on.

If the function is turned on, the downloaded macros and fonts are kept in the printer’s memory until the printer is turned off, so that they are not cleared by changing the emulation to BR-Script 2 mode.

 Note

The “KEEP PCL” function reserves free space in the printer’s memory and may cause a memory full error. If a memory full error occurs, expand the memory capacity or turn off this function.

10. Press the **Set** button.

The “exit” message appears on the display.

11. Press the **Set** button again.

The printer exits from the setting mode to the off-line state.

 Note

When you use the automatic emulation selection, try it with your application software or network server. If the function does not work properly, select a particular emulation mode manually. You can use the following commands to select the emulation on a network.

Commands	Hex	Emulation
ESC CR H	1B 0D 48	HP PCL5C
ESC CR AB	1B 0D 41 42	BR-Script 2
ESC CR GL	1B 0D 47 4C	HP-GL
ESC CR E	1B 0D 45	EPSON FX-850
ESC CR I	1B 0D 49	IBM Proprinter XL

About Emulation Modes

This printer has the following emulation modes:

■ HP PCL5C Mode

The HP PCL5C mode (or HP mode) is the emulation mode where this printer emulates Hewlett-Packard PCL5C color printers and PCL6 monochrome printers. Since a large number of application software packages support this type of laser printer, your printer will operate at its optimum performance in this mode.

■ BR-Script 2 Mode (color)

BR-Script is a Brother original page description language and it is a PostScript® language emulation interpreter. This printer has level 2 BR-Script which supports full color printing at 600 dpi . The BR-Script interpreter of this printer can control text and graphics on pages completely and satisfactorily.

Average users do not need to know much about PostScript® language. If you want to obtain technical information about PostScript® commands, see the following commercial manuals:

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

■ HP-GL Mode (monochrome)

The HP-GL mode is the emulation mode where this printer emulates the Hewlett-Packard plotter model HP-7475A. Since many graphics and CAD applications support this type of plotter, you can get more out of this printer working with your application software.

■ EPSON FX-850 and IBM Proprinter XL Mode (monochrome)

The EPSON FX-850 and IBM Proprinter XL modes are the emulation modes where this printer emulates the industry-standard dot matrix printers of respective manufacturers. Since most applications support these printers, you do not have to be concerned about compatibility.

ECONOMY Button

TONER SAVE MODE

You can turn on or off the toner save mode as follows:

Display Message	Toner Save Mode
TONER SAVE=OFF	Turn off the toner save mode. (Factory setting)
TONER SAVE=ON	Turn on the toner save mode. The amount of toner on the paper decreases and the printed image may look lighter.

POWER SAVE MODE

You can turn on or off the power save mode as follows:

Display Message	Power Save Mode
POWER SAVE=ON	Turn on the power save mode. The fixing assembly of the print engine is turned off after the specified time to save power. (Factory setting)
POWER SAVE=OFF	Turn off the power save mode. The fixing assembly of the print engine is always powered on to keep its temperature at the specified level.

When you turn on the power save mode with the **Set** button, the display shows the next sub-setting menu.

You need to set the time out for the power save mode from 1 to 99 minutes with the ▲ or ▼ button: **factory setting =60 minutes**. The time out is the duration after which the fixing assembly of the print engine is turned off ("SLEEP") to save power.

When the power save mode is turned on, the printer turns on the fixing assembly again automatically after it receives data from the computer. Since the fixing assembly must reach the specified high temperature, it takes a slightly longer time to start printing the first page.

FEEDER Button

You can select the feeder and manual feed mode with the **Feeder** button.

Display Message	Feeder
FEEDER=AUTO	Select a feeder or auto paper feed .
MANUAL MODE=ON	Enable/disable the manual feed mode.
MEDIA TYPE	Select print media
SMALL SIZE	Set the small paper size detection of sizes under B5(JIS)

You can check the current feeder.

When you want to change settings with the **Feeder** button, hold down the **Shift** button and press the **Feeder** button. You will then enter the setting mode where you change the feeder, manual feed mode, etc.

FEEDER

To select the feeder, follow these steps:

1. Press the **Sel** button to set the printer off-line.
2. Hold down the **Shift** button and press the **Feeder** button.
When you enter the setting mode, the display first shows the current feeder setting with the asterisk.
3. Press the **▲** or **▼** button until the desired feeder appears on the display.

Display Message	Paper Feed Method/Paper Source
FEEDER=AUTO	Auto paper feed
FEEDER=TRAY1	Upper Media Cassette (Tray 1)
FEEDER=TRAY2	Optional Lower Media Cassette (Tray 2)

 Notes

When you select a feeder, note the following:

- The “FEEDER=TRAY2” message appears only when the optional lower tray unit has been installed.
- The FEEDER=AUTO setting allows you to optimize your printing environment. This setting allows a print job to continue uninterrupted when a paper out condition occurs. The default setting is AUTO. This setting allows a common printing situation: Loading the same size and type of paper in both paper trays. This allows your print job to continue without error if one of the paper trays becomes empty. The printer will automatically select the other tray if one tray becomes empty.
- When you select the FEEDER=AUTO, the printer automatically searches for the paper size you set with the **Mode** button in the PAGE FORMAT mode and loads the paper from the paper source that contains the selected size of paper. If the upper and lower Media Cassettes contain different sizes of paper and one Media Cassette runs out of paper, the printer stops printing without automatically changing to the other paper source to feed paper. It prevents a different size of paper from being printed by mistake.
- If you have the same size of paper loaded but of different type (i.e.: FORM “A” in Tray 1, Form “B” in Tray 2) it is recommended to change the feeder setting from AUTO to Tray 1. This setting will allow the printer to pause when a paper empty condition occurs, allowing you to load the correct type of paper, then press **Select** to finish the print job.

4. Press the **Set** button to make the displayed selection effective.
When you select “TRAY1,” or “TRAY2,” an asterisk appears at the end of the display for a short time. Then the “exit” message appears on the display. Press the **Set** button again, so that the printer exits from the setting mode to the off-line state.
When you select “AUTO”, the tray selection menu for the auto paper feed appears on the display. Go to the next step.
5. Change the tray combination and priority with the ▲ or ▼ button.
When “AUTO=T1>T2” is set, both Tray 1 and the Tray2 are selected but tray 1 will be selected first if the paper size in tray 1 and the page size for the printing job match each other. (If you are using the optional Lower Tray and want to give priority to Tray2, you can use the “AUTO=T2>T1” setting.)
6. Press the **Set** button.

MANUAL MODE

This printer has no manual feed tray or multi-purpose tray. Therefore you cannot feed special paper in the usual way. However this printer has a special manual feed mode with Tray 1 in order to overcome this inconvenience. When “MANUAL MODE=ON” is selected or a manual feed command is sent to the printer, the printer will wait for you to replace the paper in Tray 1 with the paper for manual printing.

1. Press the ▲ or ▼ button to select the manual mode on or off.
2. Press the **Set** button to make the setting effective.

MEDIA TYPE

When you use any paper other than ordinary plain paper, such as thick bond paper, envelope, or transparency, the appropriate media type must be selected in the media type mode in order to get the best print quality.

1. Press the **Set** button to enter the media type mode. The display then shows the current setting with an asterisk.
2. Press the ▲ or ▼ button to select regular, thick paper, or transparency then press the **Set** button to make the setting effective.

Note

- Please do not forget to change the setting back to regular after you have printed on your special media with the setting changed.

SMALL SIZE

This printer can detect the size of paper in the trays automatically. If there is no paper loaded as specified by the user application, the printer indicates to the user to load the correct size paper by displaying “LOAD PAPER XX SIZE” on the LCD panel. The printer can detect A4, Letter, executive, Legal (only in Optional Legal Cassette) and B5(ISO), but not A5, B5(JIS), C5, COM10 and DL size even though they can be handled. For this reason, it is necessary to change the detection size for paper smaller than B5.

1. Press the **Set** button to enter the small size mode. The display then shows the current setting with an asterisk. Then select “T1” or “T2”.
2. Press the ▲ or ▼ button to select B5 (JIS), B5 (ISO), A5, C5, COM10 or DL then press the **Set** button to make the setting effective. (B5 (JIS) and B5 (ISO) only for “T2”.)

COPY Button

You can set the number of copies to print of the same page with the **Copy** button. The computer will release from a printing job in a shorter time if you use this feature than when you set the copy print quantity with your application software. Check the current setting on the display.

When the number of copies has been set to 3, the display may look as follows:

LJ READY 003P T1
AUTO

 **Note**
If you send too many pages to be stored in the printer memory, part or all of the set of pages or copies may not be printed.

To set the number of copies, follow these steps:

- 1. Press the **Sel** button to set the printer off-line.
- 2. Hold down the **Shift** button and press the **Copy** button.
When you enter the setting mode, the display first shows the current setting with the asterisk.
- 3. Press the ▲ or ▼ button until the desired number appears on the display.

Display Message	# of Copies to Print Same Pages
COPY PAGES= 1	1 page
COPY PAGES= 2	2 pages
...	...
COPY PAGES=999	999 pages (max.)

- 4. Press the **Set** button to make the displayed selection effective.
An asterisk appears at the end of the display for a short time. Then the printer automatically exits from the setting mode to the off-line state.

RESET Button

You can reset the printer with the **Reset** button. The print data that the printer has already received from the computer is cleared and the printer settings are restored to the user settings or factory settings.

Any temporary download fonts and macro settings you set with commands in HP PCL5C mode are also cleared.

When you want to reset the printer, hold down the **Shift** button and press the **Reset** button. You then enter the reset mode where you reset the printer.

To reset the printer, follow these steps:

1. Press the **Sel** button to set the printer off-line.
2. Hold down the **Shift** button and press the **Reset** button.
When you enter the reset mode, the display shows the first reset mode item.
3. Press the **▲** or **▼** button until the desired reset mode appears on the display.

Display Message	Reset Mode
RESET PRINTER	Resets the printer and restores all printer settings—including command settings—to settings you have previously made with the panel buttons.
RESET SETTING 1 RESET SETTING 2	Resets the printer and restores all printer settings—including command settings—to the selected number (1-2) of user settings you have previously made with the Mode button.
FACTORY SETTINGS	Resets the printer and restores all printer settings—including command settings—to the factory settings. See “List of Factory Settings.”
RESET PARTS LIFE	This menu appears only when a maintenance part is being recommended for replacement. Resets the life counter of the maintenance part that has been replaced.
exit	Exits from the reset mode. The printer is not reset.

4. Press the **Set** button to make the displayed selection effective.
The printer is reset according to the selected reset mode.

Selected Mode	LCD message on the upper row
RESET PRINTER	08 RESET TO ↔USER SETTINGS
RESET SETTING 1-2	08 RESET TO ↔SETTING # 1*
FACTORY SETTINGS	09 RESET TO ↔FACTORY SETTINGS

1* - # indicates the selected number of saved settings

The printer automatically exits from the reset mode to the on-line state.

5. When you enter the RESET PARTS LIFE mode;

LCD Message on the lower row	Parts replaced
FC ROLLER	Fuser Cleaner
OPC BELT	(OPC) Belt Cartridge
FUSER UNIT	Fixing Unit
120K KIT	Drum Cleaner, Paper discharger, Transfer Roller

The reset item is selected according to the Maintenance message that shows the currently recommended maintenance part to replace. Press **Set** to reset the parts life.

List of Factory Settings

The following table shows the factory settings made before shipment.

Notes

- The settings are subject to the emulation mode. Effective modes are indicated in parentheses in the following table.
- The following settings cannot be restored to the factory settings with the **Reset** button in the “FACTORY SETTINGS” mode: INTERFACE MODE, HRC SETTING, PAGE PROTECTION, SCALABLE FONT, LOCK PANEL, and PAGE COUNTER, and local language for display messages.
- The COPY setting is always restored to the factory setting when the printer is turned off and on again.
- The user settings are overwritten after resetting to setting 1 or 2.

Button	Item	Sub-Item	Factory Setting
MODE	INTERFACE MODE	–	I/F=AUTO
		For AUTO mode	
		TIME OUT	TIME OUT= 5s
		For bi-directional PARALLEL interface	
		HIGH SPEED	HIGH SPEED=ON
		BI-DIR	BI-DIR=ON
		For RS-232C serial interface	
		Baud Rate	BaudRate= 9600
		Code Type	CodeType=8 bits
		Parity	Parity =NONE
		Stop Bit	Stop Bit= 1 bits
		Xon/Xoff	Xon/Xoff=ON
		DTR (ER)	DTR (ER)=ON
		Robust Xon	Robust Xon=OFF
	FORMAT MODE	ORIENTATION (Except for BR-Script 2)	ORI=PORTRAIT
		AUTO MODE (HP PCL5C)	
		AUTO LF	OFF
		AUTO CR	OFF
		AUTO WRAP	OFF
		AUTO SKIP	ON
		AUTO MODE (EPSON)	
		AUTO LF	OFF
		AUTO CR	ON (No indication)
		AUTO WRAP	ON (No indication)
		AUTO MASK	OFF
		AUTO MODE (IBM)	
		AUTO LF	OFF
		AUTO CR	OFF
		AUTO WRAP	ON (No indication)
		AUTO MASK	OFF

Button	Item	Sub-Item	Factory Setting
MODE (continued)			
	FORMAT MODE (continued)		
		PAGE FORMAT MODE (HP PCL5C, EPSON, & IBM)	
		PAPER	LETTER (For 110/120V model) A4 (For 220/240V model)
		LEFT M	0 (LETTER, Portrait) 0 (LEGAL, Portrait) 0 (A4, Portrait) 0 (A5, Portrait) 0 (B5, Portrait) 0 (JIS B5, Portrait) 0 (EXE, Portrait) 0 (COM10, Portrait) 0 (DL, Portrait) 0 (LETTER, Landscape) 0 (LEGAL, Landscape) 0 (A4, Landscape) 0 (A5, Landscape) 0 (A6, Landscape) 0 (B5, Landscape) 0 (JIS B5, Landscape) 0 (EXE, Landscape) 0 (COM10, Landscape) 0 (DL, Landscape)
		RIGHT M	80 (LETTER, Portrait) 80 (LEGAL, Portrait) 78 (A4, Portrait) 78 (A5, Portrait) 64 (B5, Portrait) 67 (JIS B5, Portrait) 67 (EXE, Portrait) 36 (COM10, Portrait) 38 (DL, Portrait) 106 (LETTER, Landscape) 136 (LEGAL, Landscape) 113 (A4, Landscape) 113 (A5, Landscape) 113 (A6, Landscape) 94 (B5, Landscape) 97 (JIS B5, Landscape) 101 (EXE, Landscape) 91 (COM10, Landscape) 82 (DL, Landscape)
		TOP M	0.5" (HP) 0.33" (Non-HP)
		BOTTOM M	0.5" (HP) 0.33" (Non-HP)

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Button	Item	Sub-Item	Factory Setting
MODE (continued)	PAGE FORMAT (continued)	LINES (HP)	60 (LETTER, PORTRAIT) 78 (LEGAL, PORTRAIT) 64 (A4, PORTRAIT) 64 (A5, PORTRAIT) 53 (B5, Portrait) 54 (JIS B5, Portrait) 57 (EXE, Portrait) 51 (COM10, Portrait) 45 (DL, Portrait) 45 (LETTER, LANDSCAPE) 45 (LEGAL, LANDSCAPE) 43 (A4, LANDSCAPE) 43 (A5, LANDSCAPE) 35 (B5, Landscape) 36 (JIS B5, Landscape) 37 (EXE, Landscape) 18 (COM10, Landscape) 19 (DL, Landscape)
		LINES (Non-HP)	62 (LETTER, PORTRAIT) 80 (LEGAL, PORTRAIT) 66 (A4, PORTRAIT) 66 (A6, PORTRAIT) 55 (B5, Portrait) 56 (JIS B5, Portrait) 59 (EXE, Portrait) 53 (COM10, Portrait) 47 (DL, Portrait) 47 (LETTER, LANDSCAPE) 47 (LEGAL, LANDSCAPE) 45 (A4, LANDSCAPE) 45 (A5, LANDSCAPE) 37 (B5, Landscape) 38 (JIS B5, Landscape) 39 (EXE, Landscape) 20 (COM10, Landscape) 21 (DL, Landscape)
		X OFFSET	X OFFSET=0
		Y OFFSET	Y OFFSET=0
COLOR MODE		COLOR PRINT	COLOR PRINT=ON
FORMAT MODE (BR-Script 2)		X OFFSET	X OFFSET=0
		Y OFFSET	Y OFFSET=0
FORMAT MODE (HP-GL)		PAGE FORMAT MODE	
		PAPER	LETTER (For 110/120V model) A4 (For 220/240V model)
		X OFFSET	X OFFSET=0
		Y OFFSET	Y OFFSET=0
		GRAPHICS MODE (HP-GL)	
		PEN SETTING	SIZE: 3 dots GRAY: 100%

Button	Item	Sub-Item	Factory Setting
MODE (continued)			
	RESOLUTION MODE	RESOLUTION	RESOLUTION=600
		CAPT SETTING	CAPT=OFF
		HRC SETTING	HRC=MEDIUM
	PAGE PROTECTION (Non-BR-Script2)	–	PROTECT=AUTO
	ADVANCED MODE		
		LOCK PANEL	LOCK PANEL=OFF
		AUTO FF	AUTO FF=OFF
		For AUTO FF=ON	WAIT TIME= 5s
		WAIT TIME	
		FF SUPPRESS	FF SUPPRESS=OFF
		ERROR PRINT (BR-Script2)	ERROR PRINT=OFF
		CONTINUE MODE	CONTINUE=MANUAL
		SCALABLE FONT (HP, EPSON, & IBM)	FONT=ALL
		For any interfaces	□□□□□
	INPUT BUFFER		
PAGE COUNTER	–	0	
FONT (HP)			
PRIMARY FONT	SELECT FONT	BROUGHAM	
	SYMBOL SET	PC-8	
SECONDARY FONT	SELECT FONT	BROUGHAM	
	SYMBOL SET	PC-8	
FONT (EPSON)			
FONT	–	BROUGHAM	
CHARACTER SET	–	US ASCII	
FONT (IBM)			
FONT	–	BROUGHAM	
CHARACTER SET	–	PC-8	
EMULATION			
–	–	AUTO	
For AUTO mode	TIME OUT	TIME OUT= 5s	
	EPSON/IBM	EPSON/IBM=EPSON	
	KEEP PCL	KEEP PCL=OFF	

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Button	Item	Sub-Item	Factory Setting
ECONOMY		—	
	TONER SAVE MODE	-	TONER SAVE=OFF
	POWER SAVE MODE	-	POWER SAVE=ON
		For POWER SAVE=ON TIME OUT	TIME OUT=30m
FEEDER	FEEDER	-	FEEDER=AUTO For FEEDER=AUTO AUTO=T1>T2
	MANUAL MODE	-	MANUAL MODE=OFF
	MEDIA TYPE	-	REGULAR
	SMALL SIZE	-	SIZE=ISO B5
COPY	—	—	COPY PAGES=1
LANGUAGE (FORM FEED + POWER ON)		—	LANG=ENGLISH

TEST Button

You can test the printer or print out the list of fonts with the **Test** button. To do so, hold down the **Shift** button and press the **Test** button. You will then enter test mode where you may test the printer or print out the list of fonts.

To test the printer, follow these steps:

1. Press the **Sel** button to set the printer off-line.
2. Hold down the **Shift** button and press the **Test** button.
When you enter test mode, the display shows the first test mode item.
3. Press the ▲ or ▼ button until the desired test mode appears on the display.

Display Message	Test Mode
DEMO PAGE	Prints out the demonstration.
TEST PRINT	Performs the printer test and prints out the test pattern.
PRINT CONFIG	Prints out the list of panel button settings you have configured for the printer as user settings.
PRINT FONTS I	Prints out the list of internal or resident fonts.
PRINT FONTS C	Prints out the list of optional fonts stored in the font cartridge/card.
PRINT FONTS P	Prints out the list of permanent download fonts.
exit	Exits from the test mode. The printer does not perform the test.

 Notes

The message “PRINT FONTS C” or “PRINT FONTS P” appears only when the optional font card is installed in the font slot or permanent download fonts are stored in printer memory.

- If the optional font card is installed, you can print out the list of optional fonts. Since the list shows the ID numbers specific to each optional font, it helps you to select them with the **Font** button.
- If user-defined characters are already downloaded into the printer memory as permanent download fonts, you can print out the list of them. For further information, see “FONT Button” in Chapter 4 and Technical Reference Manual that is optionally available.

4. Press the **Set** button to make the displayed selection effective.

The printer prints out the test patterns or lists according to the selected test mode.

 Note

The printed list shows the panel button settings you have made as user settings with the **Mode** button. See “SAVE SETTINGS” in Chapter 4.

When the printer finishes printing, it automatically exits from the test mode to the off-line state.

HEX DUMP MODE

This printer has a useful Hex Dump Mode for checking the print data sent from your computer. The printer lists the print data in hexadecimal form.

To enter the hex dump mode, follow these steps:

1. Check the power state.
2. Operate the buttons according to the power state.
 - If the printer has been turned off, turn on the printer.

The printer starts the self-test and the display shows the following message.

04 SELF TEST

- If the printer has been turned on, reset the printer with the **Reset** button.
 - 1) Press the **Sel** button to set the printer off-line.
 - 2) Hold down the **Shift** button and press the **Reset** button.
The display will show “RESET PRINTER”.
 - 3) Press the **Set** button with the “RESET PRINTER” selected.
- 3. Hold down the **Continue / Shift** button.

The printer checks the **Continue / Shift** button at the end of self-test or printer reset. If the button is held down, the printer enters the hex dump mode and goes on-line. The display will show the message “HEX DUMP MODE” and the printer will return to the on-line state.

Note

If the printer returns to the on-line state without displaying the message “HEX DUMP MODE”, you did not hold down the **Continue / Shift** button *immediately* after pressing the **Set** button. Try the above steps once again.

4. Send data from your computer.
When the printer receives data, it starts printing hexadecimal values of the received data.

To exit from the hex dump mode, follow these *basic* steps:

1. Press the **Sel** button to set the printer off-line.
2. Reset the printer with the **Reset** button.

Or turn off the printer, wait for a few seconds, and turn it on again.

CHAPTER 5 MAINTENANCE

REPLACING THE CONSUMABLES

You need to replace the following consumables periodically. When the time comes to replace consumables, the following messages will appear on the LCD panel.

The following are Operator Call Messages and when these messages are displayed on the LCD, the printer stops printing.

LCD Operator Call Message	Consumable to Replace	Approximate Life	How to Replace	Order No.
16 TONER EMPTY K COLOR	Toner Cartridge Black	10,000 pages *1	See 5-3	TN-01BK
16 TONER EMPTY CMY COLOR	Toner Cartridge Cyan, Magenta or Yellow	6,000 pages *1	See 5-3	TN-01C TN-01M TN-01Y
22 WASTE TONER	Waste Toner Pack	12,000 images *1 *4	See 5-11	WT-1CL
23 OIL EMPTY	Oil Bottle	12,000 pages	See 5-6	FO-1CL
24 CHANGE FCR	Fuser Cleaner	12,000 pages	See 5-9	FO-1CL CR-1CL

The following are Maintenance Messages and appear on the lower row of the LCD in OnLine mode. These messages prompt you to replace each of the consumables before they run out.

LCD Maintenance Message	Consumable to Replace	Approximate Life	How to Replace	Order No.
(Toner nearly empty) □ ■ ■ ■ K C M Y	Toner Cartridge Black	10,000 pages *1 *2	See 5-3	TN-01BK
(Toner nearly empty) ■ □ □ □ K C M Y	Toner Cartridge Cyan, Magenta or Yellow	6,000 pages *1 *2	See 5-3	TN-01C TN-01M TN-01Y
FUSER OIL LOW	Oil Bottle	12,000 pages	See 5-6	FO-1CL

LCD Maintenance Message	Consumable to Replace	Approximate Life	How to Replace	Order No.
REPLACE FCR	Fuser Cleaner	12,000 pages	See 5-9	FO-1CL CR-1CL
REPLACE OPC BELT	(OPC) Belt Cartridge	50,000 images (continuously printed) *4	See 5-13	OP-1CL
REPLACE FUSER	Fusing unit	40,000 pages	See 5-17	
REPLACE 120K KIT	Drum Cleaner, Paper Discharger, Transfer Roller Paper Feeding Roller Separator Pad Transfer Drum	120,000 pages	See 5-20 *3	

 Note

The Ozone Filter does not have an LCD message indication. However, you need to replace it once a year.

*1 - at 5 % coverage print (A4-Letter size).

 Note

The toner cartridges shipped with the printer contain only half the normal amount of toner. (5,000 pages (Black) and 3,000 pages (Cyan, Magenta and Yellow)).

*2 - For example, if the Cyan and Magenta toner cartridges are nearly empty, the indication will be “” ( = blinking )

K C M Y

If the Cyan and Magenta toner cartridges are empty, the  indication will have disappeared.

*3 - As for how to replace the Paper Feeding Roller, the Separator Pad and the Transfer Drum, consult your local dealer/retailer.

*4 - Definition of pages: actual output page number.

Definition of images: if the image on a page contains only one color of either Cyan, Magenta, Yellow or Black=>1 image, two colors => 2 images, three colors => 3 images, four colors => 4 images.

 Note

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

Note

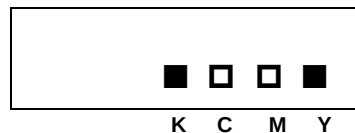
- If you use paper which is not a direct equivalent for the specified paper, the life of the various consumables and parts may be reduced.
- Approximate lives listed here are based on an average 5% coverage of the printable area using any one color toner cartridge. The frequency of replacement will vary depending on the complexity of the printed pages, the percentage coverage and media type used.

Toner Cartridges**Caution**

Be sure to use Brother original toner cartridges. Using other toner cartridges or refilled toner cartridges may void the warranty for this printer.

Toner Nearly Empty Message

Check printed pages, page counter, and display messages periodically. If the ■ indication starts blinking (□), the printer has nearly run out of toner or the toner is not evenly distributed inside the cartridge.



*K stands for Black, C stands for Cyan, M stands for Magenta and Y stands for Yellow.

Although you can print approximately 300 (Black) / 500 (Cyan, Magenta and Yellow) additional pages (at 5% coverage) after the toner low message first appears, be sure to replace the toner cartridge with a new one before it becomes completely empty. When the toner becomes completely empty, the ■ indication on the LCD panel disappears.

Toner Empty Message

When the following messages appear alternately on the LCD panel and the printer stops printing, replace the Toner Cartridge(s).

16 TONER EMPTY
K COLOR

Replacing the Toner Cartridges

! Caution

When replacing the Toner Cartridges, handle them carefully so that toner will not spill.

✍ Note

To ensure optimum print quality, be sure to use quality toner cartridges. To obtain Brother toner cartridges, consult the dealer where you purchased the printer.

To replace the toner cartridge(s), follow these steps:

1. Open the Front Cover.
2. Remove the Toner Cartridge(s) which has run out of toner.
3. After rocking each new Toner Cartridge 3 to 4 times, remove the orange protective cover of the new Toner Cartridge.

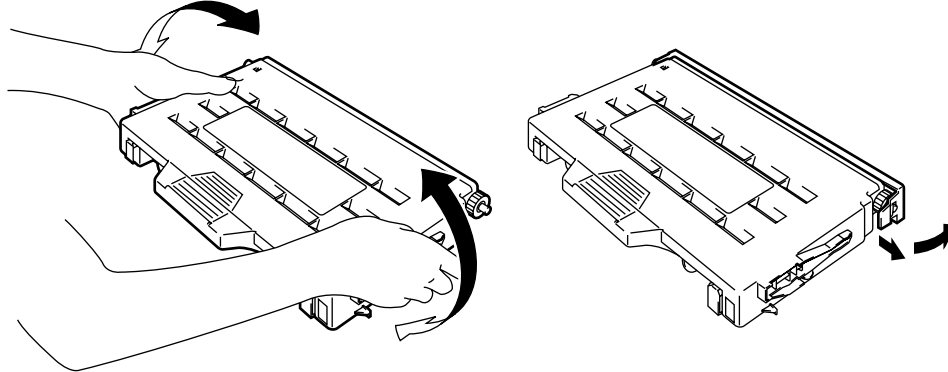


Fig. 5-1 Remove the Protective Cover

4. Insert the new Toner Cartridge(s), making sure to insert the correct cartridge into the correct position referring to the label.

5. Close the Front Cover.



Caution

- Do not stand the toner cartridge on its end or turn it upside down.
- Install the toner cartridges immediately after you remove the protective part. Do not touch the shaded part.

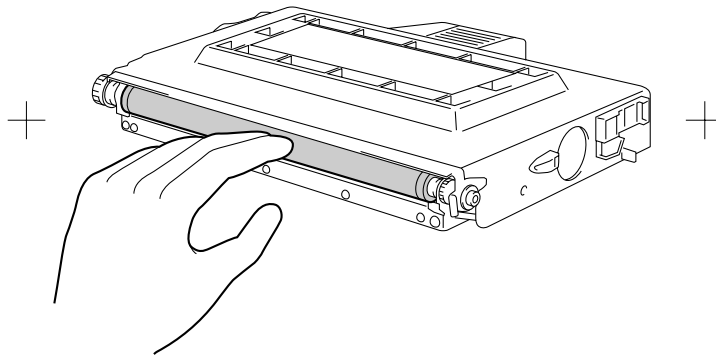


Fig. 5-2 Toner Cartridges

Oil Bottle

Oil Bottle Low Message

When the Oil has nearly run out, the following message appears on the LCD panel. You need to prepare a new Oil Bottle to replace the nearly empty bottle. After this message appears, you can print approximately 30 pages.

FUSER OIL LOW

Oil Bottle Empty Message

When the Oil runs out, the following message appears on the LCD panel and the printer stops printing. When you see this message, you need to replace the Oil Bottle with a new one.

23 OIL EMPTY



Warning

The Fusing unit and the parts around it are HOT. Be sure to wait about 30 minutes before you start replacing the Oil Bottle. If you touch the HOT parts, you might get injured.



Caution

Be careful not to spill the oil inside the printer. It might cause damage to the printer and void your warranty. If you spill any oil, consult your dealer or our authorized service representative.

Replacing the Oil Bottle

1. Press the **Power** button to turn the printer off and wait until it cools down.
2. Open the Top cover.

3. Release the Oil Bottle Lock Levers as shown below.

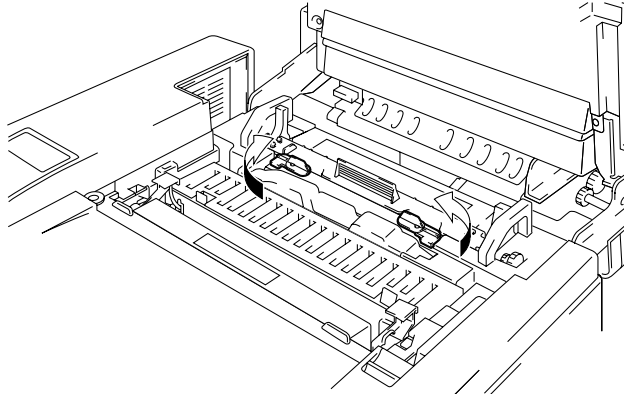


Fig. 5-3 Release the Oil Bottle Lock Levers

4. Take the empty Oil Bottle from the Fusing Unit. Place a sheet of paper under the Oil Bottle so that the oil will not spill into the printer, and remove the bottle towards the right hand side of the printer. Be careful not to spill oil inside the printer. It might cause damage to the printer.

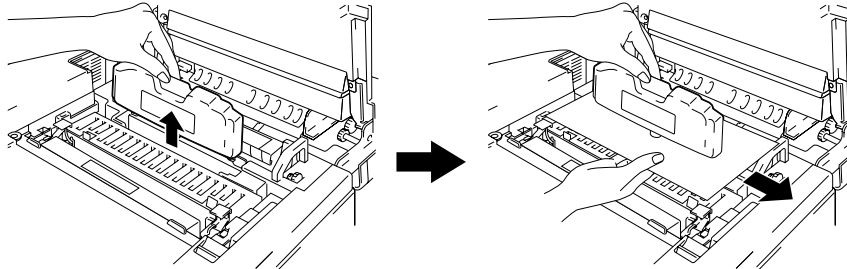


Fig. 5-4 Take the Oil Bottle out

5. Install the new Oil Bottle onto the Fusing unit with the label side facing the front of the printer.

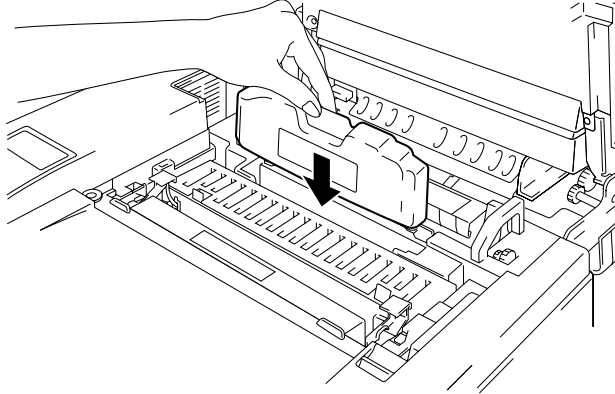


Fig. 5-5 Install the Oil Bottle

6. Lock the Oil Bottle Lock Levers securely.
7. Close the Top Cover.
8. Press the **Power** button to turn the printer On.

Fuser Cleaner

Fuser Cleaner Message

When the following message appears on the LCD panel, you need to prepare a new Fuser Cleaner.

REPLACE FCR

Fuser Cleaner Change Message

When the following message appears on the LCD panel and the printer stops printing, you need to replace the Fuser Cleaner.

24 CHANGE FCR

Replacing the Fuser Cleaner



Warning

The Fusing unit and the parts around it are **HOT**. Be sure to wait about 30 minutes before you start replacing the Fuser Cleaner. If you touch the **HOT** parts, you might get injured.

1. Press the **Power** button to turn the printer off and wait until it cools down for approximately 30 minutes.
2. Open the Top cover.
3. Release the Oil Bottle Lock Levers on both sides as shown below.

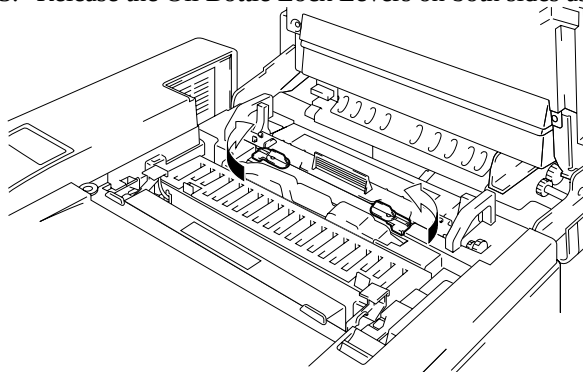


Fig. 5-6 Release the Levers

4. Take the Fuser Cleaner out of the Fusing unit by holding the knob of the Fuser Cleaner.

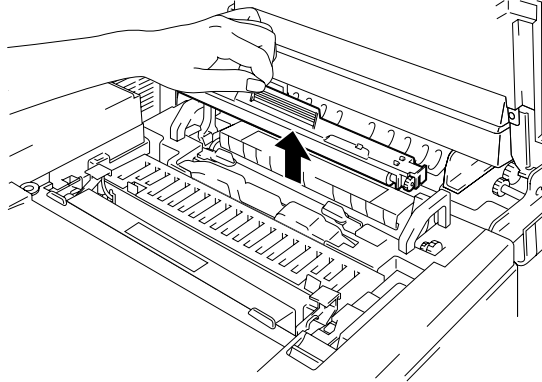


Fig. 5-7 Take the Fuser Cleaner out

5. Install the new Fuser Cleaner into the guide with the roller side facing toward you.

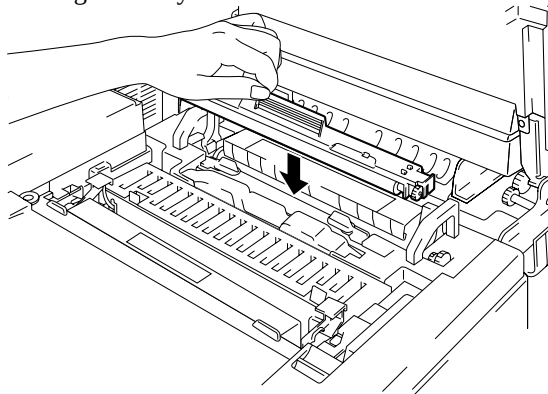


Fig. 5-8 Install the Fuser Cleaner

6. Lock the Fuser Cleaner with the Oil Bottle Lock Levers.
7. Close the Top Cover.
8. Press the **Power** button and turn the printer on.
9. Press the **Sel** button and make the printer Off Line.
10. Press the **Reset** button while holding down the **Shift** button.
11. When you see "RESET PRINTER" on the LCD panel, press the ▲ (UP) or ▼ (DOWN) button and select "RESET PARTS LIFE". Press the **Set** button and select "FC ROLLER" with the ▲ (UP) or ▼ (DOWN) button.
12. Press the **Set** button and the printer becomes On Line.

Waste Toner Pack

Approximately every 24,000 pages you print, you need to change the Waste Toner Pack.

Waste Toner Pack Full Message

When the Waste Toner Pack becomes full, the following message appears on the LCD panel and the printer stops printing. When you see this message, you need to replace the Waste Toner Pack.

22 WASTE TONER

**Caution**

Do not re-use the Waste Toner Pack.

Replacing the Waste Toner Pack

**Warning**

- Do not put the Waste Toner Pack containing toner into a fire. It might cause an explosion.
- Be careful not to spill the toner. Do not inhale the toner or allow it to get into your eyes.

**Caution**

Be careful when you handle the Waste Toner Pack so that toner will not spill on your hands or clothes.

1. Open the Front Cover.
2. Take the Waste Toner Pack out of the Waste Toner Pack Holder which is located at the lower right side of the printer. Be careful not to spill the toner.

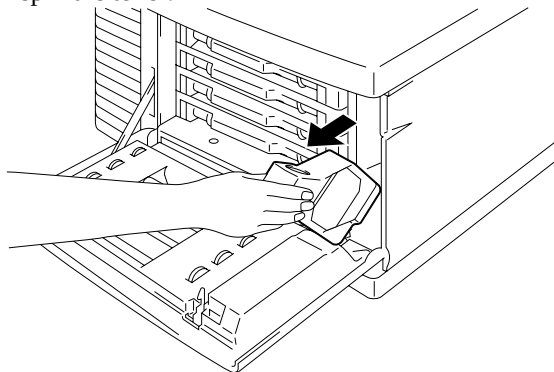


Fig. 5-9 Take the Waste Toner Pack out

3. Peel off the sealing sticker on the left hand side of the Waste Toner Pack. Seal the hole of the Waste Toner Pack with the sealing sticker. When you throw the used Waste Toner Pack away, put it in the plastic bag which is enclosed in the Waste Toner Pack carton.

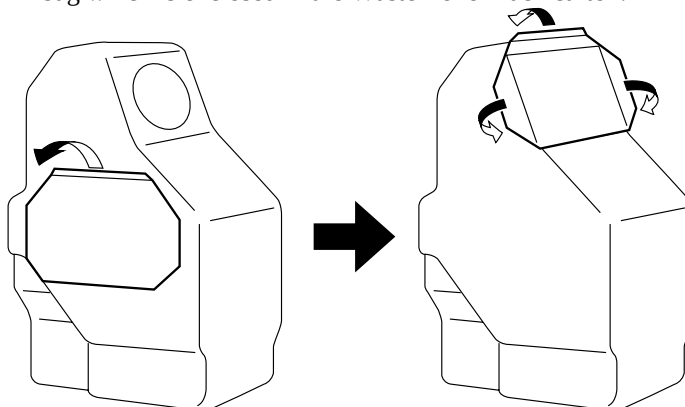


Fig. 5-10 Seal the Sealing Sticker

4. Insert the new Waste Toner Pack into the Waste Toner Pack Holder.
5. Close the Front Cover.

(OPC) Belt Cartridge

(OPC) Belt Cartridge Message

When the (OPC) Belt Cartridge runs out, the following message appears on the LCD panel. When you see this message, you need to replace the (OPC) Belt Cartridge.

REPLACE OPC BELT

! Caution

- Do not touch the surface of the (OPC) Belt Cartridge. If you touch it, it might cause print quality reduction.
- Do not expose the (OPC) Belt Cartridge to light (more than 800 lux) for more than 2 minutes. If you do, it might cause reduction of print quality.
- Be sure to open the printer Front Cover when you handle the (OPC) Belt Cartridge.
- Damage caused by improper handling of the (OPC) Belt Cartridge may void your warranty.

Replacing the (OPC) Belt Cartridge

1. Press the Power button and turn the printer off.
2. Open the Front Cover and the Top cover.
3. Pull the green Belt Cartridge Lock Levers on both sides toward you to release the lock.

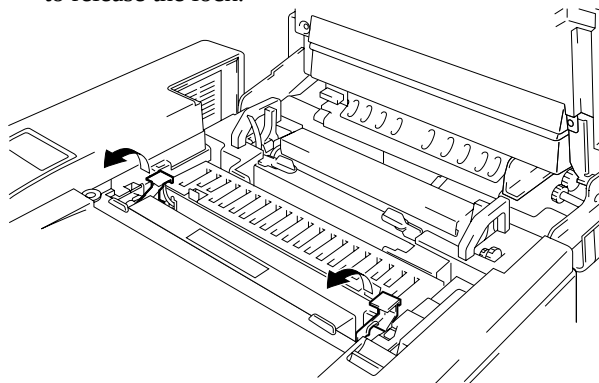


Fig. 5-11 Release the Belt Cartridge Lock Levers

4. Take the (OPC) Belt Cartridge out of the printer.

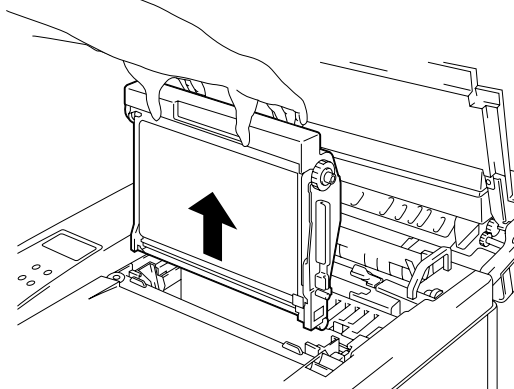


Fig. 5-12 Take the (OPC) Belt Cartridge out

5. Remove the Tension Release Pins from the new (OPC) Belt Cartridge.

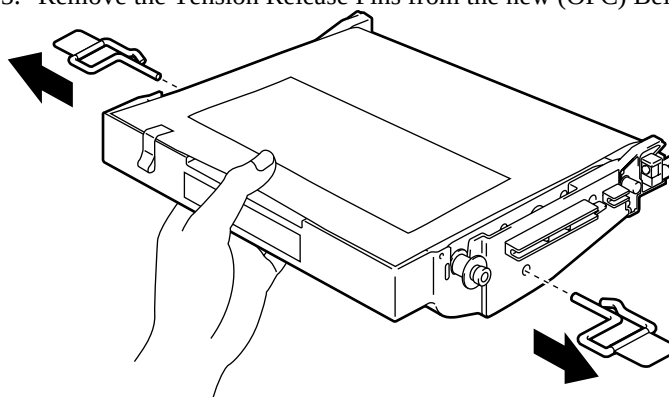


Fig. 5-13 Remove the Tension Release Pins

6. Remove the protective sheet of the new (OPC) Belt Cartridge. Do not touch the green part of the (OPC) Belt Cartridge.

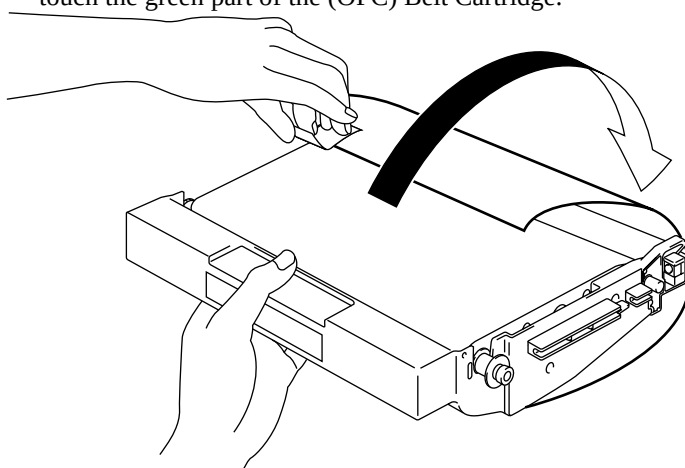


Fig. 5-14 Remove the Protective Sheet

7. Insert the new Belt Cartridge into the printer along the guide with the flat side facing toward you.

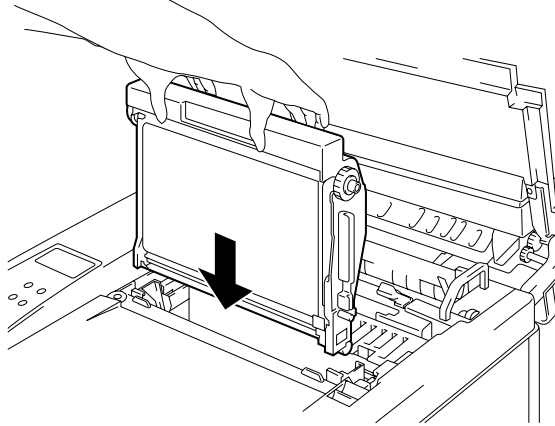


Fig. 5-15 Insert the new Belt Cartridge

8. Press the Belt Cartridge Lock Levers on both sides of the (OPC) Belt Cartridge rearwards to lock the cartridge into the printer.
9. Close the Front Cover and the Top Cover.
10. Press the **Power** button and turn the printer on.
11. Press the **Sel** button and make the printer Off Line.
12. Press the **Reset** button while holding down the **Shift** button.
13. When you see “RESET PRINTER” on the LCD panel, press the ▲ (UP) or ▼ (DOWN) button and select “RESET PARTS LIFE”. Press the **Set** button and select “OPC BELT” with the ▲ (UP) or ▼ (DOWN) button.
14. Press the **Set** button and the printer becomes On Line.

Ozone Filter

Ozone Filter

You need to replace the Ozone Filter once a year to prevent ozone from coming out of the printer.

Caution

You have to replace the Ozone Filter once a year. If you do not, it might cause a noticeable smell of Ozone.

Replacing the Ozone Filter

1. Slide and remove the Rear Side Cover . Take the Ozone Filter Case out which is located inside the Rear Side Cover.

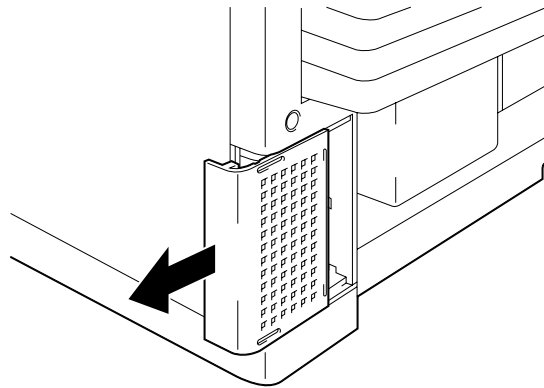


Fig. 5-16 Take the Ozone Filter Case out

2. Remove the Ozone Filter Case from the Ozone Filter Cover.

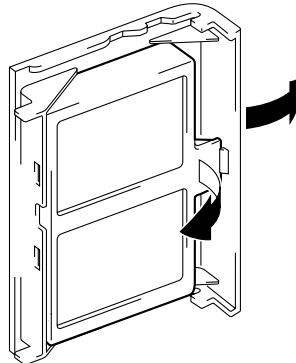


Fig. 5-17 Remove the Ozone Filter

3. Insert the new Ozone Filter Case into the Ozone Filter Cover.
4. Slide the Rear Side Cover to reinstall it.

Fusing Unit

Fusing Unit

When the following message appears on the LCD panel, you need to replace the Fusing Unit.

REPLACE FUSER



Warning

The Fusing unit and the parts around it are **HOT**. Be sure to wait about 30 minutes and check it has cooled down before you start replacing the Fusing unit.
If you touch the **HOT** parts, you might get injured.

Replacing the Fusing Unit

1. Press the **Power** button and turn the printer off and unplug the printer. Wait for 30 minutes or until the printer has cooled down.
2. Open the Top cover and the Rear Access Cover.
3. Unscrew the screws on both sides inside the Rear Access Cover and release the metal parts.

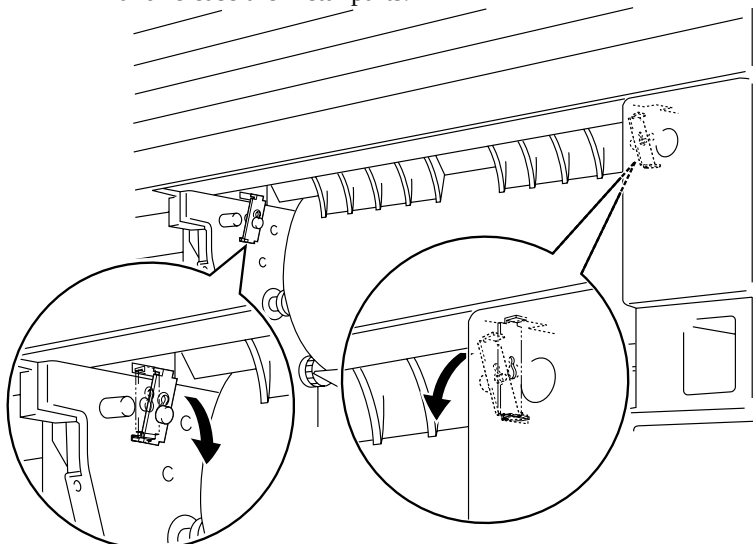


Fig. 5-18 Unscrew and release the Metal Parts

Note

When you start using a new Fusing Unit, it is possible that initially poor fixing may occur. If it does, please wait for a while until the oil penetrates through to the Heat Roller.

4. Take out the Fusing Unit from the printer by holding the handles on both sides.

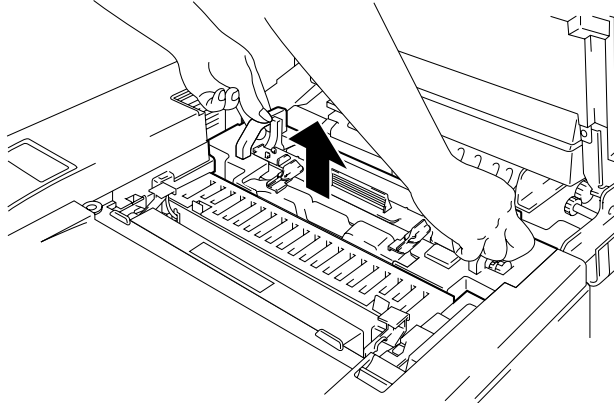


Fig. 5-19 Take out the Fusing Unit from the Printer

Caution

When taking the Fusing unit out of the printer, be sure to keep the Fusing Unit flat, so that oil will not be spilt.

5. Remove the Oil Bottle and the Fuser Cleaner from the Fusing Unit.
6. Install the new Fusing Unit into the printer. Insert the Fusing unit fully down into the correct position.

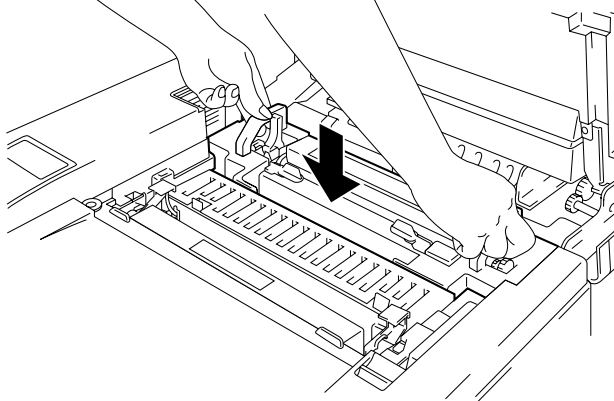


Fig. 5-20 Installing the New Fusing unit

7. Fit the metal parts and secure with the two screws.

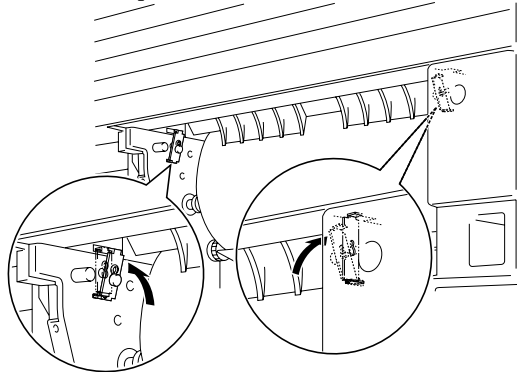


Fig. 5-21 Secure the Metal Parts

8. Release the pressure a little with the Pressure Release Levers(①). Then pull the protective parts between the rollers of the Fusing Unit out to remove them(②). Make sure that the Pressure Release Levers are locked when the protective parts have been removed.

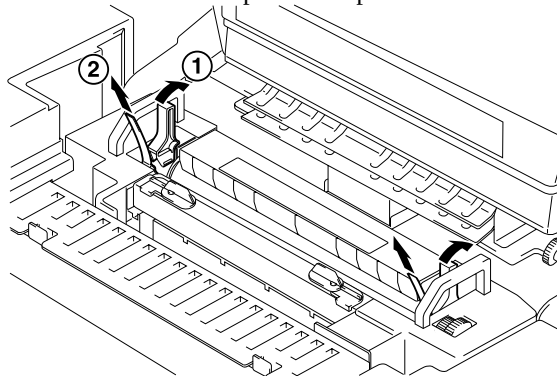


Fig. 5-22 Removing the Protective Parts

9. Install the Fuser Cleaner and the Oil bottle into the new Fixing Unit and Lock the Oil Bottle Lock Levers. Be careful not to spill oil inside the printer. It might cause damage to the printer.
10. Press the **Power** button and turn the printer on.
11. Press the **Sel** button and make the printer Off Line.
12. Press the **Reset** button while holding down the **Shift** button.
13. When you see “RESET PRINTER” on the LCD panel, press the ▲ (UP) or ▼ (DOWN) button and select “RESET PARTS LIFE”. Press the **Set** button and select “FUSER UNIT” with the ▲ (UP) or ▼ (DOWN) button.
14. Press the **Set** button and the printer becomes On Line.

! Caution

When you replace the Fusing Unit, do the replacement very carefully. Do not put pressure onto the Fusing unit. If you do, it might cause damage to the Fusing Unit and / or the printer.

120K Kit

120K Kit

When you see the following message on the LCD panel, you need to replace the Drum Cleaner, Paper Discharger, Transfer Roller, the Paper Feeding Roller, the Separator Pad and the Transfer Drum.

Note

- As for how to replace the Paper Feeding Roller, the Separator Pad and the Transfer Drum, consult your local dealer/retailer.
- We recommend you to consult the dealer where you purchased the printer when you see following message on the LCD panel.

REPLACE 120K KIT

Drum Cleaner

Caution

The axis holder and bias element must be connected to install the Drum Cleaner. Be sure to check the connection before you start replacement.

Replacing the Drum Cleaner

1. Press the **Power** button and turn the printer off.
2. Open the Top cover.
3. Remove the Drum Cover.

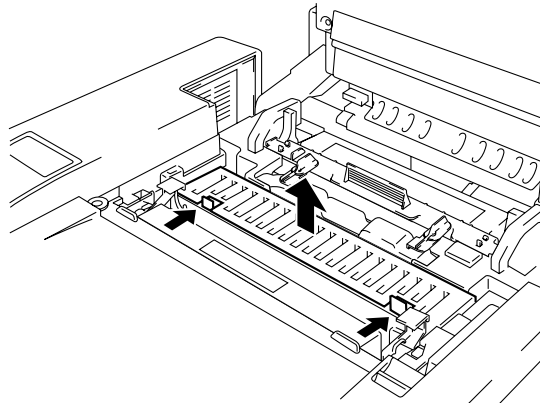


Fig. 5-23 Open the Covers

4. Take the Drum Cleaner out of the printer by holding the knob which is located on top of the Drum Cleaner. Push the knob forward first and pull to remove the Drum Cleaner.

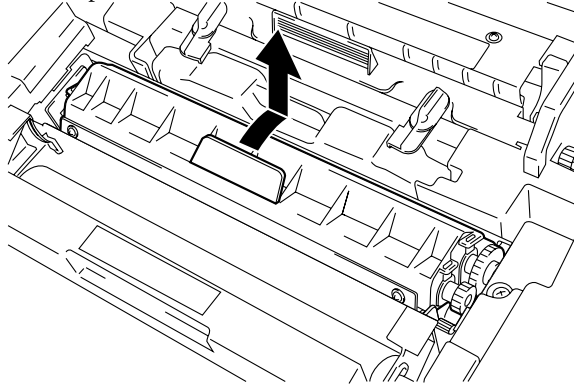


Fig. 5-24 Take the Drum Cleaner out

5. Install the new Drum Cleaner into the printer by adjusting the guides and pushing till it clicks.

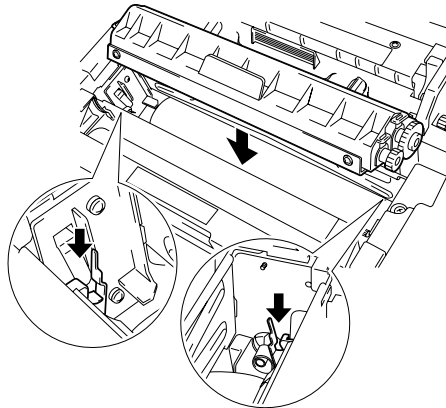


Fig. 5-25 Install the New Drum Cleaner

6. Refit the Drum Cover and close the Top Cover.

Paper Discharger

! Caution

Do not touch the charging wire.

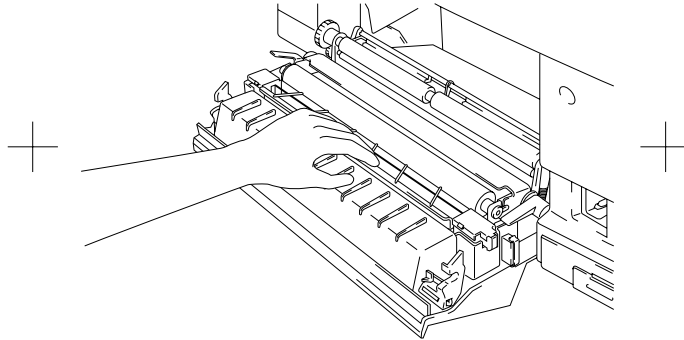


Fig. 5-26 Charging Wire

Replacing the Paper Discharger

1. Open the Rear Access Cover.
2. Remove the Paper Discharger from the Transfer Unit by sliding it to the right a little bit. Hold the right hand side of the Discharging Unit and pull to remove it.

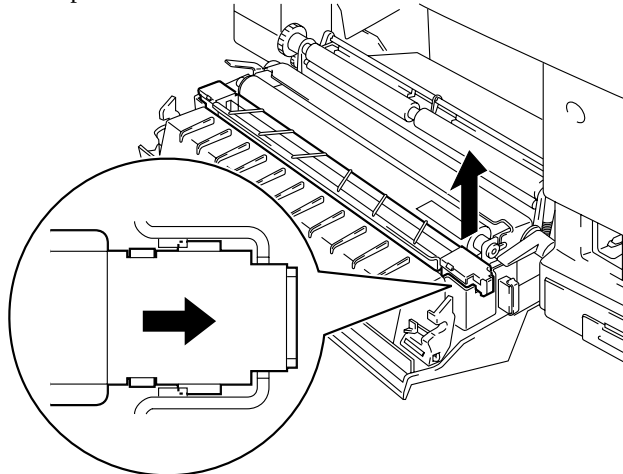


Fig. 5-27 Remove the Paper Discharger

3. Install the new Paper Discharger into the Transfer Unit.

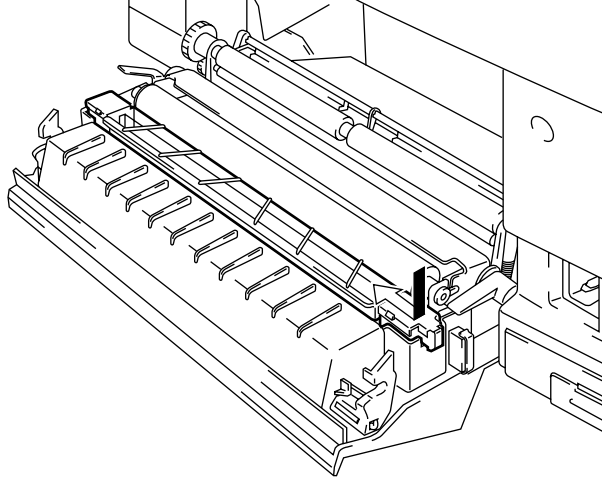


Fig. 5-28 Install the Paper Discharger

Replacing the Transfer Roller

1. Release the green Transfer Roller Lock Lever. Lift the Lever to release the Transfer roller.

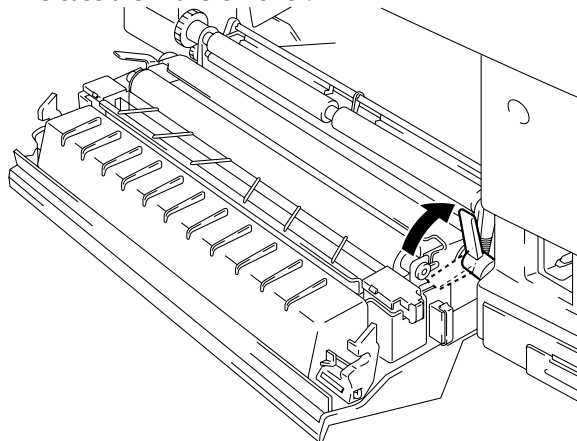


Fig. 5-29 Release the Lock Lever

2. Take the Transfer Roller out of the printer by pulling the right hand side up. Then slide the Transfer roller to the right to remove it.

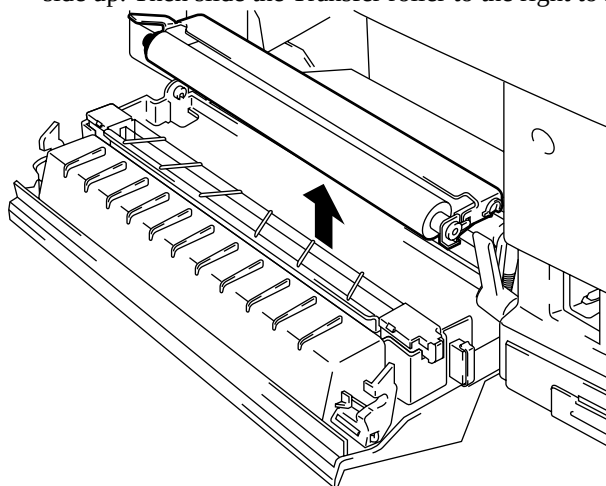


Fig. 5-30 Take the Transfer Roller out

3. Install the new Transfer Roller by putting the left side pin of the Transfer Roller into the boss on the left hand side of the unit. Adjust and place the right side knob of the Transfer Roller into the holder.

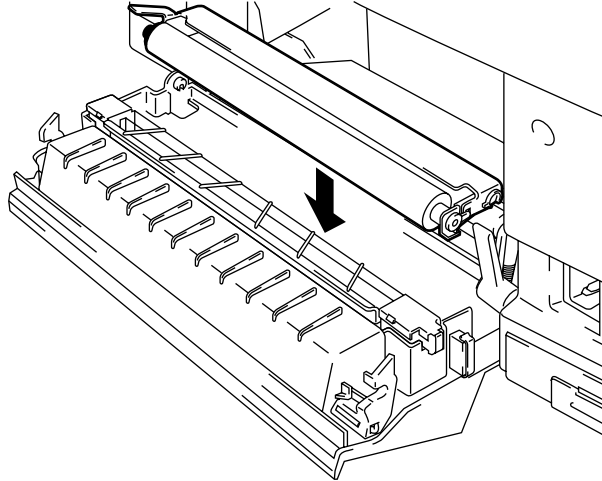


Fig. 5-31 Install the Transfer Roller

4. Lock the Transfer Roller with the Transfer Roller Lock Levers.
5. Close the Rear Access Cover.
6. Plug in the printer and press the **Power** button to turn the printer on.
7. Press the **Sel** button and make the printer Off Line.
8. Press the **Reset** button while holding down the **Shift** button.
9. When you see "RESET PRINTER" on the LCD panel, press the ▲ (UP) or ▼ (DOWN) button and select "RESET PARTS LIFE" . Press the **Set** button and select "120K KIT" with the ▲ (UP) or ▼ (DOWN) button.
10. Press the **Set** button and the printer becomes On Line.

CLEANING THE PRINTER

Clean the printer exterior and interior periodically with a dry soft cloth. If the printed page gets stained with toner, clean the printer interior with a dry soft cloth.

Cleaning the Printer Exterior

Clean the printer exterior as follows:

1. Turn off the printer and unplug the power cord.
2. Remove the Media Cassette.
3. Wipe the printer body with a soft cloth to remove dust from it.

Dip the cloth in water and wring it out thoroughly for cleaning.

Note

Use water for cleaning. Cleaning with volatile liquids such as thinner or benzine damages the surface of the printer.
Do not use cleaning materials that contain ammonia. It might damage the printer, particularly the toner cartridge.

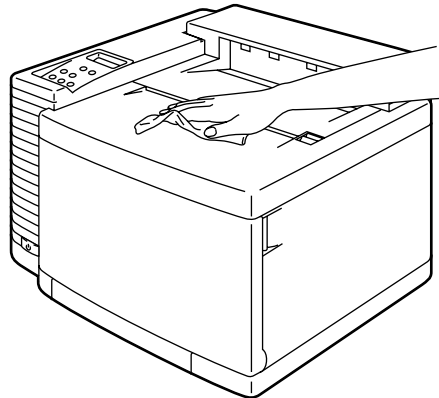


Fig. 5-32 Cleaning the Printer Exterior

Periodical Printer Cleaning

Every 20,000 pages printed or every 12 months, clean the following parts with a dry cloth.

Clean the Paper Guide and Registration Roller to prevent paper mis-picking.

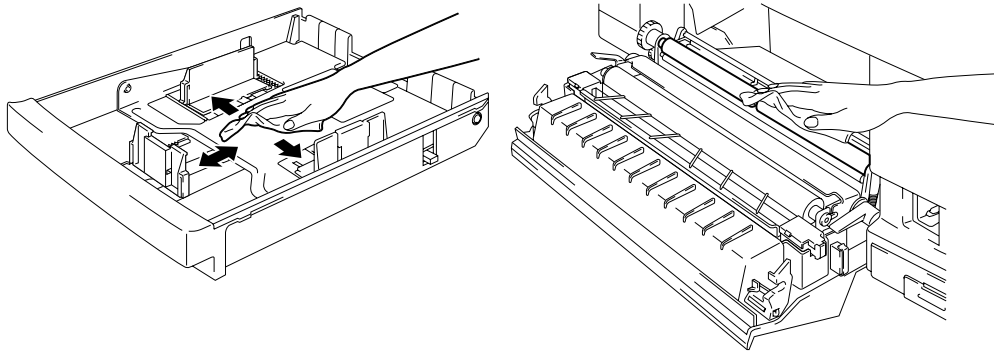


Fig. 5-33-1 Paper Guide and Registration Roller

Clean the Exit Roller after opening the Top Cover slightly. This will help to prevent paper jams at the paper exit or dirt appearing on the printed paper.

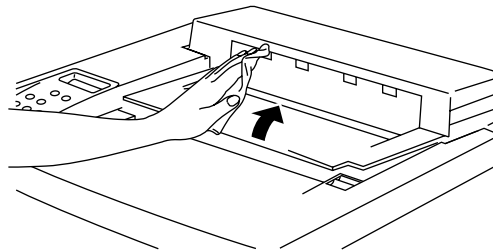


Fig. 5-33-2 Top cover and Exit Roller

REPACKING AND RELOCATING 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.
- Before you ship or move the printer, be sure to take out the following items and put them in separate bags (Do not put them in the printer carton box);
 - * the Fusing unit
 - * the Waste Toner Pack
 - * the Toner Cartridges
 - * the (OPC) Belt Cartridge
- Wipe off any Oil from the Fusing unit after removing the Oil bottle from it.
- Before you move the printer, be sure to remove the Fusing Unit, remove the Oil Bottle from the Fusing Unit and then remove the remaining oil in the Fusing Unit using the Oil Syringe. Discard the oil according to local regulations.

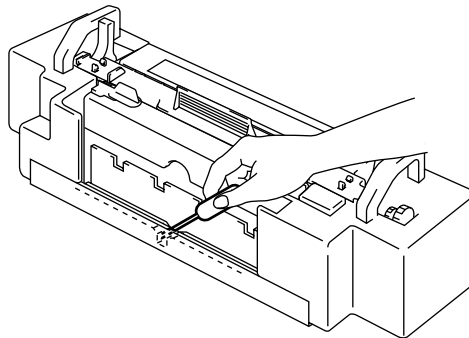


Fig. 5-33-3 Removing the Oil

How to Repack the Printer

1. Press **Power** button and unplug the printer.
2. Remove the Waste Toner Pack, the Toner Cartridges, the Fusing Unit and the (OPC) Belt Cartridge from the printer and replace them in their original packaging. However, do not put them in the printer carton box.
3. Put the printer in the original packing material and into the original carton box.
4. Close the carton box and tape it securely.

OPTIONS

Lower Tray Unit

Loading Paper from the Lower Media Cassette

The lower tray unit is a device that functions as a second paper source which can contain a maximum of 250 sheets of paper (160 g/m² or 43 lbs). For the optional lower tray unit, consult the dealer where you purchased the printer.

With the lower tray unit installed, load paper into the lower paper cassette in the same way as you do the upper media cassette.

How to Install the Lower Tray Unit



Warning

- This printer is heavy and weighs approximately 36kg (79.37lbs). When you move or lift this printer, be sure at least 2 people lift it together, so that you will not hurt your back.
- Be sure to lift the printer using the handholds which are located at the four corners at the bottom of the printer, so that the printer will not trap your hands.



Caution

When you move or lift this printer, be sure to keep the printer flat and remove Toner Cartridges, Waste Toner Pack, Oil Bottle and Fusing Unit first so that they will not spill.

1. Place the Lower Tray Unit on a flat table. Pull out the connection cable which is located at the rear left hand side of the printer.

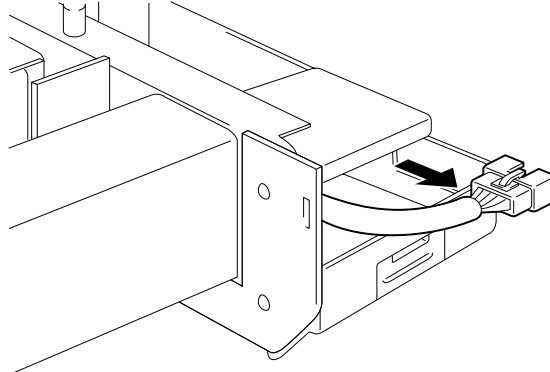


Fig. 5-34 Pull out the Connection Cable

2. Check the three alignment pins on the Lower Tray Unit. Use two people to Lift the printer and put it onto the Lower Tray Unit. Be sure to use the handholds which are located at four corners at the bottom of the printer. Check to see if the alignment pins locate correctly into the printer.
3. Insert the Metal Parts into both sides of the Lower Tray Unit from above and secure with the screws.

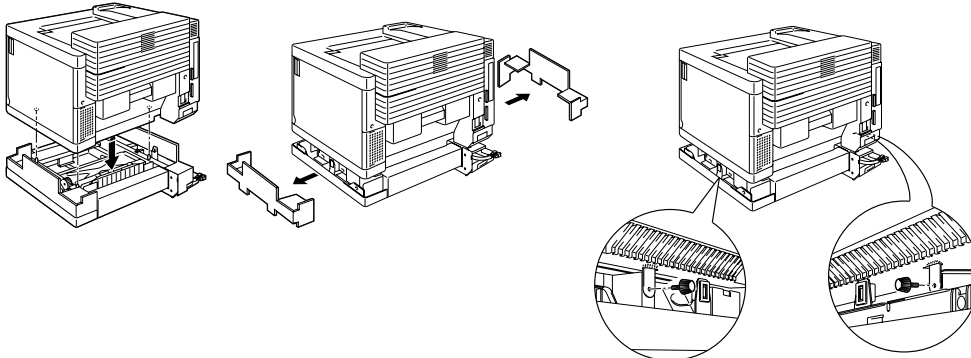


Fig. 5-35 Insert the Metal Parts and Secure with the Screws

4. Insert the connection cable to the printer's connector.

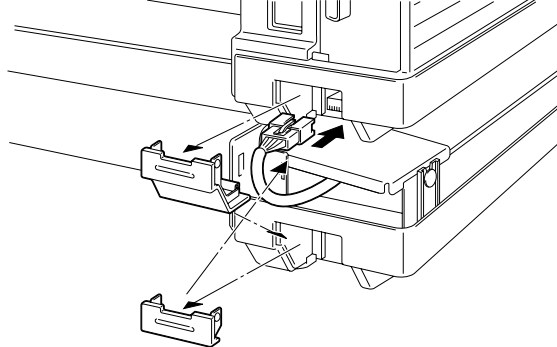


Fig. 5-36 Insert the Connection Cable

5. Fit the covers on both sides of the Lower Tray Unit.

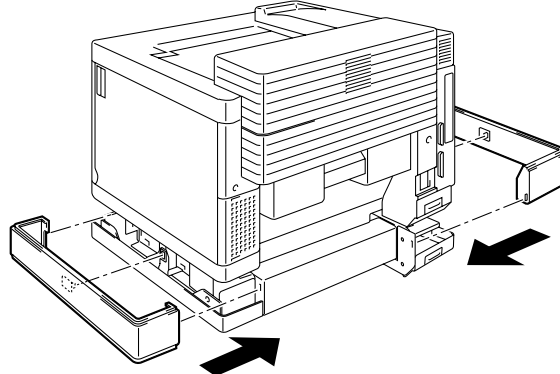


Fig. 5-37 Fit the Cover

Note

Do not load B5 or smaller size paper and envelopes in the cassette which is loaded into the optional Lower Tray Unit. It might cause paper jams.

Font Card, Flash Memory/HDD Card

Installing a Font Card, Flash Memory Card and HDD Card

This printer has two slots for an optional font cartridge and one slot for an optional font card, flash memory card or HDD card. (Type III HDD cards will only fit into card slot 2.)

If you have installed optional font card(s), you can use the fonts stored in them as well as the resident fonts. For optional font cards, consult the dealer where you purchased the printer.

If you have installed an optional flash memory card or HDD card, you can save macros and fonts on it. For flash memory card and HDD card operations and information, see “CARD OPERATION” in Chapter 4.

Notes

- Do not install or remove cards with the printer power on, or you may lose all data from the card, or may seriously damage the card.
- For more information about the cards, consult the dealer where you purchased the printer.
- For the latest information: <http://www.brother.com>

Follow these steps to install or remove a cartridge/card:

1. Make sure that the printer is turned off.

If the printer is turned on, be sure to press the **Sel** button to set the printer off-line. If data remains in the printer memory, the **Data** LED stays on. Press the **Form Feed** button to print out the remaining data, then the **Data** LED goes off. Turn off the printer.

2. Insert an HDD card into slot 2 with the label facing to the right. It is not possible to fit a card into slot 1 with a Type III PCMCIA card fitted in slot 2.
3. Fit a flash memory or font card into either slot 1 or slot 2 with the label facing to the right. Make sure they are inserted correctly.

To remove a card, pull it out of the slot with the printer turned off.

The following type of flash memory card can be installed:

- 4 Mbyte : Fujitsu MB98A81273
- 8 Mbyte : Fujitsu MB98A81373
- 16 Mbyte : Fujitsu MB98A81473
- 32 Mbyte : Fujitsu MB98A81573

- 1 Mbyte : AMD AMC001CFLKA
- 2 Mbyte : AMD AMC002CFLKA
- 4 Mbyte : AMD AMC004CFLKA
- 10 Mbyte : AMD AMC010CFLKA

- 4 Mbyte : AMD AMC004DFLKA
- 8 Mbyte : AMD AMC008DFLKA
- 20 Mbyte : AMD AMC020DFLKA

- 2-85 Mbyte : SanDisk PCMCIA PC Card ATA

The following type of HDD card can be installed:

- 170 Mbyte : Intégral Peripherals Inc. VIPER 170E

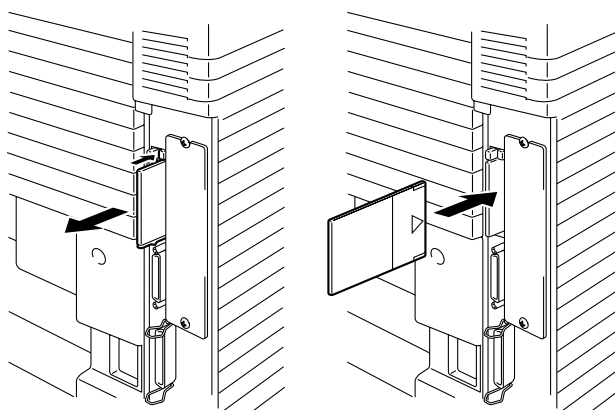


Fig. 5-38 Installing or Removing the Card

Notes

- There might be some HDD cards which will not work with this printer.
- For more information about the cards, consult the dealer where you purchased the printer.
- For the latest information: <http://www.brother.com>

Selecting the Optional Fonts

After you have installed the optional font card, you can select optional fonts by any of the following methods:

1. Through your application software
2. With a font selection command
3. With the **Font** button

When you select fonts through your application software, follow the instructions specific to your software. Refer to your software manual if you need assistance. When you select fonts with a font selection command, embed the font selection command in your program. See the Technical Reference Manual, which is optionally available for this printer.

Notes

When you select the fonts through your software or with a command, note the following:

- You do not need to be concerned about the **Font** button setting. The software or command setting overrides the button setting.
- Be sure to install the font card that has your desired fonts. The printer automatically selects the font that has exactly the same or similar characteristics as those you set through the software or with a command. If the installed font card happens to have a font of similar characteristics, the printer will print in an unexpected font.

To select fonts with the **Font** button, follow these basic steps:

1. Print out the list of optional fonts in the PRINT FONTS C mode with the **Shift** and **Test** buttons.
2. Find the font slot and font ID number on the list.

PORTRAIT LIST										SLOT FONT B										Slot 1 or 2
NUMBER (ID)	SYMBOL	SET	SIZE	STYLE	WEIGHT	TYPEFACE	P O N T S A H P L E (600dpi)													
B000	ROMAN I...	P21:42	11.00	Upright(0)	Medium(0)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(8)ESC(12)P(0)B000																			
B001	OK	P21:42	11.00	Upright(0)	Medium(0)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(10)ESC(12)P(0)B001																			
B002	OK	P21:42	11.00	Upright(0)	Medium(0)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(10)ESC(12)P(0)B002																			
B003	OK	P21:42	11.00	Upright(0)	Medium(0)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(10)ESC(12)P(0)B003																			
B004	OK	P21:42	11.00	Upright(0)	Medium(0)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(10)ESC(12)P(0)B004																			
B005	OK	P21:42	11.00	Upright(0)	Medium(0)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(10)ESC(12)P(0)B005																			
B006	OK	P21:42	11.00	Upright(0)	Bold(3)	Times Roman(5)	A	B	C	D	E	F	G	H	I	J	K	L	M	
	ESC(8)ESC(12)P(0)B006																			

Fig. 5-39 Font ID Numbers on the Font List

3. Select the font with the **Font** button.

See “FONT button” in Chapter 4.

Modular I/O Card

Before installing the NC-2010h Network card, please note the following information.

Before NC-2010h Installation

(USA)

When you install the NC-2010h Ethernet interface card, this printer complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

Please refer to the NC-2010h User's Guide for the FCC notice.

(CANADA)

When you install the NC-2010h Ethernet interface card, this printer complies with the limits for a Class A digital apparatus, pursuant to Canadian Interference-Causing Equipment Regulations.

(Europe)

When you install the NC-2010h Ethernet interface card, this printer complies with EN 55022 Class A.



Warning

In a domestic environment, the printer used with an NC-2010h Network card may cause radio interference, in which cause the user may be required to take adequate measures.

This printer has a modular input/output (MIO) interface slot on the rear panel. This slot allows you to install a commercial MIO-compatible sharing/network card.

For more information about MIO cards, consult the dealer where you purchased this printer.

When you install the MIO card, follow these steps:

1. Turn off the printer and unplug the power cord from the wall socket.



Note

- Be sure to turn off the power to the printer before installing or removing the MIO card.
- Be sure to remove the interface cable connector when installing the MIO card.

2. Remove the two screws and cover plate from the MIO interface slot.
3. Unpack the MIO card and hold it by its edge.

Note

Do not touch the card surface. If static electricity collects, it damages the card.

4. Insert the card until it is securely seated.
5. Secure the MIO card with the two captive screws on the card.
6. Retain the cover plate and two screws removed in 2 in case you want to remove the MIO card later.

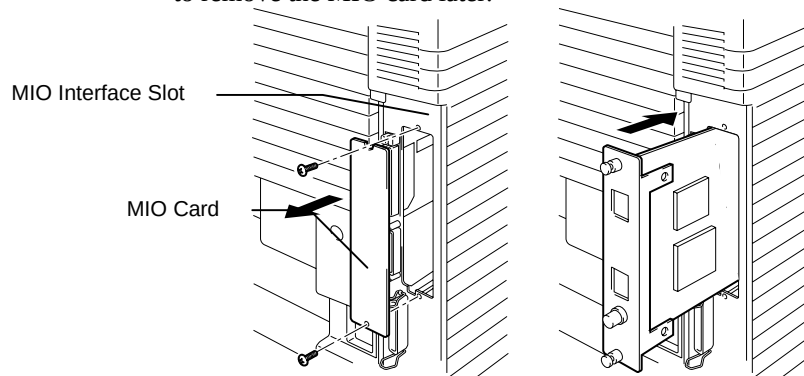


Fig. 5-40 Installing the MIO Card

RAM Expansion

This printer has 16 Mbytes or 32 Mbytes of memory standard, depending on the printer model, and 3 slots for optional expansion memory. The memory can be expanded up to 112 Mbytes by installing commercially available single in-line memory modules (SIMMs). (The standard memory fitted can vary depending on the printer model and country.)

The following capacity of SIMM can be installed:

- 1 Mbyte HITACHI HB56D25632B-6A, -7A, -8A
MITSUBISHI MH25632BJ-7, -8
- 2 Mbyte HITACHI HB56D51232B-6A, -7A, -8A
MITSUBISHI MH51232BJ-7, -8
- 4 Mbyte HITACHI HB56A132BV-7A, -7AL, -7B, -7BL, -8AL, -8B, -8BL
MITSUBISHI MH1M32ADJ-7, -8
- 8 Mbyte HITACHI HB56A232BT-7A, -7AL, -7B, -7BL
MITSUBISHI MH2M32EJ-7, -8, MH2M32DJ-7, -8
- 16 Mbyte TOSHIBA THM324000BSG-60, -70, -80
- 32 Mbyte TOSHIBA THM328020BSG-60, -70, -80

In general, the SIMM must have the following specifications:

Type: 72 pin and 32 bit or 36 bit output
Access Time: 80 nsec. or less
Capacity: 1, 2, 4, 8, 16 or 32 Mbyte
Height: 46mm (1.8 inches) or less
Parity: NONE

EDO RAM can be used.

 Notes

- There might be some SIMMs which will not work with this printer.
- For more information about the cards, consult the dealer where you purchased the printer.
- For the latest information: <http://www.brother.com>

There are 40 bit output SIMMs for workstations. Such SIMMs do not fit this printer.

For SIMMs and installation, consult the dealer where you purchased the printer.

 Note

This printer has 3 SIMM slots. The maximum size for each slot is a 32MB SIMM. For the 32MB standard memory model, a 16MB SIMM is pre-installed. If you want to expand the RAM size to 112MB, replace the 16MB SIMM with a 32MB SIMM.

When you install SIMMs, follow these steps:

1. Turn off the printer and unplug the power cord from the AC outlet.

 Note

Be sure to turn off the power to the printer before installing or removing the SIMMs.

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

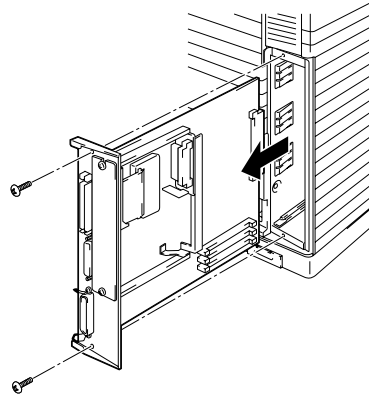


Fig. 5-41 Removing the Main Controller Board

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



Caution

Do not touch the memory chips and the surface of the main controller board. If static electricity collects, it may damage these electrical parts.

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

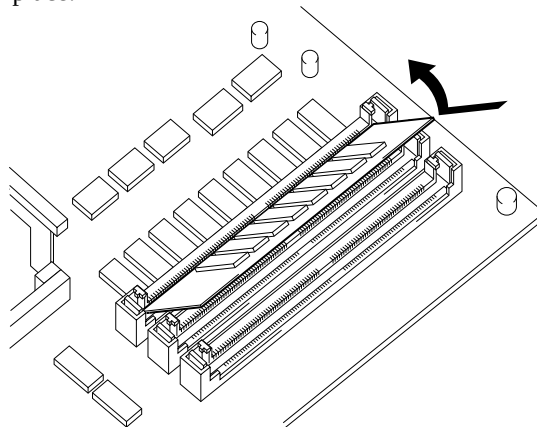


Fig. 5-42 Install the SIMM

5. Install as many SIMMs as you need.
 - Set the SIMM into the slot at an angle.
 - Push the top of the SIMM gently towards the vertical until it clicks into place.

Notes

- When you install less than two SIMMs, be sure to install them in the order Slot 1 and then Slot 2.
- When you install different capacities of SIMMs, be sure to install the larger capacity SIMMs in the lower socket and smaller capacity SIMMs in order in the upper sockets.

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

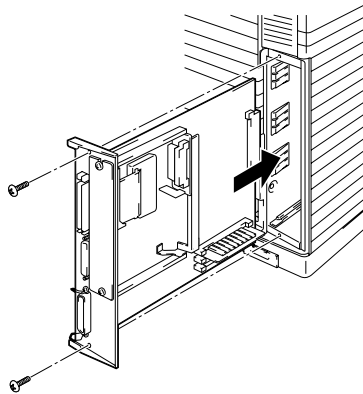


Fig. 5-43 Install the Main Controller board

7. Secure the main controller board with the two screws.
8. Reconnect the interface cable (printer cable) from your computer. Plug the power cord into the AC outlet and turn the printer on.
9. To check whether the SIMM has installed correctly, you may perform a Test Print "Print Configuration" which will print the current memory size.

CHAPTER 6

TROUBLE SHOOTING

TROUBLESHOOTING

If any problems occur, the printer automatically stops printing, diagnoses the problem, and displays the corresponding message to alert you. Take the appropriate action, referring to the following tables. If you cannot clear the problem, consult the dealer where you purchased the printer. Inform the dealer of the message number for quick troubleshooting.

Operator Call Messages

When any of the following messages appear, the printer stops operating.

Operator Call Message	Meaning	Action
CHECK XXXXXXXX	Check the paper tray. XXXXXXX is TRAY 1/ TRAY 2.	Check the adjustment lever at the bottom of the upper paper cassette and adjust to the correct setting in when the CHECK TRAY 1 message appears. Load a stack of paper into the cassette.
12 COVER OPEN FRONT	The Front cover of the printer is open.	Close the Front cover.
12 COVER OPEN TOP	The Top cover of the printer is open.	Close the Top cover.
12 COVER OPEN REAR	The Rear Access cover of the printer is open.	Close the Rear Access cover.
13 JAM XXXXXX	Paper is jammed in the printer. XXXXXX is DRUM/ FEEDER/ INSIDE/ REAR.	Remove the jammed paper from the indicated area. See 'Paper Jams' section in this chapter.
14 NO CARTRIDGE XXXX COLOR	A toner cartridge is not installed in the printer. XXXX indicates colors.	Install the toner cartridge.
XX NO CASSETTE	The Media Cassette is not installed. XX is T1/ T2.	Install the Media Cassette.
16 TONER EMPTY XXXX COLOR	The printer has almost run out of toner: you may print another 50 pages. (The Alarm LED lights at the same time.) XXXX indicates colors.	Remove the toner cartridge, rock it several times at 45°, and install it again or replace the toner cartridge with a new one.

Operator Call Message	Meaning	Action
XX LOAD PAPER ***** SIZE	The wrong size of paper was loaded in the Media Cassette. XX is T1/ T2.	Load the requested size of paper in the Media Cassette and press the Form Feed button.
T1 MANUAL FEED ***** SIZE	The printer requests you to load paper manually.	Load the requested size of paper on the Standard Media Cassette and press the Sel button.
19 CHECK FONT	An error occurred in the optional font card.	Turn off the printer, and re-install or replace the optional font card.
20 FONT REMOVAL	The PCMCIA card was removed while the printer is on-line.	Turn off the printer, install the card, and turn on the printer. The Continue button will allow you to temporarily ignore this message.
22 WASTE TONER	The Waste Toner Pack is full.	Replace the Waste Toner Pack with a new one.
23 OIL EMPTY	The Oil in the Oil Bottle is empty.	Replace the Oil Bottle with a new one.
24 CHANGE FCR	It is time to replace the Fuser Cleaner.	Replace the Fuser Cleaner with a new one.
25 NO FUSER UNIT	The Fixing Unit is not installed correctly.	Install the Fixing Unit correctly.
27 NO OPC BELT	The (OPC) Belt Cartridge is not installed correctly.	Install the (OPC) Belt Cartridge correctly.
28 NO FC ROLLER	The Cleaning Roller is not installed correctly.	Install the Cleaning Roller correctly.

Maintenance Messages (appear on the lower row)

Error Message	Meaning	Action
FUSER OIL LOW	The Oil in the Oil Bottle is almost empty.	Replace the Oil Bottle.
REPLACE FCR	It is time to replace the Cleaning Roller.	Replace the Cleaning Roller.
REPLACE OPC BELT	It is time to replace the (OPC) Belt Cartridge.	Replace the (OPC) Belt Cartridge.
REPLACE FUSER	It is time to replace the Fixing Unit.	Replace the Fixing Unit.
REPLACE 120K KIT	It is time to replace the Drum Cleaner, Paper Discharger and Transfer Roller.	Replace the Drum Cleaner, Paper Discharger and Transfer Roller.

Error Messages

Error Message	Meaning	Action
32 BUFFER ERROR	Input buffer overflow	Reset the printer or turn off and on the printer.
34 MEMORY FULL	Work memory overflow	Press the Continue button to resume printing. If the same error should occur after you press the Continue button, turn off the printer. Wait a few seconds, then turn it on again. Reduce the input buffer size. Turn off "KEEP PCL." Add SIMM memory with printer power off. Download font and the fonts saved in the HDD card might cause the error, for these occupy the same work area as the RAM. Memory expansion is recommended in that case.
40 LINE ERROR	Error in the communications circuit	When the serial interface is used, check the communications parameters such as baud rate, code type, parity, and handshake protocols. When the parallel interface is used, check the interface cable connection.
41 PRINT CHECK	Error in communication with the engine controller	Turn off the printer. Wait a few seconds, then turn it on again.

Error Message	Meaning	Action
42 CARD 1(2) FULL	Card in slot 1 or 2 overflow	Delete unnecessary macros or fonts, or use a new card.
43 CARD1(2)W ERROR	Card in slot 1 or 2 write error	Set the write protect button of the card to OFF if it has been set to ON. Use a new card. If the same error occurs, consult your dealer or service personnel.
45 MIO ERROR	Error in communication with the MIO card	Install the MIO card correctly.
47 CARD1(2)R ERROR	Card in slot 1 or 2 read error	Use a new card. If the same error occurs, consult your dealer or service personnel.
IGNORE DATA (BR-Script 2 mode only)	Data is ignored because of an error in the PostScript® language program.	Press the Reset button. If the same error occurs, you may need to add optional SIMM memory.

Service Call Messages

When any of the following messages appear on the LCD, turn the printer Off , wait 5 seconds and then turn the printer On again. If this does not clear the problem, consult your dealer or our authorized service representative.

Service Call Message	Meaning	Action
61 PROG ERROR	Program ROM checksum error	Turn off the printer. Wait a few seconds, then turn it on again.
62 FONT ERROR	Font ROM checksum error	Turn off the printer. Wait a few seconds, then turn it on again.
63 D-RAM ERROR	D-RAM error	Turn off the printer. Wait a few seconds, then turn it on again.
66 NV-W ERROR	NV-RAM write error	Turn off the printer. Wait a few seconds, then turn it on again.
67 NV-R ERROR	NV-RAM read error	Turn off the printer. Wait a few seconds, then turn it on again.
68 NV-B ERROR	NV-RAM write / read error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE C3	Engine NV-RAM error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE C4	Engine controller error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE C7	Process timing clock error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE D1	Y switching clutch error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE D2	M switching clutch error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 2	Address error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 3	Address error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 4	Bus error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 5	Bus error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 6	Privileged instruction	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 8	Illegal instruction	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE 9	No FPU	Turn off the printer. Wait a few seconds, then turn it on again.

Service Call Message	Meaning	Action
99 SERVICE D3	C switching clutch error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE D4	K switching clutch error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE D5	K,Y switching solenoid error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE D6	C, M switching solenoid error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E1	Developing motor error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E2	Main motor error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E3	Drum error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E4	Toner empty sensor error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E5	Transfer Roller solenoid error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E6	Drum cleaning solenoid error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E7	Drum cleaning clutch error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E8	Fusing Unit clutch error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE E9	Belt marker sensor error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE EL	Erase LED error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE F0	Cooling fan error	Turn off the printer. Wait a few seconds, then turn it on again.

Service Call Message	Meaning	Action
99 SERVICE F2	Ozone fan error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE F4	Fuser fan error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE F5	Charge HV unit error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE H0	Fuser thermistor error	Turn off the printer. Wait 15 minutes, then turn it on again.
99 SERVICE H2	Fuser temperature error (Warming up time error)	Turn off the printer. Wait 15 minutes, then turn it on again.
99 SERVICE H3	Fuser temperature error (On time error)	Turn off the printer. Wait 15 minutes, then turn it on again.
99 SERVICE H4	Fuser temperature error (Off time error)	Turn off the printer. Wait 15 minutes, then turn it on again.
99 SERVICE L1	Beam detector error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE L2	Scanner motor error	Turn off the printer. Wait a few seconds, then turn it on again.
99 SERVICE LL	Laser power error	Turn off the printer. Wait a few seconds, then turn it on again.

Paper Jams

This printer has been designed to be trouble free. However, if any problem should occur, note the display message and take the appropriate action. This section describes the actions to be taken against paper jams and unsatisfactory printouts.

Paper Jam

If paper jams in the printer, it stops printing and displays the following message.

13 JAM XXXXXX

Notes

If paper jams occur frequently, check the adjustment lever located in the bottom of the Media Cassette or clean the printer interior and check the paper quality.

About the Adjustment Lever

If paper is misfeeding or doublefeeding frequently, set the adjustment lever according to the table below.

Recommended Paper Size

- I. Backwards : letter, legal*, A4, B5(ISO,JIS), Executive and A5
- II. Forwards : COM10, C5 and DL

*Legal Cassette only

If CHECK TRAY is shown when the Media Cassette is filled with paper, check the adjustment lever and adjust it to the correct setting.

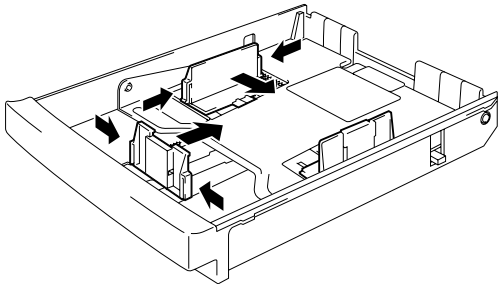


Fig. 6-1 Adjustment Lever

Do not use the following paper:

- Bent paper
- Moist paper
- Paper that does not meet specifications

Paper may jam in the Media Cassette, inside the printer, at the Rear Access Cover or at the paper exit. Check the jam location and follow the instructions below to remove the jammed paper.

After you have followed the instructions, the printer automatically resumes printing. However, the **Data** LED may come on and the following message may appear on the display.

07 FF PAUSE

After a paper jam has occurred, data usually remains in the printer memory. The message prompts you to execute a form feed and print out the remaining data. Press the **Set** button to continue.

■ Paper Jam at Paper Exit

13 JAM REAR

If paper has passed behind the Rear Access Cover and a paper jam has occurred at the paper exit, follow the steps below;

1. Open the Top Cover and release the Pressure Release Lever.

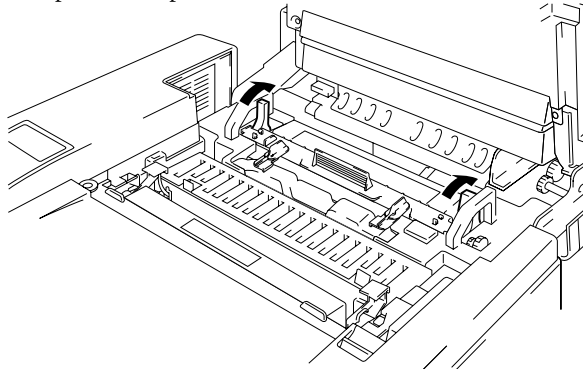


Fig. 6-2 Paper Jam at Paper Exit

2. Open the Rear Access Cover and remove the jammed paper by pulling it out slowly.

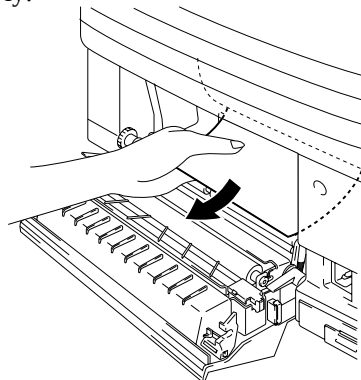


Fig. 6-3 Remove the jammed paper

3. Close the Rear Access Cover.

Note

When paper jams at the Rear Access Cover increase, replace the Paper Discharger.

■ Paper Jam at Fusing Roller inside the printer

13 JAM INSIDE

or

13 JAM DRUM

If a paper jam occurs at the Fusing Roller, follow the steps to remove the jammed paper in the same way as for 'Paper Jam at Paper Exit'. Otherwise, follow the steps below.



Warning

The Fusing Roller is extremely hot during operation. Remove the paper carefully.

1. Open the Rear Access Cover.
2. Remove the jammed paper by holding it with both hands and pulling it slowly towards you.

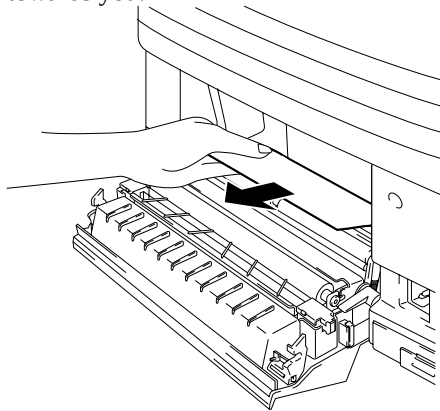


Fig. 6-4 Paper Jam Inside

3. Close the Rear Access Cover.

! Caution

- Do not touch the toner surface of the jammed paper. It might stain your hands or clothes.
- After having removed the jammed paper, if the printed paper has a stain, print several pages before restarting your printing.
- Remove the jammed paper carefully so as not to spread toner.
- Take care not to stain your hands and clothes with toner. Wash toner stains immediately with cold water.
- Never touch the transfer roller.

■ Paper Jam in the Media Cassette

13 JAM TRAYS

If a paper jam occurs inside the Media Cassette, follow these steps:

1. Pull out the Media Cassette.
2. Remove the jammed paper.

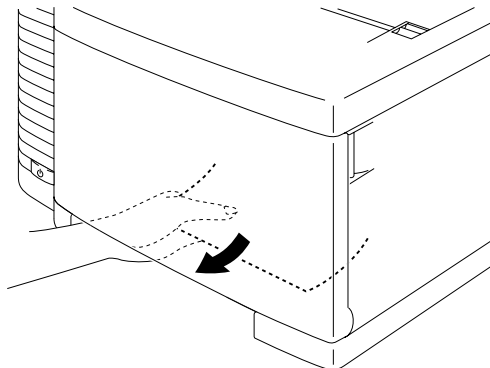


Fig. 6-5 Paper Jam at Media Cassette

3. Install the Media Cassette.

! Caution

Do not pull out the upper Media Cassette while paper is being fed from the optional lower Media Cassette, or it will cause a paper jam.

Q & A

This section contains commonly asked questions and the answers concerning your printer. If you have encountered a problem, try to 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 come on.	Check the following: • The printer is securely plugged into the AC outlet. • The power source is active. • The Power button is on.
The printer does not print.	Check the following: • The printer is turned on. • The printer is Online. • All of the protective parts have been removed. • All the covers on the printer are closed. • The toner cartridges are installed properly. • The 'toner empty' message is not displayed on the LCD. If one or more are on, replace the toner cartridges. • The interface cable is securely connected between the printer and computer. • The Alarm LED is blinking. If the LED is blinking, refer to the Operator Call section of this manual. • The HL-2400C printer is selected in the printer settings in your application. • The host is configured correctly: check printer port, print manager etc. (clear stored job or 'use print manager' is selected off) • There is no jammed paper inside the printer. • Paper is loaded in the Media Cassette. • An Error message is not displayed.

Setting Up the Printer

Question	Recommendation
I cannot print from my application software.	Make sure the supplied Windows printer driver is installed correctly and selected in your application software.
I cannot print the entire page.	- Check to see if the size of paper in the feeder is the same as the one that you have selected in your application or the printer driver. - Check to see if the interface cable is connected to the printer and computer securely.
Computer indicates a device time-out.	- If the Alarm LED is blinking, clear it referring to the 'Alarm Indications at a Glance' section in this chapter and try to print again. - If the Alarm LED is off, wait a short while and then click on the Retry button on the PC screen dialog box. Check to see if the printer is On-line
Computer indicates Paper Empty.	Paper is empty. Load paper in the Feeder and push the On Line button to recover from the error status..
Computer indicates Off Line	Press the On Line button to make the printer ready.
Computer indicates Power Off	Check if the printer is securely plugged into the AC outlet and the Power button is on.
Computer indicates an error message other than above.	Check the following; - The computer can work in bi-directional mode. - The printer port is correct. - Selection of the printer is correct. - Recommended interface cable is being used.(IEEE 1284 compliant) Or select the 'Control' tag in the driver and set the 'Status Monitor' to off.

Paper Handling

Question	Recommendation
The printer does not load paper.	• Check to see if the Alarm LED is on. If so, the Media Cassette may be out of paper or not properly installed. If it is empty, load a new stack of paper into the Media Cassette. • If there is paper in the Media Cassette, make sure that 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 replace it in the paper tray. • Reduce the stack of paper in the Media Cassette, then try again.
How can I load envelopes?	You can load envelopes from the Media Cassette. Make sure to adjust the paper guide. Your application software also 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 applications manual for further information.
What paper can I use?	See 'Paper Handling' in Chapter 3 for detailed paper specifications.
How can I clear paper jams?	See "PAPER JAMS" section in this chapter.
The printer loads more than one sheet at a time.	Check to see if: • The paper loaded is all the same type. • Paper that meets the specifications is loaded. • Papers were fanned before loading. • The stack of paper is not too high. • The side guide is not set too tight.
The printer doesn't eject paper.	Set the printer Off-line, then push the Form Feed button. Then push the On Line button.
Paper loads skewed.	Check the following; • The side guide is adjusted correctly. • The amount of paper you have loaded is correct. Refer to 'Loading Paper in the Media Cassette' section in Chapter 2.
Sometimes mis-picking of paper from the paper tray or mis-feeding of paper from the paper exit occurs.	Clean the Paper Guide, the Registration Roller and the Exit Roller referring to 'Periodical Printer Cleaning' in Chapter 5.

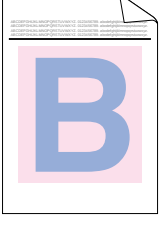
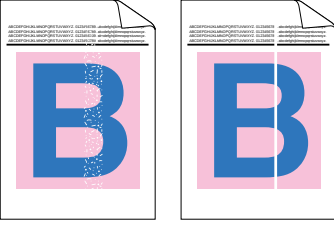
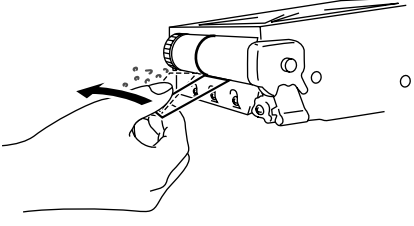
Printing

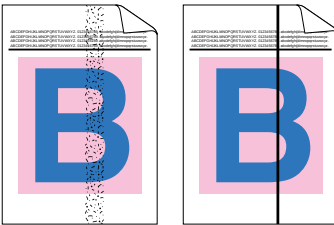
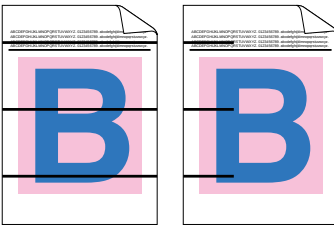
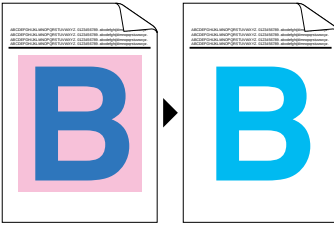
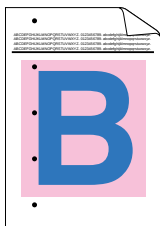
Question	Recommendation
The printer prints unexpectedly or it prints incorrect characters.	• Cancel the print job from your computer. Then, turn on and off the printer or reset the printer and try your print job again. • Make sure your application software is correctly set up to use this printer and check the printer driver settings or printer settings in your application software.
The computer hangs up when the printer starts printing, or an application error occurs.	Check to see if the system resources are enough (PC memory, etc). When you have many applications open, the system resources of your PC will not be enough and your PC will hang up. Close applications you are not using and try again.
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. Adjust the top and bottom margins in your document to allow for this.
Printing takes too long.	• When you print color graphic images, there is a large amount of data and the printer will take a relatively long time to complete printing. • When you print in Super Fine mode, the printer will take a relatively long time to finish printing. • When the Data LED is blinking, the printer is making itself ready to print. Printing speed depends on memory size or performance of your PC and memory size of the printer.
The printer doesn't print in color	• The printer may be set in monochrome mode. • Check that the color toner(s) have not run out.

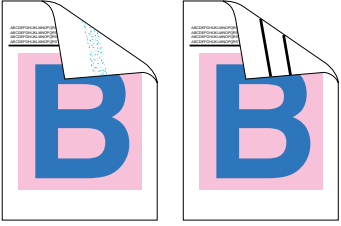
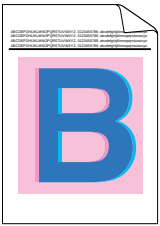
Print Quality

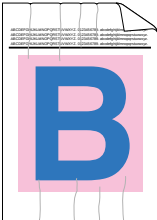
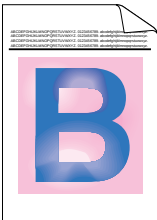
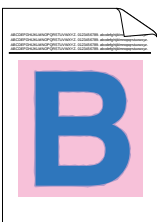
 Note

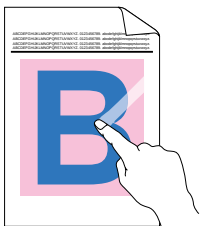
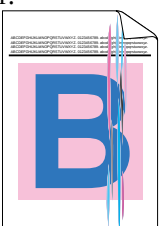
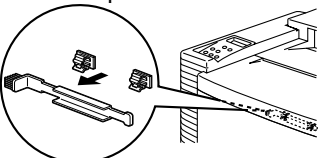
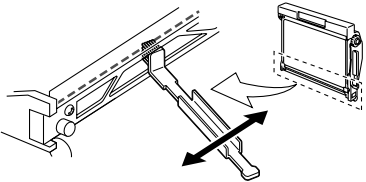
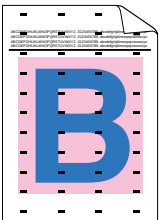
You can clear a print quality problem by replacing a toner cartridge with a new one if the LCD indicates the 'toner low' or 'toner empty' message.

Question	Recommendation
White horizontal lines or bands or rubbing 	1) Check the printer is installed on a solid, level surface. 2) Check the rear access cover is closed correctly. 3) Check the toner cartridges is installed correctly. 4) Shake the toner cartridges gently
Colors are light or unclear in the whole page 	1) Check the specified paper is used. 2) Check the problem is solved after change to fresh unpacked paper. 3) Check the rear access cover is closed correctly. 4) Shake the toner cartridges gently
White vertical streaks or bands 	Check which color is missing and replace the toner cartridge *The toner has probably come to the end of its life. However, when you see a white vertical line on the toner roller, try the following procedure. 1. Cut a sheet approx. 50mm x 50mm out of a transparency film. 2. Insert the film about 10mm into the gap between the toner roller and the blade. 3. Slide the film and pull it out as shown below. 

Question	Recommendation
Black vertical streaks or bands 	1) Check which color is missing and replace the toner cartridge 2) Replace the OPC belt cartridge
Black (colored) horizontal lines 	Check which color is missing and replace the toner cartridge.
White spots or hollow print 	1) Check the problem is solved after change to fresh unpacked paper. 2) Check the specified paper is used. 3) Check the room temperature is higher than 10 degrees C.
Completely blank or some colors are missing 	1) Check which color is missing and check the toner cartridge is installed correctly. 2) Replace the toner cartridge 3) Replace the OPC belt cartridge
Black (colored) spots or Toner stain 	Contact your dealer or our authorized service representative.

Question	Recommendation
Toner scatter or Toner stain 	1) Check which color is the problem and replace the toner cartridge 2) Replace the OPC belt cartridge
The color of your printouts are not what you expected	1) Check the test print from the control panel. 2) Check the toner cartridges are installed correctly. 3) Check the toner cartridges are not empty. 4) You can adjust the color by using the custom setting in the driver. Colors which the printer can express and colors you see on a monitor are somewhat different. The printer may not be able to express exactly some colors on your monitor. 5) Check the specified paper is used.
All one color	Replace the OPC belt cartridge
Dirt on back of paper 	1) Replace the oil bottle 2) Replace the cleaning roller
Shade on the transparency	1) Check the problem is solved after changing to the recommended type of transparency. 2) Check the media type mode is selected correctly
Color misregistration 	1) Check the OPC belt cartridge is installed correctly. 2) Replace the OPC belt cartridge

Question	Recommendation
Uneven density appears periodically in the horizontal direction 	1) Check the toner cartridges are installed correctly. 2) Check the OPC belt cartridge is installed correctly
Missing image at edge 	1) Replace the toner cartridge 2) Replace the OPC belt cartridge
Wrinkle 	1) Check the problem is solved after changing to recommended type of paper. 2) Check the rear access cover is closed correctly. 3) Check the paper discharger is installed correctly.
Mixed color image 	1) Check the front cover is closed correctly. 2) Check the toner cartridges are installed correctly. 3) Replace the toner cartridges
Insufficient Gloss	1) Check the oil is not empty. 2) Replace the cleaning roller. 3) Check that specified paper is used.

Question	Recommendation
Off set image 	1) Check that specified paper is used. 2) Check the oil is not empty. 3) Replace the cleaning roller
Poor fixing 	1) Check that specified paper is used. 2) Check the media type mode is selected correctly.
Poor fixing	Wait for a while and try again.
Poor fixing when printed on thick paper	Set the printer to thick paper mode through the control panel or the printer driver.
Blurred vertical band and spots of colour. 	Clean the Charging Wire as shown below. 1. Open the Front Cover and take the Cleaning Brush out of the printer.  2. Open the Top Cover and take the (OPC) Belt Cartridge out of the printer. 3. Brush the Charging Wire with the Cleaning brush as shown below. 
Dirt on the printed paper. 	Clean the Paper Guide, the Registration Roller and the Exit Roller referring to 'Periodical Printer Cleaning' in Chapter 5.

If the same problem still occurs, contact your dealer or our authorized service representative.

! Caution

Operation of the printer outside the specifications shall be deemed abuse and all repairs thereafter shall be the sole liability of the end user/purchaser.

APPENDICES

PRINTER SPECIFICATIONS

Printing

Print Method	Electrophotography by semiconductor laser beam scanning
Laser	Wavelength: 780 nm Output: 5 mW max.
Resolution	300 dots per inch (Normal) 600 dots per inch (Fine) (The resolution can be enhanced to 2400 dpi class by using the HRC (High Resolution Control) and CAPT (Color Advanced Photoscale Technology) features.)
Print Speed	16 pages per minute (A4/Letter size in monochrome) 4 pages per minute (A4/Letter size in full color)
Warm Up	Max. 3.5 minutes at 20°C (68°F)
First Print	Monochrome: 19 seconds or less Full Color: 30 seconds or less (A4/Letter size by face down print delivery from standard upper cassette feed)
Print Media	Toner in a single color single-component cartridge Life Expectancy: 10,000 (Black); 6,000 (Cyan, Magenata and Yellow) single-sided pages/cartridge (A4 or letter size paper with about 5% coverage).
Resident Printer Fonts	- HP PCL, EPSON FX-850, and IBM Proprinter XL modes 66 scalable fonts and 12 bitmapped fonts - BR-Script Level 2 mode 66 scalable fonts

Functions

CPU	MB86832 (SPARC architecture)
Emulation	Automatic emulation selection • HP Color Printer (PCL5C) including HP LaserJet 4+ (PCL 5e) and HP LaserJet 5 (PCL 6) • BR-Script Level 2 (Adobe Postscript Level 2 compatible) • HP-GL • EPSON FX-850 • IBM Proprinter XL
Interface	Automatic interface selection among bi-directional parallel, RS-232C serial and MIO interface.
RAM	Standard mode: 16 Mbyte Network model: 32 Mbyte (expandable to 112 Mbytes with SIMMs) The standard memory fitted can vary depending on the printer model and country.
Card Slots	2 slots for PCMCIA Type I, II 1 card slot: PCMCIA Type III Compatible for FLASH Memory or HDD cards
Control Panel	8 switches, 4 lamps, and 16-column by 2-lines liquid crystal display
Diagnostics	Self-diagnostic program

Electrical and Mechanical

Power Source	U.S.A. and Canada: AC 120 V, 50/60 Hz Europe and Australia: AC 220 to 240 V, 50/60 Hz
Power Consumption	Printing: 450 W or less Stand-by: 150 W or less Stand-by in sleep mode: 25 W or less
Noise	Printing: 55 dB A or less Stand-by: 48 dB A or less
Temperature	Operating: 10 to 32.5°C (50°F to 90.5°F) Non operational: 5 to 35°C (41°F to 95°F) Storage: 0 to 35°C (38°F to 95°F)
Humidity	Operating: 20 to 80% (without condensation) Storage: 20 to 80% (without condensation)
Dimensions (W x H x D)	500 x 388 x 490 mm (19.5 x 15.3 x 19.3 inches) 500 x 488 x 490 mm (19.5 x 19.2 x 19.1 inches) with an optional lower tray unit fitted
Weight	Approx. 32 kg (70.5 lbs.) Approx. 36 kg (79.4 lbs.) with optional lower tray unit and toner cartridge fitted .

PAPER SPECIFICATIONS

Paper Input

Media Trays :

- Standard upper tray (Tray 1)
- Optional lower tray (Tray 2)
- Paper size:
 - TRAY 1: Letter, A4, ISO B5, JIS B5, Executive, COM10 and DL
 - TRAY 2: Letter, A4, ISO B5, JIS B5, Executive (Legal for Optional Legal Cassette)
- Max. stacking height in the cassette = 27 mm(1.06")
- Max. paper cassette capacity = Approx. 250 sheets of 75g/m² (20 lbs)

Printed Output

Face down print delivery

Paper Type

Standard upper tray (Tray 1) :

- Plain paper of letter, A4, ISO B5, JIS B5 and Executive sizes
100 x 210 mm to 216 x 297 mm
(3.9 x 8.2" to 8.5 x 11.7")
[60 to 160 g/m² (16 to 43 lbs)]
- Envelopes of COM10 and DL sizes
- Transparencies
- label stocks

Optional lower tray (Tray 2) :

- Plain paper of letter, A4, ISO B5, JIS B5 and Executive sizes
100 x 210 mm to 216 x 297 mm
(3.9 x 8.2" to 8.5 x 11.7")
[60 to 160 g/m² (16 to 43 lbs)]
- Transparencies
- label stocks

Optional legal tray (Tray 1/2) :

- Plain paper of letter, legal, A4, ISO B5, JIS B5 and Executive sizes
100 x 210 mm to 216 x 356 mm
(3.9 x 8.2" to 8.5 x 14")
[60 to 160 g/m² (16 to 43 lbs)]
- Envelopes of COM10 and DL sizes (Tray 1)
- Transparencies
- label stocks

Test printing on paper, especially envelopes, is recommended before making a large purchase. The following types of envelopes are not recommended for use.

- Envelopes with thick and/or crooked edges
- Damaged, curled, wrinkled, or irregularly shaped envelopes
- Extremely shiny or highly textured envelopes
- Envelopes with clasps
- Envelopes of baggy construction
- Envelopes not sharply creased
- Embossed envelopes
- Envelopes already printed with a laser printer
- Envelopes that cannot be arranged uniformly when placed in a pile

 Notes

- An area 15 mm (0.6") from the edges of the envelope will not be printed.
- Avoid feeding labels with the carrier sheet exposed. Otherwise, your printer will be damaged.
- When feeding OHP film, the use of a recommended type for laser printers will ensure optimum printing. For detailed information on the specification or purchase, please contact your nearest authorized sales representative or the place of purchase.

■ **PAPER**

The printer is designed to work well with most types of xerographic and bond paper. However, some paper variables may have an effect on print quality or handling reliability. Always test samples of paper before buying to ensure that it provides desirable performance. Some important guidelines when selecting paper are:

1. Supplier should be informed that the paper or envelopes will be used in a laser printer.
2. Preprinted papers must use inks that can withstand the temperature of the printers fusing process. (200 degrees centigrade)
3. If selecting a cotton bond paper, paper having a rough surface such as cockle or laid finished paper, or paper that is wrinkled or puckered may exhibit degraded performance.

 Note

The manufacturer does not warrant the use of any particular paper. The operator is responsible for the quality of paper used with the printer.

Paper Types to Avoid

Some types of paper might not perform well or may cause damage to your printer.

Types of paper to avoid are:

1. Highly textured paper.
2. Smooth or shiny paper.
3. Paper that is coated or has a chemical finish.
4. Damaged, wrinkled or prefolded paper.
5. Paper exceeding the recommend weight specification specified in the manual.
6. Paper with tabs and staples.
7. Letterheads using low temperature dyes or thermography.
8. Multipart or carbonless paper.

DAMAGE OR OTHER DEFECTS CAUSED BY THE USE OF PAPERS LISTED UNDER “PAPER TYPES TO AVOID” WILL NOT BE COVERED UNDER ANY WARRANTY OR SERVICE AGREEMENTS.

■ ENVELOPES

Most envelopes will perform acceptably on your printer. However; some envelopes will have feeding and print quality problems because of their construction. A suitable envelope should have edges with a straight, well creased folds and should not have more than two thickness of paper along the lead edge. The envelope should lie flat and not have baggy or flimsy construction. Purchase quality envelopes only from a supplier who understands that the envelopes will be used in a laser printer. All envelopes should be tested prior to use to ensure desirable print results.

Envelope Types to Avoid

1. Envelopes constructed with a paper with a weight that exceeds the paper weight specifications for the printer.
2. Poorly manufactured envelopes with edges that are not straight or consistently square.
3. Envelopes with “baggy” construction or folds that are not sharply creased.
4. Envelopes with transparent windows, holes, cutouts or perforations.

5. Envelopes with clasps, snaps or tie strings.
6. Envelopes made with smooth or shiny paper.
7. Envelopes that are rough, highly textured, or deeply embossed.
8. Envelopes which do not lie flat or that are curled, wrinkled, or irregularly shaped.
9. Envelopes having an open flap with an adhesive that seals the envelope.

USE OF ANY OF THE ENVELOPES LISTED ABOVE MAY CAUSE DAMAGE TO YOUR PRINTER. SUCH DAMAGE IS NOT COVERED UNDER ANY WARRANTY OR SERVICE AGREEMENT.

 Note

The manufacturer neither warrants nor recommends the use of a particular envelope because envelope properties are subject to change by the envelope manufacturer. The entire responsibility for the quality and performance of the envelope lies with the customer.

■ LABELS AND OVERHEAD TRANSPARENCIES

The printer will print on most type of labels and transparencies designed for use with a laser printer. Labels should have an adhesive that is acrylic-based since such material is more stable at the high temperatures in the fusing unit. Adhesives should not come in contact with any part of the printer, because the label stock may stick to the drum or rollers and cause jams and print quality problems. No adhesive should be exposed between the labels. Labels should be arranged so that they cover the entire page with the only exposed spaces being lengthwise down the sheet. Using labels with spaces may result in labels peeling off and causing serious jam or print problems.

All labels and transparencies used in this printer must be able to withstand a temperature of 200 degrees centigrade (392 degrees Fahrenheit) for a period of 0.1 seconds.

Label and transparency sheets should not exceed the paper weight specifications described in the User's Guide. Labels and transparencies exceeding this specification may not feed or print properly and cause damage to your printer.

The entire responsibility for the quality and performance of labels and transparencies lies with the customer.

DAMAGE CAUSED BY THE USE OF UNSATISFACTORY LABELS OR TRANSPARENCIES IS NOT COVERED UNDER ANY WARRANTY OR SERVICE AGREEMENTS.

INTERFACE SPECIFICATIONS

Bi-directional Parallel Interface

Interface Connector

A shielded cable that is IEEE 1284 compliant with the following pin assignment should be used. Most existing parallel cables support bi-directional communication, but some might have incompatible pin assignments or may not be IEEE 1284 compliant.

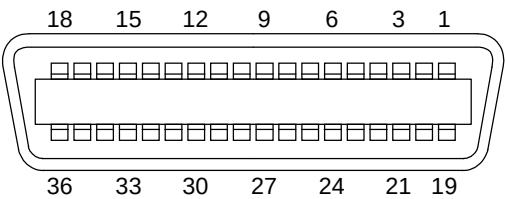


Fig. A-1 Parallel Interface Connector

Pin Assignment

Pin No.	Signal	Pin No.	Signal
1	DATA STROBE	19	Twisted pair ground
2	DATA 0	20	Twisted pair ground
3	DATA 1	21	Twisted pair ground
4	DATA 2	22	Twisted pair ground
5	DATA 3	23	Twisted pair ground
6	DATA 4	24	Twisted pair ground
7	DATA 5	25	Twisted pair ground
8	DATA 6	26	Twisted pair ground
9	DATA 7	27	Twisted pair ground
10	ACKNLG	28	Twisted pair ground
11	BUSY	29	Twisted pair ground
12	PE	30	INPUT PRIME RET
13	SLCT	31	INPUT PRIME
14	AUTO FEED	32	FAULT
15	N.C.	33	N.C.
16	0V	34	N.C.
17	0V	35	N.C.
18	+5V	36	SELECT IN

Signal Description

Pin No.	Signal Name	IN/OUT	Explanation
1	$\overline{\text{DATA STROBE}}$	IN	Data is latched at the leading edge of this signal.
2 - 9	DATA 0 - 7	IN	Parallel 8 bit data
10	$\overline{\text{ACKNLG}}$	OUT	Data reception is completed and the printer is ready for the next data reception when this signal becomes low.
11	BUSY	OUT	The printer cannot receive data when this signal is high. The signal becomes high under data receiving, off-line, or error states.
12	PE	OUT	This signal becomes high when a paper empty state is detected.
13	SLCT	OUT	This signal becomes high when the printer is selected and low when it is deselected.
14	$\overline{\text{AUTO FEED}}$	IN	This signal is used only for the bi-directional interface.
31	$\overline{\text{INPUT PRIME}}$	IN	This signal is used only for the bi-directional interface.
32	$\overline{\text{FAULT}}$	OUT	This signal becomes low when the printer is in the paper empty, off-line, or error states.
36	$\overline{\text{SLCT IN}}$	IN	This signal is used only for the bi-directional interface.

Parallel Cable Connection for IBM-PC/AT or Compatible Computers and IBM-PS/2 Computers

Signal	Printer Pin No.	Computer Pin No.
DATA STROBE	1	1
DATA 0	2	2
DATA 1	3	3
DATA 2	4	4
DATA 3	5	5
DATA 4	6	6
DATA 5	7	7
DATA 6	8	8
DATA 7	9	9
ACKNLG	10	10
BUSY	11	11
PE	12	12
SLCT	13	13
AUTO FEED	14	14
GND	19 - 30	18 - 25
FAULT	32	15
SLCT IN	36	17

RS-232C Serial Interface

Standard Specifications

- 1) Baud rate: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 baud
- 2) Synchronization: Start-stop
- 3) Communications control: No protocol
- 4) Data length: Serial 7 bits or 8 bits
- 5) Parity: Odd, even, or none
- 6) Stop bit: 1 or 2 stop bits
- 7) Protocol: Xon/Xoff or DTR

Interface Connectors

A shielded cable should be used.

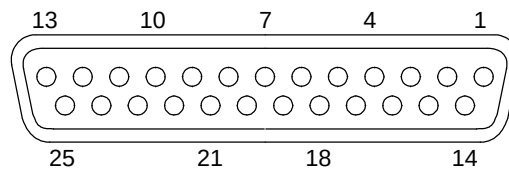


Fig. A-2 Serial Interface Connector

Pin Assignment

Pin No.	Signal	IN/OUT		Pin No.	Signal	IN/OUT	
		Printer	Controller			Printer	Controller
1	FG	←	→	14	NC		
2	SD	→		15	NC		
3	RD	←		16	NC		
4	RS	→		17	NC		
5	NC			18	NC		
6	DR	←		19	NC		
7	SG	←	→	20	ER	→	
8	NC			21	NC		
9	NC			22	NC		
10	NC			23	NC		
11	NC			24	NC		
12	NC			25	NC		
13	NC						

Signal Description

Signal Name	IN/OUT	Explanation
FG	–	Frame Ground
SD	OUT	Send Data.
RD	IN	Receive Data. Receives data transmitted from the computer.
RS	OUT	Request To Send. “SPACE” level when the printer is ready to send data to the computer.
DR	IN	Data Set Ready. When DSR is at “SPACE” level, data can be accepted.
SG	–	Signal Ground
ER	OUT	Data Terminal Ready. “MARK” level when the printer is Busy.

Serial Cable Connection for IBM-PC/AT or Compatible Computers and IBM-PS/2 Computers

The following diagrams show the pin connections for the most common serial communications.

■ DB-9 Serial Connection

When you use a computer with a 9-pin serial port, use a cable with the following pin configurations.

Printer (Male)			Computer (Female)	
SD	2	_____	2	RD
RD	3	_____	3	SD
DR (DSR)	6	_____	4	ER (DTR)
SG	7	_____	5	SG
ER (DTR)	20	_____	6	DR (DSR)
		_____	8	CS (CTS)

■ DB-25 Serial Connection

When you use a computer with a 25-pin serial port, use a cable with the following pin configurations.

Printer (Male)			Computer (Female)	
FG	1	_____	1	FG
SD	2	_____	3	RD
RD	3	_____	2	SD
DR (DSR)	6	_____	20	ER (DTR)
SG	7	_____	7	SG
ER (DTR)	20	_____	5	CS (CTS)
		_____	6	DR (DSR)

Note

Any pins not shown in the figures above are not connected.

SYMBOL/CHARACTER SETS

You can select the symbol and character sets with the FONT switch in the HP LaserJet, EPSON FX-850, and IBM Proprinter XL emulation modes. See "FONT Switch" in Chapter 4.

When you have selected the HP-GL emulation mode, you can select the standard or alternate character set with the MODE switch. See "GRAPHICS MODE" in Chapter 4.

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 PCL Mode

Roman 8 (8U)
ISO Latin1 (0N)
ISO Latin2 (2N)
ISO Latin5 (5N)

USER'S GUIDE

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)

USER'S GUIDE

Legal (1U)
Ventura Math (6M)
Ventura Intl (13J)
Ventura US (14J)

PS Math (5M)
PS Text (10J)
Math-8 (8M)
Pi Font (15U)

USER'S GUIDE

MS Publishing (6J)
Windows 3.0 (9U)
Desktop (7J)
MC Text (12J)

Symbol (19M)
Windings (579L)

The following table shows characters available only in the corresponding character set. The numbers at the top of the table are hexadecimal code values with which characters are to be replaced in the Roman 8 character set. For other characters, see the Roman 8 character set.

SYMBOL SET	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
ISO 2 IRV												
ISO 4 UK												
ISO 6 ASCII												
ISO10 SWE/FIN												
ISO11 Swedish												
ISO14 JISASCII												
ISO15 Italian												
ISO16 POR												
ISO17 Spanish												
ISO21 German												
ISO25 French												
ISO57 Chinese												
ISO60 NOR v1												
ISO61 NOR v2												
ISO69 French												
ISO84 POR												
ISO85 Spanish												
HP German												
HP Spanish												

EPSON Mode

US ASCII

The following table shows characters available only in the corresponding character set. The numbers at the top of the table are hexadecimal code values with which characters are to be replaced in the US ASCII character set. For other characters, see the US ASCII character set.

CHARACTER SET	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
German												
UK ASCII I												
French I												
Danish I												
Italy												
Spanish												
Swedish												
Japanese												
Norwegian												
Danish II												
UK ASCII II												
French II												
Dutch												
South African												

APPENDICES

PC-8
PC-8 D/N
PC-850
PC-852

USER'S GUIDE

PC-860
PC-863
PC-865
PC-8 Turkish

IBM Mode

PC-8
PC-8 D/N
PC-850
PC-852

USER'S GUIDE

PC-860
PC-863
PC-865
PC-8 Turkish

HP-GL Mode

ANSI ASCII
9825 CHR. SET

USER'S GUIDE

FRENCH/GERMAN
SCANDINAVIAN
SPANISH/LATIN
JIS ASCII

ROMAN8 EXT.
ISO IRV
ISO SWEDISH
ISO SWEDISH:N

USER'S GUIDE

ISO NORWAY 1
ISO GERMAN
ISO FRENCH
ISO U.K.

ISO ITALIAN
ISO SPANISH
ISO PORTUGUESE
ISO NORWAY 2

Symbol Sets Supported by the Printer's Intellifont Compatible Typefaces

PCL Symbol Set		Typeface							
Set ID	Symbol Set	Alaska	Antique Oakland	Brougham	Cleveland Cond.	Connecticut	Guatemala Antique	Letter Gothic	
8U	Roman-8	•	•	•	•	•	•	•	
0N	ISO 8859-1 Latin1	•	•	•	•	•	•	•	
2N	ISO 8859-2 Latin2	•	•	•	•	•	•	•	
5N	ISO 8859-9 Latin5	•	•	•	•	•	•	•	
6N	ISO 8859-10 Latin6	•	•	•	•	•	•	•	
10U	PC-8	•	•	•	•	•	•	•	
11U	PC-8 D/N	•	•	•	•	•	•	•	
12U	PC-850	•	•	•	•	•	•	•	
17U	PC-852	•	•	•	•	•	•	•	
26U	PC-775	•	•	•	•	•	•	•	
9T	PC-Turk	•	•	•	•	•	•	•	
19U	Windows 3.1 Latin1	•	•	•	•	•	•	•	
9E	Windows 3.1 Latin2	•	•	•	•	•	•	•	
5T	Windows 3.1 Latin5	•	•	•	•	•	•	•	
7J	DeskTop	•	•	•	•	•	•	•	
9J	PC-1004 (OS/2)	•	•	•	•	•	•	•	
10J	PS Text	•	•	•	•	•	•	•	
13J	Ventura International	•	•	•	•	•	•	•	
14J	Ventura US	•	•	•	•	•	•	•	
6J	Microsoft Publishing	•	•	•	•	•	•	•	
8M	Math-8	•	•	•	•	•	•	•	
5M	PS Math	•	•	•	•	•	•	•	
6M	Ventura Math	•	•	•	•	•	•	•	
15U	PI Font	•	•	•	•	•	•	•	
1U	Legal	•	•	•	•	•	•	•	
1E	ISO 4: United Kingdom*	•	•	•	•	•	•	•	
0U	ISO 6: ASCII*	•	•	•	•	•	•	•	
2U	ISO 2: IRV*	•	•	•	•	•	•	•	
0S	ISO 11: Swedish: names*	•	•	•	•	•	•	•	
0I	ISO 15: Italian*	•	•	•	•	•	•	•	
1S	HP Spanish*	•	•	•	•	•	•	•	
2S	ISO 17: Spanish*	•	•	•	•	•	•	•	
3S	ISO 10: Swedish*	•	•	•	•	•	•	•	
4S	ISO 16: Portuguese*	•	•	•	•	•	•	•	
5S	ISO 84: Portuguese*	•	•	•	•	•	•	•	
6S	ISO 85: Spanish*	•	•	•	•	•	•	•	
0G	HP German*	•	•	•	•	•	•	•	
1G	ISO 21: German*	•	•	•	•	•	•	•	
0D	ISO 60: Norwegian 1*	•	•	•	•	•	•	•	
1D	ISO 61: Norwegian 2*	•	•	•	•	•	•	•	
0F	ISO 25: French*	•	•	•	•	•	•	•	
1F	ISO 69: French*	•	•	•	•	•	•	•	
0K	ISO 14: JIS ASCII*	•	•	•	•	•	•	•	
2K	ISO 57: Chinese*	•	•	•	•	•	•	•	
9U	Windows 3.0 Latin1	•	•	•	•	•	•	•	
12J	MC Text	•	•	•	•	•	•	•	
19M	Symbol								
19L	Windows Baltic	•	•	•	•	•	•	•	
579L	Wingdings								

*These symbol sets are variations of the Roman-8 symbol set.

PCL Symbol Set		Typeface(Continued)						
Set ID	Symbol Set	LetterGothic 16.66**	Mary- land	Oklahoma	PC Brussels	PC Tennessee	Utah	Utah Cond.
8U	Roman-8	•	•	•	•	•	•	•
0N	ISO 8859-1 Latin1	•	•	•	•	•	•	•
2N	ISO 8859-2 Latin2	•	•	•	•	•	•	•
5N	ISO 8859-9 Latin5	•	•	•	•	•	•	•
6N	ISO 8859-10 Latin6	•	•	•	•	•	•	•
10U	PC-8	•	•	•	•	•	•	•
11U	PC-8 D/N	•	•	•	•	•	•	•
12U	PC-850	•	•	•	•	•	•	•
17U	PC-852		•	•	•	•	•	•
26U	PC-775		•	•	•	•	•	•
9T	PC-Turk		•	•	•	•	•	•
19U	Windows 3.1 Latin1		•	•	•	•	•	•
9E	Windows 3.1 Latin2		•	•	•	•	•	•
5T	Windows 3.1 Latin5		•	•	•	•	•	•
7J	DeskTop		•	•	•	•	•	•
9J	PC-1004(OS/2)		•	•	•	•	•	•
10J	PS Text		•	•	•	•	•	•
13J	Ventura International		•	•	•	•	•	•
14J	Ventura US		•	•	•	•	•	•
6J	Microsoft Publishing		•	•	•	•	•	•
8M	Math-8					•	•	
5M	PS Math					•	•	
6M	Ventura Math					•	•	
15U	PI Font					•	•	
1U	Legal	•	•	•	•	•	•	•
1E	ISO 4: United Kingdom*	•	•	•	•	•	•	•
0U	ISO 6: ASCII*	•	•	•	•	•	•	•
2U	ISO 2: IRV*	•	•	•	•	•	•	•
0S	ISO 11: Swedish: names*	•	•	•	•	•	•	•
0I	ISO 15: Italian*	•	•	•	•	•	•	•
1S	HP Spanish*	•	•	•	•	•	•	•
2S	ISO 17: Spanish*	•	•	•	•	•	•	•
3S	ISO 10: Swedish*	•	•	•	•	•	•	•
4S	ISO 16: Portuguese*	•	•	•	•	•	•	•
5S	ISO 84: Portuguese*	•	•	•	•	•	•	•
6S	ISO 85: Spanish*	•	•	•	•	•	•	•
0G	HP German*	•	•	•	•	•	•	•
1G	ISO 21: German*	•	•	•	•	•	•	•
0D	ISO 60: Norwegian 1*	•	•	•	•	•	•	•
1D	ISO 61: Norwegian 2*	•	•	•	•	•	•	•
0F	ISO 25: French*	•	•	•	•	•	•	•
1F	ISO 69: French*	•	•	•	•	•	•	•
0K	ISO 14: JIS ASCII*	•	•	•	•	•	•	•
2K	ISO 57: Chinese*	•	•	•	•	•	•	•
9U	Windows 3.0 Latin1		•	•	•	•	•	•
12J	MC Text		•	•	•	•	•	•
19M	Symbol							
19L	Windows Baltic		•	•		•	•	•
579L	Windings							

*These symbol sets are variations of the Roman-8 symbol set.

**LetterGothic 16.66 is a bitmapped font.

Symbol Sets Supported by the Printer's TrueType™ and Type 1 Font Compatible, and Original Typefaces

PCL Symbol Set		Typeface	BR	Copen-	Calgary	Helsinki	Portugal	Tennes-	W
Set ID	Symbol Set	Atlanta	Symbol	hagen				see	Dingbats
8U	Roman-8	•		•	•	•	•	•	
0N	ISO 8859-1 Latin1	•		•	•	•	•	•	
2N	ISO 8859-2 Latin2					•		•	
5N	ISO 8859-9 Latin5					•		•	
6N	ISO 8859-10 Latin6					•		•	
10U	PC-8	•		•	•	•	•	•	
11U	PC-8 D/N	•		•	•	•	•	•	
12U	PC-850	•		•	•	•	•	•	
17U	PC-852					•		•	
26U	PC-775					•		•	
9T	PC-Turk					•		•	
19U	Windows 3.1 Latin1	•		•	•	•	•	•	
9E	Windows 3.1 Latin2					•		•	
5T	Windows 3.1 Latin5					•		•	
7J	DeskTop	•		•	•	•	•	•	
9J	PC-1004 (OS/2)					•		•	
10J	PS Text	•		•	•	•	•	•	
13J	Ventura International	•		•	•	•	•	•	
14J	Ventura US	•		•	•	•	•	•	
6J	Microsoft Publishing	•		•	•	•	•	•	
8M	Math-8					•		•	
5M	PS Math					•		•	
6M	Ventura Math					•		•	
15U	PI Font					•		•	
1U	Legal	•		•	•	•	•	•	
1E	ISO 4: United Kingdom*	•		•	•	•	•	•	
0U	ISO 6: ASCII*	•		•	•	•	•	•	
2U	ISO 2: IRV*	•		•	•	•	•	•	
0S	ISO 11: Swedish: names*	•		•	•	•	•	•	
0I	ISO 15: Italian*	•		•	•	•	•	•	
1S	HP Spanish*	•		•	•	•	•	•	
2S	ISO 17: Spanish*	•		•	•	•	•	•	
3S	ISO 10: Swedish*	•		•	•	•	•	•	
4S	ISO 16: Portuguese*	•		•	•	•	•	•	
5S	ISO 84: Portuguese*	•		•	•	•	•	•	
6S	ISO 85: Spanish*	•		•	•	•	•	•	
0G	HP German*	•		•	•	•	•	•	
1G	ISO 21: German*	•		•	•	•	•	•	
0D	ISO 60: Norwegian 1*	•		•	•	•	•	•	
1D	ISO 61: Norwegian 2*	•		•	•	•	•	•	
0F	ISO 25: French*	•		•	•	•	•	•	
1F	ISO 69: French*	•		•	•	•	•	•	
0K	ISO 14: JIS ASCII*	•		•	•	•	•	•	
2K	ISO 57: Chinese*	•		•	•	•	•	•	
9U	Windows 3.0 Latin1	•		•	•	•	•	•	
12J	MC Text	•		•	•	•	•	•	
19M	Symbol		•						
19L	Windows Baltic					•		•	
579L	Wingdings								•

*These symbol sets are variations of the Roman-8 symbol set.

PCL Symbol Set		Typeface			
Set ID	Symbol Set	Bermuda Script	Germany	San Diego	US Roman
8U	Roman-8	•	•	•	•
0N	ISO 8859-1 Latin1	•	•	•	•
2N	ISO 8859-2 Latin2				
5N	ISO 8859-9 Latin5				
6N	ISO 8859-10 Latin6				
10U	PC-8	•	•	•	•
11U	PC-8 D/N	•	•	•	•
12U	PC-850	•	•	•	•
17U	PC-852				
26U	PC-775				
9T	PC-Turk				
19U	Windows 3.1 Latin1	•	•	•	•
9E	Windows 3.1 Latin2				
5T	Windows 3.1 Latin5				
7J	DeskTop	•	•	•	•
9J	PC-1004 (OS/2)				
10J	PS Text	•	•	•	•
13J	Ventura International	•	•	•	•
14J	Ventura US	•	•	•	•
6J	Microsoft Publishing	•	•	•	•
8M	Math-8				
5M	PS Math				
6M	Ventura Math				
15U	PI Font				
1U	Legal	•	•	•	•
1E	ISO 4: United Kingdom*	•	•	•	•
0U	ISO 6: ASCII*	•	•	•	•
2U	ISO 2: IRV*	•	•	•	•
0S	ISO 11: Swedish: names*	•	•	•	•
0I	ISO 15: Italian*	•	•	•	•
1S	HP Spanish*	•	•	•	•
2S	ISO 17: Spanish*	•	•	•	•
3S	ISO 10: Swedish*	•	•	•	•
4S	ISO 16: Portuguese*	•	•	•	•
5S	ISO 84: Portuguese*	•	•	•	•
6S	ISO 85: Spanish*	•	•	•	•
0G	HP German*	•	•	•	•
1G	ISO 21: German*	•	•	•	•
0D	ISO 60: Norwegian 1*	•	•	•	•
1D	ISO 61: Norwegian 2*	•	•	•	•
0F	ISO 25: French*	•	•	•	•
1F	ISO 69: French*	•	•	•	•
0K	ISO 14: JIS ASCII*	•	•	•	•
2K	ISO 57: Chinese*	•	•	•	•
9U	Windows 3.0 Latin1	•	•	•	•
12J	MC Text	•	•	•	•
19M	Symbol				
19L	Windows Baltic				
579L	Wingdings				

*These symbol sets are variations of the Roman-8 symbol set.

QUICK REFERENCE OF COMMANDS

The following tables show commands sorted by function. For further information about commands, refer to the “Technical Reference Manual,” which is optionally available.

Note

l represents the lowercase *l* letter. Script notation is used because lowercase *l* and the number 1 can be easily confused with each other.

HP PCL Mode

PCL Command Sets

Function	Command	Decimal	Hexadecimal
CONTROL CODE			
Backspace	BS	08	08
Horizontal Tab	HT	09	09
Line Feed	LF	10	0A
Form Feed	FF	12	0C
Carriage Return	CR	13	0D
Secondary Font Select	SO	14	0E
Primary font Select	SI	15	0F
Escape	ESC	27	1B
PAGE FORMAT			
Page Length	ESC & <i>l</i> # P (# lines)	27 38 108 ## 80	1B 26 6C ## 50
Top Margin	ESC & <i>l</i> # E (# lines)	27 38 108 ## 69	1B 26 6C ## 45
Text Length	ESC & <i>l</i> # F (# lines)	27 38 108 ## 70	1B 26 6C ## 46
Left Margin	ESC & a # L (# column)	27 38 97 ## 76	1B 26 61 ## 4C
Right Margin	ESC & a # M (# column)	27 38 97 ## 77	1B 26 61 ## 4D
Clear Side Margin	ESC 9	27 57	1B 39
Line Pitch	ESC & <i>l</i> # C (# /48 inch)	27 38 108 ## 67	1B 26 6C ## 43
Line Spacing	ESC & <i>l</i> # D	27 38 108 ## 68	1B 26 6C ## 44
1 line/inch	ESC & <i>l</i> 1 D	27 38 108 49 68	1B 26 6C 31 44
2 lines/inch	ESC & <i>l</i> 2 D	27 38 108 50 68	1B 26 6C 32 44
3 lines/inch	ESC & <i>l</i> 3 D	27 38 108 51 68	1B 26 6C 33 44
4 lines/inch	ESC & <i>l</i> 4 D	27 38 108 52 68	1B 26 6C 34 44
6 lines/inch	ESC & <i>l</i> 6 D	27 38 108 54 68	1B 26 6C 36 44
8 lines/inch	ESC & <i>l</i> 8 D	27 38 108 56 68	1B 26 6C 38 44
12 lines/inch	ESC & <i>l</i> 12 D	27 38 108 49 50 68	1B 26 6C 31 32 44
16 lines/inch	ESC & <i>l</i> 16 D	27 38 108 49 54 68	1B 26 6C 31 36 44
24 lines/inch	ESC & <i>l</i> 24 D	27 38 108 50 52 68	1B 26 6C 32 34 44
48 lines/inch	ESC & <i>l</i> 48 D	27 38 108 52 56 68	1B 26 6C 34 38 44
Character Pitch	ESC & k # H (# /120 inch)	27 38 107 ## 72	1B 26 6B ## 48
ex. 10 pitch	ESC & k 12 H	27 38 107 49 50 72	1B 26 6B 31 32 48

Function	Command	Decimal	Hexadecimal
Paper Size	ESC & l # A	27 38 108 ## 65	1B 26 6C ## 41
Executive	ESC & l 1 A	27 38 108 49 65	1B 26 6C 31 41
Letter	ESC & l 2 A	27 38 108 50 65	1B 26 6C 32 41
Legal	ESC & l 3 A	27 38 108 51 65	1B 26 6C 33 41
A4	ESC & l 26 A	27 38 108 50 54 65	1B 26 6C 32 36 41
B5	ESC & l 100 A	27 38 108 49 48 48 65	1B 26 6C 31 30 30 41
B6	ESC & l 1024 A	27 38 108 49 48 50 52 65	1B 26 6C 31 30 32 34 41
A5	ESC & l 1025 A	27 38 108 49 48 50 53 65	1B 26 6C 31 30 32 35 41
A6	ESC & l 1026 A	27 38 108 49 48 50 54 65	1B 26 6C 31 30 32 36 41
Envelopes			
Monarch	ESC & l 80 A	27 38 108 56 48 65	1B 26 6C 38 30 41
COM 10	ESC & l 81 A	27 38 108 56 49 65	1B 26 6C 38 31 41
DL	ESC & l 90 A	27 38 108 57 48 65	1B 26 6C 39 30 41
C5	ESC & l 91 A	27 38 108 57 49 65	1B 26 6C 39 31 41
CURSOR POSITIONING			
Horizontal Position	ESC & a # C (# column)	27 38 97 ## 67	1B 26 61 ## 43
Horizontal Position	ESC & a # H (# decipoint)	27 38 97 ## 72	1B 26 61 ## 48
Horizontal Position	ESC * p # X (# dot)	27 42 112 ## 88	1B 2A 70 ## 58
Vertical Position	ESC & a # R (# line)	27 38 97 ## 82	1B 26 61 ## 52
Vertical Position	ESC & a # V (# decipoint)	27 38 97 ## 86	1B 26 61 ## 56
Vertical Position	ESC * p # Y (# dot)	27 42 112 ## 89	1B 2A 70 ## 59
VECTOR GRAPHICS			
Enter HP-GL/2 Mode			
Use Previous HP-GL/2 Pen Position	ESC % 0 B	27 37 48 66	1B 25 30 42
Use Current PCL CAP	ESC % 1 B	27 37 49 66	1B 25 31 42
Use Current PCL dot coordinate System and old HP-GL/2 Pen Position	ESC % 2 B	27 37 50 66	1B 25 32 42
Use Current PCL dot coordinate System and the current PCL cursor Position	ESC % 3 B	27 37 51 66	1B 25 33 42
HP-GL/2 Plot Horizontal Size	ESC * c # K (# inch)	27 42 99 # ... # 75	1B 2A 63 # ... # 4B
HP-GL/2 Plot Vertical Size	ESC * c # L (# inch)	27 42 99 # ... # 76	1B 2A 63 # ... # 4C
Set Picture Frame Anchor Point	ESC * c 0 T	27 42 99 48 84	1B 2A 63 50 54
Picture Frame Horizontal Size	ESC * c # X (# decipoint)	27 42 99 # ... # 88	1B 2A 63 # ... # 58
Picture Frame Vertical Size	ESC * c # Y (# decipoint)	27 42 99 # ... # 89	1B 2A 63 # ... # 59

USER'S GUIDE

Function	Command	Decimal	Hexadecimal
RASTER GRAPHICS			
Resolution Setting			
75 dpi	ESC * t 75 R	27 42 116 55 53 82	1B 2A 74 37 35 52
100 dpi	ESC * t 100 R	27 42 116 49 48 48 82	1B 2A 74 31 30 30 52
200 dpi	ESC * t 200 R	27 42 116 50 48 48 82	1B 2A 74 32 30 30 52
150 dpi	ESC * t 150 R	27 42 116 49 53 48 82	1B 2A 74 31 35 30 52
300 dpi	ESC * t 300 R	27 42 116 51 48 48 82	1B 2A 74 33 30 30 52
600 dpi	ESC * t 600 R	27 42 116 54 48 48 82	1B 2A 74 36 30 30 52
Raster Graphics Presentation			
Orientation Oriented	ESC * r 0 F	27 42 114 48 70	1B 2A 72 30 46
Raster Oriented	ESC * r 3 F	27 42 114 51 70	1B 2A 72 33 46
Begin Raster Graphics			
Left-most Position	ESC * r 0 A	27 42 114 48 65	1B 2A 72 30 41
Current Position	ESC * r 1 A	27 42 114 49 65	1B 2A 72 31 41
Turn on scale mode (Logical left)	ESC * r 2 A	27 42 114 50 65	1B 2A 72 32 41
Turn on scale mode (Current position)	ESC * r 3 A	27 42 114 51 65	1B 2A 72 33 41
Transfer Raster Data	ESC * b # W [data] (# byte)	27 42 98 ## 87	1B 2A 62 ## 57
Transfer Raster Data by Plane (Expanded for PCL5C color data)	ESC * b # V [data] (# byte)	27 42 98 ## 86	1B 2A 62 ## 56
Set Compression Mode			
Uncoded	ESC * b 0 M	27 42 98 48 77	1B 2A 62 30 4D
Run-Length Encoded	ESC * b 1 M	27 42 98 49 77	1B 2A 62 31 4D
Tagged Image File Format	ESC * b 2 M	27 42 98 50 77	1B 2A 62 32 4D
Delta Row	ESC * b 3 M	27 42 98 51 77	1B 2A 62 33 4D
Mode 5	ESC * b 5 M	27 42 98 53 77	1B 2A 62 35 4D
Mode 9	ESC * b 9 M	27 42 98 57 77	1B 2A 62 39 4D
CCITT G3/G4 (original)	ESC * b 1152 M	27 42 98 49 49 53 50 77	1B 2A 62 31 31 35 32 4D
TIFF (for 600 dpi only, original)	ESC * b 1024 M	27 42 98 49 48 50 52 77	1B 2A 62 31 30 32 34 4D
1200 dpi Image Format (for 1200 dpi only, original)	ESC * b 1027 M	27 42 98 49 48 50 55 77	1B 2A 62 31 30 32 37 4D
Compress Transfer	ESC * b # C [data] (# byte)	27 42 98 ## 67	1B 2A 62 ## 43
Raster Y Offset	ESC * b # Y (# Line)	27 42 98 ## 89	1B 2A 62 ## 59
Raster Height	ESC * r # T (# Row)	27 42 114 ## 84	1B 2A 72 ## 54
Raster Width	ESC * r # S (# Pixel)	27 42 114 ## 83	1B 2A 72 ## 53
Destination Raster Width	ESC * r # H (# Pixel in decipoint)	27 42 114 ## 72	1B 2A 72 ## 48
Destination Raster Height	ESC * r # V (# Pixel in decipoint)	27 42 114 ## 86	1B 2A 72 ## 56
Scale Algorithm			
Light background	ESC * r 0 K	27 42 114 48 75	1B 2A 72 30 4B
Dark background	ESC * r 1 K	27 42 114 49 75	1B 2A 72 31 4B
End Raster Graphics	ESC * r B	27 42 114 66	1B 2A 72 42
End Raster Graphics	ESC * r C	27 42 114 67	1B 2A 72 43
COLOR COMMAND (Extended for PCL5C)			
Simple Color			
3Plane,device CMY palette	ESC * r -3 U	27 42 114 45 51 85	1B 2A 72 2D 33 55
Single Plane,Black and White palette	ESC * r 1 U	27 42 114 49 85	1B 2A 72 31 55

3Plane,device RGB pallette	ESC * r 3 U	27 42 114 51 85	1B 2A 72 33 55
Configure Image Data	ESC * v # W [data]	27 42 118 ## 87	1B 2A 76 ## 57
	(# byte)		
Color Component One	ESC * v # A	27 42 118 # 65	1B 2A 76 # 41
	(# First Component)		
Color Component Two	ESC * v # B	27 42 118 # 66	1B 2A 76 # 42
	(# Second Component)		
Color Component Three	ESC * v # C	27 42 118 # 67	1B 2A 76 # 43
	(# Third Component)		
Assign Color Index	ESC * v # I	27 42 118 # 73	1B 2A 76 # 49
	(# Index Number)		
Push Palette	ESC * p 0 P	27 42 112 48 80	1B 2A 70 30 50
Pop Palette	ESC * p 1 P	27 42 112 49 80	1B 2A 70 31 50
Foreground Color	ESC * v # S	27 42 118 ## 83	1B 2A 76 ## 53
	(# Palette Index Number)		
Render Algorithm			
Continuous Tone (Device Best)	ESC * t 0 J	27 42 116 48 74	1B 2A 74 30 4A
Snap to primaries	ESC * t 1 J	27 42 116 48 74	1B 2A 74 30 4A
Snap Black to White and other color to black	ESC * t 2 J	27 42 116 48 74	1B 2A 74 30 4A
Device best Dither	ESC * t 3 J	27 42 116 48 74	1B 2A 74 30 4A
Error Difusion	ESC * t 4 J	27 42 116 48 74	1B 2A 74 30 4A
Device best Dither (Monochrome)	ESC * t 5 J	27 42 116 48 74	1B 2A 74 30 4A
Error Difusion (Monochrome)	ESC * t 6 J	27 42 116 48 74	1B 2A 74 30 4A
Cluster Dither	ESC * t 7 J	27 42 116 48 74	1B 2A 74 30 4A
Cluster Dither (Monochrome)	ESC * t 8 J	27 42 116 48 74	1B 2A 74 30 4A
User defined Dither	ESC * t 9 J	27 42 116 48 74	1B 2A 74 30 4A
User defined Dither (Monochrome)	ESC * t 10 J	27 42 116 48 74	1B 2A 74 30 4A
Ordered Dither	ESC * t 11 J	27 42 116 48 74	1B 2A 74 30 4A
Ordered Dither (Monochrome)	ESC * t 12 J	27 42 116 48 74	1B 2A 74 30 4A
Noise Dither	ESC * t 13 J	27 42 116 48 74	1B 2A 74 30 4A
Noise Dither (Monochrome)	ESC * t 14 J	27 42 116 48 74	1B 2A 74 30 4A
Continuous Tone (Smooth 150dpi)	ESC * t 15 J	27 42 116 48 74	1B 2A 74 30 4A
Continuous Tone (Detail 300dpi)	ESC * t 16 J	27 42 116 48 74	1B 2A 74 30 4A
(Monochrome)			
Continuous Tone (Smooth 150dpi)	ESC * t 17 J	27 42 116 48 74	1B 2A 74 30 4A
(Monochrome)			
Continuous Tone (Basic 100dpi)	ESC * t 18 J	27 42 116 48 74	1B 2A 74 30 4A
Continuous Tone (Basic 100dpi)	ESC * t 19 J	27 42 116 48 74	1B 2A 74 30 4A
(Monochrome)			
Download Dither Matrix	ESC * m # W [data]	27 42 109 48 74	1B 2A 6D 30 4A
	(# byte)		
Gamma Correction	ESC * t # I	27 42 116 ## 73	1B 2A 74 ## 49
	(# Gamma Number)		
Monochrome Print Mode			
Mixed render algorithm mode	ESC & b 0 M	27 38 98 48 77	1B 26 62 30 4D
Gray equivalent mode	ESC & b 1 M	27 38 98 49 77	1B 26 62 31 4D
Text Color	ESC & v # S	27 38 118 ## 83	1B 26 76 ## 53
	(# Color Number)		
PRINT MODEL			
Select Pattern			
Solid Black (default)	ESC * v 0 T	27 42 118 48 84	1B 2A 76 30 54
Solid White	ESC * v 1 T	27 42 118 49 84	1B 2A 76 31 54

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HP-defined Shading Pattern	ESC * v 2 T	27 42 118 50 84	1B 2A 76 32 54
HP-defined Cross-Hatched Pattern	ESC * v 3 T	27 42 118 51 84	1B 2A 76 33 54
User defined	ESC * v 4 T	27 42 118 52 84	1B 2A 76 34 54
Brother-defined Shading Pattern (64 steps, original)	ESC * v 130 T	27 42 118 49 51 48 84	1B 2A 76 31 33 30 54
Select Source Transparency Mode			
Transparent	ESC * v 0 N	27 42 118 48 78	1B 2A 76 30 42
Opaque	ESC * v 1 N	27 42 118 49 78	1B 2A 76 31 42
Select Pattern Transparency Mode			
Transparent	ESC * v 0 O	27 42 118 48 79	1B 2A 76 30 43
Opaque	ESC * v 1 O	27 42 118 49 79	1B 2A 76 31 43

Function	Command	Decimal	Hexadecimal
PATTERN			
Horizontal Size	ESC * c # A (# dot)	27 42 99 ## 65	1B 2A 63 ## 41
Horizontal Size	ESC * c # H (# decipoint)	27 42 99 ## 72	1B 2A 63 ## 48
Vertical Size	ESC * c # B (# dot)	27 42 99 ## 66	1B 2A 63 ## 42
Vertical Size	ESC * c # V (# decipoint)	27 42 99 ## 86	1B 2A 63 ## 56
Pattern ID Setting (See note below.)	ESC * c # G (#: ID)	27 42 99 ## 71	1B 2A 63 ## 71
2% Gray	ESC * c 2 G	27 42 99 50 71	1B 2A 63 32 47
10% Gray	ESC * c 10 G	27 42 99 49 48 71	1B 2A 63 31 30 47
15 % Gray	ESC * c 15 G	27 42 99 49 53 71	1B 2A 63 31 35 47
30% Gray	ESC * c 30 G	27 42 99 51 48 71	1B 2A 63 33 30 47
45% Gray	ESC * c 45 G	27 42 99 52 53 71	1B 2A 63 34 35 47
70% Gray	ESC * c 70 G	27 42 99 55 48 71	1B 2A 63 37 30 47
90% Gray	ESC * c 90 G	27 42 99 57 48 71	1B 2A 63 39 30 47
100% Gray	ESC * c 100 G	27 42 99 49 48 48 71	1B 2A 63 31 30 30 47

Note

These gray settings can be expressed in 64 shades with ESC * v 130T and ESC * c 130 P.

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Function	Command	Decimal	Hexadecimal
1 Horiz. Line	ESC * c 1 G	27 42 99 49 71	1B 2A 63 31 47
2 Vert. Lines	ESC * c 2 G	27 42 99 50 71	1B 2A 63 32 47
3 Diagonal Lines	ESC * c 3 G	27 42 99 51 71	1B 2A 63 33 47
4 Diagonal Lines	ESC * c 4 G	27 42 99 52 71	1B 2A 63 34 47
5 Square Grid	ESC * c 5 G	27 42 99 53 71	1B 2A 63 35 47
6 Diagonal Grid	ESC * c 6 G	27 42 99 54 71	1B 2A 63 36 47
Print pattern			
Solid Black	ESC * c 0 P	27 42 99 48 80	1B 2A 63 30 50
Erase (Solid White Area Fill)	ESC * c 1 P	27 42 99 49 80	1B 2A 63 31 50
Shaded Fill	ESC * c 2 P	27 42 99 50 80	1B 2A 63 32 50
Cross-hatched Fill	ESC * c 3 P	27 42 99 51 80	1B 2A 63 33 50
User defined	ESC * c 4 P	27 42 99 52 80	1B 2A 63 34 50
Current Pattern	ESC * c 5 P	27 42 99 53 80	1B 2A 63 35 50
Brother-defined Shading Fill (64 steps, original)	ESC * c 130 P	27 42 99 49 51 48 80	1B 2A 63 31 33 30 50
Define Pattern	ESC * c # W (#: byte)	1B 2A 63 ## 51	27 42 99 ## 87
User-defined Pattern Control			
Delete All	ESC * c 0 Q	1B 2A 63 30 51	27 42 99 48 81
Delete Temporary	ESC * c 1 Q	1B 2A 63 31 51	27 42 99 49 81
Delete Current Pattern	ESC * c 2 Q	1B 2A 63 32 51	27 42 99 50 81
Make Temporary	ESC * c 4 Q	1B 2A 63 34 51	27 42 99 52 81
Make Permanent	ESC * c 5 Q	1B 2A 63 35 51	27 42 99 53 81
Set Pattern Reference Point			
Print Direction Oriented	ESC * p 0 R	1B 2A 70 30 52	27 42 112 48 82
Logical Page Oriented	ESC * p 1 R	1B 2A 70 31 52	27 42 112 49 82

Function	Command	Decimal	Hexadecimal
DOWNLOAD FONT			
Font ID Set	ESC * c # D (#: ID)	27 42 99 ## 68	1B 2A 63 ## 44
Character Code Set	ESC * c # E (##: chara. code)	27 42 99 ## 69	1B 2A 63 ## 45
Download Control			
Delete All	ESC * c 0 F	27 42 99 48 70	1B 2A 63 30 46
Delete Temporary	ESC * c 1 F	27 42 99 49 70	1B 2A 63 31 46
Delete Current ID	ESC * c 2 F	27 42 99 50 70	1B 2A 63 32 46
Delete Current Character Code	ESC * c 3 F	27 42 99 51 70	1B 2A 63 33 46
Make Temporary	ESC * c 4 F	27 42 99 52 70	1B 2A 63 34 46
Make Permanent	ESC * c 5 F	27 42 99 53 70	1B 2A 63 35 46
Copy Assign	ESC * c 6 F	27 42 99 54 70	1B 2A 63 36 46
Download Font/Flash Memory Card (original)			
Delete One from Card	ESC * c 1026 F	27 42 99 49 48 50 54 70	1B 2A 63 31 30 32 36 46
Delete All from Card	ESC * c 1028 F	27 42 99 49 48 50 56 70	1B 2A 63 31 30 32 38 46
Save Current Font into Card	ESC * c 1029 F	27 42 99 49 48 50 57 70	1B 2A 63 31 30 32 39 46
Set to Primary Font	ESC (# X (#: font ID)	27 40 ## 88	1B 28 ## 58
Set to Secondary Font	ESC) # X (#: font ID)	27 41 ## 88	1B 29 ## 58
Font Default Setting			
Primary	ESC (# @ (#: control)	27 40 ## 64	1B 28 ## 40
Secondary	ESC) # @ (#: control)	27 41 ## 64	1B 29 ## 40
Download Font Header	ESC) s # W (#: byte)	27 41 115 ## 87	1B 29 73 ## 57
Download Character	ESC (s # W (#: byte)	27 40 115 ## 87	1B 28 73 ## 57

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Function	Command	Decimal	Hexadecimal
USER-DEFINED SYMBOL SET			
Symbol Set ID Set	ESC * c # R (#: ID)	27 42 99 ## 82	1B 2A 63 ## 52
Define Symbol Set	ESC (f # W (#: byte)	27 40 102 ## 87	1B 28 66 ## 46
Symbol Set Control			
Delete All	ESC * c 0 S	27 42 99 48 83	1B 2A 63 30 53
Delete Temporary	ESC * c 1 S	27 42 99 49 83	1B 2A 63 31 53
Delete Current ID	ESC * c 2 S	27 42 99 50 83	1B 2A 63 32 53
Make Temporary	ESC * c 4 S	27 42 99 52 83	1B 2A 63 34 53
Make Permanent	ESC * c 5 S	27 42 99 53 83	1B 2A 63 35 53
MACRO			
Macro ID Set	ESC & f # Y (#: ID)	27 38 102 ## 89	1B 26 66 ## 59
Macro Control			
Start Macro Definition	ESC & f 0 X	27 38 102 48 88	1B 26 66 30 58
End Macro Definition	ESC & f 1 X	27 38 102 49 88	1B 26 66 31 58
Execute Macro	ESC & f 2 X	27 38 102 50 88	1B 26 66 32 58
Call Macro	ESC & f 3 X	27 38 102 51 88	1B 26 66 33 58
Macro Overlay ON	ESC & f 4 X	27 38 102 52 88	1B 26 66 34 58
Macro Overlay OFF	ESC & f 5 X	27 38 102 53 88	1B 26 66 35 58
Delete All Macros	ESC & f 6 X	27 38 102 54 88	1B 26 66 36 58
Delete Temporary Macro	ESC & f 7 X	27 38 102 55 88	1B 26 66 37 58
Delete Current Macro	ESC & f 8 X	27 38 102 56 88	1B 26 66 38 58
Make Temporary Macro	ESC & f 9 X	27 38 102 57 88	1B 26 66 39 58
Make Permanent Macro	ESC & f 10 X	27 38 102 49 48 88	1B 26 66 31 30 58
Macro/Card (original)			
Delete All Macros from Card	ESC & f 1030 X	27 38 102 49 48 51 48 88	1B 26 66 31 30 33 30 58
Delete Current Macro from Card	ESC & f 1036 X	27 38 102 49 48 51 54 88	1B 26 66 31 30 33 36 58
Save Current Macro into Card	ESC & f 1038 X	27 38 102 49 48 51 56 88	1B 26 66 31 30 33 38 58
STATUS READBACK			
Set Status Readback Location Type			
Invalid Location	ESC * s 0 T	27 42 115 48 84	1B 2A 73 30 54
Currently Selected	ESC * s 1 T	27 42 115 49 84	1B 2A 73 31 54
All Locations	ESC * s 2 T	27 42 115 50 84	1B 2A 73 32 54
Internal	ESC * s 3 T	27 42 115 51 84	1B 2A 73 33 54
Downloaded	ESC * s 4 T	27 42 115 52 84	1B 2A 73 34 54
Cartridge	ESC * s 5 T	27 42 115 53 84	1B 2A 73 35 54
Option ROM Socket	ESC * s 7 T	27 42 115 55 84	1B 2A 73 37 54
Set Status Readback Location Unit			
All Entities of Location Type	ESC * s 0 U	27 42 115 48 85	1B 2A 73 30 55
Entity 1 or Temporary	ESC * s 1 U	27 42 115 49 85	1B 2A 73 31 55
Entity 2 or Permanent	ESC * s 2 U	27 42 115 50 85	1B 2A 73 32 55
Entity 3	ESC * s 3 U	27 42 115 51 85	1B 2A 73 33 55
Entity 4	ESC * s 4 U	27 42 115 52 85	1B 2A 73 34 55
Inquire Status Readback Entity			
Font	ESC * s 0 I	27 42 115 48 73	1B 2A 73 30 49
Macro	ESC * s 1 I	27 42 115 49 73	1B 2A 73 31 49
User-defined Pattern	ESC * s 2 I	27 42 115 50 73	1B 2A 73 32 49
Symbol Set	ESC * s 3 I	27 42 115 51 73	1B 2A 73 33 49
Font Extended	ESC * s 4 I	27 42 115 52 73	1B 2A 73 34 49

Function	Command	Decimal	Hexadecimal
Flush All Pages			
Flush All Complete Pages	ESC & r 0 F	27 38 114 48 70	1B 26 72 30 46
Flush All Page Data	ESC & r 1 F	27 38 114 49 70	1B 26 72 31 46
Free Memory Space	ESC * s 1 M	27 42 115 49 77	1B 2A 73 31 4D
Echo	ESC * s # X # = Echo value (-32767 to 32767)	27 42 115 # ... # 88	1B 2A 73 # ... # 58
OTHER COMMANDS			
Push Cursor Position	ESC & f 0 S	27 38 102 48 83	1B 26 66 30 53
Pop Cursor Position	ESC & f 1 S	27 38 102 49 83	1B 26 66 31 53
Display Function			
ON	ESC Y	27 89	1B 59
OFF	ESC Z	27 90	1B 5A
Transparent Print	ESC & p # X (# byte)	27 38 112 ## 88	1B 26 70 ## 58
Perforation Skip			
ON	ESC & l 1 L	27 38 108 49 76	1B 26 6C 31 4C
OFF	ESC & l 0 L	27 38 108 48 76	1B 26 6C 30 4C
End of Line Wrap			
ON	ESC & s 0 C	27 38 115 48 67	1B 26 73 30 43
OFF	ESC & s 1 C	27 38 115 49 67	1B 26 73 31 43
Auto Underline			
ON	ESC & d # D	27 38 100 ## 68	1B 26 64 ## 44
Fix	ESC & d 0 D	27 38 100 48 68	1B 26 64 30 44
Float	ESC & d 3 D	27 38 100 51 68	1B 26 64 33 44
OFF	ESC & d @	27 38 100 64	1B 26 64 40
Half Line Feed	ESC =	27 61	1B 3D
Line Termination			
CR=CR, LF=LF, FF=FF	ESC & k 0 G	27 38 107 48 71	1B 26 6B 30 47
CR=CR+LF, LF=LF, FF=FF	ESC & k 1 G	27 38 107 49 71	1B 26 6B 31 47
CR=CR, LF=LF+CR, FF=FF+CR	ESC & k 2 G	27 38 107 50 71	1B 26 6B 32 47
CR=CR+LF, LF=LF+CR, FF=FF+CR	ESC & k 3 G	27 38 107 51 71	1B 26 6B 33 47
Print Orientation			
Portrait	ESC & l 0 O	27 38 108 48 79	1B 26 6C 30 4F
Landscape	ESC & l 1 O	27 38 108 49 79	1B 26 6C 31 4F
Reverse Portrait	ESC & l 2 O	27 38 108 50 79	1B 26 6C 32 4F
Reverse Landscape	ESC & l 3 O	27 38 108 51 79	1B 26 6C 33 4F
Print Direction	ESC & a # P (# degree)	27 38 97 # ... # 80	1B 26 61 # ... # 50
Copy Volume	ESC & l # X	27 38 108 ## 88	1B 26 6C ## 58
Paper Input Control			
Paper Eject	ESC & l 0 H	27 38 108 48 72	1B 26 6C 30 48
Feed From Upper Cassette (TRAY 1)	ESC & l 1 H	27 38 108 49 72	1B 26 6C 31 48
Manual Feed	ESC & l 2 H	27 38 108 50 72	1B 26 6C 32 48
Envelope	ESC & l 3 H	27 38 108 51 72	1B 26 6C 33 48
Feed From MP Tray	ESC & l 4 H	27 38 108 52 72	1B 26 6C 34 48
Feed From Lower Cassette (TRAY 2 or Option)	ESC & l 5 H	27 38 108 53 72	1B 26 6C 35 48

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Function	Command	Decimal	Hexadecimal
Printer Reset	ESC E	27 69	1B 45
Self-test	ESC z	27 122	1B 7A
Job Separation	ESC & l # T	27 38 108 ## 84	1B 26 6C ## 54
Unit of Measure	ESC & u # D (# = Units/inch)	27 38 117 # ... # 68	1B 26 75 # ... # 44
Go to Other Emulations (original)			
BR-Script 2 Batch Mode	ESC CR A B	27 13 65 66	1B 0D 41 42
BR-Script 2 Interactive Mode	ESC CR A I	27 13 65 73	1B 0D 41 49
HP-GL	ESC CR G L	27 13 71 76	1B 0D 47 4C
IBM Proprinter XL	ESC CR I	27 13 73	1B 0D 49
EPSON FX-850	ESC CR E	27 13 69	1B 0D 45
High Resolution Control (HRC) (original)			
Set HRC Off	ESC CR R O	27 13 82 79	1B 0D 52 4F
Set HRC to Light Level	ESC CR R L	27 13 82 76	1B 0D 52 4C
Set HRC to Medium Level	ESC CR R M	27 13 82 77	1B 0D 52 4D
Set HRC to Dark Level	ESC CR R D	27 13 82 68	1B 0D 52 44
User Reset (original)			
Restore to User Settings	ESC CR ! # R # = 0 to 2	27 13 33 # 82	1B 0D 21 # 52
Factory Reset (original)			
Restore to Factory Settings	ESC CR F D	27 13 70 68	1B 0D 46 44
Execute Card Data (original)			
Execute saved card data	ESC CR ! # E	27 13 33 # 69	1B 0D 21 # 45
FONT SELECTION			
Symbol Set			
ISO 60: Norwegian 1	ESC (0 D	27 40 48 68	1B 28 30 44
ISO 61: Norwegian 2	ESC (1 D	27 40 49 68	1B 28 31 44
ISO 4: United Kingdom	ESC (1 E	27 40 49 69	1B 28 31 45
Windows 3.1 Latin1	ESC (9 E	27 40 57 69	1B 28 39 45
ISO 25: French	ESC (0 F	27 40 48 70	1B 28 30 46
ISO 69: French	ESC (1 F	27 40 49 70	1B 28 31 46
HP German	ESC (0 G	27 40 48 71	1B 28 30 47
ISO 21: German	ESC (1 G	27 40 49 71	1B 28 31 47
ISO 15: Italian	ESC (0 I	27 40 48 73	1B 28 30 49
Microsoft Publishing	ESC (6 J	27 40 54 74	1B 28 36 4A
Desk Top	ESC (7 J	27 40 55 74	1B 28 37 4A
PS Text	ESC (10 J	27 40 49 48 74	1B 28 31 30 4A
MC Text	ESC (12 J	27 40 49 50 74	1B 28 31 32 4A
Ventura International	ESC (13 J	27 40 49 51 74	1B 28 31 33 4A
Ventura US	ESC (14 J	27 40 49 52 74	1B 28 31 34 4A
ISO 14: JIS ASCII	ESC (0 K	27 40 48 75	1B 28 30 4B
ISO 57: Chinese	ESC (2 K	27 40 50 75	1B 28 32 4B
ISO 8859-1 (ECMA-94) Latin1	ESC (0 N	27 40 48 78	1B 28 30 4E

Function	Command	Decimal	Hexadecimal
Wingdings	ESC (579 L	27 40 53 55 57 76	1B 28 35 37 39 4C
PS Math	ESC (5 M	27 40 53 77	1B 28 35 4D
Ventura Math	ESC (6 M	27 40 54 77	1B 28 36 4D
Math-8	ESC (8 M	27 40 56 77	1B 28 38 4D
Symbol	ESC (19 M	27 40 49 57 77	1B 28 31 39 4D
ISO 8859-2 Latin2	ESC (2 N	27 40 50 78	1B 28 32 4E
ISO 8859-5 Latin5	ESC (5 N	27 40 53 78	1B 28 35 4E
ISO 11: Swedish	ESC (0 S	27 40 48 83	1B 28 30 53
HP Spanish	ESC (1 S	27 40 49 83	1B 28 31 53
ISO 17: Spanish	ESC (2 S	27 40 50 83	1B 28 32 53
ISO 10: Swedish	ESC (3 S	27 40 51 83	1B 28 33 53
ISO 16: Portuguese	ESC (4 S	27 40 52 83	1B 28 34 53
ISO 84: Portuguese	ESC (5 S	27 40 53 83	1B 28 35 53
ISO 85: Spanish	ESC (6 S	27 40 54 83	1B 28 36 53
Windows 3.1 Latin5	ESC (5 T	27 40 53 84	1B 28 35 54
PC Turkish	ESC (9 T	27 40 57 84	1B 28 39 54
ISO 6: ASCII	ESC (0 U	27 40 48 85	1B 28 30 55
Legal	ESC (1 U	27 40 49 85	1B 28 31 55
ISO 2: IRV	ESC (2 U	27 40 50 85	1B 28 32 55
Roman 8	ESC (8 U	27 40 56 85	1B 28 38 55
Windows 3.0 Latin1	ESC (9 U	27 40 57 85	1B 28 39 55
PC-8	ESC (10 U	27 40 49 48 85	1B 28 31 30 55
PC-8 D/N	ESC (11 U	27 40 49 49 85	1B 28 31 31 55
PC 850	ESC (12 U	27 40 49 50 85	1B 28 31 32 55
Pi Font	ESC (15 U	27 40 49 53 85	1B 28 31 35 55
PC-852	ESC (17 U	27 40 49 55 85	1B 28 31 37 55
Windows 3.1 Latin1	ESC (19 U	27 40 49 57 85	1B 28 31 39 55
Character Set (original)			
ROMAN 8	ESC (s 1 C	27 40 115 49 67	1B 28 73 31 43
US ASCII	ESC (s 2 C	27 40 115 50 67	1B 28 73 32 43
GERMAN	ESC (s 3 C	27 40 115 51 67	1B 28 73 33 43
UK ENGLISH	ESC (s 4 C	27 40 115 52 67	1B 28 73 34 43
FRENCH	ESC (s 5 C	27 40 115 53 67	1B 28 73 35 43
DUTCH	ESC (s 6 C	27 40 115 54 67	1B 28 73 36 43
ITALIAN	ESC (s 7 C	27 40 115 55 67	1B 28 73 37 43
S. SPANISH	ESC (s 8 C	27 40 115 56 67	1B 28 73 38 43
A. ENGLISH W.P.	ESC (s 9 C	27 40 115 57 67	1B 28 73 39 43
U.K. ASCII/2	ESC (s 10 C	27 40 115 49 48 67	1B 28 73 31 30 43
SYMBOL*	ESC (s 11 C	27 40 115 49 49 67	1B 28 73 31 31 43
INTERNATIONAL	ESC (s 12 C	27 40 115 49 50 67	1B 28 73 31 32 43
AMERICAN ENGLISH	ESC (s 13 C	27 40 115 49 51 67	1B 28 73 31 33 43
U.K. ASCII	ESC (s 14 C	27 40 115 49 52 67	1B 28 73 31 34 43
PORTUGUESE	ESC (s 15 C	27 40 115 49 53 67	1B 28 73 31 35 43
SWISS GERMAN	ESC (s 16 C	27 40 115 49 54 67	1B 28 73 31 36 43
AMERICAN SPANISH	ESC (s 17 C	27 40 115 49 55 67	1B 28 73 31 37 43
NORWEGIAN	ESC (s 18 C	27 40 115 49 56 67	1B 28 73 31 38 43
CANADIAN	ESC (s 19 C	27 40 115 49 57 67	1B 28 73 31 39 43
FINNISH/SWEDISH	ESC (s 20 C	27 40 115 50 48 67	1B 28 73 32 30 43
SOUTH AFRICA	ESC (s 21 C	27 40 115 50 49 67	1B 28 73 32 31 43
JAPANESE ENGLISH	ESC (s 37 C	27 40 115 51 55 67	1B 28 73 33 37 43

*The symbol character set is not available for Tennessee and Helsinki fonts.

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Function	Command	Decimal	Hexadecimal
PC-8	ESC (s 25 C	27 40 115 50 53 67	1B 28 73 32 35 43
PC-8 D/N	ESC (s 23 C	27 40 115 50 51 67	1B 28 73 32 33 43
PC-850	ESC (s 26 C	27 40 115 50 54 67	1B 28 73 32 36 43
PC-860	ESC (s 27 C	27 40 115 50 55 67	1B 28 73 32 37 43
PC-863	ESC (s 28 C	27 40 115 50 56 67	1B 28 73 32 38 43
PC-865	ESC (s 29 C	27 40 115 50 57 67	1B 28 73 32 39 43
Fixed Pitch or P.S.			
Fixed	ESC (s 0 P	27 40 115 48 80	1B 28 73 30 50
P.S.	ESC (s 1 P	27 40 115 49 80	1B 28 73 31 50
Character Pitch Selection 1	ESC (s # H (#: char./inch)	27 40 115 ## 72	1B 28 73 ## 48
Character Pitch Selection 2			
10 Pitch	ESC & k 0 S	27 38 107 48 83	1B 26 6B 30 53
16.6 Pitch	ESC & k 2 S	27 38 107 50 83	1B 26 6B 32 53
12 Pitch	ESC & k 4 S	27 38 107 52 83	1B 26 6B 34 53
Point Size	ESC (s # V (#: point size)	27 40 115 ## 86	1B 28 73 ## 56
Italics or upright			
Italics	ESC (s 1 S	27 40 115 49 83	1B 28 73 31 53
Upright	ESC (s 0 S	27 40 115 48 83	1B 28 73 30 53
Condensed	ESC (s 4 S	27 40 115 52 83	1B 28 73 34 53
Condensed Italic	ESC (s 5 S	27 40 115 53 83	1B 28 73 35 53
Compressed (Extra Condensed)	ESC (s 8 S	27 40 115 56 83	1B 28 73 38 53
Expanded	ESC (s 24 S	27 40 115 50 52 83	1B 28 73 32 34 53
Outline	ESC (s 32 S	27 40 115 51 50 83	1B 28 73 33 32 53
Inline	ESC (s 64 S	27 40 115 54 52 83	1B 28 73 36 34 53
Shadowed	ESC (s 128 S	27 40 115 49 50 56 83	1B 28 73 31 32 38 53
Outline Shadowed	ESC (s 160 S	27 40 115 49 54 48 83	1B 28 73 31 36 30 53
Stroke Weight	ESC (s # B	27 40 115 ## 66	1B 28 73 ## 42
Ultra Thin	ESC (s-7B	27 40 115 2D 55 66	1B 28 73 45 37 42
Extra Thin	ESC (s-6B	27 40 115 2D 54 66	1B 28 73 45 36 42
Thin	ESC (s-5B	27 40 115 2D 53 66	1B 28 73 45 35 42
Extra Light	ESC (s-4B	27 40 115 2D 52 66	1B 28 73 45 34 42
Light	ESC (s-3B	27 40 115 2D 51 66	1B 28 73 45 33 42
Demi Light	ESC (s-2B	27 40 115 2D 50 66	1B 28 73 45 32 42
Semi Light	ESC (s-1B	27 40 115 2D 49 66	1B 28 73 45 31 42
Medium (Normal)	ESC (s 0 B	27 40 115 48 66	1B 28 73 30 42
Semi Bold	ESC (s 1 B	27 40 115 49 66	1B 28 73 31 42
Demi Bold	ESC (s 2 B	27 40 115 50 66	1B 28 73 32 42
Bold	ESC (s 3 B	27 40 115 51 66	1B 28 73 33 42
Extra Bold	ESC (s 4 B	27 40 115 52 66	1B 28 73 34 42
Black	ESC (s 5 B	27 40 115 53 66	1B 28 73 35 42
Extra Black	ESC (s 6 B	27 40 115 54 66	1B 28 73 36 42
Ultra Black	ESC (s 7 B	27 40 115 55 66	1B 28 73 37 42
Scalable Font Ratio (original)			
Set horizontal ratio (#=0.25 to 3 step 0.01)	ESC CR ! # H	27 13 33 # 72	1B 0D 21 # 48
Set vertical ratio (#=0.25 to 3 step 0.01)	ESC CR ! # V	27 13 33 # 86	1B 0D 21 # 56

Function	Command
Scalable Fonts	
Intellifont-compatible Fonts (##: point size)	
Alaska	ESC (s 1 p ## v 0 s 1 b 4 3 6 2 T
Alaska Extrabold	ESC (s 1 p ## v 0 s 4 b 4 3 6 2 T
Antique Oakland	ESC (s 1 p ## v 0 s 0 b 4 1 6 8 T
Antique Oakland Bold	ESC (s 1 p ## v 0 s 3 b 4 1 6 8 T
Antique Oakland Oblique	ESC (s 1 p ## v 1 s 0 b 4 1 6 8 T
Brougham	ESC (s 0 p ## h 0 s 0 b 4 0 9 9 T
Brougham Bold	ESC (s 0 p ## h 0 s 3 b 4 0 9 9 T
Brougham Oblique	ESC (s 0 p ## h 1 s 0 b 4 0 9 9 T
Brougham BoldOblique	ESC (s 0 p ## h 1 s 3 b 4 0 9 9 T
Cleveland Condensed	ESC (s 1 p ## v 4 s 3 b 4 1 4 0 T
Connecticut	ESC (s 1 p ## v 1 s 0 b 4 1 1 6 T
Guatemala Antique	ESC (s 1 p ## v 0 s 0 b 4 1 9 7 T
Guatemala Italic	ESC (s 1 p ## v 0 s 3 b 4 1 9 7 T
Guatemala Bold	ESC (s 1 p ## v 1 s 0 b 4 1 9 7 T
Guatemala BoldItalic	ESC (s 1 p ## v 1 s 3 b 4 1 9 7 T
LetterGothic	ESC (s 0 p ## h 0 s 0 b 4 1 0 2 T
LetterGothic Bold	ESC (s 0 p ## h 0 s 3 b 4 1 0 2 T
LetterGothic Oblique	ESC (s 0 p ## h 1 s 0 b 4 1 0 2 T
Maryland	ESC (s 1 p ## v 0 s 0 b 4 2 9 7 T
Oklahoma	ESC (s 1 p ## v 0 s 0 b 4 1 1 3 T
Oklahoma Bold	ESC (s 1 p ## v 0 s 3 b 4 1 1 3 T
Oklahoma Oblique	ESC (s 1 p ## v 1 s 0 b 4 1 1 3 T
Oklahoma BoldOblique	ESC (s 1 p ## v 1 s 3 b 4 1 1 3 T
PC Brussels Light	ESC (s 1 p ## v 0 s - 3 b 4 1 4 3 T
PC Brussels Demi	ESC (s 1 p ## v 0 s 2 b 4 1 4 3 T
PC Brussels LightItalic	ESC (s 1 p ## v 1 s - 3 b 4 1 4 3 T
PC Brussels DemiItalic	ESC (s 1 p ## v 1 s 2 b 4 1 4 3 T
PC Tennessee Roman	ESC (s 1 p ## v 0 s 0 b 4 1 0 1 T
PC Tennessee Bold	ESC (s 1 p ## v 0 s 3 b 4 1 0 1 T
PC Tennessee Italic	ESC (s 1 p ## v 1 s 0 b 4 1 0 1 T
PC Tennessee BoldItalic	ESC (s 1 p ## v 1 s 3 b 4 1 0 1 T
Utah	ESC (s 1 p ## v 0 s 0 b 4 1 4 8 T
Utah Bold	ESC (s 1 p ## v 0 s 3 b 4 1 4 8 T
Utah Oblique	ESC (s 1 p ## v 1 s 0 b 4 1 4 8 T
Utah BoldOblique	ESC (s 1 p ## v 1 s 3 b 4 1 4 8 T
Utah Condensed	ESC (s 1 p ## v 4 s 0 b 4 1 4 8 T
Utah Condensed Bold	ESC (s 1 p ## v 4 s 3 b 4 1 4 8 T
Utah Condensed Oblique	ESC (s 1 p ## v 5 s 0 b 4 1 4 8 T
Utah Condensed BoldOblique	ESC (s 1 p ## v 5 s 3 b 4 1 4 8 T
TrueType-compatible Fonts (##: point size)	
BR Symbol	ESC (1 9 M ESC (s 1 p ## v 0 s 0 b 1 6 6 8 6 T
Helsinki	ESC (s 1 p ## v 0 s 0 b 1 6 6 0 2 T
Helsinki Bold	ESC (s 1 p ## v 0 s 3 b 1 6 6 0 2 T
Helsinki Oblique	ESC (s 1 p ## v 1 s 0 b 1 6 6 0 2 T
Helsinki BoldOblique	ESC (s 1 p ## v 1 s 3 b 1 6 6 0 2 T
Tennessee Roman	ESC (s 1 p ## v 0 s 0 b 1 6 9 0 1 T
Tennessee Bold	ESC (s 1 p ## v 0 s 3 b 1 6 9 0 1 T
Tennessee Italic	ESC (s 1 p ## v 1 s 0 b 1 6 9 0 1 T
Tennessee BoldItalic	ESC (s 1 p ## v 1 s 3 b 1 6 9 0 1 T
W Dingbats	ESC (5 7 9 L ESC (s 1 p ## v 0 s 0 b 3 1 4 0 2 T

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Function	Command
Type 1 Font Compatible Fonts (##: point size)	
Atlanta Book	ESC (s 1 p ## v 0 s 0 b 1 5 5 T
Atlanta Demi	ESC (s 1 p ## v 0 s 3 b 1 5 5 T
Atlanta BookOblique	ESC (s 1 p ## v 1 s 0 b 1 5 5 T
Atlanta DemiOblique	ESC (s 1 p ## v 1 s 3 b 1 5 5 T
Calgary MediumItalic	ESC (s 1 p ## v 1 s 0 b 1 5 9 T
Copenhagen Roman	ESC (s 1 p ## v 0 s 0 b 1 5 7 T
Copenhagen Bold	ESC (s 1 p ## v 0 s 3 b 1 5 7 T
Copenhagen Italic	ESC (s 1 p ## v 1 s 0 b 1 5 7 T
Copenhagen BoldItalic	ESC (s 1 p ## v 1 s 3 b 1 5 7 T
Portugal Roman	ESC (s 1 p ## v 0 s 0 b 1 5 8 T
Portugal Bold	ESC (s 1 p ## v 0 s 3 b 1 5 8 T
Portugal Italic	ESC (s 1 p ## v 1 s 0 b 1 5 8 T
Portugal BoldItalic	ESC (s 1 p ## v 1 s 3 b 1 5 8 T
Bitmapped Fonts	
LetterGothic16.66	ESC (s 0 p 16.67 h 8.5 v 0 s 0 b 1 3 0 T
OCR-A	ESC (0 O ESC (s 0 p 10 h 12 v 0 s 0 b 1 0 4 T
OCR-B	ESC (1 O ESC (s 0 p 10 h 12 v 0 s 0 b 1 1 0 T
Brother Original Fonts	
Bermuda Script	ESC (s 1 p ## v 0 s 3 b 1 3 4 T
Germany	ESC (s 1 p ## v 0 s 3 b 1 3 2 T
San Diego	ESC (s 1 p ## v 0 s 5 b 1 3 3 T
US Roman	ESC (s 1 p ## v 0 s 0 b 1 3 5 T

CCITT G3/G4 and TIFF (original command)

One of the unique features of the PCL mode of this printer is it supports CCITT G3/G4 type data compression and TIFF format.

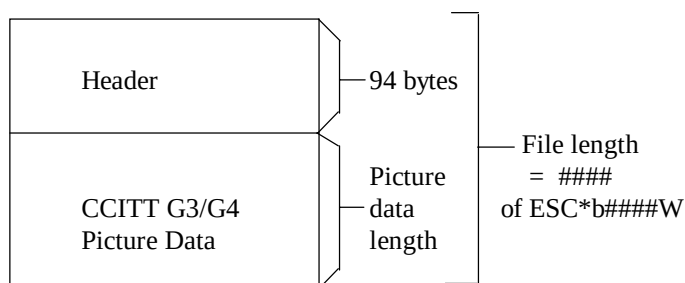
■ CCITT G3/G4 (Raster Graphic Mode 1152)

The printer's PCL mode supports CCITT G3/G4 type graphic data compression.

This format is popular in optical document storage area as this compression is effective to store black and white type pictures. Compression mode for CCITT G3/G4 is 1152 and the command becomes ESC * b 1152 M.

As G3/G4 format does not have picture size/resolution information, the printer requires a header at the beginning of the picture data. The header size is 94 byte. Both the header and the picture data are transferred by one transfer graphics data command (ESC * b ### W). Normal PCL transfer graphics data command has a limitation of the data size and ### should not exceed 32767. Unlike other mode, mode 1152 is special and this mode does not have 32767 byte size limitation. Print model is not applied to this type of raster graphics.

The mode 1152 graphic data consists of the following data structure. The picture data follows the header.



Header format is described on the next page.

You have to specify mode 1152 by sending ESC *b1152M command for each graphic data transfer.

About CCITT G3/G4 data format, please refer to CCITT (THE INTERNATIONAL TELEGRAPH AND TELEPHONE CONSULTATIVE COMMITTEE) BLUE BOOK Volume VII.

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Mode 1152 graphic data header data structure

Position	Data	Description
0-1	6E 6E	'nn' This is header ID.
2-3	0A 00	reserved (Header Version)
4-7	5E 00 00 00	Picture data start offset from header top
8-11	File Length	File length including 94 byte header. If file length is 65,536 byte, these 4 bytes become "00 00 01 00".
12-13	01 00	reserved
14-15	01 00	reserved
16-19	4A 00 00 00	reserved
20-21	compression	02 00: Fax MH format 03 00: Fax MR format 04 00: Fax G4 format
22-55	00....00	All zero
56-59	Picture Data Length	If picture data length is 65,442 (65,536 - 94) byte, these 4 bytes become "A2 FF 00 00".
60-61	01 00	bit/pixel
62-63	01 00	bit/pixel
64-65	Pixels/line	If picture dot width = 2400, these 2 bytes become "60 09".
66-67	Pixels/line	Same as 64-65
68-69	Lines/picture	If picture line count = 3100, these 2 bytes become "1C 0C".
70-71	Lines/picture	Same as 70-71
72-73	00 00	reserved
74-75	Photo metrics	00 00: data 0 = white 01 00: data 0 = black
76-77	02 00	reserved (Endian format)
78-79	Bit Fill Order	01 00: filled from MSB 02 00: filled from LSB
80-81	01 00	reserved
82-83	00 00	reserved (min. pixel value)
84-85	01 00	reserved (max pixel value)
86-87	horizontal resolution (200,300,400,600)	C8 00 00 00 : 200 dpi 2C 01 00 00 : 300 dpi 90 01 00 00 : 400 dpi 58 02 00 00 : 600 dpi 400 and 600 dpi are available when printer operates in 600 dpi.
88-89	vertical resolution (200,300,400,600)	C8 00 00 00 : 200 dpi 2C 01 00 00 : 300 dpi 90 01 00 00 : 400 dpi 58 02 00 00 : 600 dpi The printer accepts different values for vertical and horizontal resolutions. 400/600 dpi are available when printer operates in 600 dpi.
90-91	02 00	reserved (resolution unit = inch)
92-93	00 00	reserved (error code)

■ TIFF Format (Raster Graphic Mode 1024) & Advanced Photoscale Technology

The printer's PCL mode supports TIFF Version 5.0 file format as a format to transfer raster graphics data.

Mode set command for TIFF file format is ESC *b1024M.

One transfer graphics data command (ESC*b###W) should contain whole TIFF file.

In mode 1024, transfer graphics data command byte count does not have a limitation of 32,767 byte.

The printer supports both 'MM' (big endian) format and 'II' (little endian) format.

Print model is not applied to this type of data transfer.

The printer has some limitations on the TIFF file format.

1. Tags position has to be prior to the picture (strip) data.

2. Compression tag --- Tag ID:259

The printer supports 1, 2, 3, 4 and 32773.

1: no compression (Bits/Sample=1,4,8)

2: CCITT G3 MH (Bits/Sample=1)

3: CCITT G3 MR (Bits/Sample=1)

4: CCITT G4 (Bits/Sample=1)

32773: Pack Bit (Bits/Sample=1)

3. Sample/pixel --- Tag ID:277

This value should be 1. This means the printer accepts only monochrome TIFF file.

4. Bits/Sample --- Tag ID:258

The printer supports 1, 4 and 8.

If you specify 4 or 8 and the printer resolution is 600 dpi, the printer prints that page utilizing APT.

5. Horizontal resolution (Tag ID=282) and Vertical resolution (Tag ID=283)

Compression type	Bits/Sample	Available Resolution	APT
No Compression	4, 8	From 1 dpi to 300 dpi	ON
No Compression Pack Bit	1	Printer's Resolution (300 or 600 dpi)	OFF
CCITT G3 & G4	1	200,300,400,600 dpi 400 & 600 dpi are only when printer operates in 600 dpi.	OFF

We recommend 150 dpi or less resolution for APT to reduce data size.

Horizontal 1200-dpi Image Format Mode(Raster Graphic Mode 1027)

The printer supports 1200 dpi printing for special image formats in 1200 dpi mode.

We recommend that the installed printer memory is 10 Mbytes or more for 1200 dpi printing.

To set 1200 dpi mode,

1. Set 1200 dpi printing mode by using the following PJI command:

```
@PJI SET RAS1200MODE = ON
```

2. Choose PCL mode with the following PJI command:

```
@PJI ENTER LANGUAGE = PCL
```

(If you select a mode other than PCL mode, 1200 dpi printing mode cannot be selected.)

The PCL Mode set command for 1200 dpi Image Format is ESC *b1027M.

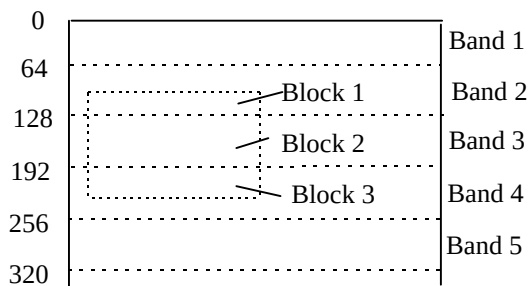
The transfer raster data command (ESC*b###W) then transfers horizontal 1200 dpi data.

<1200 dpi Graphic Data Compression Format>

This compression format consists of blocks of data 64 dots down the page starting from the leading edge of the paper.

Ex.) If the graphic data extends over three bands as shown in the following diagram, it transfers the data as three blocks of data:

```
ESC*b###W <Block 1> <Block 2> <Block 3>
```



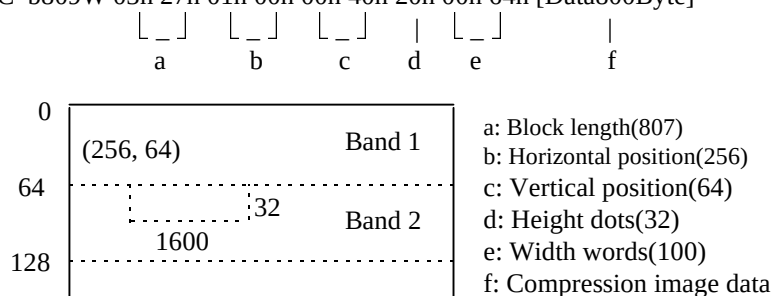
In mode 1027, the transfer graphic data command byte count does not have a limitation of 32,767 bytes.

The block data is composed as follows:

Position	Data	Description
0 - 1	Block length	n - 2
2 - 3	Horizontal position	dots from the left of the page
4 - 5	Vertical position	dots from the leading edge of the page
6	Height dots	number of image vertical dots
7 - 8	Width words	number of image horizontal 16 bit words
9 - (n - 1)	Compression data	compression image data

Ex.) Data is at horizontal position = 256, vertical position = 64, height = 32 dots, width = 100 x 16 bit words (1600 dots), and compression data is 800 bytes;

ESC*b809W 03h 27h 01h 00h 00h 40h 20h 00h 64h [Data800Byte]



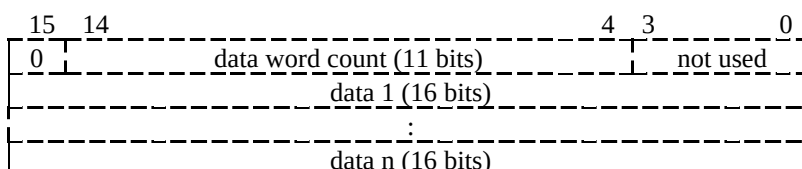
<Compressed Image Data>

Data compression compresses the original image data word by word (16 bits).

The compressed data consists of both horizontal compression which uses 16 bit, 8 bit and 4 bit repeating patterns within 1 word or 2 words of data, and vertical compression which indicates to repeat the same data as in the previous line with 1 word of data.

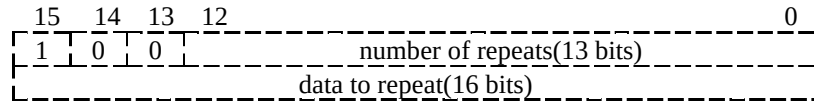
• Non-compressed data

When the most significant bit in the first 2 bytes is 0, the printer goes into non-compression mode. The following 11 bits then indicate the number of words of data, and the least significant 4 bits are not used. After that, the image data follows word by word.



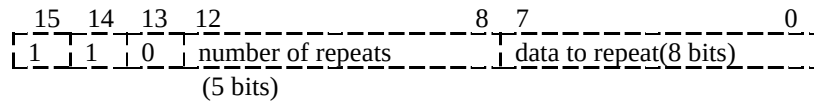
- 16 bit repeating compressed data

When the most significant 3 bits in the first 2 bytes are in the order 1, 0, 0, the remaining 13 bits indicate the number of times to repeat 16 bit data. The following 2 bytes should be the 16 bit data to repeat.



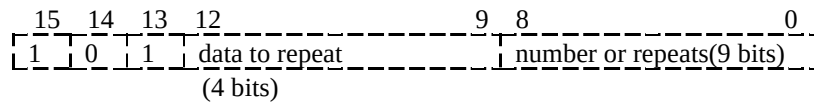
- 8 bit repeating compressed data

When the most significant 3 bits in the first 2 bytes are in the order 1, 1, 0, the following 5 bits indicate the number of times to repeat 16 bits (two by 8 bits) data. The remaining 8 bits should be the 8 bit data to repeat.



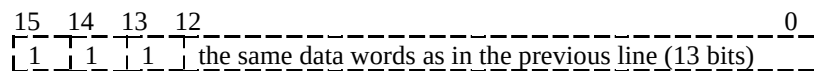
- 4 bit repeating compression data

When the most significant 3 bits in the first 2 bytes are in the order 1, 0, 1, the following 4 bits indicate 4 bit data to repeat. The remaining 9 bits indicate the number of times to repeat the 16 bit (4 by 4 bits) data.



- Vertical repeating compressed data

When the most significant 3 bits in the first 2 bytes are in the order 1, 1, 1, the remaining 13 bits indicate the same data words as in the previous line.



The printer can not support the APT and HRC function in the 1200 dpi printing mode.

HP-GL/2 Command Sets

Command	Mnemonic	Parameters
Dual Context Extensions		
ENTER PCL MODE	ESC % # A	0-Retain previous PCL cursor position and palette 1-Use current HP-GL/2 pen position and palette
RESET	ESC E	None
PRIMARY FONT	FI	Font_ID
SECONDARY FONT	FN	Font_ID
SCALABLE OR BITMAPPED FONTS	SB	0-Scalable fonts only 1-Bitmapped fonts allowed
Palette Extensions		
TRANSPARENCY MODE	TR	0-Off (opaque) 1-On (transparent)
SCREENED VECTORS	SV	[screen_type [, shading [, index]]]
Vector Group		
ARC ABSOLUTE	AA	x_center, y_center, sweep_angle [, chord_angle];
ARC RELATIVE	AR	x_increment, y_increment, sweep_angle [, chord_angle];
ABSOLUTE ARC THREE POINT	AT	x_inter, y_inter, x_end, y_end [, chord_angle];
BEZIER ABSOLUTE	BZ	x1_control_pt, y1_control_pt x2_control_pt, y2_control_pt x3_control_pt, y3_control_pt [, params ... [, params]]
BEZIER RELATIVE	BR	x1_control_pt_increments, y1_control_pt_increments, x2_control_pt_increments, y2_control_pt_increments, x3_control_pt_increments, y3_control_pt_increments [, params ... [, params]]; PLOT
ABSOLUTE	PA	[x, y ... [, x, y]];
PLOT RELATIVE	PR	[x, y ... [, x, y]];
PEN DOWN	PD	[x, y ... [, x, y]];
PEN UP	PU	[x, y ... [, x, y]];
RELATIVE ARC THREE POINT	RT	x_incr_inter, y_incr_inter, x_incr_end, y_incr_end [, chord_angle];
POLYLINE ENCODED	PE	[flag [val]]coord_pair ... [flag[val]]coord_pair]];
Polygon Group		
CIRCLE	CI	radius [, chord_angle];
FILL RECTANGLE ABSOLUTE	RA	x_coordinate, y_coordinate;
FILL RECTANGLE RELATIVE	RR	x_increment, y_increment;
EDGE RECTANGLE ABSOLUTE	EA	x_coordinate, y_coordinate;
EDGE RECTANGLE RELATIVE	ER	x_increment, y_increment;
FILL WEDGE	WG	radius, start_angle, sweep_angle [, chord_angle];

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Command	Mnemonic	Parameters
EDGE WEDGE	EW	radius, start_angle, sweep_angle [, chord_angle];
POLYGON MODE	PM	polygon_definition;
FILL POLYGON	FP	0 Odd/Even fill
EDGE POLYGON	EP	1 non-zero winding fill
Character Group		
SELECT STANDARD FONT	SS	
SELECT ALTERNATE FONT	SA	
ABSOLUTE DIRECTION	DI	[run, rise];
RELATIVE DIRECTION	DR	[run, rise];
ABSOLUTE CHARACTER SIZE	SI	[width, height];
RELATIVE CHARACTER SIZE	SR	[width, height];
CHARACTER SLANT	SL	[tangent_of_angle];
EXTRA SPACE	ES	[width [, height]]
STANDARD FONT DEFINITION	SD	[kind, value ... [, kind, value]];
ALTERNATE FONT DEFINITION	AD	[kind, value ... [, kind, value]];
CHARACTER FILL MODE	CF	[fill_mode [, edge_pen]];
LABEL ORIGIN	LO	[position];
LABEL	LB	[char ... [char]] l bterm
DEFINE LABEL TERMINATOR	DT	[l bterm [, mode]];
CHARACTER PLOT	CP	[spaces, lines];
TRANSPARENT DATA	TD	[mode];
DEFINE VARIABLE TEXT PATH	DV	[path [, line]];
Line and Fill Attributes Group		
LINE TYPE	LT	[line_type [, pattern_length [, mode]]];
LINE ATTRIBUTES	LA	[kind, value ... [, kind, value]];
PEN WIDTH	PW	[width [, pen]];
PEN WIDTH UNIT SELECTION	WU	[type];
SELECT PEN	SP	[pen];
SYMBOL MODE	SM	[char];
FILL TYPE	FT	[fill_type [, option 1 [, option 2]]];
ANCHOR CORNER	AC	[x_coordinate, y_coordinate];
RASTER FILL DEFINITION	RF	[index, width, height, pen_nbr [, ... pen_nbr]];
USER DEFINED LINE TYPE (Extended for PCL5C)	UL	[index [, gap 1 ... gap 20]];
NUMBER OF PENS	NP	[number_of_pen];
PEN COLOR ASSIGNMENT	PC	[pen[,primary 1,primary 2,primary 3]];
SET RELATIVE COLOR RANGE	CR	[black_ref_blue,white_ref_blue, black_ref_green,white_ref_green, black_ref_red,white_ref_red];
Configuration and Status Group		
COMMENT	CO	
SCALE	SC	[x 1, x 2, y 1, y 2 [, type [, left, bottom]]]; or [x 1, x factor, y 1, y factor, 2];
INPUT WINDOW	IW	[x L L, y L L, x U R, y U R];
INPUT P1 AND P2	IP	[p 1 x, p 1 y [, p 2 x, p 2 y]];
INPUT RELATIVE P1 AND P2	IR	[p 1 x, p 1 y [, p 2 x, p 2 y]];
DEFAULT VALUES	DF	
INITIALIZE	IN	
ROTATE COORDINATE SYSTEM	RO	[angle];

Printer Job Language Commands Syntax

Command	Function and Syntax
Syntax Rules	
[]	Brackets indicate optional parameters.
< >	Indicates special characters and items
Special Characters and Items	
<HT>	Horizontal Tab (element of white space)
<LF>	Line Feed (PJL command terminator) 10
<CR>	Carriage Return (optional parameter) 13
<SP>	Space (element of white space)
<ESC>	Escape (used only for UEL/SPJL)
<FF>	Form Feed
	(terminator for multiple line reply)
<WS>	White Space<SP> or <HT> or combination of <SP> and <HT>
<PC>	Printable Characters (character code 33 through 126, and 161 through 254)
<Words>	Beginning with <PC>, and combination of <PC> and <WS>
Printer Job Language Commands Syntax	
COMMENT	@PJL COMMENT <Words> [<CR>] <LF>
DEFAULT	@PJL DEFAULT [LPARM: emulation] variable = value [<CR>] <LF>
DINQUIRE	@PJL DINQUIRE [LPARM: emulation] variable [<CR>] <LF>
Reply	@PJL DINQUIRE [LPARM: emulation] variable <CR> <LF> value <CR> <LF> <FF>
ECHO	@PJL ECHO [<Words>] [<CR>] <LF>
Reply	@PJL ECHO [<Words>] <CR> <LF> <FF>
ENTER	@PJL ENTER LANGUAGE = emulation [<CR>] <LF>
EOJ	@PJL EOJ [NAME = job name] [<CR>] <LF>
INFO	@PJL INFO read only variable [<CR>] <LF>
Reply	@PJL INFO read only variable <CR> <LF> [1 or more lines of printable characters or <WS> followed by <CR> <LF>] <FF>
INITIALIZE	@PJL INITIALIZE [<CR>] <LF>
INQUIRE	@PJL INQUIRE [LPARM: emulation] variable [<CR>] <LF>
Reply	@PJL INQUIRE [LPARM: emulation] variable <CR> <LF> value <CR> <LF> <FF>
JOB	@PJL JOB [NAME = "job name"] [START = first page] [END = last page] [<CR>] <LF>
OPMSG	@PJL OPMSG DISPLAY = "message" [<CR>] <LF>
RDYMSG	@PJL RDYMSG DISPLAY = "message" [<CR>] <LF>
RESET	@PJL RESET [<CR>] <LF>
SET	@PJL SET [LPARM: emulation] variable = value [<CR>] <LF>
STMSG	@PJL STMSG DISPLAY = "message" [<CR>] <LF>
Reply	@PJL STMSG DISPLAY = "message" <CR> <LF> key <CR> <LF> <FF>
Exit Current Emulation/Start PJL (UEL/SPJL)	<ESC> % - 12345X
USTATUS	@PJL USTATUS variable = value [<CR>] <LF>
Reply	@PJL USTATUS variable <CR> <LF> [1 or more lines of printable characters or <WS> followed by <CR> <LF>] <FF>
USTATUSOFF	@PJL USTATUSOFF [<CR>] <LF>
(No Operation)	@PJL [<CR>] <LF>

EPSON FX-850 Mode

Command name	Function	Sequence	Decimal	Hexadecimal
Null	Ignored	NUL	0	00
Bell	Ignored	BEL	7	07
Space	Moves the cursor one position to the right	SP	32	20
Backspace	Moves the cursor one position to the left	BS	8	08
Line Feed	Moves down one line	LF	10	0A
Form Feed	Ejects a page (if data has been printed on it)	FF	12	0C
Carriage Return	Moves cursor to left margin	CR	13	0D
Home Positioning	Moves the cursor to the home position	ESC <	27 60	1B 3C
Select Printer	Ignored	DC1	17	11
Deselect Printer	Ignored	DC3	19	13
Set MSB=0	Sets most significant bit to zero	ESC=	27 61	1B 3D
Set MSB=1	Sets most significant bit to one	ESC >	27 62	1B 3E
Cancel MSB Settings	Cancels MSB settings	ESC #	27 35	1B 23
Expand Printable Code Area	Allows characters 128 (d) through 159 (d) and 255 (d) to be printed	ESC 6	27 54	1B 36
Cancel Expanded Printable Code Area	Cancels printing of characters 128 (d) through 159 (d) and 255 (d)	ESC 7	27 55	1B 37
Expand Printable Code Area	Allows characters 0 (d) through 31 (d) and 128 (d) through 159 (d) to be printed	ESC I 1	27 73 49	1B 49 31
Cancel Expand Printable Code Area	Cancels printing of characters 0 (d) through 31 (d) and 129 (d) through 159 (d)	ESC I 0	27 73 48	1B 49 30
Change Emulation (original)	Changes the emulation of the printer. All data received so far will be printed and the page ejected. m is an ASCII code. m=AB - BR-Script 2 Batch Mode m=AI - BR-Script 2 Interactive Mode m=E - Reset Epson Mode m=GL - HP-GL Mode m=H - HP LaserJet Mode m=I - IBM Proprinter Mode	ESC CR m	27 13 m	1B 0D m
User Reset	Restore to User Settings (n=0 to 2)	ESC CR ! n R	27 13 33 n 82	1B 0D 21 n 52
Paper Input Control	Controls the paper input n=0 - Initialize Feeder Mode n=1 - Feed From MP Tray n=2 - Feed From Upper Cassette (Tray 1) n=3 - Feed From Lower Cassette (Tray 2) n=R - Eject Paper	ESC EM n	27 25 n	1B 19 n
Duplex/Simplex Print (available when duplex unit is installed) (original)	Sets simplex or duplex print mode n=0 - Simplex n=1 - Duplex & long edge binding n=2 - Duplex & short edge binding	ESC CR ! n D	27 13 33 n 68	1B 0D 21 n 44
Page Side Selection (available when duplex unit is installed) (original)	Sets page side selection n=0 - Next side n=1 - Front side n=2 - Back side	ESC CR ! n S	27 13 33 n 83	1B 0D 21 n 53
Initialize Printer	Initializes printer and clears print buffer (prints data)	ESC @	27 64	1B 40
Set Form Length	Sets page length in current line spacing (1≤n≤127)	ESC C n	27 67 n	1B 43 n
Set Left Margin	Sets left margin n characters from home position (range depends on type size and paper size)	ESC I n	27 108 n	1B 6C n

Command name	Function	Sequence	Decimal	Hexadecimal
Set Right Margin	Sets right margin n columns from the left margin (range depends on type size and paper size)	ESC Q n	27 81 n	1B 51 n
Set Skip-over Perforation	Sets bottom margin at the n-th line, counting from the bottom	ESC N n	27 78 n	1B 4E n
Cancel Skip-over Perforation	Cancels the setting of the bottom margin	ESC O	27 79	1B 4F
Set 1/6" Line Spacing	Line spacing is set to 1/6 inch	ESC 2	27 50	1B 32
Set 1/8" Line Spacing	Line spacing is set to 1/8 inch	ESC 0	27 48	1B 30
Set 7/72" Line Spacing	Line spacing is set to 7/72 inch	ESC 1	27 49	1B 31
Set n/72" Line Spacing	Line spacing is set to n/72 inch (0≤n≤85)	ESC A n	27 65 n	1B 41 n
Set n/216" Line Spacing	Line spacing is set to n/216 inch (0≤n≤255)	ESC 3 n	27 51 n	1B 33 n
Perform n/216" Paper Feed	Advances paper (moves cursor) by n/216 inch	ESC J n	27 74 n	1B 4A n
Perform n/216" Reverse Paper Feed	Reverse feeds paper (moves cursor) by n/216 inch	ESC j n	27 106 n	1B 6A n
Set Horizontal Tab Stops	Sets up to 32 horizontal tab stops (terminated by a NUL)	ESC D n1 ... nk NUL	27 68 n1 ... nk 0	1B 44 n1 ... nk 00
Horizontal Tab	Moves to next horizontal tab	HT	9	09
Set Vertical Tab Stops	Sets up to 16 vertical tab stops (terminated by a NUL)	ESC b n1 ... nk NUL	27 98 n1 ... nk 0	1B 62 n1 ... nk 00
Vertical Tab	Moves to next vertical tab stop	VT	11	0B
Select VFU	Selects Vertical Format Unit	ESC / n	27 47 n	1B 2F n
Set Vertical Tab Stops (VFU Channel)	Sets up to 16 vertical tab stops in selected Vertical Format Unit (selected by previous command). Terminated by NUL	ESC B n1 ... nk NUL	27 66 n1 ... nk 0	1B 42 n1 ... nk 00
Set Absolute Print Position	Moves (n1 + n2 x 256)/60" from left margin	ESC \$ n1 n2	27 36 n1 n2	1B 24 n1 n2
Set Relative Print Position	Moves (n1 + n2 x 256)/120" from current position	ESC \ n1 n2	27 92 n1 n2	1B 5C n1 n2
Set Pica Pitch	Selects 10 cpi printing	ESC P	27 80	1B 50
Set Elite Pitch	Selects 12 cpi printing	ESC M	27 77	1B 4D
Set Proportional Spacing Mode	Selects proportional spacing mode and fonts (BS disabled)	ESC p 1	27 112 49	1B 70 31
Disable Proportional Spacing Mode	Disables proportional spacing mode	ESC p 0	27 112 48	1B 70 30
Set Condensed Mode	Sets condensed printing	SI or ESC SI	15 or 27 15	0F or 1B 0F
Cancel Condensed Mode	Cancels condensed printing mode	DC2	18	12
Set Emphasized Mode	Selects boldface printing	ESC E or ESC G	27 69 or 27 71	1B 45 or 1B 47
Cancel Emphasized Mode	ESC F cancels ESC E boldface and ESC H cancels ESC G boldface	ESC F or ESC H	27 70 or 27 72	1B 46 or 1B 48
Set Enlarged Character Mode	Selects enlarged characters for one line only	SO or ESC SO or ESC W 1	14 or 27 14 or 27 87 49	0E or 1B 0E or 1B 57 31
Cancel Enlarged Character Mode	Cancels above settings (CAN cancels SO only, and DC4 cancels SO and ESC SO only)	DC4 or CAN or ESC W 0	20 or 24 or 27 87 48	14 or 18 or 1B 57 30

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Command name	Function	Sequence	Decimal	Hexadecimal
Set/Cancel Double-High Mode	Sets (n = 1) or cancels (n = 0) double-high mode	ESC w n	27 119 n	1B 77 n
Set Italic Print Mode	Selects italic printing	ESC 4	27 52	1B 34
Cancel Italic Print Mode	Cancels italic printing	ESC 5	27 53	1B 35
Set Super/Subscript Print Mode	Sets either superscript (n=0) or subscript (n=1) printing	ESC S n	27 83 n	1B 53 n
Cancel Super/Subscript Print Mode	Cancels effect superscript or subscript printing	ESC T	27 84	1B 54
Set/Cancel Underline Print Mode	Sets (n=1) or cancels (n=0) underlined printing (including spaces)	ESC - n	27 45 n	1B 2D n
Select Justification	n=0: Left justify, n=1: Centering n=2: Right justify, n=3: Fully justify	ESC a n	27 97 n	1B 61 n
Set Intercharacter Space	Adds n/120" space to each character	ESC SP n	27 32 n	1B 20 n
Select Print Mode	Allows combinations of attributes to be added to following text	ESC ! n	27 33 n	1B 21 n
Select Epson/IBM character set	Selects either Epson (n=0) or IBM (n=1) character set	ESC t n	27 116 n	1B 74 n
Select International Character Set	Selects character set	ESC R n	27 82 n	1B 52 n
Define Download Characters	Defines downloaded characters	ESC & NUL n m a {data}	27 38 0 n m a {data}	1B 26 00 n m a {data}
Select Download Character Mode	Selects either downloaded (n=1) or internal (n=0) character set	ESC % n	27 37 n	1B 25 n
Copy ROM Characters to Download RAM	Copies internal character data to download RAM area	ESC : 0 0 0	27 58 48 48 48	1B 3A 30 30 30
Select Bit Image Mode	Selects and prints bit image data	ESC * m n1 n2 {data}	27 42 m n1 n2 {data}	1B 2A m n1 n2 {data}
Set 9-dot Bit Image Mode	Selects and prints "9-dot" bit image data	ESC ^ a n1 n2 {data}	27 94 a n1 n2 {data}	1B 5E a n1 n2 {data}
Set Single-Density Bit Image Mode	Selects and prints single-density bit image data	ESC K n1 n2 {data}	27 75 n1 n2 {data}	1B 4B n1 n2 {data}
Set Double-Density Bit Image Mode	Selects and prints double-density bit image data	ESC L n1 n2 {data}	27 76 n1 n2 {data}	1B 4C n1 n2 {data}
Set Double-Speed Double-Density Bit Image Mode	Selects and prints "double-speed" double-density bit image data	ESC Y n1 n2 {data}	27 89 n1 n2 {data}	1B 59 n1 n2 {data}
Set Quadruple-Density Bit Image Mode	Selects and prints quadruple-density bit image data	ESC Z n1 n2 {data}	27 90 n1 n2 {data}	1B 5A n1 n2 {data}
Reassign Graphics Mode	Changes bit image density	ESC ? n m	27 63 n m	1B 3F n m
Set Scalable Font Ratio (original)	Selects horizontal ratio (n=0.25 to 3 step 0.01)	ESC CR ! n H	27 13 33 n 72	1B 0D 21 n 48
	Selects vertical ratio (n=0.25 to 3 step 0.01)	ESC CR ! n V	27 13 33 n 86	1B 0D 21 n 56
Execute Card Data (original)	Execute saved card data	ESC CR ! n E	27 13 33 n 69	1B 0D 21 n 45

IBM Proprinter XL Mode

Command name	Function	Sequence	Decimal	Hexadecimal
Null	Ignored	NUL	0	00
Bell	Ignored	BEL	7	07
Space	Moves the cursor one character to the right	SP	32	20
Backspace	Moves the cursor one character to the left	BS	8	08
Line Feed	Moves the cursor to the next line	LF	10	0A
Form Feed	Prints the data in the buffer and ejects the page (if the buffer is empty, this command is ignored)	FF	12	0C
Carriage Return	Moves the cursor to the left margin on the current line. If Auto LF has been set from the front panel or by software (ESC 5 1), the cursor will move down one line	CR	13	0D
Set/Cancel Auto Line Feed Mode	Sets (n=1) or cancels (n=0) auto line feed	ESC 5 n	27 53 n	1B 35 n
Select Printer	Overrides the front panel setting Selects printer following deselection (ESC Q)	DC1	17	11
Deselect Printer	Ignored	DC3	19	13
Deselect Printer	Deselects printer, which will not accept data until a DC1 is received	ESC Q 2 2 ESC Q 3	27 81 50 50 27 51 51	1B 51 32 32 1B 51 33
Set Epson Emulation Mode	Selects Epson FX-850 emulation mode. All data in the buffer is printed and the page ejected	ESC @	27 64	1B 40
Change Emulation (original)	Changes the emulation of the printer. All data received so far will be printed and the page ejected. m is an ASCII code. m=AB - BR-Script 2 Batch Mode m=AI - BR-Script 2 Interactive Mode m=E - Epson Mode m=GL - HP-GL Mode m=H - HP LaserJet Mode m=I - Reset IBM Proprinter Mode	ESC CR m	27 13 m	1B 0D m
User Reset	Restore to User Settings (n=0 to 2)	ESC CR ! n R	27 13 33 n 82	1B 0D 21 n 52
Paper Input Control	Controls the paper input n=0 - Feed From Manual Feed Slot n=1 - Feed From MP Tray n=2 - Feed From Upper Cassette (Tray 1) n=3 - Feed From Lower Cassette (Tray 2) n=R - Eject Paper	ESC EM n	27 25 n	1B 19 n
Duplex/Simplex Print (available when duplex unit is installed) (original)	Sets simplex or duplex print mode n=0 - Simplex n=1 - Duplex & long edge binding n=2 - Duplex & short edge binding	ESC CR ! n D	27 13 33 n 68	1B 0D 21 n 44
Page Side Selection (available when duplex unit is installed) (original)	Sets page side selection n=0 - Next side n=1 - Front side n=2 - Back side	ESC CR ! n S	27 13 33 n 83	1B 0D 21 n 53
Set Form Length	Sets form length to n lines at current spacing (1≤n≤255) Sets from length to n inches at current spacing (0≤n≤15)	ESC C n ESC C 0 n	27 67 n 27 67 48 n	1B 43 n 1B 43 30 n
Set Right and Left Margins	n1 is used to set the left margin, and n2 the right margin (1≤n1≤n2≤255)	ESC X n1 n2	27 88 n1 n2	1B 58 n1 n2
Set Skip-over Perforation	Sets bottom margin at n-th line, counting from the bottom (1≤n≤255)	ESC N n	27 78 n	1B 4E n

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Command name	Function	Sequence	Decimal	Hexadecimal
Cancel Skip-over Perforation	Cancels the bottom margin setting	ESC O	27 79	1B 4F
Set 1/8" Line Spacing Mode	Sets line spacing to 1/8 inch	ESC 0	27 48	1B 30
Set 7/72" Line Spacing Mode	Sets line spacing to 7/72 inch	ESC 1	27 49	1B 31
Save n/72" Line Spacing Mode	Sets line spacing mode to n/72 inch (1≤n≤85). Activated by ESC 2 command	ESC A n	27 65 n	1B 41 n
Activate n/72" Line Spacing Mode set by ESC A	Activates line spacing mode set by ESC A	ESC 2	27 50	1B 32
Set n/216" Line Spacing	Sets line spacing to n/216 inch (1≤n≤255)	ESC 3 n	27 51 n	1B 33 n
Execute n/216" Line Spacing	Advances the cursor by n/216 inch	ESC J n	27 74 n	1B 4A n
Set Horizontal Tab Stops	Sets up to 28 horizontal tab stops (terminated by NUL)	ESC D n1 ... nk NUL	27 68 n1 ... nk NUL	1B 44 n1 ... nk NUL
Horizontal Tab	Advances to next horizontal tab (if none have been defined, default tab stops are set every 8 columns)	HT	9	09
Set Vertical Tab Stops	Sets up to 64 vertical tab stops (terminated by NUL)	ESC B n1 ... nk NUL	27 66 n1 ... nk NUL	1B 42 n1 ... nk NUL
Vertical Tab	Advances to next vertical tab stops (or LF if none have been defined)	VT	11	0B
Restore to Default Tab Settings	Clears any vertical tab stops, and sets default horizontal tab stops every 8 columns	ESC R	27 82	1B 52
Set Pica Pitch	Selects 10 cpi printing	DC2	18	12
Set Elite Pitch	Selects 12 cpi printing	ESC :	27 58	1B 3A
Set/Cancel Proportional Spacing Mode	Sets (n=1) or cancels (n=0) proportionally-spaced printing	ESC P n	27 80 n	1B 50 n
Set Condensed Character Mode	Selects condensed characters (canceled by DC2)	SI	15	0F
Set Emphasized Character Mode	Selects emphasized printing (canceled by ESC F)	ESC E	27 69	1B 45
Cancel Emphasized Character Mode	Cancels emphasized printing	ESC F	27 70	1B 46
Set Enlarged Character Mode	Selects enlarged characters for one line only	SO	14	0E
Cancel Enlarged Character Mode	Cancels one-line enlarged character printing	DC4 or CAN	20 or 24	14 or 18
Set/Cancel Enlarged Character Mode	Sets (n=1) or cancels (n=0) enlarged character printing. When n=0, SO enlarged printing will also be canceled	ESC W n	27 87 n	1B 57 n
Set Super/Subscript Print Mode	Sets superscript (n=0) or subscript (n=1) printing	ESC S n	27 83 n	1B 53 n
Cancel Super/Subscript Print Mode	Cancels superscript or subscript printing	ESC T	27 84	1B 54

Command name	Function	Sequence	Decimal	Hexadecimal
Set/Cancel Underline Print Mode	When n=1, subsequent characters (including spaces, but excluding horizontal tabs) are underlined. When n=0, this effect is canceled	ESC - n	27 45 n	1B 2D n
Set/Cancel Overline Print Mode	When n=1, subsequent characters (including spaces, but excluding horizontal tabs) are overlined. When n=0, this effect is canceled	ESC _ n	27 95 n	1B 5F n
Select Double-High/Double-Width Mode	Depending on the values of m3 and m4, double-height and/or double-width printing is enabled or disabled	ESC [@ 4 0 0 0 m3 m4	27 91 64 4 0 0 0 m3 m4	1B 5B 40 04 00 00 00 m3 m4
Select Character Set II	Allows printing of the symbols in Character Set II	ESC 6	27 54	1B 36
Select Character Set I	Allows printing of the symbols in Character Set I	ESC 7	27 55	1B 37
Select Characters from All Character Table	Allows (n1 + (n2 x 256)) characters to be printed from the All Characters Table. Control codes in the data are ignored	ESC \ n1 n2 {data}	27 92 n1 n2 {data}	1B 5C n1 n2 {data}
Select a Character from All Character Table	Prints one character (c) from the All Character Table	ESC ^ c	27 94 c	1B 5E c
Define 8-dot Download Characters	Allows definition of user-defined characters	ESC = n1 n2 sp m a1 a2 {data}	27 61 n1 n2 32 m a1 a2 {data}	1B 3D n1 n2 20 m a1 a2 {data}
Select Download Font	Selects font and print quality (n=0 or 2 - internal fonts, n=4 or 6 - downloaded fonts)	ESC I n	27 73 n	1B 49 n
Set Single-Density Bit Image Mode	Selects and prints single-density bit-image data	ESC K n1 n2 {data}	27 75 n1 n2 {data}	1B 4B n1 n2 {data}
Set Double-Density Bit Image Mode	Selects and prints double-density bit image data	ESC L n1 n2 {data}	27 76 n1 n2 {data}	1B 4C n1 n2 {data}
Set Double-Speed Double-Density Bit Image Mode	Selects and prints "double speed" double-density bit image data	ESC Y n1 n2 {data}	27 89 n1 n2 {data}	1B 59 n1 n2 {data}
Set Quadruple-Density Bit Image Mode	Selects and prints quadruple-density bit image data	ESC Z n1 n2 {data}	27 90 n1 n2 {data}	1B 5A n1 n2 {data}
Set Scalable Font Ratio (original)	Selects horizontal ratio (n=0.25 to 3 step 0.01) Selects vertical ratio (n=0.25 to 3 step 0.01)	ESC CR ! n H ESC CR ! n V	27 13 33 n 72 27 13 33 n 86	1B 0D 21 n 48 1B 0D 21 n 56
Execute Card Data (original)	Execute saved card data	ESC CR ! n E	27 13 33 n 69	1B 0D 21 n 45

HP-GL Mode

Command	Mnemonic	Parameters
Vector Group		
ARC ABSOLUTE	AA	x_center, y_center, sweep_angle [, chord_angle];
ARC RELATIVE	AR	x_increment, y_increment, sweep_angle [, chord_angle];
PLOT ABSOLUTE	PA	[x, y ... [, x, y]];
PLOT RELATIVE	PR	[x, y ... [, x, y]];
PEN DOWN	PD	[x, y ... [, x, y]];
PEN UP	PU	[x, y ... [, x, y]];
Polygon Group		
CIRCLE	CI	radius [, chord_angle];
SHADE RECTANGLE ABSOLUTE	RA	x_coordinate, y_coordinate;
SHADE RECTANGLE RELATIVE	RR	x_increment, y_increment;
EDGE RECTANGLE ABSOLUTE	EA	x_coordinate, y_coordinate;
EDGE RECTANGLE RELATIVE	ER	x_increment, y_increment;
SHADE WEDGE	WG	radius, start_angle, sweep_angle [, chord_angle];
EDGE WEDGE	EW	radius, start_angle, sweep_angle [, chord_angle];
Character Group		
SELECT STANDARD SET	SS	
SELECT ALTERNATE SET	SA	
ABSOLUTE DIRECTION	DI	[run, rise];
RELATIVE DIRECTION	DR	[run, rise];
ABSOLUTE CHARACTER SIZE	SI	[width, height];
RELATIVE CHARACTER SIZE	SR	[width, height];
CHARACTER SLANT	SL	[tangent_of_angle];
STANDARD SET DEFINITION	CS	[Designate_standard_character_set];
ALTERNATE SET DEFINITION	CA	[Designate_altermate_character_set];
LABEL	LB	[char ... [char]] l bterm
DEFINE LABEL TERMINATOR	DT	[l bterm];
CHARACTER PLOT	CP	[spaces, lines];
USER DEFINED CHARACTER	UC	[[pen_control], x_increment, y_increment [, ...] [, pen_control][, ...]];
Line and Fill Attributes Group		
LINE TYPE	LT	[line_type [, pattern_length]];
PEN WIDTH	PW	[width [, pen]];
SELECT PEN	SP	[pen];
SYMBOL MODE	SM	[char];
FILL TYPE	FT	[fill_type [, option 1 [, option 2]]];
TICK LENGTH	TL	[tick_p [, tick_n]];
X TICK	XT	
Y TICK	YT	
PEN THICKNESS	PT	[fill_line_interval];
Configuration and Status Group		
SCALE	SC	[x 1, x 2, y 1, y 2];
INPUT WINDOW	IW	[x L L, y L L, x U R, y U R];
INPUT P1 AND P2	IP	[p 1 x, p 1 y [, p 2 x, p 2 y]];
DEFAULT VALUES	DF	;
INITIALIZE	IN	;
ROTATE COORDINATE SYSTEM	RO	[angle];
PAGE OUTPUT	PG	[copy_number];

Function	Command	Decimal	Hexadecimal
Go to Other Emulations			
BR-Script 2 Batch Mode	ESC CR AB	27 13 65 66	1B 0D 41 42
BR-Script 2 Interactive Mode	ESC CR AI	27 13 65 73	1B 0D 41 49
HP LaserJet	ESC CR H	27 13 72	1B 0D 48
IBM Proprinter XL	ESC CR I	27 13 73	1B 0D 49
EPSON FX-850	ESC CR E	27 13 69	1B 0D 45
High Resolution Control (HRC)			
Set HRC Off	ESC CR R O	27 13 82 79	1B 0D 52 4F
Set HRC to Light Level	ESC CR R L	27 13 82 76	1B 0D 52 4C
Set HRC to Medium Level	ESC CR R M	27 13 82 77	1B 0D 52 4D
Set HRC to Dark Level	ESC CR R D	27 13 82 68	1B 0D 52 44
User Reset			
Restore to User Settings	ESC CR ! n R n = 0 to 2	27 13 33 n 82	1B 0D 21 n 52
Factory Reset			
Restore to Factory Settings	ESC CR F D	27 13 70 68	1B 0D 46 44
Duplex/Simplex Print (available when duplex unit is installed) (original)			
Set Simplex	ESC CR ! 0 D	27 13 33 48 68	1B 0D 21 30 44
Set Duplex & long edge binding	ESC CR ! 1 D	27 13 33 49 68	1B 0D 21 31 44
Set Duplex & short edge binding	ESC CR ! 2 D	27 13 33 50 68	1B 0D 21 32 44
Page Side Selection (available when duplex unit is installed) (original)			
Set next side	ESC CR ! 0 S	27 13 33 48 83	1B 0D 21 30 53
Set front side	ESC CR ! 1 S	27 13 33 49 83	1B 0D 21 31 53
Set back side	ESC CR ! 2 S	27 13 33 50 83	1B 0D 21 32 53
Scalable Font Ratio (original)			
Set horizontal ratio (n=0.25 to 3 step 0.01)	ESC CR ! n H	27 13 33 n 72	1B 0D 21 n 48
Set vertical ratio (n=0.25 to 3 step 0.01)	ESC CR ! n V	27 13 33 n 86	1B 0D 21 n 56
Execute Card Data (original)			
Execute saved card data	ESC CR ! n E	27 13 33 n 69	1B 0D 21 n 45

Bar Code Control

The printer can print bar codes in the HP LaserJet, EPSON FX-850, and IBM Proprinter XL emulation modes.

Print Bar Codes or Expanded Characters

Code ESC i
Dec 27 105
Hex 1B 69

Format: ESC i n ... n \

Creates bar codes or expanded characters according to the segment of parameters "n ... n". For further information about parameters, see the following "Definition of Parameters." This command must end with the "\ " code (5CH).

[Definition of Parameters]

This bar code command can have the following parameters in the parameter segment (n ... n). Since parameters are effective within the single command syntax ESC i n ... n \, they don't take effect in the subsequent bar code commands. If certain parameters are not specified, they take the default settings. The last parameter must be the bar code data start ("b" or "B") or the expanded character data start ("l" or "L"). Other parameters can be specified in any sequence. The prefix of each parameter can be a lower-case or upper-case character: for example, "t0" or "T0", "s3" or "S3", etc.

■ Bar Code Mode

n = "t0" or "T0"	CODE 39 (default)
n = "t1" or "T1"	Interleaved 2 of 5
n = "t3" or "T3"	FIM (US-Post Net)
n = "t4" or "T4"	Post Net (US-Post Net)
n = "t5" or "T5"	EAN 8, EAN 13, or UPC A
n = "t6" or "T6"	UPC E
n = "t9" or "T9"	Codabar
n = "t12" or "T12"	Code 128 set A
n = "t13" or "T13"	Code 128 set B
n = "t14" or "T14"	Code 128 set C
n = "t130" or "T130"	ISBN (EAN)
n = "t131" or "T131"	ISBN (UPC-E)
n = "t132" or "T132"	EAN 128 set A
n = "t133" or "T133"	EAN 128 set B
n = "t134" or "T134"	EAN 128 set C

This parameter selects the bar code mode as above. When n is "t5" or "T5", the bar code mode (EAN 8, EAN 13, or UPC A) varies according to the number of characters in the data.

■ Bar Code, Expanded Character, Line Block Drawing & Box Drawing

n = "s0" or "S0" 3 : 1 (default)
 n = "s1" or "S1" 2 : 1
 n = "s3" or "S3" 2.5 : 1

This parameter selects the bar code style as above. When the EAN 8, EAN 13, UPC-A, Code 128 or EAN 128 bar code mode is selected, this bar code style parameter is ignored.

Expanded Character

"S" 0 = White
 1 = Black
 2 = Vertical stripes
 3 = Horizontal stripes
 4 = Cross hatch

eg. "S" n1 n2
 n1 = Background fill pattern
 n2 = Foreground fill pattern

If "S" is followed by only one parameter, the parameter is a foreground fill pattern.

Line Block Drawing & Box Drawing

"S" 1 = Black
 2 = Vertical stripes
 3 = Horizontal stripes
 4 = Cross hatch

■ Bar Code

n = "mnnn" or "Mnnn" (nnn = 0 ~ 32767)

This parameter specifies the bar code width. The unit of "nnn" is %.

■ Bar Code Human Readable Line On or Off

n = "r0" or "R0" Human readable line OFF
n = "r1" or "R1" Human readable line ON

Default: Human readable line ON

- (1) "T5" or "t5"
- (2) "T6" or "t6"
- (3) "T130" or "t130"
- (4) "T131" or "t131"

Default: Human readable line OFF
All others

This parameter specifies whether or not the printer prints the human readable line below the bar code. Human readable characters are always printed with OCR-B font of 10 pitch and all the current character style enhancements are masked. Note that the default setting is subject to the bar code mode selected by "t" or "T".

■ Quiet Zone

n = "onnn" or "Onnn" (nnn = 0 ~ 32767)

Quiet Zone is the space on both side of the bar codes. Its width can be specified using the units which are set by the "u" of "U" parameter. (For the description of "u" or "U" parameter, see the next section.) The default setting of Quiet Zone width is 1 inch.

■ Bar Code, Expanded Character Unit, Line Block Drawing & Box Drawing

n = "u0" or "U0" Millimeters (default)
n = "u1" or "U1" 1/10"
n = "u2" or "U2" 1/100"
n = "u3" or "U3" 1/12"
n = "u4" or "U4" 1/120"
n = "u5" or "U5" 1/10 Millimeters
n = "u6" or "U6" 1/300"
n = "u7" or "U7" 1/720"

This parameter specifies the measurement units of X-axis offset, Y-axis offset, and bar code height.

■ Bar Code, Expanded Character, Line Block Drawing & Box Drawing
Offset in X-axis

n = "xnnn" or "Xnnn"

This parameter specifies the offset from the left margin in the "u"- or "U"-specified unit.

■ Bar Code & Expanded Character Offset in Y-axis

n = "ynnn" or "Ynnn"

This parameter specifies the downward offset from the current print position in the "u"- or "U"-specified unit.

■ Bar Code, Expanded Character, Line Block Drawing & Box Drawing
Height

n = "hnnn", "Hnnn", "dnnn", or "Dnnn"

(1)	EAN13, EAN8, UPC-A, ISBN (EAN13, EAN8, UPC-A), ISBN (UPC-E):	22 mm
(2)	UPC-E:	18 mm
(3)	Others:	12 mm

Expanded characters	→ 2.2 mm (default)
Line Block Drawing & Box Drawing	→ 1 dot

This parameter specifies the height of bar codes or expanded characters as above. It can take the prefix "h", "H", "d", or "D". The height of bar codes is specified in the "u"- or "U"-specified unit. Note that the default setting of the bar code height (12 mm, 18 mm or 22 mm) is subject to the bar code mode selected by "t" or "T".

■ Expanded Character Width, Line Block Drawing & Box Drawing

n = "wnnn" or "Wnnn"

Expanded character	→ 1.2 mm
Line Block Drawing & Box Drawing	→ 1 dot

This parameter specifies the width of expanded characters as above.

■ Expanded Character Rotation

n = "a0" or "A1"	Upright (default)
n = "a1" or "A1"	Rotated 90 degrees
n = "a2" or "A2"	Upside down, rotated 180 degrees
n = "a3" or "A3"	Rotated 270 degrees

■ Bar Code Data Start

n = "b" or "B"

Data that follows "b" or "B" is read in as bar code data. Bar code data must end with the "\ " code (5CH), which also terminates this command. The acceptable bar code data is subject to the bar code mode selected by "t" or "T".

- When CODE 39 is selected with the parameter "t0" or "T0":

Forty three characters "0" to "9", "A" to "Z", "-", ".", " (space)", "\$", "/", "+", and "%" can be accepted as bar code data. Other characters cause data error. The number of characters for bar codes is not limited. The bar code data automatically starts and ends with an asterisk "*" (start character and stop character). If the received data has an asterisk "*" at its beginning or end, the asterisk is regarded as a start character or stop character.

- When Interleaved 2 of 5 is selected with the parameter "t1" or "T1":

Ten numerical characters "0" to "9" can be accepted as bar code data. Other characters cause data error. The number of characters for bar codes is not limited. Since this mode of bar codes require even characters, if the bar code data has odd characters, the zero character "0" is automatically added to the end of the bar code data.

- When FIM (US-Post Net) is selected with the parameter "t3" or "T3":

Characters "A" to "D" are valid and 1 digit of data can be printed. Uppercase and lowercase alphabet characters can be accepted.

- When Post Net (US-Post Net) is selected with the parameter "t4" or "T4":

Characters "0" to "9" can be data and it must be terminated by a check digit. "?" can be used in place of the check digit.

- When EAN 8, EAN 13, or UPC A is selected with the parameter “t5” or “T5”:

Ten numerical characters “0” to “9” can be accepted as bar code data. The number of characters for bar codes is limited as follows.

EAN 8: Total 8 digits (7 digits + 1 check digit)

EAN 13: Total 13 digits (12 digits + 1 check digit)

UPC A: Total 12 digits (11 digits + 1 check digit)

A number of characters other than above causes data error and the bar code data is printed as normal print data. If the check digit is incorrect, the printer calculates the correct check digit automatically so that the correct bar code data will be printed. When EAN13 is selected, adding “+” and a 2-or 5-digit number after the data can create an add-on code.

- When UPC-E is selected with the parameter “t6” or “T6”:

The numerical characters “0” to “9” can be accepted as bar code data.

(1)	8 digits	Standard format. The first character must be “0” and the data must be terminated by a check digit.
		Total 8 digits = “0” + 6 digits + 1 check digit.
(2)	6 digits	The first character and the last check digit are removed from the 8 digit data.

*1: For 8 digits, “?” can be used in place of a check digit.

*2: Adding “+” and 2- or 5-digit number after the data creates an add-on code for all 6 and 8 digit formats.

- When Codabar is selected with the parameter “t9” or “T9”:

Characters “0” to “9”, “-”, “.”, “\$”, “/”, “+”, “:” can be printed. Characters “A” to “D” can be printed as a start-stop code, which can be uppercase or lowercase. If there is no start-stop code, errors occur. A check digit cannot be added and using “?” causes errors.

- When Code 128 Set A, Set B, or Set C is selected with the parameter “t12” or “T12,” “t13” or “T13,” or “t14” or “T14” respectively:

Code 128 sets A, B and C are individually selectable. Set A encodes characters Hex 00 ... 5F. Set B encodes characters Hex 20 ... 7F. Set C encodes numeric pairs 00 ... 99. Switching is allowed between the code sets by sending %A, %B, or %C. FNC 1, 2, 3, and 4 are produced with %1, %2, %3, and %4. The SHIFT code, %S, allows temporary switching (for 1 character only) from set A to set B and vice versa. The “%” character can be encoded by sending it twice.

- When ISBN (EAN) is selected with the parameter “t130” or “T130”:
Same rules apply as for “t5” or “T5”
- When ISBN (UPC-E) is selected with the parameter “t131” or “T131”:
Same rules apply as for “t6” or “T6”
- When EAN 128 set A, set B or set C is selected with the parameter “t132” or “T132”, “t133” or “T133” or “t134” or “T134” respectively:
Same rules apply as for “t12” or “T12”, “t13” or “T13”, or “t14” or “T14”.

■ Box Drawing

ESC i ... E (or e)

“E” or “e” is a terminator.

■ Line Block Drawing

ESC i ... V (or v)

“V” or “v” is a terminator.

■ Expanded Character Data Start

n = “l” or “L”

Data that follows “l” or “L” is read in as expanded character data (or labeling data). Expanded character data must end with the “\” code (5CH), which also terminates this command.

[Example Program Listings]

```
WIDTH "LPT1:",255

'CODE 39
LPRINT CHR$(27);"it0r1s0o0x00y00bCODE39?\";

'Interleaved 2 of 5
LPRINT CHR$(27);"it1r1s0o0x00y20b123456?\";

'FIM
LPRINT CHR$(27);"it3r1o0x00y40bA\";
```

```

'Post Net
LPRINT CHR$(27);"it4r1o0x00y60b1234567890?\\";

'EAN-8
LPRINT CHR$(27);"it5r1o0x00y70b1234567?\\";

'UPC-A
LPRINT CHR$(27);"it5r1o0x50y70b12345678901?\\";

'EAN-13
LPRINT CHR$(27);"it5r1o0x100y70b123456789012?\\";

'UPC-E
LPRINT CHR$(27);"it6r1o0x150y70b0123456?\\";

'Codabar
LPRINT CHR$(27);"it9r1s0o0x00y100bA123456A\\";

'Code 128 set A
LPRINT CHR$(27);"it12r1o0x00y120bCODE128A12345?\\";

'Code 128 set B
LPRINT CHR$(27);"it13r1o0x00y140bCODE128B12345?\\";

'Code 128 set C
LPRINT CHR$(27);"it14r1o0x00y160b";CHR$(1);CHR$(2);"?\\";

'ISBN(EAN)
LPRINTCHR$(27);"it130r1o0x00y180b123456789012?+12345\\";

'EAN 128 set A
LPRINT CHR$(27);"it132r1o0x00y210b1234567890?\\";

LPRINT CHR$(12)
END

```

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Brother FAX Share

OPERATION MANUAL

Please read this manual thoroughly before using the fax function in the printer.

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

The product names in this guidebook are trademarks or registered trade marks of each manufacturer. The specifications are subject to change without notice.

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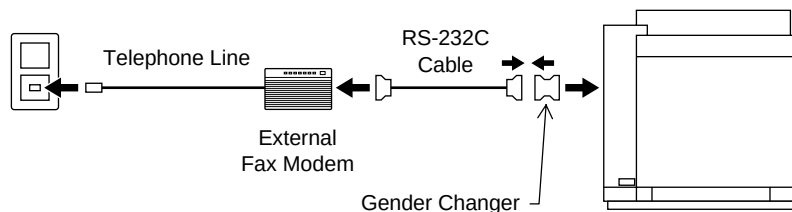
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ABOUT THE FAX FUNCTION

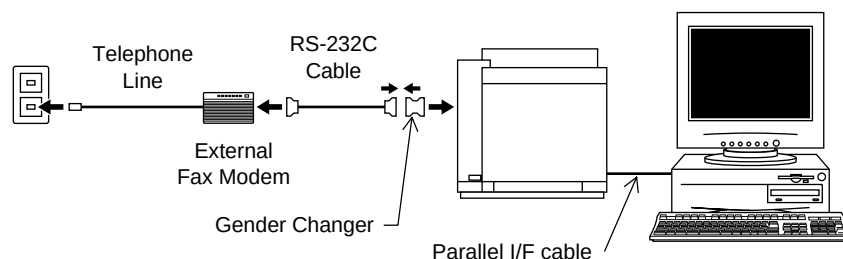
Features

When you have installed an External Fax Modem onto the printer, you can

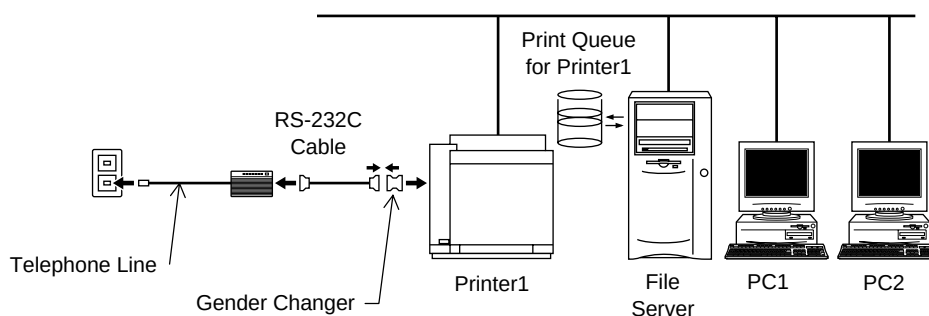
- 1) Print a received fax message on plain paper directly to the printer.



- 2) Send a fax message from your computer.



- 3) Let multiple users send fax messages from each computer on a single telephone line if the printer is shared on the network and connected to the printer via a centronics parallel cable or via a network share.



- 4) Automatically print a fax sent / received report.

Specifications

Printer

Compatibility:	ITU-T Group 3
Coding system:	MH
Resolution:	Horizontal: 200 dots/inch Vertical: Standard mode; 100 lines/inch Fine mode; 200 lines/inch (Only Fine mode is available in Windows NT 4.0)
External Fax Modem:	Fax compatibility: Class 2.0 Data transmission: 14,400 - 2,400 bps (Fax Speed)
Auto reduction:	Auto / Off / 90%

Fax driver

Operating system:	Microsoft® Windows 3.1 / Windows 95 / Windows 98 / Windows NT 4.0
Resolution:	Standard and Fine (Only Fine mode, 200 dpi in Windows NT 4.0.)
Dial type:	Tone / Pulse
Cover page:	A custom cover page can be created
Phone book:	Up to 1,000 numbers can be registered Telephone numbers can be registered as groups (up to 64 per group)

Note:

The floppy disk including the FAX Share driver for Windows NT 4.0 is supplied separately from the floppy disk including the FAX Share drivers for Windows 3.1, Windows 95 and Windows 98.

System Requirements

External Fax Modem

The printer can accept the following type of External Fax Modem;

Interface standards: RS-232C

Fax compatibility: Class 2.0

Data transmission: 14,400 - 2,400 bps (Fax Speed)

The following External Fax Modem can be used;

- ◆ 3Com U.S. Robotics 56K Faxmodem (Model No. 5686)

Note:

You cannot use a Class 1, Class 1.0 or Class 2 External Fax Modem.

PC and OS

The fax driver works on the following types of PC and operating systems (OS);

PC: IBM-PC/AT or compatible

Operating system: Microsoft Windows 3.1 / Windows 95 / Windows 98 / Windows NT 4.0

Caution

- The fax driver works in Windows NT 4.0 with Service Pack 3.0 or higher installed.
- You cannot use the fax function with later versions of Microsoft Windows.

CONNECTING TO THE PRINTER

Installing the External Fax Modem

! Caution

You have to purchase a **gender changer** to connect the RS-232C cable connected between the External Fax Modem and the serial interface on the printer as both connectors are female.

Follow the steps below to connect the External Fax Modem with your printer.

1. Turn on the printer.
2. Press the SEL switch on the control panel to set the printer off-line.
3. Press the SEL switch again while holding down the SHIFT switch. 'HIDDEN PANEL' is displayed on the LED.
4. Press the ▲ or ▼ switch until 'EXT. FAX MODEM' is displayed, then press the SET switch.
5. Select 'FAX MODEM=ON' by pressing the ▲ or ▼ switch. (Default setting is OFF.)

! Caution

When setting "FAX MODEM=ON", the RS-232C (serial) interface is used only for the fax function. The printer cannot receive normal print data via the serial interface. If you want to use the RS-232C interface for sending print data, set "FAX MODEM=OFF".

6. Turn off the printer.
7. Connect the External Fax Modem to the printer referring to the figure below.

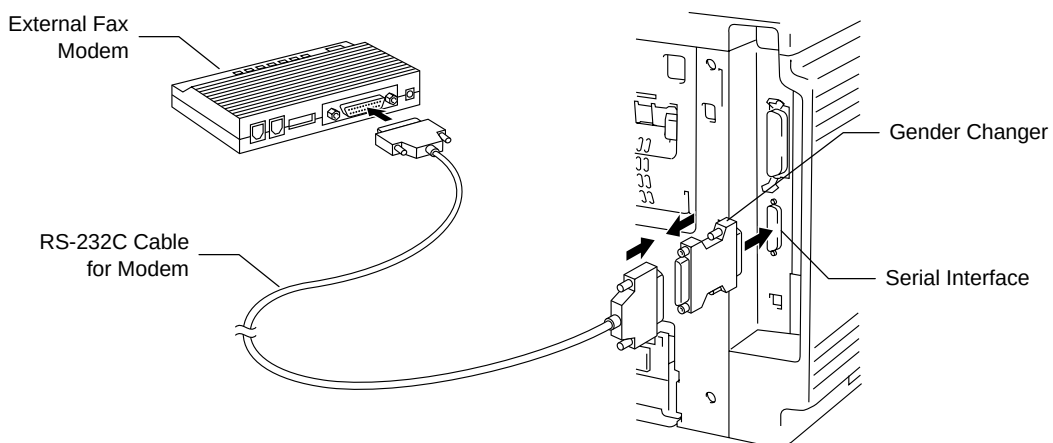


Fig. 1 External Fax Modem Connector

** Note:**

For detailed setup procedure of the External Fax Modem, refer to the user's guide supplied with the External Fax Modem.

8. Turn on the External Fax Modem.
9. Turn on the printer.

** Caution**

Once installation is completed, be sure to turn on the External Fax Modem before turning on the printer so that the printer recognizes the modem.

Settings on the Control Panel

You can make some settings for the fax functions on the printer control panel as in the following steps;

1. Press the SEL switch to make the printer off-line.
2. Press the MODE switch to enter the Mode Menu. Then, 'INTERFACE MODE' is displayed first.
3. Press the ▲ or ▼ switch until 'ADVANCED MODE' is displayed.
4. Press the SET switch.
5. Press the ▲ or ▼ switch until 'FAX MODE' is displayed.
6. Press the SET switch.

Note:

'FAX MODE' is not displayed when 'FAX MODEM=OFF' is selected in the 'HIDDEN PANEL' menu. Refer to the previous section, '[Installing the External Fax Modem](#)'.

You can now make the following settings;

Menu	Descriptions
RING DELAY	Number of rings before the printer answers when receiving fax data. Select from 0 to 4. The factory default setting is 2.
REDUCTION	Set if the received fax data is reduced for printing or not. AUTO: reduced automatically (factory default setting) OFF: not reduced automatically 90%: reduced to 90%
FAX RAM SIZE	Set the RAM size used for the fax function. After turning the printer off and on the setting is active. The factory setting is 1MB. The maximum size that can be set is 15 MB, this depends on the memory size installed into the printer.
RECEIVE	Select if the printer is to receive fax data or not. When the printer only sends Fax data, select this to OFF. ON: Receive fax data (factory default setting) OFF: Does not receive fax data
INTERVAL	Set the interval to print a fax sent / received report. The factory setting is OFF. Select one of the following 7 types. OFF: No printing 6H: every 6 hours 12H: every 12 hours 24H: every 24 hours 2D: every 2 days 4D: every 4 days 7D: every 7 days

USING THE FAX DRIVER

Installing the Fax Driver

Windows 3.1

1. Choose the RUN command from the FILE menu in the Program Manager.
2. Type A:\SETUP and press the ENTER key.

Windows 95 / Windows 98 / Windows NT 4.0

1. Click Start, and select Printers from the Settings menu.
2. Click the Add printer icon in the Printers folder.
3. Follow the instructions that appear on the screen. If you have already created a network share on your file server, specify the share name on your file server.

Caution

When installing the fax driver in Windows NT 4.0, be sure to install it as a “Local Printer” in Add Printer Wizard. You should select the network port after installing the fax driver if you want to use it as a network printer. If you install the fax driver as a “Network Printer”, it will not work.

Receiving Fax Messages

When the printer power is on, the printer automatically receives fax data through the External Fax Modem and prints the data. The ‘FAX RECEIVING’ message appears while the printer is receiving data.

You can also make a setting on the control panel to not receive fax data. For details, refer to ‘[Settings on the Control Panel](#)’ in this manual.

Caution

When the ‘FAX RECEIVING’ message appears on the control panel, do not turn off the printer as this will result in the fax data not being completely received.

Sending a Fax Message

Windows 3.1

<Select the fax driver>

To select the fax driver from *the Control Panel*:

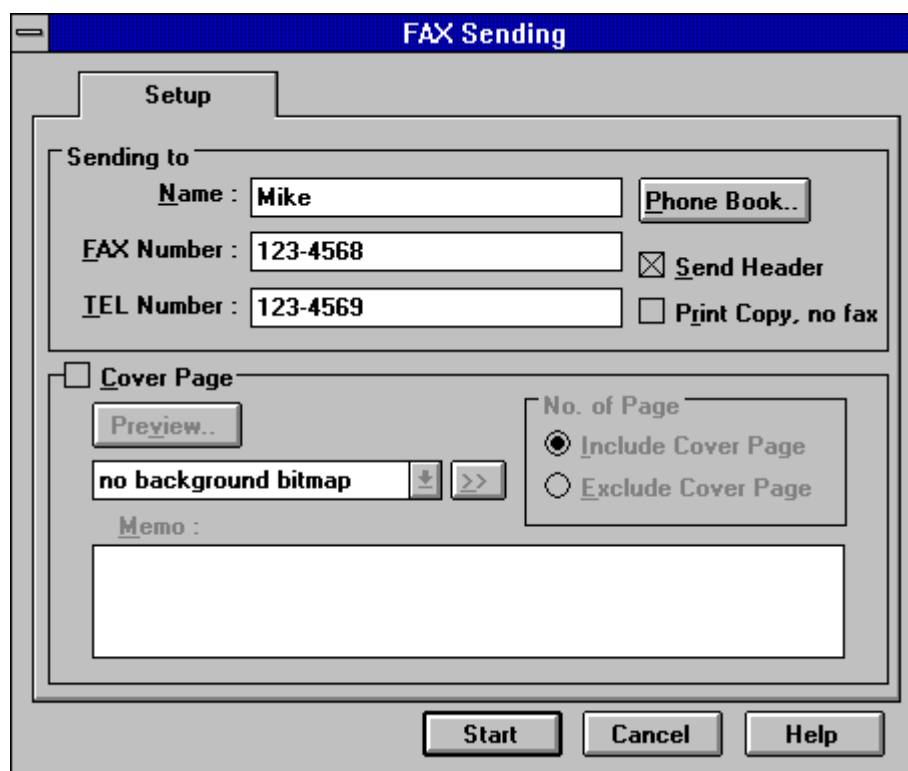
1. Choose and double-click the Printers icon in the Control Panel.
2. Select 'Brother FAX Share' from the list of the printer drivers installed onto your computer.

To select the fax driver from *the application software*:

1. Select Printer Setup or Page Setup in the File menu of the application software.
(The setting dialog box appears after selecting Print in some application software.)
2. Change the printer driver to 'Brother FAX Share' in the setting dialog box.

<Send the fax message>

1. Select Print in the File menu of the application software.
2. The Print dialog box appears, press the OK button to show the FAX Sending dialog box.



3. Enter the telephone number and other items as required and then press the Start button to send the fax data to the printer.

4. The printer sends the fax data through the External Fax Modem.

The 'FAX SENDING' message appears on the control panel while the printer is sending the fax data.

Caution

When the 'FAX SENDING' message appears on the control panel, do not turn off the printer as this will result in the fax data not being completely sent.

Windows 95 / Windows 98 / Window NT 4.0

<Select the fax driver>

To select the driver from *the Printer Folder*:

1. Click Start, and select Printers from the Settings menu.
2. Select 'Brother FAX Share' from the list of the printer drivers installed onto your computer. Then, click the right mouse button and select Set As Default.

To select the driver from *the application software*,

1. Select Printer Setup or Page Setup in the File menu.
(The setting dialog box appears after selecting Print in some application software.)
2. Change the printer driver to 'Brother FAX Share' in the setting dialog box.

<Send the fax message>

1. Select Print in the File menu of the application software.
2. The Print dialog box appears. Press the OK button to show the FAX Sending dialog box.
3. Enter the telephone number and other items as required and then press the Start button to send the fax data to the printer.
4. The printer sends the fax data through the External Fax Modem.

The 'FAX SENDING' message appears on the control panel while the printer is sending the fax data.

Caution

When the 'FAX SENDING' message appears on the control panel, do not turn off the printer as this will result in the fax data not being completely sent.

OTHER FUNCTIONS

Report Print

The printer automatically prints the sent / received report when the selected interval has passed. The printing intervals can be specified with the INTERVAL menu on the control panel. Refer to '[Settings on the Control Panel](#)' on Page 6 to make the interval setting.

When you want to print a report on the current sending / receiving status, carry out the following operations on the control panel;

1. Press the SEL switch to make the printer off-line.
2. Press the TEST switch while holding down the SHIFT switch, 'DEMO PAGE' is displayed.
3. Press the ▲ or ▼ switch until 'PRINT FAX LOG' is displayed.
4. Press the SET switch. The printer prints the sent / received report.

 Note:

- The date and time on the sent / received report are changed when the first fax data is sent after turning on the printer.
- If there is no sending / receiving log, 'PRINT FAX LOG' is not displayed on the control panel. The sending / receiving log disappears when the printer is turned off. (The printer memorizes the last 30 logs.)

Sharing the Fax Function on a Network

When the printer is shared on a network, the fax function can be also shared. Select the same printer as the one which is used as the network printer.

<Windows 95 / Windows 98 / Windows NT 4.0 Peer to Peer>

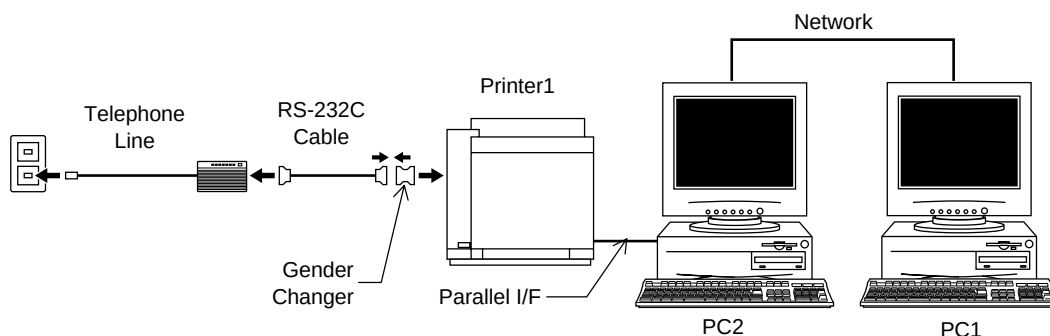
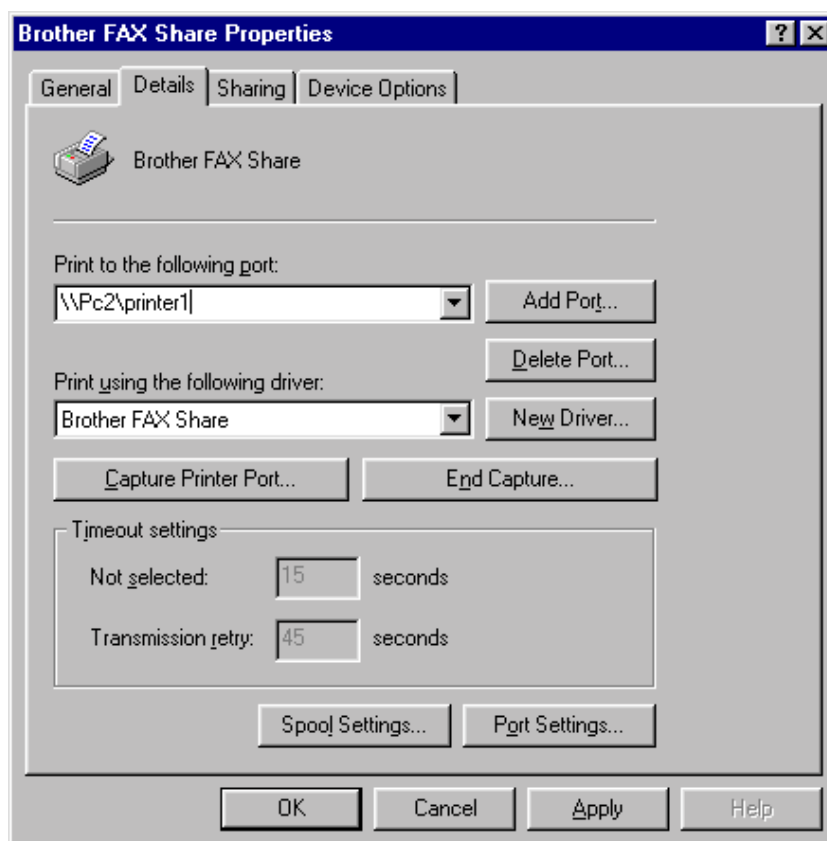


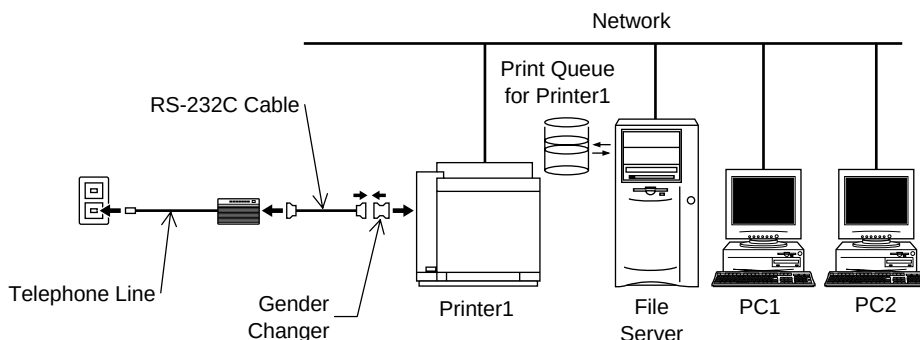
Fig. 2 Windows 95 / Windows 98 / Windows NT 4.0 Peer to Peer Sample

The printer with the External Fax Modem installed is connected to PC2 as shown in the above figure.

In order to send the fax data from PC1 to Printer1, set 'Print to the following port' in the Properties of Brother FAX Share '\\PC2\Printer1' in the Printer folder on PC1. (Refer to the illustration below for Windows 95.)



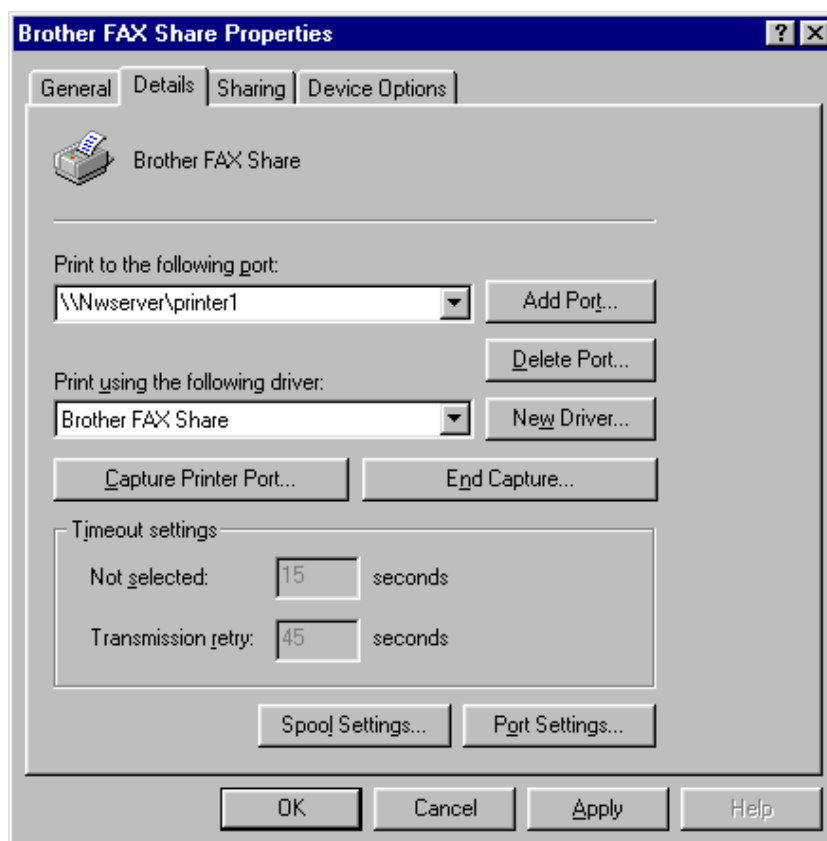
<Sharing on a file server>

**Fig. 3 Sharing on a File Server**

If your printer is connected to a network through a parallel share, or via a print server connected directly to the network cable, it is possible to send faxes from each client PC directly to the printer.

For example: Printer1 has the External Fax Modem installed and is connected to the file server through the network as shown above. The print queue for Printer1 is set on the file server.

In order to send fax data from PC1 or PC2 to the External Fax Modem in Printer1, set 'Print to the following port' in the Properties of Brother FAX Share to the queue name of the shared printer on the network, e.g. '\\NWserver\Printer1' in the Printers folder of PC1 or PC2. (Refer to the illustration below for Windows 95/98.)



TROUBLESHOOTING

Messages on the Control Panel

Status Display

Error Message	Meaning
FAX SENDING	The printer is sending the fax data.
FAX RECEIVING	The printer is receiving the fax data.
MC READY ... MC PRINT ...	'MC' shows that the printer is in the fax mode. (MC = Modem Control)

Error Messages

If a problem occurs during use of the fax function, the following message appears;

Error Message	Meaning	Action
UNKNOWN LANGUAGE	Fax data was sent although the External Fax Modem is not selected.	Turn off and on the printer. Set 'FAX MODEM=ON' on the printer control panel.

Error Print

If one of the following errors occurs during use of the fax function, the printer prints out an error message on paper. In order to recover from the error, follow the instructions printed on the paper.

- Sending memory full
- Receiving memory full
- Other memory full
- Transmission error

Q & A

This section contains questions and answers for using the fax function with your printer.

Question	Recommendation
The date or time of the sent / received report is not correct.	The clock of the printer is adjusted when sending the fax data. If the printer is turned off and on, the clock of the printer is reset to the default value (01/01/1997 00:00).
'FAX MODE' is not displayed on the control panel.	Enter the 'HIDDEN PANEL' menu by pressing the SHIFT and SEL switches. Then, select 'FAX MODEM=ON' in the 'EXT. FAX MODEM' menu.
I cannot send any fax data although the data is sent from the computer to the printer.	• Check that the correct dial type is set. If not, set the correct dial type in Fax Line Setup of the fax driver. • Check if the outside line access code is set correctly. If not, set it correctly in Outside Line Access Code in FAX Line Setup of the fax driver. • Check if the telephone line is connected correctly. • Check if the External Fax Modem is turned on. • Check if the printer and the External Fax Modem are connected correctly. • Check that you turned on the External Fax Modem before turning on the printer.
Fax data is not sent from the computer to the printer, and I cannot send any fax data.	• Check if the printer port (LPT1 / LPT2 or the network printer) is correct. • Check if the printer cable is connected correctly. • Check if the network cable is connected correctly to the network card of the printer.
I cannot receive fax data.	• Check if the telephone line is connected correctly. • Check if 'RECEIVE MODE=ON' is selected on the control panel. Refer to the 'Settings on the Control Panel' section. • Check if the External Fax Modem is turned on. • Check if the printer and the External Fax Modem are connected correctly. • Check that you turned on the External Fax Modem before turning on the printer.



COLOR LASER PRINTER PARTS REFERENCE LIST

MODEL:HL-2400C

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 >

	(1)	(2)	(3)	(4)	
REF.NO.	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK

Revision No.: marked on the main printed circuit board.

B48K056 - 201A

..... Design change indication
..... Specification No .
..... Pattern alteration No.
..... Circuit board No.

Revision No.: marked on the power supply PCB.

Rev: 0B

..... Design change indication

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 November, 1997.

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

CONTENTS

1.	DRIVE	1
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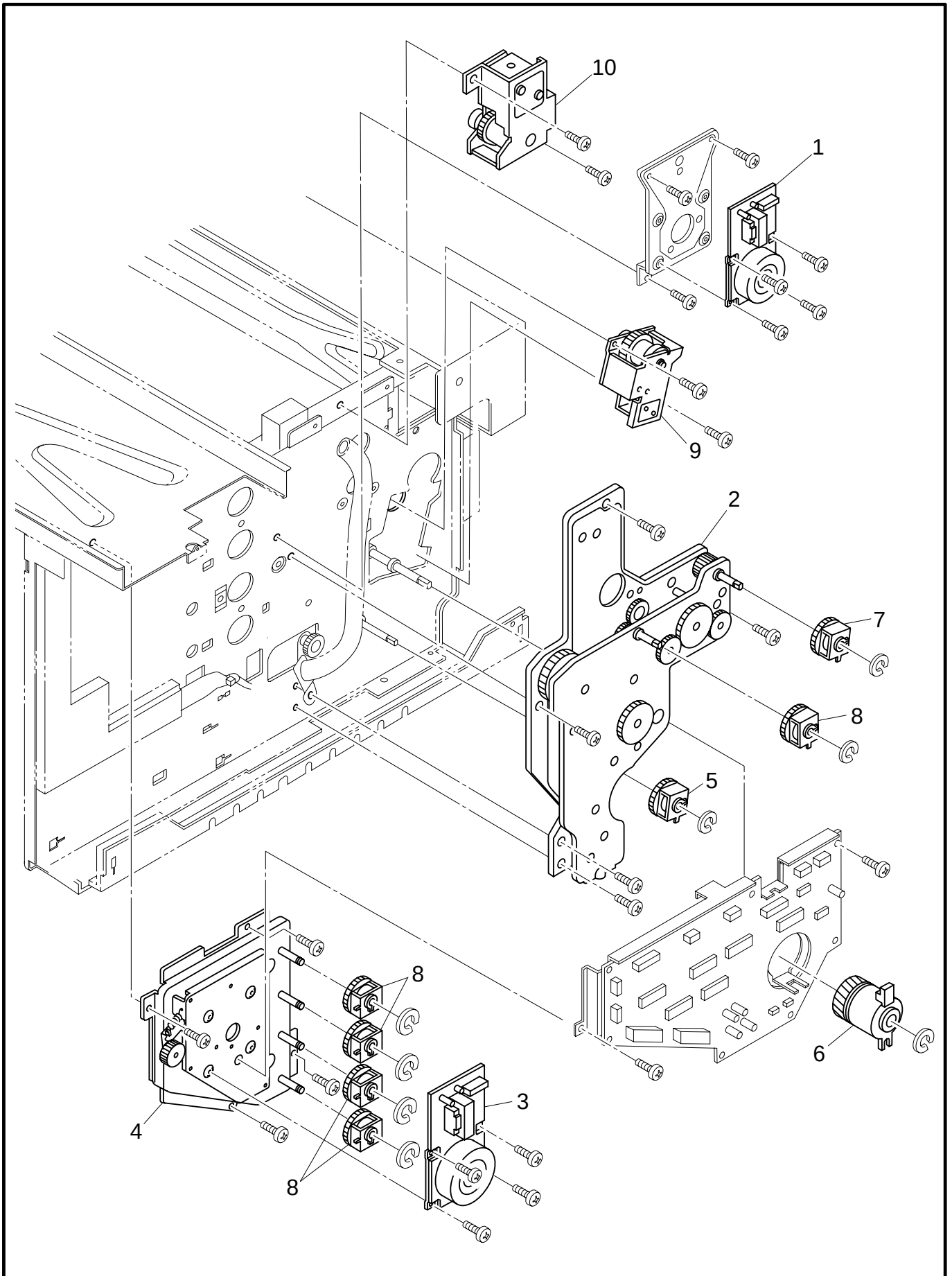
HL2400CPL

1. DRIVE

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3500001	1	MAIN MOTOR	
2	UH1941001	1	MAIN GEAR UNIT	
3	UH1942001	1	DEVELOPER DRIVE MOTOR	
4	UH1943001	1	DEVELOPER DRIVE UNIT	
5	UH3494001	1	PAPER FEEDING CLUTCH	
6	UH3495001	1	REGISTRATION CLUTCH	
7	UH3496001	1	FUSER CLUTCH	
8	UH3497001	5	DEVELOPER CLUTCH	
9	UH3498001	1	TRANSFER SOLENOID	
10	UH3499001	1	DRUM CLEANER SOLENOID	

MODEL HL-2400C 54S-301

1. DRIVE



MODEL HL-2400C 54S-301

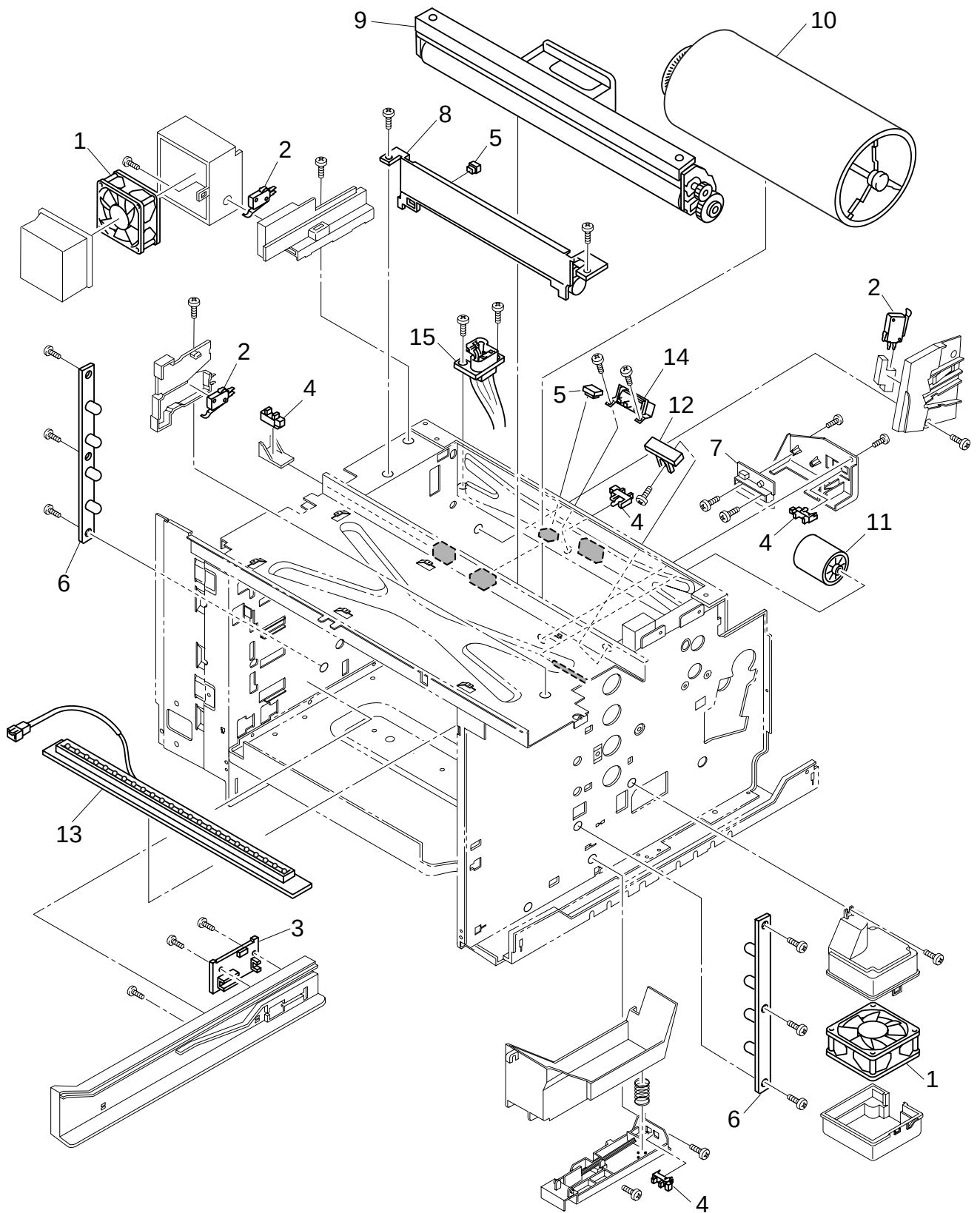
2. FRAME

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH1944001	2	COOLING FAN MOTOR	
2	UH1946001	3	INTERLOCK SWITCH	
3	UH1947001	1	PAPER SIZE SENSOR	
4	UH1948001	4	PAPER SENSOR	
5	UH1949001	2	BELT SENSOR	
6	UH1950001	1	TONER SENSOR ASSY	
7	UH1996001	1	OHP SENSOR	
8	UH3469001	1	WASTE TONER FEEDER (U)	
9	UH3483001	1	DRUM CLEANER	
10	UH3484001	1	TRANSFER DRUM	
11	UH3485001	1	PAPER FEEDING ROLLER	
12	UH3486001	1	SEPARATOR PAD	
13	UH3487001	1	ERASE LAMP	
14	UH3488001	1	OIL SENSOR	
15	UH3492001	1	FUSER CONNECTOR	

MODEL HL-2400C 54S-301

T/I NO. PR98003

2. FRAME



MODEL HL-2400C 54S-301

3. SCANNER UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3482001	1	OPTICAL UNIT	

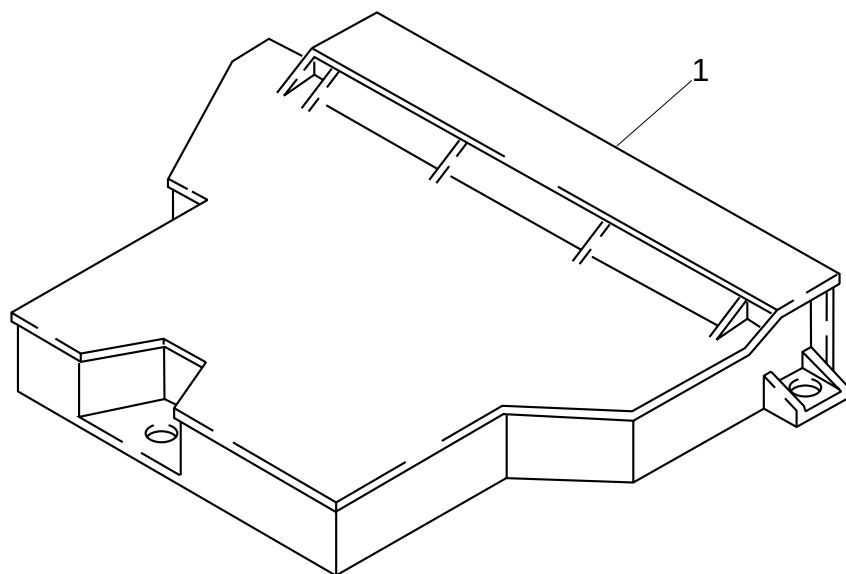
MODEL HL-2400C 54S-301

4. MEDIA CASSETTE

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3493001	1	PAPER CASSETTE	

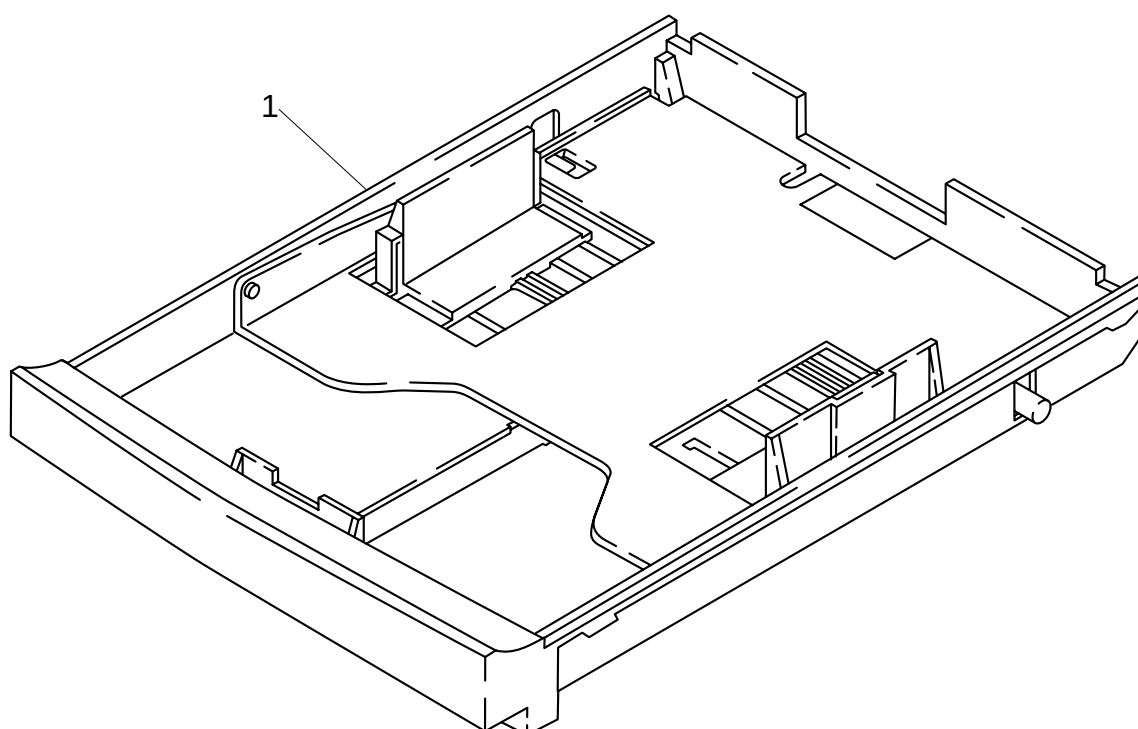
MODEL HL-2400C 54S-301

3 . SCANNER UNIT



MODEL HL-2400C 54S-301

4 . MEDIA CASSETTE



MODEL HL-2400C 54S-301

5. TRANSFER UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3547001	1	TRANSFER UNIT2	
1-1	UH3480001	1	TRANSFER ROLLER	
1-2	UH3548001	1	PAPER DISCHARGER2	

MODEL HL-2400C 54S-301

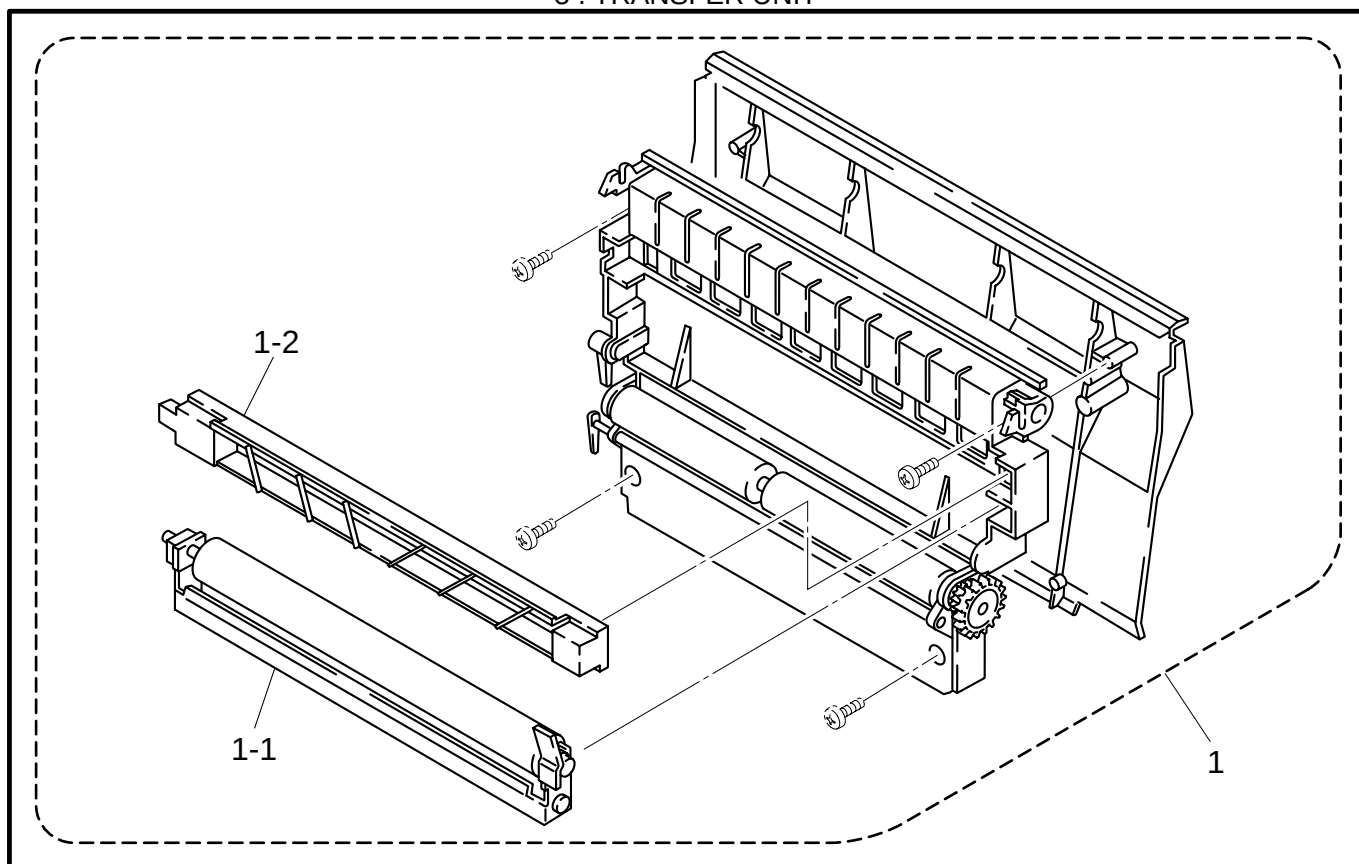
T/I NO. PR98173

6. PAPER EXIT UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3459001	1	PAPER EXIT UNIT	
1-1	UH3460001	1	PAPER EXIT UNIT COVER	
1-2	UH3461001	1	PAPER EXIT FRONT COVER	
1-3	UH3462001	1	PAPER EXIT ROLLER	
1-4	UH3463001	1	DISCHARGING BRUSH	
1-5	UH1994001	1	COOLING FAN MOTOR	
1-6	UH1948001	2	PAPER SENSOR	

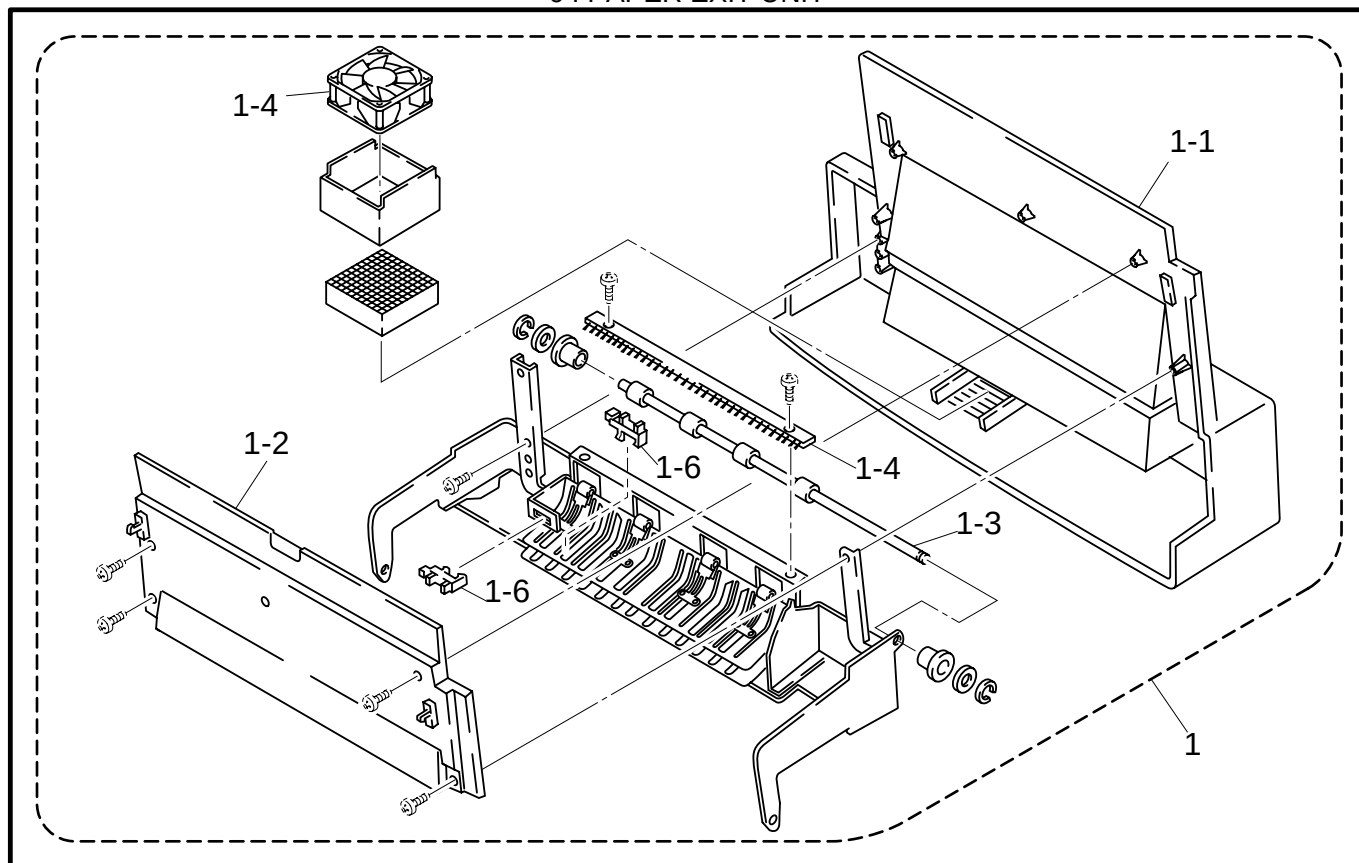
MODEL HL-2400C 54S-301

5 . TRANSFER UNIT



MODEL HL-2400C 54S-301

6 . PAPER EXIT UNIT



MODEL HL-2400C 54S-301

7. FUSING UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3470001	1	FUSING UNIT (US)	
1	UH3471001	1	FUSING UNIT (EC)	
1-1	UH3473001	1	FUSING HEATER (US)	
1-1	UH3474001	1	FUSING HEATER (EC)	
1-2	UH3476001	1	FUSING ROLLER	
1-3	UH3477001	1	BACK-UP ROLLER	

MODEL HL-2400C 54S-301

T/I NO. PR98252

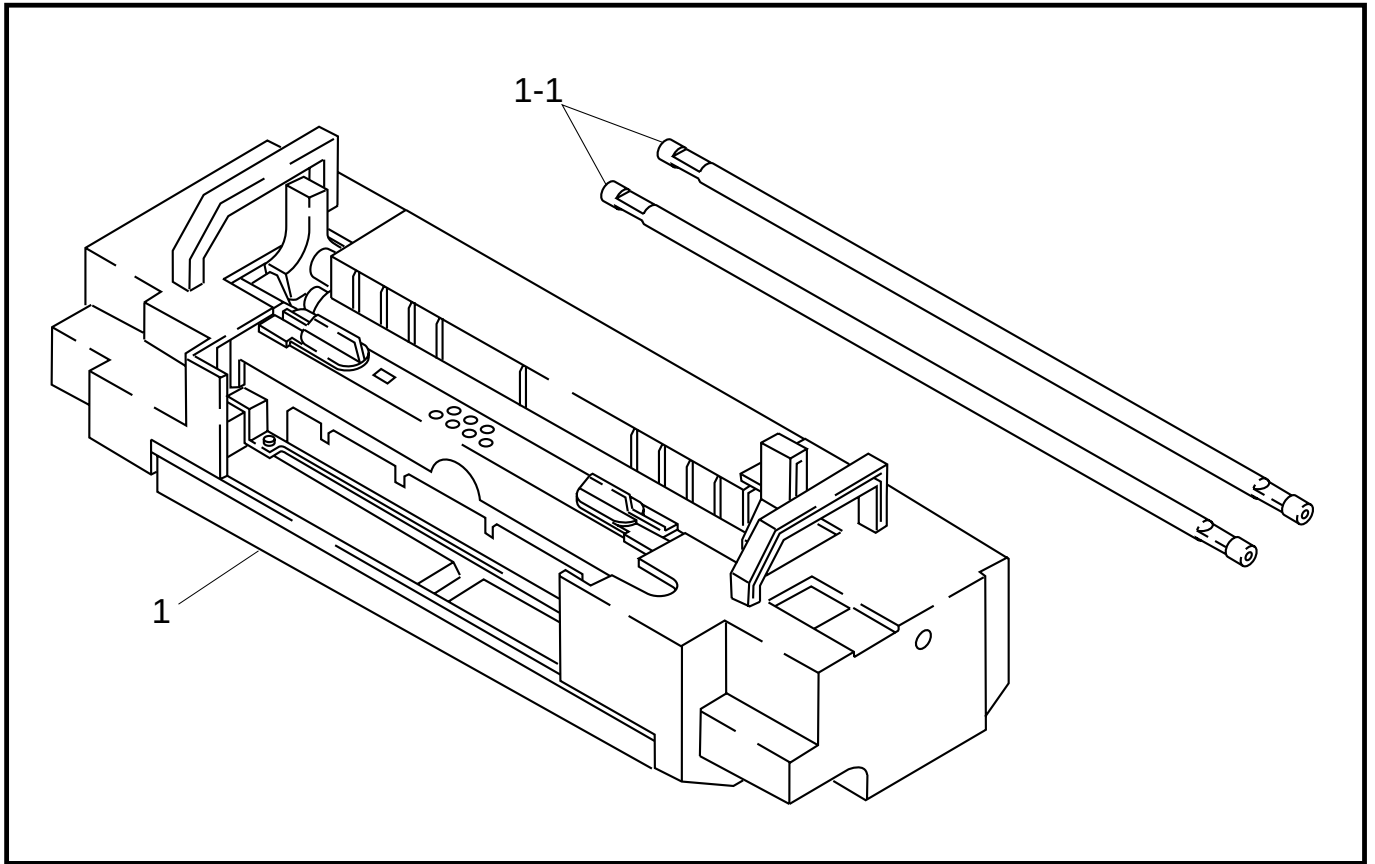
8. MAIN PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3900001	1	MAIN PCB HLC1	B48K299-300Q	
2	UK3902001	1	MIO CONNECTOR PCB ASSY		
3	UH1307001	1	OPTIONAL I/O COVER H		
4	UH1901001	1	MAIN PCB PLATE		
5	UH1903001	1	MIO RAIL R		
6	UH1940001	1	MIO RAIL L		
7	UH1904001	1	CONNECTOR PCB HOLDER		
8	UH1924001	2	CARD BLIND		
9	UK3942000	1	MROM23C3210-2	VER.1.45	
10	UK3941000	1	MROM23C3210-1	VER.1.45	

MODEL HL-2400C 54S-301

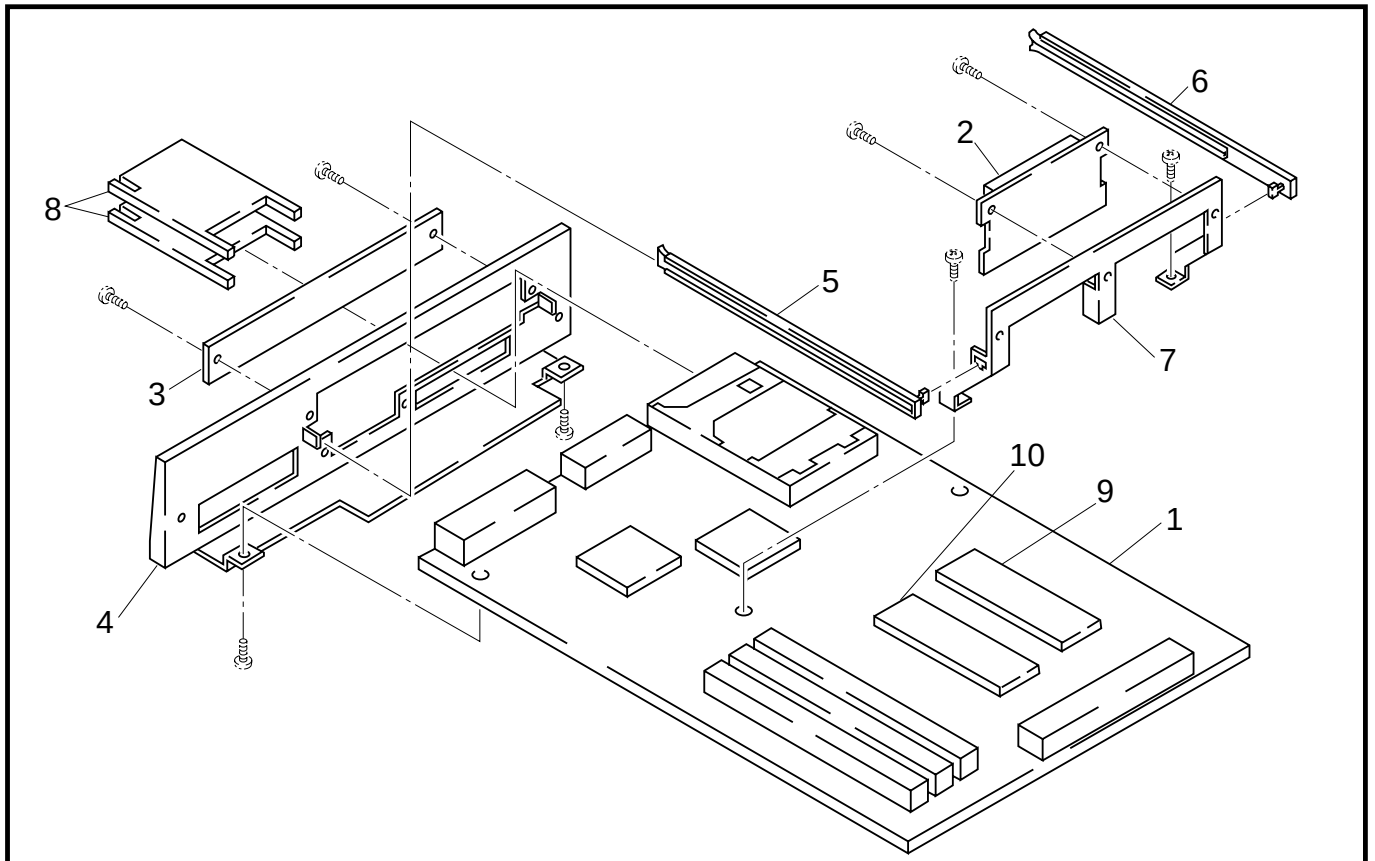
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7 . FUSING UNIT



MODEL HL-2400C 54S-301

8 . MAIN PCB



T/I NO. PR98038

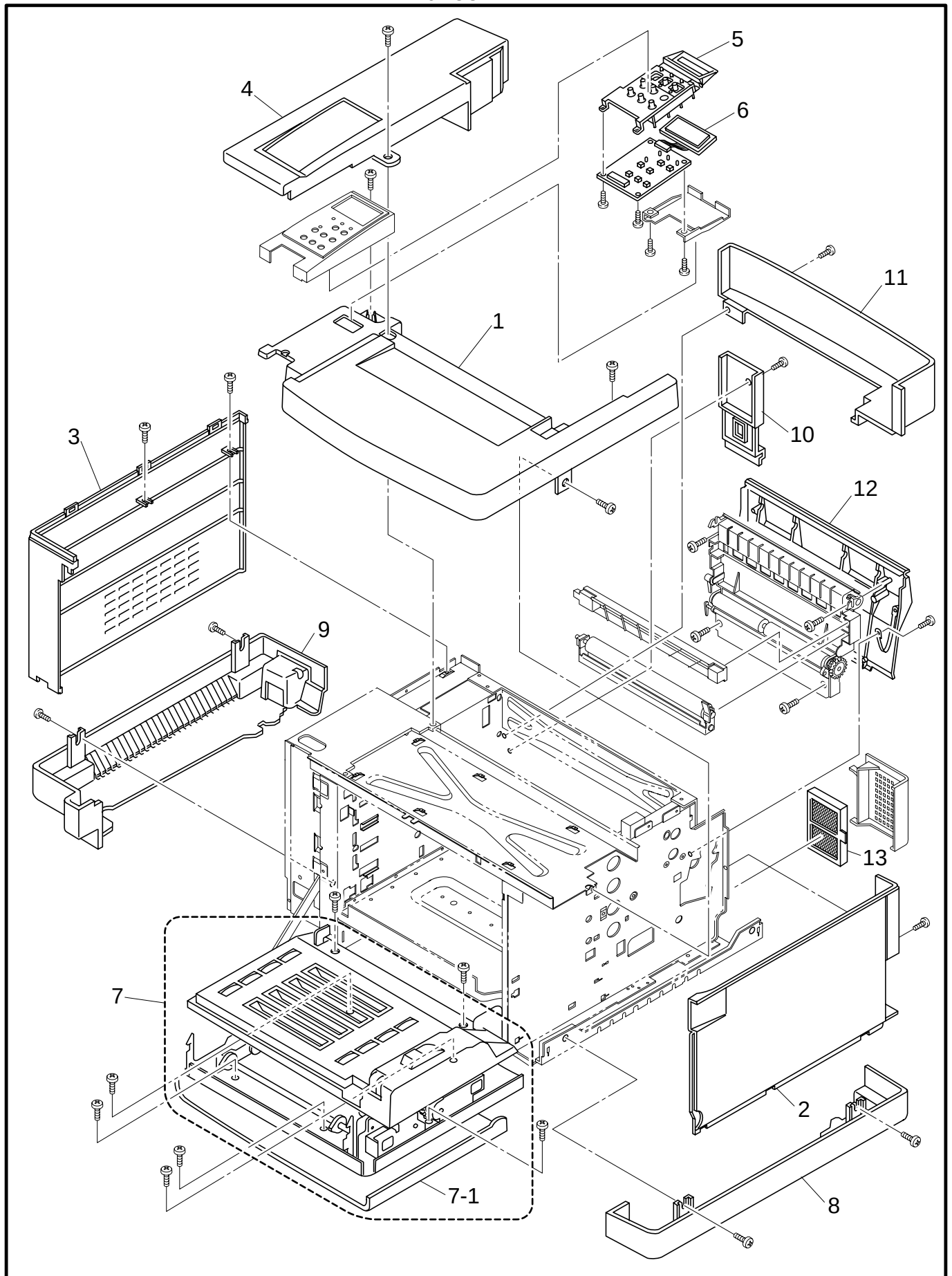
MODEL HL-2400C 54S-301

9. COVER

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3451001	1	TOP COVER	
2	UH3452001	1	SIDE COVER (R)	
3	UH3453001	1	SIDE COVER (L)	
4	UH3454001	1	UPPER SIDE COVER	
5	UH3455001	1	PANEL BUTTON	
6	UH3456001	1	PANEL PWB	
7	UH3457001	1	FRONT COVER UNIT	
7-1	UH3458001	1	FRONT COVER	
8	UH3464001	1	BASE COVER (R)	
9	UH3465001	1	BASE COVER (L)	
10	UH3466001	1	REAR COVER	
11	UH3467001	1	REAR COVER (U)	
12	UH3468001	1	REAR COVER (L)	
13	UH1945001	1	OZONE FILTER	

MODEL HL-2400C 54S-301

9. COVER



MODEL HL-2400C 54S-301

10. MCTL PCB

PR98216

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UH1997001	1	MCTL PWB	VER. LDA 1-4	CHNG VER.

MODEL HL-2400C 54S-301

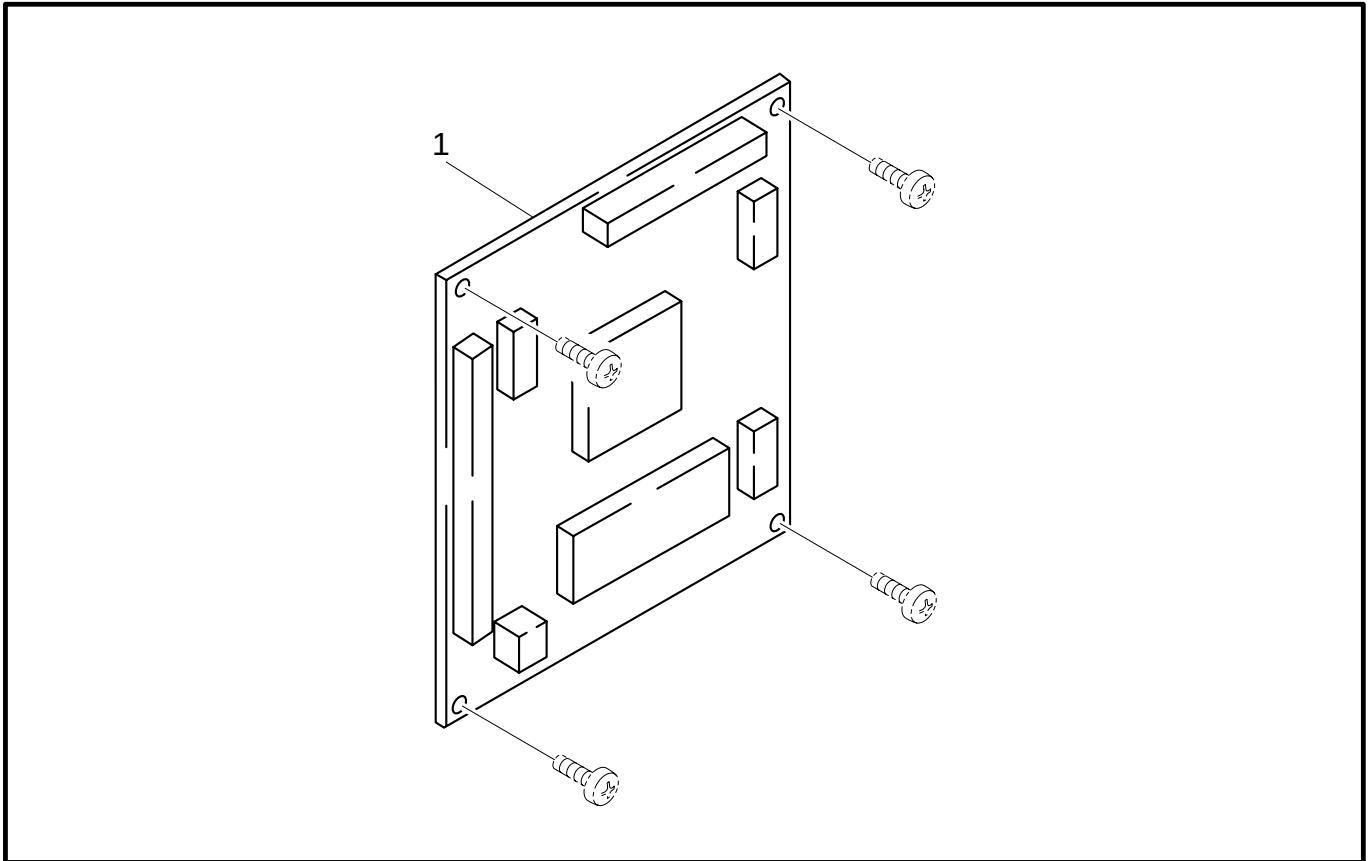
T/I NO. PR98215 / PR98216

11. IOD PCB

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH1998001	1	IOD1 PWB	
2	UH1999001	1	IOD2 PWB	

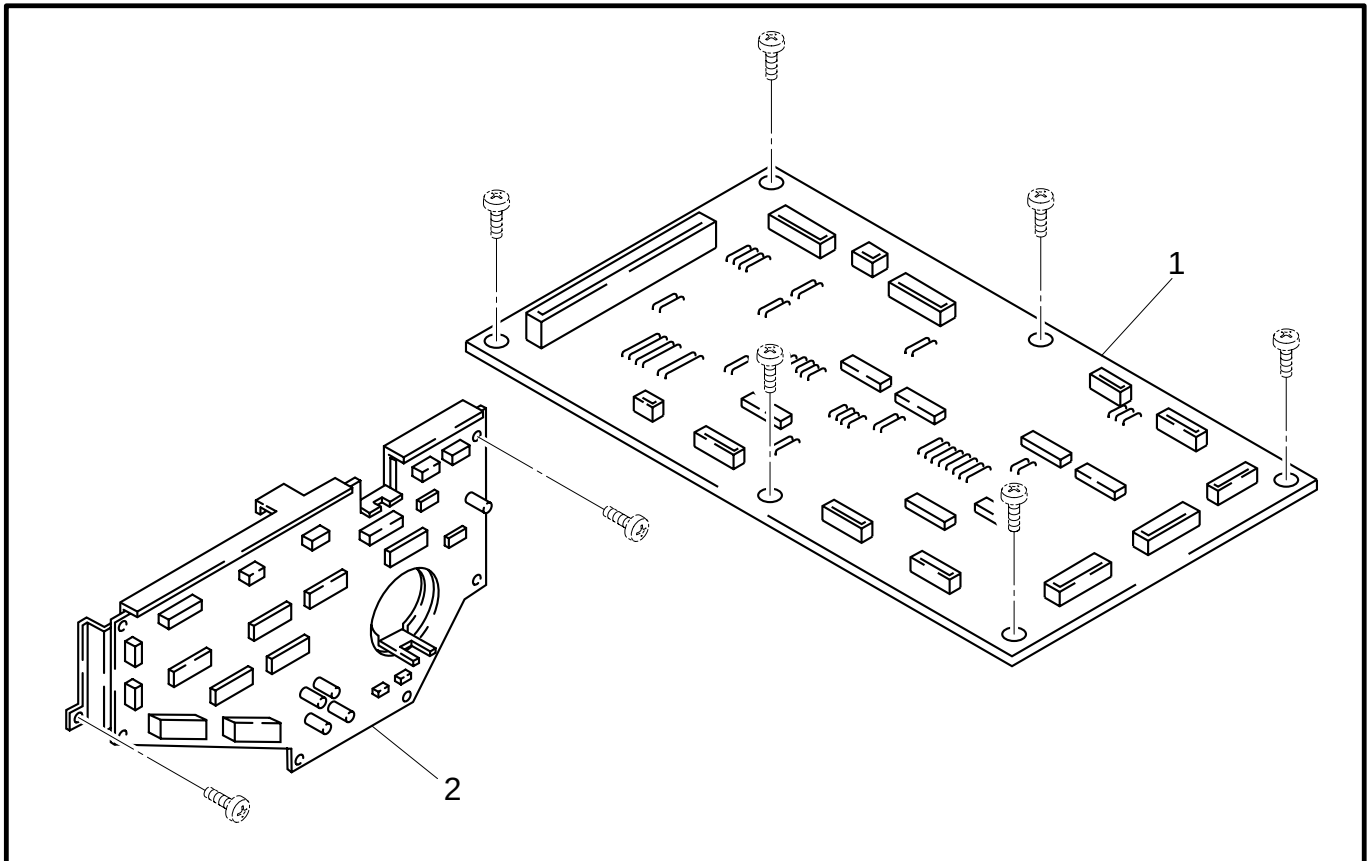
MODEL HL-2400C 54S-301

10 . MCTL PWB



MODEL HL-2400C 54S-301

11 . IOD PCB



MODEL HL-2400C 54S-301

12. POWER SUPPLY UNIT

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UH3490001	1	POWER SUPPLY UNIT (US)	Rev:0B	
1	UH3489001	1	POWER SUPPLY UNIT (EC)	Rev:0B	

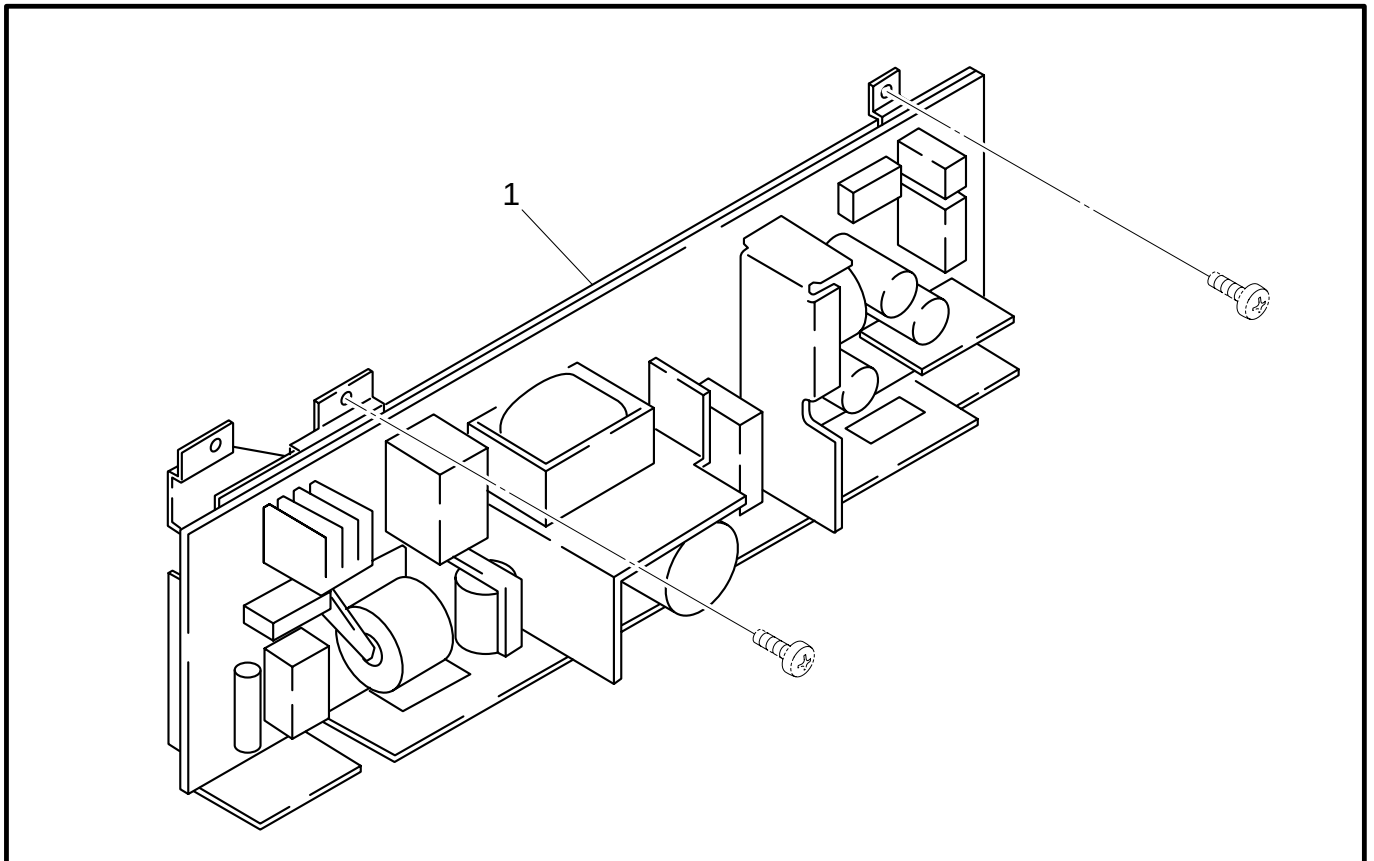
MODEL HL-2400C 54S-301

13. HIGH VOLTAGE POWER SUPPLY

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH2000001	1	HIGH VOLTAGE UNIT	

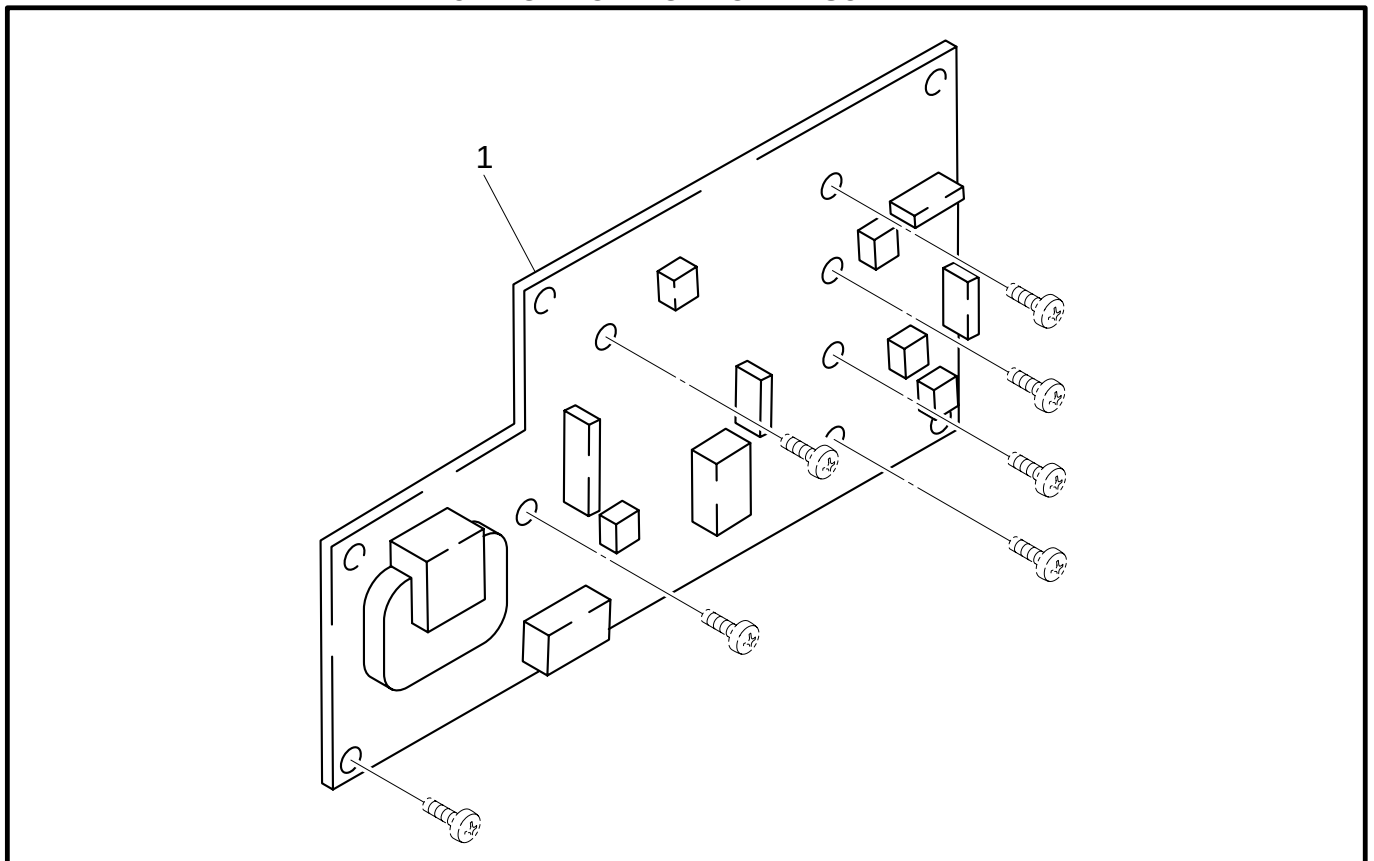
MODEL HL-2400C 54S-301

12 . POWER SUPPLY UNIT



MODEL HL-2400C 54S-301

13 . HIGH VOLTAGE POWER SUPPLY



MODEL HL-2400C 54S-301

14. AC CORDS

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1A	UH1933001	1	AC CORD US/CSA	
1B	UH1052001	1	AC CORD VDE	
1C	UH1053001	1	AC CORD SEV	
1D	UH1054001	1	AC CORD BS	
1E	UH1055001	1	AC CORD SAA	
1F	U34320001	1	AC CORD #4, BS WO/PLUG	
1G	UK4094001	1	AC CORD #5, DEMKO	
1H	U34322001	1	AC CORD #6, ISRAEL	

MODEL HL-2400C 54S-301

T/I NO. PR98046

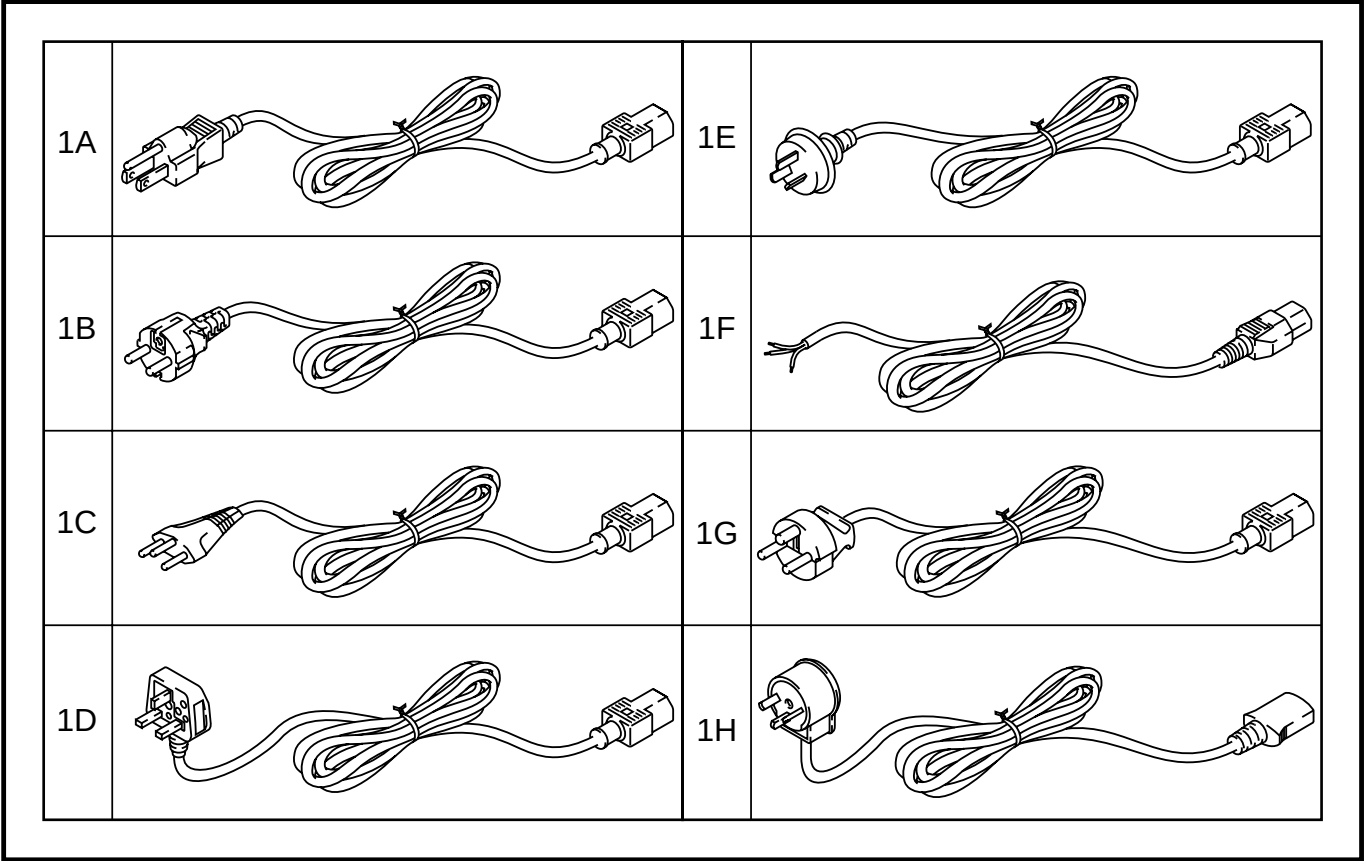
15. ACCESSORIES

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UK3850001	1	P DRIVER DISK #1	
2	UK3851001	1	P DRIVER DISK #2	
3	UK3852001	1	P DRIVER DISK #3	
4	UK3864001	1	P DRIVER DISK PS	
5	UK3870001	1	P DRIVER DISK MAC	
6	UK3866001	1	P DRIVER DISK NT	
7	UK3854001	1	USER'S MANUAL ENG.	
7	UK3855001	1	USER'S MANUAL GER.	
7	UK3856001	1	USER'S MANUAL FRA.	
7	UK3857001	1	USER'S MANUAL DUT.	
8	UE2014001	1	PE BAG 215X350H	
9	UK3676001	1	P DRIVER DISK (E-MAIL PRINTING)	
10	UK4125001	1	P DRIVER DISK NT #2	
11	UK3928001	1	PANTONE DISK PCL	

MODEL HL-2400C 54S-301

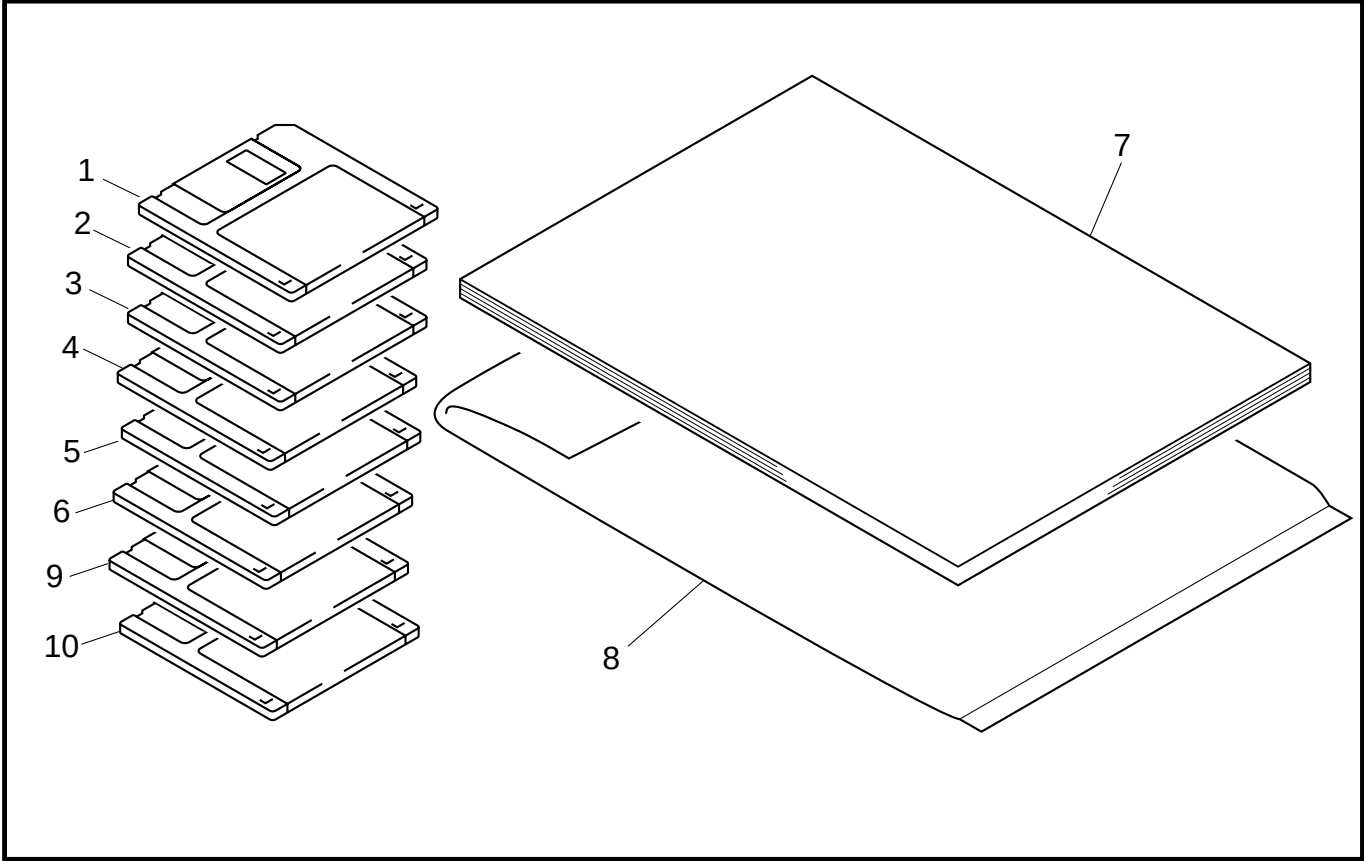
T/I NO. PR98002 / PR98195 / PR98275

14 . AC CORDS



MODEL HL-2400C 54S-301

15 . ACCESSORIES



T/I NO. PR98002

MODEL HL-2400C 54S-301

16. PACKING MATERIALS

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH2151001	1	BASE/UPPER PACKING SET	
2	UH2172001	1	POLYETHYLENE BAG (EN)	
3	UH1932001	1	STARTER KIT PACKING SET	
4	UH2164001	1	JOINT	
5	UH1935001	1	HL-C1 CARTON	

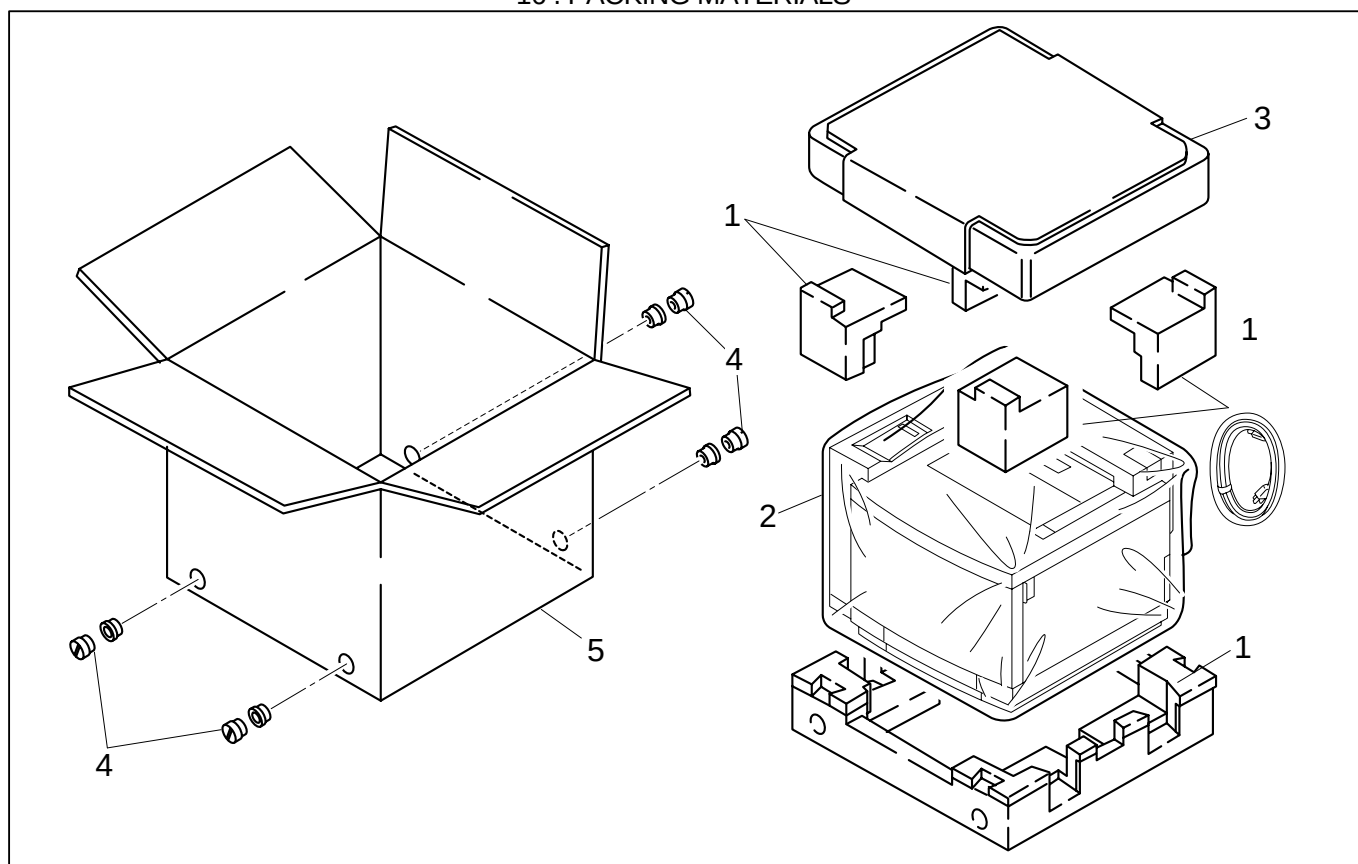
MODEL HL-2400C 54S-301

17. PERIODICAL REPLACEMENT PARTS

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3508001	1	40K KIT (US)	
1	UH3509001	1	40K KIT (EC)	
2	UH3510001	1	120K KIT	

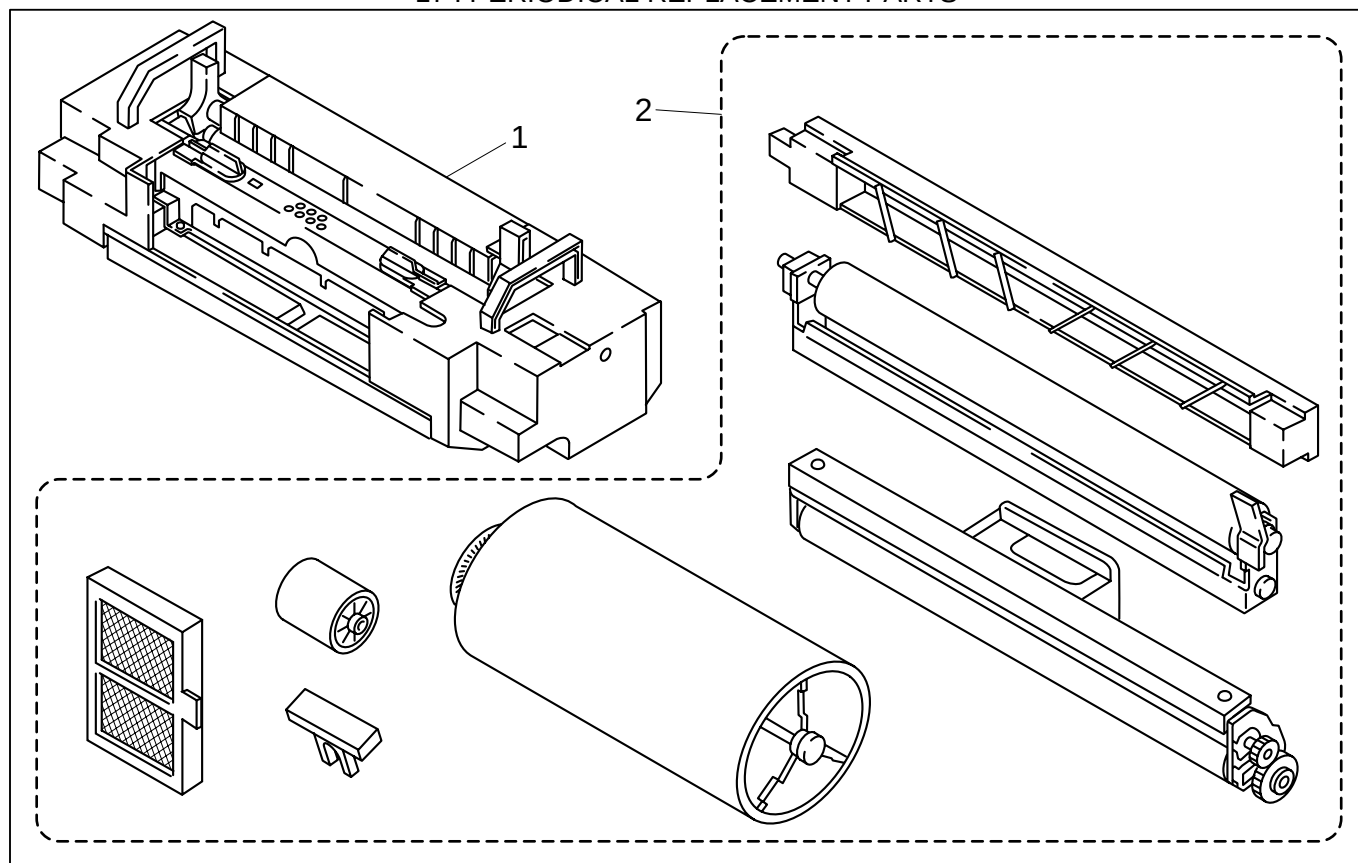
MODEL HL-2400C 54S-301

16 . PACKING MATERIALS



MODEL HL-2400C 54S-301

17 . PERIODICAL REPLACEMENT PARTS



MODEL HL-2400C 54S-301

14. AC CORDS

PR98195

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1A	UH1933001	1	AC CORD US/CSA	
1B	UH1052001	1	AC CORD VDE	
1C	UH1053001	1	AC CORD SEV	
1D	UH1054001	1	AC CORD BS	
1E	UH1055001	1	AC CORD SAA	
1F	U34320001	1	AC CORD #4, BS WO/PLUG	
1G	UK4094001	1	AC CORD #5, DEMKO	
1H	U34322001	1	AC CORD #6, ISRAEL	

MODEL HL-2400C 54S-301

T/I NO. PR98046

15. ACCESSORIES

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UK3850001	1	P DRIVER DISK #1	ADD
2	UK3851001	1	P DRIVER DISK #2	
3	UK3852001	1	P DRIVER DISK #3	
4	UK3864001	1	P DRIVER DISK PS	
5	UK3870001	1	P DRIVER DISK MAC	
6	UK3866001	1	P DRIVER DISK NT	
7	UK3854001	1	USER'S MANUAL ENG.	
7	UK3855001	1	USER'S MANUAL GER.	
7	UK3856001	1	USER'S MANUAL FRA.	
7	UK3857001	1	USER'S MANUAL DUT.	
8	UE2014001	1	PE BAG 215X350H	
9	UK3676001	1	P DRIVER DISK (E-MAIL PRINTING)	
10	UK4125001	1	P DRIVER DISK NT #2	
11	UK3928001	1	PANTONE DISK PCL	

MODEL HL-2400C 54S-301

T/I NO. PR98002 / PR98195

7. FUSING UNIT

PR98212

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3470001	1	FUSING UNIT (US)	
1	UH3471001	1	FUSING UNIT (EC)	
1-1	UH3473001	1	FUSING HEATER (US)	
1-1	UH3474001	1	FUSING HEATER (EC)	

MODEL HL-2400C 54S-301

8. MAIN PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3900001	1	MAIN PCB HLC1	B48K299-300M	CHNG VER.#
2	UK3902001	1	MIO CONNECTOR PCB ASSY		
3	UH1307001	1	OPTIONAL I/O COVER H		
4	UH1901001	1	MAIN PCB PLATE		
5	UH1903001	1	MIO RAIL R		
6	UH1940001	1	MIO RAIL L		
7	UH1904001	1	CONNECTOR PCB HOLDER		
8	UH1924001	2	CARD BLIND		
9	UK4097000	1	MROM23C3210-1	VER.1.41	
10	UK4098000	1	MROM23C3210-2	VER.1.41	

MODEL HL-2400C 54S-301

T/I NO. PR98034 / PR98038 / PR98045 / PR98058 / PR98117 / PR98212

7. FUSING UNIT

PR98229

REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH3470001	1	FUSING UNIT (US)	
1	UH3471001	1	FUSING UNIT (EC)	
1-1	UH3473001	1	FUSING HEATER (US)	
1-1	UH3474001	1	FUSING HEATER (EC)	

MODEL HL-2400C 54S-301

8. MAIN PCB

REF.NO	CODE	Q'TY	DESCRIPTION	SYMBOL	REMARK
1	UK3900001	1	MAIN PCB HLC1	B48K299-300N	CHNG VER.#
2	UK3902001	1	MIO CONNECTOR PCB ASSY	VER.1.45 VER.1.45	CHNG CHNG
3	UH1307001	1	OPTIONAL I/O COVER H		
4	UH1901001	1	MAIN PCB PLATE		
5	UH1903001	1	MIO RAIL R		
6	UH1940001	1	MIO RAIL L		
7	UH1904001	1	CONNECTOR PCB HOLDER		
8	UH1924001	2	CARD BLIND		
9	UK3942000	1	MROM23C3210-2		
10	UK3941000	1	MROM23C3210-1		

MODEL HL-2400C 54S-301

T/I NO. PR98034 / PR98038 / PR98045 / PR98058 / PR98117 / PR98212 / PR98229

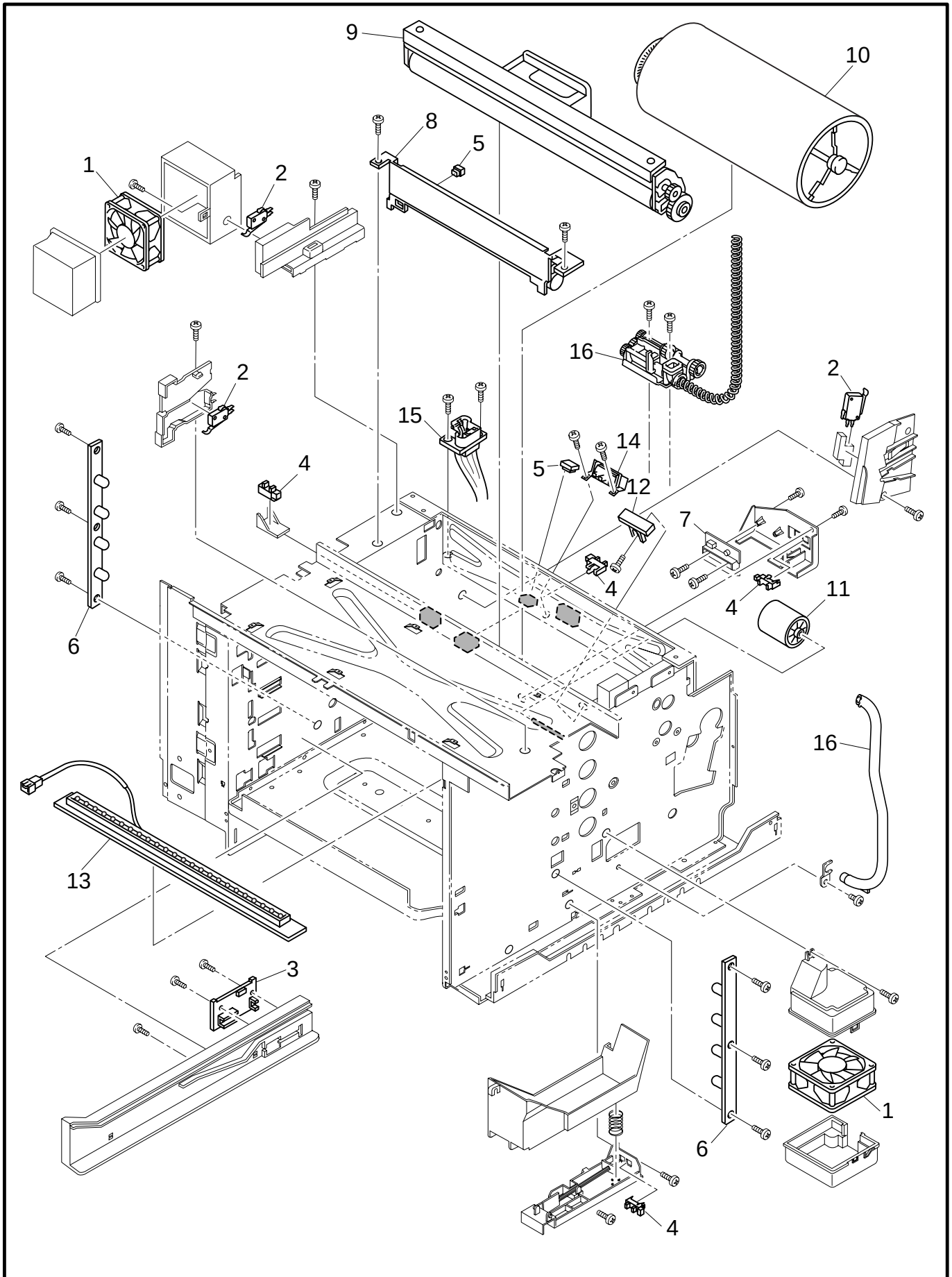
2. FRAME

PR99077

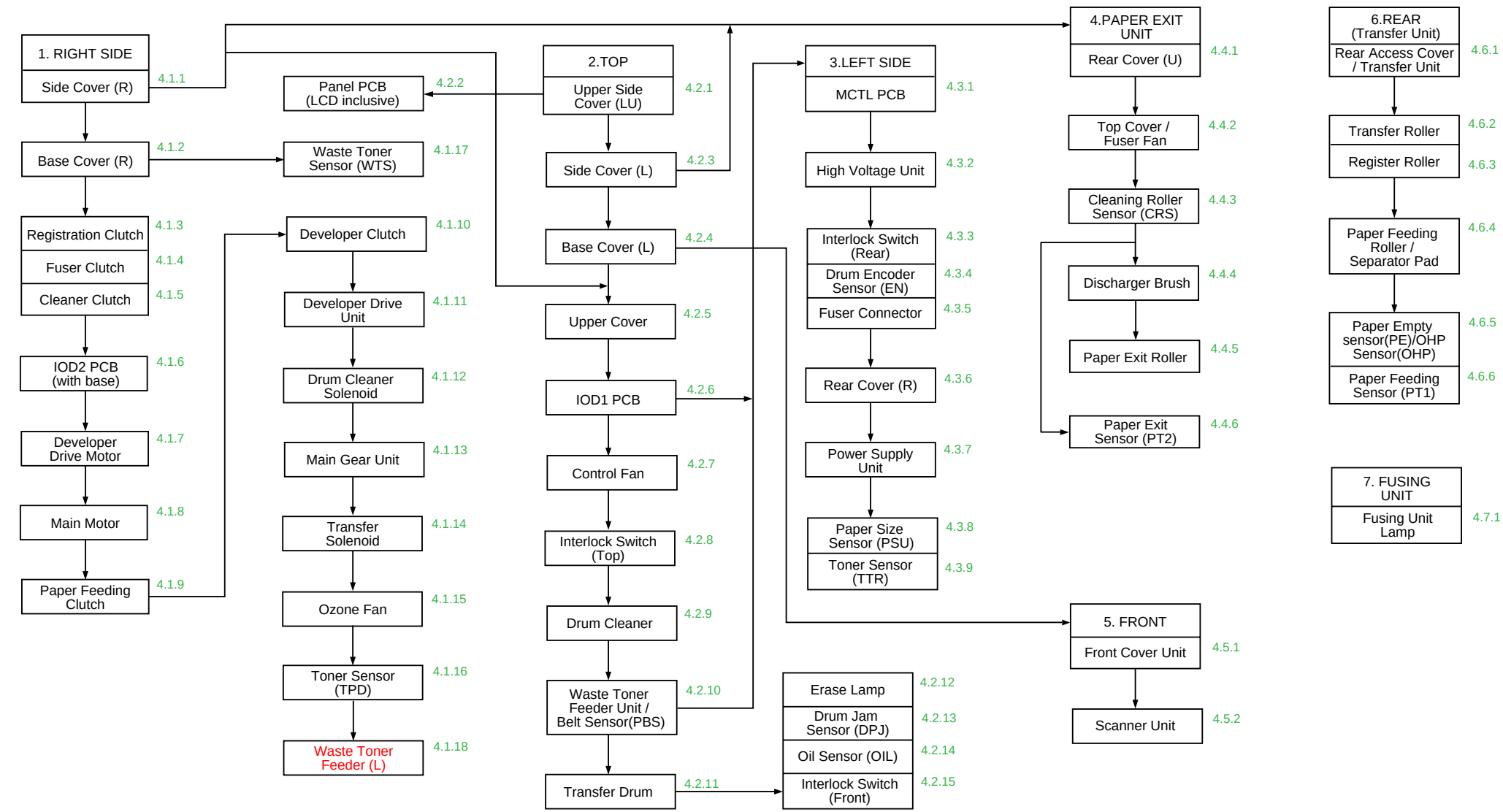
REF.NO	CODE	Q'TY	DESCRIPTION	REMARK
1	UH1944001	2	COOLING FAN MOTOR	ADD
2	UH1946001	3	INTERLOCK SWITCH	
3	UH1947001	1	PAPER SIZE SENSOR	
4	UH1948001	4	PAPER SENSOR	
5	UH1949001	2	BELT SENSOR	
6	UH1950001	1	TONER SENSOR ASSY	
7	UH1996001	1	OHP SENSOR	
8	UH3469001	1	WASTE TONER FEEDER (U)	
9	UH3483001	1	DRUM CLEANER	
10	UH3484001	1	TRANSFER DRUM	
11	UH3485001	1	PAPER FEEDING ROLLER	
12	UH3486001	1	SEPARATOR PAD	
13	UH3487001	1	ERASE LAMP	
14	UH3488001	1	OIL SENSOR	
15	UH3492001	1	FUSER CONNECTOR	
16	LJ2052001	1	WASTE TONER FEEDER (L)	

MODEL HL-2400C 54S-301

T/I NO. PR98003 / PR99077



3. DISASSEMBLY FLOW



4.1.17 Waste Toner Sensor (WTS)

- 1) Lift up the bottle holder.
- 2) Remove the screws (2 pcs.) from the bottle holder and waste toner sensor assembly.
- 3) Disconnect the connector from the waste toner sensor.
- 4) Remove the sensor assembly with the bottle holder.
- 5) Remove the waste toner sensor by removing the hooked pawl.

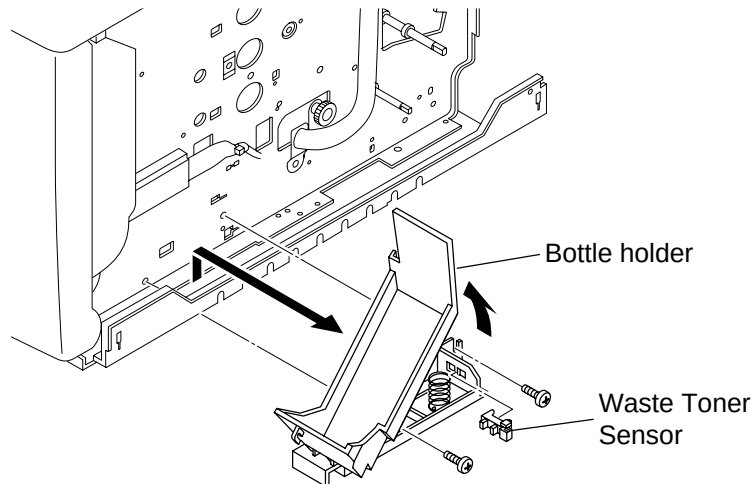


Fig.7-23

4.1.18 Waste Toner Feeder (L)

Note:

The waste toner feeder (L) is composed of plastic tube and auger spring gear unit.

- 1) Remove the set screw ST3x6 (1 pc.) to remove the waste toner feeder plate.
- 2) Remove the plastic tube from the frame.

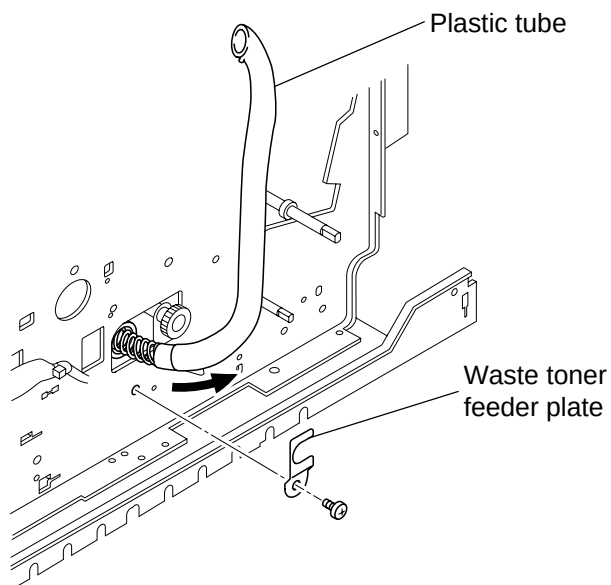


Fig.7-23a

**CAUTION**

Be sure to vacuum up waste toner remaining inside the plastic tube with a vacuum cleaner before removing the plastic tube.

- 4) Remove the set screw ST3x6 (2 pcs.) from the auger spring gear unit.
- 5) Take the auger spring out of the frame, then remove the auger spring gear unit from the printer inside .

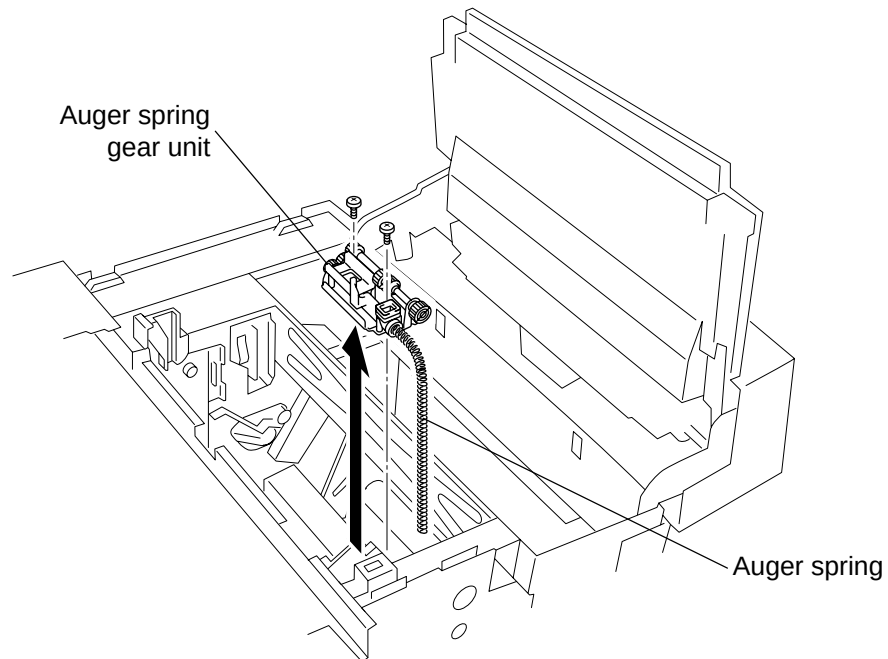


Fig.7-23b

**CAUTION**

When removing the auger spring gear unit, attach paper onto the transfer drum to prevent touching it.

Note:

- When removing the screws from the auger spring gear unit, use the screw driver whose shaft is long enough to reach the screws. If it is not available, remove the transfer drum before removing the screws.
- When re-assembling the auger spring gear unit into the frame, fix the notch to the side frame and fix the boss into the hole of the base frame referring to the figure below;.

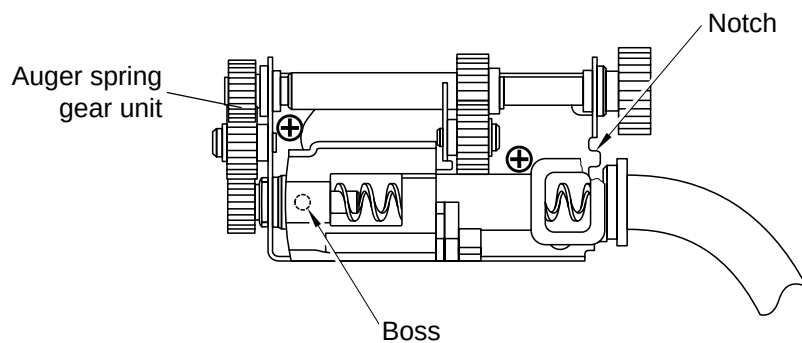


Fig.7-23c