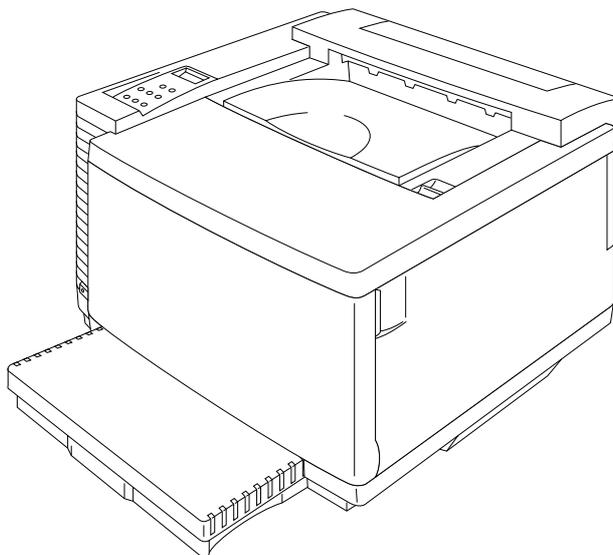




Brother Color Laser Printer **SERVICE MANUAL**

MODEL: HL-3450CN



Read this manual thoroughly before commencing any maintenance work.

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

January, 2002
SM-PRN028

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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-3450CN color laser printer.

This manual consists of the following chapters:

CHAPTER 1: OUTLINE OF PRODUCT

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

CHAPTER 2: SPECIFICATIONS

Specifications, etc.

CHAPTER 3: INSTALLATION

Installation conditions and installation procedures.

CHAPTER 4: STRUCTURE OF SYSTEM COMPONENTS

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

CHAPTER 5: CONTROL PANEL OPERATION

Operation and setting procedures on the control panel.

CHAPTER 6: PERIODIC MAINTENANCE

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

CHAPTER 7: DISASSEMBLY

Procedures for replacement of the mechanical system parts.

CHAPTER 8: 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 60825 SPECIFICATION (FOR 220-240 V MODEL ONLY)

This printer is a Class 1 laser product as defined in IEC 60825 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 laser 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 every circumstance because it is impossible to evaluate all the conditions of repair situations.

SPECIAL SAFETY INFORMATION

Introductory Information

Cautions and warnings are made clear by them following a 'Safety Alert Symbol' or 'Signal Word' 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.

<Caution for the batteries>

There is a danger of explosion if the battery is incorrectly replaced.

Do not replace the battery.

Do not disassemble, recharge or dispose of in fire.

Used battery should be disposed of according to local regulations.

 **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 in the machine, this can cause serious injuries. Note that the exit roller that ejects the printed paper rotates during 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 (bipolar 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

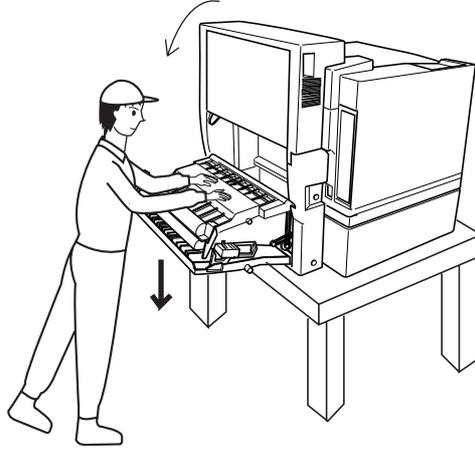
The front cover, paper exit unit and transfer unit of this printer have electrical safety interlocks to turn the power off whenever they are opened. Do not attempt to circumvent these safety interlocks.

 **CAUTION**

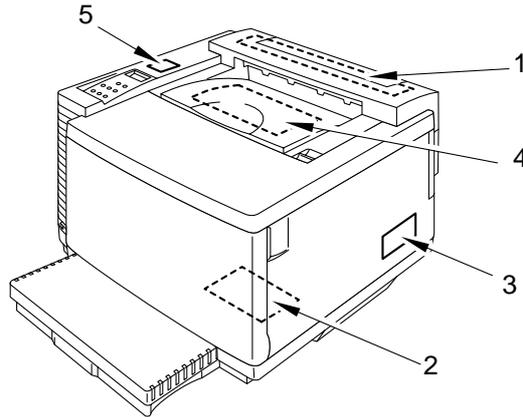
- *Do not step on or lean against the media cassette. It may cause the product to tilt or fall over and result in injuries.*
- *Do not lean against or apply any excessive force to the media cassette or open covers, otherwise it may cause the product to tilt or fall over and result in injuries.*

! CAUTION

Do not lean against or apply any excessive force to the paper cassette, open cover of Duplex unit. Otherwise it may cause the product to decline or fall down and result in the injuries.



<Label Location>



1. Hot Caution Label

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

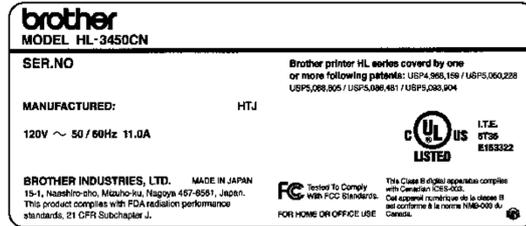
2. Laser Caution Label



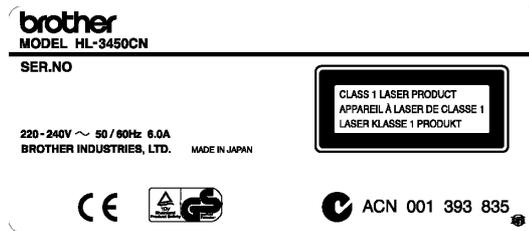
DANGER-	INVISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM.
VORSICHT-	UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET UND SICHERHEITVERriegELUNG ÜBERBRÜCKT. NICHT DEM STRAHL AUSSETZEN.
DANGER-	RAYON LASER INVISIBLE LORS DE L'OUVERTURE. EVITER L'EXPOSITION DIRECTE.
PELIGRO-	RADIACION 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

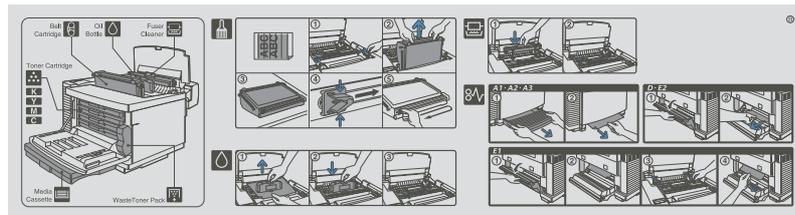
(For US)



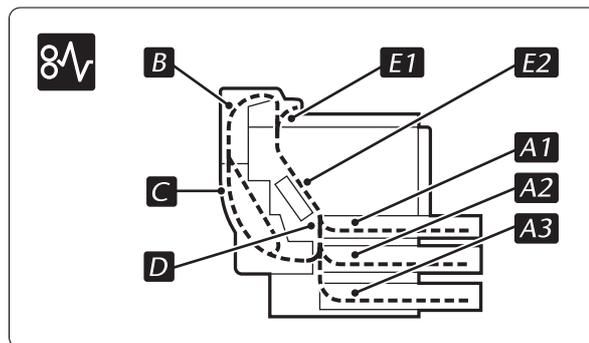
(For Europe)



4. Operation Label



5. Jam Label

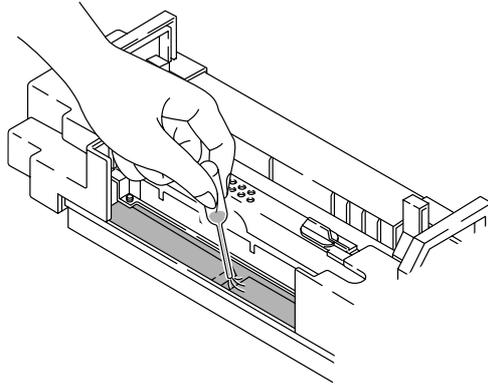


SHIPMENT OF THE PRINTER

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 1
PRODUCT OUTLINE

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CHAPTER 1 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 High Resolution Control (HRC) or Color Advanced Photoscale Technology (CAPT).

High Speed Color Laser Printing

The printer allows crisp printing in 24 bit brilliant color. The printer prints at a speed of 24 pages per minute in monochrome mode and 6 pages per minute in full color mode when printing A4 or Letter size paper in Landscape orientation. 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 3 emulations, producing nearly photographic quality. This mode is effective when printing photographic images.

Maintenance-Free & Economical Toner Cartridge

A toner cartridge can print up to 14,000 (Black) and 8,500 (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, bi-directional parallel interface, USB and Ethernet 10/100BaseTX.

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 Brother network board (NC-4100h) is factory installed in the HL-3450CN, which enables you to use this printer in the TCP/IP, IPS/SPX, Apple Talk, DLC/LLC, Banyan VINES, DEC LAT and NetBEUI environments. Also, many useful utilities, such as BRAdmin Professional for the administrator and Brother network printing software, are included in the CD-ROM supplied with the HL-3450CN printer. For setup, see the Network User's Guide.

Automatic Interface Selection

The printer can automatically select the bi-directional parallel, USB, or Ethernet 10/100 Base TX 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 language (PCL6® in monochrome mode), PostScript® 3 language emulation (Brother BR-Script 3) 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 66 scalable and 12 bitmapped fonts. The fonts that can be used will vary according to the selected emulation mode.

In PCL mode, you can also print the 13 kinds of bar codes listed below. In BR-Script mode, the printer has 165 scalable fonts.

< Bar Code Printing >

This printer can print the following 13 types of bar codes:

- Code 39
- Code 128
- Interleaved 2 of 5
- Codabar
- ISBN (EAN)
- ISBN (UPC-E)
- UPC-A
- UPC-E
- EAN-8
- EAN-13
- EAN-128
- FIM (US-PostNet)
- Post Net (US-PostNet)

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 save 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 new specification.

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. Data can be stored in an IDE HDD that can be optionally installed. It can be reprinted by selecting a document from the control panel or the browser. When the private print driver is selected, Secure Printing can be executed which allows you to print only when a password is entered.

Saving User Settings

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

***PANTONE® Calibrated**

There are many variables in process reproduction of colors generated by the HL-3450CN, any one of which may affect the quality of the PANTONE Color simulation, including;

- Type of paper used
- Type of toner used
- Effective final resolution
- Dot structure/halftones

For optimal results, it is recommended that the following materials and settings are used.

- 1) NEUSIEDLER color copy paper
- 2) Brother Toner Cartridges TN-02 BK/C/M/Y
- 3) 600 x 600 dpi resolution

2. PARTS NAMES & FUNCTIONS

<Front View>

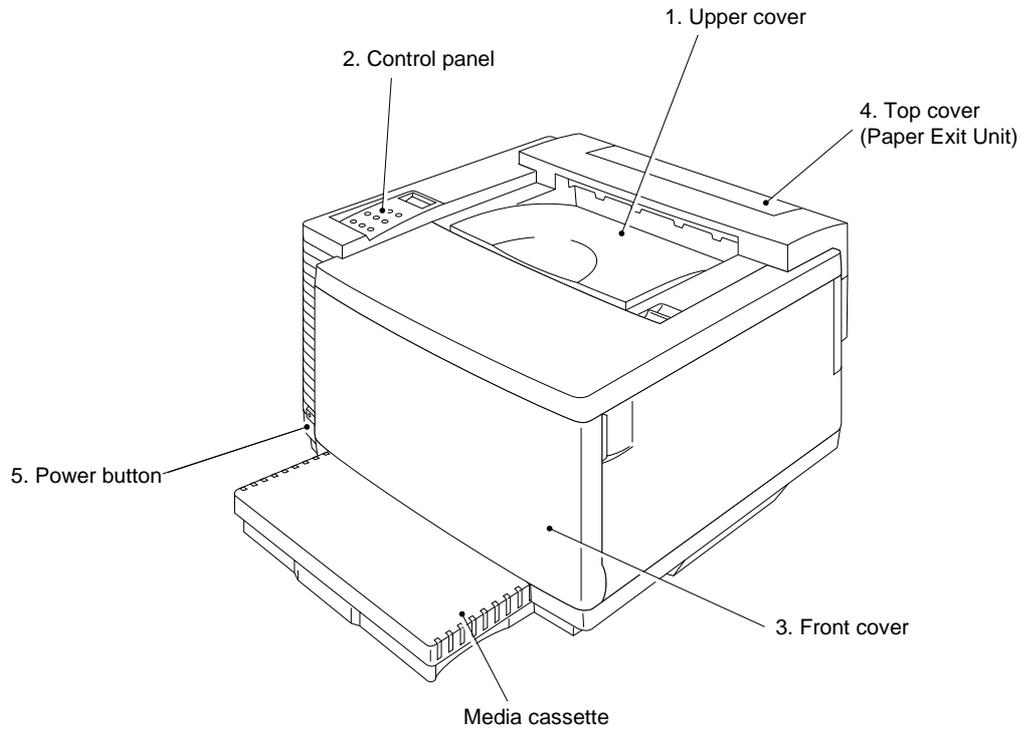


Fig. 1-1

<Rear View>

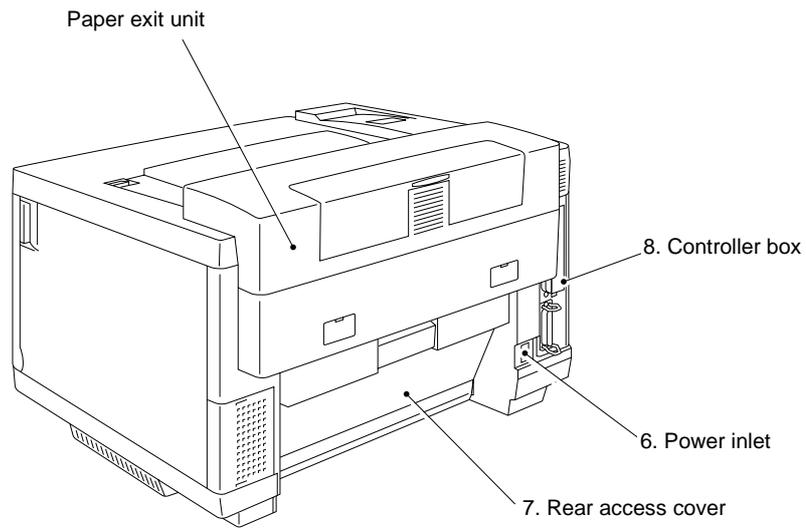


Fig. 1-2

No.	Part Name	Outline of Functions
1	Upper 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 operations and control the printer directly.
3	Front cover	To act as a front enclosure, opened when replacing a toner cartridge or waste toner pack.
4	Top cover (Paper exit unit)	To exit the printed paper onto the upper cover, acting also as part of the paper tray for printed paper. To be opened when replacing an OPC belt cartridge or Drum cleaner.
5	Power button	To operate power-on and off to the printer. (Push for On/Off operation)
6	Power inlet	To connect a power supply cable.
7	Rear access cover	To act as a rear enclosure, opened when clearing an internal jam or doing maintenance work.
8	Controller box	Space where the main (video controller) PCB is installed.

3. INTERNAL STRUCTURE

<Cross Sectional View >

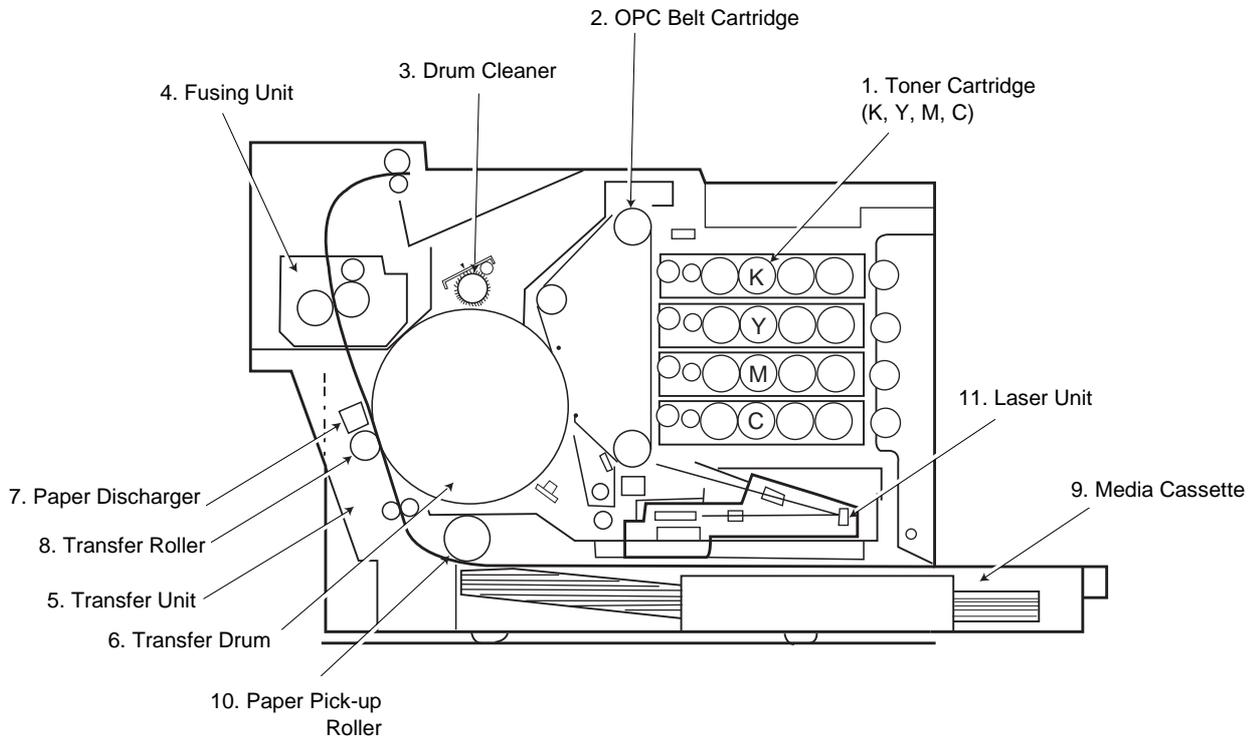


Fig. 1-3

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 OPC 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	Transfers 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 media cassette.
11	Laser Unit	Generates a modulated laser beam and scans the OPC belt to produce the image.

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 5 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 **Secure print**, **Back** and **Set** 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 labels or in the user's guide. Refer to CHAPTER 5 for detailed information.

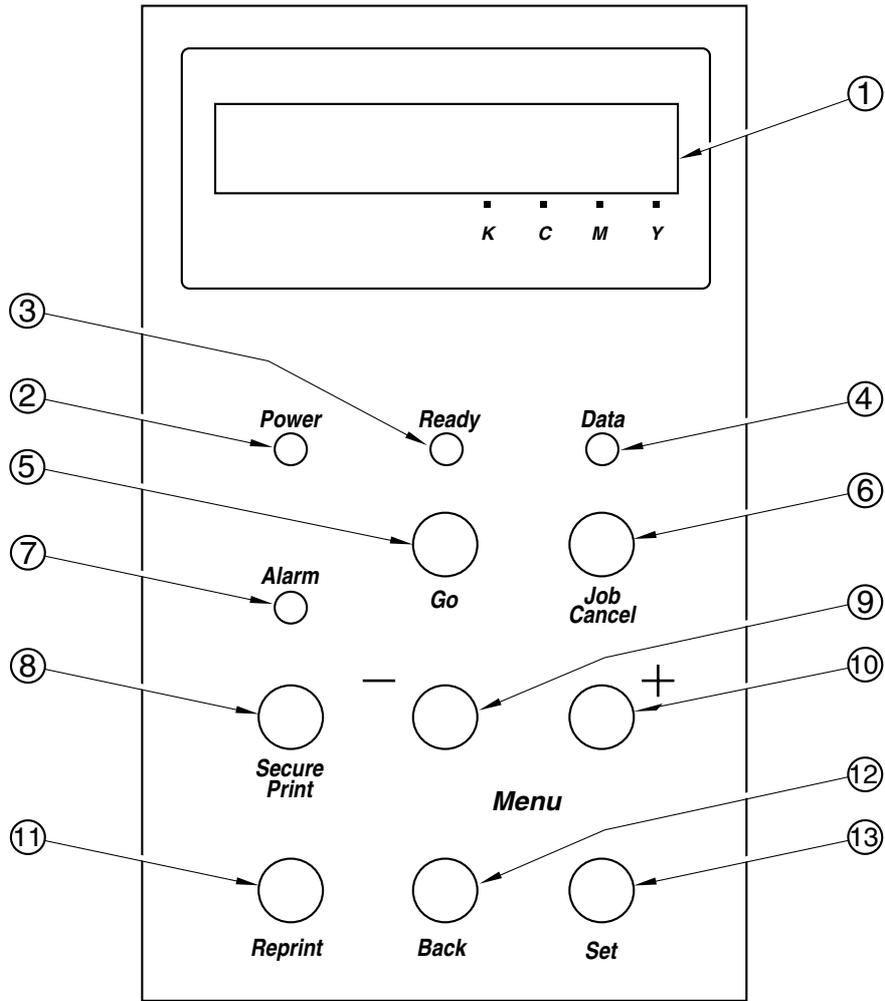


Fig. 1-4

No.	LED / Button Name
1	LCD: 16 character by 2 lines
2	Power LED
3	Ready LED
4	Data LED
5	Go button
6	Job Cancel button
7	Alarm LED
8	Secure Print button
9	- button
10	+ button
11	Reprint button
12	Back button
13	Set button

CHAPTER 2

SPECIFICATIONS

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CHAPTER 2 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	11	1
Europe	220 - 240	50/60	6	1 *

* For European models, 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)

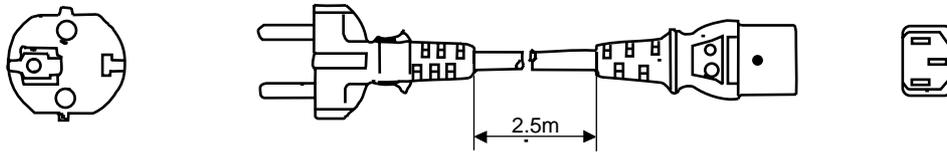
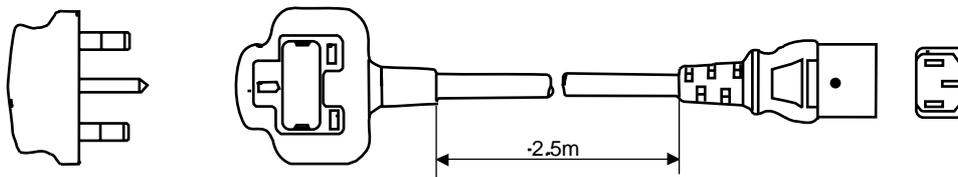


Figure B: For UK



NOTE:

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

** For rating labels, refer to ‘Safety Instruction’ on Page viii.

2. GENERAL SPECIFICATIONS

2.1. Printing

Print method	Electro photography by semiconductor laser beam scanning
Laser	Wavelength: 780nm Output: 5mW max.
Resolution	600 x 600 dots per inch (Fine) 2400 x 600 dots per inch (using HRC and CAPT) (The resolution can be enhanced to 2400dpi class by using Brother exclusive HRC (High Resolution Control) and CAPT (Color Advanced Photoscale Technology).)
Print speed	Monochrome mode: 24 page/minute Full color mode: 6 page/minute (when printing A4/Letter-size paper in Landscape orientation) Monochrome mode: 12 page/minute Full color mode: 3 page/minute (when printing A3/Ledger-size paper in Portrait orientation)
Warm-up	Max. 210 seconds at 20°C (68°F)
First print	Monochrome mode: 19 seconds or less Full color mode: 34 seconds or less (when loading A4/Letter-size plain paper in Landscape orientation by face down print delivery from standard upper cassette feed)
Print media	Toner in a single-color single-component cartridge. Life Expectancy: 14,000 single-sided pages/cartridge (Black) 8,500 single-sided pages/cartridge (C/M/Y) (when printing on A4/Letter-size paper with 5% coverage)
Resident printer fonts	<HP PCL, EPSON FX-850, and IBM Proprinter XL modes> 66 scalable fonts and 12 bitmapped fonts, 11 bar codes <BR-Script 3 mode> 165 scalable fonts

2.2. Functions

CPU	Toshiba TMPR4955-266 (TX4955-266MHz)
Emulation	Automatic emulation selection <ul style="list-style-type: none"> • HP Color Printer (PCL5C) including HP LaserJet 4+ (PCL5e) and HP LaserJet 5 (PCL6 monochrome) • BR-Script 3 (Adobe PostScript 3 compatible) • HP-GL • EPSON FX-850 • IBM Proprinter XL
Interface	Automatic interface selection among the bi-directional parallel, Universal Serial Bus (USB) and Ethernet 10/100 Base TX.
RAM	64 Mbytes (Expandable up to 384Mbytes with DIMMs) The standard memory fitted can vary depending on the printer model and country.
HDD option	2.5 inch IDE HDD
Compact Flash	1 card slot: Compact Flash Type II
Control panel	8 buttons, 4 LEDs and a 16-column x 2 lines liquid crystal display
Diagnostics	Self-diagnostic program