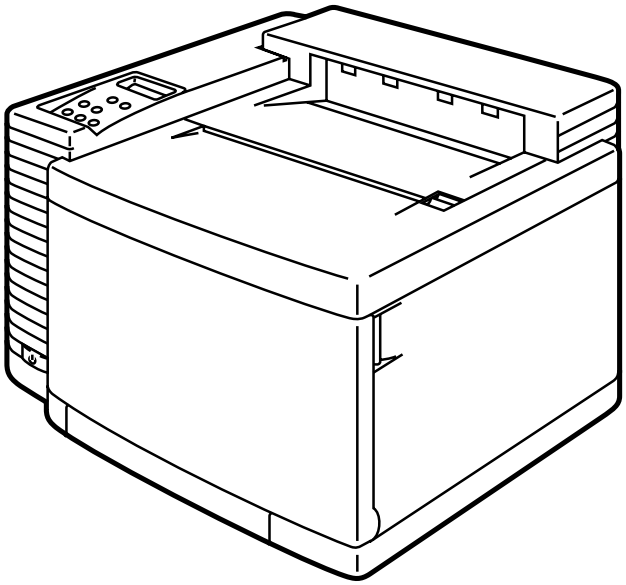
Brother Color Laser Printer

HL-2400C series

USER'S GUIDE



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

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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	1-877-284-3238	(outside California)
	949-859-9700 Ext. 329	(within California)
In CANADA	1-800-853-6660	
	514-685-6464	(within Montreal)

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

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

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

In USA	1-888-298-3616
In CANADA	1-514-685-2040

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

Fax-Back System
Brother Customer Service has installed an easy to use Fax-Back System so you can get instant answers to common technical questions and product information for all Brother products. This is available 24 hours a day, 7 days a week. You can use the system to send the information to any fax machine, not just the one you are calling from.
Please call 1-800-521-2846 (USA) or 1-800-681-9838 (Canada) and follow the voice prompts to receive faxed instructions on how to use the system and your index of Fax-Back subjects.

DEALERS/SERVICE CENTERS (USA only)
For the name of an authorized dealer or service center, call 1-800-284-4357.

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

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

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 .

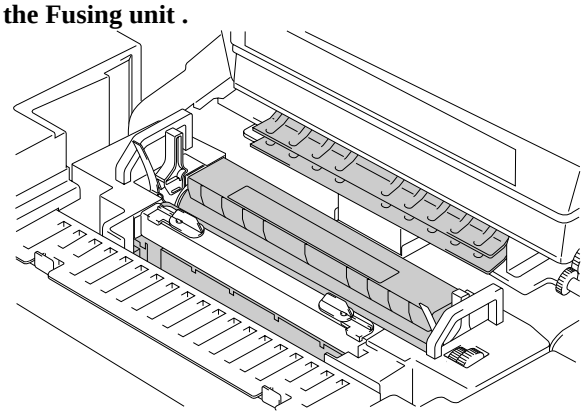

Fig. 0-1 Fusing unit

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.

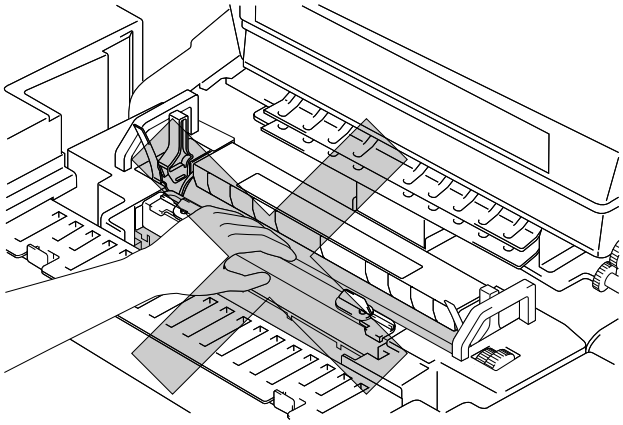

Fig. 0-2 Fusing unit Rollers

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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:

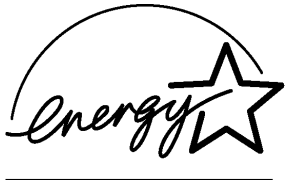
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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 la 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)

Lpa < 70 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:	±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.

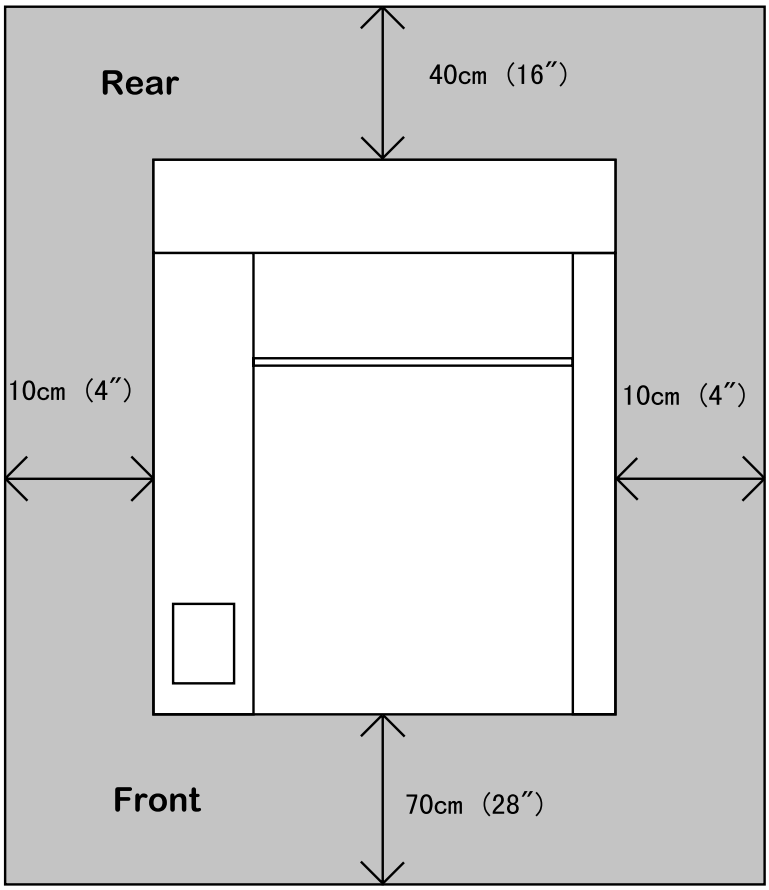


Fig. 1-1 Suitable Spacing around the Printer

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.

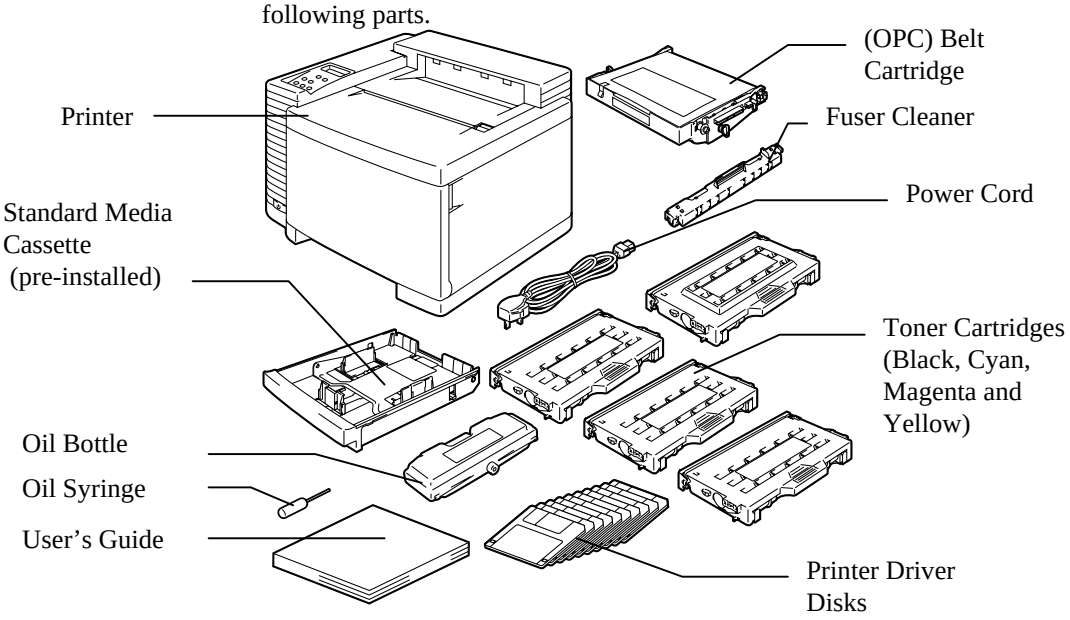


Fig. 2-1 Components in the Printer Carton

> **❗ 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 theHL-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

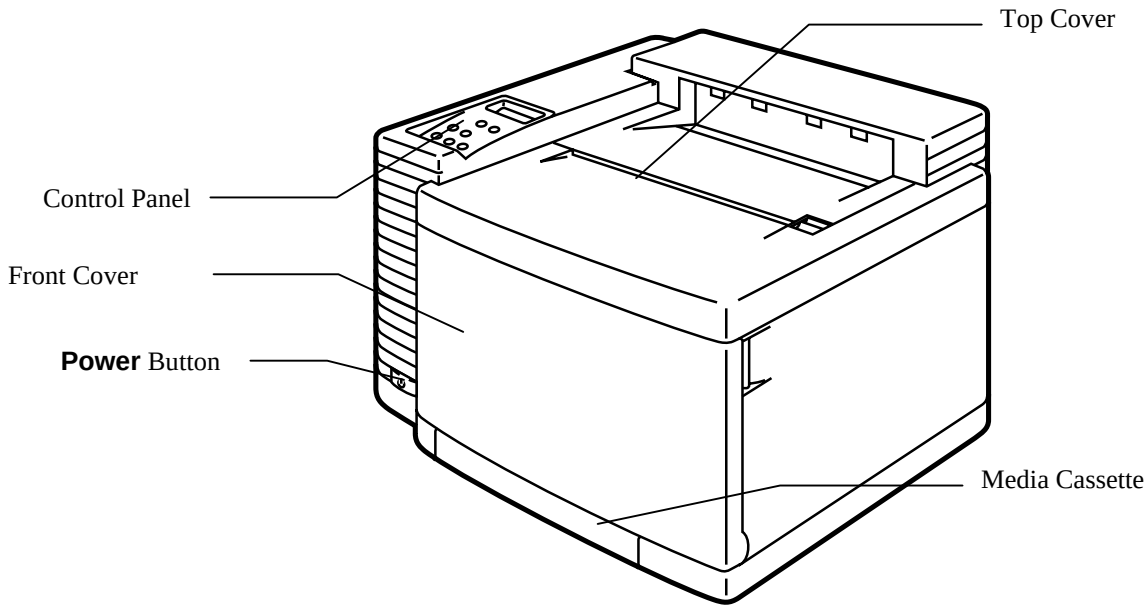


Fig. 2-2 Front View

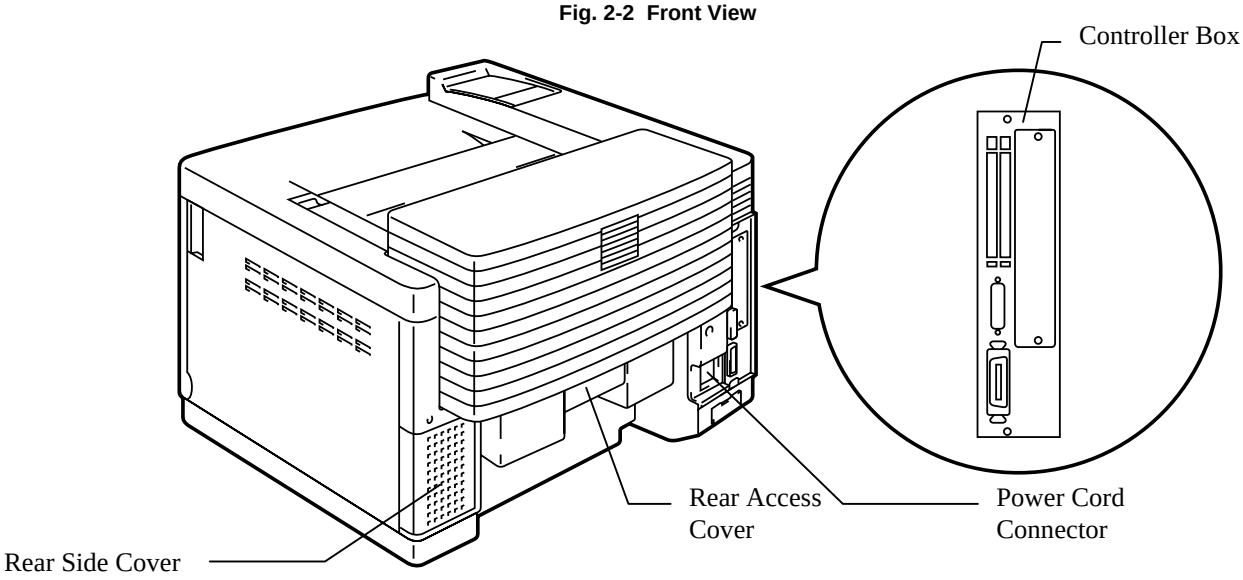


Fig. 2-3 Rear View

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.

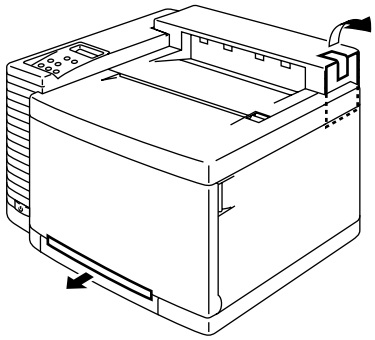


Fig. 2-4 Removing the Protective Parts

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.

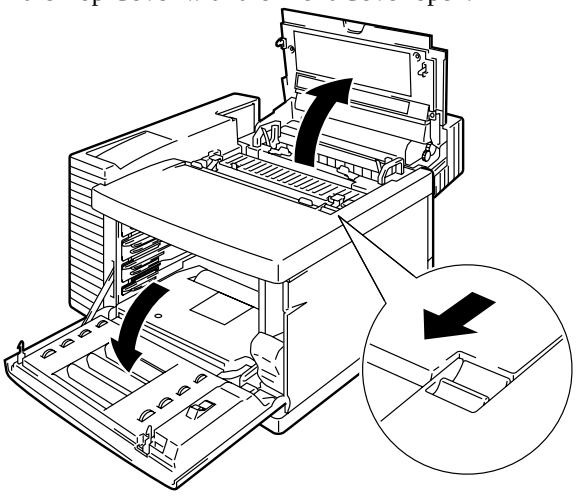


Fig. 2-5 Open the Covers

2. Release both green Belt Cartridge Lock Levers by pulling them toward you.

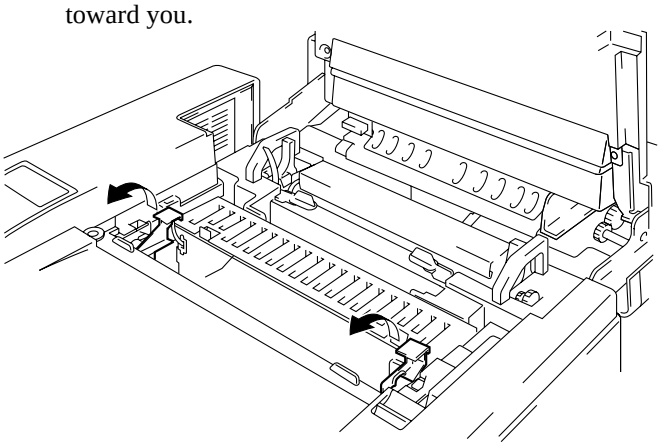


Fig. 2-6 Release the Levers

3. Remove the orange (OPC) Belt Tension Release Pins.

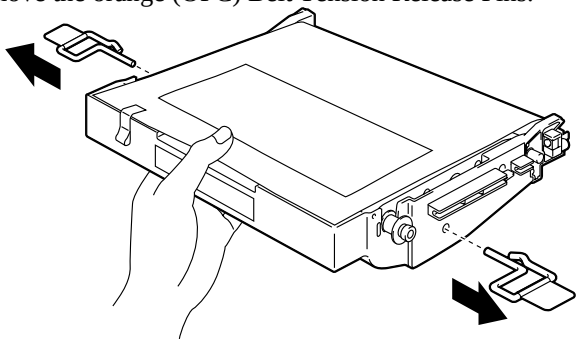


Fig. 2-7 Remove the Pins

4. Remove the Protective Sheet from the (OPC) Belt Cartridge.

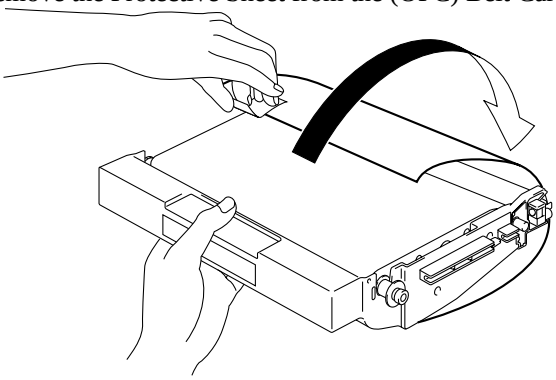


Fig. 2-8 Remove the Protective Sheet

5. Insert the (OPC) Belt cartridge into the printer along the guide with the flat side facing toward you.

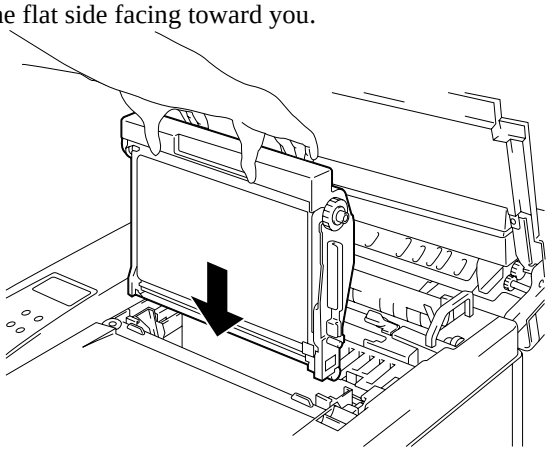


Fig. 2-9 Insert the (OPC) Belt Cartridge

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.

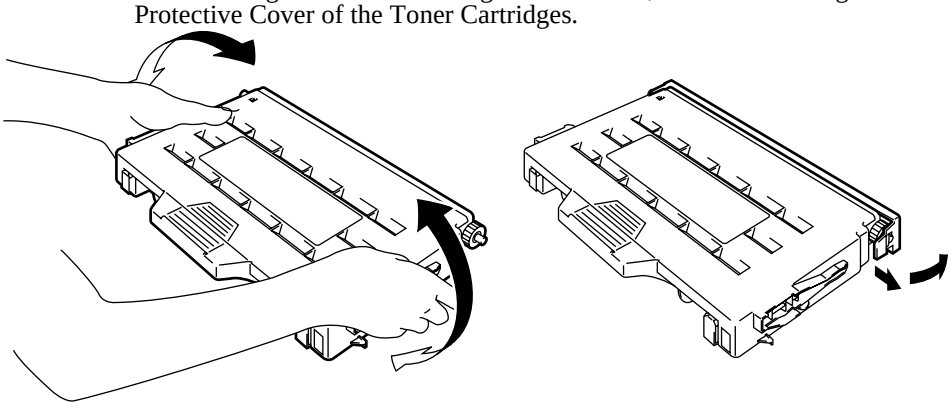


Fig. 2-10 Removing the Protective Cover

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.

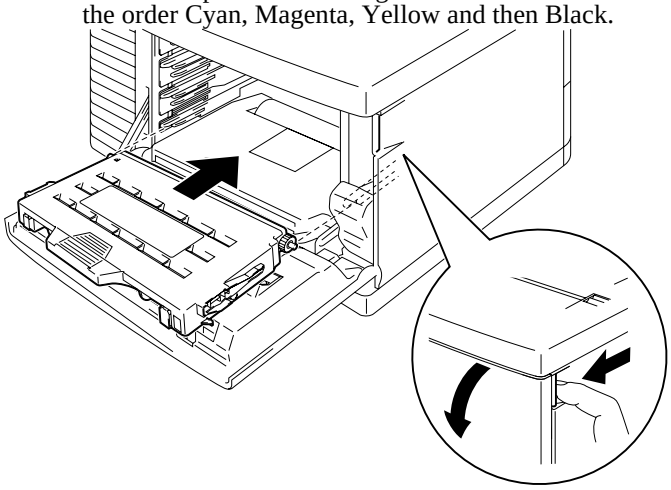


Fig. 2-11 Install the Toner Cartridges

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.

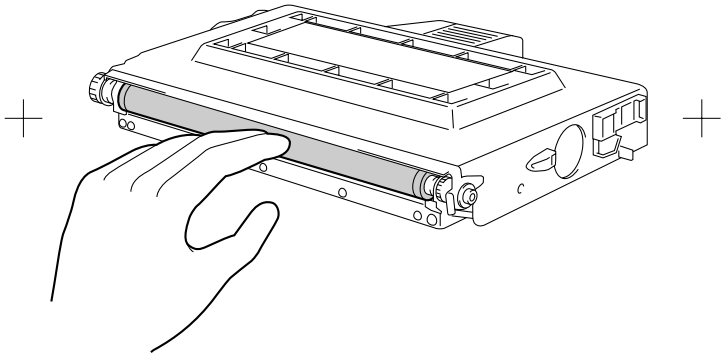


Fig. 2-12 Toner Cartridge

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.

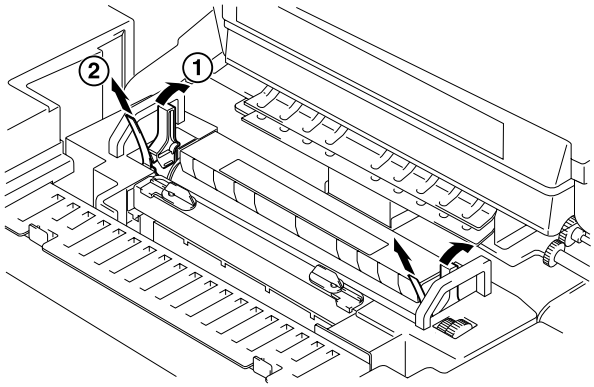


Fig. 2-13 Remove the Protective Parts

2. Install the Oil Bottle into the Fusing Unit with the label side facing the front of the printer.

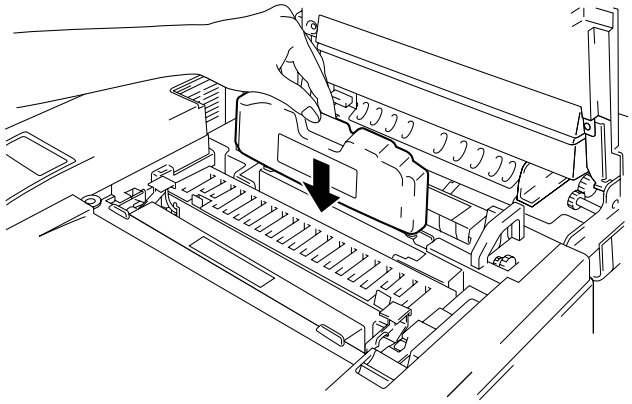


Fig. 2-14 Install the Oil Bottle

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.

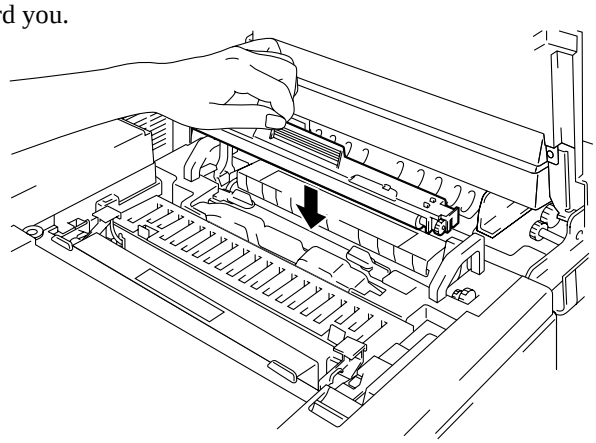


Fig. 2-15 Install the Fuser Cleaner

4. Lock the Oil Bottle and the Fuser Cleaner with the Oil Bottle Lock Levers.

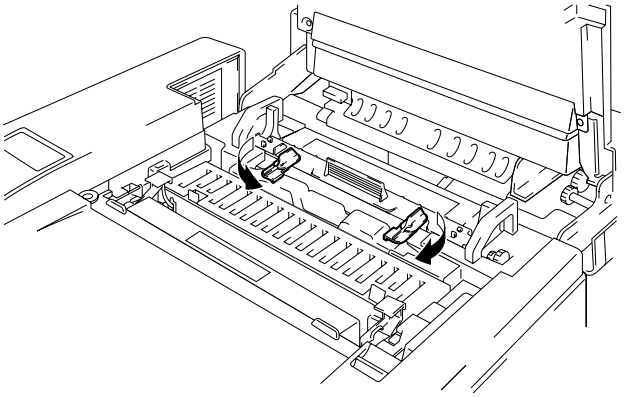


Fig. 2-16 Lock the Oil Bottle Lock Levers

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.

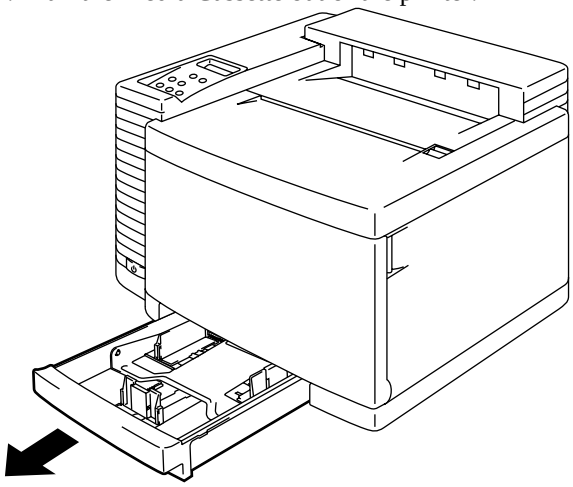


Fig. 2-17 Removing the Media Cassette

2. Adjust the Paper Guides according to the paper size you want to load. Hold the shaded parts below and move the guides.

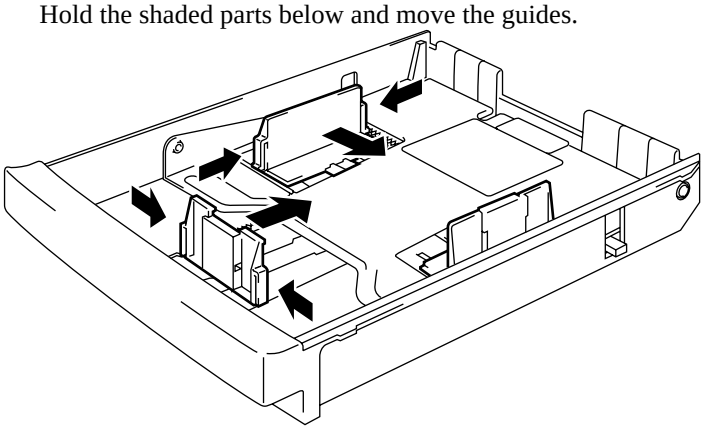


Fig. 2-18 Adjust the Paper Guides

3. Load paper into the Media Cassette.

Note

Do not load more than 250 sheets of paper (75 g/m^{2}or 20 lbs.) in the cassette, or paper jams may occur. Paper (75 g/m^2 or 20 lbs.) should be loaded up to the lines on the sliding guide.

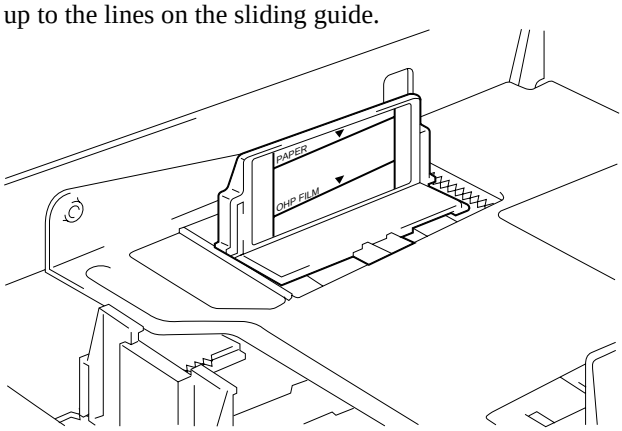


Fig. 2-19 Paper Lines

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.

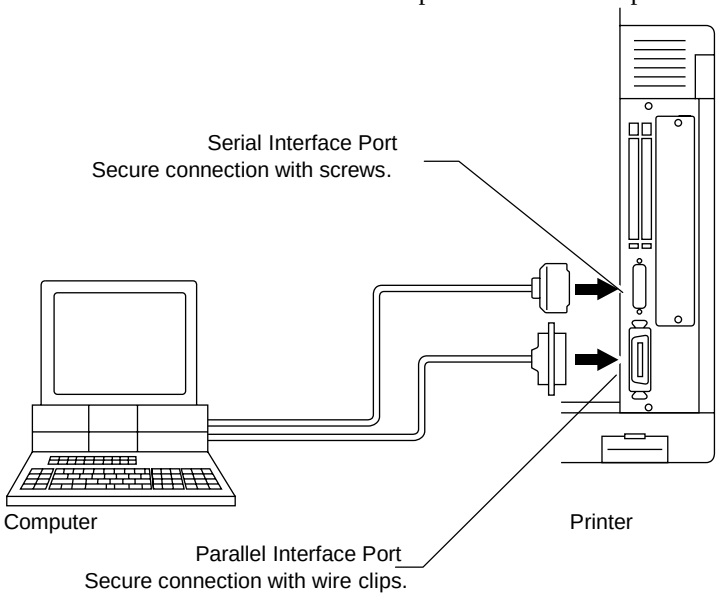


Fig. 2-20 Connecting the Printer and Computer

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.

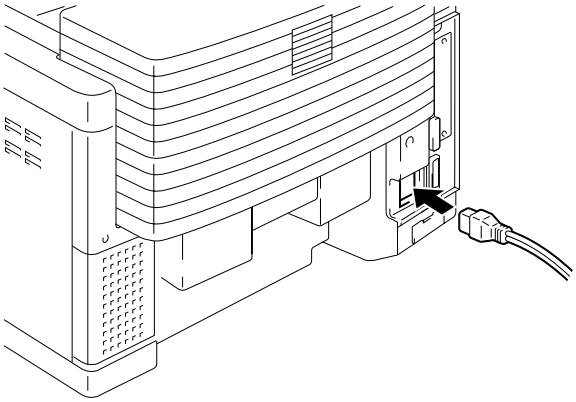


Fig. 2-21 Plugging in the Power Cord

3. Turn the printer on by pressing the **Power** Button.

Caution

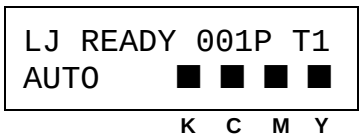
- Check the AC voltage. This printer should be operated at the specified voltage and frequency.
  - USA and Canada: AC 120 V, 50/60 Hz
  - Europe, Australia and others: AC 220 to 240 V, 50/60 Hz
- Since this printer must be electrically grounded, the power cord should be connected to a grounded AC outlet.
- 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.



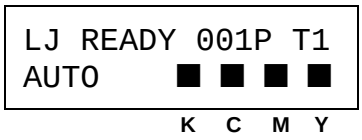
AUTO:	The auto emulation selection mode is set.
LJ :	The auto emulation selection is set and currently the HP PCL5C emulation is selected.
READY :	The printer is ready to print.
001 :	The number of copies to print is set to 1.
P :	Portrait print is selected.
T1 :	Paper is fed from Tray1.
■ :	Toner cartridges 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 **Set** 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

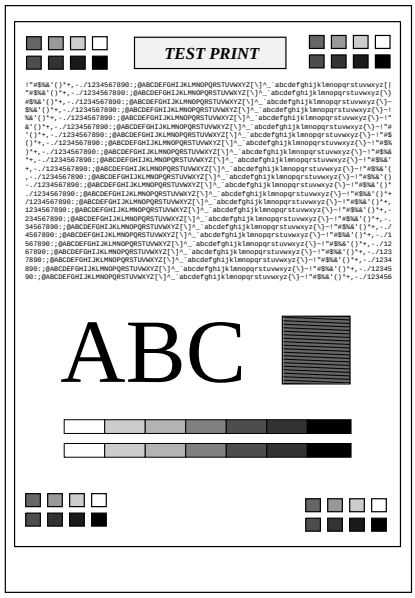
To exit from the test mode, select "exit".

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.

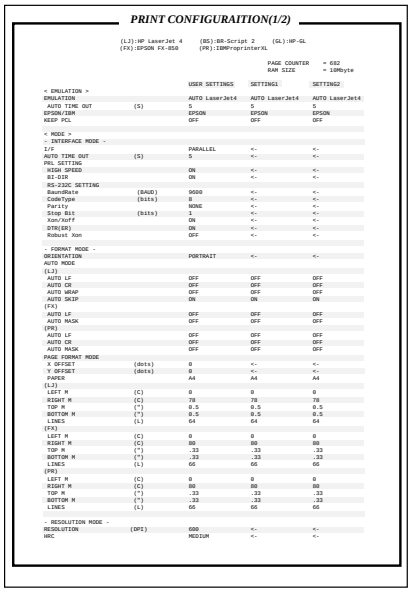
- If the optional font cartridge/card is installed, you can print out a list of optional fonts. Since the list shows the ID numbers specific to each optional font, it helps you to select them with the **Font** button. For further information, see "FONT Button" in Chapter 4.
- If user-defined characters 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.

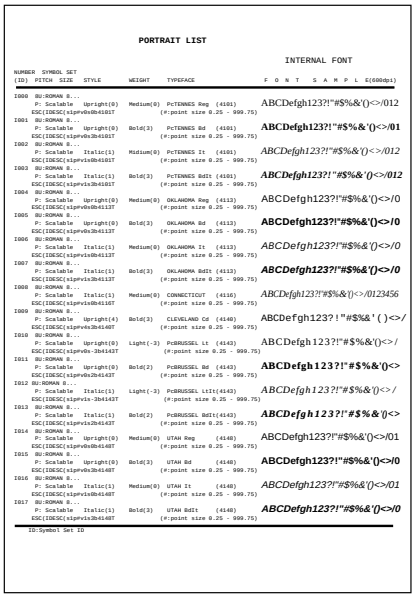
   The printer starts printing the selected test pattern or list. When the printer finishes printing, it automatically exits to the off-line state.



TEST PRINT



PRINT CONFIG



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

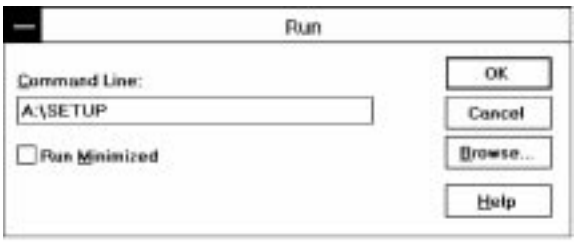
1. Insert the supplied disk for Windows into your floppy disk drive.
2. Click the "START" button and select "Setting".
3. Select "Printers" and double click "Add Printer".
4. Follow the instructions in Windows 95/98.
5. Click "Have Disk". Then browse and select "Brother HL-2400C series".
6. Follow the 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.

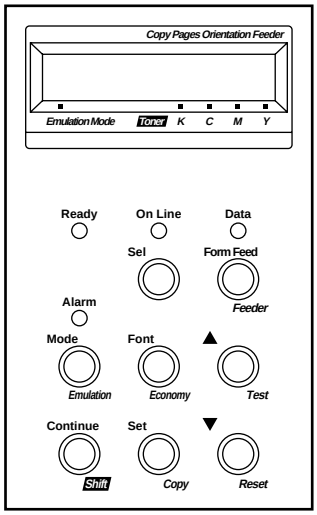
   An asterisk (*) appears at the end of the display for a short time, and then the printer automatically returns to the on-line state with the selected language message on the display.

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/m^2 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/m^2 (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/m^2 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/m^2 (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 (µ/m)	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.

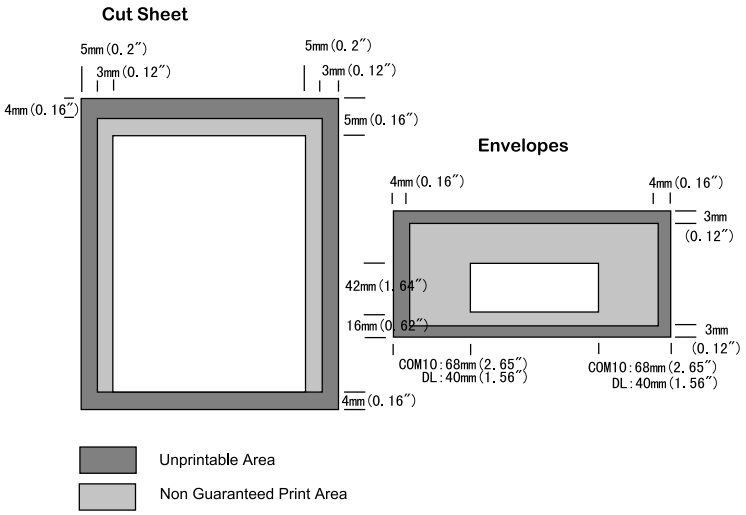


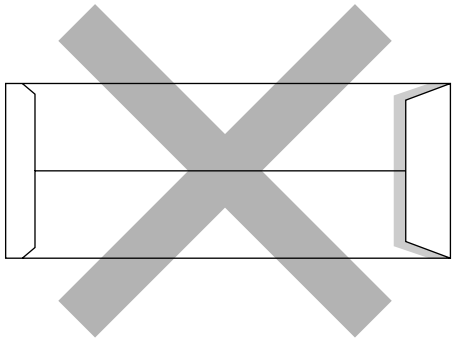
Fig. 3-2 Printable Area and Non Guaranteed Print Area

> **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.

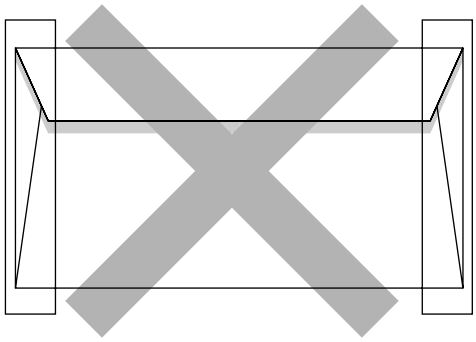
Using Envelopes

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

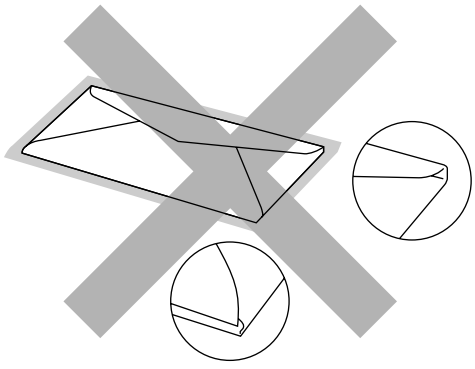


Fig. 3-3 Envelope Information

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.

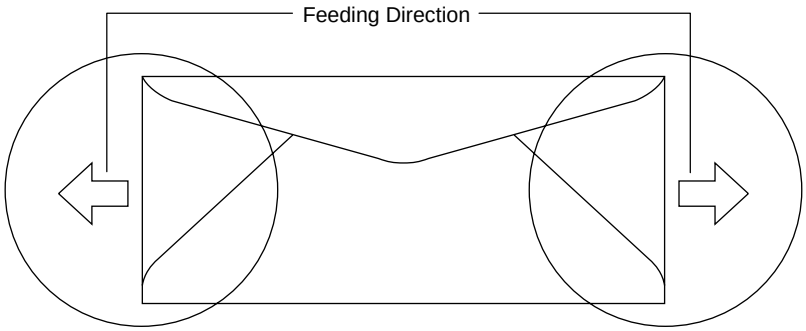


Fig. 3-4 Envelopes

- 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.

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.

Note
- Print quality might be affected by the type of paper you use and the print image.
- You may experience poor paper feeding during Duplex printing.
- This machine is not designed for continuous Duplex printing.
- When you do manual duplex printing, if you leave the printer for more than 5 minutes after you finished printing the first side, the printer will reset the function automatically.

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.

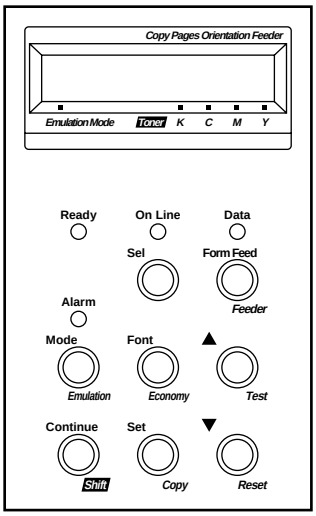


Fig. 4-1 Display and LEDs

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.

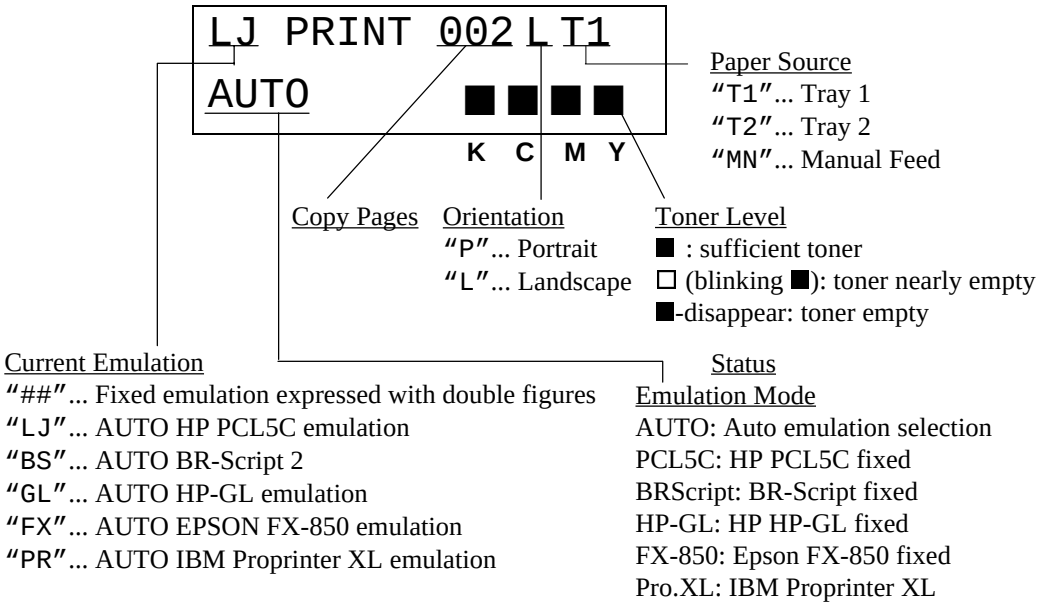


Fig. 4-2 Display

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 it's 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.

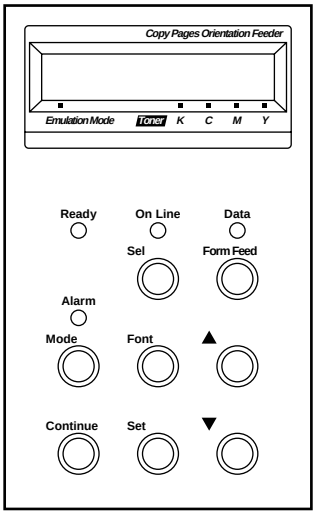


Fig. 4-3 Buttons in NORMAL Mode

> **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 **Set** 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

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 MODE	AUTO LF=OFF	ON … LF + CR OFF … CR only
		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
		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
	PAGE FORMAT MODE	PAPER =LETTER (For 120V model) PAPER =A4 (For 220/240V model)	LETTER, LEGAL, A4, A5, B5, EXECUTIVE, JIS B5, 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)	When the commercial flash memory card or the HDD card has not been formatted:		
(HP mode only) CARD1 CARD2 exit	FORMAT CARD		Format the flash memory card or the HDD card.
	exit		Exit to CARD OPERATION CARD 1(2)

Mode Menu (Continued)	Setting Menu	Sub-Setting Menu	Setting
CARD OPERATION CARD1(2) (HP mode only)	When the commercial flash memory card or the HDD card has been formatted:		
	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) PAPER=A4 (For 220/240V model)	LETTER, LEGAL, A4, A5, B5, 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 CARD1 (2)	When the commercial flash memory card or the HDD card has not been formatted:		
CARD1 CARD2 exit	FORMAT CARD		Format the flash memory card or the HDD card.
	exit		Exit to CARD OPERATION CARD 1 (2)
CARD OPERATION CARD1 (2)	When the commercial flash memory card or the HDD card has been formatted:		
CARD1	EXECUTE DATA		Execute the data on the card.
CARD2		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

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	ON or OFF
	CONTINUE MODE	CONTINUE=MANUAL	AUTO or MANUAL
	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= 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=Scipt 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 setsin 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

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.
O : The auto modes can be set.
X : 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	O **OFF**	O **OFF**	O **OFF**
AUTO CR	O **OFF**	X **ON**	O **OFF** (Note)
AUTO WRAP	O **OFF**	X **ON**	X **ON**
AUTO SKIP	O **ON**	—	—
AUTO MASK	—	O **OFF**	O **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

	Orientation	
Size	Portrait	Landscape
Letter	**60 lines**	**45 lines**
A4	**64 lines**	**43 lines**
Legal	**78 lines**	**45 lines**

In Non-HP Modes

	Orientation	
Size	Portrait	Landscape
Letter	**62 lines**	**47 lines**
A4	**66 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:

	Resolution Setting in Resolution Mode	
Print Jobs	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 CAPTs 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.

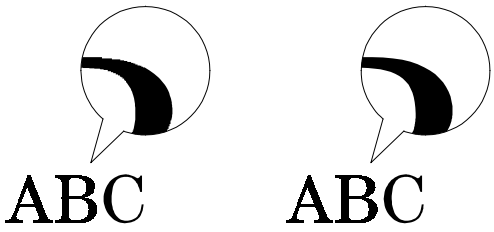


Fig. 4-5 High Resolution Control

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.

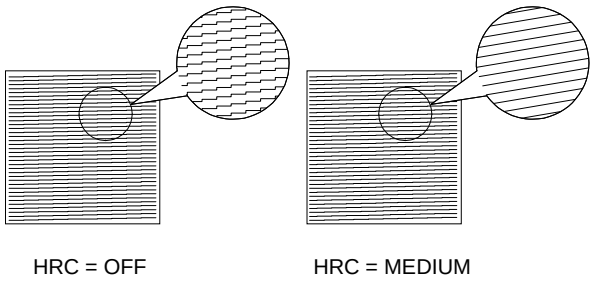


Fig. 4-6 High Resolution Control in Test Printout

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 . . WAIT TIME=99s	Set the wait time for the auto form feed. The printer automatically prints out the remaining data after the set wait time. 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 squaes	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, "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.

```
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.

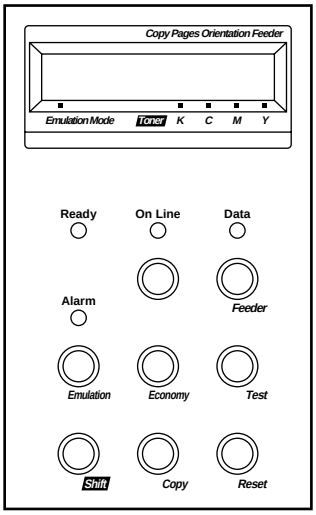


Fig. 4-8 Buttons in SHIFT Mode

> **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)

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	WAIT TIME= 5s
		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

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.

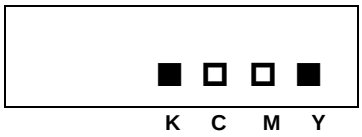
Toner Cartridges

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.

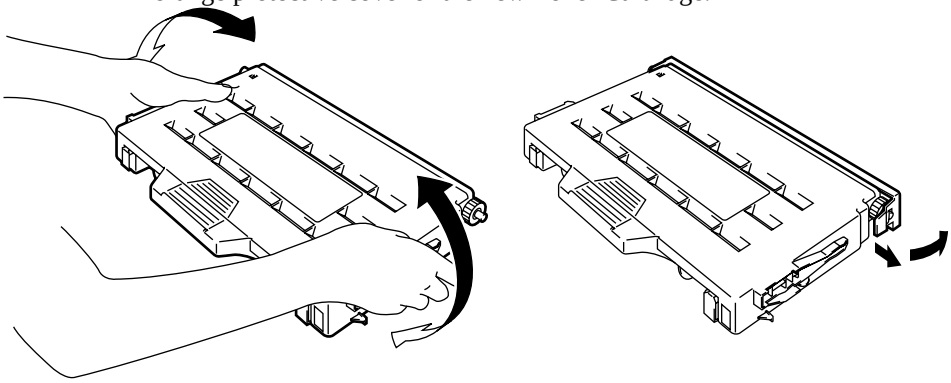


Fig. 5-1 Remove the Protective Cover

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 cartidges immediately after you remove the protective part. Do not touch the shaded part.

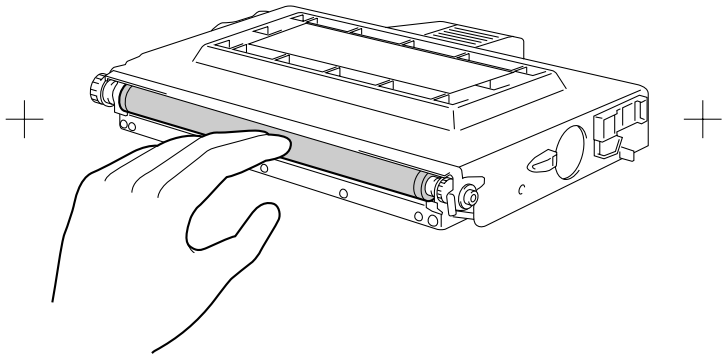


Fig. 5-2 Toner Cartridges

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.

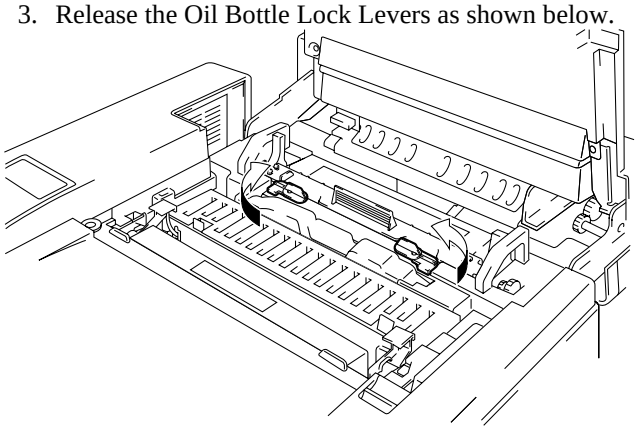


Fig. 5-3 Release the Oil Bottle Lock Levers

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.

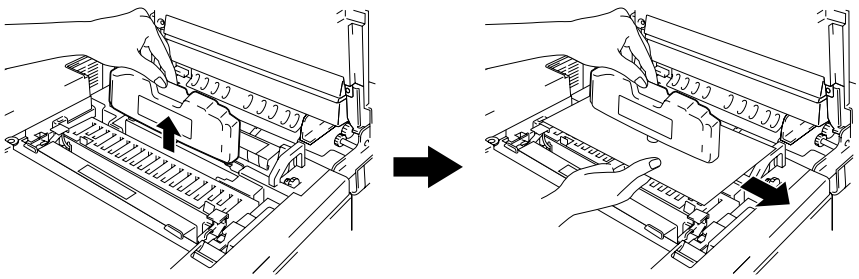


Fig. 5-4 Take the Oil Bottle out

5. Install the new Oil Bottle onto the Fusing unit with the label side facing the front of the printer.

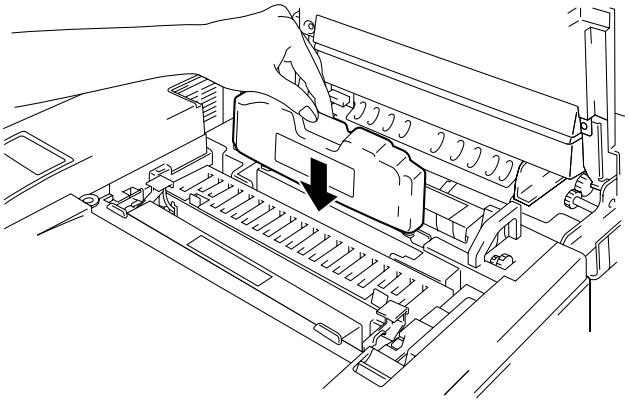


Fig. 5-5 Install the Oil Bottle

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.

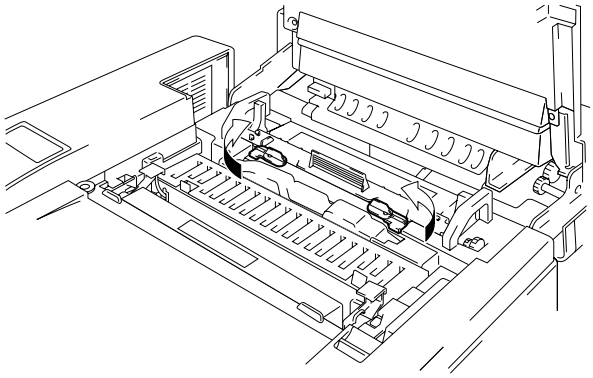


Fig. 5-6 Release the Levers

4. Take the Fuser Cleaner out of the Fusing unit by holding the knob of the Fuser Cleaner.

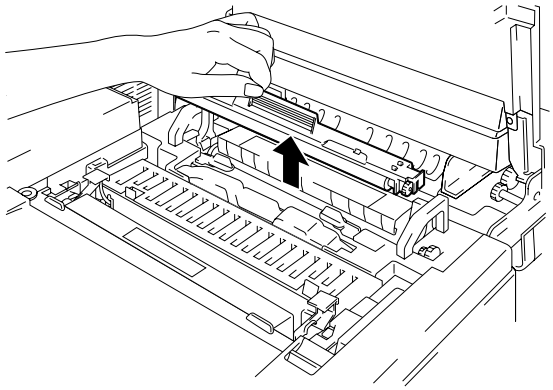


Fig. 5-7 Take the Fuser Cleaner out

5. Install the new Fuser Cleaner into the guide with the roller side facing toward you.

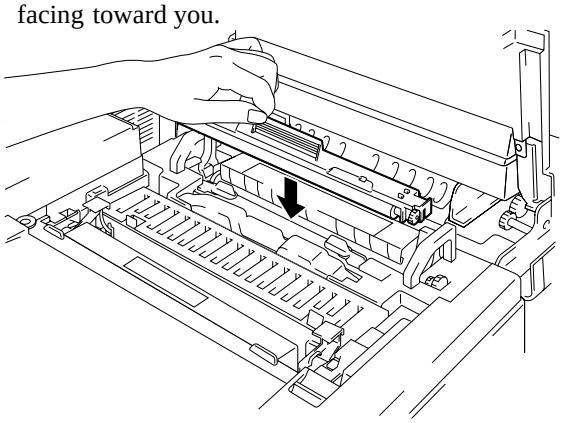


Fig. 5-8 Install the Fuser Cleaner

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 12,000 pages you print, you need to change the Waste Toner Pack.

Waste Toner Pack Full Message

When the West 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.

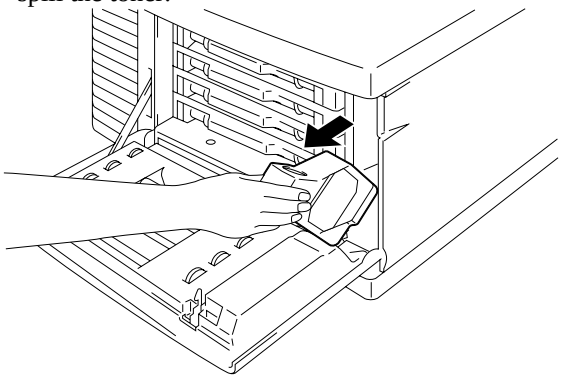


Fig. 5-9 Take the Waste Toner Pack out

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.

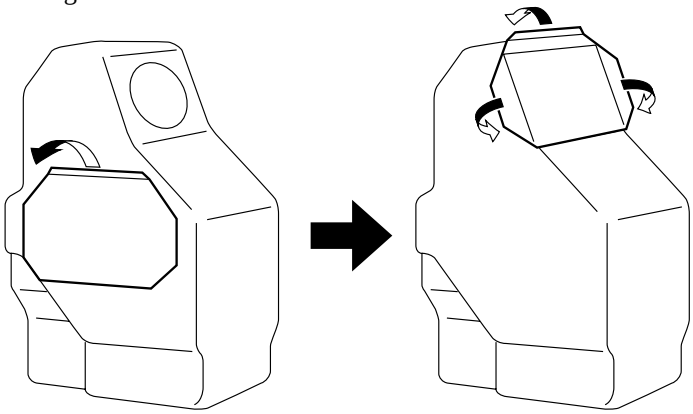


Fig. 5-10 Seal the Sealing Sticker

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.

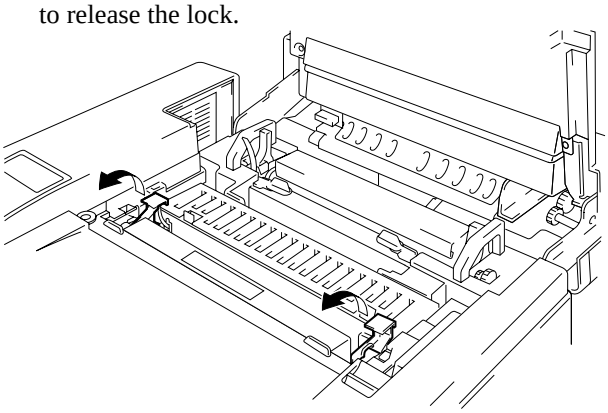


Fig. 5-11 Release the Belt Cartridge Lock Levers

4. Take the (OPC) Belt Cartridge out of the printer.

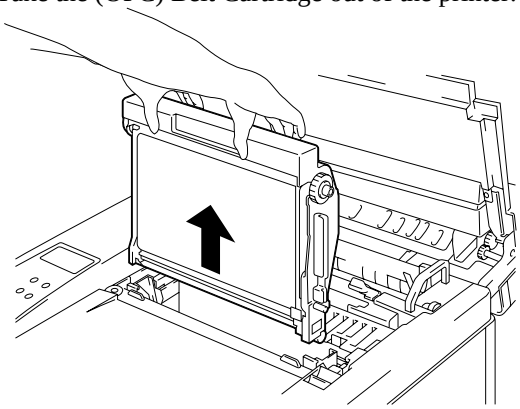


Fig. 5-12 Take the (OPC) Belt Cartridge out

5. Remove the Tension Release Pins from the new (OPC) Belt Cartridge.

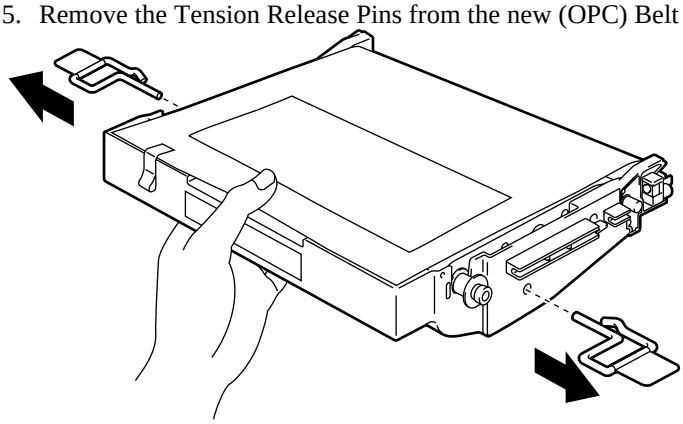


Fig. 5-13 Remove the Tension Release Pins

6. Remove the protective sheet of the new (OPC) Belt Cartridge. Do not touch the green part of the (OPC) Belt Cartridge.

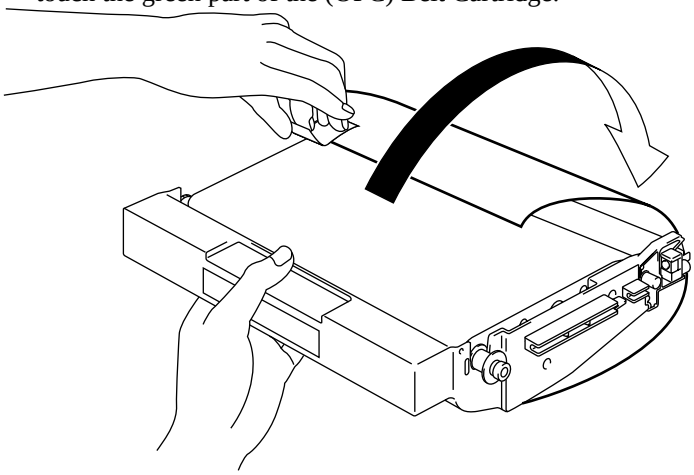


Fig. 5-14 Remove the Protective Sheet

7. Insert the new Belt Cartridge into the printer along the guide with the flat side facing toward you.

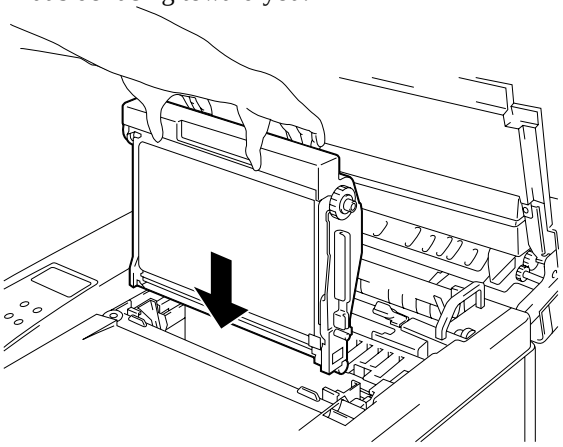


Fig. 5-15 Insert the new Belt Cartridge

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.

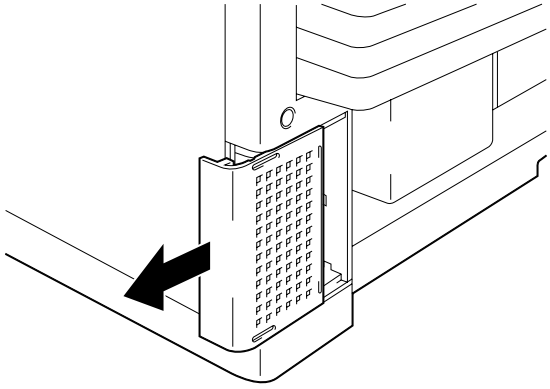


Fig. 5-16 Take the Ozone Filter Case out

2. Remove the Ozone Filter Case from the Ozone Filter Cover.

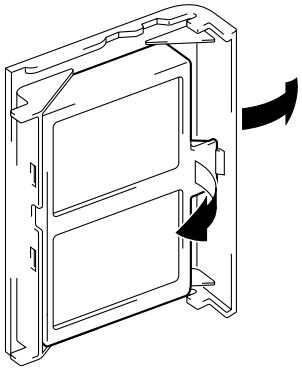


Fig. 5-17 Remove the Ozone Filter

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.

Caution

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

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.

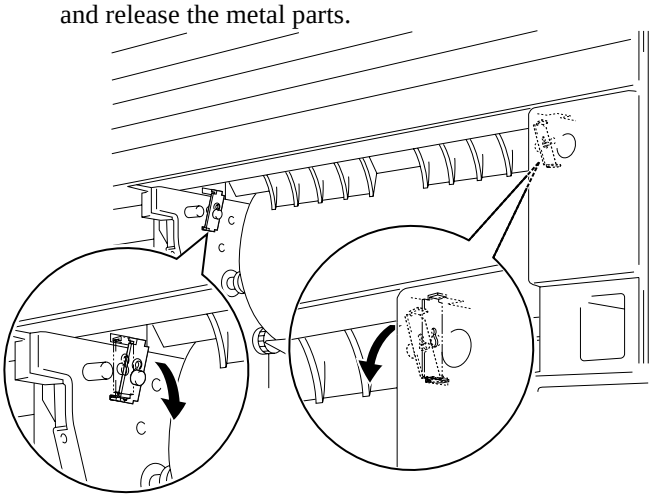


Fig. 5-18 Unscrew and release the Metal Parts

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.

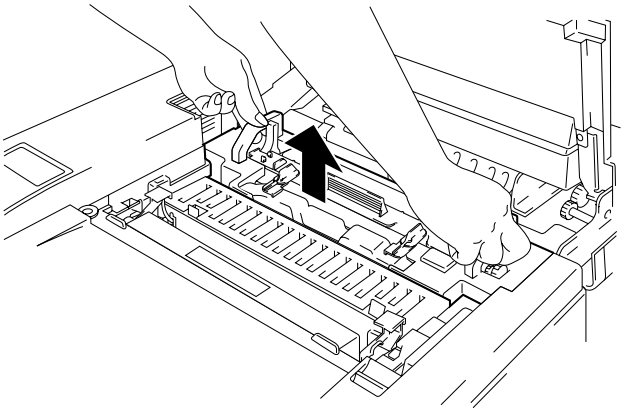


Fig. 5-19 Take out the Fusing Unit from the Printer

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.

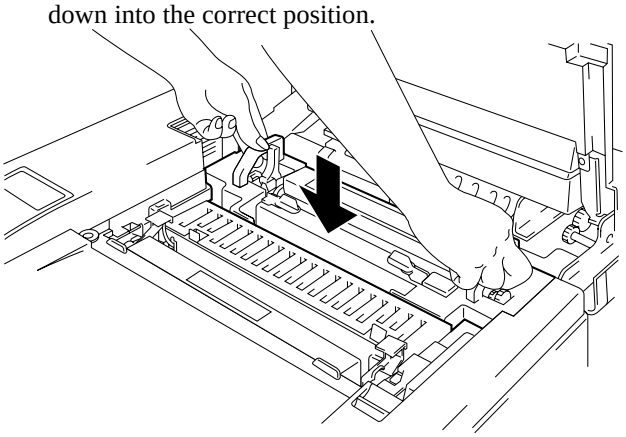


Fig. 5-20 Installing the New Fusing unit

7. Fit the metal parts and secure with the two screws.

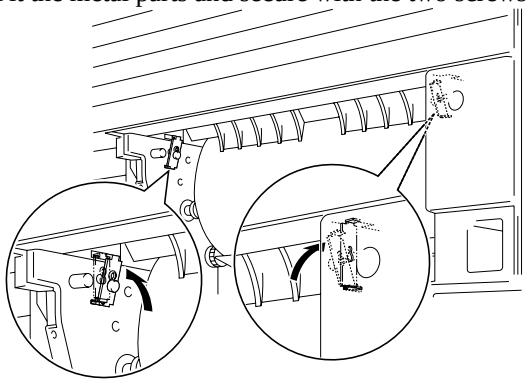


Fig. 5-21 Secure the Metal Parts

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.

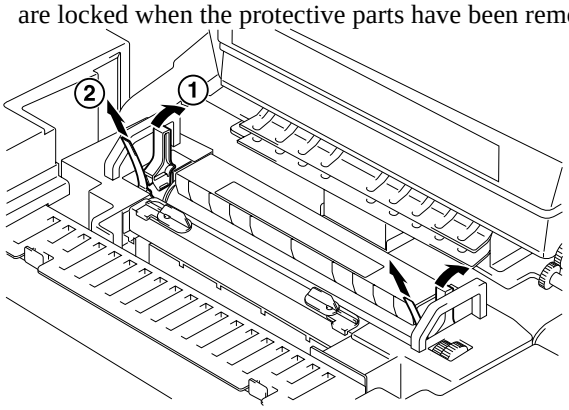


Fig. 5-22 Removing the Protective Parts

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.

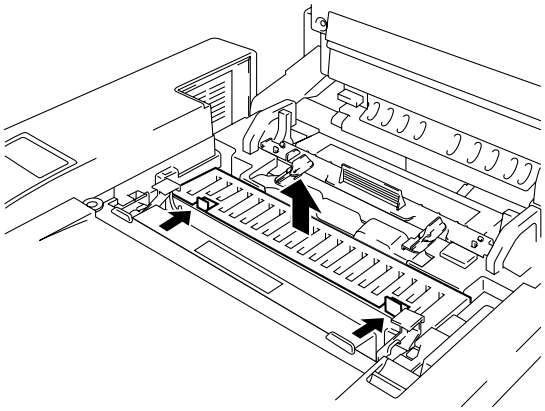


Fig. 5-23 Open the Covers

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.

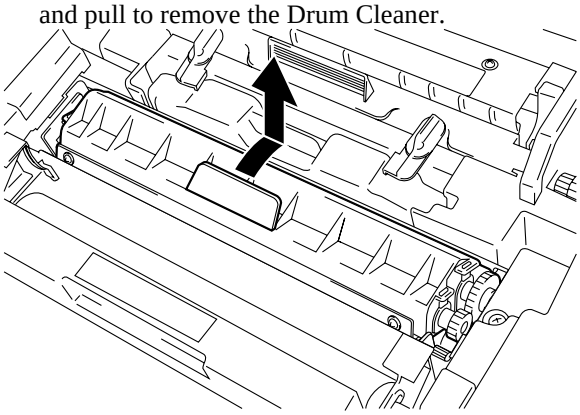


Fig. 5-24 Take the Drum Cleaner out

5. Install the new Drum Cleaner into the printer by adjusting the guides and pushing till it clicks.

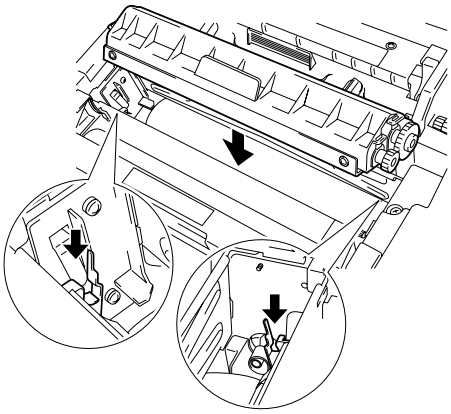


Fig. 5-25 Install the New Drum Cleaner

6. Refit the Drum Cover and close the Top Cover.

Paper Discharger

Caution

Do not touch the charging wire.

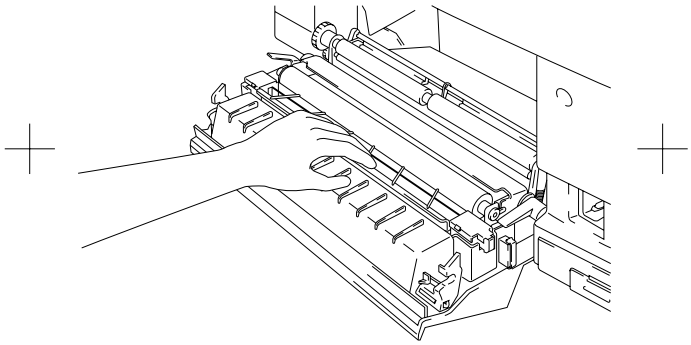


Fig. 5-26 Charging Wire

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.

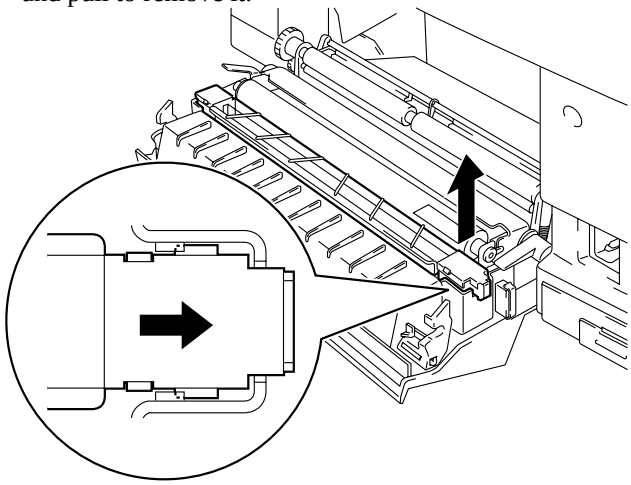


Fig. 5-27 Remove the Paper Discharger

3. Install the new Paper Discharger into theTransfer Unit.

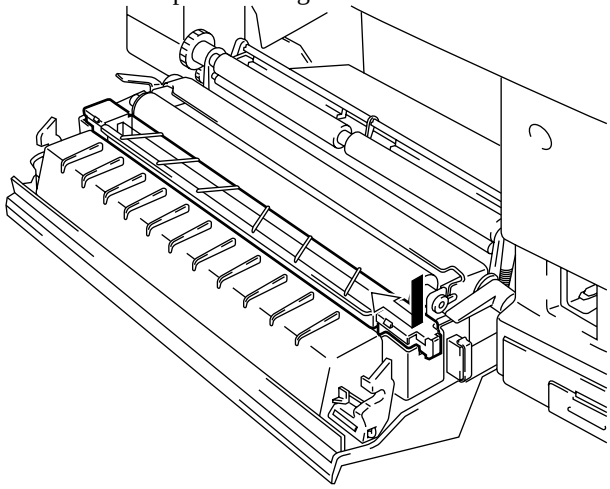


Fig. 5-28 Install the Paper Discharger

Replacing the Transfer Roller

1. Release the green Transfer Roller Lock Lever. Lift the Lever to release the Transfer roller.

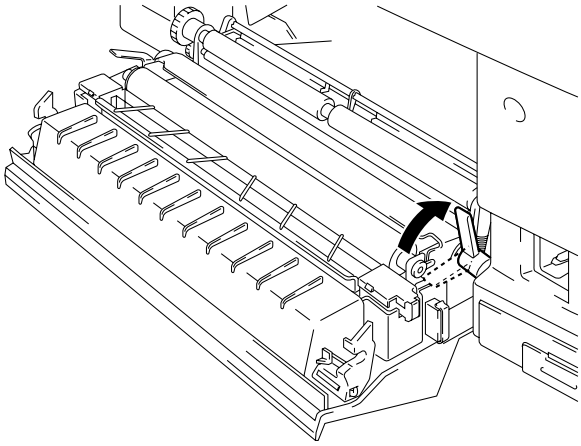


Fig. 5-29 Release the Lock Lever

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.

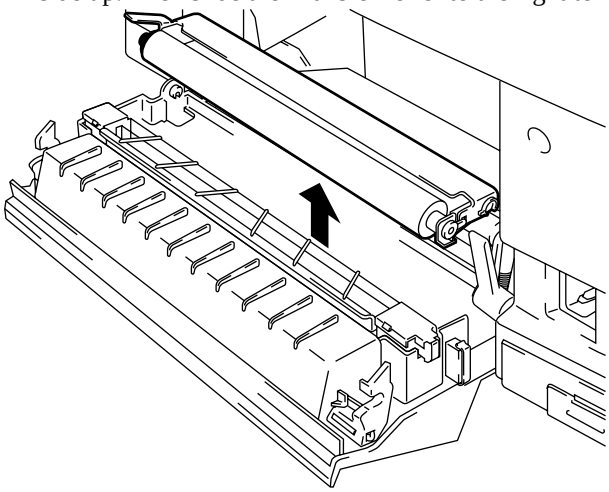


Fig. 5-30 Take the Transfer Roller out

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.

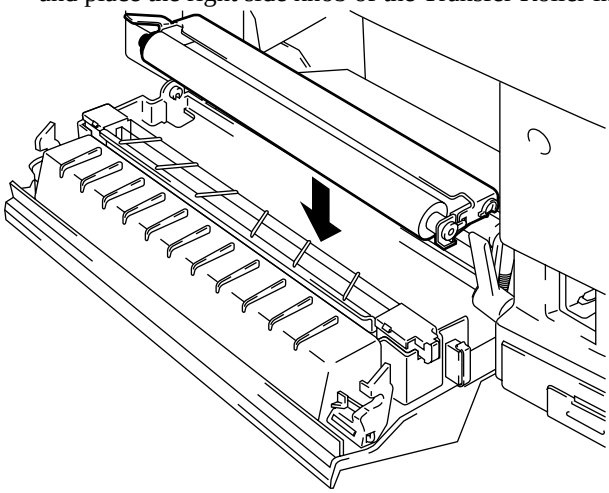


Fig. 5-31 Install the Transfer Roller

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 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.

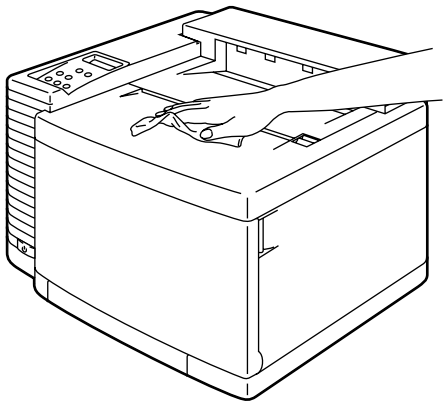


Fig. 5-32 Cleaning the Printer Exterior

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.

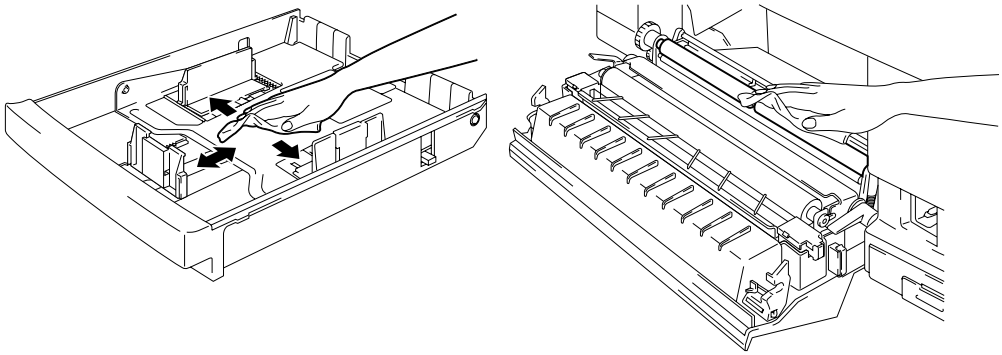


Fig. 5-33-1 Paper Guide and Registration Roller

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.

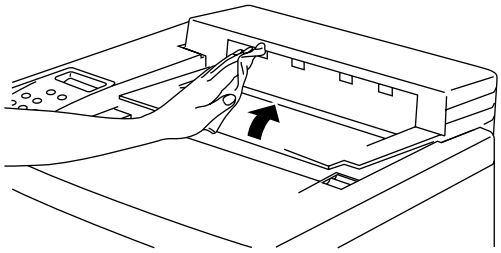


Fig. 5-33-2 Top cover and Exit Roller

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.

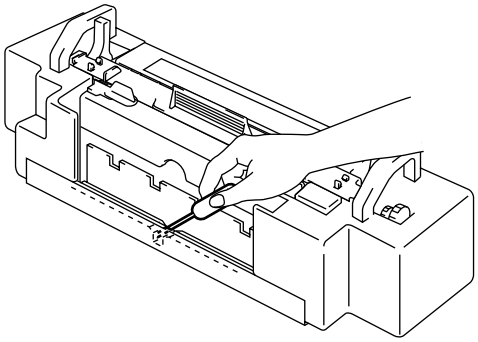


Fig. 5-33-3 Removing the Oil

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/m^2 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.

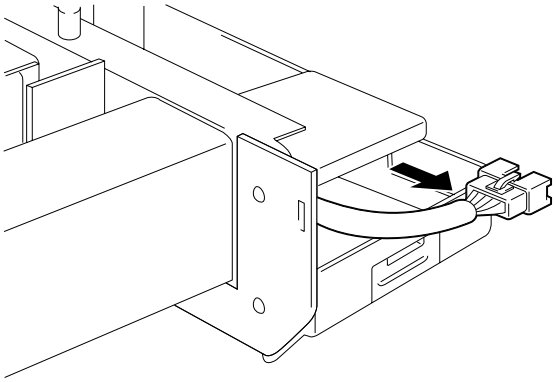


Fig. 5-34 Pull out the Connection Cable

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.

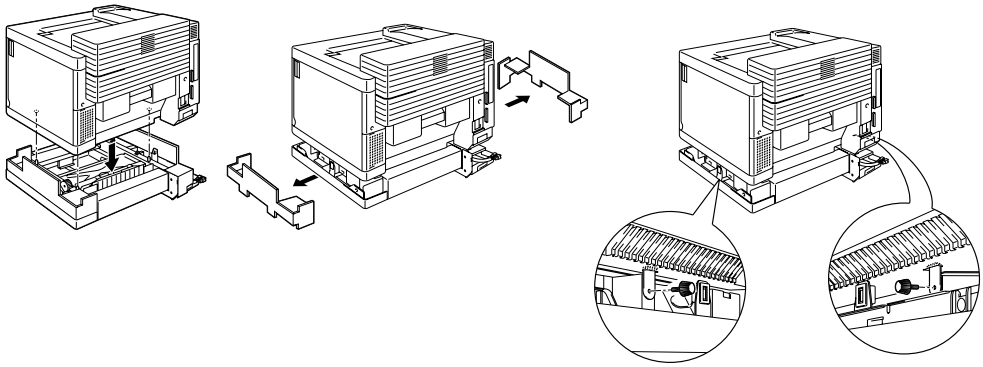


Fig. 5-35 Insert the Metal Parts and Secure with the Screws

4. Insert the connection cable to the printer's connector.

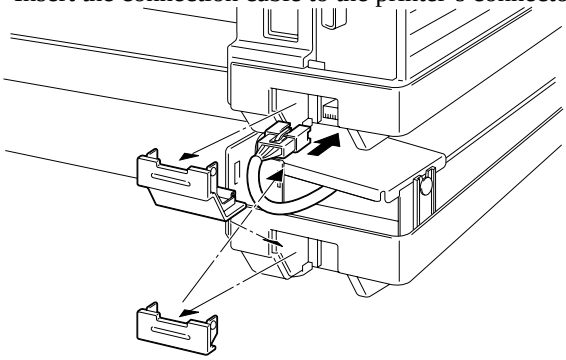


Fig. 5-36 Insert the Connection Cable

5. Fit the covers on both sides of the Lower Tray Unit.

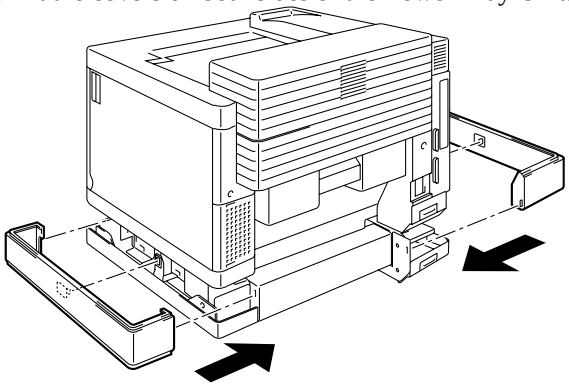


Fig. 5-37 Fit the Cover

> **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 PCMCA PC Card ATA

The following type of HDD card can be installed:

- 170 Mbyte : Intégral Peripherals Inc. VIPER 170E

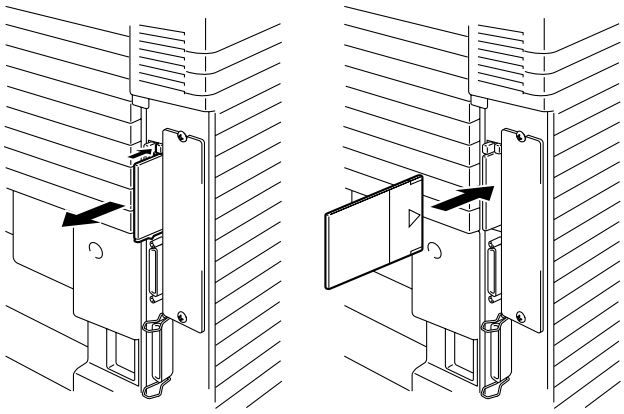


Fig. 5-38 Installing or Removing the Card

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.

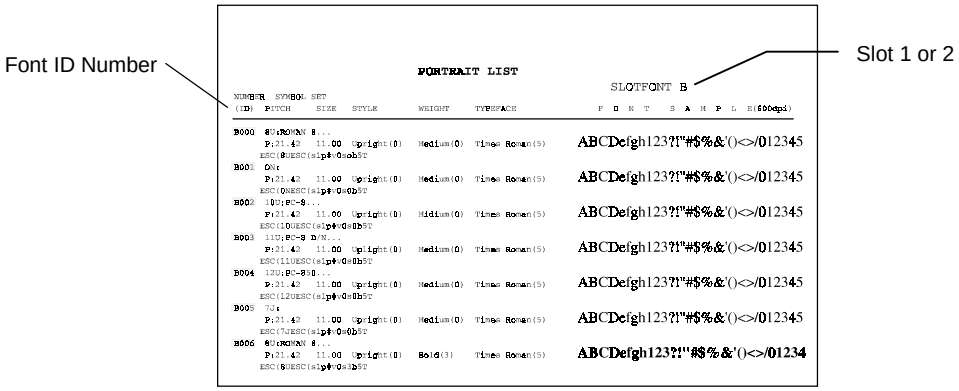


Fig. 5-39 Font ID Numbers on the Font List

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.

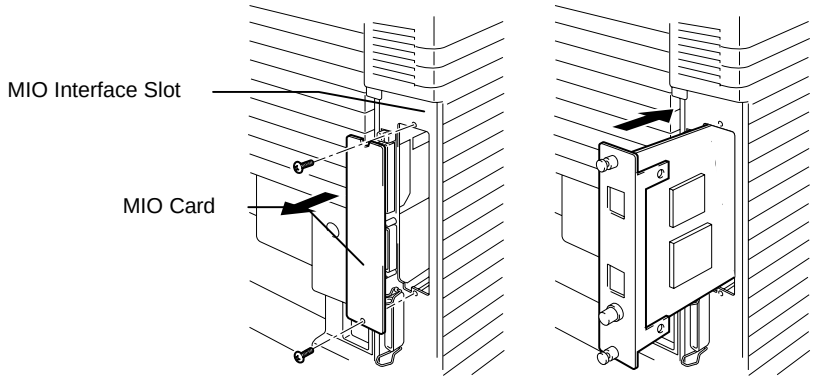


Fig. 5-40 Installing the MIO Card

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.

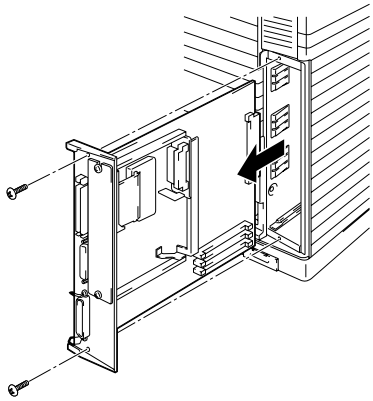


Fig. 5-41 Removing the Main Controller Board

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.

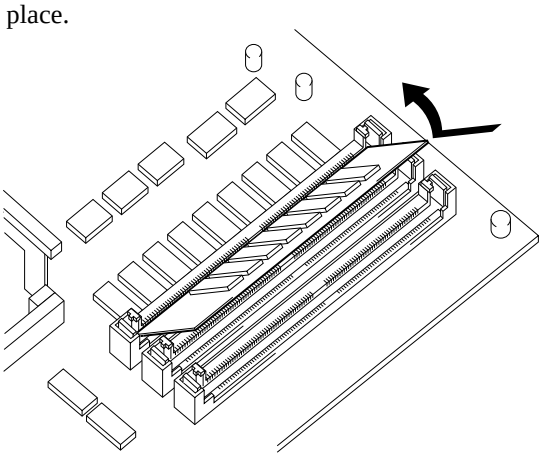


Fig. 5-42 Install the SIMM

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 1and then Slot2.
- 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.

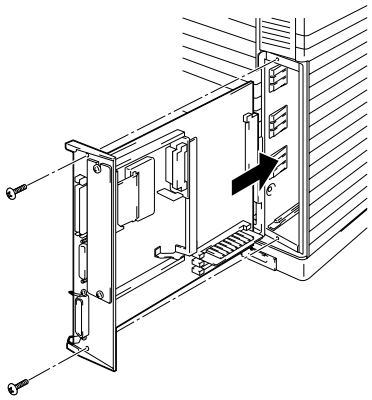


Fig. 5-43 Install the Main Controller board

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 XXXXXXX	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 PCMCIAcard 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.

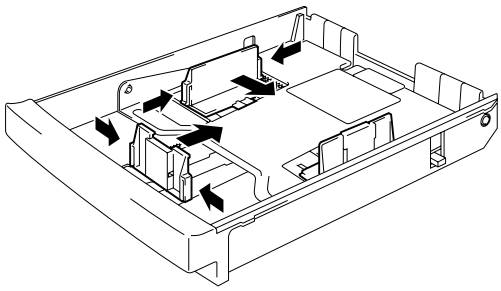


Fig. 6-1 Adjustment Lever

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.

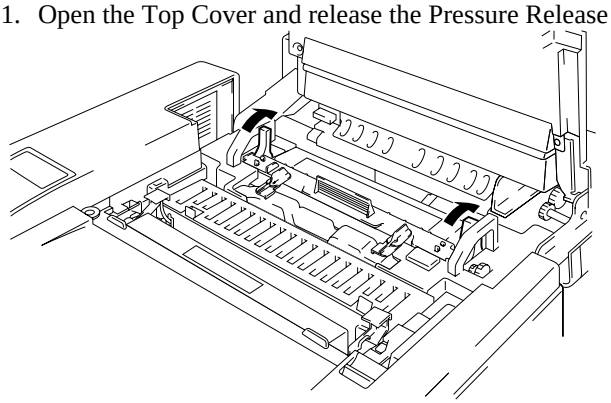


Fig. 6-2 Paper Jam at Paper Exit

2. Open the Rear Access Cover and remove the jammed paper by pulling it out slowly.

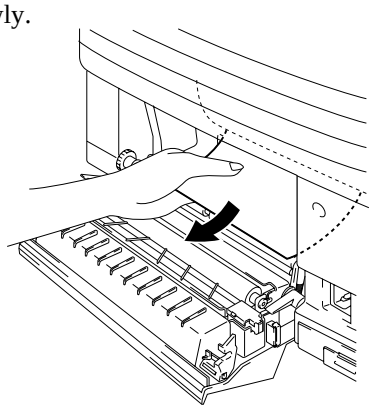


Fig. 6-3 Remove the jammed paper

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.

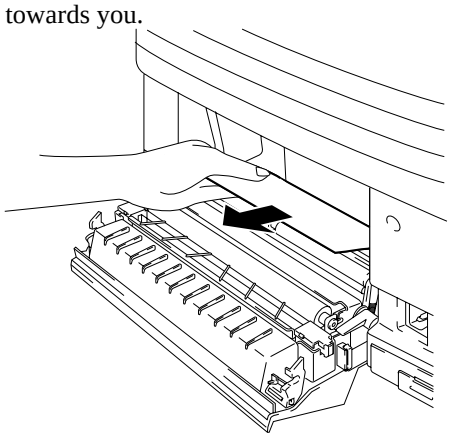


Fig. 6-4 Paper Jam Inside

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.

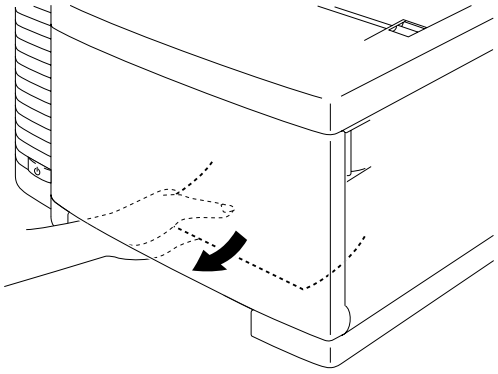


Fig. 6-5 Paper Jam at Media Cassette

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.

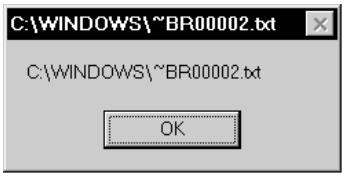
Q & A

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.
If you install the printer driver for HL-2400C from the Plug & Play installation, the installation may sometimes fail with the following error dialog. 	Please reinstall the printer driver by clicking the 'Add Printer' icon on the Settings-Printer dialog.

Paper Handling

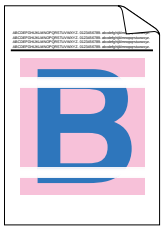
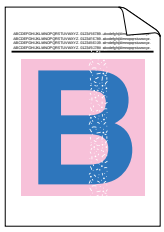
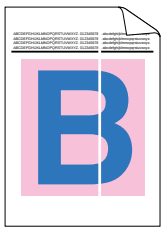
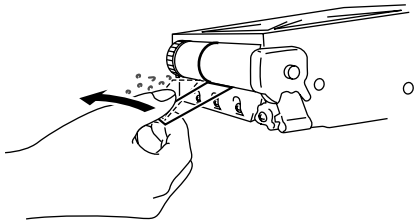
Question	Recommendation
The printer does not load paper.	• Check to see if the **Alarm** LED is on. If so, the Media Cassette may be out of paper or not properly installed. If it is empty, load a new stack of paper into the Media Cassette. • If there is paper in the Media Cassette, make sure that it 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.

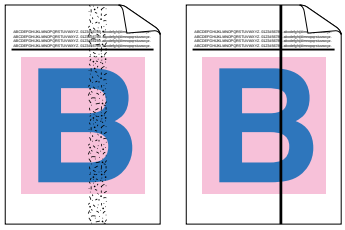
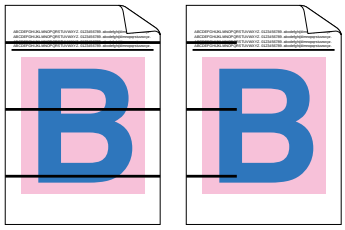
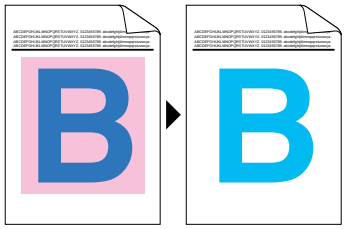
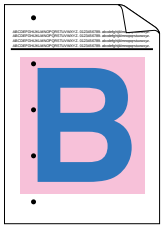
Printing

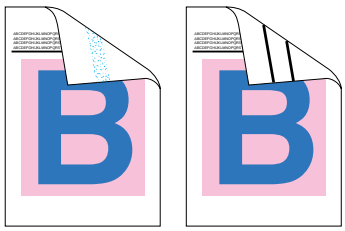
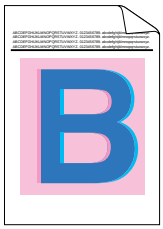
Question	Recommendation
The printer prints unexpectedly or it prints incorrect characters.	• Cancel the print job from your computer. Then, turn on and off the printer or reset the printer and try your print job again. • Make sure your application software is correctly set up to use this printer and 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.

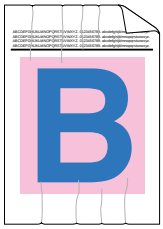
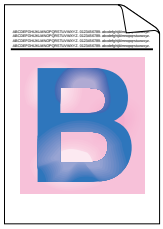
Print Quality

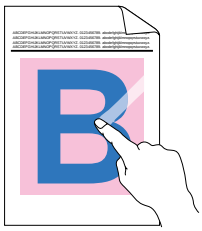
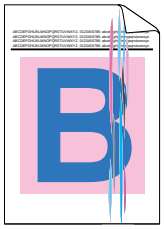
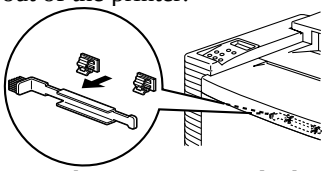
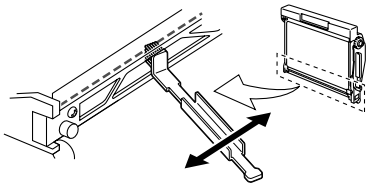
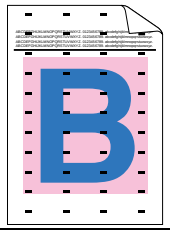
> **Note**
> You can clear a print quality problem by replacing a toner cartridge with a new one if the LCD indicates the 'toner low' or 'toner empty' message.

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 Techology) 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/m^2 (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/m^2 (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/m^2 (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/m^2 (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.

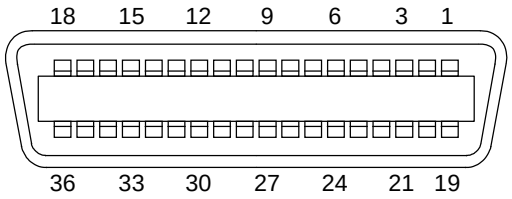


Fig. A-1 Parallel Interface Connector

Pin Assignment

Pin No.	Signal	Pin No.	Signal
1	$\overline{\text{DATA STROBE}}$	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	$\overline{\text{ACKNLG}}$	28	Twisted pair ground
11	BUSY	29	Twisted pair ground
12	PE	30	$\overline{\text{INPUT PRIME RET}}$
13	SLCT	31	$\overline{\text{INPUT PRIME}}$
14	$\overline{\text{AUTO FEED}}$	32	$\overline{\text{FAULT}}$
15	N.C.	33	N.C.
16	0V	34	N.C.
17	0V	35	N.C.
18	+5V	36	$\overline{\text{SELECT IN}}$

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.
$\overline{\text{DATA STROBE}}$	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
$\overline{\text{ACKNLG}}$	10	10
BUSY	11	11
PE	12	12
SLCT	13	13
$\overline{\text{AUTO FEED}}$	14	14
GND	19 - 30	18 - 25
$\overline{\text{FAULT}}$	32	15
$\overline{\text{SLCT IN}}$	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.

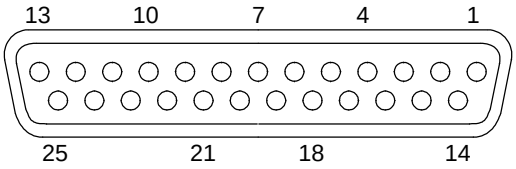


Fig. A-2 Serial Interface Connector

Pin Assignment

Pin No.	Signal	IN/OUT Printer	IN/OUT Controller	Pin No.	Signal	IN/OUT Printer	IN/OUT 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

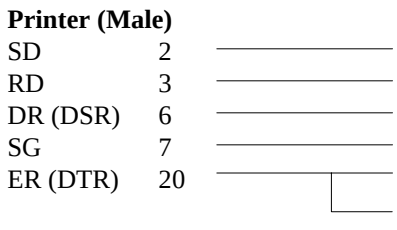
Signal Name	IN/OUT	Explanation
FG	–	Frame Ground
SD	OUT	Send Data.
RD	IN	Receive Data. Receives data transmitted from the computer.
RS	OUT	Request To Send. "SPACE" level when the printer is ready to send data to the computer.
DR	IN	Data Set Ready. When DSR is at "SPACE" level, data can be accepted.
SG	–	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.

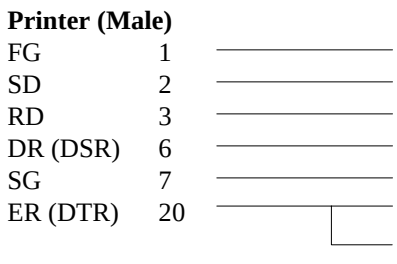
■ DB-9 Serial Connection

When you use a computer with a 9-pin serial port, use a cable with the following pin configurations.



■ DB-25 Serial Connection

When you use a computer with a 25-pin serial port, use a cable with the following pin configurations.



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)

PC-8 (10U)
PC-8 D/N (11U)
PC-850 (12U)
PC-852 (17U)

PC-8 Turkish (9T)
Windows Latin1 (19U)
Windows Latin2 (9E)
Windows Latin5 (5T)

Legal (1U)
Ventura Math (6M)
Ventura Intl (13J)
Ventura US (14J)

PS Math (5M)
PS Text (10J)
Math-8 (8M)
Pi Font (15U)

MS Publishing (6J)
Windows 3.0 (9U)
Desktop (7J)
MC Text (12J)

Symbol (19M)
Windings (579L)

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												

PC-8
PC-8 D/N
PC-850
PC-852

PC-860
PC-863
PC-865
PC-8 Turkish

IBM Mode

PC-8
PC-8 D/N
PC-850
PC-852

PC-860
PC-863
PC-865
PC-8 Turkish

HP-GL Mode

ANSI ASCII
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

Symbol Sets Supported by the Printer's Intellifont Compatible Typefaces

PCL Symbol Set		Typeface						
Set ID	Symbol Set	Alaska	Antique Oakland	Brougham	Cleveland Cond.	Connect-icut	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	Wingdings							

*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							
Set ID	Symbol Set	Atlanta	BR Symbol	Copen-hagen	Calgary	Helsinki	Portugal	Tennes-see	W 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			
		Bermuda Script	Germany	San Diego	US Roman
Set ID	Symbol Set				
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 & *l* # P (# lines)	27 38 108 ## 80	1B 26 6C ## 50
Top Margin	ESC & *l* # E (# lines)	27 38 108 ## 69	1B 26 6C ## 45
Text Length	ESC & *l* # 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 & *l* # C (# /48 inch)	27 38 108 ## 67	1B 26 6C ## 43
Line Spacing	ESC & *l* # D	27 38 108 ## 68	1B 26 6C ## 44
1 line/inch	ESC & *l* 1 D	27 38 108 49 68	1B 26 6C 31 44
2 lines/inch	ESC & *l* 2 D	27 38 108 50 68	1B 26 6C 32 44
3 lines/inch	ESC & *l* 3 D	27 38 108 51 68	1B 26 6C 33 44
4 lines/inch	ESC & *l* 4 D	27 38 108 52 68	1B 26 6C 34 44
6 lines/inch	ESC & *l* 6 D	27 38 108 54 68	1B 26 6C 36 44
8 lines/inch	ESC & *l* 8 D	27 38 108 56 68	1B 26 6C 38 44
12 lines/inch	ESC & *l* 12 D	27 38 108 49 50 68	1B 26 6C 31 32 44
16 lines/inch	ESC & *l* 16 D	27 38 108 49 54 68	1B 26 6C 31 36 44
24 lines/inch	ESC & *l* 24 D	27 38 108 50 52 68	1B 26 6C 32 34 44
48 lines/inch	ESC & *l* 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

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 pallete	ESC * r -3 U	27 42 114 45 51 85	1B 2A 72 2D 33 55
Single Plane,Black and White pallete	ESC * r 1 U	27 42 114 49 85	1B 2A 72 31 55

3Plane,device RGB pallete	ESC * r 3 U	27 42 114 51 85	1B 2A 72 33 55
Configure Image Data	ESC * v # W [data] (# byte)	27 42 118 ## 87	1B 2A 76 ## 57
Color Component One	ESC * v # A (# First Component)	27 42 118 # 65	1B 2A 76 # 41
Color Component Two	ESC * v # B (# Second Component)	27 42 118 # 66	1B 2A 76 # 42
Color Component Three	ESC * v # C (# Third Component)	27 42 118 # 67	1B 2A 76 # 43
Assign Color Index	ESC * v # I (# Index Number)	27 42 118 # 73	1B 2A 76 # 49
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 (# Palette Index Number)	27 42 118 ## 83	1B 2A 76 ## 53
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) (Monochrome)	ESC * t 16 J	27 42 116 48 74	1B 2A 74 30 4A
Continuous Tone (Smooth 150dpi) (Monochrome)	ESC * t 17 J	27 42 116 48 74	1B 2A 74 30 4A
Continuous Tone (Basic 100dpi)	ESC * t 18 J	27 42 116 48 74	1B 2A 74 30 4A
Continuous Tone (Basic 100dpi) (Monochrome)	ESC * t 19 J	27 42 116 48 74	1B 2A 74 30 4A
Download Dither Matrix	ESC * m # W [data] (# byte)	27 42 109 48 74	1B 2A 6D 30 4A
Gamma Correction	ESC * t # I (# Gamma Number)	27 42 116 ## 73	1B 2A 74 ## 49
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 (# Color Number)	27 38 118 ## 83	1B 26 76 ## 53
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

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.

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

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

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.

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

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)

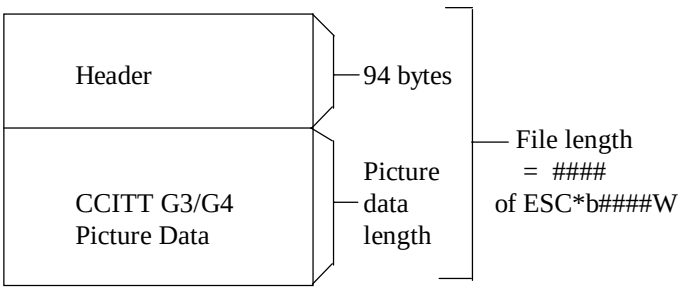
One of the unique features of the PCL mode of this printer is it supports CCITT G3/G4 type data compression and TIFF format.

■ 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.

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 PJL command:

   @PJL SET RAS1200MODE = ON

2. Choose PCL mode with the following PJL command:

   @PJL ENTER LANGUAGE = PCL

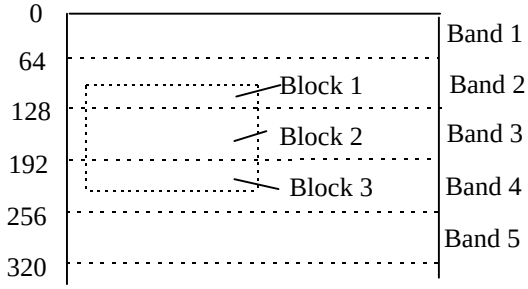
(If you select a mode other than PCL mode, 1200 dpi printing mode cannot be selected.)

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.

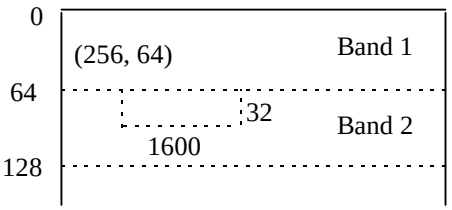
The block data is composed as follows:

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]

a b c d e f



a: Block length(807)
b: Horizontal position(256)
c: Vertical position(64)
d: Height dots(32)
e: Width words(100)
f: Compression image data

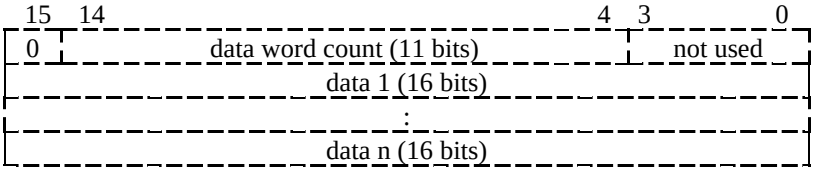
<Compressed Image Data>

Data compression compresses the original image data word by word (16 bits).

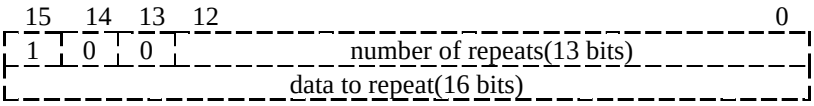
The compressed data consists of both horizontal compression which uses 16 bit, 8 bit and 4 bit repeating patterns within 1 word or 2 words of data, and vertical compression which indicates to repeat the same data as in the previous line with 1 word of data.

• Non-compressed data

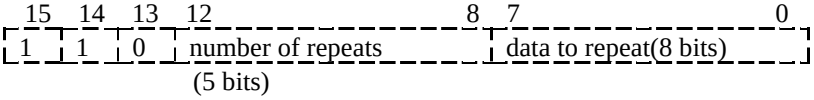
When the most significant bit in the first 2 bytes is 0, the printer goes into non-compression mode. The following 11 bits then indicate the number of words of data, and the least significant 4 bits are not used. After that, the image data follows word by word.



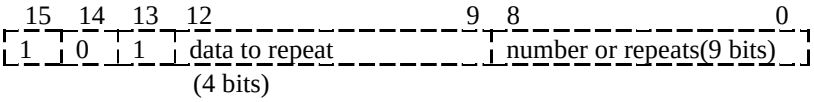
• 16 bit repeating compressed data
When the most significant 3 bits in the first 2 bytes are in the order 1, 0, 0, the remaining 13 bits indicate the number of times to repeat 16 bit data. The following 2 bytes should be the 16 bit data to repeat.



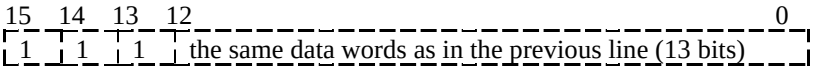
• 8 bit repeating compressed data
When the most significant 3 bits in the first 2 bytes are in the order 1, 1, 0, the following 5 bits indicate the number of times to repeat 16 bits (two by 8 bits) data. The remaining 8 bits should be the 8 bit data to repeat.



• 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 … [, parms]].
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 … [, parms]]; 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];

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	UL	[index [, gap 1 … gap 20]];
(Extended for PCL5C)		
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	DEC.	HEX.
Syntax Rules			
[ ]	Brackets indicate optional parameters.		
< >	Indicates special characters and items		
Special Characters and Items			
<HT>	Horizontal Tab (element of white space)	09	09
<LF>	Line Feed (PJL command terminator)	10	0A
<CR>	Carriage Return (optional parameter)	13	0D
<SP>	Space (element of white space)	32	20
<ESC>	Escape (used only for UEL/SPJL)	27	1B
<FF>	Form Feed (terminator for multiple line reply)	12	0C
<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 ($1 \le n \le 127$)	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 *l* 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 Proportion-al 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

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 Overrides the front panel setting	ESC 5 n	27 53 n	1B 35 n
Select Printer	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)	ESC C n	27 67 n	1B 43 n
	Sets from length to n inches at current spacing (0≤n≤15)	ESC C 0 n	27 67 48 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

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)	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

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_alternate_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
```

INDEX

—L—

—M—

—N—

—O—

—P—

—R—

—S—

—T—

—U—

—W—

—1—