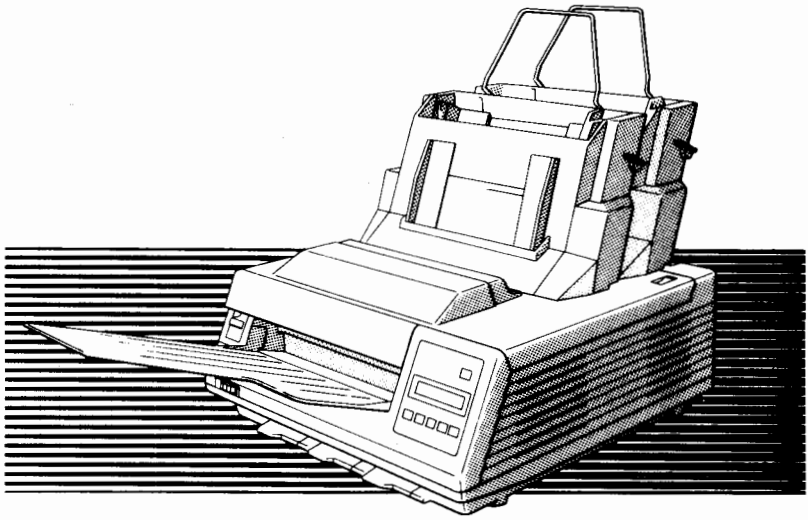
RX7100
Page Printer
User's Manual



RX7100

48FH5010E-05

Federal Communications Commission Radio Frequency Interference Statement for United States Users

This equipment generates and uses radio frequency energy. If not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference with radio and television reception. It has been type-tested and found to comply with the limits for a Class-B computing device in accordance with the specifications in Subpart J or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in residential installation. There is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with 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 taking one or more of the following measures:

- Reorient the receiving antenna.
- Relocate this equipment with respect to the receiver.
- Move this equipment away from the receiver.
- Plug this equipment into a different outlet so that this equipment and the receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to identify and Resolve Radio-TV Interference Problems". This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-000345-4.

(This equipment has been tested as model number M3706M)

NOTES:

1. The use of a nonshielded interface cable with the referenced device is prohibited. The length of the interface cable must not exceed 3 m.
2. The length of the power cord must not exceed 3 m.

Notice for German Users

Dieses Gerät entspricht also Einzelgerät den Funkentstörungsanforderungen der Postverfügung Nr. 1046/1984 bzw. der Grenzfläche B nach VDE 0871/6.78. Das Kabel muß abgeschirmt und unter 3 Meter lang sein.

Notice for Canadian Users

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

NOTICE

The contents of this manual may be revised without prior notice, without obligation, to incorporate changes and improvements into units already shipped.

Every effort has been made to ensure that the information included here is complete and accurate at the time of publication, but Fujitsu cannot be held responsible for errors and omissions.

48FH5010E-05, January, 1990

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PREFACE

This manual explains how to set up, install, and operate the Fujitsu RX7100 page printer and options. It also contains information on basic maintenance but does not include detailed descriptions of printer commands.

This manual is for the nontechnical user for word processing, graphics, and desktop publishing.

HOW TO USE THIS MANUAL

This manual can be used both as a tutorial and as a reference. First-time users should read the entire manual before using the printer. Those familiar with this type of printer need read only parts that explain functions and operations specific to this printer; see the manual organization, below. Keep this manual nearby for easy reference.

Organization

Sections of the manual are outlined below. Appendixes give reference tables, specifications, and information on options.

Quick Start lists the steps you must take to set up the printer.

Section 1 introduces the page printer. Illustrations make the printing process and printer components understandable at a glance. Notes on printer handling are provided.

Section 2 shows how to set up the printer step by step. Illustrations show how to unpack the printer, check and install components, connect and turn on power, load paper, print test pages, connect the computer and printer, and check printer clearance.

Section 3 explains how to operate the control panel. It explains how the control panel is organized, discusses displays, and details how to use and interpret push buttons and indicator lamps. It also explains messages and codes.

Section 4 gives basic instructions for printing: hopper use, fonts and font card selection, page formatting, and emulation.

Section 5 explains routine printer care and maintenance and tells how to replace consumables such as the process cartridge. It also details repacking.

Section 6 explains simple troubleshooting and how to take care of problems, such as paper jams, if they occur. It also explains error messages, how to clean changer wires, and how to replace the ozone filter.

The **appendixes** provide information on printer specifications, command sets, interfacing, code conversion, character sets, fonts, supplies and options, and notes on software application.

The **glossary** explains terms used in this manual.

References

For additional information, documents, and copies, contact your dealer or an authorized Fujitsu representative.

Description Format

Illustrations are on the same or facing page for easy reference.

Procedures are divided into steps and numbered.

Color and boldface are used for emphasis.

Notes, precautions, and warnings are enclosed in boxes. Notes include remarks, exceptions, and other useful information. Precautions indicate that damage to the printer may occur if a procedure is not followed correctly. Warnings indicate that personal injury may occur if a procedure is not followed correctly.

We hope that you find this manual helpful and that you will be able to use this printer to full advantage.

QUICK START

To use the printer right after it is taken out of the shipping carton, follow the directions given in the quick start chart below.

Quick start chart

What to do:	What to check:	See page:
Check the printer location.	Room environment	2-1
Unpack the printer.	Shipping damage	2-3
Check that no components asre missing.	Missing components	2-5
Install the components.	Hopper, stacker, process cartridge, etc.	2-6
Connect and turn on the power.	Correct voltage and outlet	2-18
Load the printer with paper.	Control panel paper size setting	2-20
Print a test page.	Test-print operation	2-24
Adjust print density.	Proper print density	2-25
Connect the printer to your computer.	Correct cable and locked connectors	2-25
Adjust the printer and computer operating modes.	For a serial interface, type of data format, baud rate, protocol, etc.	2-28
Use the computer to test the printer.	Print operation with a test program	2-32

See **Section 6** for troubleshooting procedures.

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SECTION 4 INSTRUCTIONS FOR PRINTING

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SECTION 6 TROUBLESHOOTING

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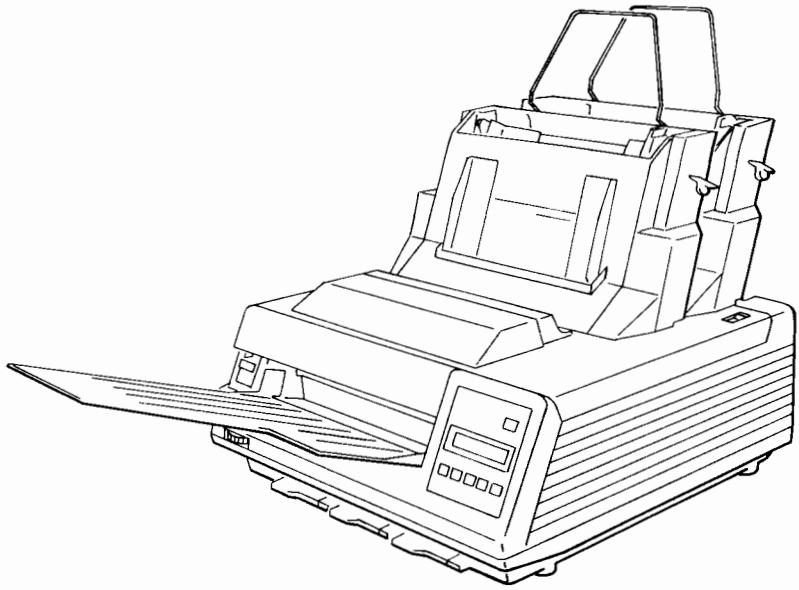
APPENDIX B COMMAND SETS

APPENDIX C INTERFACING

SECTION 1
INTRODUCTION

Congratulations on purchasing a fine, high quality page printer. You have made a wise choice. Your printer will provide years of reliable, versatile printing ideal for all office applications, including desktop publishing.

This printer is a compact electrophotographic page printer that uses a light-emitting diode (LED) array as the light source. Except for its printing mechanism, the printer is similar to an ordinary serial printer, and you will find it just as easy to use.



Printer with standard and optional hopper bins

Printing Process

This printer uses a printing process similar to most electrophotographic copiers except that the image source is data from the computer rather than a reflection from the original document.

To print a document, the computer translates the document into print codes, page by page, and sends the translated print codes to the printer.

The printer's controller converts the code to bit-image data and writes the image data to memory in a page format.

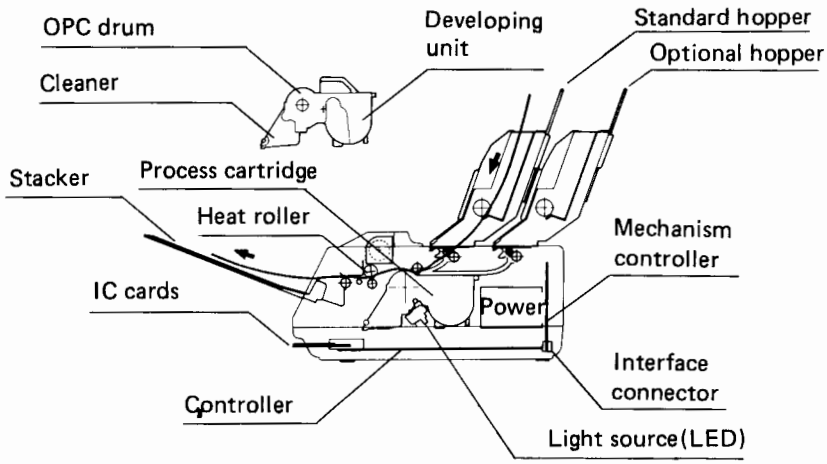
The light-emitting diode (LED) array parallel to the photoconductive drum changes the image data to light patterns. Patterns are produced on the drum as the LED array lights and the drum rotates.

The developing unit distributes charged carbon particles, called toner, onto the drum. The toner adheres to the discharged areas and produces a visible image on the drum.

Paper fed from one of the hoppers is given a polarity charge opposite to that of the toner while being pressed against the drum. This transfers the toner to the paper. The heat roller melts the toner into a permanent image on the paper.

The clearner wipes off any remaining toner from the drum so that the drum can be used for the next part of the image.

A full printed page is completed when the drum rotates one page length. The printed paper is then sent to the stacker.



Paper path and printing process

Printer Features

This printer can print up to 3000 sheets a month at a resolution of 300 x 300 dots per inch. The printing speed is five pages per minute. Ninety-nine copies of a specified page can be printed by using the data stored in memory.

This compact printer has a small footprint of 16 x 15.7 inches and weights 18 kg.

Each hopper holds up to 150 sheets of paper. Several sizes (100 to 216 mm wide) and types (xerographic paper, bond paper, projector transparencies) can be used. The standard face-down, correct-order stacker can be tipped up out of the way when not in use.

Fonts (character styles) can be chosen from three resident fonts and optional plug-in IC card fonts. The printer is software-compatible, with a wide variety of emulations: the resident HP LaserJet Plus and the optional Diablo 630 API, IBM Proprinter XL, and Epson FX-85.

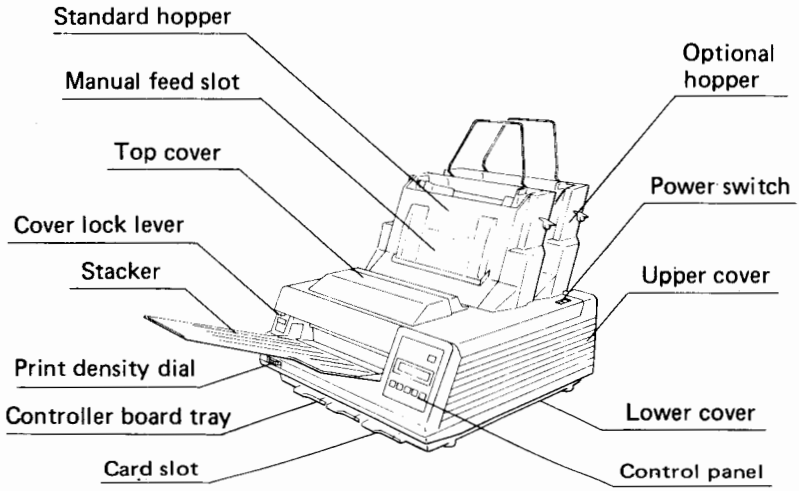
The printer consists of two main parts, the controller and the printing mechanism (engine) connected through a video interface. The controller is user-removable to enable memory expansion. The printing mechanism is compact and has a sophisticated design with simple wiring. The process cartridge produces up to 6000 pages and is easy to replace.

The printer can communicate with most computers through the standard Centronics parallel interface and RS-232C serial interface.

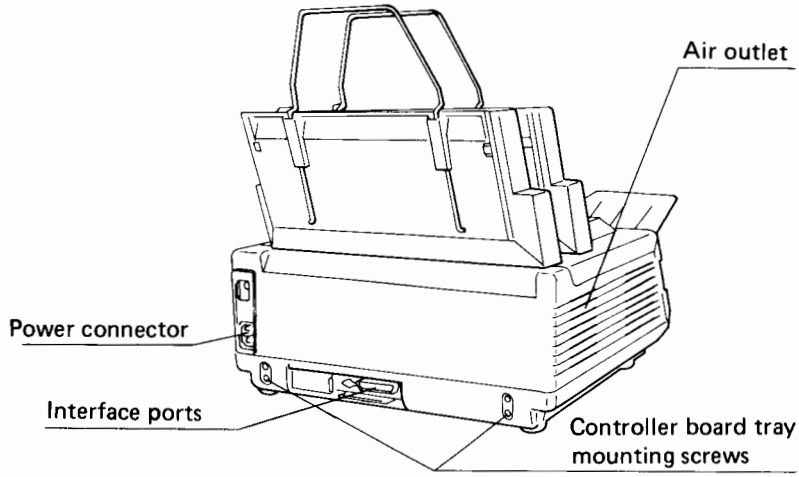
The control panel enables you to specify or adjust many of the printer's features. You can select a font and page format for your document and match your printer's interface and emulation with those of your computer. The printer's message display on the control panel uses a liquid-crystal display (LCD). The 16-character LCD display guides operation with messages and status information.

Getting Acquainted with Printer Parts

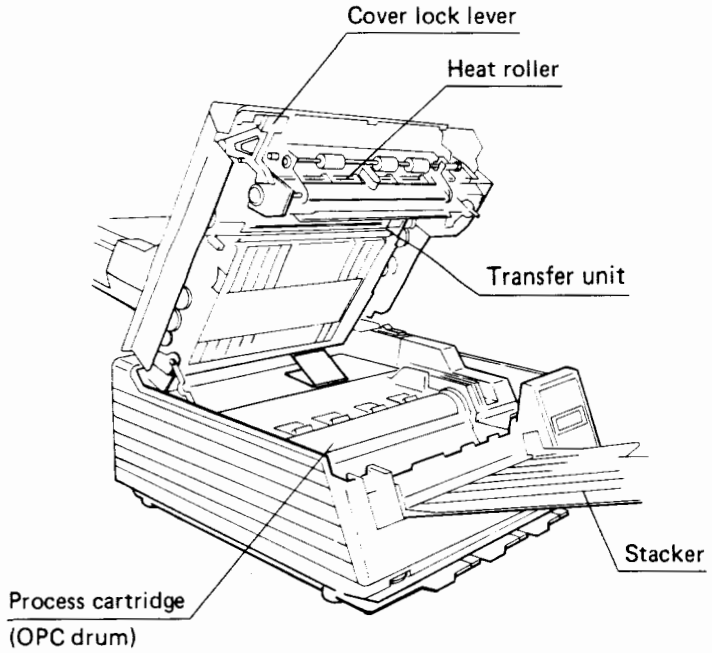
The illustrations that follow show major printer parts.



Front



Back

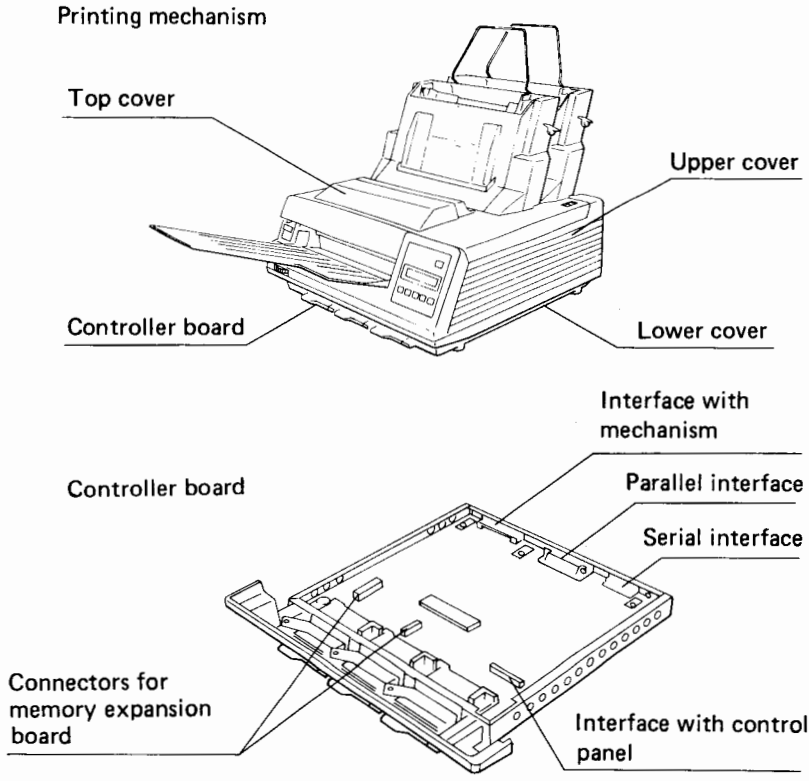


Top cover open

Printing Mechanism and Controller

The printing mechanism (engine) consists of the parts in the lower cover, the parts in the upper cover, and parts in the top cover. The top cover can be opened and raised after you push the cover lock lever up and release the lock. Hoppers need not be emptied or removed before the top cover is opened. No printing operations can be performed while the top cover is open.

The controller occupies the space inside the lower cover. The controller receives print data and control information from the computer and the control panel. It controls the printing mechanism through the control panel and video interfaces. The controller board can be easily removed. See **Section 5.**

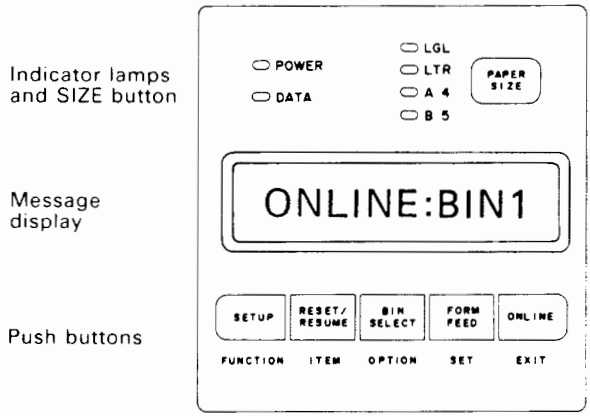


Printing mechanism and controller board

Control Panel

The control panel has a 16-digit dot-matrix display that shows messages in letters and digits. It also has six push buttons and six indicator lamps.

For details, see **Section 3.**



Control panel

Push buttons

The five push buttons at the bottom of the control panel each have two functions, depending on whether the control panel is in normal or setup mode. Normal mode functions are on the push buttons and the setup mode functions are below the push buttons. This manual uses the name that corresponds to the mode being discussed.

Normal mode

Printer operations are changed or set in normal mode. Buttons operate as follows:

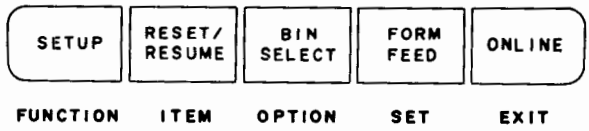
SETUP: Press to switch to the setup mode to change printer features or to select a resident function such as test printing when the printer is offline.

RESET/RESUME: Press to initialize the printer. This is sometimes done to clear error status.

BIN SELECT: When the printer is offline, press to select the standard, hopper (bin 1), optional hopper (bin 2), or manual feed slot.

FORM FEED: Press to print data in the buffer when the DATA indicator is lit and the printer is offline.

ONLINE: Press to switch the printer from online to offline or vice versa. If this button is pressed during online printing, the printer stops after printing the current page and goes off. Any remaining pages will be printed when the printer is put back online unless the FORM FEED button is pressed.



Control panel buttons used in normal mode

Setup mode

You can change printer features such as emulation, interface type, font, character spacing, page formatting and so on in setup mode. Set this mode by pressing the SETUP button while the printer is offline. Buttons operate as follows:

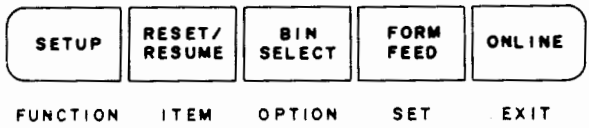
FUNCTION : Press to select a function.

TEM : Press to select a function item.

OPTION : Press to select an item option.

SET : Press to enter new option settings in RAM as temporary values. If the SAVE function has not been used, the selected options will remain valid until the printer is turned off.

EXIT : Press to return to normal mode.



Control panel buttons used in setup mode

Indicator lamps and PAPER SIZE button

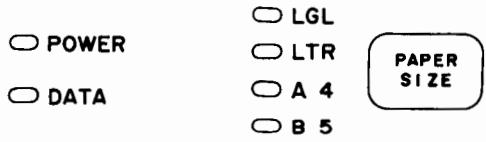
Indicator lamps and the PAPER SIZE button are used as follows:

POWER: Lights while the printer is on.

DATA: Lights while the printer buffer is being loaded or when there is data in the printer buffer.

PAPER SIZE: Selects one of the paper size indicator lamps. This push button can be used in all modes.

LGL, LTR, A4, and B5 : Indicates the size of the paper selected.
LGL: Legal size (U.S.)
LTR: Letter size (U.S.)



Indicators and PAPER SIZE push button

Message Display

The control panel displays messages in easy-to-understand form using 16 alphanumeric characters. Some messages are displayed blinking or alternating with other messages as an attention or prompt.

Control panel message display

In normal mode the message display shows the following types of operator messages:

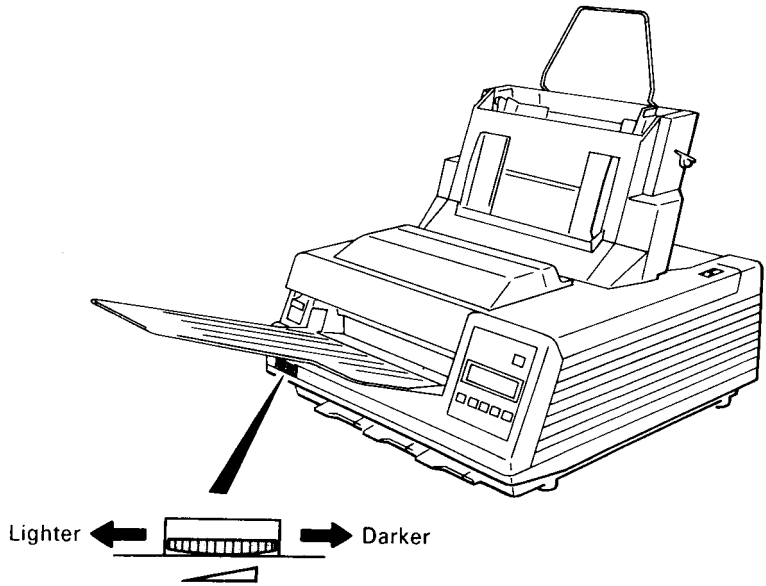
- Online or offline status with bin selection status
- Errors and alarms
- Prompts

In setup mode, the message display shows the following function menus and their options:

- Font
- Number of copies
- Miscellaneous
- Interface
- Emulation
- Default setting of printer operating modes
- Test Print
- Hexadecimal dump (hex dump) of printer commands and data
- Listing of the printer's internal status

Print Density Dial

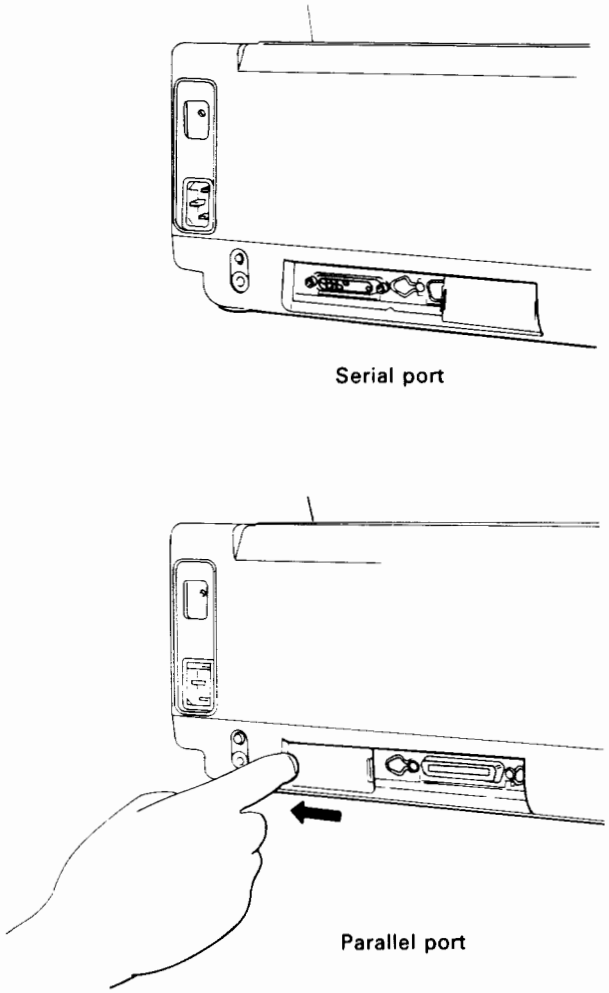
The print density dial is used to adjust the print density of a document. To increase the density (make the printing darker), turn the dial to the right.



Print density dial

Parallel and Serial Interface Ports

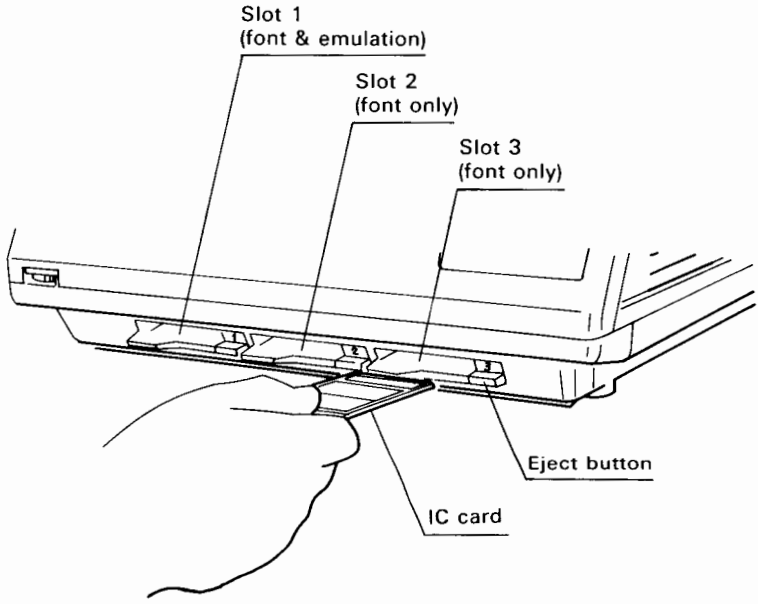
This printer communicates with your computer through either a parallel or serial interface connector. Both types are standard but only one can be connected at a time.



Parallel and serial interface ports

Font and Emulation Card Slots

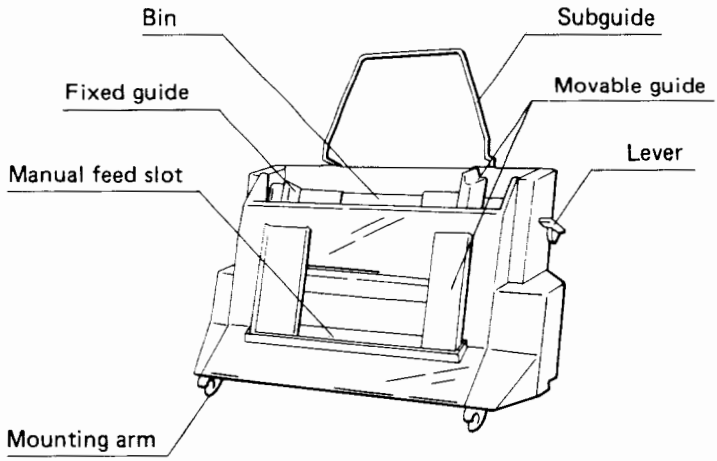
The lower front of the printer has three slots for IC cards to provide optional fonts or an alternative emulation.



Font and emulation card slots

Standard and Optional Hoppers

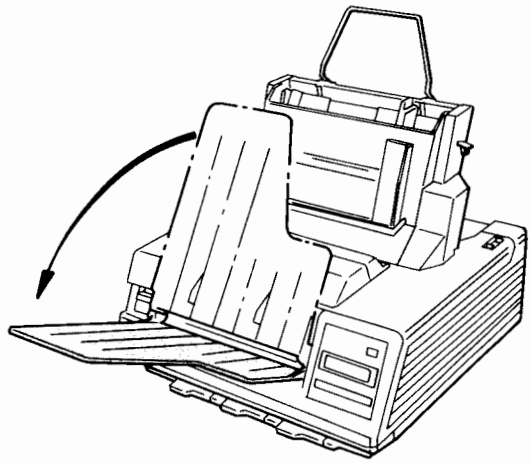
The standard hopper (bin 1) and optional hopper (bin 2) are the same. Each holds up to 150 legal-size, letter-size, A4, or B5 sheets.



Hopper

Stackers

The face-down stacker holds up to 150 sheets. Pages are ejected printed side down and stacked in order so that no sorting is needed.

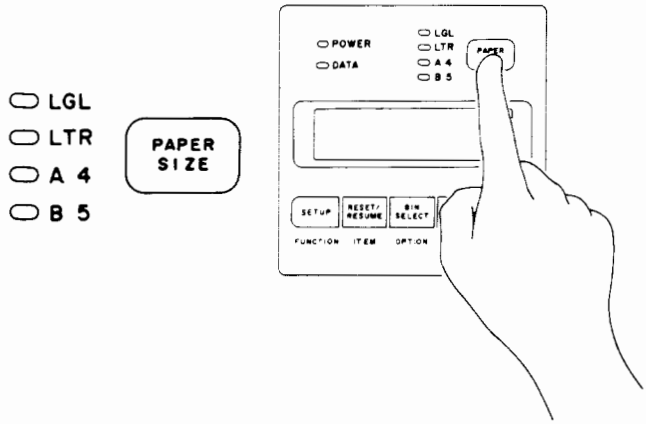


Face-down stacker

Notes on Handling

To keep your printer in good working order, follow the instructions in the maintenance messages whenever they are displayed. A complete explanation of maintenance is given in **Section 5.**

1. Whenever you change the size of the paper you are using. Select the paper size from one of the four available sizes using the PAPER SIZE button on the control panel.



PAPER SIZE button and LED indicator lamps

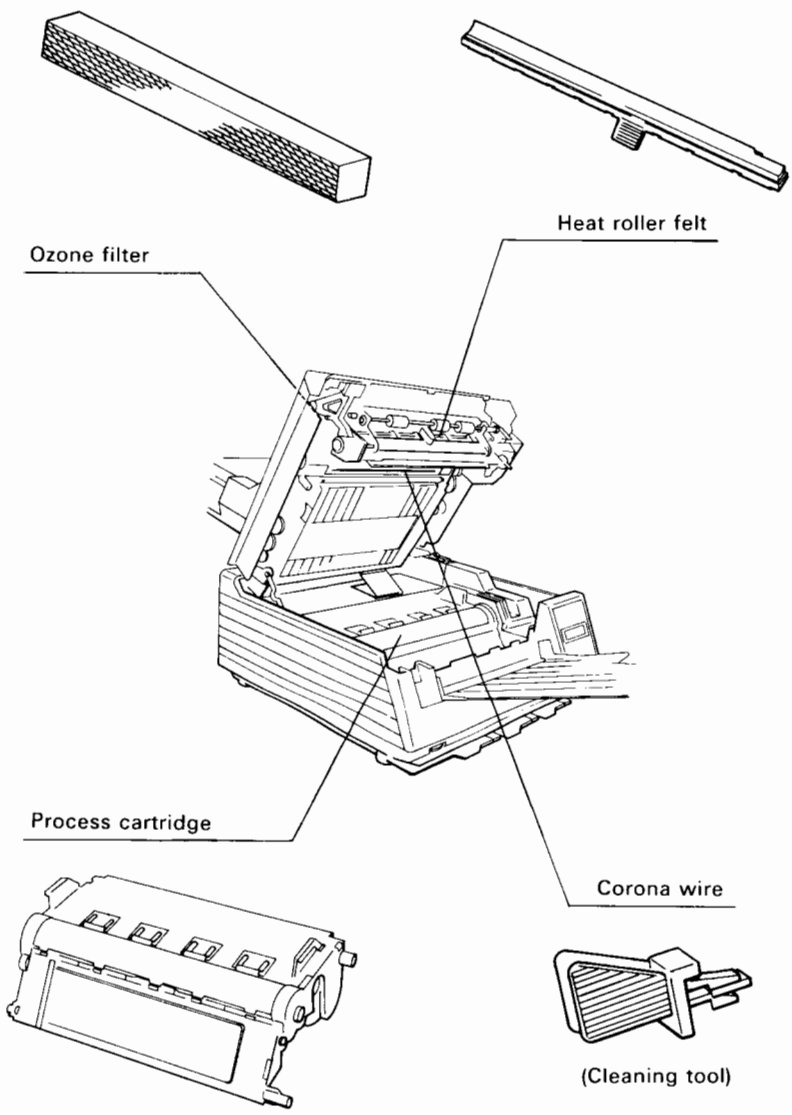
2. Maintain the printing mechanism as follows:

   - If printing becomes too light, clean the corona wire in the transfer unit. (See page 5-2.)

   - If printing becomes dirty or smudged, replace the heat roller felt. (See page 5-7.)

   - Replace the process cartridge when the printer displays a message to do so. (See page 5-4 and 3-36.)

   - If you notice the odor of ozone from the fan, replace the ozone filter. (See page 6-9.)



Caring for the printing mechanism

SECTION 2
SETTING UP THE PRINTER

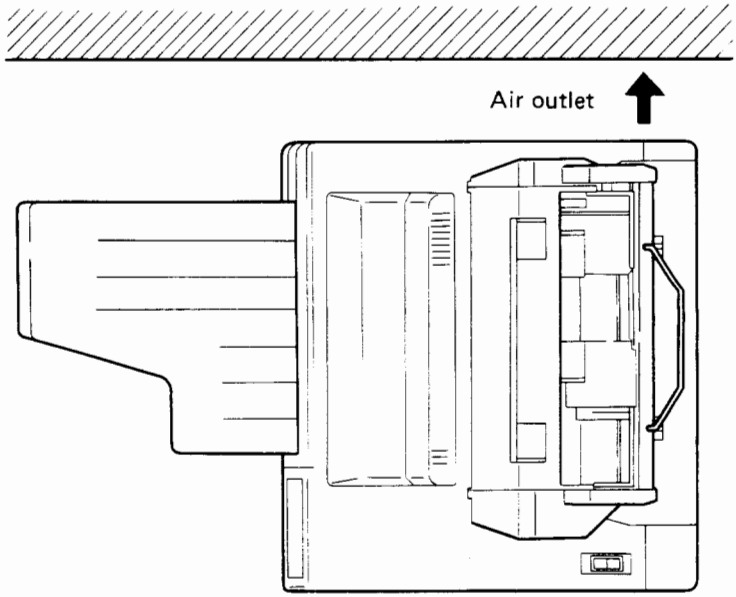
This section gives step-by-step procedures for everything from unpacking to actual printing.

If you are familiar with this type of printer, you can skip the individual item descriptions.

Environment

Your printer operates well in a general office environment. However, the place where you put your printer should meet the following requirements:

- Install the printer on a stable, level surface.
- The room should be well ventilated, without excessive dust.
- Do not put the printer in direct sunlight or near heaters.
- Do not expose the printer to high temperature or humidity. The ideal room temperature is from 10°C to 35°C (50°F to 95°F). The ideal humidity is between 20% and 80% RH.
- Do not block the air outlet of the printer fan.
- Use the power cord that comes with the printer.
- Use a grounded AC power outlet 90 to 110 percent of the voltage marked on the manufacturer's nameplate near the printer's power connector.
- Do not share power outlets with equipment that causes electrical noise or power loss.

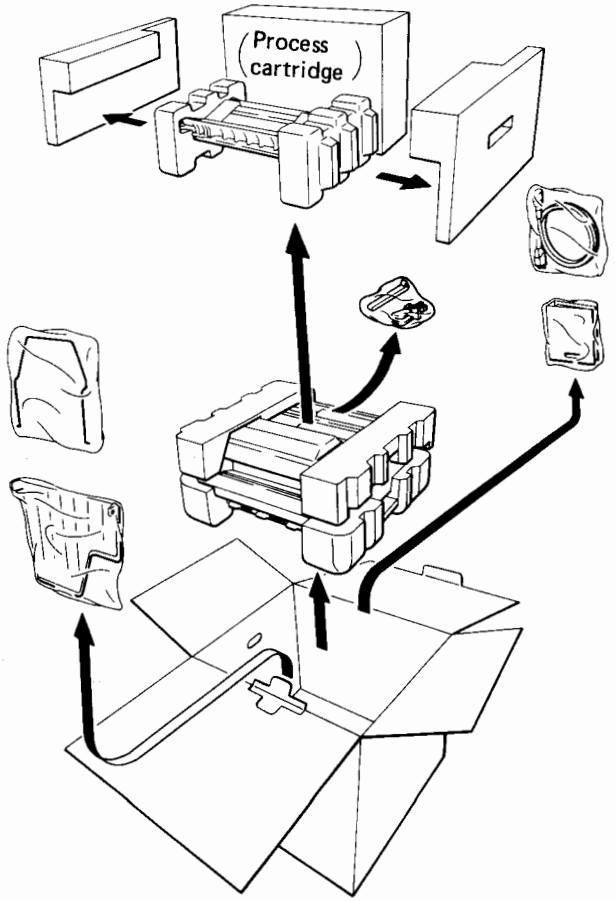


Printer clearance

Unpacking the Printer

The printer is shipped in a carton with its supplies and components wrapped in plastic. Both before and after you have unpacked the printer, check the carton and packing materials for damage. If any damage is found, notify your dealer, distributor, or shipping agent.

The figure below shows the printer just after it has been taken out of the carton.



Opened carton (Single hopper)

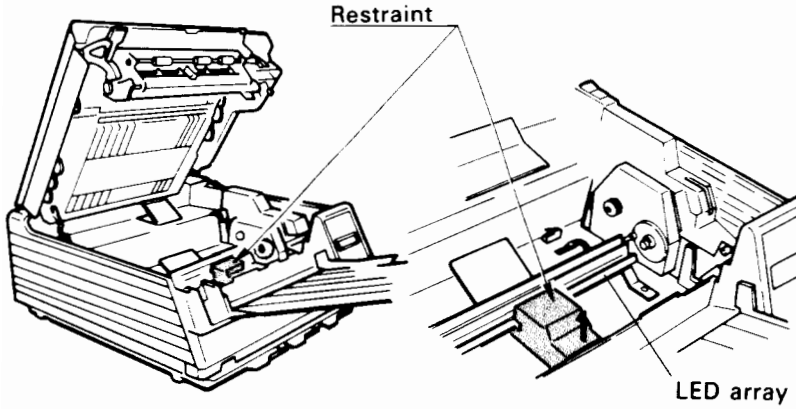
Keep the shipping carton and all packing materials for storage and possible reuse.

Removing Shipping Restraints

Be sure to remove the shipping restraints from the printer. They may damage the printer if it is used with them on.

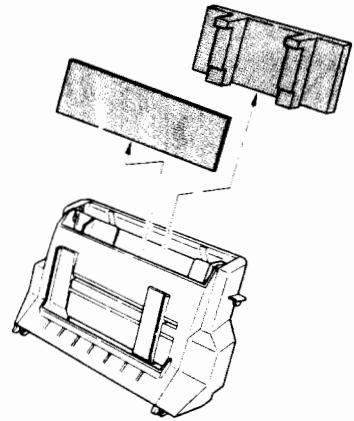
Store all shipping restraints for future shipment of the printer.

1. Open the top cover and remove the foam shipping restraint from the LED array.



LED array restraint

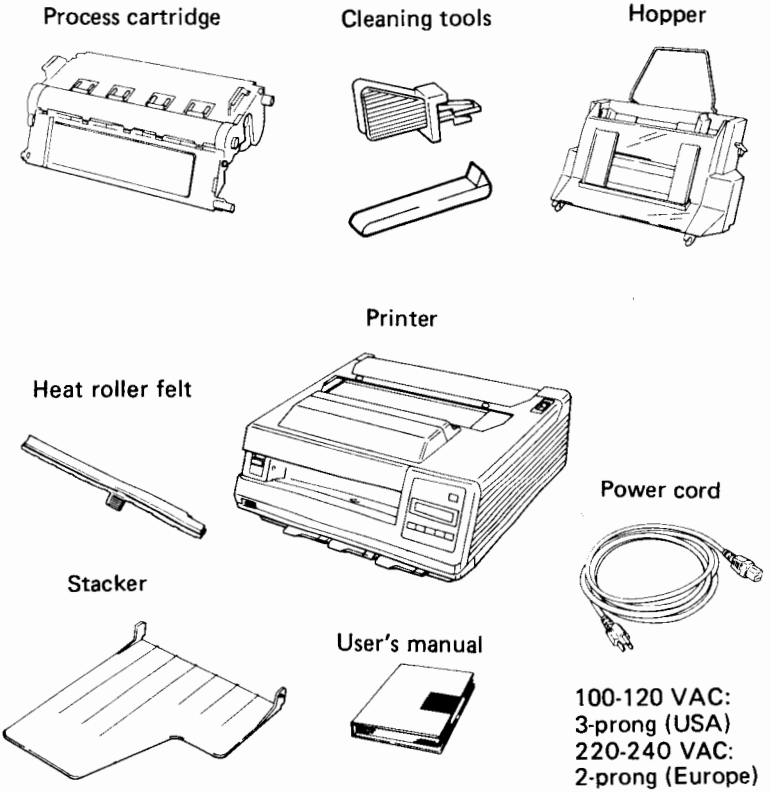
2. Remove restraints from the hopper.



Hopper restraints

Checking for Missing Components

After you unpack your printer, be sure you have all of the components below. If anything is missing, notify your dealer, distributor, or shipping agent.



Printer and components

Installing Components

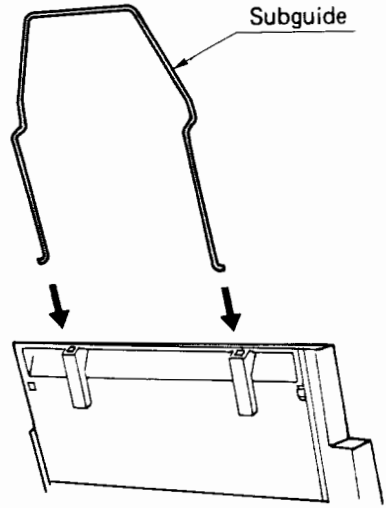
The printer has a hopper and stacker for cut sheets. It also has a process cartridge for developing images. Install the following components.

- Hopper
- Stacker
- Process cartridge
- Heat Roller Felt (packaged with the process cartridge)

Hopper

When you use only the standard hopper, install it in the opening toward the front of the printer, marked BIN 1. The opening at the back of the printer, marked BIN 2, is for a second, optional hopper.

1. Insert the ends of the subguide into the openings of the two grooves at the rear of the hopper.

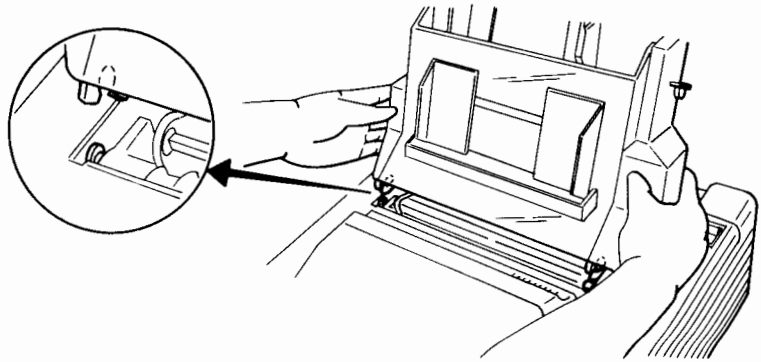


Setting the subguide

2. Fit the left and right mounting arms of the hopper over the left and right positioning stays of the printer.

3. Seat the hopper flush in the opening to engage hopper and printer gears.

The hopper is simple to mount and remove. Note that hoppers need not be removed when the printers top cover is opened.

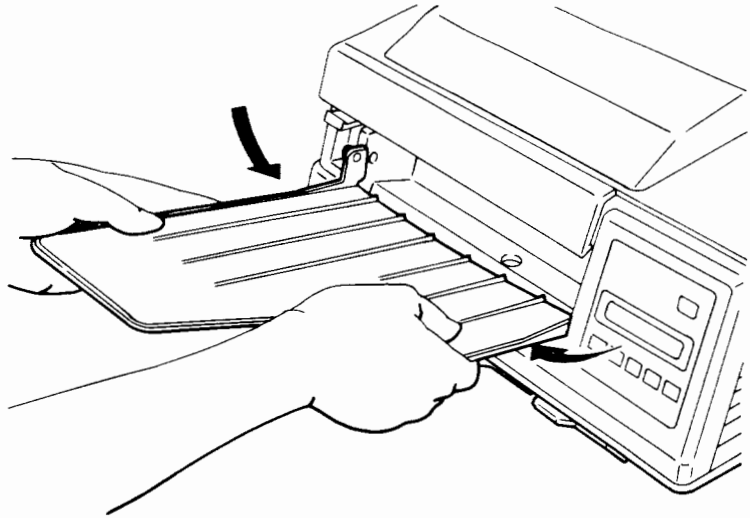


Installing the hopper

Stacker

1. Hold the stacker with the mounting arms up.

2. Insert first the left peg, then the right peg, into the holes at left and right as shown in the figure.



Installing the stacker

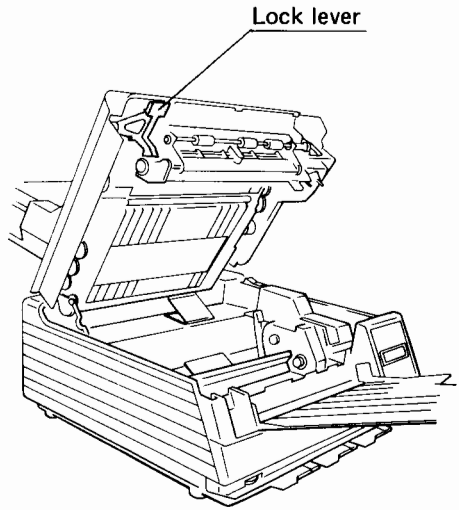
NOTE:

Take accumulated sheets out of the stacker before they exceed the marking on the cover.

Take an overhead transparency sheet out of the stacker each time when you print on it.

Process Cartridge

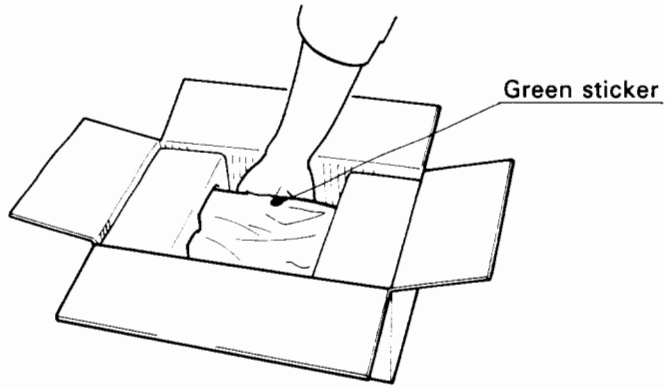
1. Push the lock lever on the top cover up to release the cover lock, then open up the cover.



Opening the top cover

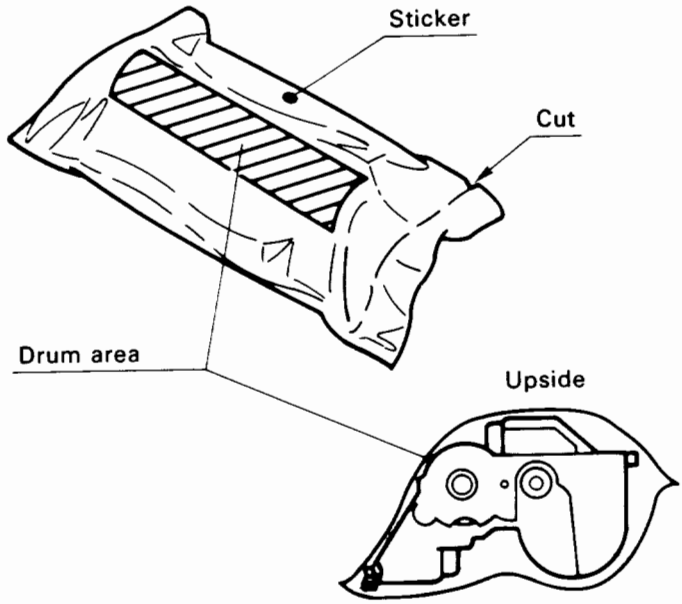
2. Unpack the process cartridge as shown below.

   a. Insert a hand between the aluminum bag and box at the side of green sticker and take the bag out.



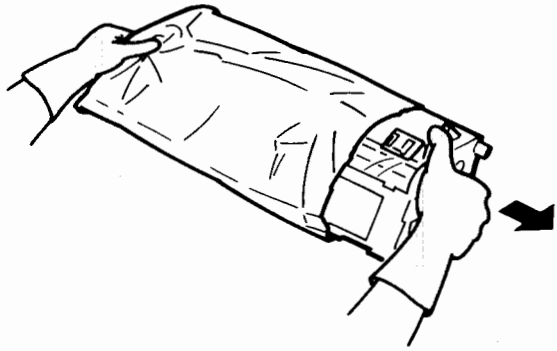
Taking out the process cartridge bag

   b. Tear open the aluminum bag from the cut. Do not turn the bag upside down.



Unpacking the bag

c. Hold the side frame and take the process cartridge out. Be sure to use the gloves provided in the package.

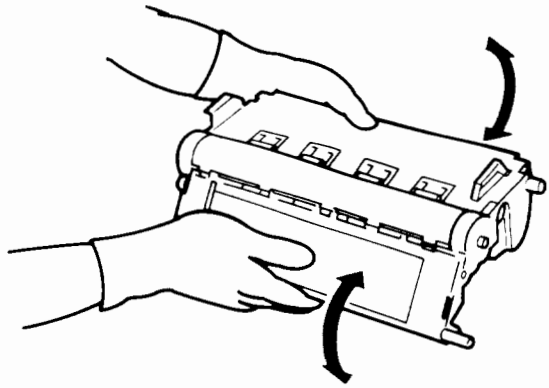


Taking out the process cartridge

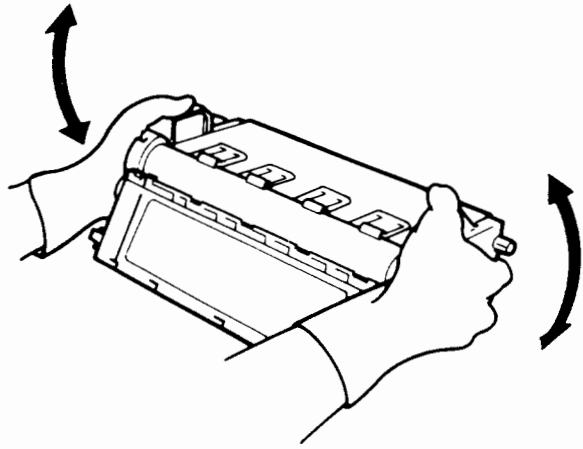
CAUTION:
Be careful not to touch or damage the drum surface when handling the cartridge.

3. To distribute the toner evenly in the process cartridge, rock the cartridge gently in the two directions as shown below.

Direction 1

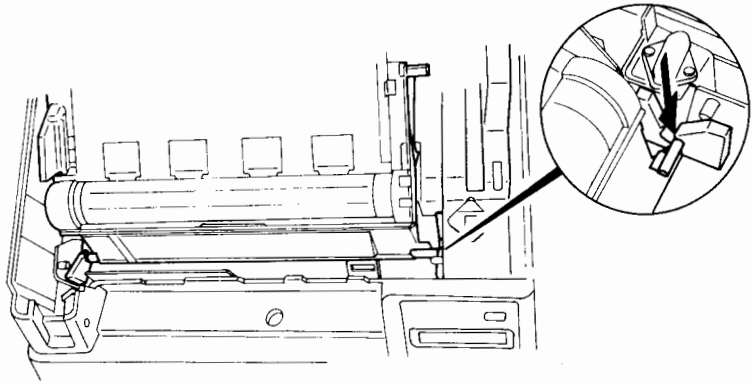


Direction 2



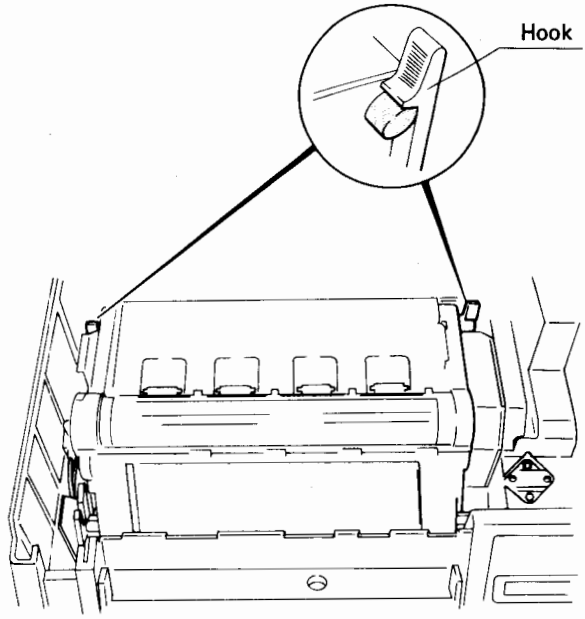
Distributing toner in the process cartridge

4. Grasping the handles on the top of the process cartridge, slide the positioning studs down along the grooves into place in the notches at the bottom of the grooves.



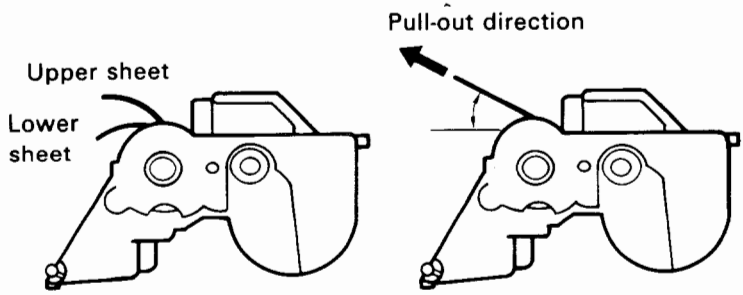
Mounting the process cartridge

5. Tip the process cartridge gently back until it engages with the hooks and snaps into place.

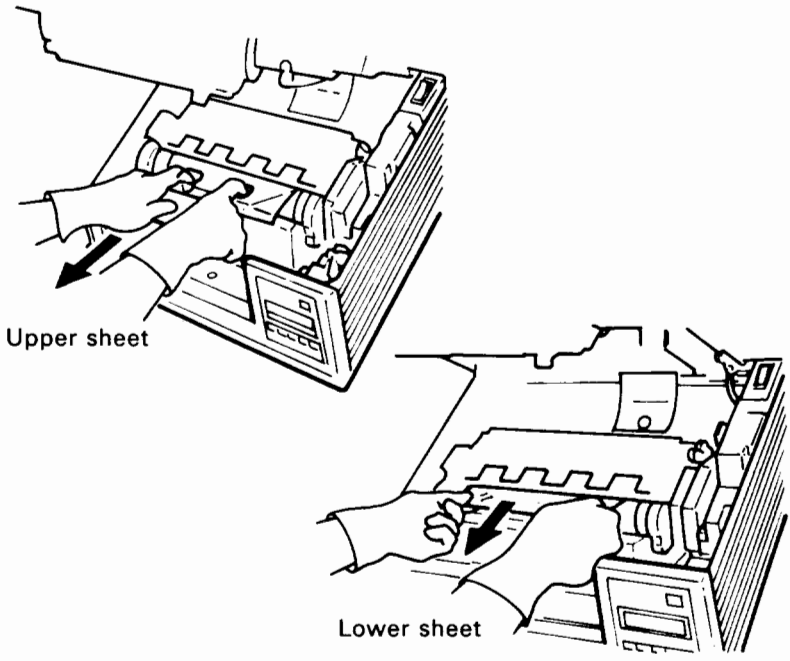


Snapping the process cartridge into place

6. Gently remove the two sealing sheets from the photoconductive drum by pulling out the end of each sheet at an angle of 30° with the horizontal surface. Use both hands.



Sealing sheets and pull-out direction



Removing the sealing sheets

CAUTION:

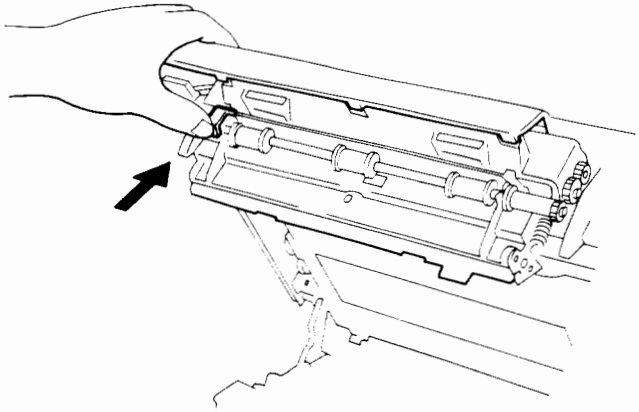
To maintain the quality of the process cartridge, exercise the following care in handling it.

- Do not touch the drum with bare hands. Finger prints, oil, and dirt will damage the drum.
- Do not leave the top cover of the printer open more than three minutes. Light may damage the photoconductive material.
- Do not place the process cartridge on its drum surface or stand it.
- Do not tilt or turn the used cartridge upside-down, because the toner will spill.

Heat Roller Felt

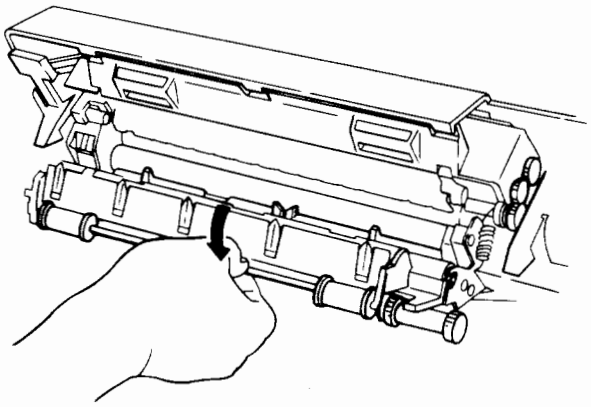
The heat roller felt (for cleaning the heat roller) is included in the bag that contains the process cartridge.

1. Push up the lock lever of the heat roller housing at the left front of the top cover.



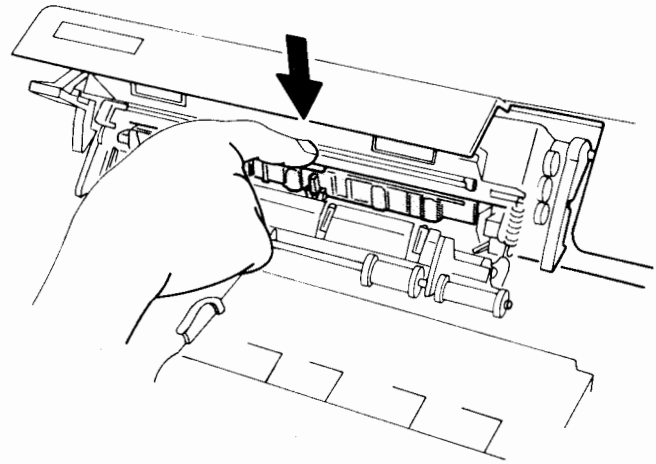
Unlocking the lever

2. Pull the exit roller shaft out and down to open the housing containing the felt.



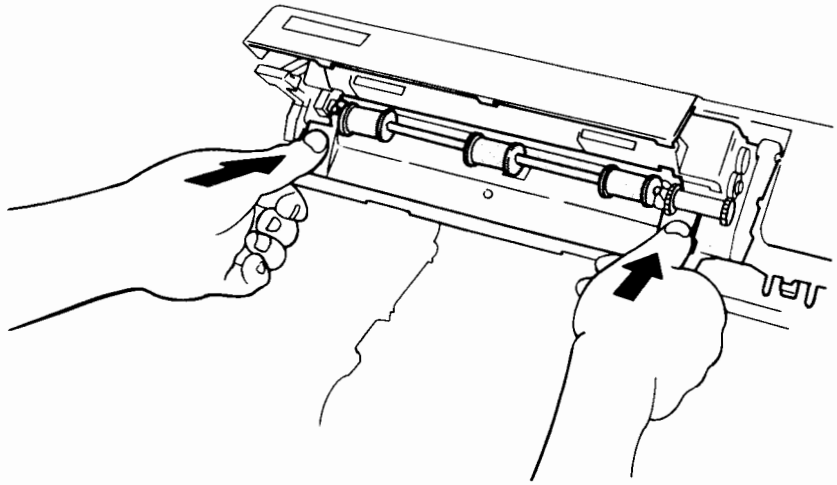
Opening the housing

3. Fit the felt in the housing, with the felt surface toward the roller.



Installing the felt

4. Close the housing gently until the exit roller shaft clicks locked into place.

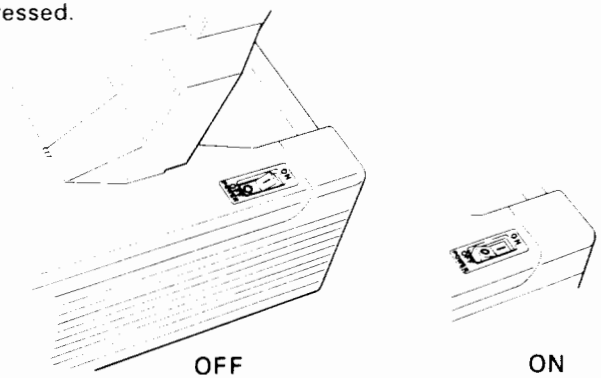


Closing the housing

Power Connection and Activation

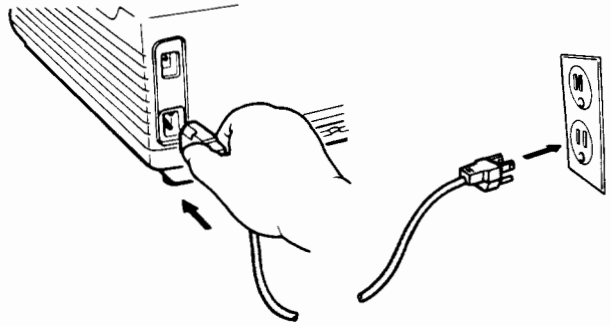
For safety, the ground pin of the power cord plug must be grounded. Therefore, the power outlet must match printer power plug and be properly grounded. The types of power cord plug differ with the input voltage (100 to 120 VAC or 220 to 240 VAC) indicated on the manufacturer's nameplate on the back of the printer. The type of power receptacle outlet also differs with your home, shop, laboratory, or country. Have plugs that don't match replaced by qualified personnel or use a proper plug converter. Because of possible radiation interference, the power cord must not be longer than 3 meters.

1. Make sure the power is off. The side of the switch marked o is pressed.



Printer power switch

2. Plug the power cord into the power connector at the back of the printer, then plug the end into a proper power outlet.

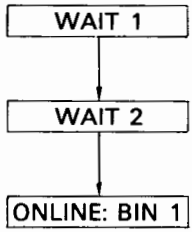


Connecting an AC power cord

3. Turn the power switch on

When the power is turned on, the printer operates as follows:

- The POWER lamp lights.
- The main motor rotates to initialize the mechanism and clean the drum.
- The control panel displays the following messages:

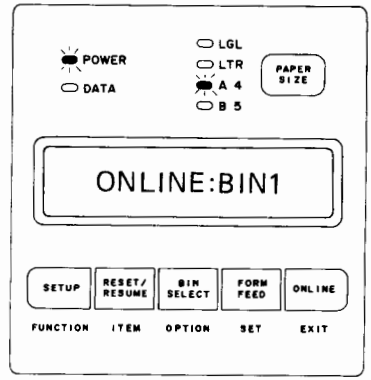


Wait state 1: Flashes.

Wait state 2: Flashes.

Online status with bin 1 selected.

It takes about 50 seconds for the printer to become ready.



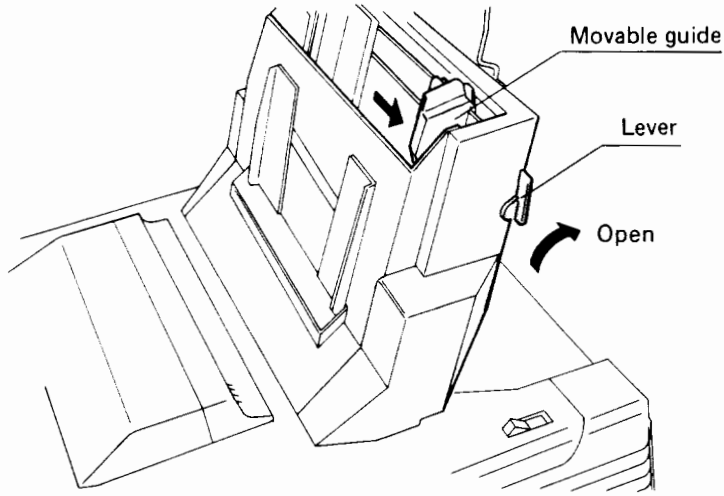
Initial control panel indication

Loading Paper

The printer handles a variety of paper types and sizes. See **Appendix A** for specifications or ask your dealer whether a specific type of paper can be used.

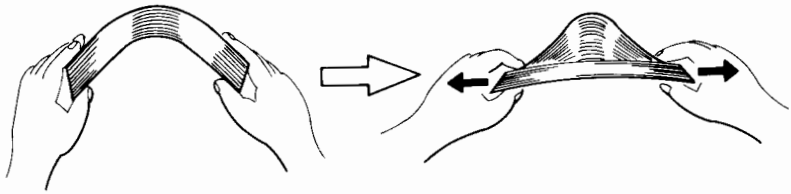
> **NOTE:**
> Curled paper may cause a jam.
>
> Do not use printed paper.

1. Push up the lever on the right side of the hopper to release the pick roller, then push the movable guide as far to the right as possible.



Releasing the pick roller

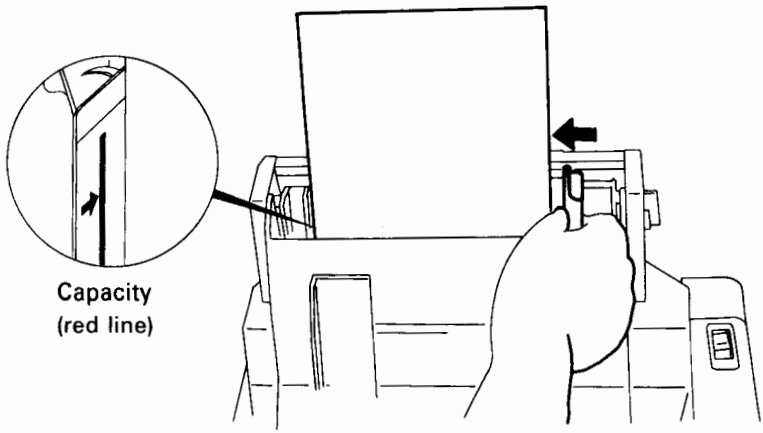
2. Take a stack of paper out of the package and riffle it (bend the stack forward and backward several times) to prevent sheets from sticking together.



Riffling the paper

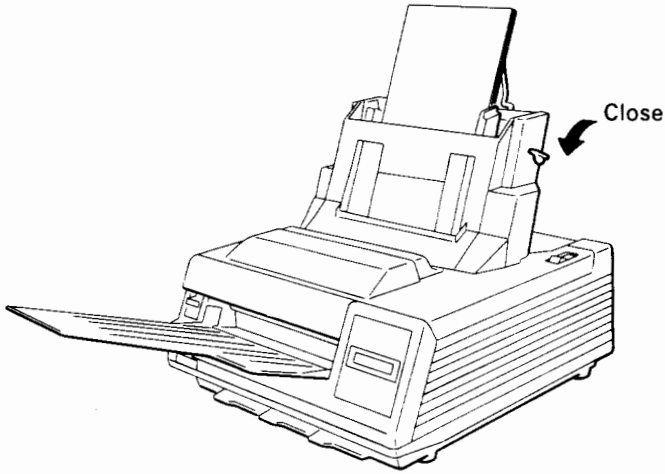
3. Put the stack of paper into the hopper bin, snug against the fixed guide, and adjust the movable guide for the width of the paper. For paper too long for the bin, pull up the bin's subguide.

> **NOTE:**
> Do not load paper exceeding the specified capacity, indicated by the red line on the fixed guide.
>
> **Use manual feed slot when you use overhead transparencies.**



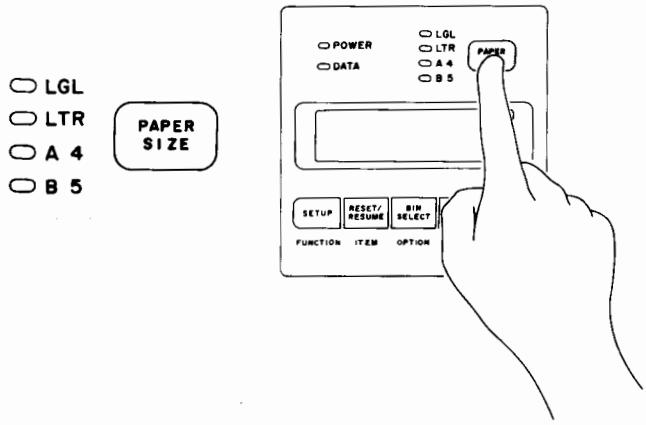
Positioning paper

4. Push down the lever to fix paper in place.



Fixing paper in place

5. Press the PAPER SIZE button on the control panel repeatedly until the indicator corresponding to the size of the paper you have loaded lights.



Selecting a paper size on the control panel

CAUTION:

A wrong setting of the paper size may cause printing outside the paper itself.

NOTE:

While the manual feed slot is selected, the four paper size indicators are all off.

Any size 148 to 360 mm long (241 to 360 mm long for bin 2) by 100 to 216 mm wide (sheets smaller than legal size) can be used. For these, select legal size (LGL).

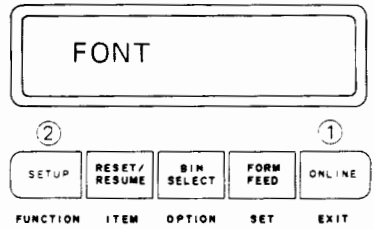
Printing Test Pages and Adjusting Print Density

The printer has a test-print function that lets you check printer operation and print quality. The test-print page has a "barber pole" pattern of resident courier 10 characters.

Start the test-print by the following procedure.

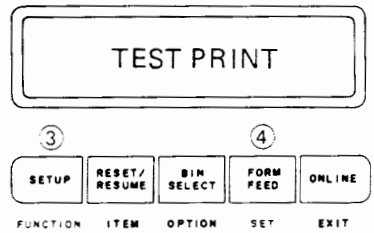
1. Press ONLINE to put the printer offline - OFFLINE:BIN 1 (if bin 1 is selected).

   Press SETUP to enter the setup mode - SETUP, then FONT.



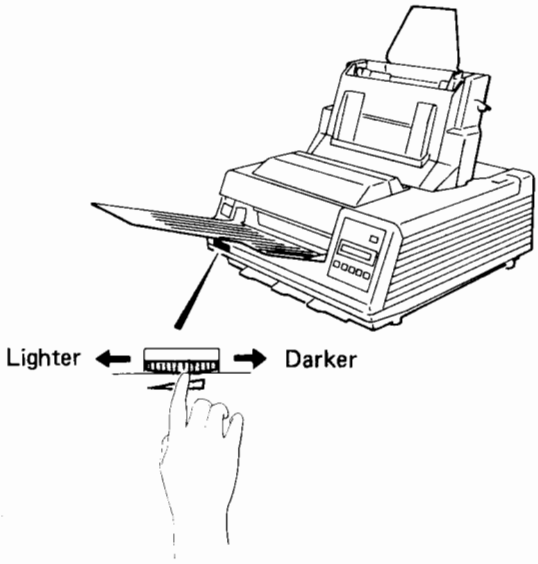
Entering setup mode

2. Press FUNCTION repeatedly until the message displays TEST PRINT, then press SET to start printing. The printer will print a test page, then stop.



Test printing

3. For printing that is too heavy or light, adjust the print density dial at left front on the printer.



Adjusting print density

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijkl
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklm
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
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789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$
89:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%
```

Test-print printout

Connection to a Computer

This printer is connected to a computer through the parallel (Centronics) and serial (RS-232C) interface connectors on the back of the printer. One of these connectors is always blocked by a slide. The slide can be moved easily manually right or left.

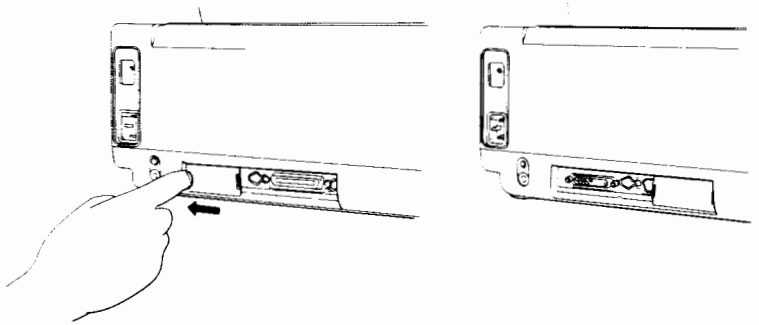
The printer is shipped without interface cables. Interface cables must have the following plugs at the printer end:

Parallel: 36-pin male contact (Amphenol 57FE-30360 or equivalent)
Serial: 25-pin male contact (Canon DB-25 or equivalent)

The cable should be as short as possible (no longer than 3 m) and its connector cover should be connected to the shield of the cable to avoid possible radiation interference.

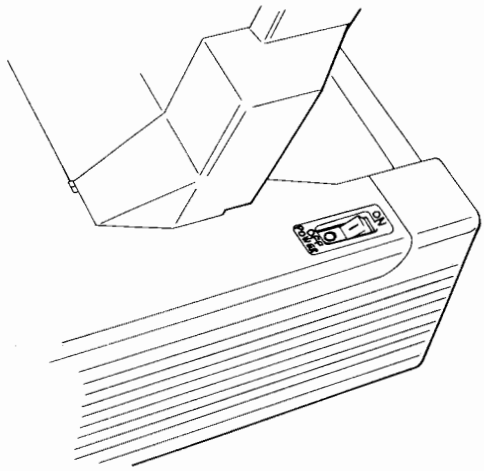
If you use a parallel interface port, you need only purchase one of the two types of Centronics interface cables (25-pin or 36-pin connector). However, if you use a serial interface port, you must choose a serial interface cable having the pin assignment of the computer interface, because the RS-232C has different pin assignments. Examples are given in **Appendix C**. Ask your dealer for details such as cable modifications.

Parallel interface **Serial interface**



Interface connectors

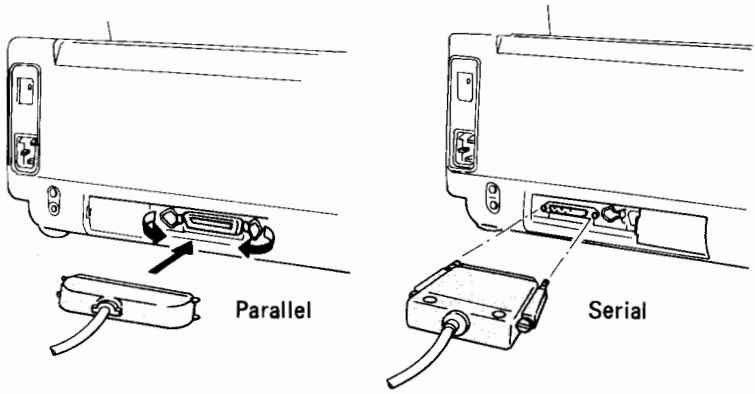
1. Check that both the printer and computer are turned off and unplugged.



Checking that the power is off

> **CAUTION:**
> Connecting the printer cable with the power on may seriously damage your printer or computer.

2. Put the slide in the correct position for the connector to be used. Connect one end of the cable to the printer and the other to the computer. To secure the plug, snap the spring latches inward (36-pin connector) or tighten the screws (25-pin connector).



Connecting the interface cable

Adjusting Printer and Computer Operation Modes

After checking that the printer operates correctly in offline mode, printer operation in online mode must be checked. The printer may not operate correctly or might not print documents in the correct format because the factory default settings of some of the printer's features (operating modes) do not match the corresponding specifications or settings of your computer or software.

These types of specification include the following:

- Serial interface specifications: Data format, baud rate, protocol, duplex mode, and control signal your computer uses for the serial interface. This is used only for the serial interface.

- Emulation: Type of printer (make and model) your software supports.

- Page format specifications and factors: Character orientation, character and line spacing, top margin, and print start position (left end) suitable for your documents. New line and auto CR and LF: these all depend on the control codes your computer sends at the end of each print line.

When first installing or changing your application software, you need to adjust your printer to match your computer and application software. This initial setup can be activated from the control panel.

Below are the minimum settings required for checking the physical connection of the interface.

For the parallel interface, the printer will print something if you select parallel interface connector and run a program providing simple print data from your computer.

For the serial interface, you must select serial interface from the control panel, then match the data format, baud rate, protocol, and control signal used between the printer and computer by selecting the proper parameters. Refer to the specifications for the serial interface in the documentation for your computer.

The procedures used during the first installation are as follows.

Parallel interface setting:

No setting usually needs to be made from the control panel because the printer is automatically set for parallel interface operation.

Serial interface setting:

	Display	Button	
1.	ONLINE:		Press ONLINE to put the printer offline, then SETUP to enter setup mode. SET UP, then FONT is displayed.
		ONLINE	
	OFFLINE:		
		SETUP	
	FONT		
2.		FUNCTION	Press FUNCTION repeatedly until INTERFACE is displayed.
	INTERFACE		
3.		ITEM	Press ITEM. FORMAT:8NONE1* is displayed, indicating that the printer has been set at the factory to handle data consisting of eight data bits with no parity bit and with a stop bit. Data always begins with a start bit. If this factory default does not match the data format of the computer's serial port, press OPTION repeatedly until the correct parameter is displayed. Other parameters are:
	FORMAT: 8NONE 1		
		OPTION	
	FORMAT: ----------		7MARK1, 7EVEN1, 7ODD1, 8EVEN1, and 8ODD1.
		SET	Press SET to store the parameter into RAM, then SET OK! is displayed.
	SET OK!		

	Display	Button	
4.		ITEM	Press ITEM. BAUD RATE:9600* is displayed. If this factory default does not match the baud rate of the computer's serial port, press OPTION repeatedly until the correct parameter is displayed. Other parameters are:
	BAUD RATE:9600		
		OPTION	
	BAUD RATE: ---------		19200, 4800, 2400, 1200, 600 and 300.
		SET	Then press SET to store the parameter into RAM.
	SET OK!		

The items in steps 3 and 4 can be replaced with changing the parameters in the computer by software, such as by the MODE command in MS-DOS.

5.		ITEM	Press ITEM. PROTOCOL:XON/XOF* is displayed indicating that the printer has been set at the factory to send the DC3 and DC1 codes to "tell" your computer to stop and restart sending data. If this factory default does not match the protocol of the computer's serial port, press OPTION repeatedly until the correct parameter is displayed. Other parameters are:
	PROTOCOL:XON/XOF		
		OPTION	
	PROTOCOL : ---------		DTR and RC.
		SET	The press SET to store the parameter into RAM.
	SET OK!		
6.		ITEM	Press ITEM. DUPLEX: Full* is displayed. This factory default cannot be changed.
	DUPLEX: FULL		

	Display	Button	
7.		[ITEM]	Press ITEM. CTRL:3WIRE* is displayed. This indicates that your printer ignores CTS, DSR, and CD signals from your computer. If this factory default is not the signal controlling of the computer's serial port, press OPTION to select the following parameter:
	[CTRL: 3WIRE]		
		[OPTION]	
	[CTRL: ----------]		FULLWIRE
	[SET OK!]	[SET]	Then press SET to store the parameter into RAM.
8.		[FUNCTION]	Press FUNCTION repeatedly until SAVE is displayed. Then press SET to save the new parameters as the new power-on default.
	[SAVE]		
		[SET]	
	[SET OK!]		
9.		[EXIT] ×2	Press EXIT twice to put the printer online. OFFLINE: BIN1, then ONLINE: BIN 1 is displayed.
	[OFFLINE:]		
	[ONLINE:]		

You must also select the correct parameters for other operating modes. Details are given in **Section 3** because they are not needed at this stage. Also see **Section 4**, or ask an experienced person or your dealer for information on these selections.

Printing

After the minimum requirements for communication between the printer and computer have been prepared, the test program below, in BASIC, can be used to check communication between the printer and computer. The printer will output the simple text in the program as entered. Of course, you can use a word processing program like Word Perfect or make a test program using MS-DOS if you prefer.

If your computer is an IBM PC/AT and its parallel (Centronics) port is used for the printer, start BASIC and enter the following program:

```
10 LPRINT "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
20 LPRINT "Communication successful!!"
30 LPRINT CHR$(13)
40 LPRINT CHR$(12)
50 END
```

If the serial (RS-232C) port is used, use the following program:

```
10 OPEN "COM1:9600,N,8,1" AS#1
20 PRINT #1, "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
30 PRINT #1, "Communication successful!!"
40 PRINT #1, CHR$(13)
50 PRINT #1, CHR$(12)
60 CLOSE #1
70 END
```

NOTE:

The first program can be used when you run the following MS-DOS Mode commands before starting BASIC:

```
MODE COM1: 9600,N,8,1,P
MODE LPT1: =COM1
```

After you enter RUN, the printer should print:

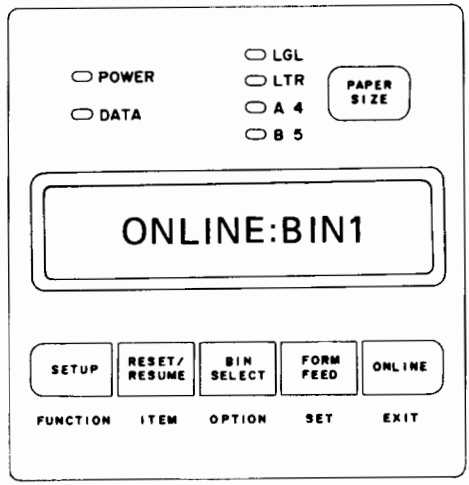
```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
Communication successful!!
```

This completes the testing of the printer in both offline and online modes. Next, familiarize yourself with the operation of the control panel, printer mode setting, and preparations needed for printing documents with your application software. See **Sections 3 and 4**.

SECTION 3
CONTROL PANEL

The control panel displays the printer status and is used to set printer operating modes. You should be familiar with the functions needed to set up operating modes when first installing the printer, adjust operating modes for the application software you are going to use, tell the printer that the specified consumables (process cartridge plus heat roller felt) have been changed, and so forth.

As explained in **Section 1**, the control panel uses a 16-character LCD, LED indicator lamps, and push buttons shown below.



Control panel

Modes and Functions

The control panel has two operation modes, normal and setup. Setup mode has a tree structure consisting of function, item, and option levels.

The control panel is put in setup mode by pressing SETUP while the printer is in normal mode offline with the DATA indicator off. It returns to normal mode offline when EXIT is pressed.

Normal

Normal mode has general-purpose functions used in everyday printer operation. Messages display the following:

- Online or offline status and bin selection status
- Error or alarm status
- Prompts
- Consumables outage alarms

Setup

Setup mode has a variety of functions mainly used for installing the printer and connecting it to your computer, for printing documents with specific font types or page settings, and for verifying printer operation. Information is displayed for three levels:

- Function
- Item
- Option

Push Buttons and Indicator Lamps

☐ POWER

Indicates that the printer power is on.

☐ DATA

Indicates that data is being sent from your computer or that there is data in the memory buffer.

NOTE:
To print data, press ONLINE in online mode or FORM FEED in offline mode.

☐ LGL
☐ LTR
☐ A4
☐ B5

PAPER SIZE

Indicates the size of paper to be used. Repeatedly pressing SIZE lights each of the four indicators, starting from the top and moving down, then starting from the top again. The size can be selected in any mode other than manual feed slot mode in which the four indicators has no meaning for selection and are all off.

LGL: Legal size (USA)
LTR: Letter size (USA)
A4: Letter size (Europe)
B5: Letter size (Japan)

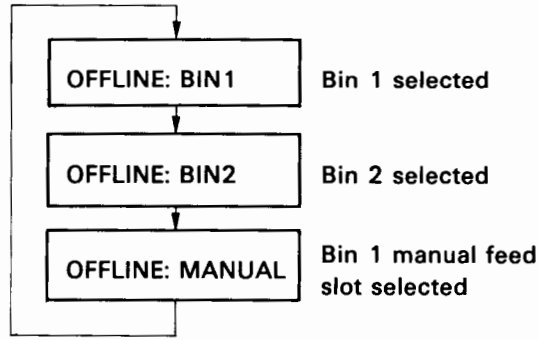
NOTE:
To use a size of paper other than one of the four above, select LGL.

SETUP FUNCTION	Normal	Sets the printer in setup mode when it is offline and the DATA indicator is off. The following message is displayed: FONT
	Setup	Advances the display so that a function can be selected. It also returns the dislay to the function level from a lower level.
RESET/ RESUME ITEM	Normal	Clears an error to resume operation, or initializes the printer. Initialization starts whenever the RESET switch is held down for more than three seconds. RESET is displayed after the three seconds, and initialization starts when the switch is released. Resuming is as follows: - Clears a serial interface communication error. - Ignores a paper mismatch alarm, uses the paper size specified by your computer, and restarts printing. - Feeds a sheet from a hopper where paper has been loaded after a paper outage and restarts printing. - Clears an IC card error.
	Setup	- Changes the display from the function level to the item level. - Changes the display from item to item. - When there is no item to be followed, the message END appears.

BIN SELECT

OPTION

Normal Selects the type of paper feed – from the bin 1 hopper, the bin 2 hopper, or the manual feed slot of the bin 1 hopper – in offline mode. Messages are displayed as follows. If a hopper is not mounted, the corresponding message is not displayed.



NOTE:
The new selection can be stored in the nonvolatile memory by using the control panel SAVE function (page 3-36).

Setup Selects an option from the option menu of an item.

FORM FEED

SET

Normal Prints data remaining in the printer's buffer (the DATA indicator is lit offline). If pressed again, the next page printing is suspended.

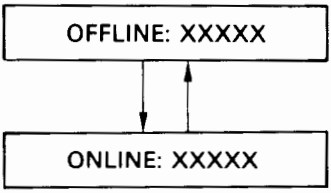
Setup Stores the selected options into RAM as temporary printer mode settings which become invalid if power is turned off.

The message SET OK! is displayed except when printing starts or another message is displayed.

ONLINE

EXIT

Normal Switches the printer from offline to online, or vice versa, when no error or operator check is indicated.
The message display changes as follows.



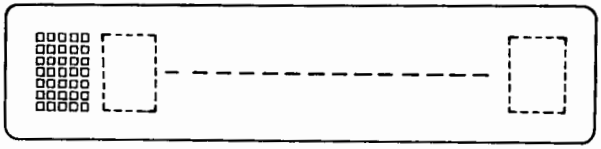
NOTE:
When switched offline during printing, the printer stops after printing the current page; any remaining pages are printed when the printer is put online again.

While the message REPLACE PARTS is displayed, it remains unchanged even if ONLINE is pressed.

Setup Returns the printer to normal mode.

Message Display

The LCD's 16 columns of 5 × 7 dot-matrix elements display all letters of the alphabet.



16-digit LCD

LCD screen

Normal Mode

The display indicates the following, followed by examples:

- Online or offline status and paper bin selection

ONLINE: BIN1

OFFLINE: MANUAL

MANUAL: Manual Feed Slot

- Operator check status prompting you to take some action

JAM 3

PAPER OUTAGE

- Hardware or software error status that may not be recoverable despite several retries.

FUSER ABNORMAL

ROM/RAM ERROR

- Interface error that may have to be recovered using a reset

COMM ERROR

MEMORY OVERFLOW

- Consumables outage alarm prompting replacement the displayed item

CHG CARTRIDGE

Setup Mode

The message display indicates one of the following types of menu:

- Function
- Item
- Option

Message types and message examples are given below for each level. For details, see the section on setup mode and structure (page 3-9).

Display messages

Level	Type	Example
Function	Function name	FONT MISCELLANEOUS EMULATION COPY
Item	Item name	RESIDENT IC CARD
Option	Item and option names or item name and option number separated by a colon	RESIDENT: 1 LANG: USA BAUD RATE: 9600 IC CARD: DIABLO COPIES: 5

Setup Mode and Structure

Setup mode functions are mainly used for changing printer operating modes that determine the font type, number of copies, line spacing, character spacing, top margin, interface characteristics, emulation, and so forth.

The setup mode's tree structure has the following levels:

Top level	Function
Middle level	Item
Bottom level	Item:option

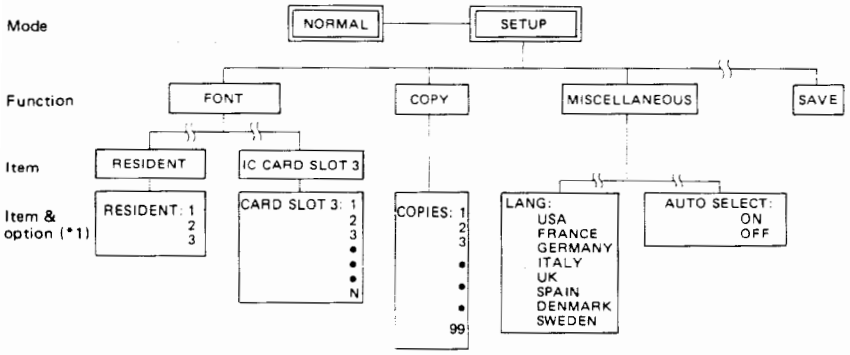
Some branches of the tree are on the top level only, others on both the top and bottom levels, and others are on all three levels.

Except for functions, the name or number displayed first when an item or option is selected is the default and is marked by an asterisk.

The option name or number at the bottom level follows the item name and a colon.

The flowchart on the next page shows how setup mode is organized. See the folding flowchart page at the end of this section for the detailed structure.

The tree structure of control panel functions in setup mode is as follows:



*1 Options are displayed following the item and colon.

Summary of the tree structure of setup mode functions

Function

A function represents a menu for selecting a printer operating environment (FONT, COPY, and MISCELLANEOUS) or a printer operation (SAVE).

When SETUP is pressed in normal mode, the printer enters setup mode and the first function (FONT) is displayed. After this, functions are selected by pressing FUNCTION.

Item

An item is a factor of the printer operating environment. There are two types of item.

Type 1: This is for items among which one is valid for a printing environment. Only the item name is displayed. (RESIDENT or IC CARD SLOT 3 in the above example)

Type 2: This is for items whose setting is valid regardless of the settings of other items. The item name is displayed with an option name without being displayed alone.(COPIES, LANG, and AUTO SELECT)

Selecting a function and pressing ITEM causes an item to be selected as follows:

Type 1: Default item (RESIDENT or IC CARD SLOT 3)

Type 2: First item and default option (COPIES: 1 and LANG: XXXX)

After this, items are selected by pressing ITEM as follows:

Type 1: Items other than the default (RESIDENT or IC CARD SLOT 3)

Type 2: Second and subsequent items and default option (AUTO SELECT: XX)

Option

Options are selected last. An option name or value is displayed following the item with a colon as a separator.

Selecting an item and pressing OPTION causes an option to be selected as follows:

Type 1: Default option (RESIDENT: X or CARD SLOT 3: X)

Type 2: Next option (COPIES: 2, LANG: XXXX, and AUTO SELECT: XX)

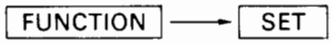
After this, options are selected by pressing OPTION.

Using Push-Button Switches in Setup Mode

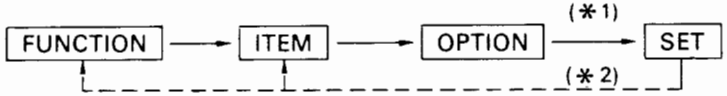
The five push-button switches on the control panel are generally used from left to right to start a function or set an option in setup mode. The printer enters setup mode when you put the printer offline and press SETUP.

Press FUNCTION, ITEM, and OPTION in the following order until the desired function, item, and option are selected, then press SET to start the function or set the option.

To start a function, such as test printing:



To set an option, such as a font:



*1 When only checking currently valid options, you do not need to press SET.

*2 When setting more than one option, you must return to ITEM if the next option is in the current function, or return to FUNCTION if not. You must press SET each time you set an option.

To make the new options defaults when power is turned on, start the save function.

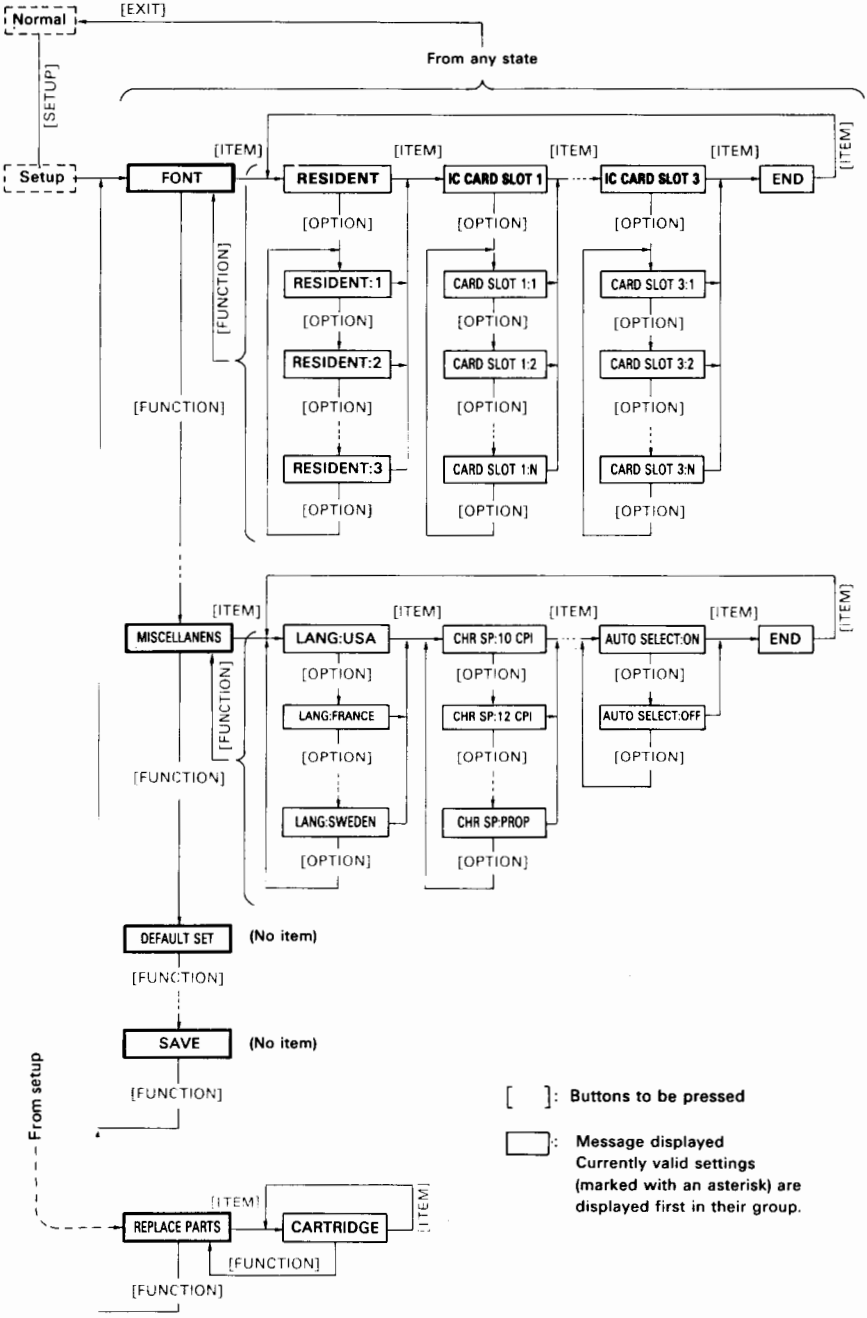
The printer returns to normal mode when you press EXIT.

NOTE:

Holding down FUNCTION, ITEM, or OPTION automatically advances the display. When you use OPTION in the font or copy function to select a font number or the number of copies, the display advances faster than usual to enable quick selection.

The last display wraps around (returns) to the first display on the same level.

Pressing FUNCTION during the selection of an item or option returns the display to the current function name.



Level transition in setup mode

Functions in Setup Mode

Setup mode functions are grouped in a hierarchy, with frequently used ones listed near the beginning. When you first select setup mode by pressing SETUP, the function FONT is displayed. Other functions can be selected by pressing FUNCTION.

Function summaries

Name	Function
FONT	To select a font type for printing a document
COPY	To specify the number of copies to be printed
MISCELLANEOUS	To format the page (e.g., line spacing, top margin) and to select hardware conditions (e.g., auto line feed, alarm beeping)
DEFAULT SET	To return temporarily changed operating modes to the default
TEST PRINT	To perform test printing
HEX DUMP	To print data, received from your computer, as a hexadecimal listing
LIST	To print out the available operating modes and options
INTERFACE	To set interface modes
EMULATION	To select a command emulation
SAVE	To set temporary operating modes as the new default when power is turned on
REPLACE PARTS (See Note.)	To notify the printer that the consumable item specified in the message prompt has been replaced

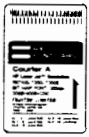
NOTE:
REPLACE PARTS is displayed right after the setup mode is selected while the printer displays the consumables outage alarm.

Font

ROM

ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

FONT



ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

In addition to the resident fonts, optional fonts can be added by using IC font cards. These cards can be inserted into any of the three slots on the lower front of the printer. See page 4-10 for details.

The message IC CARD SLOT n is displayed when a font card is inserted in the corresponding slot.

You cannot select a font for test printing, which always uses the resident courier 10 font (portrait).

Item/option message		Explanation
RESIDENT	*	Resident fonts
RESIDENT:	1 *	Font 1 (Courier 10, portrait)
	2	Font 2 (Courier 10, landscape)
	3	Font 3 (line printer, 16.66, portrait)
IC CARD SLOT 1		Optional fonts from the IC card in slot 1
CARD SLOT 1:	1	Font 1
	2	Font 2
	3	Font 3
	.	.
	.	.
	.	.
	N	Font N

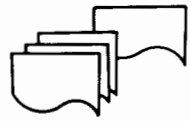
*: Factory setting

Item/option message		Explanation
IC CARD SLOT 2		Optional fonts from the IC card in slot 2
CARD SLOT2:	1	Font 1
	2	Font 2
	3	Font 3
	.	.
	.	.
	.	.
	N	Font N
IC CARD SLOT 3		Optional fonts from the IC card in slot 3
CARD SLOT3:	1	Font 1
	2	Font 2
	3	Font 3
	.	.
	.	.
	.	.
	N	Font N

NOTE:
To see which optional fonts are on the cards in the IC card slots, use the LIST function. This prints out the slot number, font numbers and names, and additional information about the fonts on each card.

Copy

COPY



n copies

You can print copies up to 99 copies.

Item/option message		Explanation
COPIES:	1 *	One copy (default)
	2	Two copies
	3	Three copies
	.	.
	.	.
	.	.
	99	99 copies

*: Factory setting

NOTE:
The power-on default value, one copy, cannot be changed.

Miscellaneous

MISCELLANEOUS

An option must be selected for each item to suit printer operating modes for your computer and for page formatting and other items of your document.

Item/option message		Explanation
LANG:		Language (International character set) Not valid for HP LaserJet Plus and IBM Proprinter emulations. See **Section 4**.
	USA *	American English (ASCII set)
	FRANCE	French (ç, à, è, ù, etc.)
	GERMANY	German (ä, ö, ü, ß, etc.)
	ITALY	Italian (ç, ò, è, ì, etc.)
	UK	British English (£)
	SPAIN	Spanish (Pt, i, ñ, ¿, etc.)
	DENMARK	Danish (æ, ø, ü, å, etc.)
	SWEDEN	Swedish (o, å , ä, é, etc.)

*: Factory setting

Item/option message		Explanation
CHR SP:		Character or word spacing Not valid for HP LaserJet Plus emulation Actual results depend on the emulation and font selected. See **Section 4**.
	10 CPI *	10 characters per inch ABCDEFGHIJKLMNOPQ
	12 CPI	12 characters per inch ABCDEFGHIJKLMNOPQ
	15 CPI	15 characters per inch (D630)
	17.1 CPI	17.1 characters per inch (FX-85 and IBM-PRO)
	PROP	Proportional spacing (Invalid for fixed-pich fonts) ABCDEFGHIJKLMNOPQ
LINE SP:		Line spacing (lines per inch) 6 LPI 8 LPI 3 LPI
	6 LPI *	ABCD ABCD ABCD ABCD ABCD
	8 LPI	ABCD ABCD ABCD ABCD ABCD
	3 LPI	ABCD ABCD ABCD ABCD ABCD

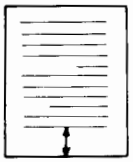
*: Factory setting

Item/option message	Explanation
TOP MARG:	Top Margin Invalid and not displayed for HP LaserJet emulation. See **Section 4**. The actual distance depends on the line spacing selected. See the previous item. Characters within or touching the unprintable area are lost and not printed.
0 LINE *	0 line
1 LINE	1 line
2 LINE	2 lines
.	.
.	.
.	.
15 LINE	15 lines

n lines

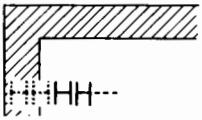
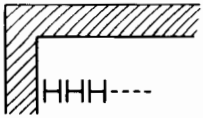
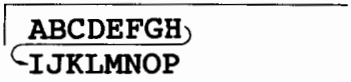
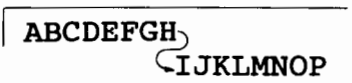
*: Factory setting

Item/option message		Explanation
BTM MARG:		Bottom Margin Invalid and not displayed for the HP LaserJet Plus emulation. See **Section 4**. The actual distance depends on the line spacing selected and includes a fraction of a line because the paper length cannot be divided by the line spacing. Characters within or touching the unprintable area are lost and not printed.
	0 LINE *	0 line
	1 LINE	1 line
	2 LINE	2 line
	.	.
	.	.
	.	.
	15 LINE	15 line

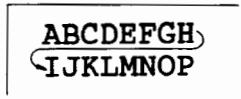
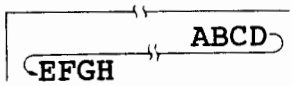
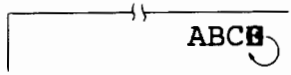


n lines

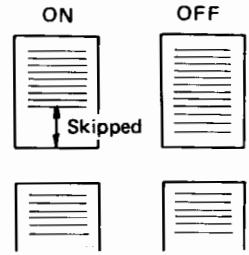
*: Factory setting

Item/option message	Explanation
LEFT END:	Left most point at which printing of a line can begin. Invalid and not displayed for the HP LaserJet Plus emulation. See **Section 4**. The actual left margin is based on the "leftend" and depends on the character spacing selected. See **Section 4**.
1	Starts at the leftmost column on the paper. Dotted characters are not printed. 
2 *	Starts at the leftmost column in the printable area. 
NEW LINE:	New line Invalid and not displayed for FX-85 emulation. Changes the LF code movement.
ON	Carriage return included. 
OFF *	Line feed only 

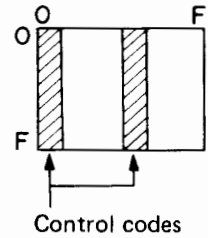
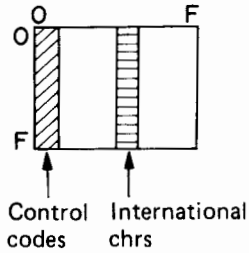
*: Factory setting

Item/option message		Explanation
AUTO LF:		Automatic line feed Changes the CR code movement.
	ON	Line feed included. 
	OFF *	Carriage return only 
AUTO CR:		Automatic carriage return Invalid and not displayed for the Epson FX-85 and IBM Proprinter emulations. Determines the next print position when the right end of the print line is detected.
	ON	Carriage return and line feed 
	OFF *	No operation (overprinting at the right end of the line) 

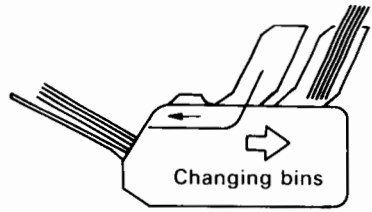
*: Factory setting

Item/option message	Explanation
PERF SKIP:	Perforation skipped Invalid and not displayed for the Diablo 630, Epson FX-85, and IBM Proprinter emulation. Determines the next print position when the bottom margin is detected.
ON *	Form feed
OFF	No operation (printing on the bottom margin) 
ZERO:	Zero font Invalid and not displayed for the HP LaserJet Plus and Diablo630 emulations. Selects the font type for the character zero.
NORMAL *	0
SLASH	Ø

*: Factory setting

Item/option message		Explanation
CHARACTER SET:		Character set Invalid and not displayed for the HP LaserJet Plus, Diablo 630, and FX-85 emulations. Selects one of IBM character sets 1 and 2.
	1	Set 1 (English): two sets of control codes 
	2 *	Set 2 (Other than English): International characters and one set of control codes 

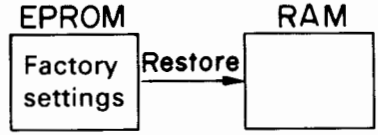
*: Factory setting

Item/option message	Explanation
BEEP:	Beep Invalid and not displayed for HP LaserJet Plus emulation. Controls the buzzer for the BEL code.
ON *	Buzzer activated
OFF	BEL code ignored
AUTO SELECT:	Automatic bin selection Controls bin selection if one of the two hoppers runs out of paper.
ON	Switches to the other bin, if any and loaded with paper. 
OFF *	Stops printing and displays a prompt.

*: Factory setting

Default Setting

DEFAULT SET



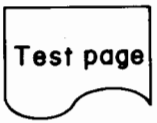
Operating modes are returned to the factory defaults except for the emulation and interface setting.

This is useful when you have changed operating modes for an application and prepare the next application.

The factory defaults cannot be changed by the user, but power-on defaults can be changed by selecting new parameters and activating the SAVE function.

Test Printing

TEST PRINT



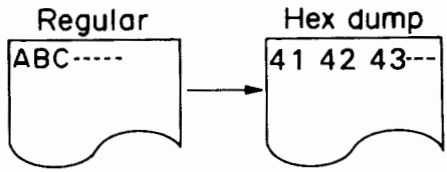
You can print a test page for checking that the printer is operating correctly. The test page has a "barber pole" pattern consisting of 96 ASCII characters shifted one character to the left each time a line is fed.

You cannot sselect a font for test printing, which always uses the resident courier 10 font (portrait).


```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijkl
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklm
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{
123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }
23456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~
456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !
56789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"
6789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#
789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$
89:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%
9:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&
:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'(
<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()
=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*
>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+
?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-.
BCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./
CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./0
DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./01
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./012
FGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./0123
GHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./01234
HIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./012345
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./0123456
JKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./01234567
KLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./012345678
LMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./0123456789
MNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./0123456789:
NOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{ }~ !"#$%&'()*+,-./0123456789:;
```

Hexadecimal Dump

HEX DUMP

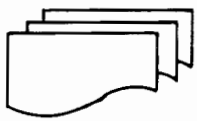


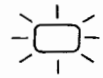
The hexadecimal (hex) dump is a debug tool helpful when troubleshooting the printer or debugging a computer program. Print data, including escape commands, from the computer are printed as two-digit hexadecimal values rather than ASCII.

For convenience, each line of hexadecimal values is followed by a line where printable characters are printed as characters and nonprintable characters are printed as periods. For unexpected printing results, it is possible to check whether the correct characters and commands are being sent to the printer.

Control panel messages and push button functions are the same in hex dump mode as in regular online status.

> **NOTE:**
> Set this mode right after the power-on initialization, or hex dump listing may have an abnormal print format.

	Display	Button	
1.	HEX DUMP	SET	Press SET, then EXIT when HEX DUMP is selected. SET OK! then OFFLINE: BIN1 is displayed if bin 1 selected.
	SET OK!	EXIT	
	OFFLINE: BIN 1		
2.		ONLINE	Press ONLINE. ONLINE:BIN1 will be displayed.
	ONLINE: BIN 1		
3.			Start the computer program. A hex dump listing will be printed.

4.  DATA

ONLINE

OFFLINE: BIN 1

If the printer stops with DATA lit, press ONLINE, then FORM FEED, to print data remaining in the printer buffer.

FORM FEED

5. POWER Turn the power off.

NOTE:

Printing starts when data is stored for a full page listing.

Because each line is 70 characters long, check the paper size and character spacing to be sure that the dump format is correct.

You must turn the power off to release the printer from this mode.

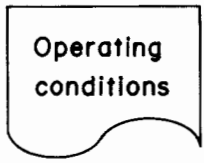
Control panel

Hexadecimal dump																ASCII characters
00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	.....
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	.....
20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F	!"#$%&'()*+,-./
30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F	0123456789:;<=>?
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	@ABCDEFGHIJKLMNO
50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	PQRSTUVWXYZ[\]^_
60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F	`abcdefghijklmno
70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F	pqrstuvwxyz{|}~▒
80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	
90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F	
A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF	ÀÁÈÊËÎÏ´ˆ˜¨ÙÛ£
B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF	°ÇçÑñ¡¿¤£¥§ƒ¢
C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF	âêôûáéóúàèòùäëöü
D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF	ÂîØÆåíøæÄìÖÜÉïßÔ
E0	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF	ÁÃãÐdÍÌÓÒõŠšÚŸÿ
F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF	Þþ ¬½¼ª²«␣»±

Hex dump Listing

Listing

LIST



Listing enables you to check the following conditions:

- Operating mode options stored in RAM; these are not the defaults stored in nonvolatile memory.
- Fonts and emulations available from the resident ROM and IC cards (if any)
- Firmware revisions and levels

```
----------PRINTER INTERNAL STATUS----------

FONT              :RESIDENT:01

 -RESIDENT-
   PORTRAIT
    *01 Courier10          ROMAN-8
     03 LnPrinter17        ROMAN-8

   LANDSCAPE
     02 Courier10          ROMAN-8


 -CARD SLOT 1-
   PORTRAIT

   LANDSCAPE
     01 PrstgElite12       ROMAN-8
     02 PrstgElite12.B     ROMAN-8
     03 PrstgElite12.I     ROMAN-8
     04 PrstgElite17       ROMAN-8
     05 PrstgElite17.B     ROMAN-8


 -CARD SLOT 2-
   PORTRAIT
     01 Swiss12p           ROMAN-8
     02 Swiss12p.B         ROMAN-8
     03 Swiss12p.I         ROMAN-8

   LANDSCAPE


 -CARD SLOT 3-
   PORTRAIT
     01 Swiss14p           ROMAN-8
     02 Swiss14p.B         ROMAN-8
     03 Swiss14p.I         ROMAN-8

   LANDSCAPE

FORMATTING
  LINE SP          :6LPI
  NEW LINE         :OFF
  AUTO LF          :OFF
  AUTO CR          :OFF

FUNCTION
  COPIES           :01
  PERF SKIP        :ON
  AUTO SELECT      :OFF

INTERFACE
  FORMAT           :8NONE1
  BAUD RATE        :9600
  PROTOCL          :XON/XOF
  DUPLEX           :FULL
  CTRL             :3WIRE
  PARALL TIMING    :2

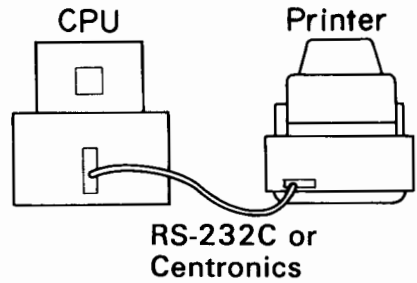
MEMORY(RAM)        :0.64MB

EMULATION
  RESIDNT          :HP LJ+

REVISION           :004
```

Interface

INTERFACE

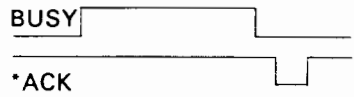
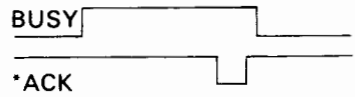


The serial (RS-232C) interface operating modes must be selected based on the I/O port of your computer or modem. See **Appendix C** and refer to computer or modem documentation on I/O interface settings.

The parallel (Centronics) interface busy timing setting may be required, depending on your computer model.

Item/option message		Explanation
FORMAT:		Serial data format
	8NONE1 *	8-bit data, no parity, one stop bit
	7MARK1	7-bit data, logical 1 fixed parity, one stop bit
	7EVEN1	7-bit data, even parity, one stop bit
	7ODD1	7-bit data, odd parity, one stop bit
	8EVEN1	8-bit data, even parity, one stop bit
	8ODD1	8-bit data, odd parity, one stop bit
BAUD RATE:		Baud rate (bits per second)
	19200	Select a speed compatible with your computer or modem.
	9600 *	
	4800	
	2400	
	1200	
	600	
	300	

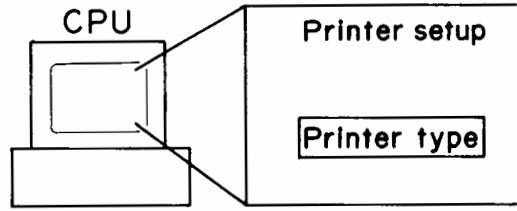
*: Factory setting

Item/option message		Explanation
PROTOCL:		Protocol (printer ready status control)
	DTR	Data Terminal Ready signal used
	XON/XOF*	DC1 and DC3 codes used
	RC	Reverse Channel signal used
DUPLEX:		Duplex data transmission mode
	FULL	Simultaneous bidirectional transmission
CTRL:		Control signals used for communication
	3WIRE *	TD, RD, and DTR (or RC) used Setting for most personal computers
	ALLWIRE	All signals used except CD Setting for computers that use CTS and DSR
PARALL TIMING:		Busy signal timing control (parallel interface only)
	1 (*)	ACK is outside BUSY.
		
	2 *	ACK is inside BUSY.
		

* : Factory setting
(*): Factory setting for emulations other than HP LaserJet Plus

Emulation

EMULATION



In addition to resident emulation, you can use different emulations by installing an optional emulation IC card in slot 1.

The message IC CARD is displayed when an emulation card is inserted in slot 1. The option name is displayed when it is included on the card.

Item/option message	Explanation
RESIDNT	Resident emulations
RESIDNT: HP LJ+ *	HP LaserJet Plus printer
IC CARD	Optional emulations from the IC card in slot 1
IC CARD: DIABLO	Diablo 630 API printer
FX-85	Epson FX-85 printer
IBM-PRO	IBM Proprinter XL

*: Factory seting

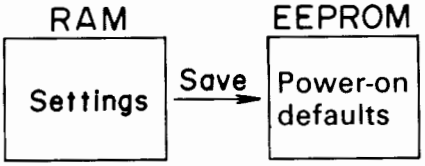
CAUTION:
While an IC card emulation is selected, never remove the IC card.

Changing the emulation initializes the printer (to the factory defaults) when it is returned to normal mode (WAT 1 and WAIT 2 messages appear when SET button is pressed).

When DATA is lit, changing the emulation will cause remaining data to be lost.

Save

SAVE



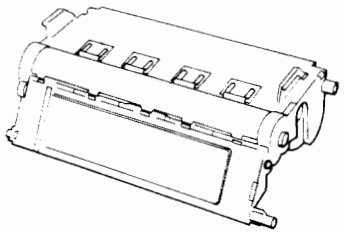
SAVE sets temporary operating modes as the new default when power is turned on.

The contents of RAM are stored in nonvolatile memory (EEPROM). The new default remains to in effect even if the printer is turned off.

The bin selected setting is also saved but the number of copies is not be saved.

Replacing Parts

REPLACE PARTS



Your printer counts the number of pages printed and prompts that a consumable item (process cartridge) must be replaced when the count reaches the lifetime of the item.

This enables you to notify the printer that you have replaced the consumable item.

> **NOTE:**
> "Replace Parts" is displayed when the printer enters setup mode after the lifetime of the process cartridge is reached.

The following procedure is when the count reaches the lifetime of the process cartridge. If you replace the cartridge for some reason, put the printer in setup mode and press the FUNCTION button until REPLACE PARTS is displayed, then follow steps 6 to 8.

	Display	Button	
1.	CHG CARTRIDGE ONLINE: BIN 1		If a message prompting that the process cartridge be replaced is displayed when the printer is printing in online with bin 1 selected, CHG CARTRIDGE and ONLINE: BIN 1 are displayed alternately.
2.		POWER 0	Turn printer power off and replace the cartridge, but you can let the printer continue printing in the above condition.
3.		POWER 1	Turn power on. The prompt is displayed again.
	CHG CARTRIDGE ONLINE: BIN 1		
4.		ONLINE	Press ONLINE. The printer enters offline with the same prompt.
	CHG CARTRIDGE OFFLINE: BIN 1		
5.		SETUP	Press SETUP. REPLACE PARTS is displayed.
	REPLACE PARTS		
6.		ITEM	Press ITEM. CARTRIDGE is displayed.
	CARTRIDGE		
7.	SET OK!	SET EXIT	Press SET then EXIT. SET OK! then OFFLINE: BIN 1 is displayed if bin 1 selected.
	OFFLINE: BIN 1		
8.		ONLINE	Press ONLINE. ONLINE:BIN1 is displayed.
	ONLINE: BIN 1		

NOTE:
Pressing SET without replacing an item resets the page counter.

Messages and Codes

Message tables displayed in normal and setup modes are given below in alphabetic and numerical sequence.

Normal mode

Message	Explanation
(No display)	Right after power is turned on
BIN1 NOT MOUNTED	The first hopper is not mounted
BIN2 NOT MOUNTED	The second hopper is not mounted
CHG CARTRIDGE	Process cartridge replacement required
COMM ERROR	Serial interface communication error
COVER OPEN	Cover open
CROSS FAN ALARM	Cross-flow fan not rotating
FUSER ABNORMAL	Fuser abnormal
HARD ERROR	Controller hardware error
IC CARD ERROR	IC card removed during printing
JAM3	Jam in hopper bin 1
JAM4	Jam at the process cartridge
JAM5	Jam at the fuser
JAM7	Jam in hopper bin 2
MEMORY OVERFLOW	Memory overflow error
MOTOR ABNORMAL	Motor abnormal
NO CARTRIDGE	No process cartridge mounted
ONLINE/OFFLINE: BIN1	Hopper bin 1 selected or to be used
ONLINE/OFFLINE: BIN2	Hopper bin 2 selected or to be used
ONLINE/OFFLINE: MANUAL	Manual feed slot selected
OVERRUN ERROR	Excessive amount of data per line or page
PAPER FEED	Manual feed slot to be used
PAPER MISMATCH	Paper size mismatch
PAPER OUTAGE	Paper outage in hopper
POWER FAN ALARM	Power supply's fan not rotating
RESET	Initialization starts when releasing RESET
ROM/RAM ERROR	ROM/RAM error
SET A4	A4 size paper required
SET B5	B5 size paper required
SET LEGAL	Legal size paper required
SET LETTER	Letter size paper required
SET OK!	Completion of parameter setting
WAIT 1	Wait 1 status during initialization when power is turned on
WAIT 2	Wait 2 status during initialization when power is turned on
WAIT READY	ONLINE is pressed during mechanism initialization when the top cover is closed

Setup mode

Message	Explanation
AUTO LF: ON OFF	Automatic line feed: On (CR=CR + LF) OFF (CR=CR only)
AUTO SELECT: ON OFF	Automatic bin selection: Switches to the other bin when paper outage. Stops printing when paper outage.
BAUD RATE: 19200 9600 4800 2400 1200 600 300	Baud rate: 19200 9600 4800 2400 1200 600 300
BEEP: ON OFF	Beep: On (Buzzer activated) OFF (BEL code ignored)
BTM MARG: 0 LINE ⋮ 15 LINE	Bottom margin: 0 line ⋮ 15 lines
CARD SLOT 1:1 CARD SLOT 1:N	Font number N in IC card slot 1
CARD SLOT 2:1 CARD SLOT 2:N	Font number N in IC card slot 2
CARD SLOT 3:1 CARD SLOT 3:N	Font number N in IC card slot 3
CARTRIDGE	Process cartridge replacement
CHANGE	Replace parts
CHARACTER SET: 1	IBM character set 1
2	IBM character set 2

Setup mode – continued

Message	Explanation
CHR SP: 10CPI	Character spacing: 10 CPI
12CPI	12 CPI
15CPI	15 CPI (D630)
17.1CPI	17.1 CPI (FX-85/IBM-PRO)
PROP	Proportional
COPY	Copy
COPIES: 1	Number of copies
COPIES: 99	
CTRL: 3WIRE	Control signals used: 3-wire
FULLWIRE	All-wire
DUPLEX: FULL	Duplex mode: Full
EMULATION	Emulation selection
END	End of option selection
FONT	Font selection
FORMAT:	Serial data format:
7EVEN1	7-bit data, even parity, one stop bit
7MARK1	7-bit data, logical 1 fixed parity, one stop bit
7ODD1	7-bit data, odd parity, one stop bit
8EVEN1	8-bit data, even parity, one stop bit
8NONE1	8-bit data, no parity, one stop bit
8ODD1	8-bit data, odd parity, one stop bit

Setup mode – continued

Message	Explanation
HEX DUMP	Hexadecimal dump
IC CARD	IC card emulations (Slot 1 only)
IC CARD: DIABLO	Diablo 630 API emulation
FX-85	Epson FX-85 emulation
IBM-PRO	IBM Proprinter XL emulation
IC CARD SLOT 1	IC card slot 1 font
2	IC card slot 2 fonts
3	IC card slot 3 fonts
INTERFACE	Interface selection
LANG: USA	Language: American English
FRANCE	Franch
GERMANY	German
ITALLY	Italian
UK	British English
SPAIN	Spanish
DENMARK	Danish
SWEDEN	Swedish
LEFT END: 1	Left end of print line: Leftmost column possible in printable area
2	Leftmost column on the paper
LINE SP: 6LPI	Line spacing: 6 LPI
8LPI	8 LPI
3LPI	3 LPI
LIST	Listing (Printer internal status)
MISCELLANEOUS	Miscellaneous
NEW LINE: ON	New line: On (LF=LF + CR)
OFF	Off (LF=LF only)

Setup mode – continued

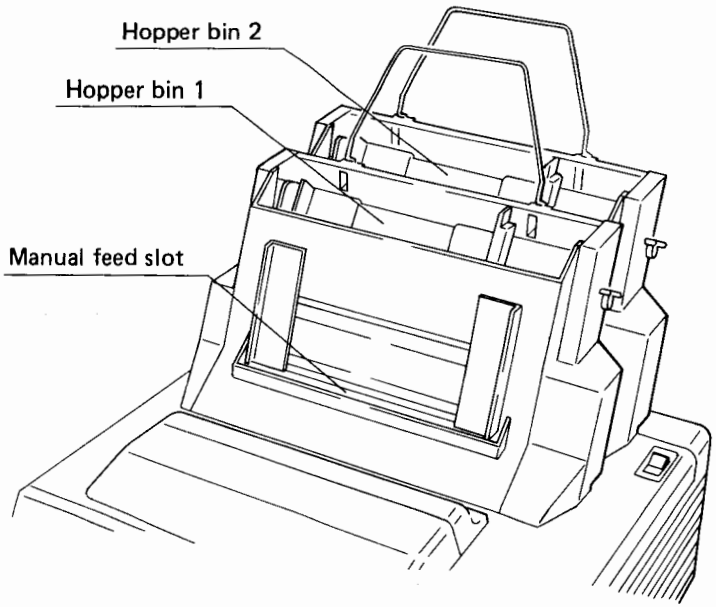
Message	Explanation
PARALL TIMING: 1 2	Busy signal timing: ACK outside BUSY ACK inside BUSY
PERF SKIP: ON OFF	Perforation skip: On (Form feed at bottom margin) Off (No form feed at bottom margin)
PROTOCL: DTR XON/XOF RC	Protocol: DTR (Data Terminal Ready signal) X-ON/X-OFF (DC1/DC3 code) RC (Reverse Channel signal)
RESIDENT	Resident fonts Resident emulations
RESIDENT: 1 RESIDENT: 3	Resident font number 1, 2, or 3
RESIDENT: HP LJ+	Hewlett Packard LaserJet Plus emulation
SAVE	Setting temporary modes as defaults
SETUP	Right after setup mode is entered
TEST PRINT	Test printing
TOP MARG: 0 LINE . . . 15 LINE	Top margin: 0 line . . . 15 lines
ZERO: NORMAL SLASH	Zero font: 0 Ø

SECTION 4
INSTRUCTIONS FOR PRINTING

Information needed for everyday printing is given in the sections that follow. Some explanations use examples of the HP LaserJet Plus printer command emulation; refer to the programmer's manual for details on these commands.

Selecting Hoppers and Manual Feed Slot

Standard hopper bin 1, optional hopper bin 2, or the manual feed slot can be selected from the control panel or by using a command.



Hoppers and manual feed slot

Hoppers

The standard (bin 1) and optional (bin 2) hoppers have the same structure. When you use a single hopper, mount it in the front bin position (BIN1). Paper from the back bin position (BIN2) takes more time to reach the print position.

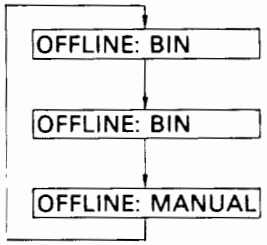
When you use both hoppers, you can use them for separate applications, for example, the first bin for job 1 and the second bin for job 2. You can also print documents continuously on two types of paper, for example, letterhead in the second bin for a first page and plain letter paper in the first bin for subsequent pages. In the case of the latter, you must change paper by using a printer command (paper input control or bin select control) rather than the control panel.

Be sure to set paper size for both bins. For loading paper and setting paper size, see page 2-20.

Manual Feed Slot

The manual feed slot, for handling special paper, feeds paper page by page as you set it, based on prompts from the control panel. The manual feed slot cannot be used from the back bin position (BIN 2).

The hopper or slot is selected from the control panel, using BIN SELECT offline. Each time you press the button, messages are displayed as follows. If a hopper is not mounted, the corresponding message is not displayed.



Bin 1 selected

Bin 2 selected

Manual feed slot selected

While the manual feed slot is selected, the four paper size lamps are all off.

Data remaining in the printer's buffer (the DATA indicator is lit offline), the new selection becomes valid after the current page is printed.

To select a hopper or the manual feed slot with a printer command, use the following Paper Input Control command:

ESC & ℓ # H.

The values for # and printer action are as follows:

Paper input control command (HP-LJ emulation)

#	Action
0	Print and eject any current page.
1	Select bin 1 after printing and ejecting any current page.
2	Select the manual feed slot after printing and ejecting any current page.
4	Select bin 2 after printing and ejecting any current page.
Others	Same as 1

The default value is 1 (bin 1).

Using the Manual Feed Slot (Bin 1 only)

Display Button

1. ONLINE: MANUAL

When the manual feed slot is ready, ONLINE: MANUAL is displayed.

The printer enters this status when it receives the Paper Input Control command specifying the manual feed slot or when you select the slot from the control panel as follows:

OFFLINE: BIN 1

BIN SELECT

OFFLINE: MANUAL

ONLINE

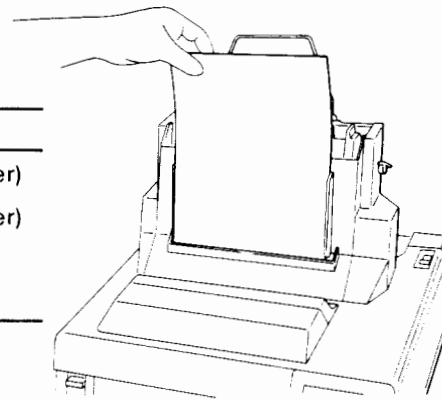
When the printer is offline, press BIN SELECT repeatedly until the manual feed slot (OFFLINE: MANUAL) is displayed then press ONLINE.

2. PAPER FEED

SET □□□□

When the printer is ready, PAPER FEED and SET □□□□ are displayed alternately, prompting that the paper of the specified size be set in the slot. Insert a sheet of paper deep enough to feed.

□□□□	Size
A4	A4 (European letter)
B5	B5 (Japanese letter)
LETTER	US letter
LEGAL	US legal



Setting paper in the manual feed slot

3. ONLINE: MANUAL — Paper is loaded and printing starts when you set paper in the slot.

4. The prompt for paper setting is displayed again when the printer is ready for the next page.

CAUTION:

Do not set the next page before the messages prompt is displayed.

The paper does not feed sometimes if you don't insert it deep enough and correctly.

Choosing Fonts

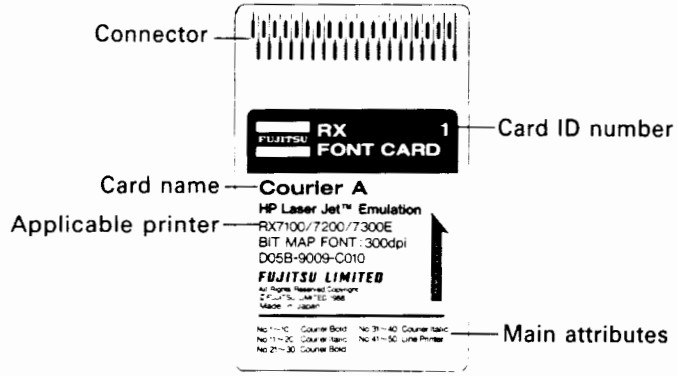
The electrophotographic process used by this printer produces goodquality printing, and features a wide variety of fonts and graphics. This is due to its high dot resolution (300 dots per inch or about a 32 x 32 dot matrix per 12-point size character cell). Choosing the appropriate fonts makes your documents readable, attractive, and professional-looking.

Resident: ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

IC cards: ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

Font samples

The printer has three types of resident fonts. A variety of additional fonts is available on IC font cards used in slots 1 to 3 on the printer. One card usual has several fonts.



Font card and label

Font selection information, including compatibility with HP LaserJet font cartridges, is provided in detail on the carton label. **Appendix F** gives printing samples for fonts.

Fonts Attributes

Fronts are identified by the attributes, which are listed on the label of each font card carton. The desired font can be selected by a combination of attributes or a font number.

Font No.	Typestyle	Orientation	Pitch/Point Size	Character Set
1~10	**Courier Bold**	Portrait	10/12	Roman 8 USASCII Roman-Ext. DAN/NOR U.K. French German Italian SWE/FIN Spanish
11~20	*Courier Italic*	Portrait	10/12	
21~30	**Courier Bold**	Landscape	10/12	
31~40	*Courier Italic*	Landscape	10/12	
41~50	Line Printer	Landscape	16.66/8.5	

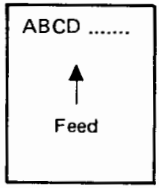
Note: Not for use with Fujitsu RX7300A or RX7400 Printers.

Made in Japan

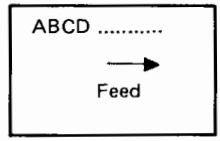
Font card carton label

Orientation

Printed characters can be oriented in two directions: "Portrait" refers to text printed with a vertical, up-to-down orientation, like that of a painted portrait. "Landscape" refers to text printed with a horizontal, side-to-side orientation, like landscape view that the name implies.



Portrait



Landscape

Symbol set (character set)

A group of letters and/or symbols of a specific type is called a symbol set or character set. Examples include Roman 8, and IBM Character Set 1 or 2. (See **Appendix E.**) General-purpose sets include the standard English alphanumeric characters, special characters, and operation symbols, in addition to the characters or symbols specific to a particular software package or machine.

Spacing and pitch

Fixed pitch indicates the number of characters printed per inch. Proportional spacing determines the pitch based on the width of each character.

Fixed pitch (10 CPI):

ABCDEFGHIJKLMNOPQRSTUVWXYZ
Communication Successful!!

Proportional spacing:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
Communication Successful!!

Point size

The point size is the height of a character in units of 1/72 inch.

ABCD ABCDEF ABCDEFGHIJ
ABCD ABCDEF ABCDEFGHIJ

14-point 10-point 6-point

Style

The style of a character is its "tilt," that is, upright or italic.

Upright

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Italic

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Weight

A character's weight refers to the thickness of its stoke, that is, light, regular (medium), or bold.

Regular

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Bold

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Type face

The type face is the "family" a character belongs to. Examples include Courier, Prestige Elite, Letter Gothic, HELV, and Tms Rmn.

Courier

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Prestage

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

Tms Rmn

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

HELV

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

NOTE:

The attributes and font samples of the resident and IC card fonts are shown in appendix F and the font card manual, and on the label of the card. Main attributes can be printed out by using the listing function in setup mode (page 3-32).

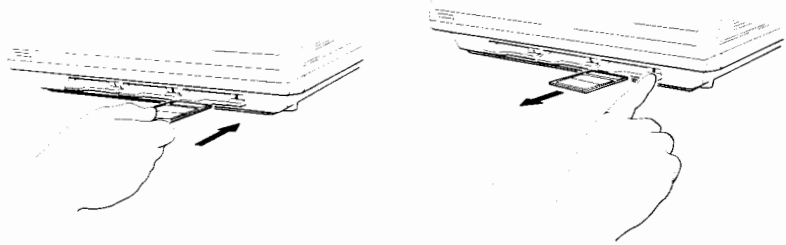
Installing Font Cards

Up to three IC font cards can be mounted at a time, enabling a variety of characters styles to be printed.

The three slots for installing the IC cards are in the controller board tray in the lower cover at the front of the printer.

Insert the font card into one of the slots until it "clicks" into place. Be sure that the label is up and that the connector is away from you.

To change or remove the card, press the eject button to pop the card out.



Installing and removing a font card

> **NOTE:**
> An emulation card, must be mounted in slot 1. This leaves slots 2 and 3 available for optional font cards.

Specifying a Font

You can specify a font from either the control panel or via software. With the HP LaserJet Plus emulation selected either method can be used and you can freely specify any of the installed fonts for the same page using software commands. With other emulations, only the control panel can be used and you cannot specify more than one font for the same page.

If you select an emulation other than that indicated on the inserted font card, some characters will be replaced with others or will not be printed.

When using a font card, refer also to its manual for details.

From the control panel

A font is selected by the font source (resident or IC card slot 1 to 3) and font number.

The following example shows how to select a font when factory-set defaults are used and the font is in slot 1 and listed as number 02 in the internal status listing. See page 3-32 for a sample listing.

	Display	Button	
1.	OFFLINE:BIN 1		Set the printer offline and press
		SETUP	SETUP to enter setup mode. FONT is
	FONT		displayed.
2.		ITEM	Press ITEM. The default font source,
	PRESIDENT		RESIDENT, is displayed.
3.		ITEM	Press ITEM to select the desired font
	IC CARD SLOT 1		source, IC CARD SLOT 1.
4.		OPTION	Press OPTION button. The default font
	CARD SLOT 1:1		number, CARD SLOT 1:1, is displayed.
5.		OPTION	Press OPTION to select the desired
	CARD SLOT 1:2		font number, CARD SLOT: 1:2.
		SET	Then press SET. SET OK! is displayed.
	SET OK!		
6.		EXIT ×2	Press EXIT twice to put the printer
	ONLINE: BIN 1		online.

From software

Although most software packages enable fonts to be selected without using printer commands, it is sometimes convenient to specify or change fonts by "embedding" printer commands. These commands specify the font attributes discussed on pages 4-7 to 4-9. All attributes do not need to be specified each time.

The current attributes remain in effect until you change them. If the printer does not have the specified fonts, the fonts closest to the one requested is selected.

Attributes and printer commands (HP-LJ emulation)

Attribute	Command	Remarks
Orientation	ESC & *l* 0 O ESC & *l* 1 O	Portrait Landscape
Character set	ESC (8 U	Roman 8
Spacing	ESC (s 1 P ESC (s 0 P	Proportional Fixed
Pitch	ESC (s # H	# = 10: 10 CPI 12: 12 CPI
Point size	ESC (s # V	# = 10: 10 Pt.
Style	ESC (s 0 S ESC (s 1 S	Upright Italic
Weight	ESC (s - 3 B ESC (s 0 B ESC (s 3 B	Light Medium Bold
Type face	ESC (s # T	# = 0: Line printer 3: Courier 5: Tms Rmn

NOTE:
When specifying more than one attribute in a single ESC sequence, give them in the sequence shown in the table.

Combining Escape Sequence

Commands having the same first two characters following the escape code can be combined and the escape code and these two characters omitted for subsequent commands. Note, however, that the last uppercase letter of each command must be changed to a lowercase letter, except for the last command.

For example, ESC (s 1 P and ESC (s 0 S can be combined into ESC (s 1 p 0 S and executed in this sequence.

The following example shows how to changes fonts when WordPerfect is used. Assume that the the text is 12 Pt. and medium stroke and you want to emphasize captions by using 18 Pt. and bold stroke. The command for captions is ESC (s 1 8 v 3 B and that for restoring regular text printing is ESC (s 1 2 v 0 B.

1. Position the cursor at the beginning of a caption.
2. Holding down the Ctrl key, press the F8 key, then type A. WordPerfect is ready to accept printer commands for the text.
3. Enter the command for captions as [2 7] s 1 8 v 3 B. Nonprintable characters are shown in decimal notation in brackets.
4. Position the cursor at the next-to-the-last character in the caption.
5. Holding down the Ctrl key, press the F8 key, then type A.
6. Enter the command for restoring regular text printing as [2 7] s 1 2 v 0 B.
7. Repeat steps 1 to 6 for each caption.

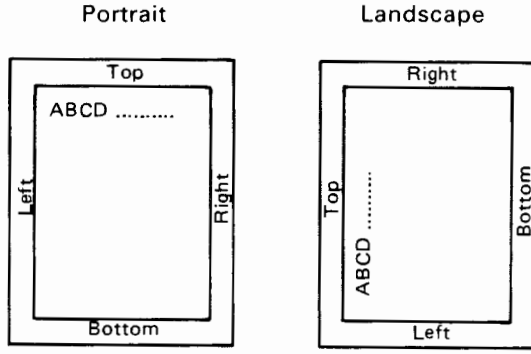
The procedure differs with the software package.

Setting the Page Format

In this manual, page formatting refers to setting the page orientation, page size, margins, and number of lines printed per page. The page format can be set by software commands; some can also be set from the control panel.

The format depends on the current line spacing, called the vertical motion index (VMI), and the character spacing, called the horizontal motion index (HMI).

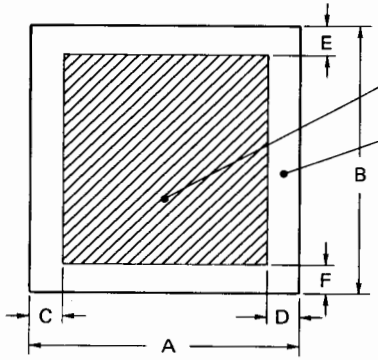
The top, bottom, left, and right position names refer to the printed text, not to the paper in the hopper.



Orientation

Page Formatting Parameters

No characters can be printed outside the printable area in figure below because of the physical restrictions of the printing mechanism. Figure below is for the HP Laser Jet Plus emulation. The printable areas vary with the emulation. See Programmer's Manuals for other emulations.



Printable area

Print-inhibited area

A: Physical page width
B: Physical page length
C: Left print-inhibited area
D: Right print-inhibited area
E: Top print-inhibited area
F: Bottom print-inhibited area

Page Formatting Parameters

Portrait mode

Unit: dot (1/300 in)

Size	Width × Length	A	B	C	D	E	F
Legal	8.5 × 14 in	2550	4200	50	100	60	60
Letter	8.5 × 11 in	2550	3300	50	100	60	60
A4	210 × 297 mm	2480	3507	50	92	60	58
B5	182 × 257 mm	2149	3035	50	92	60	58

Landscape mode

Unit: dot (1/300 in)

Size	Width × Length	A	B	C	D	E	F
Legal	14 × 8.5 in	4200	2550	60	60	50	100
Letter	11 × 8.5 in	3300	2550	60	60	50	100
A4	297 × 210 mm	3507	2480	60	58	50	92
B5	257 × 182 mm	3035	2149	60	58	50	92

Specifying a Format

The printer commands and control panel setup functions listed below are used for changing page formatting parameters.

Changing the page format (HP-LJ emulation)

Parameter	Printer command	Control panel	Distance
HMI(column)	ESC & k # H	None	n/120 inches
VMI (line)	ESC & ℓ # C	None	n/48 inches
	ESC & ℓ # D	LINE SP function	1/n inches (n LPI)
Left margin	ESC & a # L	None	n columns
Right margin	ESC & a # M	None	n columns
Top margin	ESC & ℓ # E	None	n lines
Text length	ESC & ℓ # F	None	n lines
Page size	ESC & ℓ # A	SIZE button	Preset (A4, B5, etc.)
	ESC & ℓ # P	None	n lines

Choosing the Correct Emulation

Emulation means simulating a command set defined for a different printer and producing identical results. This printer has a resident emulation mode and several options. The resident mode emulates the HP LaserJet Plus printer and the others are for emulating conventional serial printers.

Note that not all commands can be emulated. This is because of differences in architecture. However, most software packages will work under these emulations because these commands are rarely used. Refer to programmer's manuals for details.

First set the emulation from the control panel.

Emulation and printer

Emulation message	Program source	Printer
RESIDNT: HP LJ+	Resident	HP LaserJet Plus
IC CARD: DIABLO	IC Card	Diablo 630 API
IC CARD: FX-85	IC Card	Epson FX-85
IC CARD: IBM-PRO	IC Card	IBM Proprinter XL

CAUTION:

While an IC card emulation is selected, never remove the IC card.

When you select a new emulation mode and place the printer online, all downloaded fonts and data in the buffer are lost.

See **Appendix B** for command sets.

Specifying an Emulation

An optional emulation (one not resident in the printer) is specified as explained below.

1. Put the IC emulation card into slot 1. Note that slots 2 and 3 cannot be used for emulation cards.

	Display	Button	
2.	OFFLINE: BIN 1	SETUP	Put the printer offline and press SETUP to enter setup mode. FONT will be displayed.
	FONT		
3.		FUNCTION	Press FUNCTION repeatedly until EMULATION is displayed.
	EMULATION		
4.		ITEM	Press ITEM. The default emulation source, RESIDENT, is displayed.
	RESIDENT		
5.	IC CARD	ITEM	Press ITEM to select the desired emulation source, IC CARD.
6.		OPTION	Press OPTION. The available emulation, e.g., IC CARD: DIABLO, is displayed.
	IC CARD: DIABLO		
		SET	Then press SET. The printer starts initialization and becomes online.
	WAIT 1		
	↓		
	WAIT 2		
	↓		
	ONLINE: BIN 1		

SECTION 5
MAINTENANCE

This printer does not require any special maintenance. However, to keep it in top condition, it should be cleaned from time to time. Be careful not to drop anything inside the printer.

Other routine maintenance includes replacing the process cartridge and heat roller felt, cleaning the corona wires, etc., as prompted by the control panel.

Following the procedures for general maintenance, are the procedures for installing a memory expansion board and for repacking the printer.

CAUTION:

Only the above maintenance should be done; lubrication is not needed.

Be sure that the power is off and the power cord unplugged before performing any maintenance.

Do not use alcohol to clean the feed rollers.

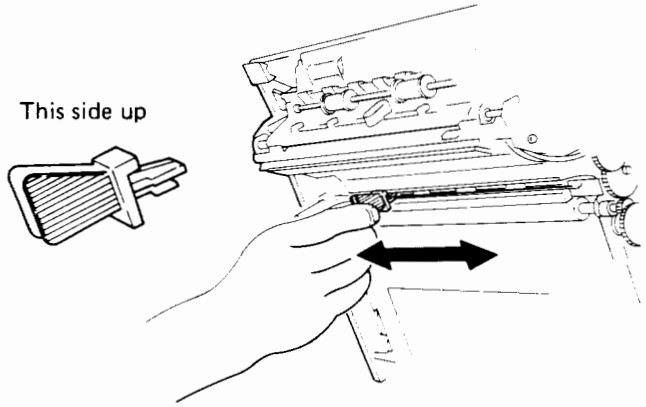
Be careful not to touch any parts, such as the heat roller, that may be hot.

Do not touch the photoconductive drum.

Cleaning the Transfer Charger Corona Wire

The corona wire of the transfer unit should be cleaned each time the process cartridge is replaced. Use the cleaning tool that comes with the printer.

Open the top cover, replace the old process cartridge, and carefully wipe off toner particles by moving the cleaning tool along the entire length of the wire.



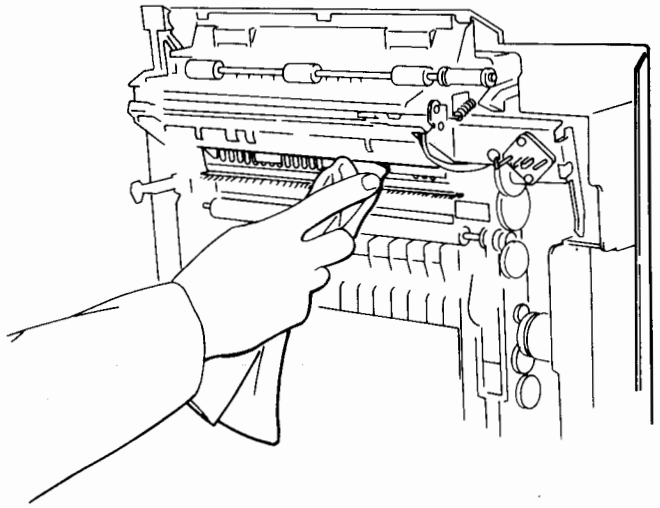
Cleaning the transfer charger corona wire

Cleaning the Paper Feed Path

Wipe off any paper dust and toner particles from the paper path when dirty, especially after cleaning a paper jam.

Use vacuum cleaner and a soft cloth moistened with a mild detergent.

Be sure to clean the Mylar sheet attached to the paper path between the transfer unit and the heat roller unit.



Cleaning the paper feed path (Mylar sheet)

Replacing the Process Cartridge

The toner in the process cartridge is designed to last for about 6000 sheets of letter size paper, or two months of the recommended duty cycle of 5% black printing. The number of pages printed is counted and the control panel displays a message prompting you to replace the cartridge.

Of course, this timing may not reflect the actual lifetime of the process cartridge, which depends on the amount of toner used per page. If a lot of toner is used, the cartridge may have to be replaced before the message is displayed.

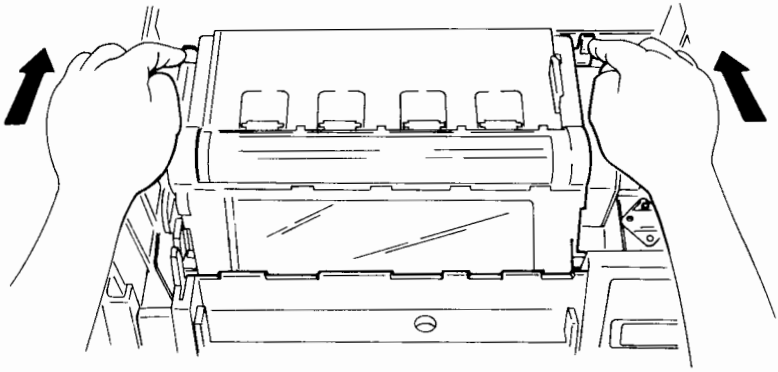
Be sure to clear the page counter whenever you replace the process cartridge. See page 3-36.

Before replacing the process cartridge, be sure to replace the heat roller felt and clean the heat roller to prevent paper particles from getting into the new cartridge. A heat roller felt is packed with the process cartridge.

1. When the control panel displays CHG CARTRIDGE, turn the power off and open the top cover.

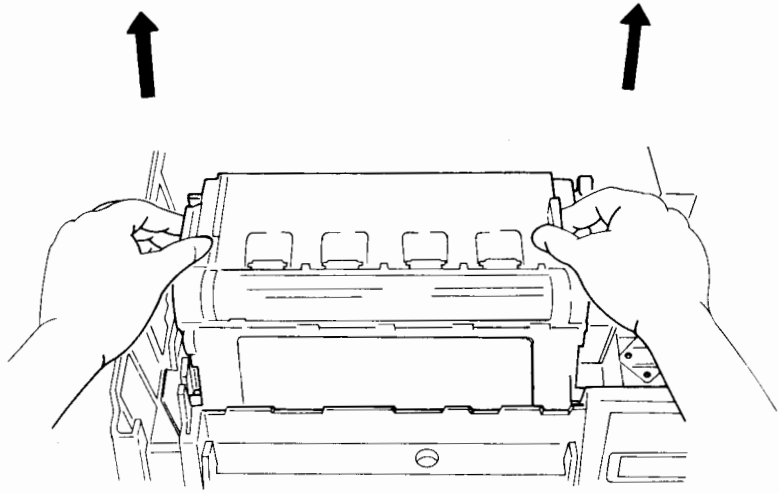
2. Replace the heat roller felt and clean the heat roller as explained from page 5-7.

3. Push the hooks back to release the process cartridge, which will pop up from the installed position.



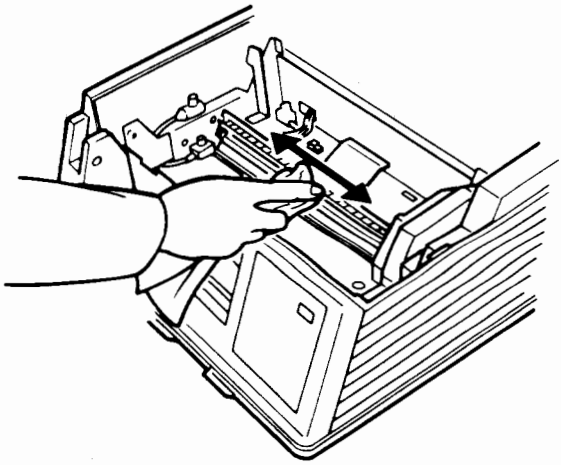
Releasing the process cartridge

4. Grasp the handles on the top of the process cartridge and pull the cartridge toward you to an angel of about 45 degrees around the positioning studs. Lift the cartridge up and out of the printer.



Removing the process cartridge

5. Clean the LED lens using the cloth included with the cartridge.



Cleaning the LED lens

6. Insert a new process cartridge as explained in **Section 2** (page 2-9).

   Be sure to rock the process cartridge gently to distribute the toner evenly, and to remove the sealing sheets form the photoconductive drum after installation.

7. On the control panel, select the Replace Parts function in setup mode to indicate to the printer that the process cartridge has been replaced. The printer resets the page counter. See page 3-36.

   Press SET when the control panel displays CARTRIDGE.

CAUTION:
Don't tilt the removed process cartridge too much or turn it upside down, as toner may spill out.

Replacing the Heat Roller Felt and Cleaning the Heat Roller

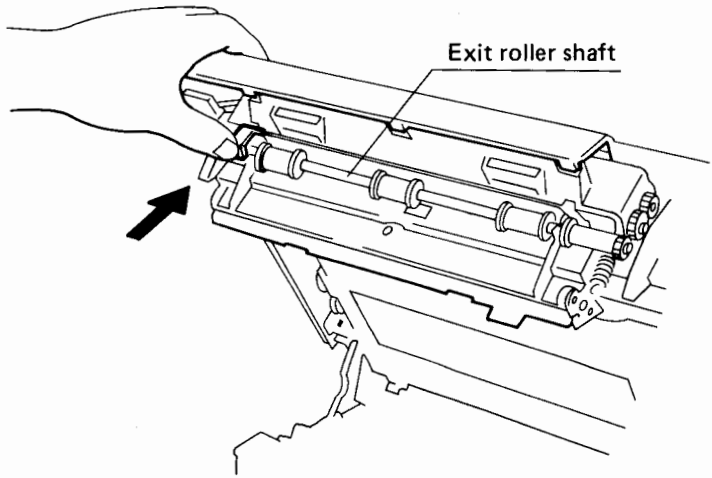
The heat roller felt, which cleans the heat roller, is designed to last for the same number of pages as the process cartridge. A new felt comes with the new process cartridge so that they can both be replaced at the same time.

Be sure to replace the heat roller felt before the process cartridge to prevent paper particles from getting into the new cartridge. If you clean only the heat roller unit, remove the process cartridge during cleaning.

Use a damp cloth to clean off any toner that has stuck to the heat roller or pressure roller. Be sure rollers are dry before inserting the new felt.

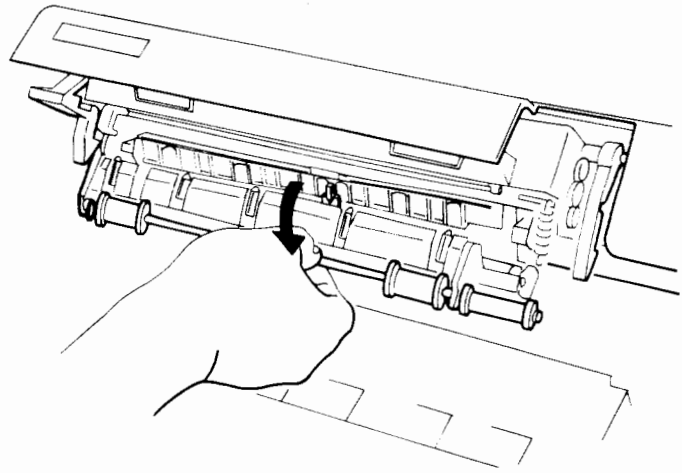
> **WARNING:**
> The heat roller remains very hot for quite a while after power is turned off. Be sure it is cool before handling.

1. Push up the lock lever of the heat roller housing.



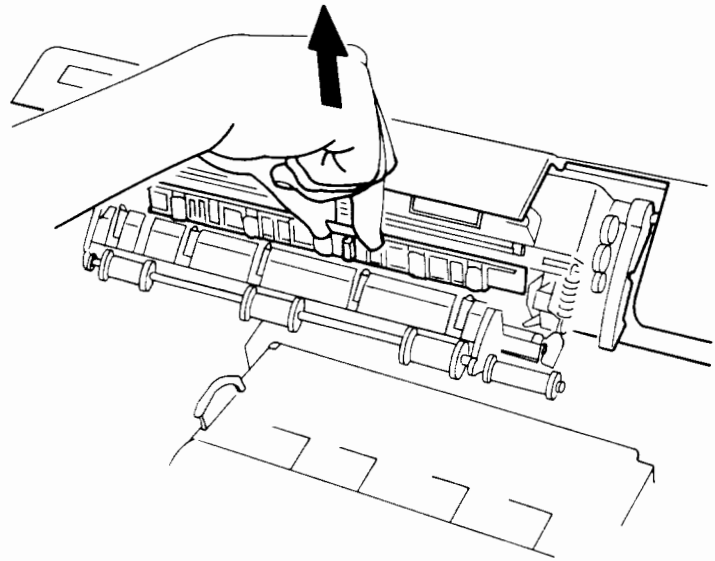
Unlocking the lever

2. Pull the exit roller shaft out and down to open the housing containing the heat roller felt.



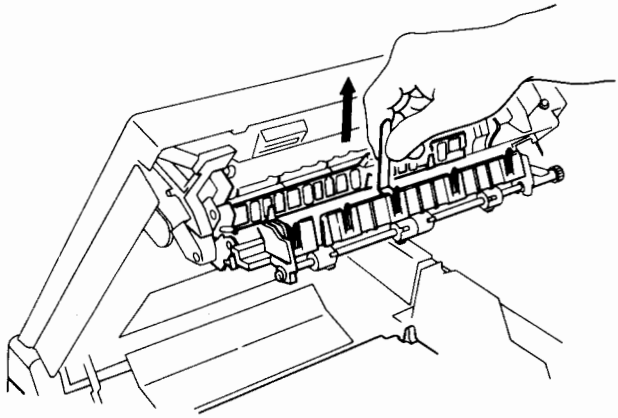
Opening the heat roller housing

3. Grasp the tab at the center of the felt and lift it out as shown in the figure.



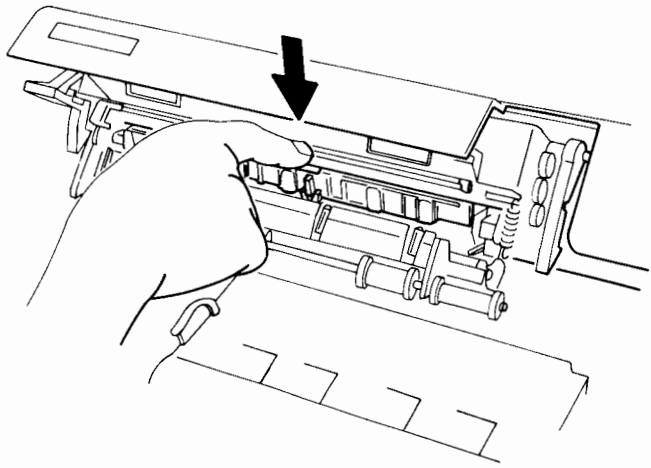
Removing the heat roller felt

4. Clean the rollers with a damp cloth and scrape adhered toner off the five separators with the cleaning tool.



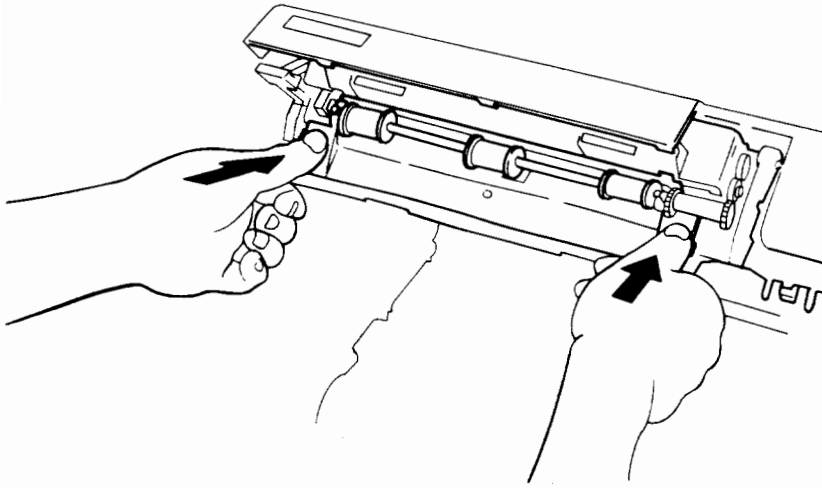
Cleaning the separators

5. Fit the new felt in the housing, with the felt surface toward the roller.



Installing the felt

6. Close the housing gently until the exit roller shaft clicks locked into place.

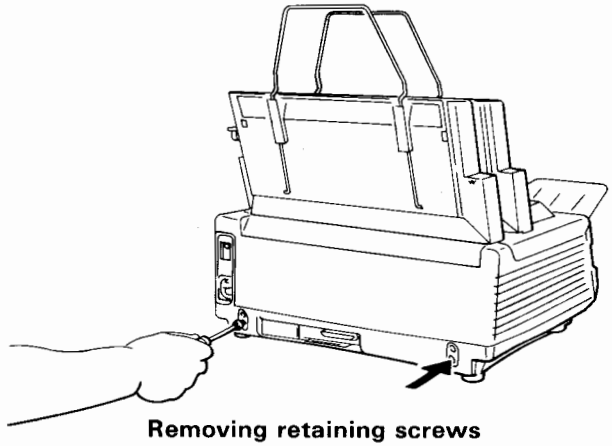


Closing the heat roller housing

Installing a Memory Expansion Board

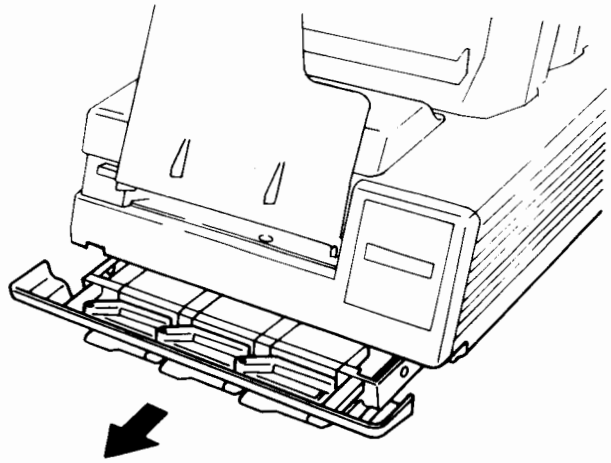
To download a large number of fonts or use a large amount of graphics data, you can expand the printer's RAM capacity by adding an optional memory expansion board (1M, 2M, or 4M bytes per board). See **Appendix G** for the order number.

1. Disconnect the interface cable and remove the lower retaining screws (one on each side) from the back of the printer.



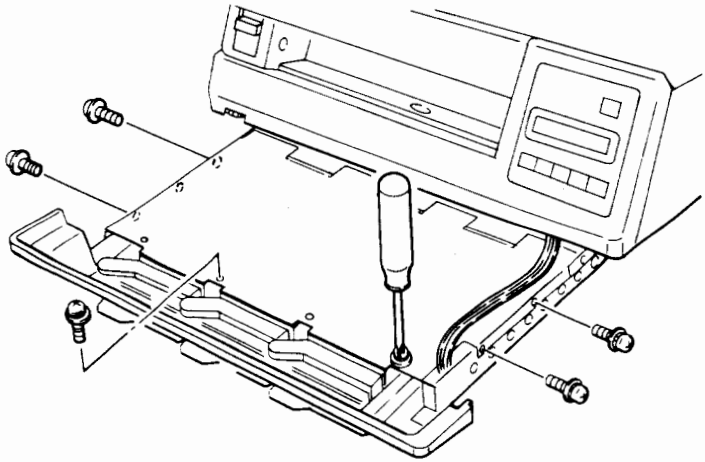
Removing retaining screws

2. Pull the controller board out toward you from the front of the printer.



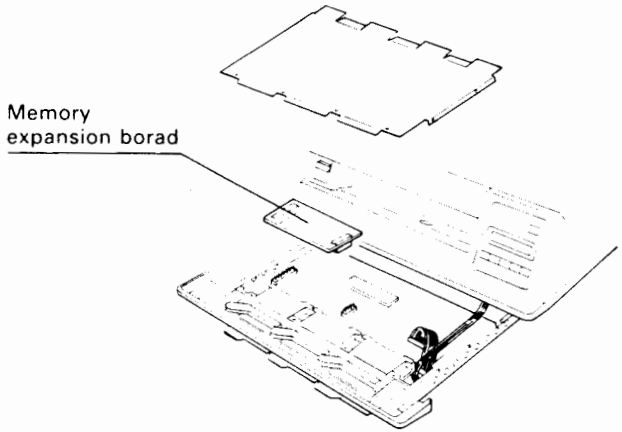
Pulling out the controller board

3. Remove the nine screws to remove shield plate.



Removing the shield plate

4. Connect the two connectors carefully when mounting the memory expansion board. Be sure that connector pins are oriented correctly.



Installing the memory expansion board

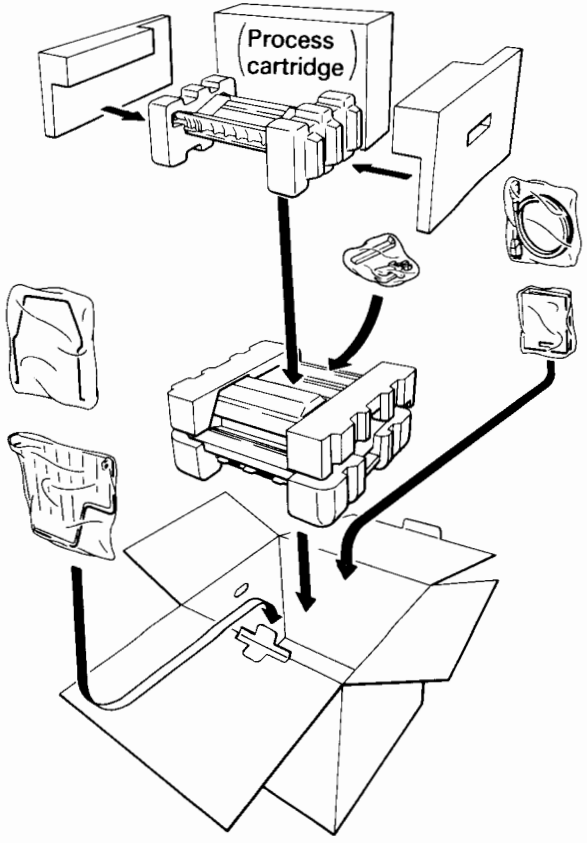
5. Install the shield plate and push the controller board back into the printer. Secure the retaining screws at the back of the printer and connect the interface cable.

   Turn the power on and check that no ROM or RAM errors occur.

Repacking the Printer

When you need to move the printer or prepare it for storage, note the following:

- Repack it using the carton and packing material originally supplied.
- Remove the process cartridge from the printer to prevent toner from spilling.
- Enclose the printer into its protective plastic bag to protect against moisture.
- Use the polystyrol pads as cushions.



Repacking the printer(single hopper)

SECTION 6
TROUBLESHOOTING

This printer is designed to provide reliable operation. Generally, the only problems that occur will be due to an operator error or outside cause. Paper jams and problems with print quality are the most common.

If problems occur, use the procedures in the sections that follow to troubleshoot the printer and fix the problem. The tables cover common problems.

Normal execution of the test print means that the problem is in your computer or the interface connector to the computer. Check the computer and application program documentation for possible solutions.

If the problem is difficult to solve, collect as much information as possible and contact your dealer.

Printer status

Problem	Solution
Power does not turn on.	- Check the power cord and connection.
The printer does not initialize correctly.	- Close the top cover completely. - Install the process cartridge or lock it firmly in place. - Install the hopper correctly. - Check that all control panel connectors are connected.
The control panel does not operate.	- Check that all control panel connectors are connected.

Print quality

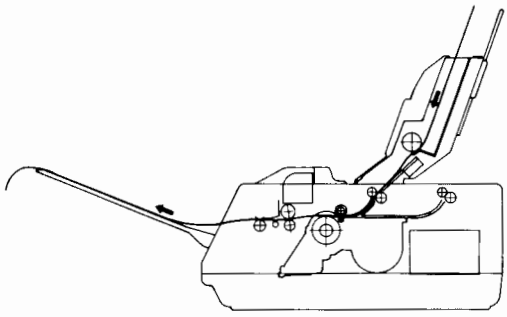
Problem	Solution
Printing is too light.	- Turn the print density dial to the right. - Use dry paper. - Remove and rock the process cartridge gently to distribute toner evenly. - Replace the process cartridge. - Clean the transfer charger corona wire.
Printing is too dark.	- Turn the print density dial to the left.
The page is black or blank.	- Replace the process cartridge.
Vertical density is uneven.	- Remove and rock the process cartridge gently to distribute toner evenly. - Clean the corona wire. - Clean the precharger. - Replace the process cartridge.
Vertical white lines are appear.	- Clean the LED light source.
Stains or smudging occurs.	- Clean the heat roller or pressure roller. - Replace the heat roller felt, if necessary. - Clean the frame of the transfer unit. - Clean the paper path. - Print several pages if the problem occurs after jammed paper is removed.
Ghost printing on transparencies	- Replace the heat roller felt.

Paper jamming

Problem	Solution
Paper is not fed from the hopper.	- Remove the top edge deformed paper. - Reset the release lever of the hopper.
Paper is not ejected to the stacker.	- Lock the heat roller unit correctly.
Other jams	- Remove the wavy or damaged paper.

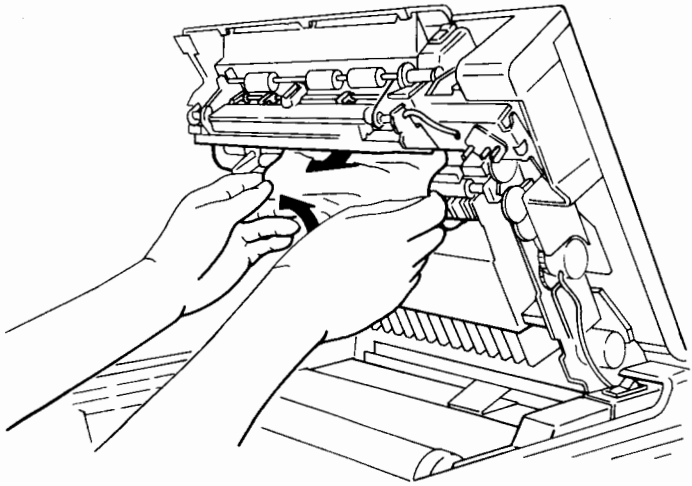
Removing Jammed Paper

Paper jams do not occur very often. However, remove the paper as soon as possible if there is a jam to avoid problems with the heat roller. The printer has a simple paper path, so jammed paper is quite easy to remove.



Paper path

1. Open the top cover and find where the jam has occurred. For a jam before the heat roller, pull out paper as shown below.



Removing jammed paper

2. If the jam occurs in the heat roller unit, open the unit to pull out the paper.

3. Clean any toner out of the paper path.

Storing Paper

Observe the following when storing paper to avoid paper jams and problems with print quality:

1. Do not expose paper to moisture or direct sunlight. Damp paper is likely to lose its electrostatic charge and dry paper is likely to have an undesired electrostatic charge. Both of these conditions cause poor print quality.

2. Store remaining paper in its original package or rewrap it.

3. Store paper in flat. Curled paper is likely to jam.

Error and Operator Check Messages

Error messages indicate that your printer has errors in the controller or mechanism. Generally, the printer cannot be recovered from such problems.

Operator check messages indicate that your printer has troubles recoverable by your operation.

The following tables show the messages and the actions to be taken.

Error messages

Message	Problem	Solution
FUSER ABNORMAL	Heat roller temperature is abnormal.	- Contact your dealer if the error recurs when you retry the program after turning power off, then on again. - For an IC card error, try reinserting the IC card.
MOTOR ABNORMAL	The main motor does not rotate.	
ROM/RAM ERROR	An error occurs in mechanism controller board memory.	
IC CARD ERROR	An IC card is removed during printing.	
HARD ERROR	A hardware error occurs in the controller board.	
POWER FAN ALARM	The power supply unit fan does not rotate.	
CROSS FAN ALARM	The cross-flow fan does not rotate.	

Error messages - continued

Message	Problem	Solution
MEMORY OVERFLOW	The input buffer overflowed. (*1)	- Reset serial interface operation modes (data format, baud rate, and protocol). - Replace the serial interface cable.
OVERRUN ERROR	Excessive amount of data per line or page.	
COMM ERROR	The printer received data with an incorrect parity or format. (*2)	

*1 The printer stops printing, ejects the page with the remaining area blank, and goes offline.
*2 The printer continues printing. The error indication can be cleared by the RESET/RESUME button even online.

Operator check message

Message	Problem	Solution
NO CARTRIDGE	The process cartridge is not mounted or is loose.	- Reinstall the process cartridge.
JAM 3	Paper does not exit the feed roller (bin 1).	- Remove the jammed paper (see page 6-3). - Remove damaged or wrong-size sheets from the hopper.
JAM 4	Paper does not enter the heat roller unit.	
JAM 5	Paper does not exit the heat roller unit.	
JAM 7	Paper does not exit the feed roller (bin 2).	

Operator check message - continued

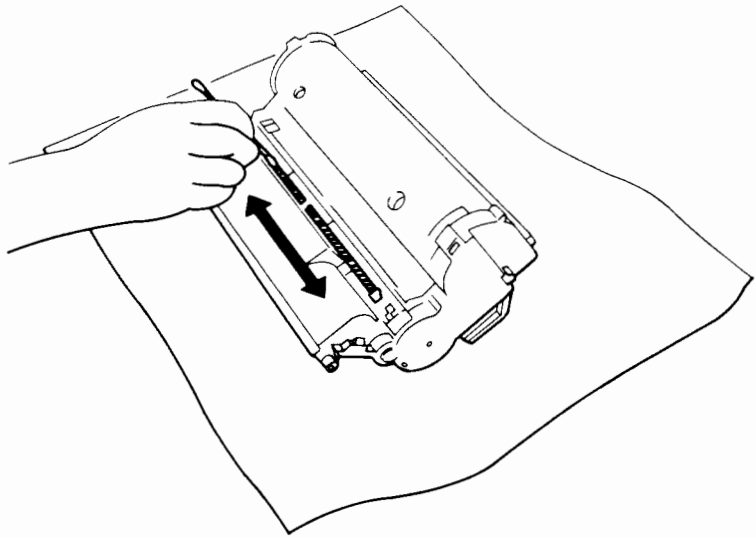
Message	Problem	Solution
COVER OPEN	The top cover is open.	- Close the top cover completely.
PAPER OUTAGE	The hopper is empty.	- Load new paper and press the RESET/RESUME button.
PAPER MISMATCH	The paper is not the size specified by the computer.	- When using paper in the hopper, press the RESET/RESUME button.
	This message is displayed alternately with one of the four messages below.	- When using the paper of the specified size, change the paper in the hopper and press PAPER SIZE to select the size.
SET A4 SET B5 SET LETTER SET LEGAL	The printer prompts you to set the specified size of paper.	
BIN 1 NOT MOUNTED	Hopper bin 1 is not mounted.	- Mount a hopper at the specified bin place and press the ONLINE button.
BIN 2 NOT MOUNTED	Hopper bin 2 is not mounted.	

Cleaning the Precharger Corona Wire

It is rarely necessary to clean the corona wire of the precharger in the process cartridge. Clean it, however, if printing is vertically uneven density or dark lines occur. Use the cotton swab supplied with the process cartridge to clean the wire.

1. Open the top cover and remove the process cartridge. Place it upside down on paper spread on a level surface.

2. Inserting the cotton swab into the cleaning slot, gently wipe off any toner from the wire.

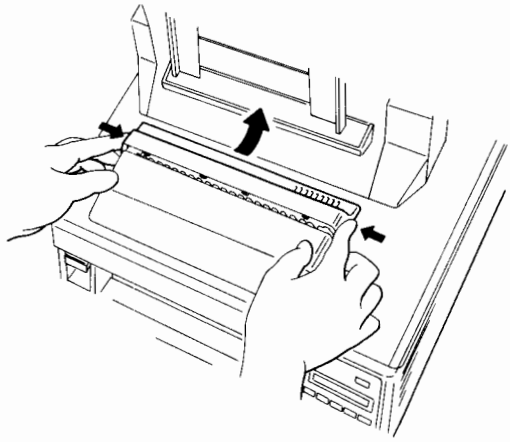


Cleaning the precharger corona wire

Replacing the Ozone Filter

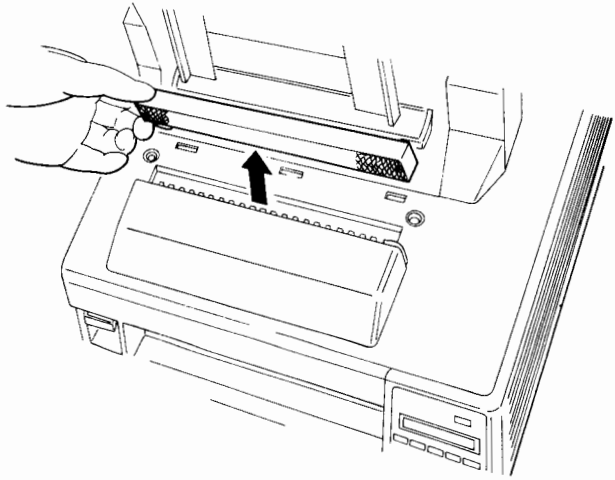
If you notice the smell of ozone, replace the ozone filter on the top cover.

1. Unlock the upper latches, then remove the filter cover.



Removing the filter cover

2. Remove the filter.



Removing the ozone filter

3. Put the new filter with the honeycombed surfaces vertical and put the filter cover back on.

APPENDIX A
SPECIFICATIONS

This appendix outlines the printer's physical, electrical, and environmental specifications, performance, and paper specifications.

Printer Specifications and Performance

Dimensions and weight

Width: 406 mm (16 in)
Depth: 399 mm (15.7 in), excluding the hopper and stacker
Height: 169 mm (6.7 in), excluding the hopper
Weight: 18 kg (39 lb) in the standard configuration

AC input power

100 to 120 VAC ±10%, 50/60 ±2 Hz (USA)
220 to 240 VAC ±10%, 50 ±1 Hz (Europe)

Power consumption

700 W (100 VAC, 200 VAC)

Temperature

Operating: 10°C 35°C (50°F to 95°F)
Stored: 0°C to 45°C (32°F to 113°F)

Humidity

Operating: 20% to 80% RH (no condensation)
Maximum wet bulb temperature 29°C (84.2°F)
Stored: 20% to 80% RH (no condensation)

Printing technology

LED-light-sourced electrophotography

Print resolution

300 dots per inch (both text and graphics)

Printing speed
5 pages per minute (character printing on A4 size paper from the standard hopper)

Warm-up time
50 seconds (120 V and 240 V at 25°C)

Recommended duty cycle
Up to 3000 pages per month

Process cartridge life
6000 pages per cartridge at 5% black printing

Safety certification
Safety: UL 478, CSA 22.2-220, IEC 380, VDE 0806
Radiation: FCC Class B, VDE 0871 Class B

Fonts
Resident: Courier 10 Portrait and Landscape (12 pt.)
Line Printer 16.66 Portrait (8.5 pt.)
IC card: Bit map fonts
Downloadable: Bit map fonts

Computer interface
Centronics and RS-232C

Emulations
Resident: HP LaserJet Plus
IC card: Diablo 630
Epson FX-85
IBM Proprinter

Paper feed
Hopper: 150 sheets of 75 g/m² paper (65 kg or 20 lb)
(standard bin and optional bin)
Manual feed slot: Single-sheet
Stacker: 150 sheets of 75 g/m² paper

Acoustical noise
Printing: 53 dBA or less
Standby: 45 dBA or less

Paper Specifications

A variety of types and sizes of paper can be used, providing that they meet the requirements listed below. Test unspecified or unusual printing materials that may cause a problem in paper charging, heating, or feeding.

> **CAUTION:**
> Do not use sheets of adhesive labels or paper with staples. These will damage the printer's photoconductive drum.

Type

Plain single-sheet photocopy paper (equivalent to Xerox 4024), bond paper, and overhead transparencies (equivalent to 3M 731)

Size

Legal (USA, 8 1/2 by 14 in)
Letter (USA, 8 1/2 by 11 in)
A4 (standard European letter size, 8 1/4 by 11 2/3 in)
B5 (standard Japanese letter size, 7 1/4 by 10 1/4 in)
Any size 148 to 360 mm long (241 to 360 mm long for bin 2) by 100 to 216 mm wide (within legal size)

Weight

64 to 105 g/m² (55 to 90 kg or 17 to 28 lb)

> **NOTE:**
> Ream weight is in parentheses: Kilogram weight of 1000 sheets of 788 × 1091 mm paper (1.16 g/m²) or pound weight of 500 sheets of 17 × 22 inch paper (3.76 g/m²).

APPENDIX B
COMMAND SETS

This printer emulates the command sets listed in the table below. Emulation programs are resident in the printer or are available on optional IC cards inserted in slot 1 (leftmost) on the front of the printer. Emulations are selected from the control panel.

A command is represented by a control character or an escape sequence consisting of an escape character followed by a command identifier and parameters.

This appendix gives commands and brief descriptions of emulations, but does not provide the details or programming examples required to modifying your application software or writing your own programs. These are given in the programmer's manual for each emulation.

Emulation and printer

Emulation	Source	Printer
HP LASERJET +	Resident	HP LaserJet Plus
DIABLO 630	IC card	Diablo 630 API
FX-85	IC card	Epson FX-85
IBM PRO	IC card	IBM Proprinter XL

HP LaserJet Plus Control and Escape Codes (Resident)

Control code	
BS	Backspace
LF	Line feed (optional CR)
FF	Form feed to next page (optional CR)
CR	Carriage return to left margin (optional LF)
SO	Shift out to activate secondary font
SI	Shift in to activate primary font
ESC	Begin escape sequence

Level 1 escape code	
ESC 9	Clear horizontal margins
ESC =	Half-line feed
ESC E	Reset command
ESC Y	Display functions on
ESC Z	Display functions off

Level 2 escape code	
ESC (# @	Primary font default function (#: 0-3)
ESC (# <A-U>	Primary symbol set (#: 0-2047)
ESC (# X	Primary soft font selection (#: ID number)
ESC) # @	Secondary font default function (#: 0-3)
ESC) # <A-U>	Secondary symbol set (#: 0-2047)
ESC) # X	Secondary soft font selection (#: ID number)

Level 3 escape code	
ESC & a # C	Cursor X positioning (#: number of columns)
ESC & a # H	Cursor X positioning (#: number of decipoints (1/720 in))
ESC & a # L	Left margin (#: column number)
ESC & a # M	Right margin (#: column number)
ESC & a # R	Cursor Y positioning (#: number of rows)
ESC & a # V	Cursor Y positioning (#: number of decipoints (1/720 in))
ESC & d # D	Autounderline on (#: 0 or 3) 0: Fixed 3: Floating
ESC & d @	Autounderline off

ESC & f # S	Cursor stack (#: 0 or 1) 0: push (store cursor position) 1: pop (recall cursor position)
ESC & f # X	Macro control function (#: 0-10) 0: Start macro definition (last ID specified) 1: Stop macro definition 2: Execute macro (last ID specified) 3: Call macro (last ID specified) 4: Enable macro for automatic overlay (last ID specified) 5: Inhibit automatic overlay 6: Delete all macros 7: Delete all temporary macros 8: Delete macro (last ID specified) 9: Make macro temporary (last ID specified) 10: Make macro permanent (last ID specified)
ESC & f # Y	Specify macro ID (#: 0-32767)
ESC & k # G	Line termination code (#: 0-3) 0: CR to CR; LF to LF; FF to FF 1: CR to CR-LF; LF to LF; FF to FF 2: CR to CR; LF to CR-LF; FF to CR-FF 3: CR to CR-LF; LF to CR-LF; FF to CR-FF
ESC & k # H	HMI (#: 1/120 in units)
ESC & k # S	Primary/Secondary pitch (0: 10cpi, 2: 16.66cpi)
ESC & *l* # C	VMI (#: 1/48 in units)
ESC & *l* # D	Line spacing (#: lines per inch) #: 1, 2, 3, 4, 6, 8, 12, 16, 24, or 48
ESC & *l* # E	Top margin (#: number of lines)
ESC & *l* # F	Text length (#: number of lines)
ESC & *l* # H	Paper input control code (#: 0-4) 0: Print current page 1: Feed form from bin 1 2: Feed form from manual feed slot 4: Feed form from bin 2
ESC & *l* # L	Skip perforation (0: off, 1: on)
ESC & *l* # O	Orientation (0: portrait, 1: landscape)
ESC & *l* # P	Page length (#: number of lines)
ESC & *l* # X	Number of copies (#: 1-99)
ESC & p # X <data>	Transparent print data (#: number of bytes of transparent print data)
ESC & s # C	End of line wrap (0: on, 1: off)

ESC (s # B Primary stroke weight (#: −7 to +7)

Value	Typeface
−7	Ultra thin
−5	Thin
−3	Light
0	Medium
+3	Bold
+5	Black
+7	Ultra black

ESC (s # H Primary pitch (#: cpi)

ESC (s # P Primary spacing (0: fixed, 1: proportional)

ESC (s # S Primary style (0: upright, 1: italic)

ESC (s # T Primary typeface code (#: 0-255)

Value	Typeface
0:	Line Printer
3:	Courier
4:	Helv
5:	Tms Rmm
6:	Letter Gothic
8:	Prestige
11:	Presentations
17:	Optima (*1)
18:	Garamond (*1)
19:	Cooper Black (*1)
20:	Coronet Bold (*1)
21:	Broadway (*1)
22:	Bauer Bodoni Black Condensed (*1)
23:	Century Schoolbook (*1)
24:	University Roman (*1)

*1 These typeface names may be registered trade marks of a third party. Use of these fonts may require a licence grant from the owners.

ESC (s # V Primary point size (#: height in points)

ESC (s # W <data>

Download font character data (#: number of bytes)

data: character descriptor and data

ESC) s # B Secondary stroke weight (#: −7 to +7)

Value	Typeface
−7	Ultra thin
−5	Thin
−3	Light
0	Medium
+3	Bold
+5	Black
+7	Ultra black

ESC) s # H Secondary pitch (#: cpi)
ESC) s # P Secondary spacing (0: fixed, 1: proportional)
ESC) s # S Secondary style (0: upright, 1: italic)
ESC) s # T Secondary typeface code (#: 0-255)
ESC) s # V Secondary point size (#: height in points)
ESC) s # W <data>
Download font header (#: number of bytes)
ESC * b # W <data>
Transfer raster graphics (#: number of bytes in raster row)
data: raster data

ESC * c # A Horizontal rule size (#: number of dots)
ESC * c # B Vertical rule size (#: number of dots)
ESC * c # D Specify font ID (#: 0-32767)
ESC * c # E Specify character code (#: character code: 0-255)
ESC * c # F LJ+font management function (#: 0-6)
0: Delete all soft fonts
1: Delete all temporary soft fonts
2: Delete soft font (last ID specified)
4: Make soft font temporary (last ID specified)
5: Make soft font permanent (last ID specified)
ESC * c # G Specify fill pattern ID (Gray: 1-100, Pattern: 1-6)
Bright to dark: 1 to 100
Type of pattern: 1 to 6
ESC * c # H Horizontal rule size (#: number of decipoints (1/720 in))
ESC * c # P Print rule/pattern (0: rule, 2: gray, 3: pattern)
ESC * c # V Vertical rule size (#: number of decipoints (1/720 in))

ESC * p # X	Cursor X positioning (#: number of dots)
ESC * p # Y	Cursor Y positioning (#: number of dots)
ESC * r # A	Start raster (#: 0 or 1) 0: Left graphics margin at X position 0 1: Left graphics margin at the current X position
ESC * r B	End raster graphics
ESC * t # R	Set raster graphics resolution (#: dots/inch) #: 75 -75 dpi 100 -100 dpi 150 -150 dpi 300 -300 dpi

Diablo Control Codes and Escape Sequences (IC Card)

Control code	
NUL	Null operation (pad character)
ETX	End of transmission character (sent by computer; computer waits for ACK (ETX/ACK)).
BS	Backspace horizontally one HMI
HT	Move right to next horizontal tab
LF	Line feed (move down one VMI)
VT	Move down to next vertical tab
FF	Form feed (eject page and home cursor)
CR	Carriage return (move to left margin)
SO	Enable 128 bias to printable characters (Set 7-bit access to characters A0-FF)
SI	Disable bias to printable characters (Reset 7-bit access to characters 20-7F)
ESC	Escape code (begin escape sequence)
SP	Space character (move right one HMI)
DEL	Delete character (null)
DC1/DC3	Select/deselect printer

Escape code	
ESC BS	Backspace horizontally 1/120 in
ESC HT n	Move to absolute horizontal position (n-1) × HMI/120 in n: 1 to 255
ESC LF	Negative line feed (move up VMI/48 in)
ESC VT n	Move to absolute vertical position (n-1) × VMI/48 in n: 1 to 255
ESC FF n	Set lines per page to n (default: 66) Top margin: 0, bottom margin: VMI × n n: 1 to 126
ESC CR P	Diablo 630 reset command
ESC DC1 n	Set signed offset n added to CX (1/120") (n range: −63 to +63, bit 6: sign)
ESC SUB I	Diablo 630 reset command
ESC RS n	Set VMI to (n-1) /48 in (default: 6/48 in) n: 1 to 126

ESC US n	Set HMI to (n-1)/120 in (default: 12/120 in) n: 1 to 126
ESC !	Inhibit auto-CR mode (no excess line length print wrapping)
ESC &	Terminate bold/shadow print mode
ESC 0	Set right margin to current X position
ESC 1	Set horizontal tab at current X position
ESC 2	Clear all horizontal and vertical tabs
ESC 3	Enter graphic mode
ESC 4	Exit graphic mode
ESC 5	Set forward printing mode
ESC 6	Set backward printing mode (CR cancel)
ESC 7	Enable print suppression (CR cancel)
ESC 8	Clear horizontal tab at current X position
ESC 9	Set left margin to current X position
ESC <	Set reverse printing mode (page origin at upper right edge)
ESC =	Enter auto-center mode (CR or ESC X exit)
ESC >	Reset reverse printing mode (page origin at upper left edge)
ESC ?	Enable auto-CR mode
ESC C	Clear top and bottom margins
ESC D	Negative half-line feed, up VMI/2 /48 in
ESC E	Begin autounderscore
ESC L	Set bottom margin to current Y position
ESC M	Enter auto-justify mode (ESC X exits)
ESC O	Enable bold print (CR cancel)
ESC P	Enable proportional spacing mode (use char width, not HMI, except for spaces)
ESC Q	Terminate proportional spacing mode
ESC R	Terminate auto underscore (draw line)
ESC S	Reset HMI to font panel spacing
ESC T	Set top margin to current Y position
ESC U	Half-line feed, move down VMI/2 /48 in
ESC W	Enable shadow printing (CR cancel)
ESC X	Cancel WP modes (reset offset) Clear bold, shadow, underscore modes Exit auto-justify and center modes

ESC Y	Print character at font position 20 (hex)
ESC Z	Print character at font position 7F (hex)
ESC EM 1	Feed from bin 1
ESC EM 2	Feed from bin 2
ESC EM E	Manual feed
ESC EM R	Remove paper
ESC -	Set vertical tab
//1//	Select bin 1
//2//	Select bin 2
//C//	Select bin change
//E//	Manual feed
//R//	Select remove
ESC SUB R	Remote error reset
ESC SUB SO	Memory test
ESC SUB 1	Request status byte 1
ESC SUB 3	Request status byte 3
ESC I	Feed from bin 1
ESC K	Feed from bin 2
ESC SYN n	Language select

IBM Proprinter (XL) (IC Card)

Control code

BEL	Bell
BS	Backspace
HT	Horizontal tab execution
LF	Line feed
VT	Vertical tab execution
FF	Form feed
CR	Carriage return
SO	Set one-line double-width mode
SI	Set condensed mode
DC1	Select printer
DC2	Select 10 cpi
DC4	Reset one-line double-width mode
CAN	Cancel line buffer
SP	Space

Escape code

ESC - (0)	Reset underline mode
ESC - (1)	Set underline mode
ESC 0	Set line spacing to 1/8 in
ESC 1	Set line spacing to 7/72 in
ESC 2	Enable text line spacing
ESC 3 (n)	Set line spacing to n/216 in n: 1 to 255
ESC 4	Set top of form
ESC 5 (0)	Disable automatic line feed by CR code
ESC 5 (1)	Enable automatic line feed by CR code
ESC 6	Select character set II
ESC 7	Select character set I
ESC :	Set elite pitch
ESC A (n)	Set line spacing to n/72 in (text line spacing) n: 0 to 127
ESC B NUL	Reset all vertical tabs
ESC B (n1)...(nk) NUL	Set vertical tabs nk: 0 to 254 nk-1 is smaller than nk. k: 1 to 127
ESC C NUL (n)	Set form length by inches (n in) n: 1 to 22

ESC C (n)	Set form length by line space (n lines) n: 1 to 127
ESC D NUL	Reset all horizontal tabs
ESC D (n1)...(nk) NUL	Set horizontal tabs nk: 1 to 255 nk-1 is smaller than nk. k: 1 to 256
ESC E	Set emphasized print mode
ESC F	Reset emphasized print mode
ESC G	Set NLQ mode
ESC H	Reset NLQ mode
ESC J (n)	Single line feed (n/216 in) n: 1 to 255
ESC K (n1)(n2)(data)	Single-density image
ESC L (nl)(n2)(data)	Double-density image
ESC N (n)	Set skip perforations (n lines) n: 1 to 127
ESC O	Reset skip perforations
ESC Q SYN	Deselect printer
ESC R	Reset tabs to defaults
ESC S (0)	Set superscript mode
ESC S (1)	Set subscript mode
ESC T	Reset superscript mode
ESC T	Reset subscript mode
ESC W (0)	Reset double-width mode
ESC W (1)	Set double-width mode
ESC Y (n1)(n2)(data)	Double-density image
ESC Z (n1)(n2)(data)	Quadruple-density image
ESC \ (n1)(n2)(chars)	Print characters from all-character set n1 and n2 specify the number of characters to be printed from the all-character set. Total: n1 + 256 × n2
ESC ^ (char)	Print character from all-character set
ESC _ (0)	Reset overline mode
ESC _ (1)	Set overline mode
ESC P (n)	Proportional space mode
ESC X (n)(m)	Set horizontal margin (columns n and m) n: 0 to 255 m: 1 to 255

ESC [@ n1 n2 m1...m4 Double height, width, and line spacing printing

n1: Low order byte, usually 4

n2: High order byte, usually 0

m1: Reserved, must be 0(NUL)

m2: Reserved, must be 0(NUL)

m3: Line spacing and character height modes

Bit	Mode
5	Double line feed
4	Normal line feed
1	Double height character
0	Normal heiht character

m4: Character width mode

Bit	Mode
1	Double-width character
0	Normal-width character

Epson FX-85 Control and Escape Codes (IC Card)

Control code

CAN	Cancel line buffer
BS	Backspace
CR	Carriage return to left margin
DC2	Cancel condensed print mode
DC4	Cancel one-line enlarged-print mode
ESC	Begin escape sequence
FF	Form feed to next page
HT	Horizontal tab
LF	Line feed
SO	Shift out to set enlarged print mode
SI	Shift in to set condensed print mode
SP	Space
VT	Vertical tab
DC1/DC3	Select/deselect printer
DEL	Delete one character
BEL	Beep

Escape code

ESC SO	Set one line enlarged print mode
ESC SI	Set condensed print mode
ESC ! n	Select print mode

n: 0 to 63

The print mode depends on the bit pattern:

Bit	On	Off	Function
0	ESC M	ESC P	Elite/pica
1	ESC p 1	ESC p 0	Proportional or not
2	SI	DC2	Compressed or not
3	ESC E	ESC F	Emphasized or not
4	ESC G	ESC H	Double-strike or not
5	WSC W 1	ESC W 0	Expanded or not
6	ESC 4	ESC 5	Italic or not
7	ESC - 1	ESC - 0	Underline or not

ESC #	Cancel MSB control sequence
ESC *	Select bit image mode
ESC - n	Set/cancel underlined print mode n: 1, 49, or 129 sets underline mode. n: 0, 48, or 128 cancels underline mode.
ESC 0	Set 1/8 in line spacing
ESC 1	Set 7/72 in line spacing
ESC 2	Set 1/6 in line spacing
ESC 3 n	Set n/216 in line spacing n: 0 to 216
ESC 4	Select alternate character set (italics)
ESC 5	Cancel alternate character set
ESC 6	Expand printable code area
ESC 7	Cancel ESC 6 setting
ESC <	No operation (Prints one line from left to right)
ESC =	Set MSB of input 8-bit data as 0
ESC >	Set MSB of input 8-bit data as 1
ESC @	Initialize the printer
ESC A n	Set n/72 in line spacing n: 0 to 85
ESC B n1 n2...n16	Set vertical tab at n1 n2...n16 n: 0 to 255
ESC C n	Set form length to n lines n: 1 to 127
ESC C 0 m	Set page length to m inches m: 1 to 22
ESC D n1 n2...n32	Set horizontal tab at n1 n2...n32 n: 0 to 255
ESC E	Set printing to bold
ESC F	Cancel bold printing mode
ESC G	Set double-strike print mode
ESC H	Cancel double-strike print mode
ESC I n	Disable/enable expanded characters n: 0, 48, or 128 enables expanded characters. n: 1, 49, or 129 disables expanded characters.
ESC J n	Feed n/216 in line spacing for one line n: 0 to 255
ESC K	Set normal-density bit image mode
ESC L	Set dual-density bit image mode
ESC M	Set elite pitch

ESC N n — Set perforation skip
n: 1 to number of lines to be skipped at the bottom of a page

ESC O — Cancel perforation skip

ESC P — Cancel ESC M code/set pica pitch

ESC Q n — Set right margin to n character width

Pica	n: 2 to 80
Elite	n: 3 to 96
Pica (compressed)	n: 3 to 137
Elite (compressed)	n: 4 to 160
Pica (expanded)	n: 1 to 40
Pica (expanded compressed)	n: 2 to 68
Elite (expanded compressed)	n: 2 to 80

ESC S n — Set superscript/subscript print mode
n: 0, 48, or 128 sets superscript print mode.
n: 1, 49, or 129 sets subscript print mode.

ESC T — Cancel superscript/subscript print mode

ESC W n — Set/cancel enlarged print mode
n: 0, 48, or 128 cancels enlarged mode.
n: 1, 49, or 129 sets enlarged mode.

ESC Y — (Set dual-density bit image mode)

ESC Z — Set quadruple-density bit image mode

ESC j n — Executes reverse feed n/216 in line spacing
n: 0 to 255

ESC ℓ n — Set left margin to n character width

Pica	n: 2 to 80
Elite	n: 3 to 96
Pica (compressed)	n: 3 to 137
Elite (compressed)	n: 4 to 160
Pica (expanded)	n: 1 to 40
Pica (expanded compressed)	n: 2 to 68
Elite (expanded compressed)	n: 2 to 80

ESC p n — Set spacing mode (proportional/fixed)
n: 1, 49, or 129 sets proportional spacing.
n: 0, 48, or 128 sets normal spacing.

ESC / (n) — VFU (vertical format unit) channel selection
n: 0 to 7

ESC b (n) (m1 m2...m16) NUL

VFU (vertical format unit) position setting
n: 0 to 7 m: 0 to 255

ESC ? s n

Reassign graphics mode

ESC EM n

(No operation) Cut-sheet feeder control

ESC R n

International character

n=0:	USA	n=6:	Italy
n=1:	France	n=7:	Spain
n=2:	Germany	n=8:	Japan
n=3:	UK	n=9:	Norway
n=4:	Denmark I	n=10:	Denmark II
n=5:	Sweden		

ESC SP n

Select character space in n/240 in
n: 0 to 64

ESC $ n1 n2

Select absolute dot position in units of 1/160 in

$$\text{Cursor position: } \frac{n1 + n2 \times 256}{60} \text{ in}$$

n1: 0 to 255
n2: 0 to 4

ESC \ n1 n2

Select relative dot position

$$\text{Cursor movement: } \frac{n2 \times n1}{120} \text{ in}$$

ESC a n

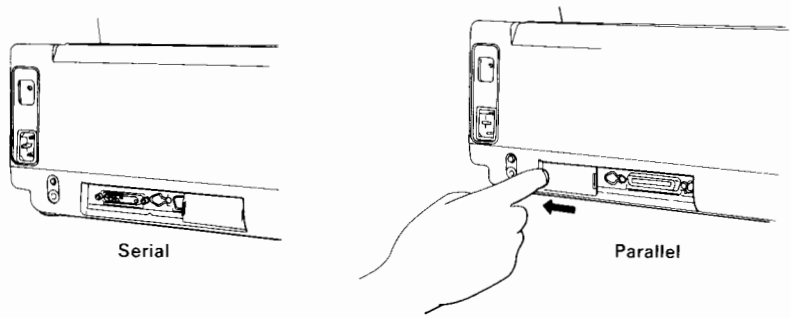
Select NLQ justification

n: 0, 48, or 128	Left-justification
n: 1, 49, or 129	Centering
n: 2, 50, or 130	Right-justification
n: 3, 51, or 131	Word wrap (full-justification)

APPENDIX C
INTERFACING

Overview

This printer can communicate with a computer through both parallel (Centronics) and serial (RS-232C) interfaces.



Interface connectors

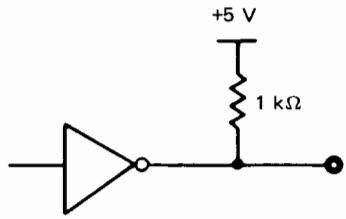
Parallel Interface

Hardware Requirements

Signal levels: TTL-compatible

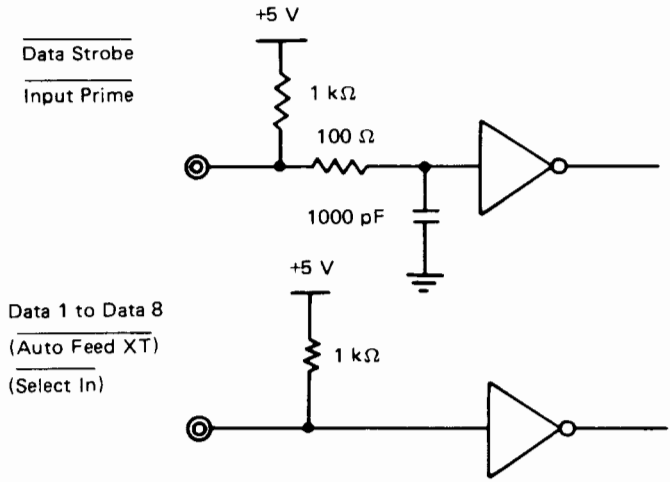
0.0 to +0.4 V for low level
+2.4 to +5.0 V for high level

Output circuit: SN74LS06 or equivalent



Parallel interface output circuit

Input circuit: SN74LS14 or equivalent

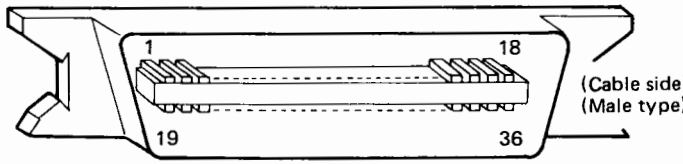


Parallel interface input circuit

Connector Pin Assignment

Connector (cable side): Shielded plug

Amphenol DDK57FE-30360 or equivalent



Parallel interface connector

Signal definition:

Parallel interface signals

Connector pin number	Return line pin number	Signal name	Direc-tion	Description
1	19	$\overline{\text{Data Strobe}}$	In	– Strobe pulse for reading data (Data 1 to Data 8). The printer reads data when this signal is low. – The pulse width must be 0.5μs or more at the terminal of the printer.

Parallel interface signals – continued

Connector pin number	Return line pin number	Signal name	Direction	Description
2	20	Data 1	In	– Data 8 is the most significant bit, but is not used in 7-bit ASCII mode. – All signals must go high at least 0.5μs before the falling edge of the $\overline{\text{Data Strobe}}$ signal and must stay high for at least 0.5μs after the rising edge.
3	21	Data 2	In	
4	22	Data 3	In	
5	23	Data 4	In	
6	24	Data 5	In	
7	25	Data 6	In	
8	26	Data 7	In	
9	27	Data 8	In	
10	28	$\overline{\text{Acknowledge}}$	Out	– Pulsed signal indicating data receive completed (or data receive enable) status. – It is also issued when the printer switches from offline to online.
11	29	Busy	Out	Data cannot be received when this signal is high, for example, if the buffer is full or when an error occurs.
12	30	Paper Empty	Out	This signal goes high when paper runs out.
13	—	Select	Out	This signal indicates the selected (online) state when the signal is high and the deselected (offline) state when it is low.

Parallel interface signals – continued

Connector pin number	Return line pin number	Signal name	Direction	Description
14	—	$\overline{\text{Auto Feed XT}}$	In	(Reserved)*
15	—	—		Not used
16	—	Signal Ground (SG)		Logic ground level (0V)
17	—	Frame Ground (FG)		Printer cabinet ground line
18	—	—		Not used
19 to 30	—	Signal Ground (SG)		Twisted-pair return lines
31	—	$\overline{\text{Input Prime}}$	In	If this signal is low for more than 50μs, the printer is reset to initial status and put online.
32	—	$\overline{\text{Fault}}$	Out	This signal goes low under the following conditions: 1. Offline 2. Paper outage 3. Open cover 4. Other printer error
33		—		Not used
34		+5V		Pulled up to +5V through 3.3kΩ.
33		—		Not used
34		—		Not used

Parallel interface signals – continued

Connector pin number	Return line pin number	Signal name	Direc-tion	Description
35		+5V		Pulled up to +5V through 3.3kΩ.
36		(Select In)	In	(Reserved)*

NOTES:

1. Direction:
   In indicates a signal input to the printer.
   Out indicates a signal output from the printer.

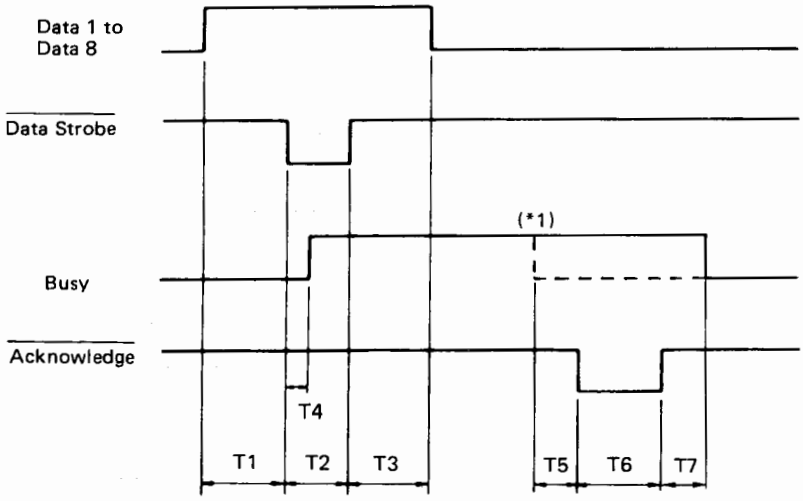
2. Return line:
   Represents a twisted pair return line, one side of which is connected to signal ground level.

3. * indicates assignment as a signal name, but no function.

Data Transmission Timing

The printer receives data from the computer in handshake mode based on the Busy and Acknowledge signals from the printer and the Data Strobe signal from the computer.

Timing for the Busy, Data Strobe, and Acknowledge signals must be as shown in the figure below.



*1 Timing for emulations other than HP LJ+

T1, T2, T3 > 0.5 μs
T4 < 0.5 μs
T5, T7 = 0 μs
T6 = 3 ±1.0 μs

Data transmission timing

Serial Interface

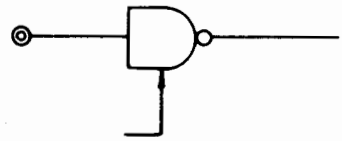
Hardware Requirements

Signal levels:

- 3 V or lower for a mark condition (logical 1)
+3 V or higher for a space condition (logical 0)

Input circuit:

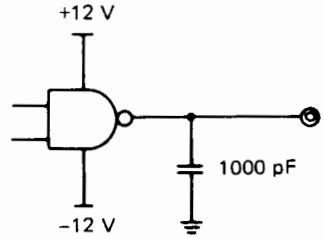
The MC1489AL is used to convert from RS-232C level to TTL level.



Serial interface input circuit

Output circuit:

The MC1488L is used to convert from TTL level to RS-232C level. A 1000-pF capacitor suppresses noise on the output signal line.

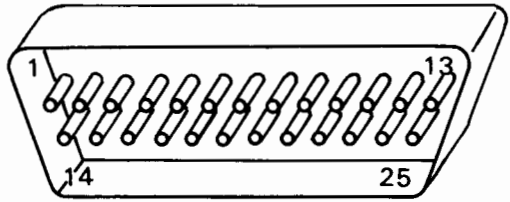


Serial interface output circuit

Connector Pin Assignment

Connector (cable side):

D-subminiature Cannon or Cinch DB-25 plug or equivalent connector conforming to EIA standards



Serial interface connector

Signal definition:

Serial interface signals

Pin number	Designation	Direction	Function
1	FG		Frame/Chassis Ground Safety/Protective Ground
2	TD	Output	Transmitted Data
3	RD	Input	Received Data
4	RTS	Output	Request to Send Spaces are sent when the printer is ready to transmit data
5	CTS	Input	Clear to Send Spaces are sent when the computer is ready to receive data
6	DSR	Input	Data Set Ready The computer sends spaces when it is ready to send or receive data
7	SG		Signal Ground (common return)

Serial interface signals – continued

Pin number	Designation	Direction	Function
8	CD	Input	Carrier Detect The printer sends spaces when it is ready to receive data
11	(RC)	Output	(Reverse Channel) Availabel as a printer ready signal (Not used for the standard interface)
20	DTR	Output	Data Terminal Ready The printer sends spaces when it is ready to send or receive data

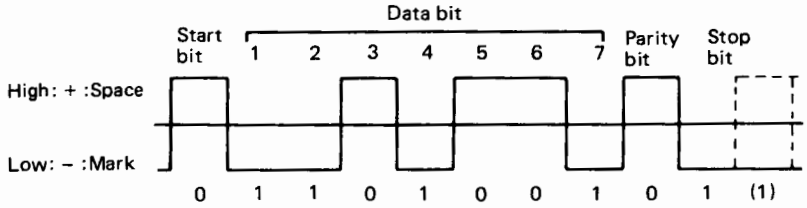
NOTES:

1. The space state corresponds to the high level of the interface signal.

2. The direction (output or input) refers to the printer side.

Serial Data Format

Serial data consists of a start bit, data bits, a parity bit, and one or two stop bits. A bit is in the mark state when not in transmission. Data bits start with the least significant bit (LSB). For example, the character K (hexadecimal 4B) is sent as shown below (7 data bits, even parity).



Serial data format

Timing Diagrams

The printer enables or inhibits input control signals for the printer linked with the RS-232C interface. Thus, it enables communication via the RS-232C interface as well as simpler communication.

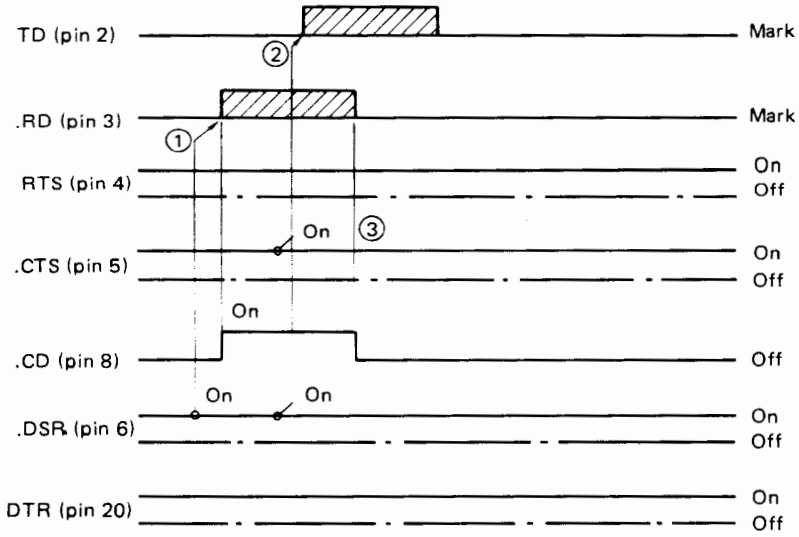
This function is selected from the control panel, and display settings for the control signals listed in the table below are indicated.

Control signals

Term	Display setting		Enable/Inhibit single		
	"CONTROL:"	"DUPLEX:"	CTS(pin 5)	CD (pin 8)	DSR(pin 6)
(1)	ALL-WIRE	FULL	E	D	E
(2)	3 WIRE	FULL	D	D	D

The timing charts that follow show how the above settings, data communication conditions, and control signals are related.

(1) Full-duplex all-wire control mode



NOTES:

Signals prefixed by a dot are input to the printer.

① DSR must be high when the printer receives data in this mode. Otherwise, received data is rejected.

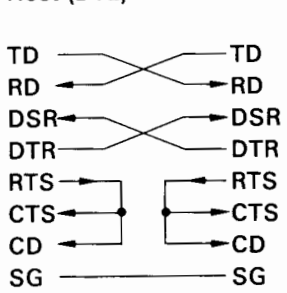
② If both DSR and CTS are high when the printer has data to be transmitted to the computer in this mode, the printer transmits the data immediately. If either DSR or CTS is low, data is not transmitted until both signals go high.

③ In this mode, CD is "don't care".

An example of cable wiring:

a. To DCE (data circuit terminating equipment)
   Use the "straight-through" cable.

b. To DTE (data terminal equipment)
Be sure to use the "cross-patched" cable as shown below.



(2)Full-duplex 3-wire control mode

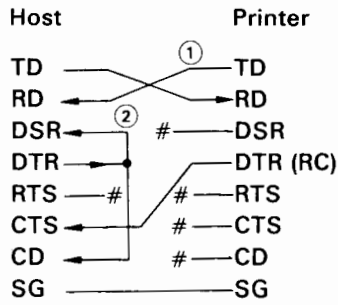
This mode enables simpler communication than the above mode.

Input control signals DSR, CTS, and CD are always treated as high, regardless of their actual states.

Data communication is always enabled even if a computer that does not use any of these input control signals is linked to the terminal.

An example of cable wiring:

This wiring is for IBM PCs and most other personal computers.



#: Indicates the open wire.

NOTES:

1. Wire ① is unnecessary for the DTR (or RC) protocol.
2. Some hosts may not require wire ②.

Data Protocols

Different types of protocol are available for the RS-232C serial interface depending on the computer manufacturer.

- X-ON/X-OFF or DC1/DC3
- DTR
- RC
- ETX/ACK

These protocols are used to prevent the print data receive buffer from overflowing because interface data is transmitted faster than buffer data. The printer uses specific character codes or an interface signal for each protocol to notify the computer of buffer status.

(1) X-ON/X-OFF or DC1/DC3 protocol

The XOFF (DC3) code (hexadecimal 13) is transmitted from the printer when less than 255 bytes remain in the buffer. The XON (DC1) code (hexadecimal 11) is transmitted when less than 255 bytes of data remain in the buffer.

Data might not be process normally if data is transmitted to the printer when not enough buffer space is available after the XOFF code has been transmitted.

When the printer is first turned on, the DTR signal is set (spaces are sent) and an XON (DC1) code is transmitted from the printer. When the printer is put offline, the XOFF code is transmitted even if the buffer is not full. The XON code is transmitted when the printer is put online again.

If paper runs out or the cover is open, a NAK code (hexadecimal 15) is sent from the printer.

(2) DTR protocol

The DTR signal (pin 20) goes low. That is, the Busy signal is issued when 255 bytes of data remain in the buffer. When the printer is put offline, the DTR signal becomes inactive.

The transmitter must stop transmission within 255 bytes after the DTR signal is low.

Valid data cannot be guaranteed if data exceeding the buffer capacity is transmitted (the DTR signal is ignored).

Buffer-full recovery timing:

Data transmission is suspended when the DTR signal goes low. Even in this state, printing continues. When available area in the buffer exceeds 255 bytes, the DTR signal goes high (a READY signal is issued).

(3) RC protocol

This is the same as the DTR protocol, except that it uses the Reverse Channel signal (pin 11) instead of the Data Terminal Ready signal (pin 20).

(4) ETX/ACK protocol

The printer sends the ACK (Acknowledge) character (hexadecimal 06) to the computer when it reads out the ETX (End of Text) character (hexadecimal 03) from its print data receive buffer. It does not print the ETX character.

The computer transmits fixed-length messages that are half of buffer length or less. All messages end with the ETX character.

When the first message is transmitted to the printer, printing begins and the computer sends the second message to the printer. The printer's receive buffer becomes full. The printer sends the ACK character when the ETX character (end of the first message) is detected. The computer stops sending the third message to the printer.

This procedure can prevent the receive buffer from overflowing. The computer does not send the next message after the first two messages until it receives the ACK character.

Data transmission continues unless the printer finishes printing two messages (enough to fill the receive buffer).

This protocol provides highly efficient, high-throughput data communication.

APPENDIX D
CODE CONVERSION

The following character sets are used in the conversion tables in this section:

Set 1: IBM character set 1, specifiable by the ESC 7 command in IBM-PRO emulation

Set 2: IBM character set 2, specifiable by the ESC 6 command in IBM-PRO emulation

All: IBM all-printable-character set, specifiable by the ESC \ or ESC ^ command in IBM-PRO emulation

Rmn 8: Roman-8 character set, specifiable by the ESC (8 U command in HP-LaserJet Plus emulation

Rmn8	Set1	Set2	All	Dec	Hex	Binary	Rmn8	Set1	Set2	All	Dec	Hex	Binary
NUL	NUL	NUL	Ø	0	00	00000000	SP	SP	SP	SP	32	20	00100000
SOH	SOH	SOH	☺	1	01	00000001	!	!	!	!	33	21	00100001
STX	STX	STX	●	2	02	00000010	"	"	"	"	34	22	00100010
ETX	ETX	♥	♥	3	03	00000011	#	#	#	#	35	23	00100011
EOT	EOT	♦	♦	4	04	00000100	$	$	$	$	36	24	00100100
ENQ	ENQ	♣	♣	5	05	00000101	%	%	%	%	37	25	00100101
ACK	ACK	♠	♠	6	06	00000110	&	&	&	&	38	26	00100110
BEL	BEL	BEL	●	7	07	00000111	'	'	'	'	39	27	00100111
BS	BS	BS	◘	8	08	00001000	(	(	(	(	40	28	00101000
HT	HT	HT	○	9	09	00001001	)	)	)	)	41	29	00101001
LF	LF	LF	▮	10	0A	00001001	*	*	*	*	42	2A	00101001
VT	VT	VT	♂	11	0B	00001011	+	+	+	+	43	2B	00101011
FF	FF	FF	♀	12	0C	00001100	,	,	,	,	44	2C	00101100
CR	CR	CR	♪	13	0D	00001101	-	-	-	-	45	2D	00101101
SO	SO	SO	♫	14	0E	00001110	.	.	.	.	46	2E	00101110
SI	SI	SI	☼	15	0F	00001111	/	/	/	/	47	2F	00101111
DLE	DLE	DLE	►	16	10	00010000	0	0	0	0	48	30	00110000
DC1	DC1	DC1	◄	17	11	00010001	1	1	1	1	49	31	00110001
DC2	DC2	DC2	↕	18	12	00010010	2	2	2	2	50	32	00110010
DC3	DC3	DC3	‼	19	13	00010011	3	3	3	3	51	33	00110011
DC4	DC4	DC4	¶	20	14	00010100	4	4	4	4	52	34	00110100
NAK	NAK	§	§	21	15	00010101	5	5	5	5	53	35	00110101
SYN	SYN	SYN	▬	22	16	00010110	6	6	6	6	54	36	00110110
ETB	ETB	ETB	↨	23	17	00010111	7	7	7	7	55	37	00110111
CAN	CAN	CAN	↑	24	18	00011000	8	8	8	8	56	38	00111000
EM	EM	EM	↓	25	19	00011001	9	9	9	9	57	39	00111001
SUB	SUB	SUB	→	26	1A	00011001	:	:	:	:	58	3A	00111001
ESC	ESC	ESC	←	27	1B	00011011	;	;	;	;	59	3B	00111011
FS	FS	FS	∟	28	1C	00011100	<	<	<	<	60	3C	00111100
GS	GS	GS	↔	29	1D	00011101	=	=	=	=	61	3D	00111101
RS	RS	RS	▲	30	1E	00011110	>	>	>	>	62	3E	00111110
US	US	US	▼	31	1F	00011111	?	?	?	?	63	3F	00111111

Rmn8	Set1	Set2	All	Dec	Hex	Binary	Rmn8	Set1	Set2	All	Dec	Hex	Binary
@	@	@	@	64	40	01000000	‘	`	`	`	96	60	01100000
A	A	A	A	65	41	01000001	a	a	a	a	97	61	01100001
B	B	B	B	66	42	01000010	b	b	b	b	98	62	01100010
C	C	C	C	67	43	01000011	c	c	c	c	99	63	01100011
D	D	D	D	68	44	01000100	d	d	d	d	100	64	01100100
E	E	E	E	69	45	01000101	e	e	e	e	101	65	01100101
F	F	F	F	70	46	01000110	f	f	f	f	102	66	01100110
G	G	G	G	71	47	01000111	g	g	g	g	103	67	01100111
H	H	H	H	72	48	01001000	h	h	h	h	104	68	01101000
I	I	I	I	73	49	01001001	i	i	i	i	105	69	01101001
J	J	J	J	74	4A	01001001	j	j	j	j	106	6A	01101001
K	K	K	K	75	4B	01001011	k	k	k	k	107	6B	01101011
L	L	L	L	76	4C	01001100	l	l	l	l	108	6C	01101100
M	M	M	M	77	4D	01001101	m	m	m	m	109	6D	01101101
N	N	N	N	78	4E	01001110	n	n	n	n	110	6E	01101110
O	O	O	O	79	4F	01001111	o	o	o	o	111	6F	01101111
P	P	P	P	80	50	01010000	p	p	p	p	112	70	01110000
Q	Q	Q	Q	81	51	01010001	q	q	q	q	113	71	01110001
R	R	R	R	82	52	01010010	r	r	r	r	114	72	01110010
S	S	S	S	83	53	01010011	s	s	s	s	115	73	01110011
T	T	T	T	84	54	01010100	t	t	t	t	116	74	01110100
U	U	U	U	85	55	01010101	u	u	u	u	117	75	01110101
V	V	V	V	86	56	01010110	v	v	v	v	118	76	01110110
W	W	W	W	87	57	01010111	w	w	w	w	119	77	01110111
X	X	X	X	88	58	01011000	x	x	x	x	120	78	01111000
Y	Y	Y	Y	89	59	01011001	y	y	y	y	121	79	01111001
Z	Z	Z	Z	90	5A	01011001	z	z	z	z	122	7A	01111001
[	[	[	[	91	5B	01011011	{	{	{	{	123	7B	01111011
\	\	\	\	92	5C	01011100	|	|	|	|	124	7C	01111100
]	]	]	]	93	5D	01011101	}	}	}	}	125	7D	01111101
^	^	^	^	94	5E	01011110	~	~	~	~	126	7E	01111110
_	_	_	_	95	5F	01011111	DEL	DEL	DEL	⌂	127	7F	01111111

Rmn8	Set1	Set2	All	Dec	Hex	Binary	Rmn8	Set1	Set2	All	Dec	Hex	Binary
	NUL	Ç	Ç	128	80	10000000		á	á	á	160	A0	10010000
	SOH	ü	ü	129	81	10000001	À	í	í	í	161	A1	10010001
	STX	é	é	130	82	10000010	Â	ó	ó	ó	162	A2	10010010
	ETX	â	â	131	83	10000011	È	ú	ú	ú	163	A3	10010011
	EOT	ä	ä	132	84	10000100	Ê	ñ	ñ	ñ	164	A4	10010100
	ENQ	à	à	133	85	10000101	Ë	Ñ	Ñ	Ñ	165	A5	10010101
	ACK	å	å	134	86	10000110	Î	ª	ª	ª	166	A6	10010110
	BEL	ç	ç	135	87	10000111	Ï	º	º	º	167	A7	10010111
	BS	ê	ê	136	88	10001000	´	¿	¿	¿	168	A8	10011000
	HT	ë	ë	137	89	10001001	`	⌐	⌐	⌐	169	A9	10011001
	LF	è	è	138	8A	10001001	^	¬	¬	¬	170	AA	10011001
	VT	ï	ï	139	8B	10001011	¨	½	½	½	171	AB	10011011
	FF	î	î	140	8C	10001100	~	¼	¼	¼	172	AC	10011100
	CR	ì	ì	141	8D	10001101	Ù	¡	¡	¡	173	AD	10011101
	SO	Ä	Ä	142	8E	10001110	Û	«	«	«	174	AE	10011110
	SI	Å	Å	143	8F	10001111	£	»	»	»	175	AF	10011111
	DLE	É	É	144	90	10010000	¯	⣿	⣿	⣿	176	B0	10110000
	DC1	æ	æ	145	91	10010001	Ý	▒	▒	▒	177	B1	10110001
	DC2	Æ	Æ	146	92	10010010	ý	▓	▓	▓	178	B2	10110010
	DC3	ô	ô	147	93	10010011	°	│	│	│	179	B3	10110011
	DC4	ö	ö	148	94	10010100	Ç	┤	┤	┤	180	B4	10110100
	NAK	ò	ò	149	95	10010101	ç	╡	╡	╡	181	B5	10110101
	SYN	û	û	150	96	10010110	Ñ	╢	╢	╢	182	B6	10110110
	ETB	ù	ù	151	97	10010111	ñ	╖	╖	╖	183	B7	10110111
	CAN	ÿ	ÿ	152	98	10011000	¡	╕	╕	╕	184	B8	10111000
	EM	Ö	Ö	153	99	10011001	¿	╣	╣	╣	185	B9	10111001
	SUB	Ü	Ü	154	9A	10011001	¤	║	║	║	186	BA	10111001
	ESC	¢	¢	155	9B	10011011	£	╗	╗	╗	187	BB	10111011
	FS	£	£	156	9C	10011100	¥	╝	╝	╝	188	BC	10111100
	GS	¥	¥	157	9D	10011101	§	╜	╜	╜	189	BD	10111101
	RS	₧	₧	158	9E	10011110	ƒ	╛	╛	╛	190	BE	10111110
	US	ƒ	ƒ	159	9F	10011111	¢	┐	┐	┐	191	BF	10111111

Rmn8	Set1	Set2	All	Dec	Hex	Binary	Rmn8	Set1	Set2	All	Dec	Hex	Binary
â	└	└	└	192	C0	11000000	Á	α	α	α	224	E0	11100000
ê	┴	┴	┴	193	C1	11000001	Ã	β	β	β	225	E1	11100001
ô	┬	┬	┬	194	C2	11000010	ã	Γ	Γ	Γ	226	E2	11100010
û	├	├	├	195	C3	11000011	Đ	π	π	π	227	E3	11100011
á	─	─	─	196	C4	11000100	đ	Σ	Σ	Σ	228	E4	11100100
é	┼	┼	┼	197	C5	11000101	Í	σ	σ	σ	229	E5	11100101
ó	╞	╞	╞	198	C6	11000110	Ì	μ	μ	μ	230	E6	11100110
ú	╟	╟	╟	199	C7	11000111	Ó	τ	τ	τ	231	E7	11100111
à	╚	╚	╚	200	C8	11001000	Ò	Φ	Φ	Φ	232	E8	11101000
è	╔	╔	╔	201	C9	11001001	Õ	Θ	Θ	Θ	233	E9	11101001
ò	╩	╩	╩	202	CA	11001001	õ	Ω	Ω	Ω	234	EA	11101001
ù	╦	╦	╦	203	CB	11001011	Š	δ	δ	δ	235	EB	11101011
ä	╠	╠	╠	204	CC	11001100	š	∞	∞	∞	236	EC	11101100
ë	═	═	═	205	CD	11001101	Ú	φ	φ	φ	237	ED	11101101
ö	╬	╬	╬	206	CE	11001110	Ÿ	∈	∈	∈	238	EE	11101110
ü	╧	╧	╧	207	CF	11001111	ÿ	∩	∩	∩	239	EF	11101111
Å	╨	╨	╨	208	D0	11010000	Þ	≡	≡	≡	240	F0	11110000
î	╤	╤	╤	209	D1	11010001	þ	±	±	±	241	F1	11110001
Ø	╥	╥	╥	210	D2	11010010	·	≥	≥	≥	242	F2	11110010
Æ	╙	╙	╙	211	D3	11010011	μ	≤	≤	≤	243	F3	11110011
å	╘	╘	╘	212	D4	11010100	¶	⌠	⌠	⌠	244	F4	11110100
í	╒	╒	╒	213	D5	11010101	¼	⌡	⌡	⌡	245	F5	11110101
ø	╓	╓	╓	214	D6	11010110	—	÷	÷	÷	246	F6	11110110
æ	╫	╫	╫	215	D7	11010111	¼	≈	≈	≈	247	F7	11110111
Ä	╪	╪	╪	216	D8	11011000	½	°	°	°	248	F8	11111000
ì	┘	┘	┘	217	D9	11011001	ª	•	•	•	249	F9	11111001
Ö	┌	┌	┌	218	DA	11011001	º	·	·	·	250	FA	11111001
Ü	▉	▉	▉	219	DB	11011011	«	√	√	√	251	FB	11111011
É	■	■	■	220	DC	11011100	■	n	n	n	252	FC	11111100
ï	▌	▌	▌	221	DD	11011101	»	2	2	2	253	FD	11111101
ß	▌	▌	▌	222	DE	11011110	±	■	■	■	254	FE	11111110
Ô	■	■	■	223	DF	11011111		SP	SP	SP	255	FF	11111111

APPENDIX E
CHARACTER SET

Roman-8 (Resident, HP LaserJet Plus Emulation)

H / L	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	'	p				¯	â	Å	Á	Þ
1	SOH	DC1	!	1	A	Q	a	q			À	Ý	ê	î	Ã	þ
2	STX	DC2	"	2	B	R	b	r			Â	ý	ô	Ø	ã	·
3	ETX	DC3	#	3	C	S	c	s			È	°	û	Æ	Ð	µ
4	EOT	DC4	$	4	D	T	d	t			Ê	Ç	á	å	đ	¶
5	ENQ	NAK	%	5	E	U	e	u			Ë	ç	é	í	Í	¾
6	ACK	SYN	&	6	F	V	f	v			Î	Ñ	ó	ø	Ì	—
7	BEL	ETB	'	7	G	W	g	w			Ï	ñ	ú	æ	Ó	¼
8	BS	CAN	(	8	H	X	h	x			´	¡	à	Ä	Ò	½
9	HT	EM	)	9	I	Y	i	y			`	¿	è	ì	Õ	ª
A	LF	SUB	*	:	J	Z	j	z			^	¤	ò	Ö	õ	º
B	VT	ESC	+	;	K	[	k	{			¨	£	ù	Ü	Š	«
C	FF	FS	,	<	L	\	l	|		~	¥	ä	É	š	■
D	CR	GS	-	=	M	]	m	}			Ù	§	ë	ï	Ú	»
E	SO	RS	.	>	N	^	n	~			Û	ƒ	ö	ß	Ÿ	±
F	SI	US	/	?	O	_	o	DEL			£	¢	ü	Ô	ÿ	

IBM Character Set 1 (IC Card)

H / L	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	NUL	DLE	á	⁝⁝	└	╨	α	≡
1	SOH	DC1	!	1	A	Q	a	q	SOH	DC1	í	▒	┴	╤	β	±
2	STX	DC2	"	2	B	R	b	r	STX	DC2	ó	▓	┬	╥	Γ	≥
3	ETX	DC3	#	3	C	S	c	s	ETX	DC3	ú	│	├	╙	π	≤
4	EOT	DC4	$	4	D	T	d	t	EOT	DC4	ñ	┤	─	╘	Σ	⌠
5	ENQ	NAK	%	5	E	U	e	u	ENQ	NAK	Ñ	╡	┼	╒	σ	⌡
6	ACK	SYN	&	6	F	V	f	v	ACK	SYN	ª	╢	╞	╓	μ	÷
7	BEL	ETB	'	7	G	W	g	w	BEL	ETB	º	╖	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	╕	╚	╪	Φ	°
9	HT	EM	)	9	I	Y	i	y	HT	EM	⌐	╣	╔	┘	Θ	•
A	LF	SUB	*	:	J	Z	j	z	LF	SUB	¬	║	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	╗	╦	█	δ	√
C	FF	FS	,	<	L	\	l	|	FF	FS	¼	╝	╠	▄	∞	n
D	CR	GS	-	=	M	]	m	}	CR	GS	¡	╜	═	▌	φ	²
E	SO	RS	.	>	N	^	n	~	SO	RS	«	╛	╬	▐	∈	■
F	SI	US	/	?	O	_	o	DEL	SI	US	»	┐	╧	▀	∩	SP

IBM Character Set 2 (IC Card)

L \ H	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE	SP	0	@	P	`	p	Ç	É	á	⣿	└	╨	α	≡
1	SOH	DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2	STX	DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	DC3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠	SYN	&	6	F	V	f	v	å	û	ª	╢	╞	╓	μ	÷
7	BEL	ETB	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A	LF	SUB	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C	FF	FS	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D	CR	GS	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	2
E	SO	RS	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
F	SI	US	/	?	O	_	o	DEL	Å	ƒ	»	┐	╧	▀	∩	SP

IBM All-Printable-Character Set (IC Card)

H / L	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Ø	▶	SP	0	@	P	`	p	Ç	É	á	⁝⁝	└	╨	α	≡
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	μ	÷
7	●	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	n
D	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	▀	∩	SP

HP LaserJet Plus International Character Set (Resident)

Dec. / Country	35	36	64	91	92	93	94	96	123	124	125	126
ASCII	#	$	@	[	\	]	^	`	{	|	}	~
ISO IRV	#	¤	@	[	\	]	^	`	{	|	}	¯
ISO UK	£	$	@	[	\	]	^	`	{	|	}	¯
ISO France	£	$	à	°	ç	§	^	`	é	ù	è	¨
ISO France	£	$	à	°	ç	§	^	µ	é	ù	è	¨
Germany	£	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ISO Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ISO Italy	£	$	§	°	ç	é	^	ù	à	ò	è	ì
JIS ASCII	#	$	@	[	¥	]	^	`	{	|	}	¯
ISO China	#	¥	@	[	\	]	^	`	{	|	}	¯
ISO Sweden	#	¤	@	Ä	Ö	Å	^	`	ä	ö	å	¯
ISO Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Spain	#	$	@	¡	Ñ	¿	°	`	{	ñ	}	~
ISO Spain	£	$	§	¡	Ñ	¿	^	`	°	ñ	ç	~
ISO Spain	#	$	·	¡	Ñ	Ç	¿	`	´	ñ	ç	¨
ISO Portugal	#	$	§	Ã	Ç	Õ	^	`	ã	ç	õ	°
ISO Portugal	#	$	´	Ã	Ç	Õ	^	`	ã	ç	õ	~
ISO Norway v1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	¯
ISO Norway v2	§	$	@	Æ	Ø	Å	^	`	æ	ø	å	|

Diablo 630 International Character Set (IC Card)

Dec. / Country	35	36	64	91	92	93	94	96	123	124	125	126
USA	#	$	@	[	\	]	^	`	{	|	}	~
France	£	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
UK	£	$	@	[	\	]	^	`	{	|	}	~
Denmark	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	£	$	§	°	ç	é	^	ù	à	ò	è	ì
Spain	£	$	§	¡	Ñ	¿	^	`	°	ñ	ç	~

Epson FX-85 International Character Set (IC Card)

Dec. / Country	35	36	64	91	92	93	94	96	123	124	125	126
USA	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
UK	£	$	@	[	\	]	^	`	{	|	}	~
Denmark 1	#	$	@	Æ	Ø	Å	^	`	æ	ϕ	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~

APPENDIX F
FONTS

This appendix provides printing samples of resident fonts or fonts on optional font cards. Contact your dealer for information on additional fonts.

Resident Fonts

Courier (12-point, 10-pitch, regular, upright, portrait/landscape)

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 !"#$%&'()*+,-./
:;<=>?@[\]^_‘{|}~ÀÂÈÊËÎÏ´`
ˆ¨˜ÙÛ£¯°ÇçÑñ¡¿¤£¥§ƒ¢âêôûáé
óúàèòùäëöüÅîØÆåíøæÄìÖÜÉïßÔ
ÁÃãÐðÍÌÓÒÕõŠšÚŸÿÞþ—¼½ª º«■»
±
```

Line Printer (8.5-point, 17-pitch, regular, upright, portrait)

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 !"#$%&'()*+,-./
:;<=>?@[\]^_'{|}~ÀÂÈÊËÎÏ´`
ˆ¨˜ÙÛ£¯°ÇçÑñ¡¿¤£¥§ƒ¢âêôûáé
óúàèòùäëöüÅîØÆåíøæÄìÖÜÉïßÔ
ÁÃãÐðÍÌÓÒÕõŠšÚŸÿÞþ—¼½ª º«■»
±
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Optional Fonts

Font cards generally have several fonts for a type face. Some cards have two or three type faces. Contact your dealer for details on font attributes such as the symbol set, orientation, type face, point size, pitch, wieght, and style. Refer also to the Font Cards Catalog for available fonts and the compatibility with HP font cartridges.

Courier Legal A (D05B-9009-C011)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Landscape ABCDEFGHIJabcdefghij0123456789

Courier PC1 (D05B-9009-C012)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Courier PC3 (D05B-9009-C014)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Prestige A (D05B-9009-C020)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Prestige B (D05B-9009-C021)

Landscape
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Prestige PC1 (D05B-9009-C022)

Portrait
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Prestige PC2 (D05B-9009-C023)

Landscape
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Prestige PC3 (D05B-9009-C024)

Portrait
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Landscape
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Prestige Legal A (D05B-9009-C025)

Portrait
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Landscape
ABCDEFGHIJabcdefghij0123456789

Letter Gothic A (D05B-9009-C040)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Letter Gothic B (D05B-9009-C041)

Landscape

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Letter Gothic PC1 (D05B-9009-C042)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Landscape

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

HELV A (D05B-9009-C060)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

HELV B (D05B-9009-C061)

Landscape

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Swiss 721 10A (D05B-9009-C062)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Swiss 721 12A (D05B-9009-C064)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Swiss 721 14A (D05B-9009-C066)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Swiss 721 10PC1 (D05B-9009-C068)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Dutch 801 12A (D05B-9009-C084)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Dutch 801 10PC1 (D05B-9009-C080)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Tms Rmn A (D05B-9009-C082)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Tms Rmn B (D05B-9009-C083)

Landscape

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Tms Rmn C (D05B-9009-C086)

Portrait

ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789
ABCDEFGHIJabcdefghij0123456789

Landscape

ABCDEFGHIJabcdefghij0123456789

APPENDIX G
OPTIONS AND SUPPLIES

The supplies and options below are available. Contact your dealer for details and additional information.

Supplies and Order Numbers

Process Cartridge (D860-1163-T401)
The cartridge consists of a photoconductive drum, developing unit, toner, and drum cleaner in a single module. The package also contains a heat roller felt and a cotton swab and cloth for cleaning the corona wire and heat roller. These should be replaced at the same time.

Ozone filter (D860-1163-X771)

Heat roller felt (D860-1163-T346)

Options and Order Numbers

Hopper (D86L-6002-0023)

Font card
See **Appendix F.**

Emulation card (not yet available)
Diablo 630 (D06B-2361-D501)
Epson FX-85 and IBM Proprinter (D06B-2361-D502)

Memory expansion board
Either can be added on the controller board.
1M bytes (D86B-1166-B301)
2M bytes (D86B-1166-B302)
4M bytes (D86B-1166-B304)

APPENDIX H
NOTES ON SOFTWARE APPLICATION

When you print a document using an application software package, you usually need to select a printer type from the list of printer options on the setup menu of the application software, then select a corresponding emulation from the control panel in setup mode.

Don't be concerned if this printer is not on the menu. This is because it has not been on the market long. The following table gives possible selections:

Printer type and emulation selection

Printer type selection in your application software	Emulation selection from the control panel	Status
HP Laser Jet Plus	RESIDNT:HP LJ+	Standard
Diablo 630	IC CARD:DIABLO	Optional
Epson FX-85	IC CARD:FX-85	Optional
IBM Proprinter	IC CARD:IBM-PRO	Optional

GLOSSARY OF TERMS

A4 Size:

A standard European letter size, 210 mm by 297 mm.

AC Power Cord:

Provides electricity to the printer (two prongs for power and one plug for ground).

Application Software:

Program that provides a solution to a particular problem such as maintaining an inventory or creating a report.

ASCII:

An acronym for American Standard Code for Information Interchange, or the code sent to the printer with a unique binary coded number for each character.

B5 Size:

A standard Japanese letter size, 182 mm by 257 mm.

Baud Rate:

The speed of data transmission to the printer. Appllies to serial data only. The baud rate is equal to the number of bits transmitted per second.

Bit:

A bit is the smallest unit of data and has a value of 0 or 1.

Buffer:

Storage area for data set from the computer to the printer.

Byte:

Eight bits that are considered as one symbol. Used to represent a single character such as a number, a letter, or a special control character.

Card Slot:

An opening to install an optional font or emulation card.

Carriage Return:

The return of the cursor to the beginning of the next line.

Character:

Any letter, number, or symbol.

Command:

An instruction that tells the computer what to do. A command usually consists of words, parts of words, or codes. The computer will only respond to those commands that are accepted by the program which the computer is currently running.

Command Set:

The series of print of format instructions imbedded in the printer firmware, and actuated by codes sent from the host computer.

Compatibility:

The capability of substituting for another printer, including both plug-compatibility and command compatibility.

Corona Wire:

A fine wire to impact an electrical charge to the photoconductive drum to make it sensitive to the light (precharger) or impact a charge to the paper to make the toner to move from drum to paper (transfer charger).

Data:

Another word for information.

Data Circuit Terminating Equipment (DCE)

The side of an interface that provides functions necessary for connection or signal transformation between data termianl equipment and data transmission line, usually modems.

Data Terminal Equipment (DTE)

The side of an interface that acts as a data source and/or sink, usually computers or computer terminals.

Default:

A printer parameter that the printer returns to when power is turned on.

Downloading:

Transferring character font matrix data from the computer to the printer's memory to enable the printer to print specially designed characters.

Emulation:

Exactly executing a command set defined for a different printer and producing the identical results.

Emulation Card:

Plug-in unit that has memory chips for providing an optional emulation for the printer.

EEPROM:

Electrically erasable and programmable read-only memory. A kind of ROM that can be erased and reprogrammed by the user.

Escape Sequence:

A command beginning with an ESC code to expand the variety of command sets.

Font:

A complete set of type in one size and style of characters.

Font Card:

An IC card containing matrix data of characters to enable the printer to print various styles of fonts.

Form Feed:

A signal to the printer to advance the cursor to the top of the next page. It starts printing of data in the buffer.

Form Length:

A printer setting for the spacing between top-of-form positions measured in inches.

Format:

The shape and appearance of printer output, including page size, character width and spacing, line spacing, etc.

Function Level:

One of the three levels in the setup mode tree structure.

Hex Dump:

Special debugging tool used to analyze printer malfunctions and computer program errors. Control codes and print data are printed as hexadecimal values.

Hopper:

A unit capable of handling cut sheets or equivalent continuously.

IC Card:

Plug-in unit that has memory chips to provide a variety of fonts and emulations for the printer.

Interface:

The connection that transfers electrical signals from one part of a system to another, e.g., from the computer to the printer and vice versa.

International Character:

Characters or symbols specific to each language.

Item Level:

One of the three levels in the setup mode tree structure.

LCD Display:

One of the two types of control panel display available with this printer. It uses a 16-digit dot-matrix display to show messages in easy-to-read characters.

Legal Size:

A US legal size, 8 1/2 by 14 in.

Letter Size:

A US letter size, 8 1/2 by 11 in.

Light-Emitting Diode Array:

Light source used in electrophotographic printing.

Line Spacing:

The vertical spacing between lines, measured in lines per inch.

Matrix:

An array of elements; in the case of printers the arrangement of the pins that form the letters through closely spaced dots.

Nonvolatile Memory:

A memory that retains information even if power is turned off.

Normal Mode:

One of the two printer modes. This mode has general-purpose functions used sometimes during daily printer operation. Messages displayed include online/offline status, bin selection, error status, operator prompts and consumables outages.

Offline:

Mode in which printer operations are not performed, but printer parameters, for example, are set.

Online:

Mode in which the printer is enabled to print whatever is set to its buffer.

OPC drum:

Another word for the photoconductive drum.

Option level:

One of the three levels in the setup mode tree structure.

Photoconductive drum:

Component parallel to the LED array on which patterns are produced as the LED array lights and the drum rotates.

Power Switch:

The ON/OFF switch located on the right side toward the back of the printer. The switch is labeled with the international designations 1 for ON and 0 for OFF.

Proportional Spacing:

Character width differs from one character to another. These characters require variable printhead spacing (proportional).

RAM:

Random-access memory. A memory that loses the stored information when power is turned off.

Reset:

A function performed by turning printer OFF and then ON again.

ROM:

Read-only memory. A memory that cannot be changed in the normal use.

Setup Mode:

One of the two printer modes. This mode is mainly used when the printer is first set up with the computer system, when specific font types and page settings are to be used for a document, and to check printer operation. Messages display images on the function, item, and option levels.

Top cover:

The upper part of the print mechanism that is opened during printer maintenance or troubleshooting, for example, to clean the process cartridge or to clear a paper jam.

Toner:

Charged carbon particles that adhere to charged areas on the photoconductive drum to produce a visible image on the drum. The heat roller melts toner transferred to the paper into a permanent image on the paper.

Top-of-Form:

The very top of a page of text.

Video Interface:

Specifications of communication between the printer controller board and the printing mechanism (engine).

Warmup Time:

The period required until the printer becomes ready for printing after power is first turned on.

INDEX

For control characters and ESC sequences, see Appendix B "Command Sets".