

**DL3300/3400 Printer
User's Manual**

Federal Communications Commission Radio Frequency Interference Statement for United States Users

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to 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 of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that computer and 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 U.S. Government Printing Office, Washington, DC 20402, Stock No. 0040-00345-4.

(This equipment has been tested as the M3358A of the the model number.)

NOTES

1. The length of the power cord must be 3 m (10 ft) or less.
2. An unshielded plug or cable may cause radiation interference. The printer is designed for use with a properly shielded interface cable. A non-shielded interface cable must not be used. The shield must be connected directly to the chassis of the printer. The cable length must be 3 m (10 ft) or less.

Notice for German Users

Dieses Gerät entspricht als 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.

Le présent appareil numérique n'émet pas de bruits radio-électriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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This manual represents the FUJITSU DL3300/3400 Printer as manufactured at the time of publication. Every effort has been made to ensure that the information included here is complete and accurate. Fujitsu has reviewed this material but cannot be held responsible for errors and omissions.

We reserve the right to make changes and improvements to this product and manual without obligation to incorporate these changes and improvements into units previously shipped.

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**** **PRINTER FEATURES** ****

Congratulations on acquiring a reliable, powerful, high-speed printer for your computer system. Your printer has been designed to satisfy all the word processing, data processing and graphic printing requirements you may have.

This printer gives you high quality printing by producing as many as 360 x 180 dots per inch with its 24-pin printhead. Your documents can be professional-looking because the printer offers several different typestyles with easily-accessed variations, such as double-width, double-height, bold and italic. You can increase the type font selection even more with the use of optional font cards and downloading capabilities.

This printer can quickly deliver your documents because it prints up to 240 characters per second (at 10 CPI), using its efficient bi-directional printing ability. It has smooth paper handling, automatic paper loading, a unique "park" position for continuous forms in the built-in tractor feeder, and optional automatic sheet feeder for custom sheet-feeding requirements.

All of the features mentioned above along with such handy variables as character spacing, line spacing, print quality and language are set with the clear, easy-to-use control panel. Each of the four soft-touch buttons fulfills a second or third function which is listed in a menu that prints out automatically.

Your printer also boasts quiet operation, due to its acoustic top cover and sound insulation. The printing noise level is 55 dBA or less. Other appealing features include your choice of serial or parallel interface, optional color printing and high reliability. Furthermore, this printer capably emulates the IBM Graphics Printer, IBM Proprinter XL, Diablo 630, Epson FX-80/100, Epson JX-80 and many Fujitsu printers.

You're sure to find this printer full-featured and easy to use. Congratulations on your selection!

NOTE

In this manual, the DL3300 is referred to as the "80-column printer" and the DL3400 as the "136-column printer."

**** **ABOUT THIS MANUAL** ****

This manual contains everything you need to know about setting-up and operating your new printer. It is written and organized for all levels of users, from novice to fully experienced.

QUICK START — designed for people who have set up printers before and know what to expect. This section lists only the very basic steps required to get the printer running. It contains 10 illustrations to help users get going without reading further into the manual.

SECTION 1 SETTING UP THE PRINTER — shows you in detail how to unpack your printer, select a suitable location, install the ribbon, attach the power cord and connect the interface cable to link the printer to your computer. If you have never set up a printer before, you should read this section carefully.

SECTION 2 SELECTING AND LOADING PAPER — explains how to choose which paper to use and how to load it into the printer. This section clearly illustrates the auto-load feature, the differences between using continuous-form paper and single sheets and how to run a self-test on the printer to be sure you've done everything correctly.

SECTION 3 USING THE CONTROL PANEL — covers basic operation of the printer with the control panel. The illustrations and instructions in this section will give even first-time users complete confidence about using the printer.

SECTION 4 SETUP — details how to use your printer's extra features, such as varying the typestyle, page format, computer system interface and many others. All of these options are handled right from the control panel. Step-by-step instructions walk the reader through the many functions available on this machine. By the end of the section, you will be able to set any option with ease.

SECTION 5 USING COMMERCIAL SOFTWARE — discusses various commercial software programs and how to get the most out of your printer while using them. This handy section covers printer drivers, setup strings, embedded commands and application tips for such popular programs as Microsoft Word, Lotus 1-2-3, WordPerfect, WordStar and Symphony.

SECTION 6 PRINTER MAINTENANCE — covers basic operator maintenance. Although your printer requires very little care, preventive maintenance such as cleaning and lubrication, changing ribbons, repacking your printer for shipment and troubleshooting are all important in keeping your printer in good working order. Everything you might need to know is explained here.

SECTION 7 COMMAND SETS — offers a summary of the command sets available in your printer. It covers printer emulations, command formats and three different resident command sets. It is very helpful information when you are taking full advantage of your printer's versatility.

APPENDICES — provide additional reference information, including the installation of interface boards, printer specifications, a glossary of printer and computer terms and much more. The guide is fully cross-referenced with an index to help you quickly find any information you need.

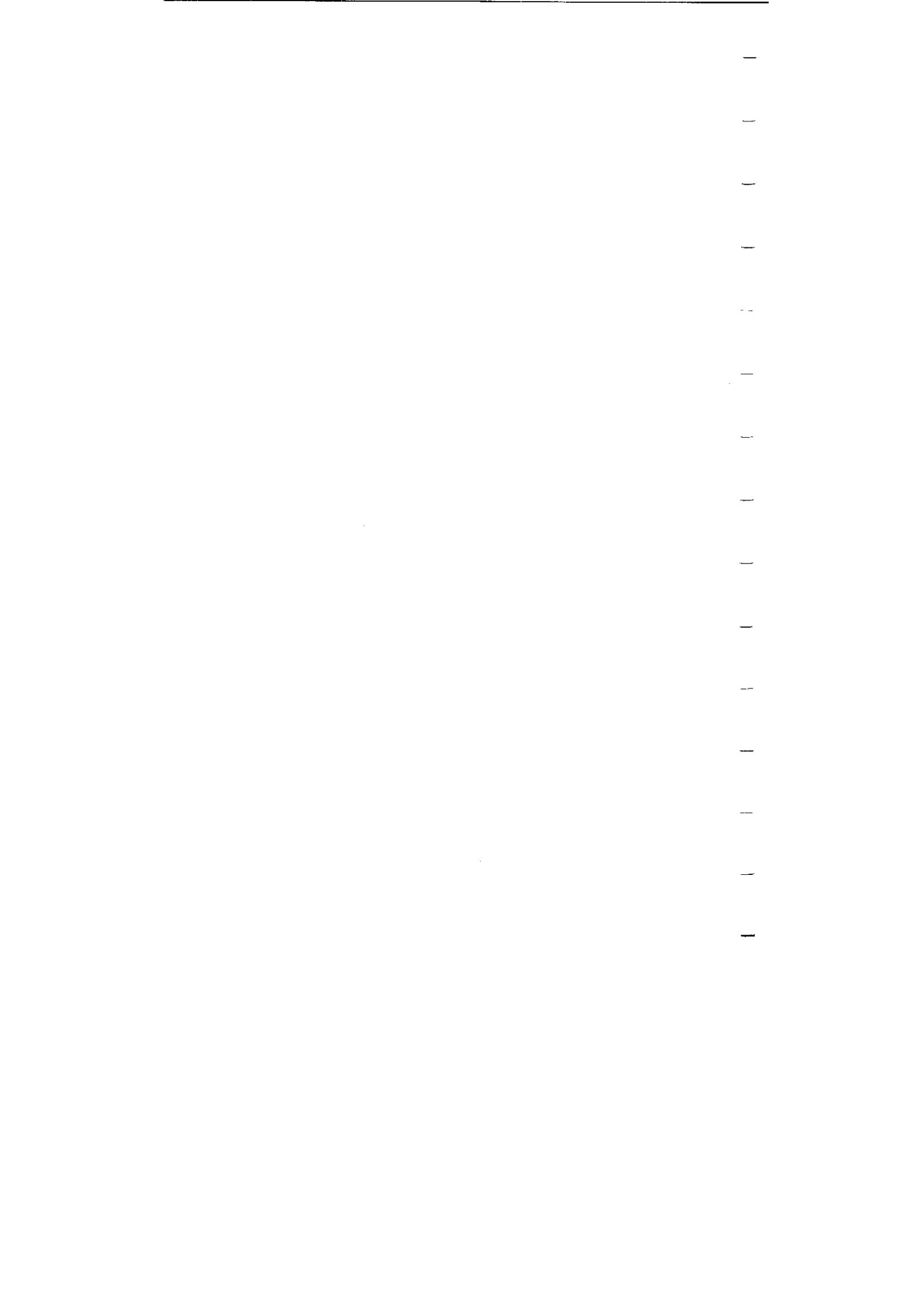


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Quick Start

**Quick
Start**

**Section 1
Installation**

Installation

**Section 2
Selecting and Loading Paper**

**Loading
Paper**

**Section 3
Using the Control Panel**

**Control
Panel**

**Section 4
Setup**

Setup

**Section 5
Using Commercial Software**

**Commercial
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**Printer
Maintenance**

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Command Sets**

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**Command
Sets**

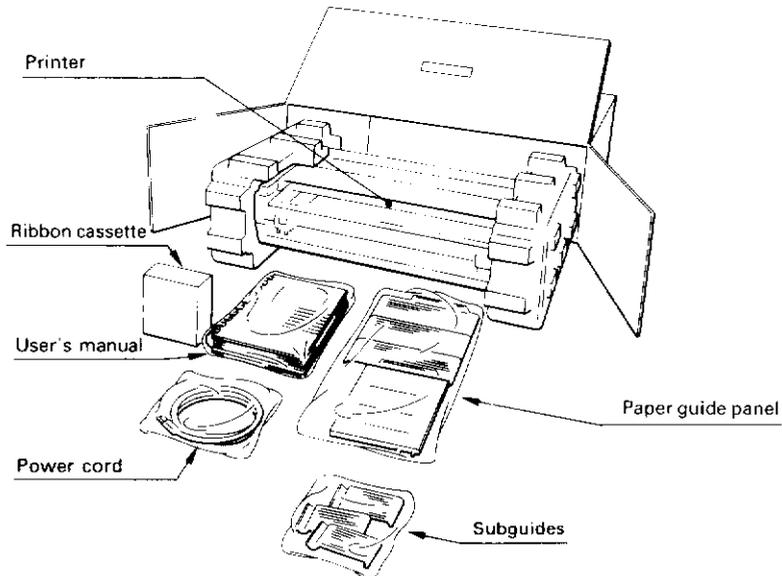
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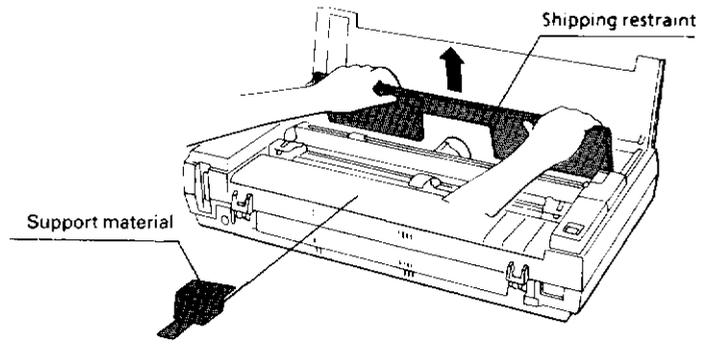


QUICK START

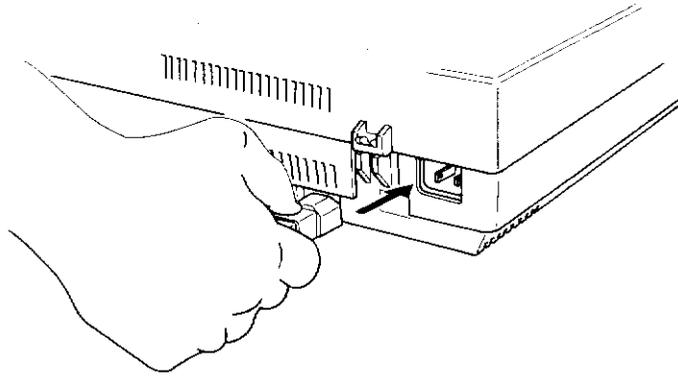
Everything you need to know about setting up and using your new printer is explained in this manual. It includes ribbon changing, font card usage, basic operator maintenance, paper loading alternatives, problem-solving and much more. However, if you want to begin printing *right now* and read the rest later, this section will get you started immediately. If you are setting up a printer for the first time, though, we recommend you read the complete unpacking and installation instructions and follow them carefully.



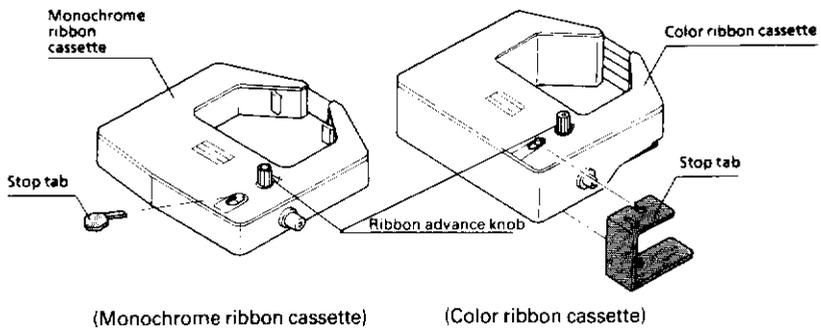
1. Unpack your printer



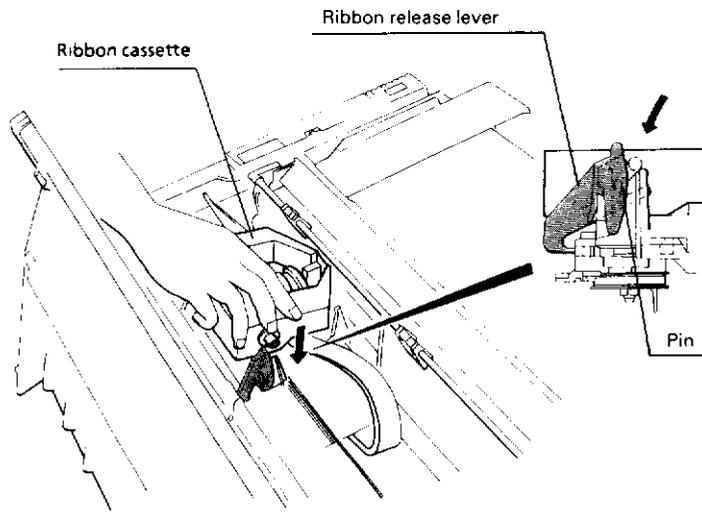
2. **Open the front and top covers and remove shipping restraints**



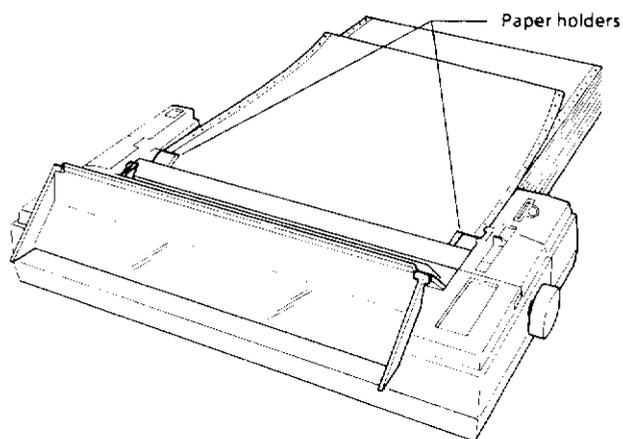
3. **Attach the power cord**



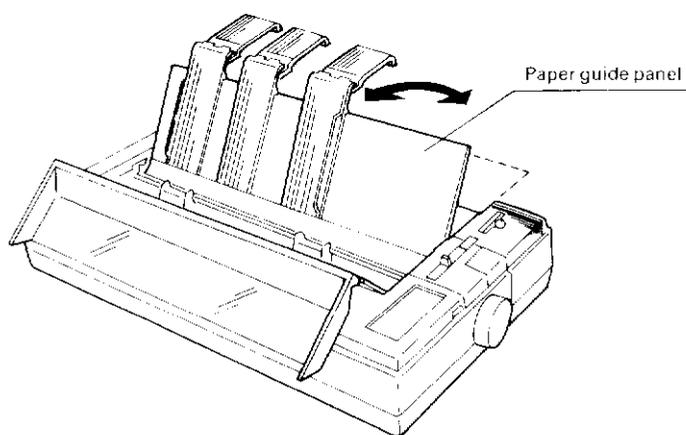
4. Remove stop tabs and install the ribbon cassette



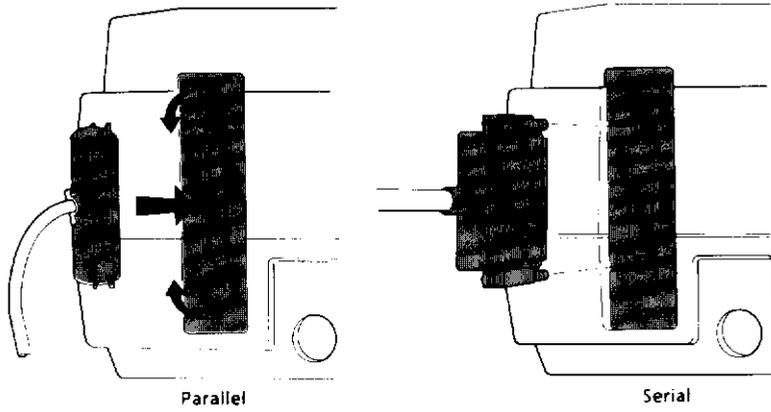
5. Tighten the ribbon



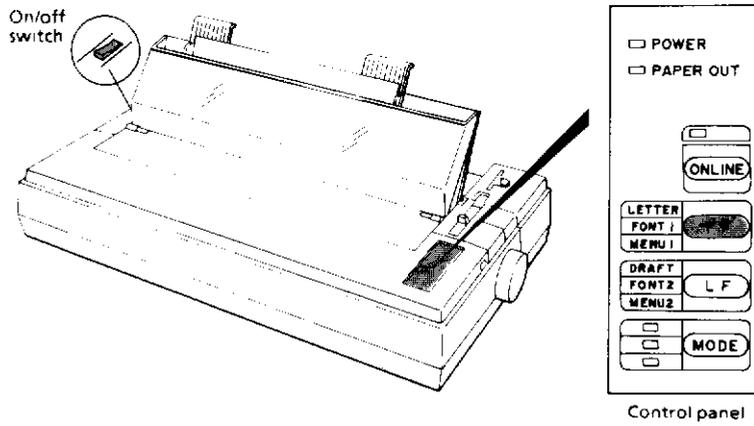
6. Load continuous-form paper



7. Install the paper guide panel



8. Connect the printer to your computer



9. Run self-test by pressing FF while turning on the printer

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SECTION 1 INSTALLATION

This section shows you how to set up your printer, including:

- unpacking and situating the printer
- installing the ribbon cassette
- connecting the power cord and interface cable

1.1 UNPACKING THE PRINTER

The first step in setting up your printer is to unpack the carton and take inventory. **Figure 1-1** identifies the parts.

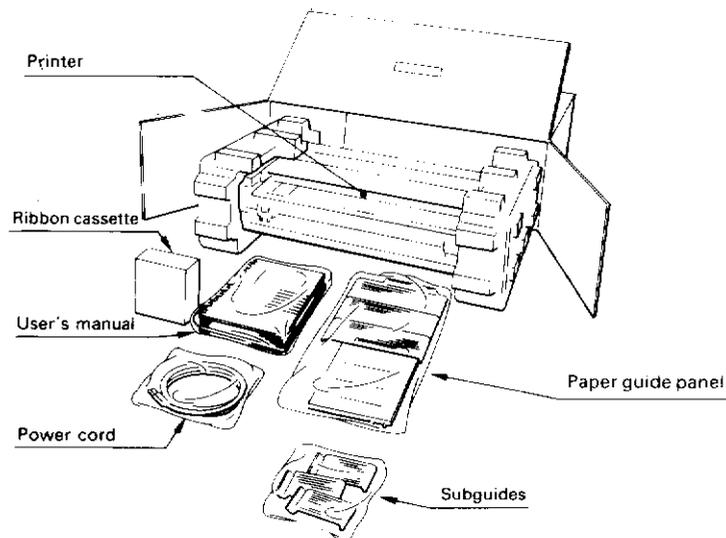


Figure 1-1 Unpacking the printer

You should find the following: (1) printer, (2) ribbon cassette, (3) power cord, (4) paper guide panel, (5) paper guide extenders, and (6) this User's Manual.

You may have purchased one or more of these optional items: color kit, parallel or serial interface board, font cards, cut sheet feeder or extra ribbon cassettes.

Inspect each item. If you find any damage, notify your dealer, distributor or your shipping agent.

1.1.1 Choosing a Location for Your Printer

You should decide where you want to put your printer before setting it up. Of course, the length of the printer cable and the availability of a power source will be two important factors.

Here are some additional precautions when choosing a location:

- Place your printer on a flat, stable surface. Make sure there is enough room for paper to freely flow in to and out of the printer.
- Avoid locations subject to excessive heat (such as direct sunlight), humidity, excessive dust, or grease.
- Do not obstruct the ventilation around the printer.
- Use a standard, grounded power outlet with a steady source of electricity (the required power is printed on the nameplate on the back of your printer). Use a power outlet that is not shared with equipment that may generate electrical noise.

1.1.2 Removing the Shipping Restraints

Before you set up your printer and pack away the carton, you must remove the shipping restraints. Here's how:

1. Open the top and front cover (**Figure 1-2**) by first lifting the clear plastic top cover up and toward the front of the printer until it rests in an open position.

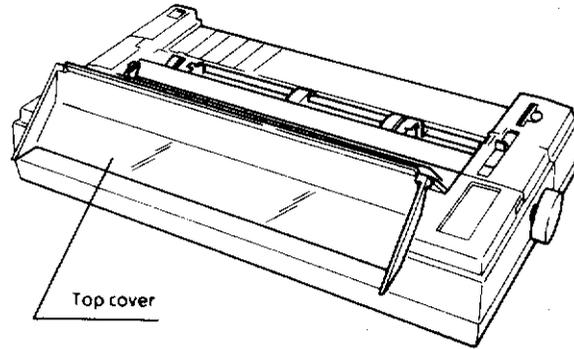


Figure 1-2 Opening the top cover

2. Now grasp the recessed sides of the front cover (Figure 1-3) and lift the cover up until it rests all the way open (Figure 1-4).

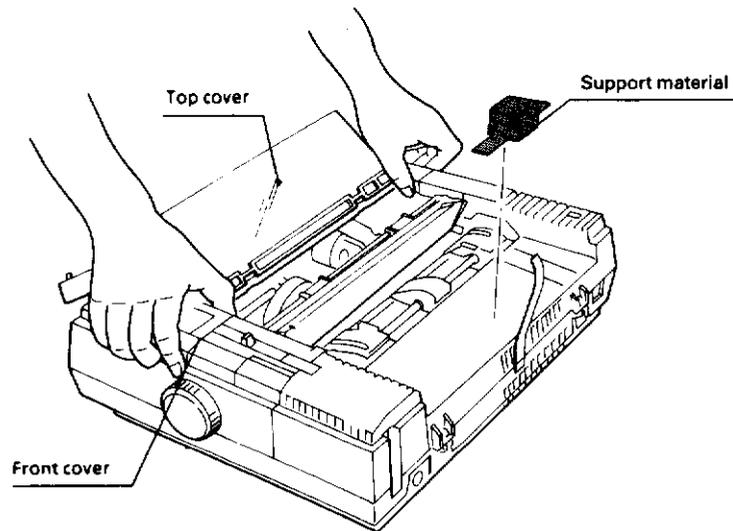


Figure 1-3 Opening the top and front covers completely

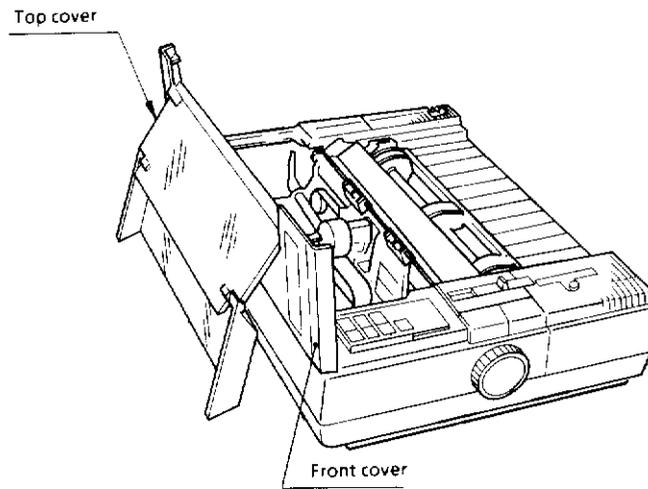


Figure 1-4 The top and front covers completely open

3. Remove the support material and tape.
4. Remove the cardboard restraint from inside the printer (**Figure 1-5**).

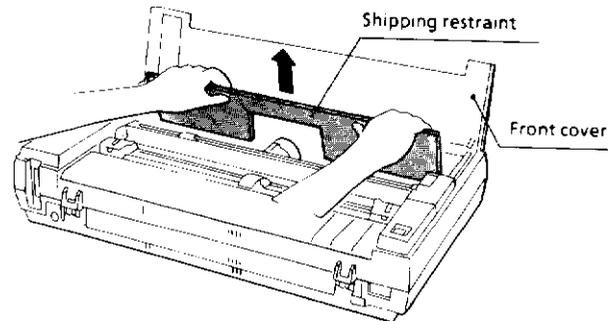


Figure 1-5 Removing the shipping restraint

Leave the covers open until you install the ribbon cassette. Keep all shipping material in case you need to ship or store the printer.

1.2 INSTALLING THE RIBBON CASSETTE

Your printer uses a black fabric ribbon unless you have purchased the optional color kit (see Appendix C). Take the ribbon cassette out of its packaging and remove the ribbon stop from the slot as shown in **Figure 1-6**. (The ribbon stop looks different, depending on which ribbon you are using.)

Installation

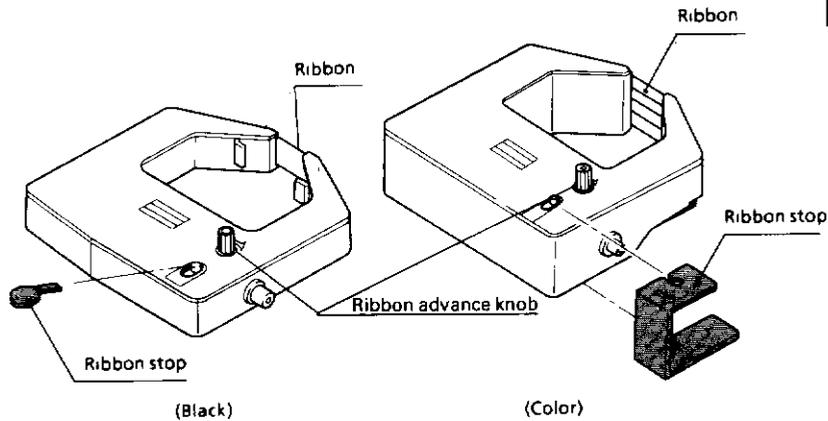


Figure 1-6 Removing the ribbon stop

To install the ribbon cassette:

1. With the printer covers already open, place the ribbon cassette over the print head. Insert the pins on both sides of the cassette into the slots between the plastic release levers and the metal ribbon carrier (**Figure 1-7**). Make sure that the exposed ribbon is between the print head and the plastic card guide, and is not folded or creased.

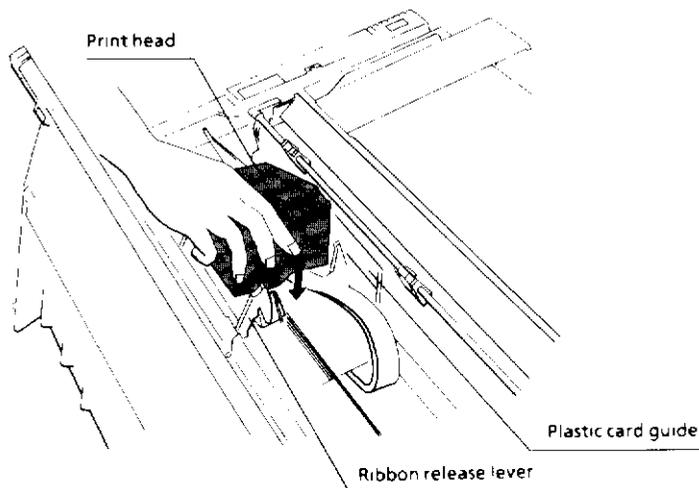


Figure 1-7 Installing the ribbon cassette

2. Press down lightly on the ribbon cassette until it clicks into place.
3. Rotate the ribbon advance knob clockwise once or twice to adjust any slack in the ribbon. With the power off, slide the print head left and right to be sure the ribbon is feeding correctly.

CAUTION

Never move the print head when the power is on. This may damage the printer. If you have been printing, be careful not to touch the print head which becomes hot during use.

FOR GERMAN USERS

Halten Sie Finger, Haar, Schmucke usw. fern von dem Bereich der Wagenrückaufsbewegung.

Berühren Sie nie das Druckelement oder den Wagenrücklaufmotor, weil sie heiß sind.

4. Close the front and top covers.

1.3 PRINTER COMPONENTS

Let's take a closer look at the printer's components and controls (Figure 1-8) to see what they do.

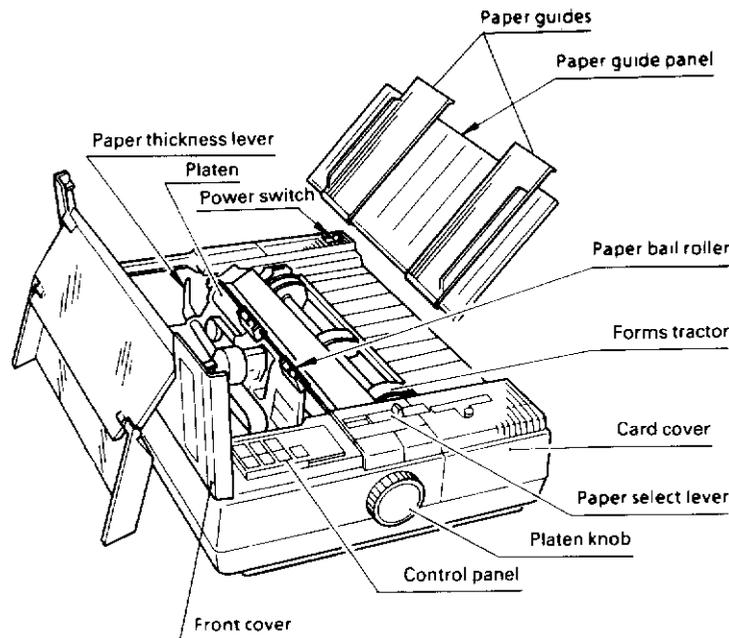


Figure 1-8 Printer components

- | | |
|----------------------|--|
| Top cover | The top cover reduces the sound level during printing and protects the printer from dirt and dust. |
| Front cover | The front cover opens to expose the print head area to facilitate changing ribbon cassettes and loading paper. |
| Control panel | The control panel is located on the top right corner of the printer. It consists of four soft-touch buttons and six status lights. See Sections 3 and 4 for control panel operation. |
| Platen knob | By turning this knob, you can manually feed paper. |

Paper select lever	The paper select lever selects the paper path according to the type of paper being used. It has two positions: forward for single sheets and back for continuous paper.
Card cover	The card cover contains a slot for installing optional font cards. Pressing the button on top of the cover releases the font card when one is installed. The card cover is removed to change the interface board.
Forms tractor	The forms tractor feeds continuous paper into the printer and keeps the paper properly aligned. It has two tractors with pins which fit into the paper's sprocket holes. Adjust the tractors and the center support to the width of the paper.
Paper bail	The paper bail keeps the paper pressed against the platen for clean printing results.
Paper guide panel	The paper guide panel is a separate panel that is installed and then used in one of two positions: up for single sheets or down for continuous forms. In the up position, the paper guide helps feed single sheets. In the down position, it helps feed continuous paper smoothly and separates the paper going into the printer from the printed output.
Paper guides	The paper guide panel has removable paper guides which can be adjusted according to the width of the paper.
Paper guide extenders	The paper guide extenders are used with paper-stapled, multi-part continuous forms to ensure a smooth paper path and prevent paper jams.
Power switch	The power switch is used to turn the printer on and off.
Platen	The platen is the hard rubber cylinder that carries the paper to the print head.

Paper thickness lever The paper thickness lever adjusts the print head to accommodate different paper thicknesses and types of forms. You can also increase the life of your ribbon by adjusting this lever for a slightly darker print.

1.3.1 Rear View of the Printer

There are a number of items on the rear of the printer (**Figure 1-9**) which should also be identified.

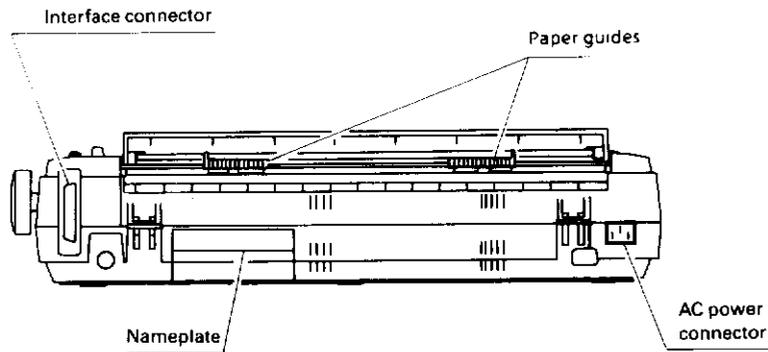


Figure 1-9 Rear components

Interface connector The removable interface connector can be either a parallel or serial connector, depending on which one you purchased. It connects the printer to your computer via a serial or parallel printer cable.

Power connector The power connector connects the printer to an AC power source via the power cord.

Nameplate The nameplate and the label directly under it contain manufacturing and power source information about your printer.

Connecting the interface cable and the power cord are described in the following sections.

1.4 ATTACHING THE POWER CORD

The power cord is installed in the left rear of the printer (**Figure 1-10**). The power cord connector has three prongs so the cord will fit only one way. Make sure the printer power switch is off before you connect the cord to an electrical outlet.

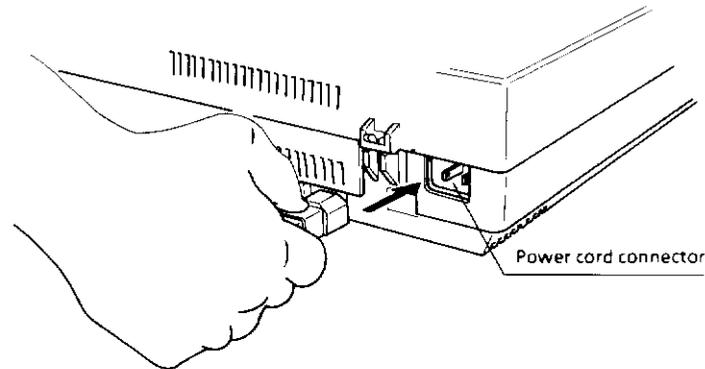


Figure 1-10 Attaching the power cord

Make sure the cord connection is secure; you won't want the printer to accidentally lose power while printing a document!

1.5 CONNECTING THE INTERFACE CABLE

Your computer and printer communicate by means of a cable, which is sold separately. The cable is either parallel or serial and must be made specifically for your computer. Refer to your computer manual to determine the type of interface required for your system.

If your interface board is not installed yet or you need to switch from one interface to the other, refer to Appendix B for complete installation instructions and specifications.

CAUTION

Make sure your computer and printer are turned off before connecting the interface cable.

Connecting the cable is simple. The two different types are described below.

1.5.1 Connecting the Parallel Interface

If you have a parallel interface connector installed, you need a Centronics parallel printer cable.

1. Fit the cable connector onto the interface connector (**Figure 1-11**) while moving the wire clamps out of the way. Since the connector is tapered, you can only connect the cable one way. The connectors should fit together with just a slight push. If they do not, you may have the connector upside down.

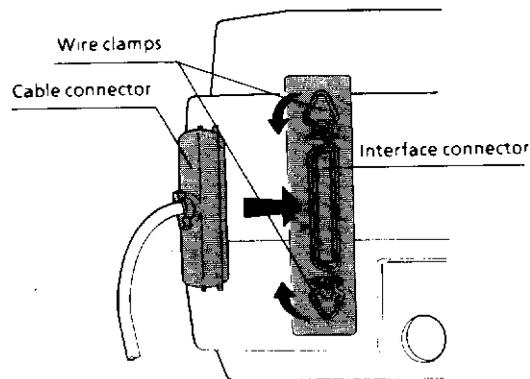


Figure 1-11 Connecting the parallel interface

2. Press the wire clamps into the notches on the connector and check for a secure connection.
3. Follow the directions in your computer manual to connect the other end of the cable to your computer.

1.5.2 Connecting the Serial Interface

If you have a serial interface connector installed, you need an RS-232-C serial cable.

1. Fit the cable connector onto the interface connector (**Figure 1-12**). Since the connector is tapered, you can only connect the cable one way. The connectors should fit together with just a slight push. If they do not, you may have the connector upside down.

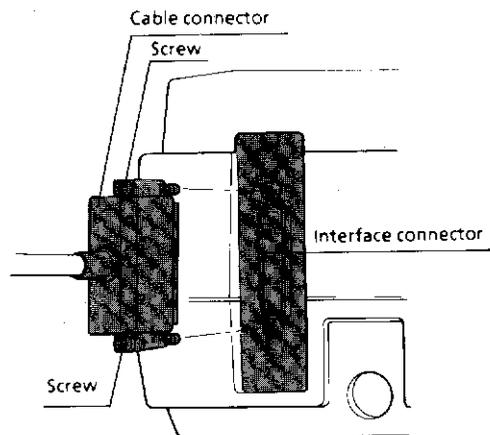


Figure 1-12 Connecting the serial interface

2. Tighten the screws on each end of the connector for a snug fit.
3. Follow the directions in your computer manual to connect the other end of the cable to your computer.

1.6 INSTALLING FONT CARDS

Credit card-sized font cards can be installed in the printer to expand its printing capabilities. Appendix C describes the types of optional font cards available and how to install and print with them.

SECTION 2 SELECTING AND LOADING PAPER

This section shows you how to select and load paper, including both single sheets and continuous forms. You'll learn how to:

- install the paper guide panel and paper guide extenders
- prepare the printer for loading different types of paper
- use the printer's paper handling features
- quickly switch between single sheets and continuous forms
- run a self-test

Loading
Paper

2.1 SELECTING PAPER

Your printer can be used with single sheets or continuous form paper. Continuous form paper, also called tractor, or pin-feed paper, consists of continuous perforated sheets with punched holes along each edge. You may also print on letterhead and pre-printed forms.

Your printer can handle single sheets or continuous forms from 4 inches (101 mm) up to 10.5 inches (267 mm) wide for the 80-column printer and up to 16.5 inches (419 mm) wide for the 136-column printer. Both printers can handle single sheets from 3 inches (76 mm) to 14.3 inches (363 mm) long. Complete paper specifications including types, sizes and print areas are described in Appendix A.

An optional cut sheet feeder can be purchased which allows you to use stacks of paper and other types of forms with your printer. Sheet feeders are commonly used to print on letterhead and pre-printed forms using multiple bins. See Appendix C for details.

2.2 INSTALLING THE PAPER GUIDE PANEL

The paper guide panel is used to feed single sheets of paper into the printer and to separate continuous form paper going into the printer from the printed output. The paper guide panel is easily installed by following these steps:

1. Open the top cover (**Figure 2-1**).

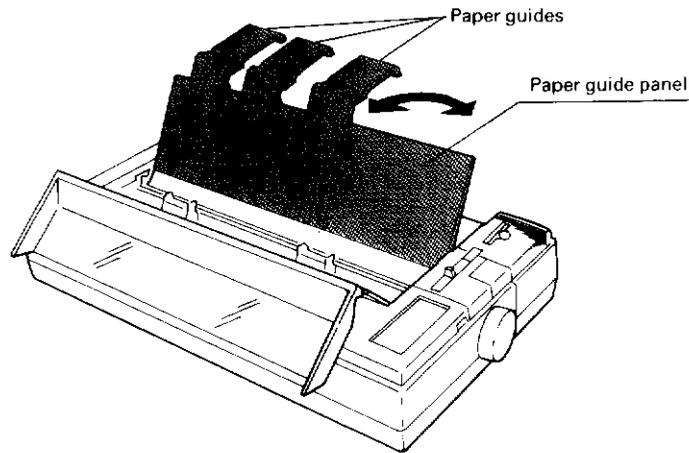


Figure 2-1 Installing the paper guide panel

2. Set the two pins on each side of the paper guide panel into the long slots just above the forms tractor. Slide the panel down until it rests in these slots.
3. Close the top cover, resting it against the paper guide panel.

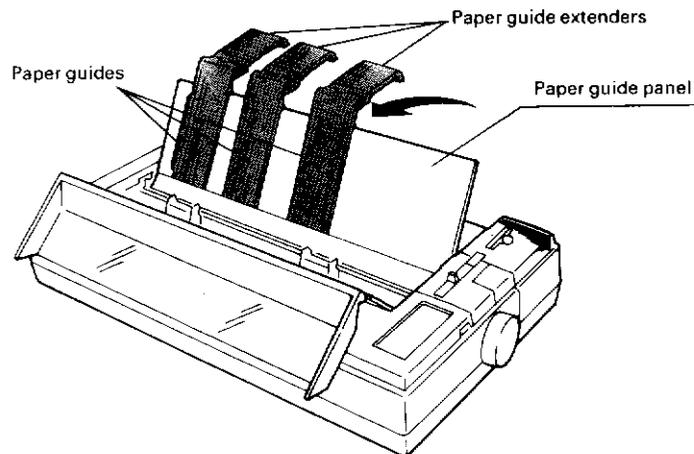
The paper guide panel has two positions: up for single sheets and down for continuous forms. When the paper guide panel is in the up position, you can easily set it in the down position by lifting it up about 1/4-inch and then laying it down flat.

To place the paper guide panel in the up position again, simply lift it by the back edge up until the pins slide into the long slots.

2.3 INSTALLING THE PAPER GUIDE EXTENDERS

Install the paper guide extenders if you plan to use paper-stapled, multi-part forms. The paper guide extenders ensure a smooth output path to prevent paper jams when using multi-part forms.

Here's how to install the paper guide extenders (**Figure 2-2**):



Loading
Paper

Figure 2-2 The paper guide extenders

1. Remove the paper guide panel from the printer.
2. Turn the paper guide panel over (**Figure 2-3**). Each paper guide has two clips on the top edge. Hook the slots on the extender over the clips on the paper guide and slide it up (towards the top of the paper guide). Then slide the extender left to lock it in place.
3. Now move the extender up to snap the lower edge of the extender under the "W" shaped clip on the paper guide.
4. Replace the paper guide panel on the printer when all extenders are installed.

See Section 2.7.3 for paper loading procedures with the paper guide extenders installed.

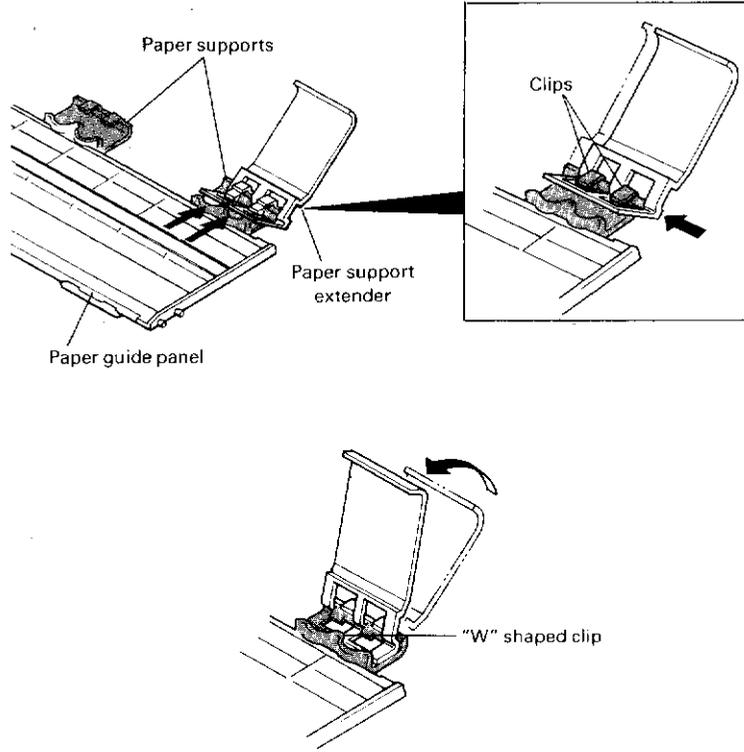


Figure 2-3 Installing the paper guide extenders

2.4 THE PAPER SELECT LEVER

The paper select lever (**Figure 2-4**) selects the type of paper feed method you want. The lever slides forward and back and has two positions: forward for single sheets and back for continuous forms.

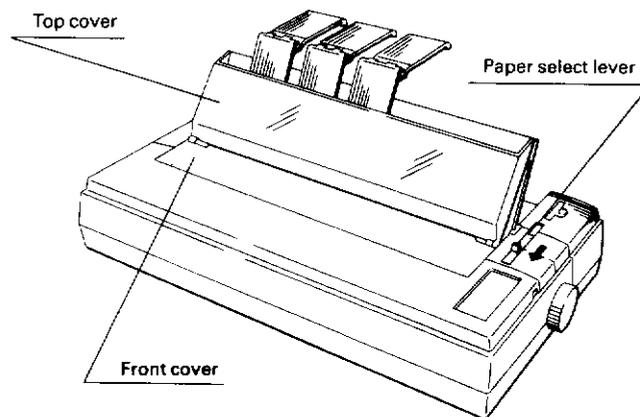


Figure 2-4 The paper select lever

The paper select lever can be used in the back position to adjust and align any type of paper because it releases the pressure between the platen and the paper.

2.5 ADJUSTING FOR PAPER THICKNESS

You can accommodate different paper thicknesses and multi-part forms up to 3 parts (original + 2 copies) by adjusting the paper thickness lever. It is located inside the printer, on the left side near the platen (**Figure 2-5**). It has 4 positions, or notches, each of which corresponds to about one sheet of paper.

Adjusting this lever widens or lessens the gap between the print head and the platen. Widening the gap accommodates thicker paper and multi-part forms. You can adjust the paper thickness lever before you load paper and make any changes as required.

Here's how to adjust for paper thickness (**Figure 2-5**):

1. Open the top and front covers to access the inside of the printer.

CAUTION

Do not touch the print head which becomes hot during use.

2. Move the paper thickness lever to a higher or lower number (as shown in **Figure 2-5**).
3. Close the front and top covers.

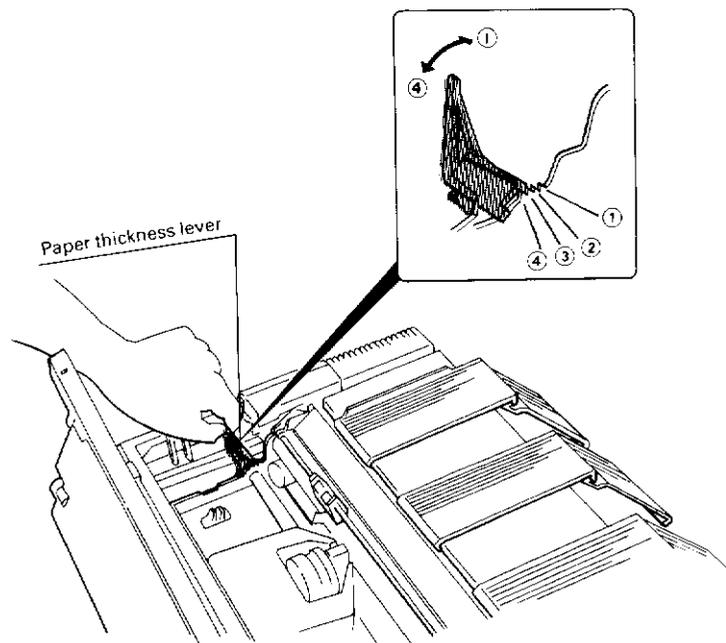


Figure 2-5 The paper thickness lever

Table 2-1 can be used as a guide for multi-part forms.

Table 2-1 Adjusting for Multi-part Forms

Type of Paper	Notch Position
One copy	2
Two copies	2 or 3
Three copies	3 or 4

When using thicker paper, use a higher notch position, regardless of the number of sheets.

The paper thickness lever can also be adjusted to obtain the best print quality for the paper you are currently using. Table 2-2 shows you how to determine what adjustment to make.

Table 2-2 Adjusting for Print Quality

Print Quality	Adjustment
Too light	Lower number
Too dark	Higher number
Smudged print	Higher number

If your print quality is too light, select a lower number on the paper thickness lever. If your print quality is too dark or appears smudged, select a higher number.

A good time to make a print quality adjustment is while running a self test because it prints the entire character set including line and block graphics characters.

2.6 LOADING SINGLE SHEETS

Loading single sheets of paper is very easy. Most of the time, you will use the automatic sheet load feature. Occasionally, you may need to manually feed paper. This section shows you how to do both.

First, prepare the printer by following these simple steps:

1. Open the top cover to its forward resting position (**Figure 2-6**).

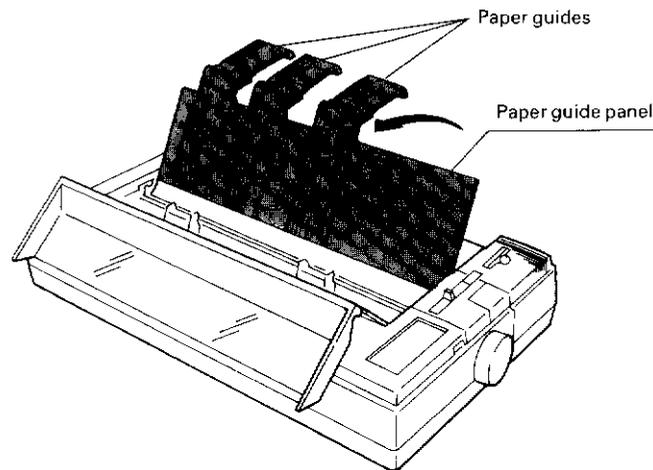


Figure 2-6 Preparing the printer for single sheet paper

2. Place the paper guide panel in the up position.
3. Set the paper select lever for single sheets (forward).
4. Slide the left paper support to where you want the left edge of the paper to be. You can use the ruler just above the platen as a guide. (The ruler shows up to 80 picas on the 80-column printer and 136 picas on the 136-column printer.) Slide the right paper support to the approximate right edge of the paper. (The 136-column printer also has a center paper support.)
5. The paper bail has two grooves to help you align the bail rollers (**Figure 2-7**). Sliding the rollers left or right will click them into place. (These grooves are set for 136-column wide paper on the 136-column printer.) For other paper sizes, set the left bail roller in the left groove (about 20 picas on the ruler). Set the right bail roller in the right groove and the left bail roller in the left groove. When you use narrow paper on which both bail rollers cannot be set, set the both bail rollers inside each groove.

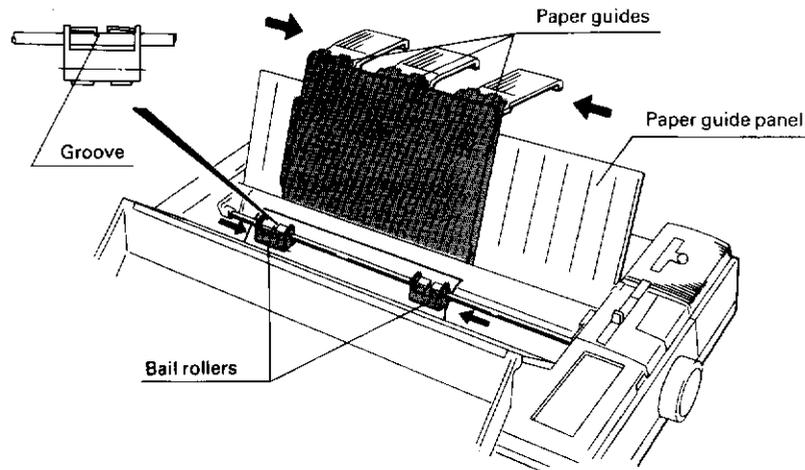


Figure 2-7 Adjusting the bail rollers and paper supports

6. Close the front and top covers.
7. Place the paper between the top cover and the paper guide panel (**Figure 2-8**). Lightly press the paper down so that it fits snugly. If necessary, readjust the paper guides to the exact width of the paper.

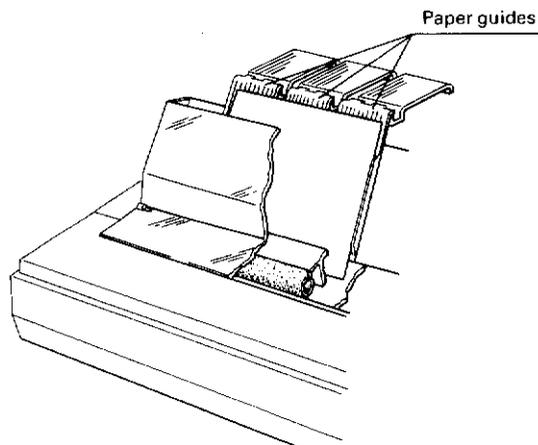


Figure 2-8 Inserting single sheet paper

8. Use either the automatic sheet load feature or the platen knob to manually load paper. Both methods are described below.

2.6.1 Using the Automatic Sheet Load Feature

After you have prepared the printer for single sheets (see the previous section), here's how to load single sheets automatically (**Figure 2-9**):

1. Turn the printer on. The printer will beep and the POWER and PAPER OUT indicators on the control panel will light.
2. Press the FF button on the control panel. The paper will feed into the printer and the PAPER OUT indicator will go out. If you need to start over, press the FF button to eject the paper and start again.

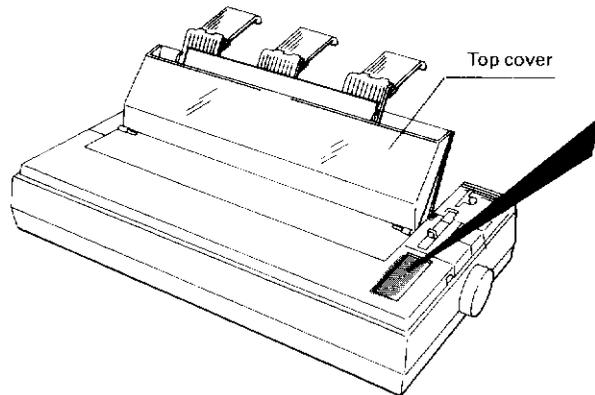


Figure 2-9 Using the automatic sheet load feature

If you wish, a "top-of-form" adjustment (TOF-ADJ) can be made using the control panel's setup function (see Section 4). *Do not rotate the platen knob to adjust the top-of-form.* Your printer keeps track of the number of lines on the page; therefore, advancing the paper manually will change the top-of-form setting. If necessary, press the LF button to advance the paper one line at a time.

If the paper is not straight, you can set the paper select lever to the continuous forms position and adjust the paper. When you're finished, return the paper select lever to the forward position for single sheets.

3. Press the ON LINE button and the ON LINE indicator will light. This means the printer is ready to print.

2.6.2 Manually Loading Single Sheets

Occasionally, you may need to manually load paper, which is much like loading paper in a typewriter. After you have prepared the printer for single sheets and inserted a sheet of paper (see the previous section), follow these steps to manually load single sheets:

1. Open the top cover to its forward resting position.
2. Turn the platen knob clockwise (**Figure 2-10**) until the top edge of the paper is where you want printing to start.

If the paper is not straight, you can set the paper select lever to the continuous forms position (back) and adjust the paper. When you're finished, return the paper select lever to the forward position.

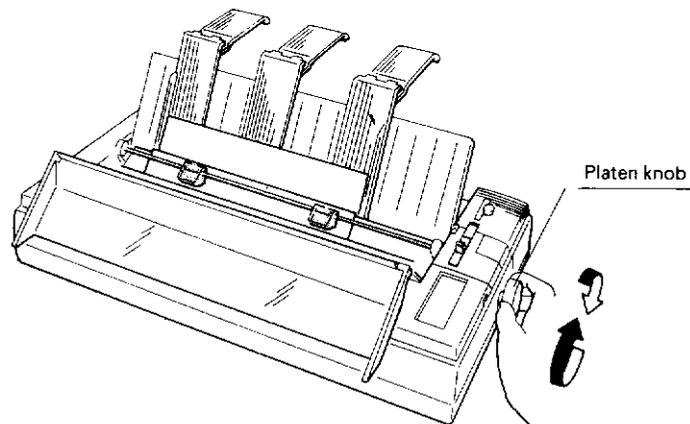


Figure 2-10 Manually loading single sheets

3. Close the top cover.
4. Check to see that the printer is on and online (the POWER and ON LINE indicators are lit). The printer is now ready to print.

Loading
Paper

2.7 LOADING CONTINUOUS FORMS

Continuous forms, or pin-feed paper, lets you print continuously without having to load individual sheets of paper for every page. It is convenient for printing special forms, heavy data processing output, and printing rough drafts on less expensive paper.

NOTE

To use "paper-stapled" continuous forms, you must follow the procedure in Section 2.7.3, "Loading Paper-stapled Continuous Forms."

The printer's forms tractors are used to feed the paper through the printer. Before you load paper, complete these steps:

1. Set the paper select lever (**Figure 2-11**) back for continuous forms.

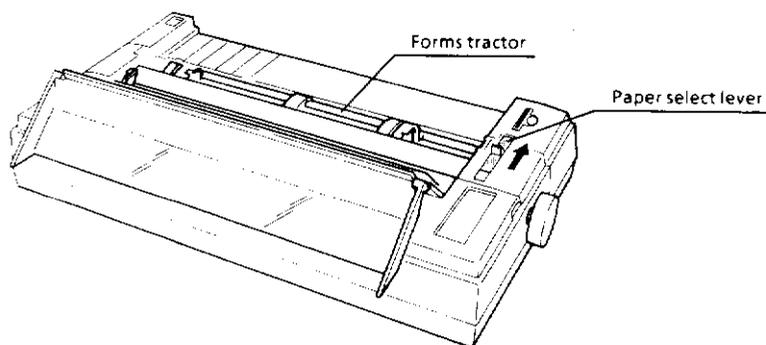


Figure 2-11 Preparing the printer for continuous forms

2. Open the top cover to its forward resting position.
3. Remove the paper guide panel and set it aside for now.

- Adjust the forms tractors (**Figure 2-12**). First, unlock both tractors by moving the locking levers toward the rear of the printer. Then, slide the left tractor to where you want the left edge of the paper to be. You can use the ruler in front of the forms tractor as a guide. (The ruler shows up to 80 picas on the 80-column printer and 136 picas on the 136-column printer.) The left perforation of the paper is actually the left edge of the paper so the tractor should be slightly further left.

Slide the right tractor to the approximate right edge of the paper.

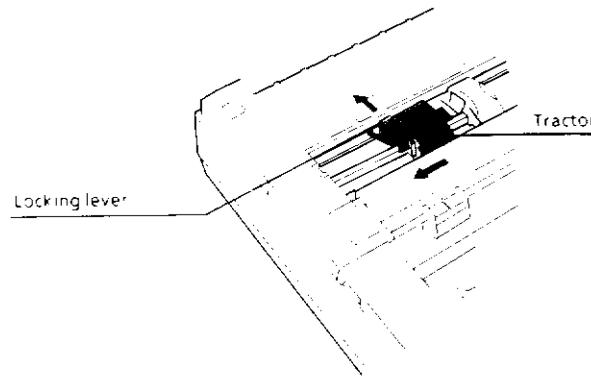


Figure 2-12 Adjusting the forms tractors

- Open the paper holders on the tractors (**Figure 2-13**).

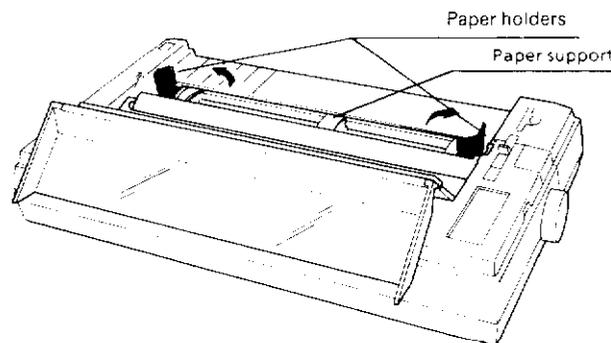


Figure 2-13 Opening the paper holders

Loading
Paper

Now complete these steps to load continuous forms:

1. Place a stack of continuous forms behind the printer and bring the first sheet over the rear of the printer (**Figure 2-14**).

NOTE

Make sure that the edge of the paper going into the printer is not curled or damaged. This may cause a paper jam when you load the paper.

2. Fit the paper holes onto the tractor pins and close the paper holders. Slide the tractors left or right to position the paper correctly and to be sure the paper is taut before you use printer. Lock the tractors by moving the locking levers toward the front of the printer.

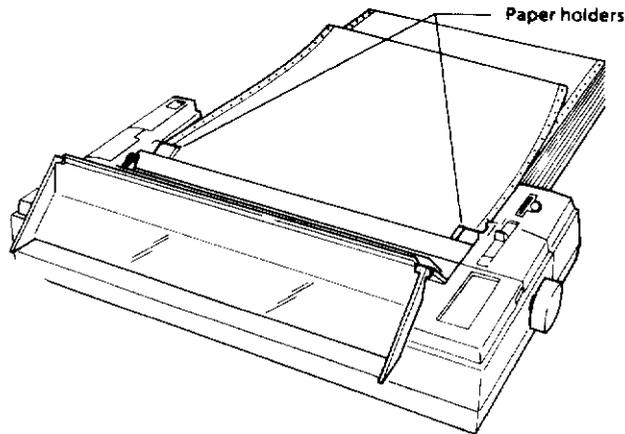
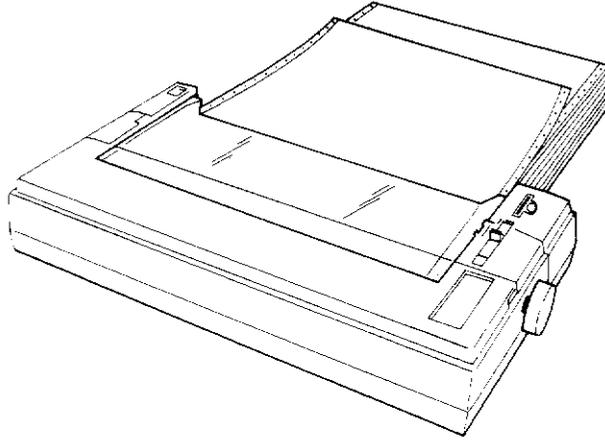


Figure 2-14 Fitting the paper on the tractors

3. Turn the power switch on. The printer will beep and the POWER and PAPER OUT indicators on the control panel will light.

4. Press the FF button on the control panel. The paper will feed into the printer (**Figure 2-15**) and the PAPER OUT indicator will go out.



Loading
Paper

Figure 2-15 Using the auto load feature to load continuous forms

If you wish, a "top-of-form" adjustment (TOF-ADJ) can be made using the control panel's setup function (see Section 4). *Do not rotate the platen knob to adjust the top-of-form.* Your printer keeps track of the number of lines on the page; therefore, advancing the paper manually will change the top-of-form setting. If necessary, press the LF button to advance the paper one line at a time.

5. The paper bail has two grooves to help you align the bail rollers (**Figure 2-7**). Sliding the rollers left or right will click them into place. (These grooves are set for 136-column wide paper on the 136-column printer.) Set the right bail roller in the right groove and the left bail roller in the left groove. When you use narrow paper on which both bail rollers cannot be set, set the bail rollers inside each groove.

CAUTION

For one-part lighter-weight continuous forms, or if multi-part forms are used in high temperature, position the bail rollers at the left and right sides of the paper so that each roller rests half on the paper and half on the platen (**Figure 2-16**). This evens the paper tension and helps prevent less durable forms from tearing during printing.

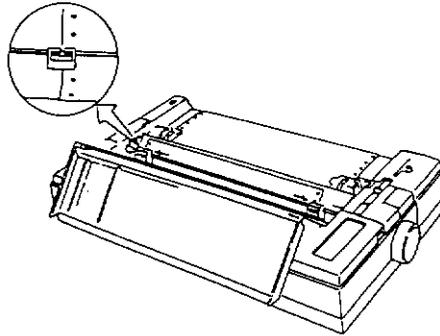


Figure 2-16 Bail roller position for thin paper or multi-part forms at high temperature

6. Place the paper guide panel in its down position and close the top cover.
7. Check to see that the printer is on and online (the POWER and ON LINE indicators are lit). The printer is now ready to print.

2.7.1 Paper Placement for Continuous Forms

The placement of the paper stack going into the printer and the printed output coming out of the printer is very important for smooth operation of continuous forms. The feed paper can be stacked directly below the printer and must not interfere with the printed output. **Figure 2-17** shows a typical printing setup.

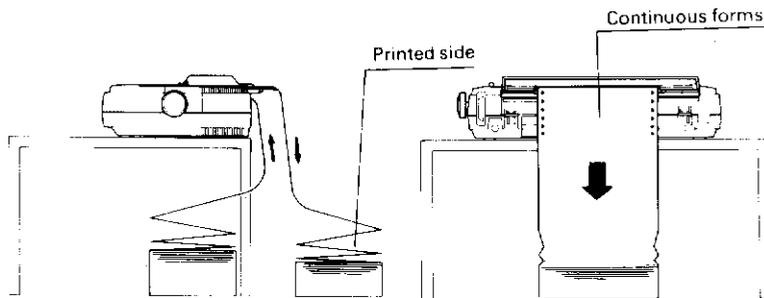


Figure 2-17 Paper placement for continuous forms

The paper stack must be positioned so the paper feeds in a straight line. Misfeeding can occur if the paper is slightly askew or off center. During heavy printing sessions, you should periodically check the paper flow.

2.7.2 Using the Paper Tear-Off Feature

The paper tear-off feature is ideal for removing a printed page from the printer without advancing the paper a full page. The top cover serves as a tear-off edge when the top portion is opened to a 45 degree angle. The paper is first advanced to the tear-off edge, the paper is removed at the perforation and then retracted back into the printer. You'll save many of those "wasted sheets" you would normally have to throw away with printers that do not have this feature.

You can also use the tear-off edge to tear paper anywhere in the page — not just at the perforation.

Loading
Paper

Here's how the paper tear-off feature works:

1. Open the top portion of the top cover, to a 45 degree angle (**Figure 2-18**). The back edge of the cover becomes a tear-off edge.

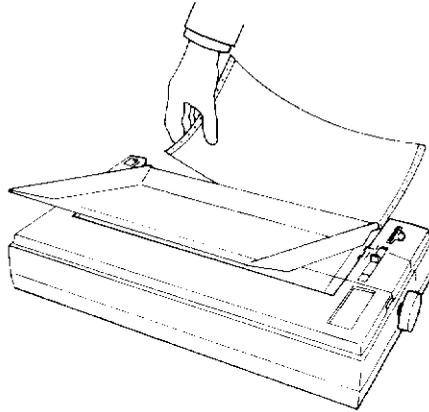


Figure 2-18 Using the paper tear-off feature

2. Press the ON LINE and FF buttons at the same time. The paper advances to the tear-off position and the ON LINE indicator flashes. Tear the paper at the perforation.
3. Press any control panel button to move the paper back into position.
4. Close the top cover.

You're ready to start printing again!

2.7.3 Loading Paper-stapled Continuous Forms

Follow this procedure to use paper-stapled continuous forms or other multi-part forms that have difficulty feeding through the printer. "Paper stapled" forms do not have staples in them; instead, they are multi-part forms that have crimped edges in order to hold them together (most multi-part forms are simply glued).

You will first need to add the paper guide extenders if you wish to use paper-stapled continuous forms or if other forms are jamming and you have already checked for proper paper loading and paper thickness setting. See Section 2.3, "Installing the Paper Guide Extenders."

1. Begin by loading paper-stapled/multi-part forms using the same procedure as for standard continuous forms (see Section 2.7).

CAUTION

To autoloading paper-stapled/multi-part continuous forms, autoloading the forms first, with the paper guide panel removed or in the flat (down) position. Once you have autoloading the forms, then place the paper guide in the upright position. Otherwise, if you try to autoloading with the paper guide panel already in the upright position, the paper may jam. This caution does not apply if you autoloading forms from the "parked" position or if you manually load the paper.

2. With the paper guide extenders installed and the forms loaded, check to see that the paper guide panel is in the upright position. Move the paper guides to the center as shown in **Figure 2-19**.

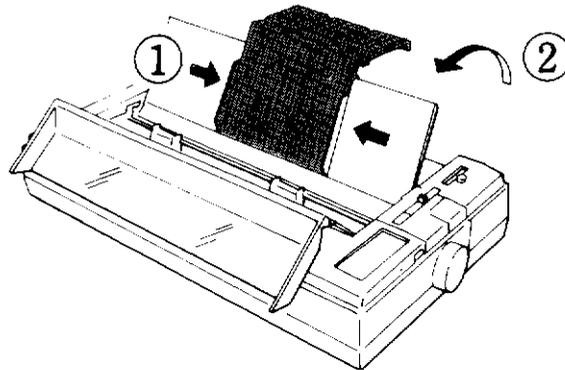


Figure 2-19 Positioning the paper guides

3. Close the front and top covers.
4. Check to see that the printer is on and online (the POWER and ONLINE indicators are lit). The printer is now ready to print.
5. Check to see that the paper is positioned so that it feeds in a straight line without interference, as shown in **Figure 2-20**.

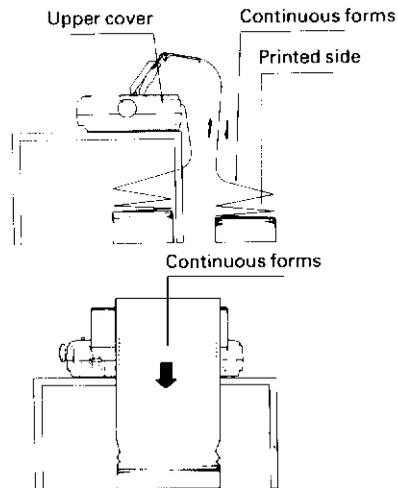


Figure 2-20 Paper placement for paper-stapled continuous forms

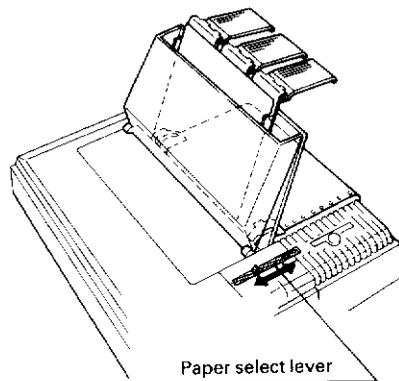
2.8 SWITCHING PAPER TYPES

Switching between different types of paper is not a problem with your printer's unique paper-loading design. Unlike most printers, you can easily print using single sheets without having to remove the continuous forms from the printer. This dynamic feature greatly increases your printing flexibility on a job-to-job basis. It's especially helpful for producing rough drafts on less expensive continuous paper and then switching to letterhead, etc. for the final draft.

2.8.1 Changing to Single Sheets

If continuous forms are loaded, you can load single sheets by completing these steps (**Figure 2-21**):

1. Make sure the paper select lever is set for continuous forms (back).



Loading
Paper

Figure 2-21 Changing from continuous forms to single sheets

2. With the printer online (the ON LINE indicator on the control panel is lit), press the FF button. The paper will retract out of the platen area. The printer will beep and the PAPER OUT indicator will light.
3. Set the paper select lever for single sheets (forward).
4. Move the paper guide panel to the up position. Insert a sheet of paper between the top cover and the paper guide panel.
5. Press the FF button and the single sheet will automatically feed into the printer.
6. Press the ON LINE button and the ON LINE indicator will light.

If necessary, you can align the paper as explained in the previous section on loading single sheets.

Now you are ready to print using single sheets. The continuous forms stay in the retracted position as long as the paper select lever is set for single sheets (forward).

2.8.2 Returning to Continuous Forms

When you are finished printing on single sheets, you can quickly load continuous forms again. Here's how:

1. If a single sheet is still in the printer, press the ON LINE button (the ON LINE indicator will go out), then press the FF button to eject the paper.
2. Move the paper guide panel to the down position, lowering the top cover as well.
3. Set the paper select lever for continuous forms (back).
4. Press the FF button to reload the continuous forms.
5. Press the ON LINE button and the ON LINE indicator will light.

You're ready to use continuous forms again!

2.9 THE SELF-TEST

Your printer contains a built-in program called a self-test that prints all of the characters including line and block graphics.

The self-test gives you a chance to make sure everything is working correctly (paper, ribbon, etc.). Running the self-test is very easy and can even be done without the printer being hooked up to your computer.

The self-test is best run with continuous forms. (Single sheets will work if loaded into the printer before you activate the self-test; however, you'll have to end the test before printing goes past the bottom of the sheet.)

NOTE

The first time you operate the 136-column printer, it's best to use wide paper (15" or more) to avoid printing off the right side of the paper which may damage the print head or the platen. In Section 4, you'll see how to set the self test margins to avoid printing off the paper.

To run the self-test, follow these steps:

1. If the printer is on, turn it off.
2. Load paper into the printer.
3. Hold down either the LF or FF button on the control panel while turning on the power switch. The self-test will begin to print.
4. When you want to stop the self-test, simply press the ON LINE button.
5. With the platen knob, advance the paper to the next perforation so you will start printing at the top of the next page when you turn the printer on again.

While the self-test is running, you can use the control panel buttons shown in **Table 2-3**.

Table 2-3 Control panel options during self-test

Press this button:	To do this:
ON LINE	Exit; ready to print
FF	Enter Setup
LF	Pause printing (toggles on/off)

You can also start the self-test using the printer's setup feature. See Section 4 for details. **Figure 2-22** shows a sample of the self-test.

SECTION 3 USING THE CONTROL PANEL

The control panel on your printer is conveniently located on the right front corner. Four push-buttons offer a wealth of handy options for using your printer. From here you can choose print quality (letter or draft), specify fonts, run a self-test, select a printer emulation and do much more. See Section 4 for additional control panel functions.

This section of your manual contains:

- A description of how to use each control panel light and button
- Step-by-step instructions for switching from menu 1 to menu 2

3.1 CONTROL PANEL LAYOUT

Figure 3-1 is an illustration of the control panel. The four touch-pad buttons manipulate all printer functions and the six LED lights show printer status.

Control Panel

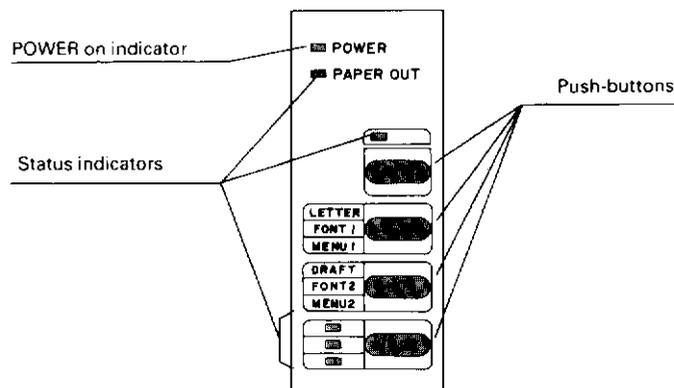


Figure 3-1 Control panel

From the top...

- **POWER** The power light glows whenever the printer is on.

- **PAPER OUT** This indicator lights only when there is no paper against the platen. (Continuous-form paper can be in the tractor feeder in the "park" position.) A paper out condition will automatically take your printer offline, unless you specify otherwise (see Section 4).

- **ONLINE** When this is lit, you know the printer is online. Your printer must be online to receive data from your computer and it must be online to print.

- ONLINE BUTTON** Turn your printer online and offline with this button. Most of the time your printer will be online but it must be taken offline occasionally to change certain printer settings.

- FF BUTTON** The form feed (FF) button's primary function is to advance (or reverse) the paper by one full page. Single sheets of paper always move forward but continuous-form paper moves forward when the printer is offline and backward when it is online.

 With the FF button you can:
 1. **LOAD** paper when the PAPER OUT indicator is lit. You can load continuous forms, single sheets, or single sheets with the cut sheet feeder option to the top of the first form or sheet. (The printer automatically goes offline when paper is out, unless you specify otherwise).
 2. **ADVANCE** to the top of the next sheet when the printer is offline and you are using continuous-form paper.
 3. **EJECT** one sheet of paper when you are using single sheets (either manually or with a cut sheet feeder). The printer can be either online or offline.

4. **BACK-UP** one sheet of paper when you are using continuous forms and the printer is online. This is an exceptional feature; it allows you to "park" the continuous-form paper out of the way but still in the forms tractors while you switch to using single sheets.

See Section 2.7 for more information.

LF BUTTON

The line feed (LF) button advances the paper one line at a time. The printer must be offline. Your printer keeps track of each line feed, so that pressing the form feed button will place the print head at the top of the next sheet.

■ **MODE** LEDs and **BUTTON**

Pressing the **MODE** button changes the functions of the FF and LF buttons. When you press the **MODE** button (with the printer offline) the top **MODE** indicator light comes on. Press it a second time for the middle light and a third time for the bottom light. A fourth press will turn them all off and you will be back where you started.

3.2 USING THE MODE BUTTON

To use the features of the **MODE** button, take the printer offline by pressing the **ONLINE** button. (When the indicator light is out, the printer is offline.) Then push the **MODE** button once. The first (top) of the three mode indicator lights will come on (**Figure 3-2**). As long as one of these three lights is on, you know the **MODE** button is active. Press the **ONLINE** button again to deactivate the **MODE** feature.

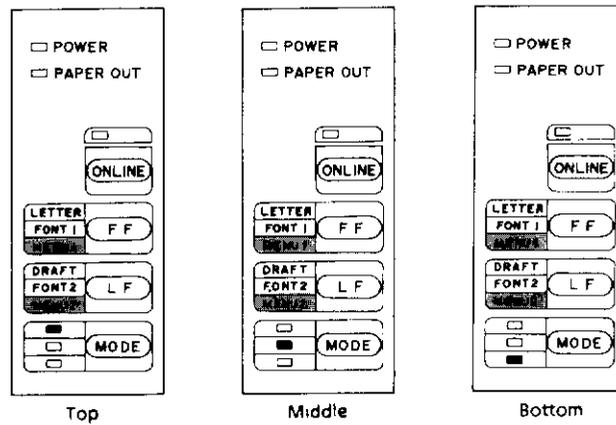


Figure 3-2 Using the MODE button

When the top MODE light is lit, you can access the top feature of the FF group (LETTER) by pressing the FF button or the top feature of the LF group (DRAFT) by pressing the LF button. They will never both be active at the same time. Your document will print in either letter or draft quality, depending on which button you pressed last.

LETTER or DRAFT

1. Set the printer to offline.
2. Press the **MODE** button once (the top MODE LED will light).
3. Press either the FF button once for letter quality printing, **or** the LF button once for draft quality printing.

NOTE

The printer will forget these selections when it is turned off. Each time you turn on the printer, it will revert to the settings in Menu 1. See Section 4 for viewing and changing these settings.

When the middle mode light is lit, you can access the middle feature of the FF group (FONT 1) or the middle feature of the LF group (FONT 2). Font 1 and font 2 come preset from the factory as Courier 10 and Prestige 12, but you can change them using the "setup" instructions in Section 4. To select one or the other, follow these steps:

FONT 1 or FONT 2

1. Set the printer to offline.
2. Press the MODE button twice (the middle MODE LED will light).
3. Press either the FF button once to select font 1, **or** the LF button once to select font 2.

Similarly, when the bottom LED is lit, you can access the bottom feature of either group (MENU 1 or MENU 2). With the menu feature you can preset such things as quality (letter or draft), font (Courier, Prestige, compressed and others), character spacing, printer emulation and page length. See Section 4, "Setup," for how to make menu selections and for how to print a list of menus 1 and 2. You can cut out the list and tape it to the front of your printer for handy reference.

MENU 1 or MENU 2

1. Set the printer to offline.
2. Press the MODE button three times (the bottom MODE LED will light).
3. Press either the FF button once to select menu 1, **or** the LF button once to select menu 2.

NOTE:

The printer defaults to Menu 1 when you turn it on.

Resume Printing

Press the ONLINE button to turn off the MODE button status instantly. This will put the printer back online and you can begin printing. Or you can press the MODE button itself until all of its indicator lights are off. Then press the ONLINE button and resume printing.

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SECTION 4 SETUP

Your printer can be setup in many different ways using the setup functions of the control panel. They control many of the features handled by DIP switches on other printers. This means that you can change the two menu listings, select an alternate language character set, configure the printer's serial interface, turn the printer "beeper" on or off, extend or decrease the buffer capacity and make other changes all from the control panel. Just follow the instructions in this section. They include:

- Understanding and using setup options
- Step-by-step instructions on how to set up your printer to quickly select a particular font
- Details on how to take advantage of the other exceptional features of this printer, including a sequential menu of the setup options

You may want to refer to the fold-out chart at the end of this section as a quick reference aid while you are reading through the setup options.

4.1 UNDERSTANDING SETUP FUNCTIONS

Each of the main setup functions (shown in **Figure 4-1**) controls a related group of printing options. The setup functions are described briefly in the following paragraphs.

FUNCTION:SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					

Figure 4-1 Main setup functions



Customize control panel selections

You can determine what happens when you use the font 1 and font 2 buttons on the control panel (see **Figure 4-2**). They are "user-defined." This feature makes it easy to change quickly from one typestyle to another (such as Courier 10 to Prestige 12), print out a draft of your document using the high-speed draft option, or change letter spacing, when necessary.

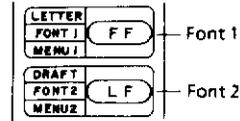


Figure 4-2 The font 1 and font 2 buttons

Review or change menus 1 and 2

Menus 1 and 2 are also user-defined. You can specify what will happen when you use them. By setting each menu you can have certain printer options always ready for your use. This is especially valuable if you have one or two kinds of documents, such as a word processed report and a spreadsheet, which you print frequently. You can save the requirements for the report in one menu and the spreadsheet in the other menu.

In both menus you can specify letter or draft print quality, the typestyle (or font), character and line spacing, a printer emulation, an additional print characteristic (such as italic), page length, width and margins, certain standard procedures (such as carriage return with each line feed and right-end wrap), and print color (if you have the color kit option installed).

NOTE

Both menus are preset at the factory with identical settings. This allows you to begin printing immediately.

Modify hardware settings

This setup feature allows you to override the paper out detector, choose between uni- and bi-directional printing (uni-directional gives more precise characters but at a slower pace than bi-directional), turn the beeper on or off, configure the printer to use single or dual bin cut-sheet feeders, and modify the input buffer and download memory capacities.

If your printer has a serial interface board installed, your hardware options increase to include various data formats, baud rates, and protocols. These must be set properly to allow your computer to "talk" to your printer.

Print all current selections

The setup list is a printout of all the presently-saved settings. This will show you all the choices you have made and saved in the panel, menu 1, menu 2 and hardware functions.

Restore all options to factory settings

This option allows you to quickly revert to the standard settings. Called the default function, this will automatically change both menu 1 and menu 2 back to letter quality, Courier 10, 10 cpi, 6 lpi, DPL241 emulation, 11-inch page length, and no-skip over perforation. The current (factory) settings are shown in **Figure 4-3**. Font 1 and font 2, which you can change with the control panel, will also revert to their original settings of Courier 10 and Prestige 12, respectively.

Setup

```

FF [LETTER] : LETTER QUALITY
   [FONT1] : COUR 10, 10CPI
   [MENU1] : SEE BELOW
LF [DRAFT] : DRAFT
   [FONT1] : PRSTG12
   [MENU1] : SEE BELOW
    
```

NO: Item	MENU1	MENU2	NO: Item	HARDWARE	
01	QUALITY	LETTER	01	PPR-OUT	CNTONLY
02	FONT	COUR 10	02	PRMT-DIR	B1-DIR
03	CHR-WIDE	NORMAL	03	BZZZER	ON
04	CHR-HIGH	NORMAL	04	WORD-LG	8-BIT
05	CHAR-SPC	10CPI	05	BUFFER	8KBYTE
06	LINE-SPC	6LPI	06	FEEDEE	NONE
07	EMULATE	DPL24C	07	DT-FRMT	NONE1
08	ATTRIB	NONE	08	BAUD-RT	9600BPS
09	PAGE-LG	11INCH	09	PROTCCL	XON/XOFF
10	CDLR	AUTOSEL	10	DSR	IGNORE
11	LEFT-END	ICOLN			
12	TOP-MRGN	1LINE			
13	LANGUAGE	USA			
14	CHAR-SET	SET2			
15	GRAPH-LF	IBM-GPH			
16	PERFRATN	NO-SKIP			
17	WIDTH	13.5INCH			
18	ZEROFONT	NO-SLASH			
19	OC3-CODE	ENABLE			
20	CR-CODE	CR-ONLY			
21	LF-CODE	LF&CR			
22	RIGHTEND	WRAP			

```

NO: Item :TDF-ADJ
01:ORIGIN :1/5INCH
02:FINE-ADJ :0
    
```

Figure 4-3 Printout of the current settings

Print a self-test

The self-test printout shows every character of the font saved in menu 1. It also illustrates the chosen character spacing, line spacing and other print definitions saved in menu 1. This helps you to see what your document will look like, using the selected settings.

Print a Hex Dump

This is primarily a debugging feature for programmers who need to see the data coming from the computer to the printer in hexadecimal and ASCII form. It only works when the printer is receiving data from the host computer system.

Adjust vertical alignment of bi-directional printing

In bi-directional printing, the printhead prints characters on the page while it is traveling left to right as well as right to left. This allows for much faster printing. If the characters get out of alignment (appearing slanted or wavy), you can adjust them with this setup feature.

Change the top of form location

When you use the automatic paper loading feature, the paper will advance into the printer to a certain point and then stop, ready for printing. You can control how far it goes by using the top-of-form adjustment option.

Save choices for future use

You must use the "save&end" setup function to save your changes for future use. This option will store your settings in a special section of the printer's memory which will not be erased when the power is turned off. If you don't want to save your changes, you can exit setup by turning off your printer without using "save&end."

From the initial menu you may select one of the eleven setup activities in the same way that you would make selections on a computer screen – by using a cursor. The cursor is a small red rectangular block on the plastic card guide between the printhead and the platen. (See **Figure 4-5**.) When you first see the main function menu, the cursor will be below the word "panel." To move the cursor from one selection to another, press the MODE button repeatedly until the cursor moves under your selection.

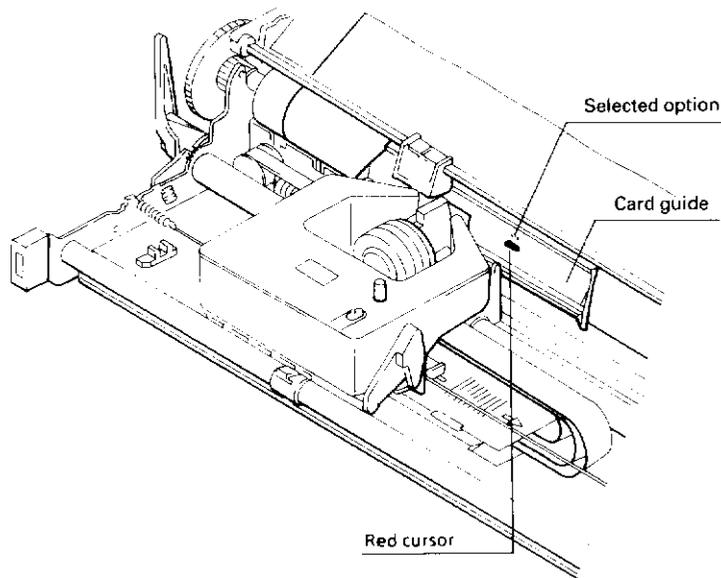


Figure 4-5 Printhead and cursor

4.2.1 Setting the PANEL Options

The following steps show you how to change the PANEL settings. PANEL allows you to change the typestyles accessible with the font 1 and font 2 buttons on the control panel.

FUNCTION-SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					

1. Press the MODE button once, then press the FF button to select PANEL.

Pressing the FF button will underline the function above the cursor and then print a new menu of choices for that selection. (You may need to lift up the paper bail to see the entire menu.) Each menu will have an "item" followed by a list of "options" as shown in **Figure 4-6**.

```

FUNCTION: SAVE&END  PANEL      MENU1  MENU2  HARDWARE  LIST  DEFAULT  SELF-TST
                HEX-DUMP  V-ALNMNT  TOF-ADJ  SAVE/END

[DRAFT]         :DRAFT      HI-DRAFT
    
```

Figure 4-6 Relationship of functions, items, and options

With some functions, the action of selecting it will execute that function without your specifying further items or options. These include "list," "default," "self-tst," "hex-dump", "v-alnmnt" and "save&end."

2. Press the MODE button to move the cursor to HI-DRAFT.

Press the MODE button repeatedly until the cursor is positioned beneath the desired option. The cursor will move to the second line, if there is one. Notice that every time an item is printed, the cursor relocates itself to the currently-selected option, indicated by a short underline.

3. Press the MODE button again to return the cursor to DRAFT.
4. Press the FF button to select DRAFT. DRAFT will be underlined and the next item (FONT1) and its options will print.

```

[FONT1] :COUR10  PRSTG12  COMPRSD  FNTCARD0  FNTCARD1  FNTCARD2  FNTCARD3
                FNTCARD4  FNTCARD5  FNTCARD6  FNTCARD7  DOWNLDD  DOWNLDD1
    
```

5. With the new item, FONT1, in front of you, press the MODE button to move the cursor to the PRSTG12 option. PRSTG12 is the Prestige Elite font. (All the options will be described later in this section.)
6. Press the FF button to select this option. PRSTG12 will be underlined and a new item (and options) will appear.

Setup

FNT1PTCH	2.5CPI	3 CPI	5 CPI	6 CPI	10CPI	12CPI	15CPI
	17CPI	18CPI	20CPI	PROP-SP			

The FNT1PTCH (font 1 pitch) item lets you select the pitch or character spacing you want to use with font 1.

7. Use the **MODE** button to move the cursor to 12CPI. This will give you 12 characters per inch spacing.
8. Press **FF** to select the pitch now and display the next menu.

[FONT2]	:COUR10	PRSTG12	COMPRSD	FNTCARD0	FNTCARD1	FNTCARD2	FNTCARD3
	FNTCARD4	FNTCARD5	FNTCARD6	FNTCARD7	DOWNLD0	DOWNLD1	

Now you can select the font that the font 2 button will print.

9. Press the **MODE** button to move the cursor to **COMPRSD** for compressed print.
10. Press **FF** to underline it and display the next menu.

FNT2PTCH	2.5CPI	3 CPI	5 CPI	6 CPI	10CPI	12CPI	15CPI
	17CPI	18CPI	20CPI	PROP-SP			

11. Press the **MODE** button to move the cursor to 17CPI. This is the correct pitch for compressed print.
12. Now try something different. Press the **LF** button. 17CPI will be underlined, but the previous item will be printed instead of the next.

[FONT2]	COUR10	PRSTG12	COMPRSD	FNTCARD0	FNTCARD1	FNTCARD2	FNTCARD3
	FNTCARD4	FNTCARD5	FNTCARD6	FNTCARD7	DOWNLD0	DOWNLD1	

The **LF** button allows you to back up in the sequence. You can then check or change your previous selections. Note that the cursor and the single underline are under **COMPRSD**, the option you previously selected.

13. Since **COMPRSD** is what we want, press **FF** to confirm it and to move forward again.

```

FNT2PTCH:2.5CPI   3CPI   5CPI   6CPI   10CPI   12CPI   15CPI
              17CPI   18CPI   20CPI   PROP-SP
    
```

Again, the option is correct, so press FF to confirm 17CPI.

```

==END==
    
```

The end marker indicates that you have reached the end of the sequence.

14. Press ONLINE to return to the main function menu.

```

FUNCTION:SAVE&END  PANEL   MENU1  MENU2  HARDWARE  LIST  DEFAULT  SELF-TST
                HEX-DUMP  V-ALNMNT  TOF-ADJ
    
```

15. At this point, you have two choices:

If you want to save these settings:

- (a) Press the FF button to save your changes and exit setup.
(The cursor will already be at the word "save&end".)

The printer is now online and ready for printing.

If you want to reset all items to their factory settings:

- (a) Press the MODE button to move the cursor to "default."
- (b) Press the FF button, then "Function" menu is printed.
- (c) Press the FF button to exit setup.

The printer is now online and ready for printing.



CAUTION

Printer settings must be saved using the Save&End function or they will be lost when the printer is turned off.

That's all there is to it. Now you know how to set up the various printer functions by selecting different options. The next section defines the options available for all of the functions. Before you look at them, follow the next procedure to print out a list of current printer settings.

4.2.2 Printing the List of Settings

Follow these steps to print out a list of the current settings:

1. Turn off the printer and wait a few seconds.
2. Press the MODE button on the control panel and continue holding it while you turn the printer back on.
3. Hold the MODE button for three or four seconds, until the printhead moves. You will see a printout like the one in **Figure 4-7**.

```
*** SETUP MODE ***
```

- Push button functions

<u>BUTTON</u>	<u>ACTION</u>
<ONLINE>	Return to "FUNCTION" menu
< F F >	Select option and move down
< L F >	Select option and move up
< MODE >	Move to next option

- Operation

- The cursor (red) on the plastic card guide indicates the option to be selected.
- The selected option is underlined.

- Saving and Exiting

- Press <ONLINE>, then < F F >

```
FUNCTION:SAVE&END PANEL MENU1 MENU2 HARDWARE LIST DEFAULT SELF-TST
          HEX-DUMP V-ALNMM1 TOF-ADJ
```

Figure 4-7 Initial setup menu and function menu

4. Press the MODE button repeatedly until the cursor on the plastic guide is below LIST.
5. Press the FF button to select LIST. You will see a printout like the one in **Figure 4-8**.

FUNCTION:SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TEST
HEX-DUMP	V-ALNMNT	TOP-ADJ					
[DRAFT]	DRAFT	HI-DRAFT					

Figure 4-9 Relationship of functions, items, and options

The cursor always stops at the presently-selected option (the first letter is underlined to help identify it). Press the MODE button until the cursor is under the option you want. Press the FF button to select the option. This will underline it and the next set of choices will appear. You can also make your selection with the LF button. This will underline the option and show you the previous set of choices.

Anytime you want to stop changing the options of one function and go on to another, press the ONLINE button. This will reprint the function list which appears at the bottom of the initial setup menu. Then press the MODE button to move the cursor to a different function.

4.3 OPTION DESCRIPTIONS

The options for all the functions are described in this section. They are organized in the order in which they appear on the menus. The function menu is the starting place for setup. You can branch off of this menu to change your printer settings.

FUNCTION:SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					

4.3.1 Panel

Panel allows you to vary the draft printing speed from regular to high speed. It also allows you to change the type font you will get when you use the font 1 or font 2 buttons.

[DRAFT]	:DRAFT	HI-DRAFT
---------	--------	----------

- [DRAFT] This item lets you select between regular and high-speed draft printing.
- DRAFT Draft quality printing (120 x 180 dots per inch)
- HI-DRAFT High speed draft quality printing (90 x 180 dots per inch)

[FONT1]	:COUR10	PRSTG12	COMPRSD	FNTCARD0	FNTCARD1	FNTCARD2	FNTCARD3
	FNTCARD4	FNTCARD5	FNTCARD6	FNTCARD7	DOWNLD0	DOWNLD1	

- [FONT1] This item lets you select the font that will print when you use the FONT 1 button.
- COUR10 Courier 10 font (factory setting)
- PRSTG12 Prestige Elite 12 font
- COMPRSD Compressed font (for 15, 17, 18, and 20cpi)
- FNTCARD This option lets you select one of the fonts on an optional font card. When you insert an optional font card, the card font names will print here for selection.
- DOWNLD This option lets you select one of the two fonts which can be downloaded into the printer's memory from certain software applications. Select the appropriate option here.



FNT1PTCH:2.5CPI 7CPI	3CPI 18CPI	5CPI 20CPI	6CPI PROP-SP	10CPI	12CPI	15CPI
-------------------------	---------------	---------------	-----------------	-------	-------	-------

FNT1PTCH This item (font pitch) lets you select a character spacing appropriate for the font you have selected.

CPI Characters per inch. There are ten fixed character spacings available. If you pick a character spacing which is too tight (too high numerically), the characters will overlap.

PROP-SP Proportional spacing. Proportional spacing works with all fonts.

[FONT2] :COLR10 FNTCARD4	PRSTG12 FNTCARD5	COMPRSD FNTCARD6	FNTCARD0 FNTCARD7	FNTCARD1 DOWNLDC	FNTCARD2 DOWNLDC	FNTCARD3 DOWNLDC
-----------------------------	---------------------	---------------------	----------------------	---------------------	---------------------	---------------------

[FONT2] The font 2 item works just like the font 1 item. See the options listed above.

FNT2PTCH:2.5CP 17CPI	3CPI 18CPI	5CPI 20CPI	6CPI PROP-SP	10CPI	12CPI	15CPI
-------------------------	---------------	---------------	-----------------	-------	-------	-------

FNT2PTCH The font 2 pitch item works just like the font 1 pitch item. See the options listed above.

4.3.2 Menu 1 and Menu 2

Menu 1 and Menu 2 allow you to specify two different configurations for your printer which you can select with the touch of a button. Since both offer the same items and options, only the Menu 1 items will be described. (The printer always reverts to the current Menu 1 settings each time you turn it on.)

NOTE

The FF and LF buttons can be especially helpful on long options lists like this one. If you want to jump quickly from the top of the list to the end, select the item (such as QUALITY) by pressing the LF button. This will take you to the end of the list (==END==). Press the LF button again for the last item, RIGHTEND. Similarly, if you are at ==END== and want to jump back up to the beginning of the list, press the FF button to reprint the QUALITY item and its options. This step will by-pass the main function menu.

FUNCTION:SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					
QUALITY	LETTER	DRAFT	HI-DRAFT				

- QUALITY This item lets you select the print quality.
- LETTER Select letter quality to use Courier 10, Prestige Elite or Compressed printing (factory setting).
- DRAFT Draft quality
- HI-DRAFT High speed draft quality

[FONT]	COUR10	PRSTG12	COMPRSD	FNTCARD0	FNTCARD1	FNTCARD2	FNTCARD3
	FNTCARD4	FNTCARD5	FNTCARD6	FNTCARD7	DOWNLD0	DOWNLD1	

- FONT This item lets you specify the font that will be selected with the menu button.
- COUR10 Courier 10 font (factory setting)
- PRSTG12 Prestige Elite 12 font
- COMPRSD Compressed font (for 15, 17, 18, and 20dpi)



FNTCARD This option lets you select one of the fonts on an optional font card. When you insert an optional font card, the card font names will print here for selection.

DOWNLD This option lets you select one of the two fonts which can be downloaded into the printer's memory from certain software applications. Select the appropriate option here.

CHR-WIDE	NORMAL	2-TIMES	4-TIMES
----------	--------	---------	---------

CHR-WIDE This item specifies the character width.

NORMAL Standard font size characters (factory setting)

2-TIMES Double-width characters

4-TIMES Quadruple-width characters

This selection does not automatically adjust character spacing. If you select double- or quadruple-width characters, you must change the number of characters printed per inch (CPI) to avoid overlapping print.

CHR-HIGH	NORMAL	2-TIMES	4-TIMES
----------	--------	---------	---------

CHR-HIGH This item specifies character height.

NORMAL Standard font size characters (factory setting)

2-TIMES Double-height characters

4-TIMES Quadruple-height characters

This selection does not automatically adjust line spacing. If you select double- or quadruple-height characters, you must change the line spacing (LPI) to avoid overlapping print. For example, at double-width, change 10CPI to 5CPI; at quadruple-width, change 10CPI to 2.5CPI.

CHAR-SPC:2.5CPI 17CPI	3CPI 18CPI	5CPI 20CPI	6CPI PROP-SP	10CPI	12CPI	15CPI
--------------------------	---------------	---------------	-----------------	-------	-------	-------

CHAR-SPC This item lets you set the character spacing. Characters will overlap if the spacing is too narrow.

CPI Characters per inch. If you pick a character spacing that is too tight (too high numerically) the characters will overlap (factory setting 10CPI).

PROP-SP Proportional spacing. Proportional spacing works with all typesyles and print qualities.

LINE-SPC: 1LPI 8LPI	2LPI	3LPI	4LPI	5LPI	6LPI	7LPI
------------------------	------	------	------	------	------	------

LINE-SPC This item sets the line spacing.

LPI Lines per inch. If you've selected extra high characters, be sure to use a large enough line spacing (lower numerically) (factory setting 6LPI).

EMULATE: DPL24C DIABLO	DPL24I	IBM-GPH	IBM-PRO	FX-80	JX-80	DPL24D
---------------------------	--------	---------	---------	-------	-------	--------

EMULATE This item specifies the command set that the printer uses.

DPL24C Emulates the Fujitsu DPL24C color printer (only prints if color kit option is installed)

DPL24I Emulates the Fujitsu DPL24I printer (factory setting)

IBM-GPH Emulates the IBM Graphics Printer

IBM-PRO Emulates the IBM Proprinter XL

FX-80 Emulates the Epson FX-80/100 printer

JX-80 Emulates the Epson JX-80 color printer (only prints if color kit option is installed)



DPL24D Emulates the Fujitsu DPL24D printer
 DIABLO Emulates the Diablo 630 printer

ATTRIBT:NONE	ITALICS	CONDNSD	SHADOW	BOLD
--------------	---------	---------	--------	------

ATTRIBT This item lets you select special character attributes.

NONE Normal characters (factory setting)

ITALICS Italic characters

CONDNSD Condensed characters

SHADOW Characters are struck a second time in a slightly offset position for a shadow effect.

BOLD Characters are struck a second time in the same print position for a bold effect.

PAGE-LG:11INCH	11.6INCH	12INCH	14INCH	18INCH	3INCH	3.5INCH
4INCH	5INCH	5.5INCH	6INCH	7INCH	8INCH	8.5INCH

PAGE-LG This item sets the page length in inches (factory setting 11 inches).

COLOR:AUTOSEL	BLACK	YELLOW	MAGENTA	CYAN
---------------	-------	--------	---------	------

COLOR This item specifies a ribbon color (only prints if color kit option is installed).

AUTOSEL Printing color can be selected by the command. (factory setting)

BLACK Black

YELLOW Yellow

MAGENTA Red

CYAN Blue

LEFT-END:1COLM 36COLM	6COLM 41COLM	11COLM	16COLM	21COLM	26COLM	31COLM
--------------------------	-----------------	--------	--------	--------	--------	--------

LEFT-END This item sets the left margin.

COLM Column: Left margin is selected in 5-column increments from column 1 to column 41. The actual left margin is a combination of the margin specified here and the margin specified in the software application. The column varies according to character spacing. Proportional spacing assumes 12CPI (factory setting 1COLM).

TOP-MRGN:1LINE	2LINE	3LINE	4LINE	5LINE	6LINE	7LINE
----------------	-------	-------	-------	-------	-------	-------

TOP-MRGN This item sets the top margin.

LINE The distance between the top of the page and the first line of print, measured in lines, 1 through 7 (factory setting 1 line)

LANGUAGE:USA FINNISH	UK DANISH	GERMAN NORWEGN	FRENCH	ITALIAN	SPANISH	SWEDISH
-------------------------	--------------	-------------------	--------	---------	---------	---------

LANGUAGE Selects a character set with special characters for the language specified (factory setting USA). See Appendix E for a complete list.

Swedish, Finnish, Danish and Norwegian all use the same character set.

CHAR-SET:SET1	SET2
---------------	------

CHAR-SET This item selects the character set.

SET 1 IBM character set 1

SET 2 IBM character set 2 (factory setting)

If Set 2 is selected when a font card is installed or downloaded fonts are in RAM, the printer will use the font card or download character set. See Appendix E for details.

Setup

GRAPH-LF:IBM-GPH	FX-80
------------------	-------

GRAPH-LF This item specifies the way the graphics line feed commands, ESC A and ESC 2, function.

IBM-GPH IBM Graphics Printer characteristics (factory setting)

FX-80 Epson FX-80 printer characteristics

This option appears only when DPL24I or DPL24C emulation is selected.

PERFRATN:SKIP	NO-SKIP
---------------	---------

PERFRATN This item controls whether or not the printer automatically advances the paper over the perforation between pages.

SKIP Skips one inch between the last line of print on one page and the first line on the next page to avoid printing on the perforation on continuous forms

NO-SKIP Prints up to and on the perforation (factory setting)

WIDTH	8-INCH	13.6-INCH
-------	--------	-----------

WIDTH This item sets the maximum paper width.

8-INCH Restricts the printer to printing only 8" wide. (If you have a wide printer but use primarily narrow paper, this setting will prevent printing on the bare right-hand side of the platen.) (factory setting on the 80-column printer)

13.6-INCH Allows printing across the full width of wide paper; appears only on 136-column printers (factory setting on the 136-column printer)

ZEROFONT:NO-SLASH WITHSLSH

- ZEROFONT This item specifies regular or slashed zero characters.
- NO-SLASH Prints zero as 0 (factory setting)
- SLASH Prints zero as 0

DC3-CODE:ENABLE DISABLE

- DC3-CODE This item controls the function of the DC3 and DC1 codes.
- ENABLE Activates DC3 and DC1 codes. Any print data received between a DC3 code and a DC1 code is ignored (factory setting).
- DISABLE De-activates the DC3 and DC1 codes

CR-CODE :CR-ONLY CR&LF

- CR-CODE This item controls the function of the carriage return code.
- CR-ONLY Carriage return moves the print head to the left margin without advancing the paper one line (factory setting)
- CR&LF Line feed with each carriage return

LF-CODE :LF-ONLY LF&CR

- LF-CODE This item controls the function of the line feed code.
- LF-ONLY Advances the paper one line but does not move the print head to the left margin
- LF&CR Returns the printhead to the left margin with each line feed (factory setting)

Setup

RIGHTEND WRAP	OVR-PRNT
---------------	----------

RIGHTEND	This item tells the printer what to do when the printhead reaches the right margin.
WRAP	Advances the paper one line and returns the printhead to the left margin (factory setting)
OVR-PRNT	Continues to print in the same location (no carriage return and no line feed). This option prevents a line which is too long from altering your pagination.

==END==

4.3.3 Hardware

The **HARDWARE** function allows you to define the printer's hardware and computer interface setup. To change the settings in this panel function, use the **MODE** button to move the cursor to **HARDWARE**. Press the **FF** button to select it. The following items and options will appear.

NOTE

The **FF** and **LF** buttons can be especially helpful on long options lists like this one. If you want to jump quickly from the top of the list to the end, select the item (such as **PPR-OUT**) by pressing the **LF** button. This will take you to the end of the list (**==END==**). Press the **LF** button again for the last item, **PROTOCL**. Similarly, if you are at **==END==** and want to jump back up to the beginning of the list, press the **FF** button to reprint the **PPR-OUT** item and its options. This step will by-pass the main function menu.

FUNCTION:SAVE&END	PANEL	MENU1	MENU2	<u>HARDWARE</u>	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					
PPR-OUT	CNTONLY	DETECT	IGNORE				

- PPR-OUT** This item controls the paper-out detector. You might choose to turn off this sensor in order to print down to the bottom of the page.
- CNTONLY** The paper-out detector will stop the printing only when continuous forms are used. Single sheet paper will continue printing (factory setting).
- DETECT** Printing stops when sensor detects no more paper against the platen.
- IGNORE** Printing continues, even when a paper-out condition is detected.

PRNT-DIR	BI-DIR	UNI-DIR
----------	--------	---------

- PRNT-DIR** This item turns bi-directional printing off and on. You may want to select uni-directional printing for the most precise printing possible.
- BI-DIR** Bi-directional printing (factory setting)
- UNI-DIR** Uni-directional printing is recommended for printing graphs with vertical lines.

BUZZER	ON	OFF
--------	----	-----

- BUZZER** This item controls whether or not you hear a "beep" when an error occurs or when you are selecting options with the control panel.
- ON** Turns the buzzer on (factory setting)
- OFF** Turns the buzzer off



WORD-LG	7-BIT	8-BIT
---------	-------	-------

- WORD-LG** This item adjusts the number of bits a "word" may contain. Bit image graphics always use 8-bit data.
- 7-BIT** The high-order or eighth bit of each character is ignored. You can't use the entire character set of the printer if you select this option.
- 8-BIT** All eight bits of each character are used. We recommend you use this option always.

BUFFER	256BYTE	2KBYTE	8KBYTE	24KBYTE
--------	---------	--------	--------	---------

- BUFFER** This item refers to the size of the printer's erasable memory. It holds information waiting to be printed. Downloaded character fonts are stored in a separate buffer the size of which is set simultaneously with this one. See the table below.
- BYTE** Each byte holds one character to be printed.
- KBYTE** Kilo-byte: 1024 bytes (factory setting 8KBYTE)

Input buffer size	Download buffer size
256 byte	31.75 byte
2K byte	30K byte
8K byte	24K byte
24K byte	8K byte

FEEDER	NONE	SNGL-BIN	DBL-BIN
--------	------	----------	---------

- FEEDER** This item refers to an automatic cut-sheet feeder for single sheets of paper.
- NONE** No cut-sheet feeder is installed (factory setting.)
- SNGL-BIN** A single bin cut-sheet feeder is installed. (See Appendix C for a description of the cut-sheet feeder option.)

DBL-BIN A dual bin cut-sheet feeder is installed for using two different kinds of paper.

With a serial interface board installed, you will also see the following items when you are setting hardware options.

DT-FRMAT:8NONE1 7EVEN1	8NONE2 7ODD2	8ODD1 7EVEN2	8EVEN1	7MARK1	7SPACE1	7ODD1
---------------------------	-----------------	-----------------	--------	--------	---------	-------

DT-FRMAT This item controls data format. It refers to the way information is sent from the computer to the printer. See Appendix B for more details.

- 8NONE1** 8 data bits, no parity bit, 1 stop bit
- 8NONE2** 8 data bits, no parity bit, 2 stop bits
- 8ODD1** 8 data bits, odd parity, 1 stop bit
- 8EVEN1** 8 data bits, even parity, 1 stop bit
- 7MARK1** 7 data bits, mark parity bit, 1 stop bit
- 7SPACE1** 7 data bits, space parity bit, 1 stop bit
- 7ODD1** 7 data bits, odd parity bit, 1 stop bit
- 7EVEN1** 7 data bits, even parity bit, 1 stop bit
- 7ODD2** 7 data bits, odd parity bit, 2 stop bits
- 7EVEN2** 7 data bits, even parity bit, 2 stop bits

BAUD-RT	600BPS	1200BPS	2400BPS	4800BPS	9600BPS	19200BPS
---------	--------	---------	---------	---------	---------	----------

BAUD-RT Baud rate is the speed at which information is transmitted between the computer and the printer. It is measured in bits per second (BPS) (factory setting 9600).



PROTOCOL:XON/OFF	DTR	REV-CHNL	ETX/ACK
------------------	-----	----------	---------

PROTOCOL Protocol is the term used for the instructions which control the data transmission from computer to printer. (See Appendix B for details.)

XON/XOFF XON and XOFF codes control data transfer

DTR Data terminal ready protocol

REV-CHNL Reverse channel protocol

ETX/ACK ETX and ACK codes control data transfer

4.3.4 List

The LIST function prints out all current selections for the PANEL, MENU 1, MENU 2, HARDWARE, and TOF/ADJ functions. There are no options to select. Selecting LIST from the main functions menu (as shown below) will produce printouts in two sizes (**Figure 4-10**). You may want to cut out the smaller version and tape it to your printer for reference.

FUNCTION	SAVE&END	PANEL	MENU1	MENU2	HARDWARE	<u>LIST</u>	DEFAULT	SELF-TST
	HEX-DUMP	V-ALNMT	TOF-ADJ					

[FF]		[LETTER]: LETTER QUALITY	[FONT1]: COUR 10, 10CPI		
[LF]		[DRAFT]: DRAFT	[FONT2]: PRSTG12, 12CPI		
		[MENU1]: SEE BELOW	[MENU2]: SEE BELOW		

NO	Item	MENU1	MENU2	NO	Item	HARDWARE
01	QUALITY	LETTER	LETTER	01	PPR-OUT	CNTONLY
02	FONT	COUR 10	COUR 10	02	PRNT-DIR	BI-DIR
03	CHR-WIDE	NORMAL	NORMAL	03	BUZZER	ON
04	CHR-HIGH	NORMAL	NORMAL	04	WORD-LG	8-BIT
05	CHAR-SPC	10CPI	10CPI	05	BUFFER	8KBYTE
06	LINE-SPC	6LPI	6LPI	06	FEEDER	NONE
07	EMULATE	DPL24C	DPL24C	07	DT-FRMAT	8NONE1
08	ATTRIB	NONE	NONE	08	BAUD-RT	9600BPS
09	PAGE-LG	11INCH	11INCH	09	PROTOCOL	XON/XOFF
10	COLOR	AUTOSEL	AUTOSEL	10	DSR	IGNORE
11	LEFT-END	1COLM	1COLM			
12	TOP-MRGN	1LINE	1LINE			
13	LANGUAGE	USA	USA			
14	CHAR-SET	SET2	SET2			
15	GRAPH-LF	IBM-GPH	IBM-GPH			
16	PERFRATN	NO-SKIP	NO-SKIP			
17	WIDTH	13.6INCH	13.6INCH			
18	ZEROFONT	NO-SLASH	NO-SLASH			
19	DC3-CODE	ENABLE	ENABLE			
20	CR-CODE	CR-ONLY	CR-ONLY			
21	LF-CODE	LF&CR	LF&CR			
22	RIGHTEND	WRAP	WRAP			

NO	Item	TDF-ADJ
01	ORIGIN	1/6INCH
02	FINE-ADJ	0

[FF]		[LETTER]: LETTER QUALITY	[FONT1]: COUR 10, 10CPI		
[LF]		[DRAFT]: DRAFT	[FONT2]: PRSTG12, 12CPI		
		[MENU1]: SEE BELOW	[MENU2]: SEE BELOW		

NO	Item	MENU1	MENU2	NO	Item	HARDWARE
01	QUALITY	LETTER	LETTER	01	PPR-OUT	CNTONLY
02	FONT	COUR 10	COUR 10	02	PRNT-DIR	BI-DIR
03	CHR-WIDE	NORMAL	NORMAL	03	BUZZER	ON
04	CHR-HIGH	NORMAL	NORMAL	04	WORD-LG	8-BIT
05	CHAR-SPC	10CPI	10CPI	05	BUFFER	8KBYTE
06	LINE-SPC	6LPI	6LPI	06	FEEDER	NONE
07	EMULATE	DPL24C	DPL24C	07	DT-FRMAT	8NONE1
08	ATTRIB	NONE	NONE	08	BAUD-RT	9600BPS
09	PAGE-LG	11INCH	11INCH	09	PROTOCOL	XON/XOFF
10	COLOR	AUTOSEL	AUTOSEL	10	DSR	IGNORE
11	LEFT-END	1COLM	1COLM			
12	TOP-MRGN	1LINE	1LINE			
13	LANGUAGE	USA	USA			
14	CHAR-SET	SET2	SET2			
15	GRAPH-LF	IBM-GPH	IBM-GPH			
16	PERFRATN	NO-SKIP	NO-SKIP			
17	WIDTH	13.6INCH	13.6INCH			
18	ZEROFONT	NO-SLASH	NO-SLASH			
19	DC3-CODE	ENABLE	ENABLE			
20	CR-CODE	CR-ONLY	CR-ONLY			
21	LF-CODE	LF&CR	LF&CR			
22	RIGHTEND	WRAP	WRAP			

NO	Item	TDF-ADJ
01	ORIGIN	1/6INCH
02	FINE-ADJ	0

Setup

Figure 4-10 Printout of current settings

4.3.5 Default

Selecting DEFAULT from the functions menu simultaneously resets Font 1 and Font 2 as well as Menu 1 and Menu 2 to their factory settings. You can confirm this by selecting LIST and printing them out. There are no options to select. To keep this change, remember to use the SAVE&END function.

4.3.6 Self-Tst

This is the self-test feature. It prints out a complete set of the available characters using the settings currently saved in Menu 1. There are no options to select. However, at the beginning of the self-test you will see a summary of actions you may take while the self-test is running, as in Figure 4-11.

```
*** SELF-TEST PRINTING ***  
  
  BUTTON      ACTION  
< ONLINE >  Exit to normal mode  
< F F >     Return to "FUNCTION" menu  
< L F >     Pause or resume printing  
< MODE >    Pause or resume printing
```

Figure 4-11 Self-test control menu

- Press the ONLINE button to return to the online condition. This will end the self-test and allow you to continue printing your document.
- Press the FF button to return to the functions menu.
- Press the LF button or the MODE button to pause printing during the self-test; press it again to resume printing the self-test.

You can also run this same self-test by holding down the FF button while turning on the printer. You will see a printout like the one shown in Figure 4-12.

You can also run the hex-dump directly by holding down both the FF and LF buttons while turning on the printer. You will see a printout like the one in **Figure 4-13**.

*** HEX-DUMP PRINTING ***

BUTTON		ACTION	
< ONLINE >		Exit to normal mode	
< F F >		Return to "FUNCTION" menu	
< L F >		Pause or resume printing	
< MODE >		Pause or resume printing	

0	1	2	3	4	5		D	E	F	0123456789ABCDEF
20	21	22	23	24	25	C	2D	2E	2F	!"#\$%&'()*+,-./
30	31	32	33	34	35	C	3D	3E	3F	0123456789;<=>?
40	41	42	43	44	45	C	4D	4E	4F	@ABCDEFGHIJKLMNO
50	51	52	53	54	55	C	5D	5E	5F	PQRSTUVWXYZ[\]^_
60	61	62	63	64	65	C	6D	6E	6F	`abcdefghijklmno
70	71	72	73	74	75	C	7D	7E	7F	pqrstuvwxyz{|}~.
80	81	82	83	84	85	C	8D	8E	8F	ÇüéàáâäçèéëìíîË
90	91	92	93	94	95	C	9D	9E	9F	ÈéÊëÖöÙùÿÜÜçÿŸŸ
A0	A1	A2	A3	A4	A5		AD	AE	AF	áíóúñÑªº¿~¡í«»
B0	B1	B2	B3	B4	B5		BD	BE	BF	⌠⌡⌢⌣⌤⌥⌦⌧⌨〈〉⌫⌬⌭⌮⌯⌰⌱⌲⌳⌴⌵⌶⌷⌸⌹⌺⌻⌼⌽⌾⌿ⓀⓁⓂⓎⓏⓐⓑⓓⓔⓕⓖⓗⓘⓙⓜⓝⓞⓟⓠⓡⓢⓣⓤⓥⓦⓧⓨⓩ⓪⓫⓬⓭⓮⓯⓰⓱⓲⓳⓴⓵⓶⓷⓸⓹⓺⓻⓼⓽⓾⓿ⓀⓁⓂⓎⓏⓐⓑⓓⓔⓕⓖⓗⓘⓙⓜⓝⓞⓟⓠⓡⓢⓣⓤⓥⓦⓧⓨⓩ⓪⓫⓬⓭⓮⓯⓰⓱⓲⓳⓴⓵⓶⓷⓸⓹⓺⓻⓼⓽⓾⓿
C0	C1	C2	C3	C4	C5		CD	CE	CF	
D0	D1	D2	D3	D4	D5		DD	DE	DF	
E0	E1	E2	E3	E4	E5		ED	EE	EF	
F0	F1	F2	F3	F4	F5		FD	FE	FF	
0D	0A									

Figure 4-13 Printout from hex-dump

4.3.8 V-Alnmnt

The V-ALNMNT (vertical alignment) function allows you to adjust the vertical alignment of bi-directionally printed characters. You will know the print is out of alignment if the lines appear thicker than normal or when the forward- and backward-printing lines are slightly offset. Here's how to make this adjustment:

1. Load wide paper into the printer because all available columns (80 or 136, depending on your model printer) are printed.
2. Select V-ALNMNT from the main functions menu. (You may also activate this function by pressing the ONLINE button while turning on the printer.)

3. Press the MODE button to move the cursor to V-ALNMNT. Press FF to select this function. You will see a printout like the one in **Figure 4-14**.

*** VERTICAL ALIGNMENT ADJUSTMENT ***

BUTTON	ACTION
< ONLINE >	Save and exit to normal mode
< F F >	Return to "FUNCTION" menu
< L F >	Shift backward print position to the right
< MODE >	Shift backward print position to the left

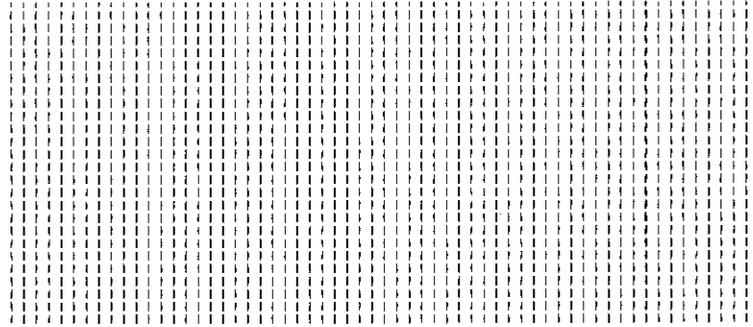


Figure 4-14 Printout from vertical alignment function

There are no options to select. However, at the beginning of the vertical alignment printout you will see a summary of actions you may take to adjust the vertical alignment. They are:

- Press the ONLINE button to save your adjustment and return to the online condition. This will end the vertical alignment function and allow you to continue printing your document.
- Press the FF button to return to the functions menu.
- Press the LF button to shift the backward section of print one line to the right. The "backward" section is printed when the printhead is moving right to left.
- Press the MODE button to shift the forward section of print one line to the left. The "forward" section is printed when the printhead is moving left to right.

4.3.9 TOF/ADJ

The TOF/ADJ (top of form adjustment) allows you to vary the point at which the paper stops when you use the auto-load feature. This will change the location of the first line of print on your paper. This feature is particularly helpful when you have an unusual format for your document. If you save a new top of form setting, each page of your document will start at the same place, so you don't have to use several line feeds to start each page. Remember to set it back when you're finished if you don't expect to use this setup again soon.

To adjust the top of form position, select TOF/ADJ from the functions menu.

Press the MODE button to move the cursor to TOF/ADJ. Select it with the FF button.

FUNCTION:SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					
ORIGIN	.1/6INCH		1INCH				

ORIGIN This item provides a rough setting of the top of form position (factory setting 1/6INCH).

FINE-ADJ:-7/60IN	-6/60IN	-5/60IN	-4/60IN	-3/60IN	-2/60IN	-1/60IN
0	+1/60IN	+2/60IN	+3/60IN	+4/60IN	+5/60IN	+6/60IN
	+7/60IN	+8/60IN				

FINE-ADJ This item allows you to fine-tune the top of form position with fraction-of-an-inch increments (factory setting 0).

4.3.10 Save&End

The SAVE&END function saves all printer settings so that they will not be lost when you turn off the printer. After saving, it exits setup and leaves the printer online and ready to print. There are no options to select. This function works when you select it from the functions menu.

Press the FF button once to select this function. (The cursor will already be at the word "SAVE&END.")

FUNCTION: SAVE&END	PANEL	MENU1	MENU2	HARDWARE	LIST	DEFAULT	SELF-TST
HEX-DUMP	V-ALNMNT	TOF-ADJ					

CAUTION

If you turn off the printer or exit setup before using SAVE&END, you will lose any settings you have just made.

The following chart provides a quick reference to the setup menus of your printer. Open the chart out while you use Section 4 to make your settings.

SECTION 5 USING COMMERCIAL SOFTWARE

5.1 INTRODUCTION

Now that you understand how to use your printer, let's turn our attention to something you will be doing every day: printing with commercial software.

This section explains:

- The different ways software programs communicate with the printer
- How to select the correct printer driver
- How to create a setup string
- How to use embedded printer commands
- How to use several different software programs

5.2 USING SOFTWARE PROGRAMS

Software programs communicate with the printer in different ways. Some programs are very sophisticated, and can use all the capabilities of your printer. Other programs only use a few commands to control the printer.

Some software programs, such as database and accounting programs, make few, if any, special demands of a printer. Many times this type of program can be used without regard to the kind of printer you are using.

The software programs you can use fall into one (or more) of the following categories. Some programs understand the inner workings of the printer and can automatically send the proper commands to the printer. This ability is usually built into a sub-program called a printer driver.

Some programs have the ability to send a command or group of commands to the printer each time they start printing. This group of commands is called a setup string.

Some programs let you put your own printer commands wherever you want them in the file. These commands in the file are called embedded commands.

These three ways of sending commands to the printer are not mutually exclusive. Programs that use a printer driver don't usually need setup strings or embedded commands, and many times programs that don't use printer drivers have the capability to use both setup strings and embedded commands.

5.2.1 Printer Drivers

Programs that understand the inner workings of the printer can automatically send the proper commands to the printer. This ability is usually built into a sub-program called a printer driver.

There are two ways to recognize programs that use printer drivers. When you install or first use these programs, they usually prompt you for what kind of printer you have. Many times this is done with an installation or setup program, although sometimes a menu of printer choices is built into the main program.

The other way to recognize them is by the type of printing options they have. If the program has results-oriented options, instead of printer-oriented options, it probably uses a printer driver. For example a program that has a prompt like "Enter the sheet feeder bin number" probably uses a printer driver, while a program that prompts "Enter the printer codes for the first sheet feeder bin" probably does not use a printer driver.

If your software uses printer drivers, you won't have to learn about the commands that make your printer work. The software does it all for you.

The printer has several different command sets, called emulations. You need to select an emulation on your printer, then select the matching printer driver with your software. The emulations and the printers that they emulate are listed below.

Printer	Emulation
IBM Proprinter XL	IBM-PRO
Fujitsu DL2400 or DPL24I	DPL24I
IBM Graphics Printer	IBM-GPH
Fujitsu DPL24D	DPL24D
Epson FX-80/100	FX-80
Diablo 630 API	DIABLO
Epson JX-80	JX-80*
Fujitsu DL2400 Color or DPL24C	DPL24C*

* Available with the color option.

Some programs that use printer drivers are listed below. For programs marked with an asterisk, special drivers are available from your dealer.

AutoCad*
 Display Write 4*
 FrameWork
 GEM
 Lotus 1-2-3 (graphics only)*
 Microsoft Word
 Microsoft Works
 MultiMate Advantage
 PFS:First Publisher
 Q&A
 Q&A Write
 SuperCalc (graphics only)
 Symphony*
 Ventura Publisher
 Windows*
 WordPerfect
 WordPerfect Executive
 WordStar 2000+
 WordStar Professional
 XyWrite

5.2.2 Setup Strings

A setup string is a command or group of commands that you define. Your software program sends the commands to the printer each time it starts to print.

Typically the setup string will contain a reset command to restore the printer's state to its default condition. It may also contain commands to set the orientation, margins and line spacing, and to select a font. Refer to Section 7 to help you decide which commands to include in your setup string.

Some programs that use setup strings include:

- Dac-Easy Accounting
- Lotus 1-2-3
- SuperCalc
- VP Planner
- WordStar 3.3
- WordPerfect Executive

5.2.3 Embedded Commands

Software programs that don't understand all the commands of modern printers usually provide a way to put your own printer commands directly into a file. Placing printer commands directly into the file is called embedding the commands.

The ability to use embedded commands gives you great power; you can literally use all the capabilities of your printer. But you must also use caution when embedding commands. It's easy to get the printer and your software program "out of synch."

For example, if you embed a command to advance to a new page half way down a page of text, the printer will advance to a new page while your program thinks it's still on the previous page. The results may not be what you expected.

The effects can also be more subtle. If you are printing justified text, and you embed a command to change the width of the characters (perhaps by changing the point size) in the middle of a block of text, the lines after the command won't align at the right margin with the lines before the command.

Embedded commands are useful for things like making one line of a spreadsheet bold, but are not recommended for special effects in a word processing program.

Some programs that allow you to embed commands are:

- Lotus 1-2-3
- SuperCalc
- WordStar 3.3
- VP Planner
- Microsoft Word
- Sidekick

5.2.4 Limited Support Programs

There are a few programs that don't let you do much at all with the printer. They don't have built-in printer control capabilities, and they don't allow you to embed commands. If you have to use this type of program, you can still use the capabilities of your printer through the Menu 1, Menu 2, Font 1, and Font 2 features. These features allow you to set up four different printing styles for programs that don't help you control your printer.

5.3 APPLICATION TIPS

This section provides some guidance with specific software programs. Contact your printer dealer for a complete list of software application packages compatible with your printer.

The following provides a key to the information in this section:

- | | |
|--------------------|---|
| Printer support: | This tells whether the program uses printer drivers, setup strings, embedded commands, or a combination of the three. |
| Printer selection: | This tells where to select the correct printer driver or printer type. |
| Helpful tips: | This gives hints on using the particular program. |

Lotus 1-2-3

Printer support: Printer drivers, setup strings and embedded commands. There is a special printer driver available from your printer dealer for this program.

Printer selection: Use the INSTALL program. Select both a text and graphics printer.

Helpful tips: You can use the /Print Printer Options menu to change the report format.

You can use setup strings with the /Print Printer Options Setup command.

To print in compressed print (with all emulations except DPL24D and DIABLO) use this setup string:

\015

You can embed commands into the first cell in a row. If there are no other entries in that row, 1-2-3 will execute the command but won't print the row. Precede the command with two vertical rule characters (||). To underline one row in a spreadsheet (with all emulations except DPL24D and DIABLO), enter this in the row above it:

||\027-1

and enter in the row below it:

||\027-0

For the DPL24D and DIABLO emulations, enter this in the row above:

||\027E

and enter in the row below it:

||\027R

Microsoft Word

- Printer support: Printer drivers. Match the printer driver to the emulation you are using. There is a special printer driver available from your printer dealer for this program.
- Printer selection: Use the SETUP program or the Print Options menu.
- Helpful tips: Use the Format Character menu to set font characteristics.
Use the Format Division menus to set page format.
Use the Format Paragraph menu to set paragraph style.

MultiMate Advantage

- Printer support: Printer drivers, called Printer Action Tables or PAT files. Match the PAT to the emulation you are using.
- Printer selection: From the Print Parameters for Document screen.
- Helpful tips: MultiMate has additional printer action tables and information on the fonts supported.

Symphony

- Printer support: Printer drivers, setup strings, and embedded commands (worksheet only). There is a special printer driver available from your printer dealer for this program.
- Printer selection: Use the INSTALL program. Select both a text and graphics printer.

Symphony -- continued

Helpful tips: In a worksheet, you can embed commands into the first cell in a row. If there are no other entries in that row, Symphony will execute the command but won't print the row. Precede the command with two vertical rule characters (||). To underline one row in a spreadsheet (with all emulations except DPL24D and DIABLO), enter this in the row above it:

```
||\027-1
```

and enter in the row below it:

```
||\027-0
```

For the DPL24D and DIABLO emulations, enter this in the row above:

```
||\027E
```

and enter in the row below it:

```
||\027R
```

WordPerfect

Printer support: Printer drivers. Match the printer driver to the emulation you are using.

Printer selection: Use the Printer Control Menu (press Ctrl-F8).

Helpful tips: Print the FONT.TST and PRINTER.TST documents to see what fonts the printer driver you selected supports.

SECTION 6 PRINTER MAINTENANCE

Although your printer needs very little care, preventive maintenance is important to keep your printer in good working order. This section describes cleaning, lubrication, and changing ribbons, as well as how to safely repack your printer for transport or storage. A troubleshooting section containing solutions to common problems is also provided.

6.1 CLEANING AND LUBRICATION

Dirt and dust are common troublemakers for your printer. The top cover helps prevent dirt and dust from getting inside the printer; however, an occasional cleaning to remove paper particles is recommended. It's also a good idea to clean your printer before shipping and storage.

WARNING

Turn the printer off and disconnect the power cord from the electrical outlet before performing any printer maintenance.

To clean the inside of the printer:

1. Open the top and front covers.
2. Use a soft brush to remove dust and paper particles from the print head area (**Figure 6-1**). You can also use a small vacuum cleaner with a brush attachment, but be careful around the cables and wires and use a light touch.

With the power off, you can move the print head left or right to clean the entire area. However, be sure the power is off before moving the print head.

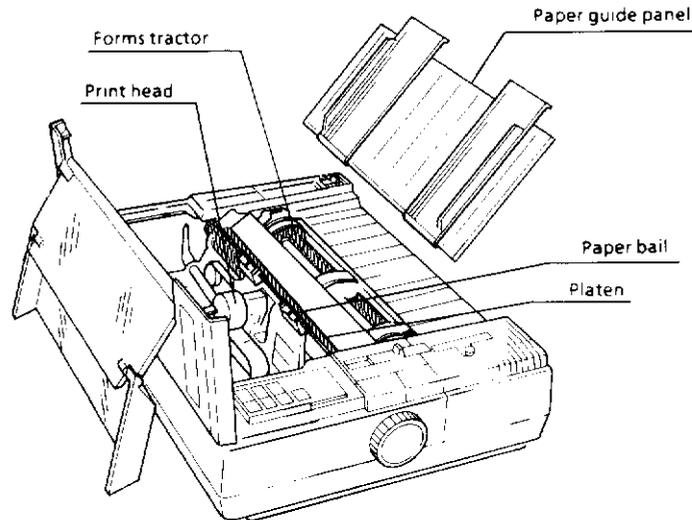


Figure 6-1 Cleaning inside the printer

3. Use a platen cleaner to remove any ink from the platen and paper bail rollers. Apply a small amount of platen cleaner to a clean, dry cloth. Place the cloth against the platen (or paper bail rollers) and rotate the platen knob. Then dry the platen (or rollers) using a different dry cloth.

CAUTION

Do not use alcohol to clean rubber parts such as the platen and paper bail rollers. Alcohol may harden the rubber.

4. Remove the paper guide and clean around the forms tractor area.
5. Replace the paper guide panel and top cover.

Printer lubrication is generally not required and is best performed by a service technician.

To clean the outside of the printer:

1. Use a soft brush to remove loose dirt and dust.
2. Clean the outer surfaces of the printer with a soft cloth dampened with a mild detergent. Be careful not to drip any inside the printer.

Be sure the printer is completely dry before reconnecting the power cord and turning the printer on.

6.2 CHANGING THE RIBBON CASSETTE

The inked ribbon in the cassette is a continuous loop and will last a long time before needing replacement. When printed characters begin to appear faint, it can be a sign to replace the ribbon cassette.

Before replacing the ribbon cassette, try moving the paper thickness lever to produce a darker print. Section 2 shows you how to make this adjustment. If this doesn't help, then you should replace the ribbon cassette.

Whenever possible, it is best to turn the printer off and disconnect the power cord first. However, you can change the ribbon cassette with the printer on if you are printing a document and you don't want to lose any information.

CAUTION

Never move the print head when the power is on. This may damage the printer. If you have been printing, be careful not to touch the print head which becomes hot during use.

To replace the ribbon cassette:

1. Open the top and front covers.
2. Release the ribbon cassette by pulling one of the ribbon release levers towards the front of the printer (**Figure 6-2**). Remove the old cassette.

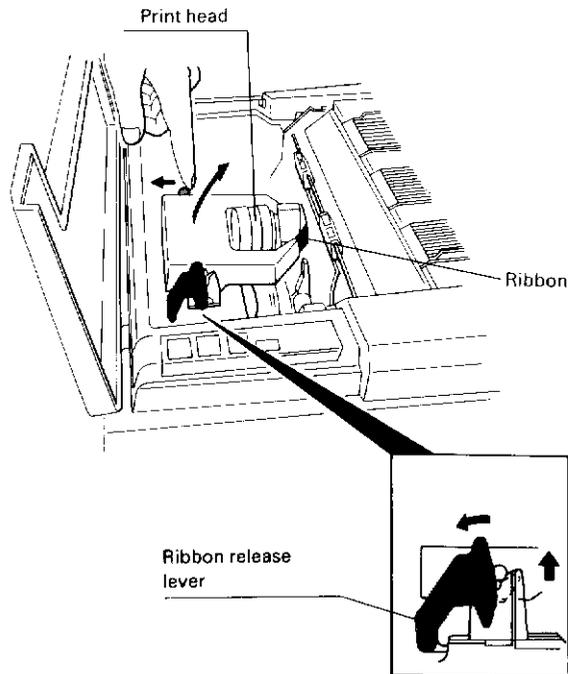


Figure 6-2 Removing the old ribbon cassette

3. Place the new ribbon cassette over the print head. Insert the pins on both sides of the cassette into the slots between the plastic release levers and the metal ribbon carrier (**Figure 6-3**).

Make sure that the exposed ribbon is between the print head and the plastic card guide, and is not folded or creased.

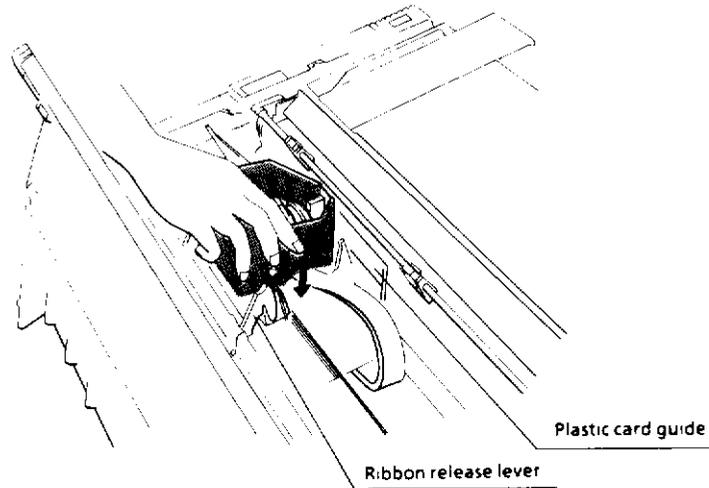


Figure 6-3 Installing the new ribbon cassette

4. Press down lightly on the ribbon cassette until it clicks into place.
5. Rotate the ribbon advance knob clockwise once or twice to adjust any slack in the ribbon. *If the printer is off*, slide the print head left and right to be sure the ribbon is feeding correctly.
6. Close the top and front covers.

6.3 REPACKING YOUR PRINTER

Since you may need to store or transport your printer, it's important to retain the original carton and packing material to ensure that the printer is properly protected.

Refer to Section 1, Figures 1-1, 1-2 and 1-3, while following these steps to repack your printer:

1. Turn the printer and your computer off. Remove any paper from the printer.
2. Remove the interface cable, power cord, ribbon cassette and paper guide. Place these items in their original packing material.
3. Clean the printer, if necessary.
4. Move the print head to the center and install the cardboard shipping restraint to prevent the print head from moving.
5. Secure the support material and close the top cover. Tape the cover to hold it in place.
6. Place the printer in its plastic bag and secure the styrene cushions on each end of the printer. Slide the printer into the original carton.
7. Place the other printer parts in the carton, close the flaps and secure the plastic handles. Tape the carton if necessary.

6.4 TROUBLESHOOTING

Printer difficulties can present themselves in many different forms ranging from running out of paper, to needing a new ribbon, to having an inoperable printer.

The troubleshooting information in this section describes common problems and suggested solutions. In addition, **Table 6-1** lists sections of this manual you can refer to for help in troubleshooting. If you have tried all of these suggestions and you still need help, contact the authorized dealer or distributor where you purchased your printer.

Table 6-1 Subject Reference for Additional Help

Subject	Reference
Assembly and setup	Section 1
Cables and connectors	Section 1
Character sets	Appendix G
Color printing	Appendix C
Command sets	Section 7
Components	Section 1, Appendix D
Control panel operation	Sections 3 & 4
Control panel setup	Sections 3 & 4
Emulations	Sections 5 & 7
Fonts	Appendix F
Font cards	Appendix E
Glossary of terms	Appendix J
Interfaces	Section 1, Appendix B
Maintenance	Section 6
Paper specifications	Appendix I
Paper types and loading	Section 2
Printer specifications	Appendix A
Ribbon installation	Sections 2 & 6
Software	Section 5

6.4.1 Printer Power

Problem	Solution
There is no power to the printer when the power switch is turned on.	<p>Check the power cord for a secure connection at both ends, the source of power going to the electrical outlet, and the power requirements of your printer.</p> <p>Turn the power switch off and then on again. If this doesn't work after several attempts, contact your dealer or distributor where you purchased the printer.</p>
The power is on but the printer does not print anything.	<p>If the ON LINE indicator is not lit, press the ON LINE button.</p> <p>If the PAPER OUT indicator is lit, load paper.</p> <p>Verify that the interface cable is properly connected to both the computer and printer.</p>
Printing stops and the PAPER OUT indicator is lit.	Load more paper.

6.4.2 Printing Results

Problem	Solution
Printing is too light or too dark.	<p>Adjust the paper thickness lever to lighten or darken the print. If the ribbon is old and worn, it may need to be replaced.</p> <p>Verify that the ribbon is properly installed and is feeding correctly.</p>

- Print quality is poor or smudged.

 - Adjust the paper thickness lever to see if it improves print quality. If the ribbon is old and worn, it may need to be replaced.
 - Verify that the ribbon is properly installed and is feeding correctly.
 - Clean the print head with a soft brush. If the print head needs replacing, contact the authorized dealer or distributor where you purchased your printer.
- Printing is erratic or the wrong characters are printing.

 - Have you selected the right setup options for your software application? Refer to Sections 3 and 4 for printer setup options and Section 5 for software configuration.
 - Check the interface connections for a loose connection or possibly a damaged cable or connector. With a serial interface, verify that the printer's configuration matches the computer's for serial communications protocol. Refer to Appendix B and your computer's manual for specifications and requirements.
- Lines are double-spaced when you want single-spaced.

 - Change the Setup mode CR-CODE option to CR-ONLY. (See Section 4.)
- Lines are printing on top of each other.

 - Change the Setup mode CR-CODE option to CR&LF. (See Section 4.)
- Graphics pattern is garbled.

 - Have you selected the right emulation on your printer and in your application software? For example, if you are using the IBM GPH emulation on the printer, you should select IBM Graphics printer with your software.
 - If you are programming your printer, make sure you are using the graphics commands correctly. For example, sending too much data to the printer in a graphics command will cause the printer to print the extra data as characters.

6.4.3 Paper Handling

Problem	Solution
The paper jams while loading.	<p data-bbox="639 342 1158 427">Are the paper guide panel and paper select lever set in their correct positions? Is the left paper bail roller set in the left paper bail groove?</p> <p data-bbox="639 461 1174 577">Adjust the paper thickness lever if you are using heavier-weight paper or multi-part forms. Manually feed multi-part forms; do not use automatic sheet load.</p>
The paper jams while printing.	<p data-bbox="639 607 1166 719">To remove the jammed paper, first turn the printer off. Then, gently pull the paper out as you turn the paper feed knob. Reload paper after checking these items:</p> <p data-bbox="639 752 1166 837">With continuous forms, check the paper going into the printer for proper alignment. Remove anything that might interfere with the paper path.</p> <p data-bbox="639 871 1166 987">Check to be sure the paper guide panel and paper select lever are set in their correct positions. If necessary, adjust the paper thickness lever for thicker paper or multi-part forms.</p>
While printing, the pin-holes in continuous paper run off the tractor pins.	<p data-bbox="639 1016 1147 1102">Make sure the paper path is straight and not skewed or off center. Check for interfering cords and cables.</p> <p data-bbox="639 1135 1147 1247">Verify that the paper holders on the tractors are closed and that the tractors do not have any bits of paper stuck in them. Verify that the tractor's locking levers are locked.</p> <p data-bbox="639 1281 1118 1364">Are the tractors set for the correct width? The paper should be taut but not tearing the side perforations.</p>

SECTION 7 COMMAND SETS

7.1 INTRODUCTION

This section offers a brief summary of the command sets available in your printer. It covers the following:

- Printer emulations
- Command format
- Command sets

7.2 SELECTING AN EMULATION

There are eight different printer emulations from which you can choose. It's important to select the correct emulation so that you can use the many features of your printer.

In general, you should select the emulation based on the capabilities of the software you will be using with the printer. Check the list of printers that your software supports. Refer to the following table to select the appropriate emulation supported by your software.

If you are using a wide variety of software, you may want to use the FX-80 emulation (or JX-80 if you have the color option). These Epson printers are supported by almost all software programs.

The following list shows the various printers that your printer emulates. The emulations with the most capabilities are listed first.

Printer Emulated	Emulation
Fujitsu DPL24C Fujitsu DotMax 24C Fujitsu DL2400 (color) Fujitsu DL2600 (color)	DPL24C
Fujitsu DPL24 Type I Fujitsu DotMax 24I Fujitsu DL2400 Type C/D Fujitsu DL2600 Type C/D	DPL24I
IBM Graphics Printer	IBM-GPH
Epson JX-80 (color)	JX-80
Epson FX-80/100	FX-80
IBM Proprinter XL	IBM-PRO
Fujitsu DPL24 Type D Fujitsu DotMax 24D Fujitsu DL2400 Type C/D Fujitsu DL2600 Type C/D	DPL24D
Diablo 630 API Diablo 1640	DIABLO

The DPL24C emulation adds the color commands to the DPL24I emulation, as the JX-80 does to the FX-80. The color emulations are only available if you have the color option.

The main difference between the IBM-GPH and the FX-80 and JX-80 emulations is the character set. The IBM-GPH emulation has the IBM Graphics characters. They also vary in some of the line spacing commands.

The DPL24D and DIABLO emulations are identical.

7.3 UNDERSTANDING THE COMMANDS

Your printer has three different command sets. These three command sets have slight variations depending on the emulation you select.

In the following command set tables, the commands are shown like this:

Function	Command	Note
Set horizontal tabs The values of <i>n1</i> , <i>n2</i> , etc. in this command are the ASCII values of the print columns (at the current character width) where you wish to set tabs. (1< <i>n</i> <255)	ESC D <i>n1 n2 ...</i> <NUL>	

- The first column gives a brief description of the command. If there is a variable (such as "*n*") in the command it is explained. The minimum and maximum values for the variables are shown as (1<*n*<255). This indicates that the variable *n* can range from 1 to 255.
- The second column shows the command syntax. The ESC indicates the ESC or Escape code, ASCII 27. All other ASCII codes are enclosed in angle brackets, like <NUL>. You can find the numeric ASCII values for these codes in Appendix E. Variable values in a command are represented in *italics*, like *n1*. You must substitute a value for these variables when you use the command. The ellipsis ("...") indicates that the variable can be repeated to enter more values.

Other letters and numbers in the commands, such as the capital D above, must be included exactly as shown.

- The third column indicates whether additional information is included as a note. The notes appear at the end of each command set.

NOTE

Spaces are shown here for readability only. Spaces are never used in the commands themselves.

7.3.1 Command Set 1

Command set one provides emulation of the **Fujitsu DPL24I, DPL24C, IBM Graphics, FX-80, and JX-80** printers. The differences between these emulations are explained in notes following the table.

Function	Command	Note
Character style commands		
One-line double width characters on	<SO> or ESC <SO>	
One-line double width characters off	<DC4>	
Double width characters (on: $n = 1$, off: $n = 0$)	ESC W n	1
Double height characters (on: $n = 1$, off: $n = 0$)	ESC V n	1
This command does not adjust the line spacing.		
Condensed characters on	<SI> or ESC <SI>	
Condensed characters off	<DC2>	
Underline (on: $n = 1$, off: $n = 0$)	ESC - n	1
Shadow (emphasized) printing on	ESC E	
Shadow (emphasized) printing off	ESC F	
Bold printing on	ESC G	
Bold printing off	ESC H	
Italic printing on	ESC 4	
Italic printing off	ESC 5	
Superscript printing on ($n = 0$) or subscript printing on ($n = 1$)	ESC S n	1
Superscript and subscript printing off	ESC T	
Proportionally spaced characters (on: $n = 1$, off: $n = 0$)	ESC p n	1
Select printing style	ESC ! n	2
This command allows you to combine various printing styles. The value of n is the sum of the values of the styles you want to combine.		
1 Elite pitch		
4 Condensed		
8 Shadow		
16 Bold		
32 Double width		
64 Proportional		

Function	Command	Note
Select internal font <i>n</i> 0 Courier 10 1 Prestige Elite 2 Draft 3 Compressed 4 Boldface PS This command does not change the character spacing. Use a horizontal spacing command to set the correct character spacing.	ESC% <NUL> <i>n</i>	
Select font card font <i>n</i> (0< <i>n</i> <7)	ESC% <STX> <i>n</i>	
Horizontal motion commands		
Space	<SP>	
Backspace	<BS>	
Carriage return	<CR>	
Horizontal spacing commands		
Pica pitch (10 cpi)	ESC P	
Elite pitch (12 cpi)	ESC M	
Set horizontal character spacing to (<i>n</i> -1)/120 inch (1< <i>n</i> <127)	ESC <US> <i>n</i>	
Set horizontal character spacing to <i>n</i> /180 inch (0< <i>n</i> <255)	ESC h <i>n</i>	
Set inter-character space to <i>n</i> /120 Canceled by <CR> and ESC X (0< <i>n</i> <63)	ESC <DC1> <i>n</i>	
Vertical motion commands		
Line feed	<LF>	
Reverse line feed	ESC <LF>	
Form feed	<FF>	
Advance paper <i>n</i> /180 inch (0< <i>n</i> <255)	ESC J <i>n</i>	3
Reverse paper <i>n</i> /180 inch (0< <i>n</i> <255)	ESC j <i>n</i>	3
Vertical spacing commands		
Set line spacing to 8 lines per inch	ESC 0	
Set line spacing to 7/60 inch	ESC 1	4
Set line spacing to <i>n</i> /180 inch (0< <i>n</i> <255)	ESC 3 <i>n</i>	3
Preset line spacing to <i>n</i> /60 inch (0< <i>n</i> <127)	ESC A <i>n</i>	5,6
Set line spacing to the value set with the Preset line spacing command (ESC A <i>n</i>)	ESC 2	7

Function	Command	Note
Horizontal tabs		
Set horizontal tabs The values of $n1$, $n2$, etc. in this command are the ASCII values of the print columns (at the current character width) where you wish to set tabs. ($1 < n < 255$)	ESC D $n1\ n2...<NUL>$	
Clear all horizontal tabs	ESC D <NUL>	
Horizontal tab	<HT>	
Move to print column n ($1 < n < 255$)	ESC <HT> n	
Move to dot column $n1 * 256 + n2$ ($0 < n1 < 255$)($0 < n2 < 19$)	ESC \$ $n1\ n2$	
Vertical tabs		
Set vertical tabs The values of $n1$, $n2$, etc. in this command are the ASCII values of the lines (at the current line spacing) where you wish to set tabs. ($0 < n < 254$)	ESC B $n1\ n2...<NUL>$	
Clear all vertical tabs	ESC B <NUL>	
Vertical tab	<VT>	
Move to line n ($1 < n < 255$)	ESC <VT> n	
Page formatting commands		
Set left margin ($0 < n < 255$)	ESC $\perp n$	8
Set right margin ($1 < n < 255$)	ESC Q n	
Set perforation skip to n lines ($0 < n < 127$)	ESC N n	
Perforation skip off	ESC O	9
Set page length to n lines ($0 < n < 127$)	ESC C n or ESC <FF> n	
Set page length to n inches ($0 < n < 22$)	ESC C <NUL> n or ESC <FF> <NUL> n	
Character set commands		
Select character set 1 Appendix E lists the character sets.	ESC 7	
Select character set 2 Appendix E lists the character sets.	ESC 6	

Function	Command	Note
Select international character set <i>n</i> The character sets are: 0 USA 1 France 2 Germany 3 United Kingdom 4 Denmark/Norway 5 Sweden/Finland 6 Italy 7 Spain	ESC R <i>n</i>	
Input control commands		
Clear input buffer	<CAN>	
Deselect printer (ignore input)	<DC3>	
Select printer	<DC1>	
Force most significant bit to 1	ESC >	
Force most significant bit to 0	ESC =	
Cancel control over most significant bit	ESC #	
Miscellaneous commands		
Select printing color <i>n</i> The available printing colors are: 0 Black 1 Magenta (red) 2 Cyan (blue) 3 Violet 4 Yellow 5 Orange 6 Green	ESC r <i>n</i>	10
Sound the bell	<BEL>	
Enable the paper out detector	ESC 9	
Ignore the paper out detector	ESC 8	
Typewriter mode (on: <i>n</i> = 1, off: <i>n</i> = 0)	ESC i <i>n</i>	1
Move printhead to home position	ESC <	
Unidirectional printing (on: <i>n</i> = 1, off: <i>n</i> = 0)	ESC U <i>n</i>	1
Reset printer	ESC @ or ESC <CR> P or ESC <SUB> I	11
Word processing commands		
Line justification on	ESC m	
Line justification off	ESC x	

Function	Command	Note
Download character commands Select font <i>m</i> with source and style set by <i>n</i> Copy built-in font to download area Create download font	ESC % <i>n m</i> ESC : <NUL> <i>n m</i> ESC & ...	12
Bit image graphics commands Single density graphics Double density graphics High speed double density graphics Quad density graphics Graphics type <i>n</i> graphics	ESC K <i>n1 n2 data</i> ESC L <i>n1 n2 data</i> ESC Y <i>n1 n2 data</i> ESC Z <i>n1 n2 data</i> ESC * <i>n n1 n2 data</i>	13
Cut sheet feeder commands Feed a sheet from bin 1 Feed a sheet from bin 2 Eject a page from the printer Select bin 1 for following pages Select bin 2 for following pages Eject sheet at end of current page Change bins at next page	ESC 1 ESC 2 ESC R //1// //2// //R// //C//	14

Notes:

- The value of *n* in this command can be represented by the ASCII characters "1" (ASCII 31 Hex) or "0" (ASCII 30 Hex), or by ASCII 01 Hex or ASCII 00 Hex.
- In the FX-80 and JX-80 command sets, the values are:
 - 0 Pica pitch
 - 1 Elite pitch
 - 2 Proportional
 - 4 Condensed
 - 8 Shadow
 - 16 Bold
 - 32 Double width
 - 64 Italic
 - 128 Underline
- In the IBM-GPH emulation, this command moves $n/216$ inch.

4. In the IBM-GPH emulation, this command sets the line spacing to 7/72 inch.
 5. In the IBM-GPH emulation, this command sets the line spacing to $n/72$ inch.
 6. For the FX-80 and JX-80, this command sets the line spacing to $n/60$ inch.
 7. For the FX-80 and JX-80, this command sets the line spacing to 6 lines per inch.
 8. This command uses the lowercase letter `l`, not the number 1.
 9. This command uses the capital letter `O`, not the number 0.
 10. This command only works with the color printing option.
 11. This command uses the capital letter `I`, not the number 1.
 12. Creating download fonts is beyond the scope of this user's manual. See the printer's programmer's manual for this information.
 13. Creating bit image graphics is beyond the scope of this user's manual. See the printer's programmer's manual for this information.
 14. These commands only work if you have an optional cut-sheet feeder installed.
-

7.3.2 Command Set 2

Command set two provides emulation of the **IBM Proprinter XL**. See the notes following the table for additional information.

Function	Command	Note
Character style commands		
One-line double width characters on	<SO> or ESC <SO>	
One-line double width characters off	<DC4>	
Double width characters (on: $n = 1$, off: $n = 0$)	ESC W n	1
Double height/double width characters $m3$ controls character height and line spacing.	ESC [@ <EOT> <NUL> <NUL> <NUL> $m3 m4$	
Height Spacing		
0 Unchanged	Unchanged	
1 Normal	Unchanged	
2 Double	Unchanged	
16 Unchanged	Single	
17 Normal	Single	
18 Double	Single	
32 Unchanged	Double	
33 Normal	Double	
34 Double	Double	
$m4$ controls character width.		
Width		
0 Unchanged		
1 Normal		
2 Double		
Elite characters on	ESC :	
Condensed characters on	<SI> or ESC <SI>	
Condensed and Elite characters off	<DC2>	
Underline (on: $n = 1$, off: $n = 0$)	ESC - n	1
Overline (on: $n = 1$, off: $n = 0$)	ESC _ n	1
Shadow (emphasized) printing on	ESC E	
Shadow (emphasized) printing off	ESC F	
Bold printing on	ESC G	
Bold printing off	ESC H	
Italic printing on	ESC 4	
Italic printing off	ESC 5	
Superscript printing on ($n = 0$) or subscript printing on ($n = 1$)	ESC S n	1

Function	Command	Note
Superscript and subscript printing off Proportionally spaced characters (on: $n = 1$, off: $n = 0$)	ESC T ESC P n	1
Horizontal motion commands		
Space	<SP>	
Backspace	<BS>	
Carriage return	<CR>	
Vertical motion commands		
Line feed	<LF>	
Form feed	<FF>	
Advance paper $n/216$ inch ($0 < n < 255$)	ESC J n	
Vertical spacing commands		
Set line spacing to 8 lines per inch	ESC 0	
Set line spacing to $7/72$ inch	ESC 1	
Set line spacing to $n/216$ inch ($0 < n < 255$)	ESC 3 n	
Preset line spacing to $n/72$ inch ($0 < n < 127$)	ESC A n	
Set line spacing to the value set with the Preset line spacing command (ESC A n)	ESC 2	
Horizontal tabs		
Set horizontal tabs The values of $n1$, $n2$, etc. in this command are the ASCII values of the print columns (at the current character width) where you wish to set tabs. ($1 < n < 255$)	ESC D $n1 n2...<NUL>$	
Clear all horizontal tabs	ESC D <NUL>	
Set horizontal tabs every 8 columns	ESC R	
Horizontal tab	<HT>	
Vertical tabs		
Set vertical tabs The values of $n1$, $n2$, etc. in this command are the ASCII values of the lines (at the current line spacing) where you wish to set tabs. ($1 < n < 255$)	ESC B $n1 n2...<NUL>$	
Clear all vertical tabs	ESC B <NUL>	
Vertical tab	<VT>	

Function	Command	Note
Page formatting commands		
Set left margin at column n and right margin at column m ($1 < n < m < 255$)	ESC X $n m$	
Set perforation skip to n lines ($0 < n < 127$)	ESC N n	
Perforation skip off	ESC O	2
Set page length to n lines ($1 < n < 127$)	ESC C n or ESC <FF> n	
Set page length to n inches ($1 < n < 22$)	ESC C <NUL> n	
Character set commands		
Select character set 1 Appendix E lists the character sets.	ESC 7	
Select character set 2 Appendix E lists the character sets.	ESC 6	
Print $n + m * 256$ characters following this command from the all character set shown in Appendix E	ESC \ $n m$	
Print the next character from the all character set shown in Appendix E	ESC ^	
Input control commands		
Clear input buffer	<CAN>	
Deselect printer (ignore input)	ESC Q <SYN>	
Select printer	<DC1>	
Miscellaneous commands		
Sound the bell	<BEL>	
Unidirectional printing (on: $n = 1$, off: $n = 0$)	ESC U n	1
Add a carriage return to all line feeds (on: $n = 1$, off: $n = 0$)	ESC 5 n	1
Download character commands		
Select download font n	ESC I n	3 4
0 Built-in normal		
2 Built-in bold		
4 Download normal		
6 Download bold		
Create download font	ESC = ...	

Function	Command	Note
Bit image graphics commands		5
Single density graphics	ESC K <i>n1 n2 data</i>	
Double density graphics	ESC L <i>n1 n2 data</i>	
High speed double density graphics	ESC Y <i>n1 n2 data</i>	
Quad density graphics	ESC Z <i>n1 n2 data</i>	
Cut sheet feeder commands		6
Feed a sheet from bin 1	ESC 1	
Feed a sheet from bin 2	ESC 2	
Eject a page from the printer	ESC R	
Select bin 1 for following pages	//1//	
Select bin 2 for following pages	//2//	
Eject sheet at end of current page	//R//	
Change bins at next page	//C//	

Notes:

1. The value of *n* in this command can be represented by the ASCII characters "1" (ASCII 31 Hex) or "0" (ASCII 30 Hex), or by ASCII 01 Hex or ASCII 00 Hex.
2. This command uses the capital letter O, not the number 0.
3. Creating download fonts is beyond the scope of this user's manual. See the printer's programmer's manual for this information.
4. This command uses the capital letter I, not the number 1.
5. Creating bit image graphics is beyond the scope of this user's manual. See the printer's programmer's manual for this information.
6. These commands only work if you have an optional cut-sheet feeder installed.

7.3.3 Command Set 3

Command set three provides emulation of the **Fujitsu DPL24D** and **Diablo 630** printers. The differences between these emulations are explained in notes following the table.

Function	Command	Note
Character style commands		
Double width characters (on: $n = 1$, off: $n = 0$)	ESC w n	1
Underline on	ESC E	
Underline off	ESC R or ESC X	
Shadow (emphasized) printing on	ESC W	
Bold printing on	ESC O	2
Shadow (emphasized) and bold printing off	ESC & or ESC X or CR	
Proportionally spaced characters on	ESC P	
Proportionally spaced characters off	ESC Q	
Select font n	ESC # n	
0 Courier 10		
1 Prestige Elite		
4 Draft		
5 Compression		
This command does not change the character spacing. Use a horizontal spacing command to set the correct character spacing.		
Horizontal motion commands		
Space	<SP>	
Backspace	<BS>	
Backspace 1/120 inch	ESC <BS>	
Carriage return	<CR>	
Horizontal spacing commands		
Set horizontal character spacing to $(n-1)/120$ inch ($1 < n < 126$)	ESC <US> n	
Set horizontal character spacing to $n/180$ inch ($0 < n < 255$)	ESC b n	
Set inter-character space to $n/120$ Canceled by <CR> and ESC X ($1 \leq n \leq 126$)	ESC <DC1> n	

Function	Command	Note
Vertical motion commands		
Line feed	<LF>	
Reverse line feed	ESC <LF>	
Form feed	<FF>	
Advance paper $n/180$ inch ($0 < n < 255$)	ESC J n	
Reverse paper $n/180$ inch ($0 < n < 255$)	ESC j n	
Half line feed	ESC U	
Reverse half line feed	ESC D	
Line feed for graphics	ESC v	
Vertical spacing commands		
Set line spacing to $(n-1)/48$ inch ($1 < n < 126$)	ESC <RS> n	
Set line spacing to $n/180$ inch ($0 < n < 255$)	ESC a n	
Horizontal tabs		
Set tab at current column	ESC 1	
Clear tab at current column	ESC 8	
Clear all horizontal (and vertical) tabs	ESC 2	
Horizontal tab	<HT>	
Move to print column n ($1 < n < 255$)	ESC <HT> n	
Move to dot column $n1 * 256 + n2$ ($0 < n1 < 255$) ($0 < n2 < 19$)	ESC \$ $n1 n2$	
Vertical tabs		
Set vertical tab at current line	ESC -	
Clear all vertical (and horizontal) tabs	ESC 2	
Vertical tab	<VT>	
Move to line n ($1 < n < 255$)	ESC <VT> n	
Page formatting commands		
Set left margin at current column	ESC 9	
Set right margin at current column	ESC 0	3
Set top margin at current row	ESC T	
Set bottom margin at current row	ESC L	
Clear top and bottom margins	ESC C	
Set page length to n lines ($1 < n < 126$)	ESC <FF> n	

Function	Command	Note
Character set commands		
Select international character set <i>n</i>	ESC " <i>n</i>	
The characters sets are:		
0 USA		
1 United Kingdom		
2 Germany		
3 France		
4 Italy		
5 Spain		
6 Sweden/Finland		
7 Denmark/Norway		
Use supplementary character set	<SO>	
Print "ç" character	ESC Y	
Print "→" character	ESC Z	
Input control commands		
Clear input buffer	<CAN>	
Deselect printer (ignore input)	<DC3>	
Select printer	<DC1>	
Suppress printing	ESC 7	
Miscellaneous commands		
Select printing color <i>n</i>	ESC r <i>n</i>	4
The available printing colors are:		
0 Black		
1 Magenta (red)		
2 Cyan (blue)		
3 Violet		
4 Yellow		
5 Orange		
6 Green		
Print with black ribbon	ESC B	
Print with magenta (red) ribbon	ESC A	
Sound the bell	<BEL>	
Unidirectional printing	ESC \	
Bidirectional printing	ESC /	

Function	Command	Note
Word processing commands		
Line justification on	ESC M	
Line justification off	ESC X	
Automatically center printing	ESC =	
Automatic centering off	ESC X or <CR> or <LF>	
Download character commands		
Select download font <i>n</i>	ESC # <i>n</i>	5
Copy built-in font to download area	ESC : <NUL> <i>n m</i>	
Create download font	ESC l...	6
Bit image graphics commands		
Graphics type <i>n</i> graphics	ESC * <i>n n1 n2 data</i>	7
24-dot graphics	ESC H <i>n1 n2 data</i>	
Cut sheet feeder commands		
Feed a sheet from bin 1	ESC 1 or ESC I	8 9
Feed a sheet from bin 2	ESC 2 or ESC K	
Eject a page from the printer	ESC R	
Select bin 1 for following pages	//1//	
Select bin 2 for following pages	//2//	
Eject sheet at end of current page	//R//	
Change bins at next page	//C//	
Reset and sense controls		
Reset printer	ESC <CR> P or ESC <SUB> I	9
Error reset	ESC <SUB> R	
Request status byte 1	ESC <SUB> 1	
Request status byte 3	ESC <SUB> 3	
Memory test	ESC <SUB> <SO>	

Notes:

1. The value of n in this command can be represented by the ASCII characters "1" (ASCII 31 Hex) or "0" (ASCII 30 Hex), or by ASCII 01 Hex or ASCII 00 Hex.
2. This command uses the capital letter O, not the number 0.
3. This command uses the number 0, not the capital letter O.
4. This command only works with the color printing option.
5. Creating download fonts is beyond the scope of this user's manual. See the printer's programmer's manual for this information.
6. This command uses the lowercase letter l, not the number 1.
7. Creating bit image graphics is beyond the scope of this user's manual. See the printer's programmer's manual for this information.
8. These commands only work if you have an optional cut-sheet feeder.
9. This command uses the capital letter I, not the number 1.

APPENDIX A SPECIFICATIONS

A.1 PRINTER

- Emulations:** Fujitsu DPL24I and DPL24D, IBM Graphics Printer, Epson FX-80, IBM Proprinter XL, and Diablo 630 API.
With optional color printing: Fujitsu DPL24C and Epson JX-80.
- Print Method:** 24-pin dot matrix
- Print Speed:** 240 CPS at 10 CPI in high-speed draft
180 CPS at 10 CPI in draft
60 CPS at 10 CPI in letter quality
(CPS = characters per second;
CPI = characters per inch)
- Line Feed Speed:** Less than 100 milliseconds at 6 lines per inch
- Form Feed Speed:** 4 inches per second
- Print Direction:** Bidirectional or unidirectional, logic seeking
- Character Sets:** IBM Graphics printer with international characters
IBM Proprinter all characters set
- Standard Fonts:** Courier 10
Prestige Elite 12
Draft
High-Speed Draft
Compression
- Optional Fonts:** Orator
Letter Gothic 12
Scientific 12
Boldface PS
Light Italic

Character Spacing: 1/2.5, 1/3, 1/5, 1/6, 1/10, 1/12, 1/15, 1/17.1, 1/18 or 1/20 inch standard; proportional spacing (control panel or software); programmable in 1/180 inch increments

Characters Per Line:	80-column	136-column
10 CPI	80	136
12 CPI	96	163
15 CPI	120	204
17.1 CPI	136	232
18 CPI	144	244
20 CPI	160	272

Line Spacing: 1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7 or 1/8 inch standard; programmable in 1/180 inch increments

Ribbon: Black fabric: D30L-9001-0601
Optional four-color fabric: D30L-9001-0402
Life: Up to 2.5 million characters

Paper Handling: Standard: Friction or tractor feed
Optional: Cut sheet feeder (single bin or double bin adaptor)
Automatic loading with control panel
Paper parking for using tear-off feature

Interfaces: Centronics type parallel or RS-232-C serial interface boards; can be installed by user

Buffer Sizes: 256, 2K, 8K or 24K characters, selectable

Download Characters: Maximum 31.75K characters storage

Dimensions:	80-column	136-column
Height:	4.7" (120 mm)	4.7" (120 mm)
Width:	17.2" (438 mm)	22.8" (580 mm)
Depth:	13.6" (345 mm)	13.6" (345 mm)
Weight:	20 lbs (9 kg)	27 lbs (12 kg)

(Dimensions are without paper feed attachments.)

A.2 POWER

Voltage:	100–120 or 220–240 VAC 10%, depending on power source and printer
Frequency:	50/60Hz
Operating Environment:	41° to 101°F (5° to 38°C), 20 to 80% relative humidity, non-condensing
Storage Environment:	–4° to 117°F (–20° to 47°C), 10 to 95% relative humidity, non-condensing

A.3 PAPER

A.3.1 Paper Types and Sizes

Type: Single sheets and continuous forms up to 0.012" thick

Printer	Types	Sizes
80-column	Continuous	Width 4" to 10.5" 101mm to 267mm
	Single Sheet	Width 4" to 10.5" 101mm to 267mm Length 3" to 14.3" 76mm to 363mm
136-column	Continuous	Width 4" to 16.5" 101mm to 419mm
	Single Sheet	Width 4" to 16.5" 101mm to 419mm Length 3" to 14.3" 76mm to 363mm

A.3.2 Number of Copies and Binding Forms

Follow the descriptions below to copy and bind continuous forms and cut sheet paper.

A.3.2.1 Number of Continuous Forms Copies

Paper types and number of copies are as follows:

Number of Copies	Form thickness (g/m ²)	Condition
3	40,52,64	Only the bottom copy can be of the 52 or 64 g/m ² quality.
2	52,64,81	Only the bottom copy can be of the 81 g/m ² quality.
1	52,64,81	

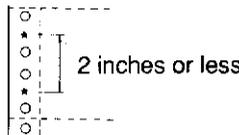
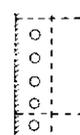
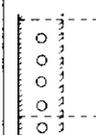
Notes:

- (1) The number of copies includes the original.
- (2) For copies, use carbon-backed or NCR forms.
- (3) If carbon paper is inserted between forms, the carbon paper is counted as one sheet. Therefore, the number of sheets of carbon paper that are inserted will have to be subtracted from the number of copies.
- (4) Total thickness must be 0.3 mm or less.
- (5) For paper end detection, reflective photosensor is used. When such paper as has high density printing on about 24 picas on the ruler, paper end might be sometimes detected wrongly.

A.3.2.2 Binding Continuous Forms

When making multipart continuous forms, forms that have adhesive on both sides are recommended.

Several methods of gluing can be used; however, forms on which adhesive is used at alternate points on each copy is recommended.

	Spot adhesive	Line adhesive	
		1 line	2 lines
Illustration	 <p>2 inches or less</p>		
Evaluation	Good	Acceptable	
Remarks	<ul style="list-style-type: none"> - Adhesive intervals should be 2 inches or less. - Adhesive spots should be as close to the perforations as possible. - Adhesive spots should be as small as possible and be at alternate positions on each copy. 		

Appendices

In the figure above, only one side of the form is shown. Make sure that there are no bulges along the perforated line, as shown in the following figure, after the forms have been bound together.



Notes:

- (1) Metal staples are likely to cause print displacement and feed problems. Use of staples should be avoided.
- (2) Use forms having a tractor hole alignment tolerance of 0.4 mm or less.
- (3) Last page of continuous forms which has left tractors sometimes cannot be fed normally.

A.3.2.3 Number of Cut Sheet Paper Copies

The number of copies and types of forms are as follows:

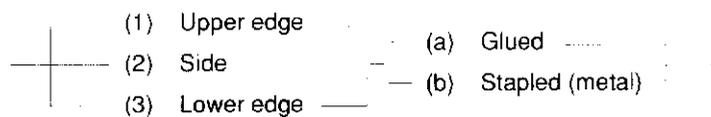
Number of Copies	Form thickness (g/m ²)	Condition
3	40,52,64	Two copies of 40 g/m ² type with 64 or 52 g/m ² type as the bottom copy.
2	40,52,64,81	One copy of 40 or 52 g/m ² type and 64 or 81 g/m ² type as the bottom copy.
1	52,64,81	

Notes:

- (1) The number of copies indicated above includes the original.
- (2) For copying, use carbon-backed or NCR forms.
- (3) Do not insert carbon paper between forms.
- (4) Total thickness must be 0.3 mm or less.

A.3.2.4 Binding Cut Sheet Paper Forms

Generally, cut sheet paper is bound as follows:



The standard for this printer is upper edge(1)/glued(a) forms.

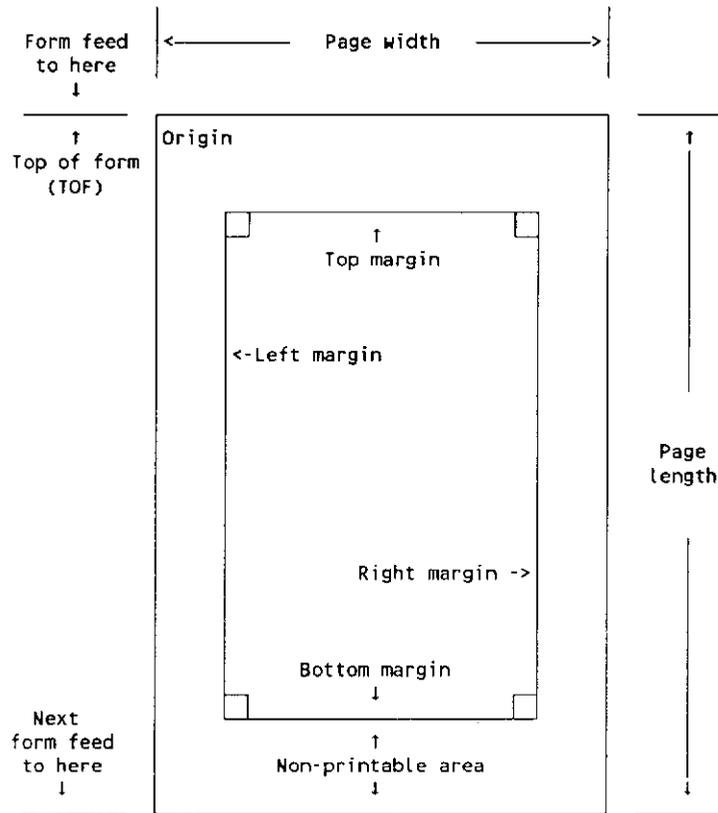
A.4 Other Precautions

Use high-quality paper forms.

Make sure that cut sheet paper is not curled.

Handle and store forms carefully. Make sure that they are not deformed or damaged.

A.5 Printing Area



APPENDIX B INTERFACES

The printer can communicate with a computer through either a Centronics parallel or RS-232C serial interface. Most likely, you selected one of these already installed when you purchased your printer. If necessary, you can remove the interface you are currently using and install the other one by following the instructions in this appendix.

B.1 INSTALLING THE INTERFACE BOARD

Here's how to remove the interface currently in use and install the new one:

1. Turn the power switch off and disconnect the power cord at the source.
2. Set the paper select lever for single sheets (forward).
3. If there is a font card installed, remove it.
4. To remove the card cover, insert a flat screwdriver (or a coin) into the notch on the rear of the cover (**Figure B-1**). The cover should release and can be pulled back for removal.

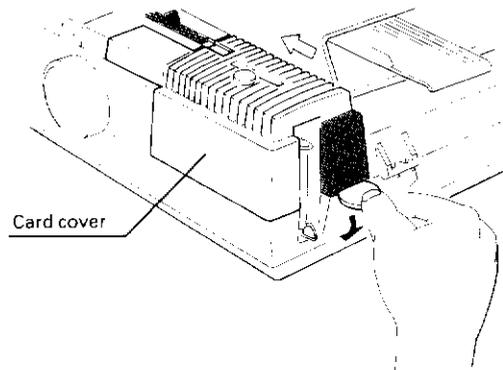


Figure B-1 Removing the card cover

5. If an interface board is already installed, remove the screws (**Figure B-2**) and pull the board up and away from the printer. If an interface board is not installed, go to step 6.
6. Insert the new interface board into the outermost socket by carefully aligning the connectors along the slot and then pressing the board into place.

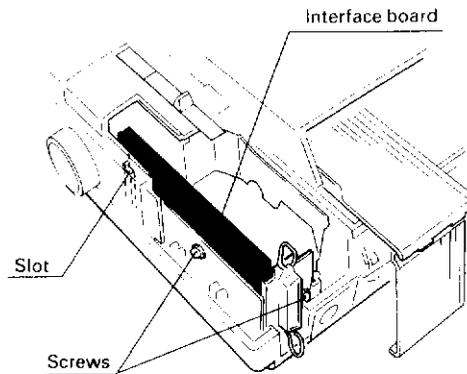


Figure B-2 Installing the interface board

7. Replace and tighten the screws on the interface board.
8. Replace the card cover by sliding it forward into position and snapping it into place.
9. Connect the power cord. Initialize the interface by turning the power switch on while holding down both the MODE and LF buttons.

B.2 PARALLEL INTERFACE SPECIFICATIONS

B.2.1 Hardware Requirements

The parallel interface input and output circuits have the following specifications.

Signal level: TTL compatible
 0.0 to +0.4V for low level
 +2.4 to +5.0V for high level

Output circuit: SN74LS07 or equivalent

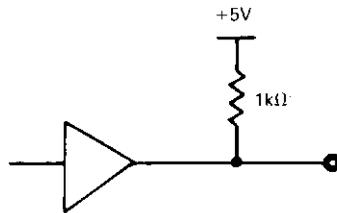


Figure B-3 Parallel interface output circuit

Input circuit: SN74LS14 or equivalent

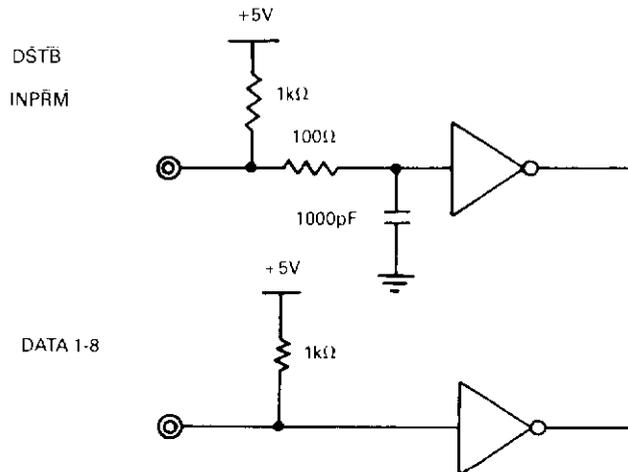


Figure B-4 Parallel interface input circuit

B.2.2 Connector Pin Assignments

The parallel interface uses a Centronics parallel printer cable to communicate with your computer. The cable connector is a shielded plug male type Amphenol DDK 57E-30360 or equivalent (**Figure B-5**).

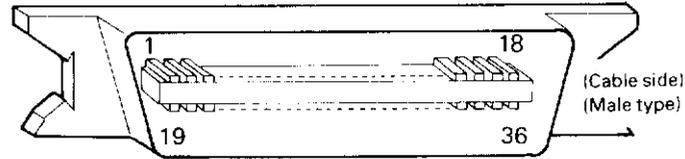


Figure B-5 Parallel interface connector

The parallel interface pin assignments are described in **Table B-1**.

Table B-1 Parallel Interface Pin Assignments

Connector pin number	Return line pin number	Signal name	Direction	Description
1	19	Data Strobe (DSTB)	In	<ul style="list-style-type: none"> — Strobe pulse for reading data (Data 1 to Data 8). The printer reads data when this signal is low. — Pulse width must be 1 μs or more at the printer receive terminal.

Table B-1 Parallel Interface Pin Assignments – continued

Connector pin number	Return line pin number	Signal name	Direction	Description
2	20	Data 1	In	<ul style="list-style-type: none"> — The Data 1 to Data 8 signals correspond to parallel data bits 1 to 8. — Data 8 is the most significant bit, but is not used in the 7-bit ASCII mode. — All signals must be set at least 1 μs before the falling edge of the Data Strobe signal and must be held for at least 1 μs 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	Acknowledge (ACK)	Out		— Pulse signal indicating data receive completed (or data receive enable) status. — Also issued when the printer switches from the offline state to the online state.
11	29	Busy	Out	Data cannot be received when this signal is high, for example, when the buffer is full or when an error occurs.
12	30	Paper Empty (PE)	Out	This signal goes high when paper runs out.
13	—	Select (SLCT)	Out	Indicates the selected (online) state when the signal is high and the deselected (offline) state when it is low.

Table B-1 Parallel Interface Pin Assignments – continued

Connector pin number	Return line pin number	Signal name	Direction	Description
14	—	—	In	Not used.
15	—	—	—	No connection
16	—	Signal Ground (SG)		Logic ground level (0 V)
17	—	Frame Ground (FG)		Printer cabinet ground line. FG and SG are connected together.
18	—	—	—	No connection
19 to 30	—	Signal Ground (SG)		Twisted pair return lines
31	—	Input Prime (IN PRM)	In	If this signal is low for more than 50 μ s, the printer is reset to the initial status and placed online.
32	—	Fault	Out	This signal goes low under the following printer conditions: (1) Offline (2) Paper out (3) Cover open (optional) (4) Cut sheet feeder error (5) Other printer error
33	—	Signal Ground (SG)		Logic ground level (0 V)
34	—	—	—	No connection

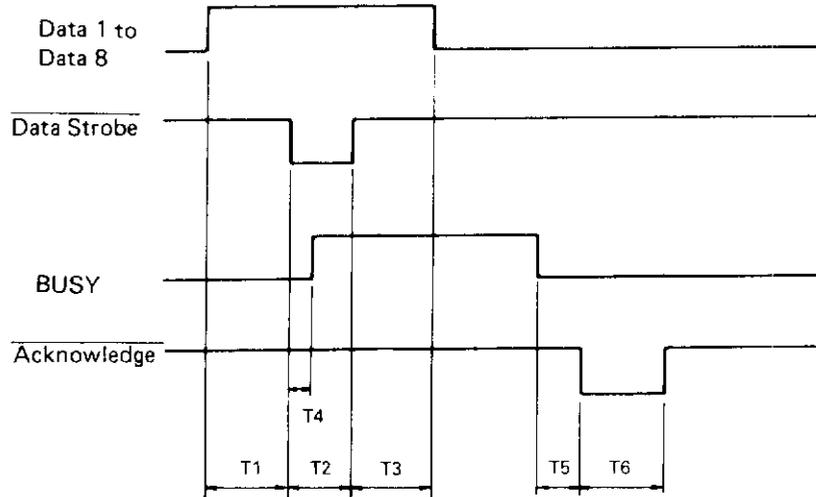
Table B-1 Parallel Interface Pin Assignments – continued

Connector pin number	Return line pin number	Signal name	Direction	Description
35	—	+5VR	Out	Connected to the +5 V source through the 3.3 K Ω resistor.
36	—	—	In	Not used.

B.2.3 Data Transmission Timing

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

For the Data Strobe and Acknowledge signals, the timing of the Busy signal must be as shown in **Figure B-6**.



$$T1, T2, T3 > 1\mu s$$

$$T4 < 1\mu s$$

$$0\mu s \leq T5 < 3\mu s$$

$$2\mu s < T6 < 6\mu s$$

Figure B-6 Data transmission timing

B.3 SERIAL INTERFACE SPECIFICATIONS

The serial interface uses an RS-232C serial cable to communicate with your computer. The serial options are as follows:

Transmission mode:	Asynchronous Full duplex
Speeds:	600, 1200, 2400, 4800, 9600 or 19200 baud (selectable)
Data bits:	7 or 8 bits (selectable)
Parity bit:	Odd, even, mark, space or none (selectable)
Start bit:	1 bit
Stop bit:	1 or 2 bits (selectable)
Protocol:	XON/XOFF (DC1/DC3) DTR (Data Terminal Ready) RC (Reverse Channel) ETX/ACK
Buffer Size:	256, 2K, 8K or 24K characters (selectable)

The options marked selectable can be changed using the Setup feature on the control panel. However, be sure to configure your computer so it matches the printer configuration. (Note: The MODE command can be used in DOS to configure your computer. The most common setting is "MODE COM1:9600,n,8,1,p.") Refer to your computer manuals for details.

B.3.1 Hardware Requirements

The serial interface input and output circuits have the following specifications.

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

Input circuit: An MC1489AL is used to convert from the RS-232C level to the TTL level.

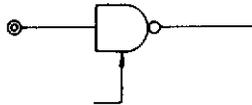


Figure B-7 Serial interface input circuit

Output circuit: An MC1488L is used to convert from the TTL level to the RS-232C level. A 100-pF capacitor suppresses noise on the output signal line.

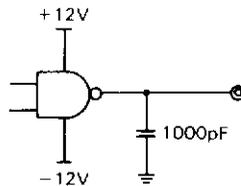


Figure B-8 Serial interface output circuit

B.3.2 Connector Pin Assignments

The cable connector is a D-subminiature Cannon or Cinch DB-25 male type or an equivalent connector that conforms to EIA standards (Figure B-9).

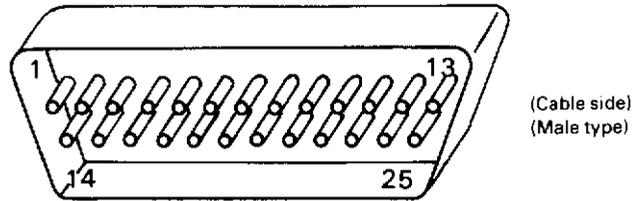


Figure B-9 Serial interface connector

The serial interface pin assignments are described in **Table B-2**.

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 Space state when the printer is ready to transmit data
5	CTS	Input	Clear to Send Space state when the host is ready to receive data
6	DSR	Input	Data Set Ready The printer can receive or transmit data when this signal is in the space state.
7	SG		Signal Ground (common return)
8	CD	Input	Carrier Detect The printer can receive data when this signal is in the space state.
11	(RC)	Output	(Reverse Channel) Available as a printer ready signal (Not used for the standard interface)
20	DTR	Output	Data Terminal Ready Space state when the printer is ready to receive or transmit data.

Notes:

- The space state corresponds to the high level of the interface signal.
- The direction (output or input) refers to the printer side.

B.3.3 Serial Data Format

The format of the serial data, 10 or 11 bits long, consists of a start bit, data bits, a parity bit, and stop bits. A bit is in the mark state when not in transmission. The data bits start with the least significant bit (LSB). For example, transmission of the character "K" (hexadecimal 4B) is shown in **Figure B-10** (7 data bits, even parity).

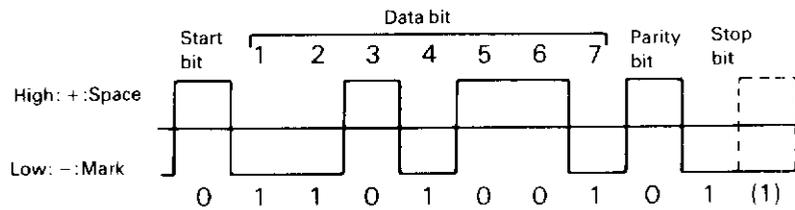


Figure B-10 Serial data format

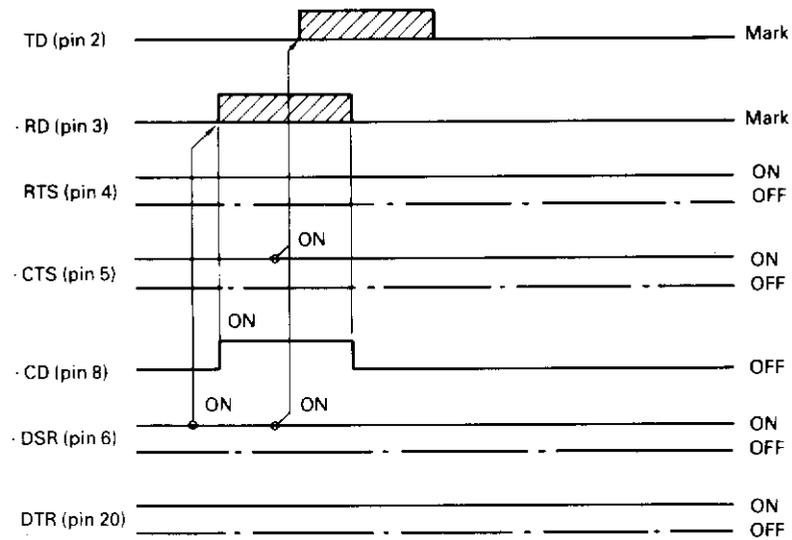
B.3.4 Timing Diagrams

Your printer enables or disables the flow of data to the printer via the RS-232C interface, as well as more simple communication, such as status or condition.

There are two primary cabling methods for the RS-232C interface:

- Full-wire
- 3-wire

Full-wire control mode

**Notes:**

- Signals prefixed by a dot (·) are input to the printer.
- DSR must be high (ON) when the printer receives data in this mode. Otherwise, received data is rejected.
- If both DSR and CTS are ON when the printer has data to be transmitted to the host in this mode, the printer transmits the data immediately. If either DSR or CTS is OFF, data is not transmitted until both signals go high (ON).
- In this mode, CD is "don't care."

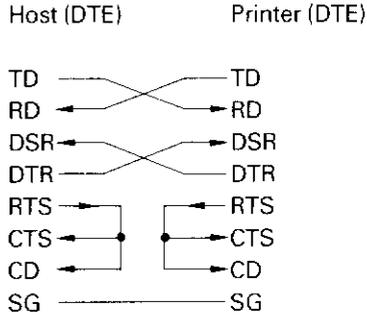
The following are examples of cable configuration:

- To DCE (data circuit terminating equipment)

Use the "straight-through" cable.

- To DTE (data terminal equipment)

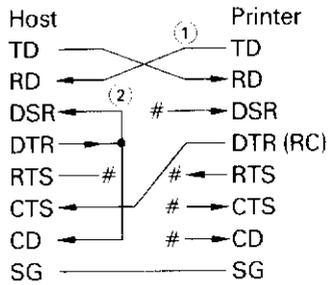
Be sure to use the "cross-patched" cable as shown below.



3-wire control mode

The 3-wire mode is used for more simple communication than the full-wire mode.

The following is an example of cable configuration:



#: Indicates the open wire.

Notes:

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

B.3.5 Transmission Protocols

The way in which data is transmitted between the computer and the printer is known as the transmission protocol. A transmission protocol helps to ensure that the computer doesn't send data to the printer faster than the printer can print it.

If you use the parallel interface, the computer and printer take care of the protocol automatically. This protocol, by the way, is called the Centronics protocol.

If you use the serial interface, you have a choice of four protocols:

- XON/XOFF (DC1/DC3)
- DTR (Data Terminal Ready)
- RC (Reverse Channel)
- ETX/ACK

Your computer manuals should tell you which serial protocol the software uses. If you're not sure which one to use, try a test print using the software with whatever protocol is currently configured. If it works satisfactorily, stay with that one. If not, try the other three and see if you get better results. If you still have a problem, call the customer service department of your software manufacturer and ask what serial transmission protocol they recommend.

Here is some information about the four different serial transmission protocols.

XON/XOFF Protocol

This is the simplest of the software protocols. When the remaining space in the buffer is less than 255 bytes (63 bytes when the buffer is configured for 256 bytes), the printer sends the control code XOFF (ASCII value 13 hex) to the computer. The XOFF code, sometimes called DC3, tells the computer to stop transmitting while the printer prints out the data. When the amount of data in the buffer is less than 255 bytes, the printer sends the control code XON (ASCII 11 hex, sometimes called DC1) to tell the computer to resume transmission.

When the printer is first turned on, the DTR signal is set to the space state (Ready) and the XON (DC1) code is sent from the printer to say that it's ready for printing. When the printer is placed off-line, the XOFF (DC3) code is sent to say that the printer is not ready even if the buffer is not full. When the printer set on-line again, it sends the XON code to say that it's ready for printing.

DTR Protocol

Data Terminal Ready, or DTR, protocol is sometimes called Ready/Busy protocol. When the printer is set on-line, it changes the level of the DTR signal on the serial interface from LOW to HIGH. This tells the computer that the printer is ready to receive data.

Print data transmitted from the computer is initially stored in an area of the printer's memory known as the input buffer. When the buffer fills to within 255 bytes (63 bytes when the buffer is configured for 256 bytes), the printer changes the DTR signal to LOW, and starts printing out the contents of the input buffer. As the data is printed out, the free space in the input buffer increases. When the amount of data in the buffer is less than 255 bytes, the printer changes the DTR signal back to HIGH.

RC Protocol

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

ETX/ACK Protocol

This protocol is a little more complicated, but allows faster printing under some conditions. The computer adds the ASCII code ETX (03 hex) to the end of each block of characters it sends to the printer. A block, including the ETX code, can be as large as the printer's input buffer.

When the printer gets the ETX code out of the buffer, it sends an ASCII ACK (06 hex) code to the computer. The computer must wait until it receives this ACK before it sends the next block, to be sure that the buffer is never completely filled.

APPENDIX C OPTIONS

There are several options available for your printer including:

- Interface boards
- Font cards
- Cut sheet feeder
- Color printing

These options can be purchased separately from your dealer. This appendix gives part numbers and a description of each option.

C.1 INTERFACE BOARDS

Your printer can communicate with a computer through either a Centronics parallel or RS-232C serial interface. Most likely, you selected one of these already installed when you purchased your printer. If necessary, these interface boards can be purchased separately and installed by following the instructions in Appendix B of this manual.

The part numbers are:

Parallel interface: D05B-2901-B101
Serial interface: D05B-2901-B201

C.2 FONT CARDS

Although your printer has several standard fonts available, optional font cards increase the variety of printing styles your printer can print.

Optional fonts currently available include:

Boldface PS/Light Italic: D05B-2610-C710
Orator/Light Italic: D05B-2610-C711
Scientific 12/Letter Gothic 12: D05B-2610-C712

See your dealer for the latest list; new fonts are constantly being added.

C.2.1 Installing a Font Card

Although font cards are in some ways very durable, there are some basic precautions you should follow whenever handling font cards:

- Never insert or remove a font card when the printer is turned on; you could damage the card or the printer. Always turn the printer off before installing or removing cards.
- Static electricity or any kind of magnet can damage the information stored on a font card. Always keep the card in its electrostatic (plastic) case.
- Never touch the gold connectors on a card. Dirt, dust, oil or even perspiration on the connectors could damage the card and the printer.

Installing a font card is very simple. Here's how:

1. Turn the printer off.
2. Remove the font card from its case.
3. The font card slot is located on the top right, near the back (Figure C-1).

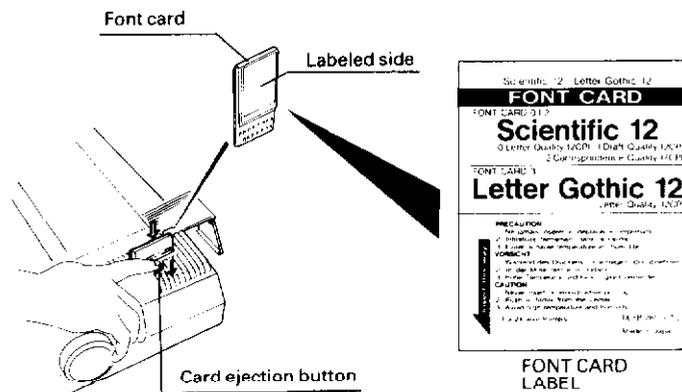


Figure C-1 Installing and removing the font card

Insert the card into the slot with the label facing out, towards the eject button. Press down firmly on the center of the card until the card clicks into place.

4. Turn the printer on.

To remove the font card:

1. Turn the printer off.
2. Press the card eject button (**Figure C-1**). The font card will "pop up."
3. Lift the card out of the slot and return it to its case.

C.2.2 Printing With a Font Card

With the font card installed, you can access the fonts in one of two ways: with the control panel or through software control.

Using the control panel's setup function, the card fonts can be assigned to FONT1, FONT2, MENU1 or MENU2. This procedure is explained in detail in Section 4.

You can use these fonts with your commercial software, or program the printer using the commands in the emulation command sets.

C.3 CUT SHEET FEEDER

The optional cut sheet feeder allows you to use stacks of single sheet paper and envelopes with your printer. Sheet feeders are commonly used for printing on letterhead, second sheets, and envelopes.

The sheet feeder is sold in two parts (**Figure C-2**): as a single bin unit and a double bin adaptor unit.

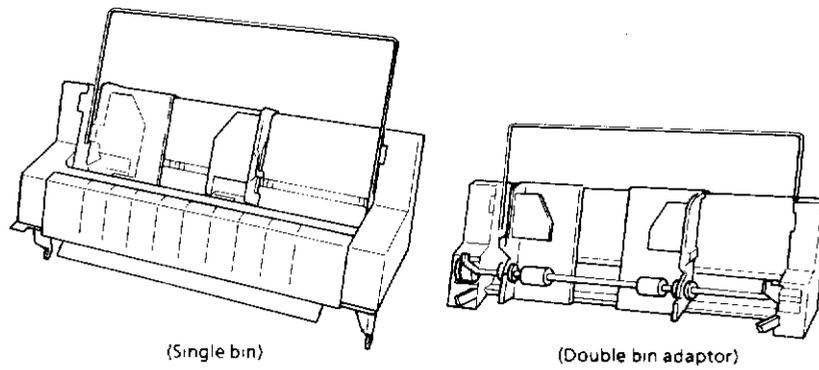


Figure C-2 Single bin cut sheet feeder and double bin adaptor unit

Ask your dealer for these models:

For the 80-column printer:

Single Bin Cut Sheet Feeder (ASF300-FJ3301)

Double Bin Adaptor (ASF300-FJ3311)

For the 136-column printer:

Single Bin Cut Sheet Feeder (ASF300-FJ3401)

Double Bin Adaptor (ASF300-FJ3411)

Consult your dealer for further information and specifications.
Installation and operation is contained in a separate manual for each model.

C.4 COLOR PRINTING

Your printer can print in color when the optional color unit and color fabric ribbon cassette are installed. The printer uses software commands or the control panel's setup function to control which color is printed. The color kit (D86B1156D351) and color ribbon (D30L90010402) can be purchased with your printer or separately from your dealer.

C.4.1 Installing the Color Unit

The color unit is designed for easy installation. Follow these steps:

1. Turn your printer and computer off.
2. Open the top cover.
3. Remove the ribbon cassette that is in your printer.

CAUTION

If you have been printing, be careful not to touch the print head which becomes hot during use.

4. Slide the carriage frame to the far right side (**Figure C-3**). Loosen the two screws (do not remove them) on the carriage frame.

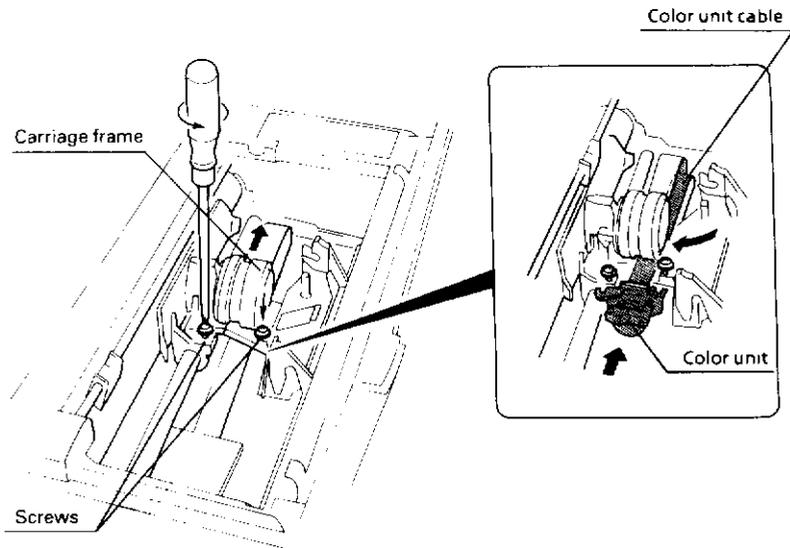


Figure C-3 Installing the color unit

5. Slide the flat cable from the color unit through the space between the print head and the carriage frame. The cable will loop under the carriage frame, on the right side and then go under the frame, towards the left (see **Figure C-3** close up).

6. Attach the color unit by placing the tabs under the two carriage frame screws. Hold the unit in place while tightening the screws.
7. Slide the clear plastic connector cover to the right and remove it (**Figure C-4**).

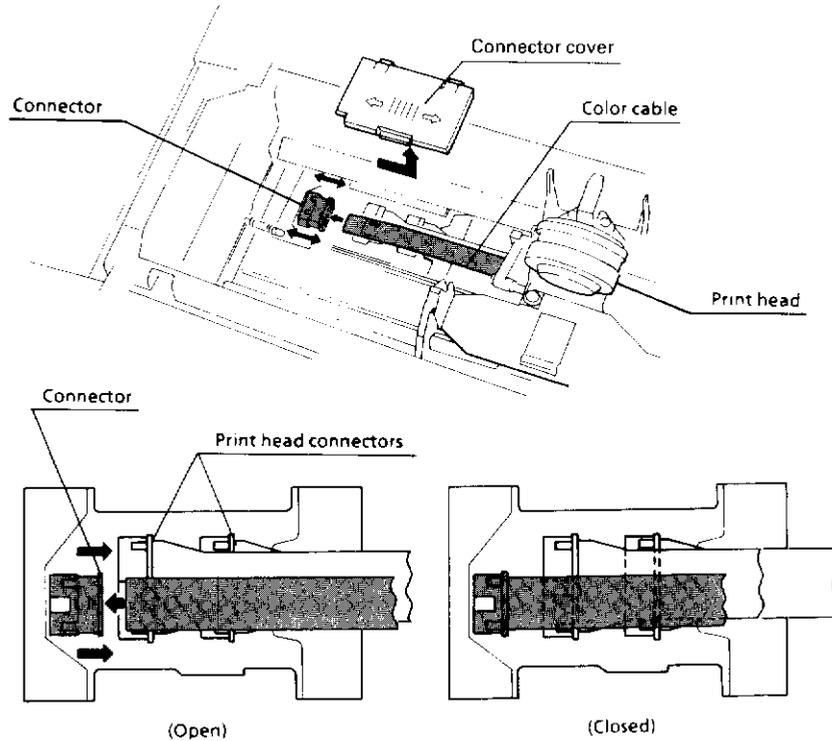


Figure C-4 Connecting the color cable

8. Open the color cable connector by pulling the end of it out. Insert the end of the color cable into the connector. Close the connector by pushing it back in. (**Figure C-4** shows open and closed positions.)

C.4.2 Installing the Color Ribbon

Install a color ribbon cassette the same as a black ribbon. (A black ribbon cassette can be used without removing the color unit. The results are simply printed in black.) Section 1 describes ribbon installation.

C.4.3 Using Color Printing

Once the color unit and color ribbon cassette are installed, you can control color printing through:

- the control panel's setup function
- your software (including programming the printer with color commands)

Section 4 describes selecting color with the control panel.

To install your software for color printing:

1. Turn the printer on.
2. Set the printer emulation for Fujitsu DPL24C or Epson JX-80, which are both color printer emulations available through the control panel's setup function.
3. Use your software application to select one of the printer emulations listed in step 2. This is usually done through a "printer select" option.
4. Try a few test prints to verify correct installation.

If you need additional help on selecting printers, refer to Section 5 or your software manual.

Commands used to control color printing in each emulation command set are included in Section 7.

APPENDIX D RESIDENT FONTS

There are five fonts stored in your printer, called *resident fonts*. They include Courier 10, Prestige Elite 12, Draft, High-Speed Draft and Compressed. Samples of these fonts are shown below. Use Appendix E to find the decimal, hexadecimal and binary values of each character.

Courier 10

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	⋮	⋮	⋮	⋮	⋮
1	SOH	DC1	:	1	A	Q	a	q	ü	æ	í	⋮	⋮	⋮	⋮	⋮
2	STX	DC2	"	2	B	R	b	r	é	Æ	ó	⋮	⋮	⋮	⋮	⋮
3	♦	DC3	#	3	C	S	c	s	â	ô	ú	⋮	⋮	⋮	⋮	⋮
4	♦	DC4	\$	4	D	T	d	t	ä	ö	ñ	⋮	⋮	⋮	⋮	⋮
5	♦	§	%	5	E	U	e	u	à	ò	Ñ	⋮	⋮	⋮	⋮	⋮
6	♦	SYN	&	6	F	V	f	v	á	û	ª	⋮	⋮	⋮	⋮	⋮
7	BEL	ETB	'	7	G	W	g	w	ç	ù	º	⋮	⋮	⋮	⋮	⋮
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	⋮	⋮	⋮	⋮	⋮
9	HT	EM	)	9	I	Y	i	y	ë	Ö	¸	⋮	⋮	⋮	⋮	⋮
A	LF	SUB	*	:	J	Z	j	z	è	Ù	¸	⋮	⋮	⋮	⋮	⋮
B	VT	ESC	+	;	K	[	k	{	í	Ç	½	⋮	⋮	⋮	⋮	⋮
C	FF	FS	,	<	L	\	l	:	î	È	¾	⋮	⋮	⋮	⋮	⋮
D	CR	GS	-	=	M	}	m	}	ï	ÿ	¾	⋮	⋮	⋮	⋮	⋮
E	SO	RS	.	>	N	^	n	~	ÿ	À	¸	⋮	⋮	⋮	⋮	⋮
F	SI	US	/	?	O	_	o	DEL	À	f	»	⋮	⋮	⋮	⋮	⋮

Prestige Elite 12

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		ç	±	α	≡
1	SOH	DC1	!	1	A	Q	a	q	ù	æ	í		±	β	±	
2	STX	DC2	"	2	B	R	b	r	é	Æ	ó		±	Γ	≥	
3	♥	DC3	#	3	C	S	c	s	ä	ö	ú		±	π	≤	
4	♦	DC4	\$	4	D	T	d	t	ä	ö	ñ		±	Σ	∫	
5	♣	§	%	5	E	U	e	u	ä	ö	Ñ		±	o	∫	
6	♠	SYN	&	6	F	V	f	v	ä	ö	á		±	μ	±	
7	BEL	ETB	'	7	G	W	g	w	ç	ù	ø		±	τ	±	
8	BS	CAN	(	8	H	X	h	x	è	ý	è		±	φ	°	
9	HT	EM	)	9	I	Y	i	y	è	ó	~		±	θ	°	
A	LF	SUB	*	:	J	Z	j	z	è	Ü	~		±	Ω	°	
B	VT	ESC	+	;	K	[	k	{	í	ç	½		±	δ	√	
C	FF	FS	,	<	L	\	l	!	í	£	¼		±	∞	n	
D	CR	GS	-	=	M	]	m	}	í	¥	¾		±	∅	²	
E	SO	RS	.	>	N	^	n	~	Ä	ß	«		±	Ε	■	
F	SI	US	/	?	O	_	o	DEL	À	f	»		±	Π	SP	

Draft

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		ç		α	≡
1	SOH	DC1	!	1	A	Q	a	q	ù	æ	í		±	β	±	
2	STX	DC2	"	2	B	R	b	r	é	Æ	ó		±	Γ	≥	
3	♥	DC3	#	3	C	S	c	s	ä	ö	ú		±	π	≤	
4	♦	DC4	\$	4	D	T	d	t	ä	ö	ñ		±	Σ	∫	
5	♣	§	%	5	E	U	e	u	ä	ö	Ñ		±	o	∫	
6	♠	SYN	&	6	F	V	f	v	ä	ö	á		±	μ	±	
7	BEL	ETB	'	7	G	W	g	w	ç	ù	ø		±	τ	±	
8	BS	CAN	(	8	H	X	h	x	è	ý	è		±	φ	°	
9	HT	EM	)	9	I	Y	i	y	è	ó	~		±	θ	°	
A	LF	SUB	*	:	J	Z	j	z	è	Ü	~		±	Ω	°	
B	VT	ESC	+	;	K	[	k	{	í	ç	½		±	δ	√	
C	FF	FS	,	<	L	\	l	!	í	£	¼		±	∞	n	
D	CR	GS	-	=	M	]	m	}	í	¥	¾		±	∅	²	
E	SO	RS	.	>	N	^	n	~	Ä	ß	«		±	Ε	■	
F	SI	US	/	?	O	_	o	DEL	À	f	»		±	Π	SP	

High-Speed Draft

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	í	ñ	ü	α	≡
1	SOH	DC1	!	1	A	Q	a	q	ú	æ	í	ñ	ü	β	≡	≡
2	STX	DC2	"	2	B	R	b	r	é	æ	ó	ñ	ü	Γ	≡	≡
3	•	DC3	#	3	C	S	c	s	á	ó	ú	ñ	ü	π	≡	≡
4	♦	DC4	\$	4	D	T	d	t	á	ó	ñ	ü	ñ	Σ	≡	≡
5	†	\$	%	5	E	U	e	u	á	ó	ñ	ü	ñ	o	≡	≡
6	•	SYN	&	6	F	V	f	v	á	ó	ñ	ü	ñ	μ	≡	≡
7	BEL	ETB	'	7	G	W	g	w	ç	ü	ó	ñ	ü	τ	≡	≡
8	BS	CAN	(	8	H	X	h	x	é	ý	ó	ñ	ü	φ	≡	≡
9	HT	EM	)	9	I	Y	i	y	é	ó	ñ	ü	ñ	θ	≡	≡
A	LF	SUB	*	:	J	Z	j	z	é	ó	ñ	ü	ñ	Ω	≡	≡
B	VT	ESC	+	;	K	L	k	{	í	é	á	ñ	ü	δ	≡	≡
C	FF	FS	,	<	L	\	l	|	í	é	á	ñ	ü	•	≡	≡
D	CR	GS	-	=	M	J	m	}	í	ý	í	ñ	ü	•	≡	≡
E	SD	RS	.	>	N	^	n	~	á	ó	ñ	ü	ñ	€	≡	≡
F	SI	US	/	?	O	_	o	DEL	A	f	•	ñ	ü	∅	≡	SP

Compressed

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	í	ñ	ü	α	≡
1	SOH	DC1	!	1	A	Q	a	q	ú	æ	í	ñ	ü	β	≡	≡
2	STX	DC2	"	2	B	R	b	r	é	æ	ó	ñ	ü	Γ	≡	≡
3	•	DC3	#	3	C	S	c	s	á	ó	ú	ñ	ü	π	≡	≡
4	♦	DC4	\$	4	D	T	d	t	á	ó	ñ	ü	ñ	Σ	≡	≡
5	†	\$	%	5	E	U	e	u	á	ó	ñ	ü	ñ	o	≡	≡
6	•	SYN	&	6	F	V	f	v	á	ó	ñ	ü	ñ	μ	≡	≡
7	BEL	ETB	'	7	G	W	g	w	ç	ü	ó	ñ	ü	τ	≡	≡
8	BS	CAN	(	8	H	X	h	x	é	ý	ó	ñ	ü	φ	≡	≡
9	HT	EM	)	9	I	Y	i	y	é	ó	ñ	ü	ñ	θ	≡	≡
A	LF	SUB	*	:	J	Z	j	z	é	ó	ñ	ü	ñ	Ω	≡	≡
B	VT	ESC	+	;	K	L	k	{	í	é	á	ñ	ü	δ	≡	≡
C	FF	FS	,	<	L	\	l	|	í	é	á	ñ	ü	•	≡	≡
D	CR	GS	-	=	M	J	m	}	í	ý	í	ñ	ü	•	≡	≡
E	SD	RS	.	>	N	^	n	~	á	ó	ñ	ü	ñ	€	≡	≡
F	SI	US	/	?	O	_	o	DEL	A	f	•	ñ	ü	∅	≡	SP

Appendices

APPENDIX E ASCII CODE CONVERSION TABLE

This appendix lists the ASCII codes in three character sets: IBM Character Set 1, IBM Character Set 2 and IBM All Characters. (IBM All Characters are all the characters that print when you use either the ESC \ or ESC ^ command in the IBM Proprinter XL (IBM-PRO) emulation.) Each character shows its corresponding decimal, hexadecimal and binary equivalent.

Set1	Set2	*	Dec	Hex	Binary	Set1	Set2	*	Dec	Hex	Binary
NUL	NUL	∅	0	00	00000000	SP	SP	SP	32	20	00100000
SOH	SOH	Ⓢ	1	01	00000001	!	!	!	33	21	00100001
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	•	7	07	00000111	'	'	'	39	27	00100111
BS	BS	▣	8	08	00001000	(	(	(	40	28	00101000
HT	HT	○	9	09	00001001	)	)	)	41	29	00101001
LF	LF	Ⓚ	10	0A	00001010	*	*	*	42	2A	00101010
VT	VT	♂	11	0B	00001011	+	+	+	43	2B	00101011
FF	FF	♀	12	0C	00001100	,	,	,	44	2C	00101100
CR	CR	♪	13	0D	00001101	-	-	-	45	2D	00101101
SO	SO	♫	14	0E	00001110	.	.	.	46	2E	00101110
SI	SI	♯	15	0F	00001111	/	/	/	47	2F	00101111
DLE	DLE	▶	16	10	00010000	0	0	0	48	30	00110000
DC1	DC1	◀	17	11	00010001	1	1	1	49	31	00110001
DC2	DC2	↕	18	12	00010010	2	2	2	50	32	00110010
DC3	DC3	!!	19	13	00010011	3	3	3	51	33	00110011
DC4	DC4	¶	20	14	00010100	4	4	4	52	34	00110100
NAK	NAK	§	21	15	00010101	5	5	5	53	35	00110101
SYN	SYN	-	22	16	00010110	6	6	6	54	36	00110110
ETB	ETB	↕	23	17	00010111	7	7	7	55	37	00110111
CAN	CAN	↑	24	18	00011000	8	8	8	56	38	00111000
EM	EM	↓	25	19	00011001	9	9	9	57	39	00111001
SUB	SUB	→	26	1A	00011010	:	:	:	58	3A	00111010
ESC	ESC	←	27	1B	00011011	;	;	;	59	3B	00111011
FS	FS	↵	28	1C	00011100	<	<	<	60	3C	00111100
GS	GS	↻	29	1D	00011101	=	=	=	61	3D	00111101
RS	RS	▲	30	1E	00011110	>	>	>	62	3E	00111110
US	US	▼	31	1F	00011111	?	?	?	63	3F	00111111

*: All printable characters (used in ESC \ and ESC ^ commands of IBM-PRO emulation)

Set1	Set2	*	Dec	Hex	Binary	Set1	Set2	*	Dec	Hex	Binary
@	@	@	64	40	01000000	~	~	~	96	60	01100000
A	A	A	65	41	01000001	a	a	a	97	61	01100001
B	B	B	66	42	01000010	b	b	b	98	62	01100010
C	C	C	67	43	01000011	c	c	c	99	63	01100011
D	D	D	68	44	01000100	d	d	d	100	64	01100100
E	E	E	69	45	01000101	e	e	e	101	65	01100101
F	F	F	70	46	01000110	f	f	f	102	66	01100110
G	G	G	71	47	01000111	g	g	g	103	67	01100111
H	H	H	72	48	01001000	h	h	h	104	68	01101000
I	I	I	73	49	01001001	i	i	i	105	69	01101001
J	J	J	74	4A	01001010	j	j	j	106	6A	01101010
K	K	K	75	4B	01001011	k	k	k	107	6B	01101011
L	L	L	76	4C	01001100	l	l	l	108	6C	01101100
M	M	M	77	4D	01001101	m	m	m	109	6D	01101101
N	N	N	78	4E	01001110	n	n	n	110	6E	01101110
O	O	O	79	4F	01001111	o	o	o	111	6F	01101111
P	P	P	80	50	01010000	p	p	p	112	70	01110000
Q	Q	Q	81	51	01010001	q	q	q	113	71	01110001
R	R	R	82	52	01010010	r	r	r	114	72	01110010
S	S	S	83	53	01010011	s	s	s	115	73	01110011
T	T	T	84	54	01010100	t	t	t	116	74	01110100
U	U	U	85	55	01010101	u	u	u	117	75	01110101
V	V	V	86	56	01010110	v	v	v	118	76	01110110
W	W	W	87	57	01010111	w	w	w	119	77	01110111
X	X	X	88	58	01011000	x	x	x	120	78	01111000
Y	Y	Y	89	59	01011001	y	y	y	121	79	01111001
Z	Z	Z	90	5A	01011010	z	z	z	122	7A	01111010
[	[	[	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	☐	127	7F	01111111

Appendices

Set1	Set2	*	Dec	Hex	Binary	Set1	Set2	*	Dec	Hex	Binary
NUL	Ç	Ç	128	80	10000000	á	á	á	160	A0	10100000
SOH	ü	ü	129	81	10000001	í	í	í	161	A1	10100001
STX	é	é	130	82	10000010	ó	ó	ó	162	A2	10100010
ETX	â	â	131	83	10000011	ú	ú	ú	163	A3	10100011
EOT	ä	ä	132	84	10000100	ñ	ñ	ñ	164	A4	10100100
ENQ	à	à	133	85	10000101	Ñ	Ñ	Ñ	165	A5	10100101
ACK	á	á	134	86	10000110	æ	æ	æ	166	A6	10100110
BEL	ç	ç	135	87	10000111	ø	ø	ø	167	A7	10100111
BS	ê	ê	136	88	10001000	č	č	č	168	A8	10101000
HT	ë	ë	137	89	10001001	ř	ř	ř	169	A9	10101001
LF	è	è	138	8A	10001010	ŕ	ŕ	ŕ	170	AA	10101010
VT	ì	ì	139	8B	10001011	š	š	š	171	AB	10101011
FF	í	í	140	8C	10001100	š	š	š	172	AC	10101100
CR	ì	ì	141	8D	10001101	ı	ı	ı	173	AD	10101101
SO	â	â	142	8E	10001110	«	«	«	174	AE	10101110
SI	á	á	143	8F	10001111	»	»	»	175	AF	10101111
DLE	é	é	144	90	10010000				176	B0	10110000
DC1	æ	æ	145	91	10010001				177	B1	10110001
DC2	æ	æ	146	92	10010010				178	B2	10110010
DC3	ó	ó	147	93	10010011	|	|	|	179	B3	10110011
DC4	ó	ó	148	94	10010100	†	†	†	180	B4	10110100
NAK	ó	ó	149	95	10010101	‡	‡	‡	181	B5	10110101
SYN	û	û	150	96	10010110	‡	‡	‡	182	B6	10110110
ETB	ù	ù	151	97	10010111	‡	‡	‡	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	10011010	‡	‡	‡	186	BA	10111010
ESC	ç	ç	155	9B	10011011	‡	‡	‡	187	BB	10111011
FS	£	£	156	9C	10011100	‡	‡	‡	188	BC	10111100
GS	¥	¥	157	9D	10011101	‡	‡	‡	189	BD	10111101
RS	ŕ	ŕ	158	9E	10011110	‡	‡	‡	190	BE	10111110
US	ŕ	ŕ	159	9F	10011111	‡	‡	‡	191	BF	10111111

Set1	Set2	*	Dec	Hex	Binary	Set1	Set2	*	Dec	Hex	Binary
L	L	L	192	C0	11000000	α	α	α	224	E0	11100000
⊥	⊥	⊥	193	C1	11000001	β	β	β	225	E1	11100001
⊤	⊤	⊤	194	C2	11000010	Γ	Γ	Γ	226	E2	11100010
⊥	⊥	⊥	195	C3	11000011	π	π	π	227	E3	11100011
-	-	-	196	C4	11000100	Σ	Σ	Σ	228	E4	11100100
+	+	+	197	C5	11000101	ο	ο	ο	229	E5	11100101
⊥	⊥	⊥	198	C6	11000110	μ	μ	μ	230	E6	11100110
⊥	⊥	⊥	199	C7	11000111	τ	τ	τ	231	E7	11100111
⊥	⊥	⊥	200	C8	11001000	ϕ	ϕ	ϕ	232	E8	11101000
⊥	⊥	⊥	201	C9	11001001	θ	θ	θ	233	E9	11101001
⊥	⊥	⊥	202	CA	11001010	ϖ	ϖ	ϖ	234	EA	11101010
⊥	⊥	⊥	203	CB	11001011	δ	δ	δ	235	EB	11101011
⊥	⊥	⊥	204	CC	11001100	∞	∞	∞	236	EC	11101100
=	=	=	205	CD	11001101	ϕ	ϕ	ϕ	237	ED	11101101
⊥	⊥	⊥	206	CE	11001110	€	€	€	238	EE	11101110
⊥	⊥	⊥	207	CF	11001111	∅	∅	∅	239	EF	11101111
⊥	⊥	⊥	208	D0	11010000	≡	≡	≡	240	F0	11110000
⊥	⊥	⊥	209	D1	11010001	±	±	±	241	F1	11110001
⊥	⊥	⊥	210	D2	11010010	≥	≥	≥	242	F2	11110010
⊥	⊥	⊥	211	D3	11010011	≤	≤	≤	243	F3	11110011
⊥	⊥	⊥	212	D4	11010100	⊥	⊥	⊥	244	F4	11110100
⊥	⊥	⊥	213	D5	11010101	⊥	⊥	⊥	245	F5	11110101
⊥	⊥	⊥	214	D6	11010110	⊥	⊥	⊥	246	F6	11110110
⊥	⊥	⊥	215	D7	11010111	⊥	⊥	⊥	247	F7	11110111
⊥	⊥	⊥	216	D8	11011000	⊥	⊥	⊥	248	F8	11111000
⊥	⊥	⊥	217	D9	11011001	⊥	⊥	⊥	249	F9	11111001
⊥	⊥	⊥	218	DA	11011010	⊥	⊥	⊥	250	FA	11111010
⊥	⊥	⊥	219	DB	11011011	√	√	√	251	FB	11111011
⊥	⊥	⊥	220	DC	11011100	⊥	⊥	⊥	252	FC	11111100
⊥	⊥	⊥	221	DD	11011101	⊥	⊥	⊥	253	FD	11111101
⊥	⊥	⊥	222	DE	11011110	⊥	⊥	⊥	254	FE	11111110
⊥	⊥	⊥	223	DF	11011111	SP	SP	SP	255	FF	11111111

Appendices

E.1 LANGUAGE CHARACTERS

Language characters are the characters that print out for several foreign languages. These characters are shown in **Table E-1**.

Table E-1 Language Characters

Hex	23H	24H	40H	5BH	5CH	5DH	5EH	60H	7BH	7CH	7DH	7EH
Dec	35	36	64	91	92	93	94	96	123	124	125	126
USA	#	\$	@	[	\	\]	^	~	{	|	}	~
FRENCH	£	§	à	•	ç	§	~	~	é	ù	è	~
GERMAN	#	\$	§	Ä	ö	ü	~	~	ä	ö	ü	ß
UK	£	§	@	[	\	\]	^	~	{	|	}	~
DANISH/ NORWEGN	#	\$	£	Æ	ø	Å	ü	é	æ	ø	ä	ü
SWEDISH/ FINNISH	#	¤	£	Ä	ö	Å	ü	é	ä	ö	ä	ü
ITALIAN	£	§	§	•	ç	é	~	ù	à	ò	è	ì
SPANISH	£	§	§	í	ñ	¿	~	~	•	ñ	ç	~

Note: Danish, Norwegian, Swedish, and Finnish all use the same character set.

E.2 GRAPHICS CHARACTERS

Graphics characters are often used to make graphs and tables. There are two basic types of graphics characters: block and line. **Table E-2** shows block graphics characters and the corresponding decimal values. If you need to convert these values to hexadecimal format, see the conversion tables at the beginning of this appendix.

Table E-2 Block Graphics Characters

Character	Decimal	Character	Decimal
	176		220
	177		221
	178		222
	219		223

Line graphics characters can be combined to print many different shapes. Line graphics are divided into three groups that, when combined, connect to each other correctly. **Figure E-1** shows the three groups with the corresponding decimal values.

218	196	194	210	196	191
┆	┆	┆	┆	┆	┆
|←179	|	|	||←186	|←179	
|←195 -		┆←197	┆←215 -	|←180	
|←179	|	|	||←186	|←179	
┆←198 =		┆←216	┆←206 =	┆←181	
205			205		
┆←192 —	┆←193	┆←208	—	┆←217	
201	205	203	209	187	
┆	┆	┆	┆	┆	
||←186		||←186	|←179	||	
┆←199 —		┆←215 -	┆←197	┆←182	
||←186		||←186	|←179	||	
┆←204 =		┆←206 =	┆←216 =	┆←185	
┆←200 =		┆←202 =	┆←207 =	┆←188	
┆←213 =	┆←184		┆←214 -	┆←183	
|	|←179		||	||←186	
┆←212 =	┆←190		┆←211 -	┆←189	

Figure E-1 Line graphics characters

APPENDIX F GLOSSARY OF TERMS

This glossary provides definitions for commonly-used printer terms. Although they may have other applications, these terms are described as they apply to printers (and sometimes computers).

- Alphanumeric** Designates letters and numbers or other symbols that make up a character set.
- ASCII** An acronym for American Standard Code for Information Interchange, ASCII is a standard set of 256 codes (numbered 0 to 255) used to communicate information between the computer and the printer. Each symbol is represented by a single 7-bit binary number in decimal, hexadecimal, or binary numbers.
- BASIC** A computer language most widely used with microcomputers. There are several different versions of BASIC, depending on the computer you are using, such as Microsoft BASIC, TRS-80 BASIC, IBM BASIC, and Applesoft BASIC.
- Baud** Also called baud rate. Unit of measure (in bits per second) for the speed or rate information is being transmitted. Baud rates are used when communicating through the printer's serial interface. 1200 baud is approximately equal to 120 characters per second. Faster (higher) baud rates mean faster transmission.
- Bidirectional** The ability to print from left to right and then right to left. Printing in both directions increases the time required to print a typical page. (See *unidirectional*.)
- Binary numbers** Part of a numbering system using 1's and 0's, representing the ON and OFF states in a computer's memory. For example, the letter "A" is expressed in binary numbers as 01000001.

Bit	The smallest unit of information in a computer's memory, a bit is a single digit in the binary numbering system. A binary digit may have only two values: 1 or 0.
Bold print	Multi-strike printing which darkens the letter without increasing the line thickness.
Buffer	A storage area in the memory of the printer or computer. The buffer temporarily holds information until it can be processed. For example, the printer's buffer holds information it receives from the computer until it can be printed.
Byte	Eight binary digits that, as a group, express a single character, function, or similar piece of information. For example, the letter "A" is equal to one byte, or eight bits.
Character	A symbol that represents a letter, number, or punctuation mark or a symbol such as #, £ or ¥.
Code	A system or standard set of rules used for communicating information.
Column	A vertical line or set of spaces on a printed page or display screen. A printer that prints 80 characters in a single line is said to print "80 columns."
Control codes	Commands used to tell the printer to perform a function. For example, LF is the control code to perform a line feed.
Control key	A keyboard key that modifies the actions of most other keys. The Ctrl key is used with other keys to determine various functions.
CPI	Meaning characters per inch, CPI is the number of characters printed per inch. CPI is commonly referred to as pitch. Popular print pitches include 10 pitch (10 CPI) and 12 pitch (12 CPI).
CPS	Meaning characters per second, CPS is the number of characters printed per second.

Data	Information sent between two devices such as a computer and printer.
Decimal numbers	The most widely used numbering system used to communicate which is based on 10's. All ASCII codes can be expressed in their decimal format (as well as in hexadecimal or binary formats).
Default	If you do not specify a choice, that printer uses an "automatic" choice, or default, for a particular function, setting, or option. For example, the number of characters per inch usually has a default setting. Settings in effect when you turn on or reset the printer are power-on defaults.
Dot matrix	The grid used to design characters on a dot-matrix printer (or on a graphic display). Each dot corresponds to a wire in the printer's print head. Dots are printed in columns and rows to form the characters on the paper.
ESC	The control code for decimal ASCII 27, ESC is also referred to as the escape code, or simply escape. ESC instructs the printer to interpret the next character, or group of characters, as a control sequence. The keyboard that produces the escape character is called the Escape key.
Font	A complete set of type in one size and style of characters.
Form Feed (FF)	A control character that advances the printer's paper to the top of the next page.
Format	The shape and appearance of printer output, including page size, character width and spacing, line spacing, and so on.
Friction feed	The method of paper handling in which paper is fed through the printer by the pressure of the friction rollers against the platen.
Hexadecimal	A number system of base 16, commonly referred to as hex numbers. Since 16 digits are required for a base-16 number system, hexadecimal uses the digits 0 through 9 and the letters A through F.

Initialize	Reset the printer to its power-on default settings. The printer can be initialized through both hardware and software signals.
Interface	The connection by which electrical signals are transferred from one part of a system to another.
Justify	Printing lines of text that extend evenly to the ends of both the left and right margins. Justification is accomplished by increasing space between words and/or characters.
K	An abbreviation of the Greek word "Kilo," meaning the number 1,000. In computer-related terms, 1K is equal to 1024 characters, and is used to express some type of capacity such as 64K of random access memory (RAM).
Online	When a printer is online, it is ready to receive information and print.
Parallel interface	Transfers the bits that make up a character simultaneously over separate wires (pins). Parallel printer interfaces are generally standardized and easy to operate.
Peripheral	Any device that works with a computer and is controlled by it, such as a printer.
Proportional	The width each character occupies is proportional to its shape. With fixed spacing, each character occupies the same space regardless of its width.
Protocol	The instructions controlling the way data bits are transmitted between the computer and the printer.
RAM	Acronym for Random Access Memory. You can retrieve from or place information into the memory. Your printer uses RAM as a buffer, and to store download character sets and graphics.
Re-boot	The process of restarting a computer. There are two primary ways to re-boot a computer: turning the power switch on or pressing certain keys on the keyboard.

ROM	Acronym for Read-Only Memory. You can retrieve (read) information from the memory but cannot place (write) information into it (as with RAM). Your printer uses ROM to store its standard character set, as well as the operating instructions used by the printer.
Serial interface	Transfers information to a peripheral device along a single wire (although other wires are used to signal whether or not information is being transferred). Serial interfaces allow the use of very long cables between devices such as printers and computers.
Shadow print	One-time printing which darkens a letter by increasing its line thickness.
Software	Programs that control your computer or perform specified tasks such as word processing, database and spreadsheet software. Software is sometimes called application software.
Top-of-form	The very top of a page.
Tractor feed	The method of paper handling in which paper is advanced through the printer using a tractor feed mechanism. The pressure of the friction rollers against the platen is released. The holes on each side of the paper fit over the tractor's pins enabling the tractor to push or pull the paper.
Unidirectional	Printing in one direction only. The print head must return to the margin before the next line is printed. (See <i>bidirectional</i> .)

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