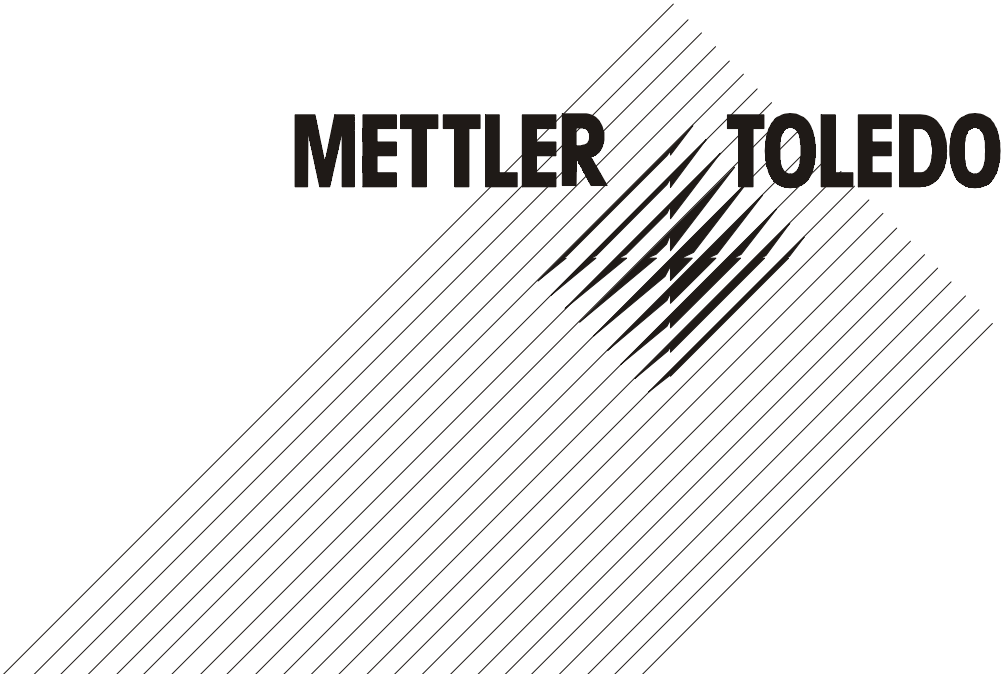

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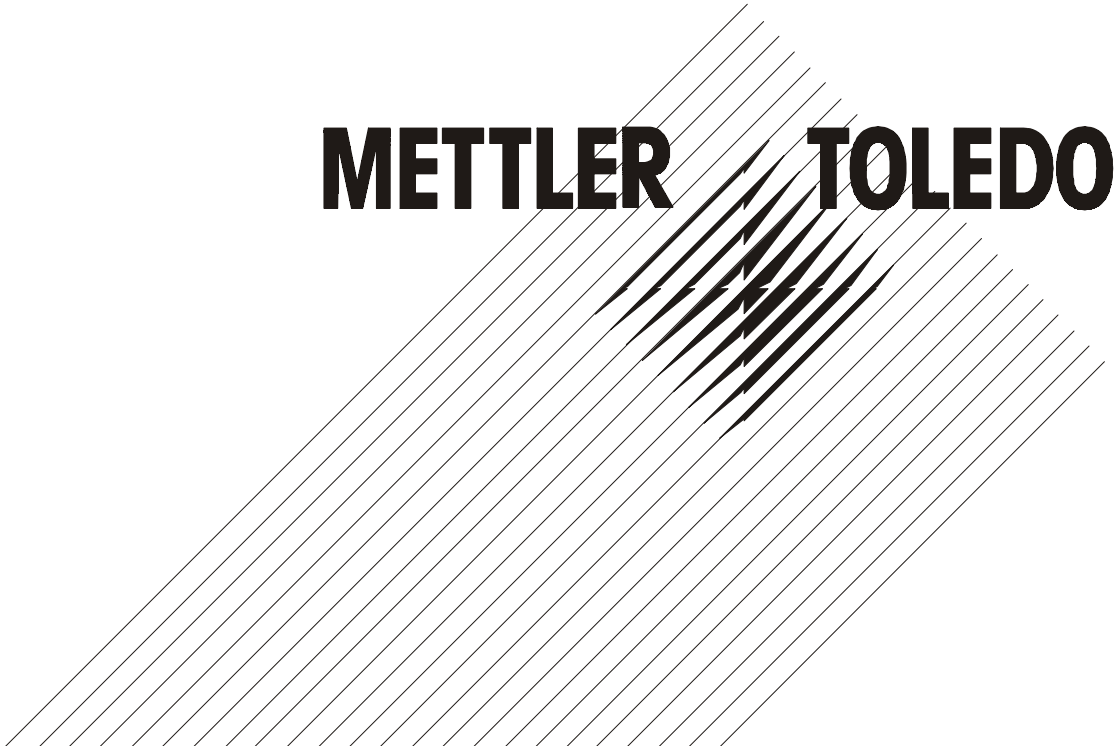
User's Guide

Document No. 377019-A



8846
User's Guide

Document No. 377019
Revision A

METTLER TOLEDO
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Columbus, OH 43240
www.mt.com

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International: (614) 438-4511

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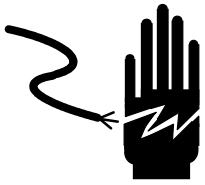
Would you like to learn more about METTLER TOLEDO products and services? Please send requests, comments or suggestions to:

quality_feedback.mtwt@mt.com
or fax us, (Attn: Quality Manager), at 614-438-4355.



⚠ WARNING

THIS PRODUCT IS NOT DESIGNED FOR WASHDOWN OR WET ENVIRONMENTS. TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS PRODUCT TO RAIN, LIQUIDS, OR ANY TYPE OF MOISTURE.

⚠ WARNING!

THIS PRODUCT IS NOT DESIGNED FOR USE IN AREAS CLASSIFIED AS HAZARDOUS BY THE NATIONAL ELECTRICAL CODE (NEC).

DO NOT USE THIS PRODUCT IN COMBUSTABLE OR EXPLOSIVE ATMOSPHERES.

INTERFACE / CABLE OVERVIEW

8846 COMMUNICATION PARAMETERS - RS232 INTERFACE SETTINGS					
	Baud rate	**Parity**	**Data bits**	**Stop bits**	**Handshaking**
Default	**9600**	**Even**	**7**	**1**	**X-on / X-off**
Alternate	150, 300, 600, 1200, 2400, 9600, 19200, 38400	None, odd, even	7, 8, 8M	1 or 2	DTR, X-on / X-off, D/X

COMPLETE INTERFACE INFORMATION IS FOUND IN SECTION 4 OF THIS MANUAL.

RS-232 INTERFACE CABLE MATRIX – 8846 DOCUMENT PRINTER				
Device	**Device Connector**	**REQUIRED CABLE**	**Cable Length**	**Printer Connector**
Cougar, Lynx, Jaguar, JagXtreme, Panther, Panther Plus, Speedweigh, Speedweigh Plus Trimweigh	Terminal block	Factory number 0900-0309-000 Part number 14656000A	15 ft	DB9 male TxD: Pin 3 RxD: Pin 2 Ground: Pin 5 DB9 female to DB25 female adapter included with printer. TxD: Pin 2 RxD: Pin 3 Ground: Pin 7
BC, SC, Hawk, Wildcat	DB9 female TxD: Pin 3 RxD: Pin 2 Ground: Pin 5	Factory number 0900-0255-000 Part number 13191100A	6 ft	
SP, Spider, Viper	DB9 female TxD: Pin 2 RxD: Pin 3 Ground: Pin 5	Factory number 0900-0313-000 Part number 14861800A	15 ft	
8582, 9360, Puma	DB25 TxD: Pin 2 RxD: Pin 3 Ground: Pin 7	Factory number 0900-0243-000 Part number 13230500A	6 ft	
PR, SR, SG	LocalCAN	Part number LC-RS25	6 ft	
PG, PB, SB	DB9 female TxD: Pin 2 RxD: Pin 3 Ground: Pin 5	Part number 1110-1052	3 ft	
ID Terminals	DIN	Part number 503755	10 ft	
SMx	MiniMettler	Part number 33640	6 ft	

REPLACEMENT PARTS	
Description	**Part Number**
Ribbon Cartridge, Black	15948900A

This guide is divided into six sections and five appendixes:

- ✓ Section 1, *Unpacking*, describes how to find a good place for your printer and unpack it.
- ✓ Section 2, *Set Up*, points out the various components you use to operate the printer and describes how to install the tractor, paper support, ribbon cartridge, and printer windows. It also describes how to check the voltage select switch, attach the power cord, turn the printer on, print a self test, adjust the print quality, and attach an interface cable.
- ✓ Section 3, *Loading Paper*, describes how to load various kinds of media into the printer, including single sheets, pin-feed paper, multipart forms, labels and transparencies.
- ✓ Section 4, *Control Panel*, describes how to use the control panel.
- ✓ Section 5, *Cleaning and Maintenance*, describes how to keep your printer in good shape and how to replace the ribbon cartridge, fuse, and expansion cartridge.
- ✓ Section 6, *Solving Problems*, describes printer messages, provides a troubleshooting guide, and shows how to run printer tests.
- ✓ Appendix A, *Specifications*, lists printer specifications.
- ✓ Appendix B, *Bar Codes*, provides information on printing bar codes.
- ✓ Appendix C, *Interfaces*, provides technical information on the parallel and serial interfaces of the printer.
- ✓ Appendix D, *Code Sets*, describes the printer's code sets.

Conventions

Some of the procedures in this guide contain special notices that highlight important information:

☞	**Notes**	Indicate information that you should know to help your printer run properly and efficiently.
✋	**Cautions**	Indicate guidelines that, if not followed, can cause damage to equipment.
⚠	**Warnings**	Indicate a situation where there may be a danger to yourself.

The use of the terms *right* and *left* assume that your are looking at the front of the printer.

Technical Support

If you have a problem with your printer, refer to the *Solving Problems* section for troubleshooting information. If you are unable to solve the problem yourself, contact the distributor that sold you the printer. The distributor should be able to assist you or tell you where to find additional help.

Trademarks

Copyright

DECLARATION OF CONFORMITY
Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Conformiteitsverklaring
Dichiarazione di conformità

METTLER TOLEDO

We/Wir/Nous/Wij/Noi: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
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verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilitá, che il prodotto,

Model/Type: 8846 Printer

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
Al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
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in combination with a indicating terminal produced by Mettler-Toledo is in conformity with the following directives and standards.

Council directive on the harmonization of the laws of the Member states:	**standards:**
relating to non-automatic weighing instruments (90/384/EEC) amended by directive (93/68/EEC)	EN 45501
relating to electromagnetic compatibility (89/336/EEC) amended by directive (93/68/EEC; 92/31/EEC)	EN 55022; class B EN 55024; class B EN 6100-3-2 EN 61000-3-3
relating to electrical equipment designed for use within certain voltage limits (73/23/EEC amended by directive (93/68/EEC)	EN 60950: 1992/A1:93, A2:93, A3:95, A4:97, A11:97

Worthington, Ohio USA, May, 2000 **Mettler-Toledo, Inc.**

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures

P/N 377020A According to EN 45014

Instruction to the User

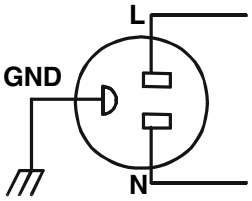
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

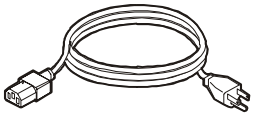
In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to this equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Power Precautions

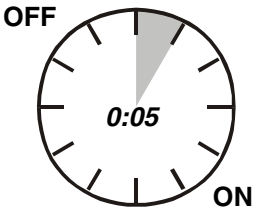
When installing and using the printer, be sure to take the following precautions:



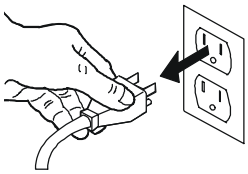
✔ Use the appropriate power supply and voltage frequency. Be sure to check the voltage label at the rear of the printer before operating the printer.



✔ Make sure the *total* length of the power cord does not exceed 16.4 feet (5 meters). Using a longer power cord can result in reduced voltage and possible malfunctions. Do not use an extension cord.



✔ After turning the power off, always wait at least five seconds before turning it back on.

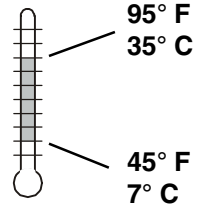


✔ In case of smoke, odd smells, or other trouble, unplug the power cord. Do not place furniture or other obstacles in front of the outlet.

Caution: When unplugging the power cord, pull the plug, not the cord.

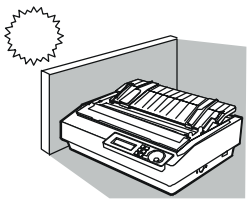
Operating Precautions

When installing and using the printer, be sure to take the following precautions:

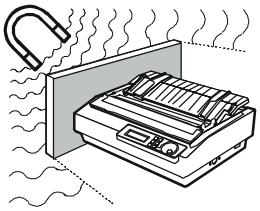


✔ Use the printer only within the following temperature and humidity ranges:

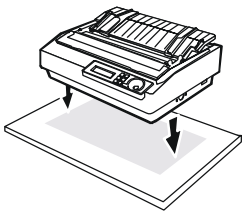
Ambient temperature: 7° to 35° C (45° to 95° F)
Relative humidity: 10% to 85% noncondensing



✔ Avoid direct sunlight. Use a blind or heavy curtain to protect the printer from direct sunlight when the printer is near a window.

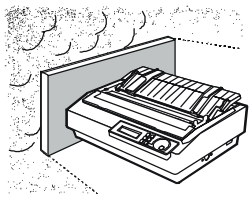


✔ Do not install the printer near devices that contain magnets or generate magnetic fields.

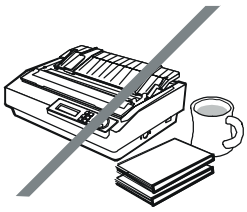


✔ Place the printer on a flat, horizontal surface. Protect the printer from strong physical shocks and vibrations. Lift the printer from underneath and on both sides.

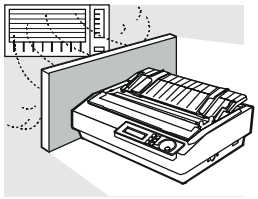
Operating Precautions—continued



✔ Keep the printer clean. Dust accumulation and paper fiber deposits can cause the printer to function improperly.



✔ Do not place cups, books or other objects on top of the printer. Be careful not to hang jewelry, clothes or hair near the paper entry slots.



✔ Do not install the printer near an air conditioner.

Contents

Figures and Tables

Figures

Tables

Section

1

Unpacking

This section describes how to select a good place for the printer and how to unpack it. If the printer is already set up, you can skip to the next section.

Selecting a Good Place for the Printer

When selecting a place for your printer, observe the following guidelines:

- ✓ The site must be large enough to accommodate the printer. The site must be at least 17 inches (43 cm) wide by 13 inches (33 cm) deep.
- ✓ The printer must be close enough to the computer for your cable to reach: 10 feet (3 meters) for parallel or 50 feet (15 meters) for serial.
- ✓ The printer must be on a flat, solid surface—never on a chair or any other unstable support.
- ✓ Choose a place that is clean and free from excessive heat (including direct sunlight), moisture, and dust.
- ✓ Use a grounded outlet—one that has three holes to match the power plug on the printer. Don't use an adapter plug or an extension cord.

Selecting a Good Place for the Printer—continued

- ✓ Avoid outlets on the same circuit with large motors, such as copiers or postage machines, or other appliances that might disturb the power supply.
- ✓ Leave several inches of empty space in front, behind, and on both sides of the printer for good air flow.
- ✓ Leave proper clearances for your paper loading needs.

Unpacking the Printer

To unpack the printer, use the following procedure:

1. Cut the packing tape and open the shipping carton.
2. Remove the components that are packed on top and around the printer.
3. Grasp the front and back edges of the printer and lift the printer out of the shipping carton.
4. Remove the foam end caps and place the printer on the site you selected.
5. Remove the protective plastic covering from the printer.
6. Verify that you have all of the items shown in figure 1-1. If anything is missing or damaged, contact the distributor that sold you the printer.
7. Be sure to save all of the packing materials in case you need to ship or store the printer later.

Unpacking the Printer—continued

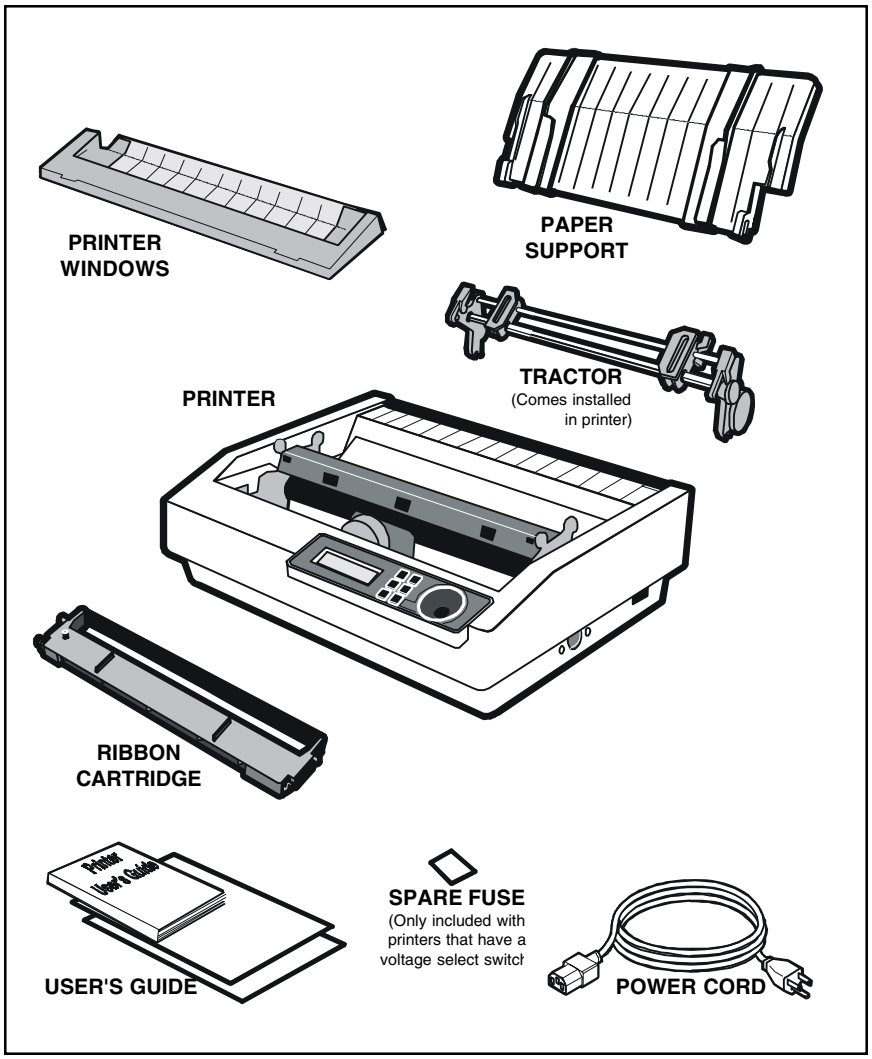


Figure 1-1. Unpacking the Printer

Removing Internal Packing

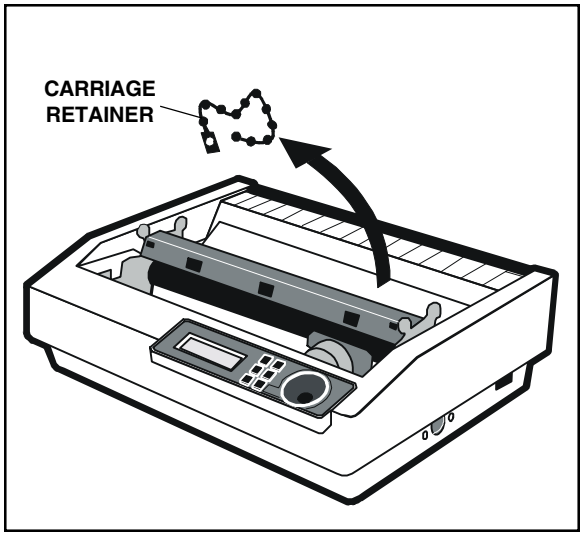


Figure 1-2. Removing the Carriage Retainer

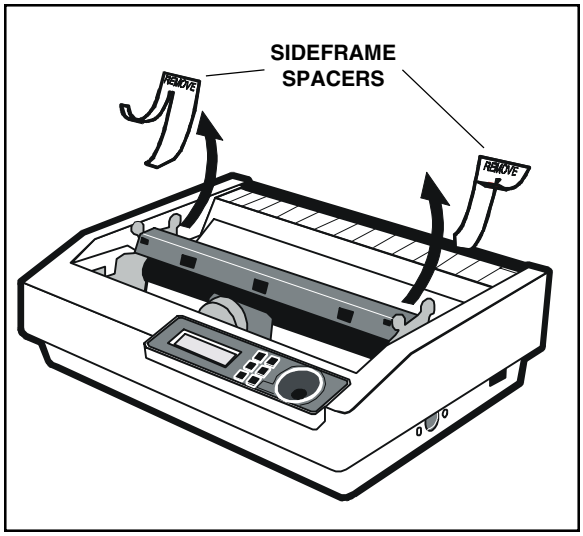


Figure 1-3. Removing the Sideframe Spacers

To remove the internal packing, use the following procedure:

1. Lift up on the printer windows and remove them.
2. Unsnap and remove the plastic, beaded retainer that secures the carriage to the printer chassis, as shown in figure 1-2.
3. Remove the sideframe spacers, as shown in figure 1-3.

Be sure to save the internal packing materials with the rest of the packaging in case you need to ship or store the printer later.

Section

2

Set Up

This section points out the various printer components that you use to operate the printer and describes how to install the paper support, ribbon cartridge, printer windows, and forms tractor. This section also describes how to check the voltage select switch and fuse, attach the power cord, turn the printer on and off, print a self test, adjust the print quality, attach the interface cable, and set communications parameters.

Introducing Printer Components

You should familiarize yourself with the printer components that are shown in the figures on the following pages. They are referred to in the procedures throughout this guide.

Introducing Printer Components—continued

PAPER SUPPORT

Supports single sheets as they enter printer

PAPER EDGE GUIDES

Guide sheets into the printer

PRINTER WINDOWS

Reduces noise and keeps dirt and dust out of the printer

PAPER SELECT LEVER

Lets you engage and disengage the forms tractor

SELECT-DIAL CONTROL PANEL

Provides easy setup and configuration of the printer

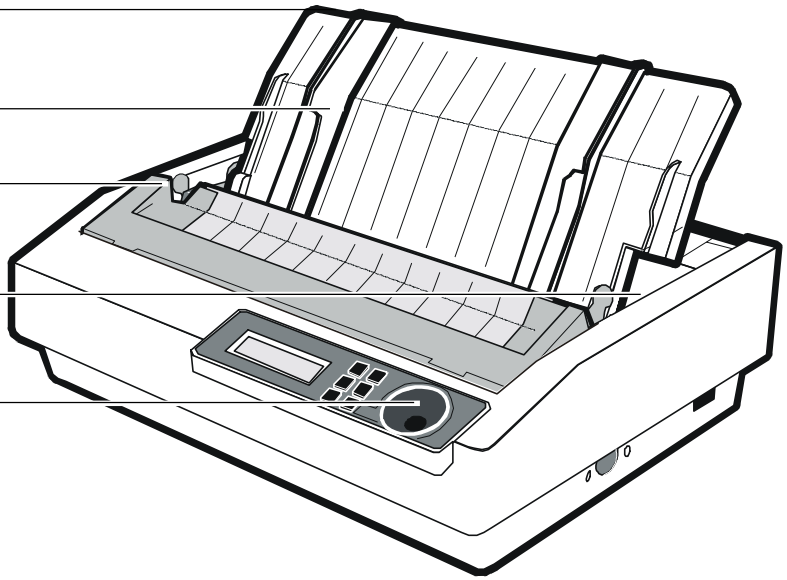


Figure 2-1. Printer Components, Front

Introducing Printer Components—continued

PAPER SCALE
Provides an easy way to align paper

PAPER THICKNESS LEVER
Moves the printhead closer to or farther from the paper to optimize print quality

RIBBON SPINDLE
Engages the sprocket on the ribbon cartridge to advance the ribbon

CARRIAGE
Carries the printhead from side-to-side

PRINTHEAD
Impacts the ribbon and paper to produce printed images (has 24 pins for high-quality printing)

RIBBON CARTRIDGE
Holds the continuous-loop inked ribbon and is user replaceable

2-POSITION FORMS TRACTOR
Moves pin-feed paper through the printer

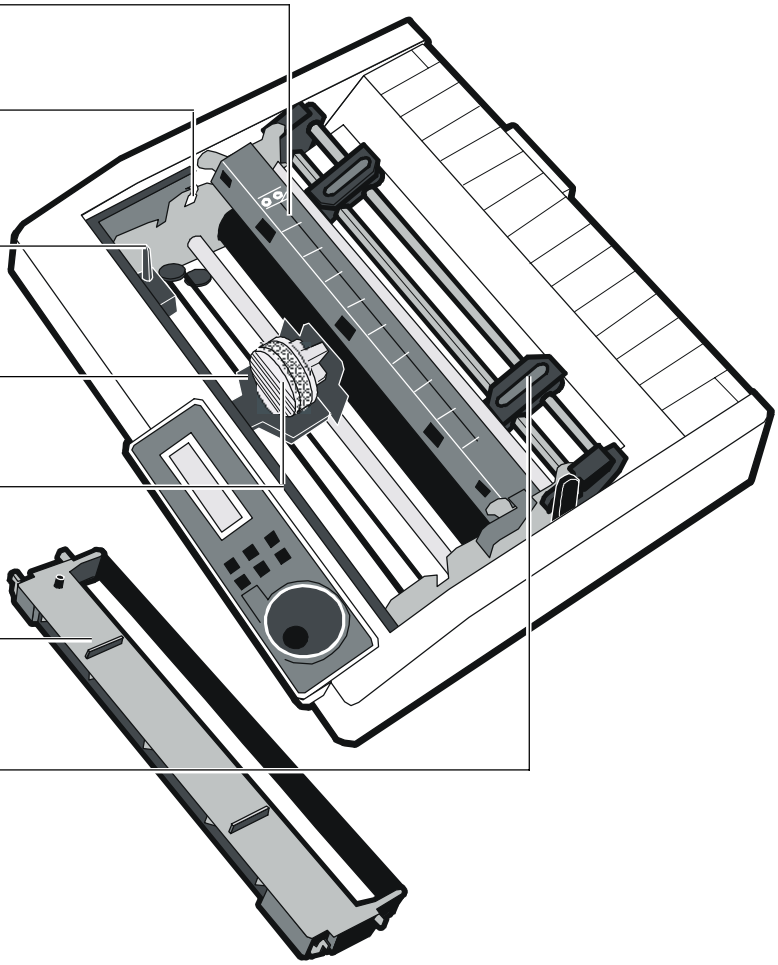
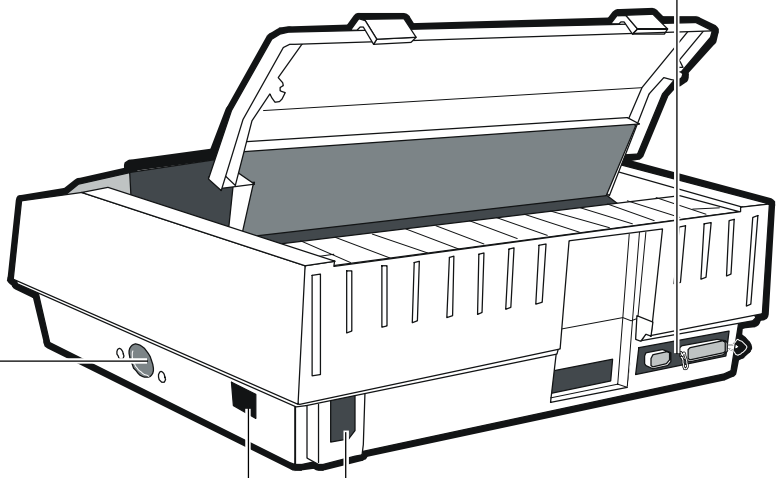


Figure 2-2. Printer Components, Internal

Introducing Printer Components—continued

INTERFACE CONNECTORS

Receives parallel and serial interface cables



OPTIONAL VOLTAGE SELECT

Lets you set up the printer to receive U.S. or international input power

POWER SWITCH

Lets you turn the printer on and off

AC POWER RECEPTACLE

Receives the power cord

Figure 2-3. Printer Components, Rear

Installing the Paper Support

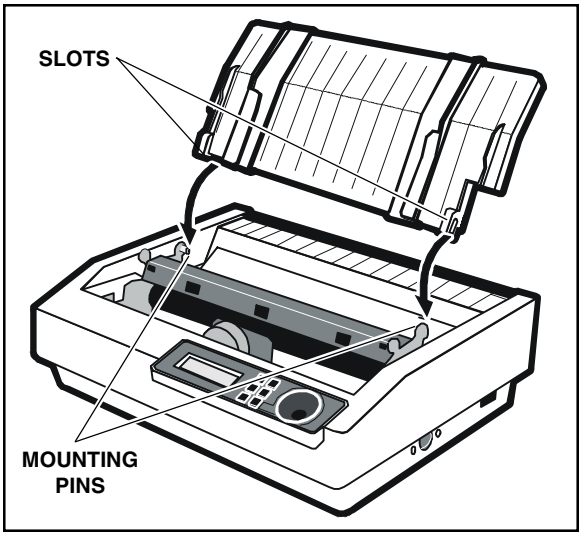


Figure 2-4. Installing the Paper Support, Raised

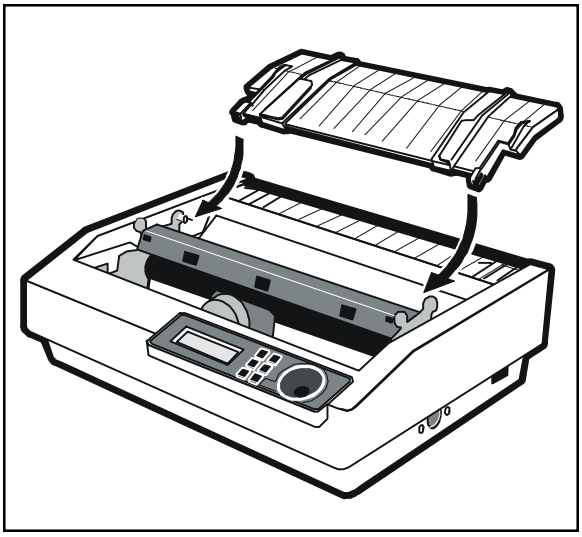


Figure 2-5. Installing the Paper Support, Lowered

The paper support with adjustable edge guides attaches to the printer to guide cut sheets into the printer. You should position the paper support into the *raised* position when using cut sheets and into the *lowered* position when using pin-fed paper.

To install the paper support, perform the following procedure:

1. If the windows are installed on the printer, pull the top window towards the front of the printer.
2. Slide the paper support slots onto the mounting pins, as shown in figures 2-4 and 2-5.

Installing the Ribbon Cartridge

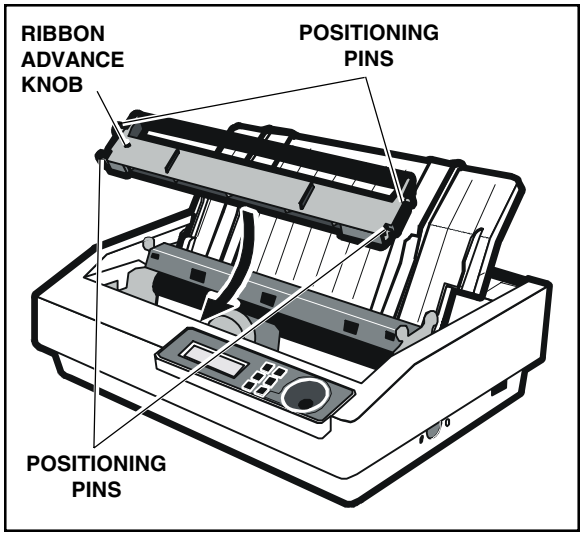


Figure 2-6. Installing the Ribbon Cartridge

The printer uses a ribbon cartridge containing a continuous-loop, inked ribbon. When printing becomes too light, you should replace the whole cartridge.

To install a ribbon cartridge in the printer, perform the following procedure:

1. Make sure the printer is turned off. If the window is installed on top of the printer, lift up and remove it.
2. Slide the printhead towards the center of the printer.
3. Move the paper thickness lever to the third or fourth *click* from the platen.
4. If a ribbon cartridge is already installed, lift it up and out of the printer.
5. Remove a new ribbon cartridge from its packaging and turn the ribbon advance knob *counterclockwise* to remove any slack in the ribbon fabric.
6. Lower the ribbon cartridge down into place, as shown in figure 2-6. Make sure that the positioning pins on the ends of the cartridge are in the mounting slots on the printer frame and that the ribbon sprocket on the bottom of the cartridge is mounted on the spindle.

Installing the Ribbon Cartridge—continued

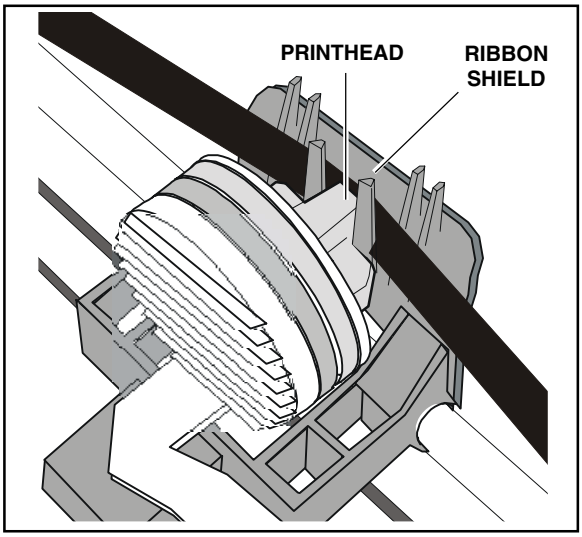


Figure 2-7. Threading the Ribbon

☞**Note:** You may need to turn the ribbon advance knob slightly so that the ribbon sprocket on the bottom of the cartridge will mesh with the spindle.

7. Carefully slip the exposed ribbon fabric between the tip of the printhead and the ribbon shield, as shown in figure 2-7.
8. Slide the printhead from side-to-side to tighten the ribbon. Make sure that the ribbon advances smoothly and that there are no snags.
9. Replace the window (refer to *Installing the Printer Window* later in this section).

Installing the Printer Window

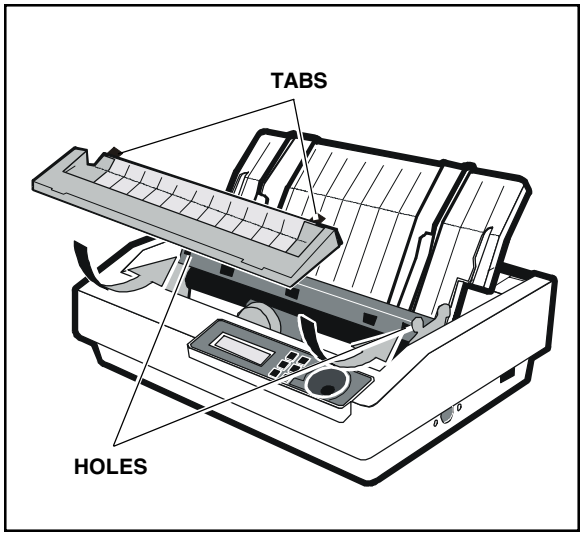


Figure 2-8. Installing the Printer Windows

The printer window reduces noise and keeps out dust. To install the printer window, insert the tabs on the window into the mounting holes on the platen cover, as shown in figure 2-8.

To remove the printer window, tilt up the windows slightly and pull them towards you until the tabs detach from the mounting holes.

Installing the Forms Tractor

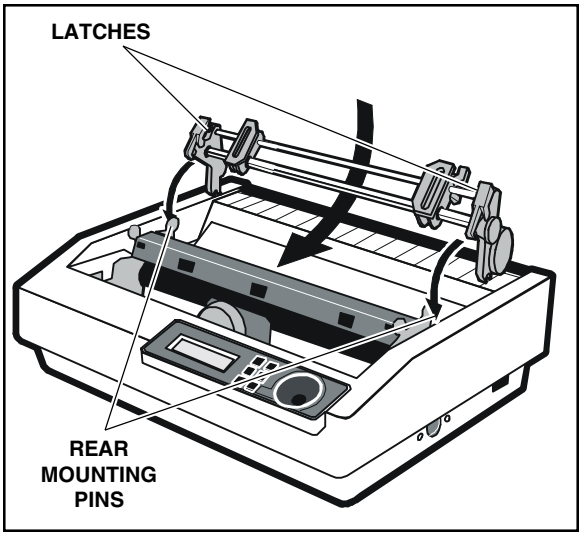


Figure 2-9. Installing the Tractor, Rear Feed

The printer comes with a detachable forms tractor that you use to feed pin-feed paper. You can install the forms tractor in two different positions, depending on whether you want to feed paper from the *rear* or *bottom* of the printer. When you feed paper from the rear, the forms tractor *pushes* the paper into the printer, around the platen, and then out the top. When you feed paper from the bottom, the forms tractor *pulls* the paper through the slot in the bottom of the printer, in front of the platen, and then out the top.

To install the forms tractor for paper feeding from the *rear*, perform the following procedure:

1. If the paper support is installed, lift up and remove it.
2. Position the forms tractor over the top rear of the printer and lower it into place, as shown in figure 2-9. The forms tractor will locate and engage onto two mounting pins down inside the printer.
3. While pushing down on the forms tractor, rotate the forms tractor towards the front of the printer until the latches snap onto the rear mounting pins, as shown in figure 2-9.
4. Replace the paper support.

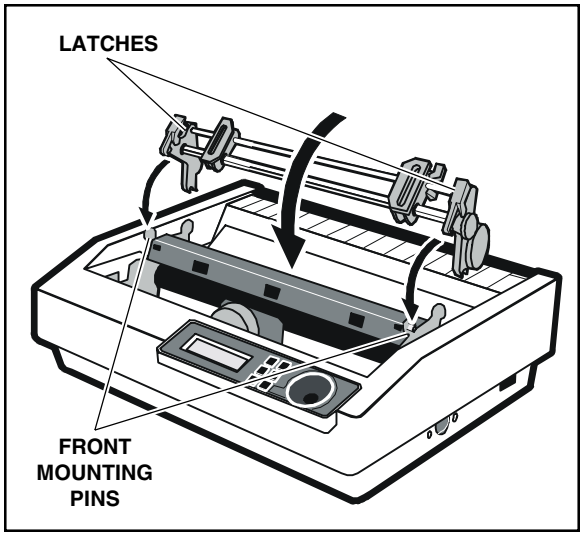


Figure 2-10. Installing the Tractor, Bottom Feed

Feeding paper from the *bottom* is recommended while printing on labels, multipart forms, thick paper, or any other media that does not bend easily.

To install the forms tractor for paper feeding from the *bottom*, use this procedure:

1. If the paper support is installed, lift up and remove it.
2. Position the forms tractor over the top center of the printer and lower it onto the two rear mounting pins.
3. While pushing down on the forms tractor, rotate the forms tractor towards the front of the printer until the latches snap onto the front mounting pins, as shown in figure 2-10.
4. Replace the paper support.

To remove the forms tractor, just press down on the tractor latches. This unlatches the forms tractor from the mounting pins. You can then lift the forms tractor out of the printer.

Checking the Voltage Select Switch and Fuse

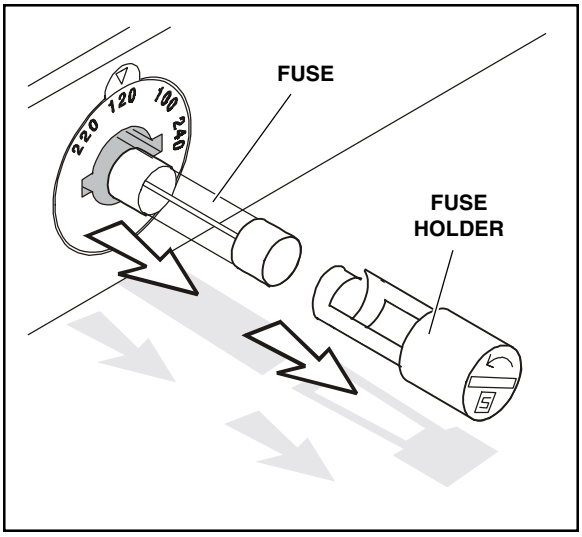


Figure 2-11. Removing the Fuse

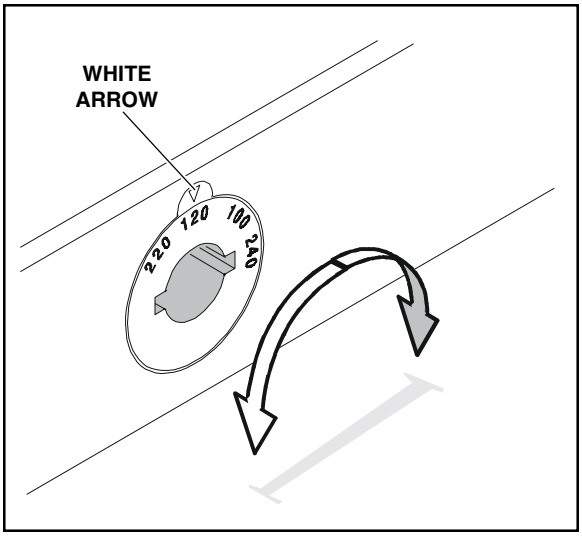


Figure 2-12. Setting the Voltage Select Switch

Some printers contain an *optional* switching power supply that enables the printer to receive U.S. or international input voltage. If so, the printer also contains a voltage select switch. If your printer does not have a voltage select switch, the following information does not apply to you.

The switch is located on the lower right side near the power switch.

Caution: Before plugging in the power cord, make sure the voltage select switch is set to the correct AC input voltage for your installation.

If the voltage select switch is set incorrectly, perform the following procedure to reset the switch and check the fuse:

1. Unplug the power cord.
2. Use the edge of a coin to push in and turn the fuse holder counterclockwise until it pops out of the voltage select switch, as shown in figure 2-11.
3. Use the edge of a coin to turn the voltage select switch as needed to position the desired AC voltage number under the white arrow, as shown in figure 2-12.

Checking the Voltage Select Switch and Fuse—continued

4. Make sure you have the correct fuse. The serial number label (on the rear of the printer) shows the correct fuse rating for the printer.

5. Place a fuse with the proper rating back into the fuse holder and reinstall the holder into the voltage select switch.

You are now ready to attach the power cord and turn on the printer.

⚠ **Warning:** The AC power cord is the primary means of disconnection. The AC power cord should be plugged into an accessible outlet and *must be* disconnected before servicing.

Attaching the Power Cord

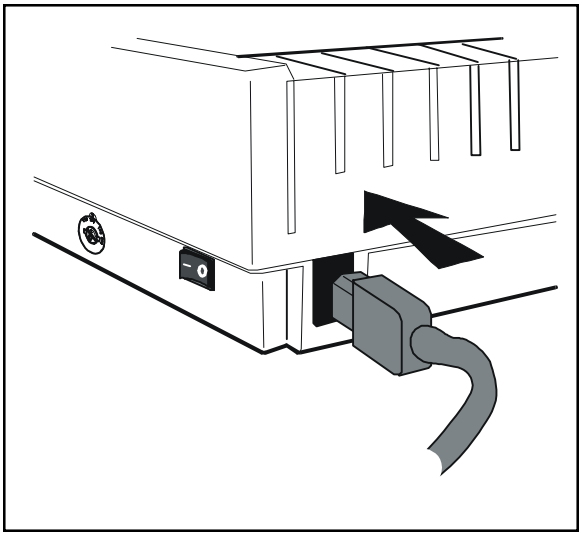


Figure 2-13. Attaching the Power Cord

To attach the power cord to the printer, use the following procedure:

1. Make sure the power switch is off.
2. Take the power cord and plug the three-hole connector into the power receptacle at the rear of the printer, as shown in figure 2-13.
3. Plug the three-prong connector at the other end of the power cord into a properly grounded AC power outlet.

Turning the Printer On and Off

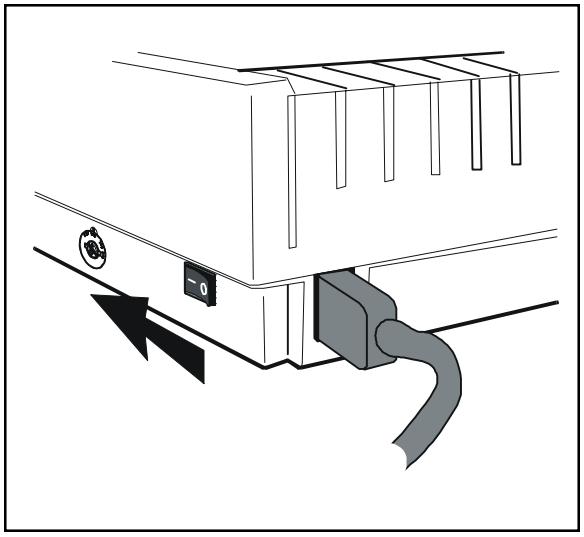


Figure 2-14. Turning On the Printer

To turn on the printer, set the power switch to the **I** position, as shown in figure 2-14.

To turn off the printer, set the power switch to the **O** position.

Cautions:

- ✓ Do not unplug the power cord with the printer turned on.
- ✓ Wait at least five seconds after turning off the printer before turning it back on.

Printing a Self Test

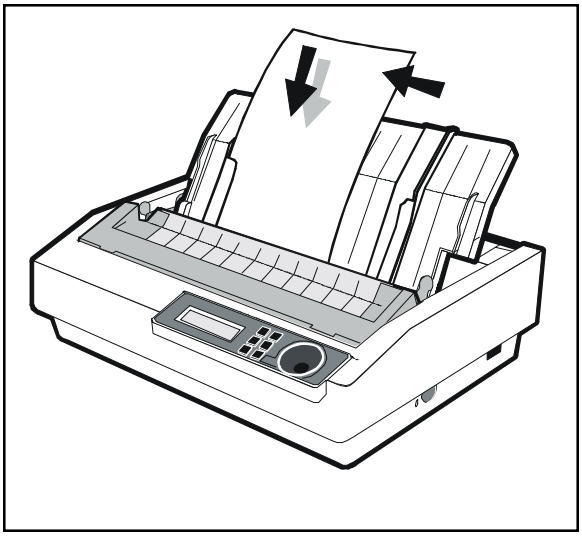


Figure 2-15. Loading a Cut Sheet

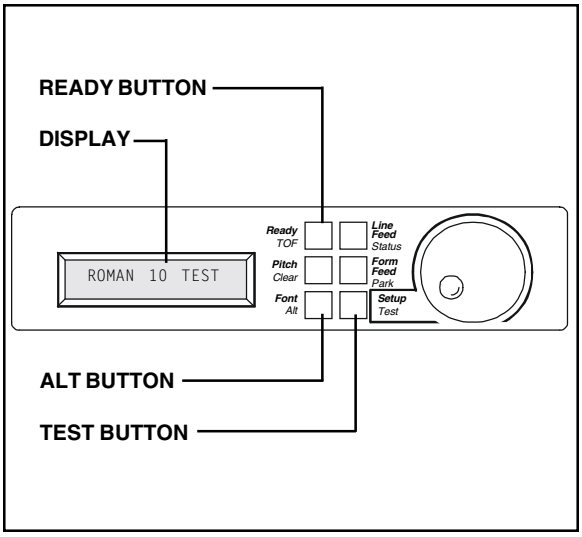


Figure 2-16. Printing a Self Test

Self test lets you verify normal printing operation and inspect print quality. You should print a self test after installing the printer, after preventive maintenance, after extended periods of inactivity, and during troubleshooting when applicable.

To print a self test, perform this procedure:

1. With the paper support raised, set a sheet of paper between the paper edge guides, as shown in figure 2-15. Make sure the left paper edge guide is aligned with the "0" mark ( ) on the ruler and that the right paper edge guide is against the right side of the paper.
2. Hold down the Alt button and press the Test button. The TEST message displays and the self test pattern prints.
3. To stop the self test, press the Ready button. The printer will stop printing after completing the current line and the PAUSE message will appear.
4. Inspect the printout. Make sure the characters are dark and crisp. If necessary, perform the procedure for *Adjusting the Print Quality* later in this section.

Adjusting the Print Quality

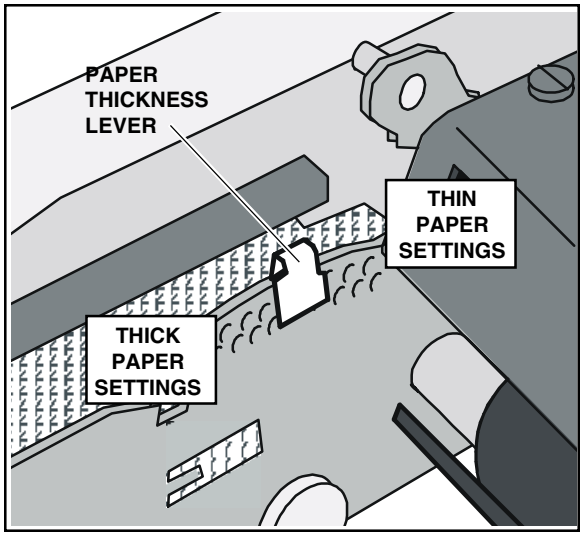


Figure 2-17. Setting the Paper Thickness Lever

The paper thickness lever (see figure 2-17) moves the printhead closer to or farther from the paper, which lets you optimize the print quality for different paper thicknesses. As you move the paper thickness lever, the printhead moves in the same direction. Be sure to pull the paper thickness lever toward the *front* of the printer when using thick paper or multipart forms, and toward the *rear* of the printer when using thin paper. If the printhead is too close to the paper, smearing results. If the printhead is too far from the paper, light printing results.

To adjust the print quality, use the following procedure:

1. Remove the printer window and print a self test. Inspect the print quality.
2. If printing is smeared or smudged, move the paper thickness lever farther from the paper. If printing is light, move the lever closer to the paper.
3. Repeat steps 1 and 2 until print quality is optimized.

Caution: Printing with the printhead too close to the paper can damage the ribbon and adversely affect printhead life. When using a new printhead, *do not use the two thinnest paper settings*. These settings move a new printhead too close to the paper for optimal print quality and maximum printhead life. Over time, as your printhead begins to wear, you may then begin using these two thin paper settings.

Attaching the Interface Cable

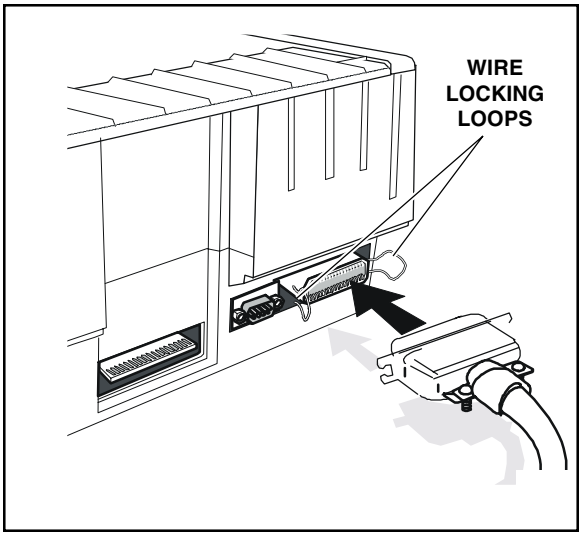


Figure 2-18. Connecting the Parallel Cable

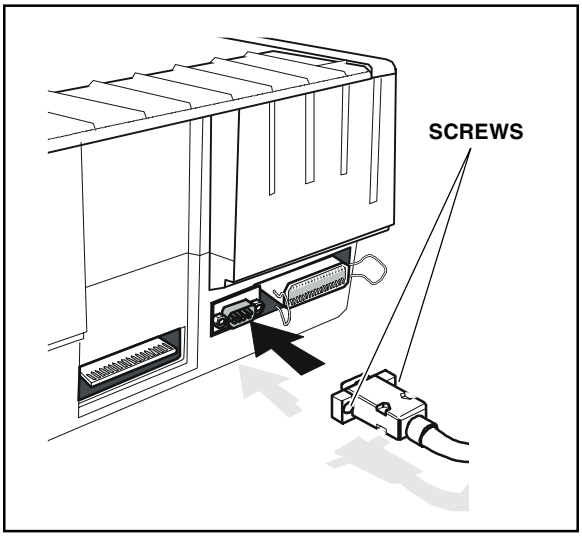


Figure 2-19. Connecting the Serial Cable

The printer has a Centronics®-compatible parallel interface and an EIA RS-232-C-compatible serial interface for communications with computers.

The printer does not come with an interface cable, since the correct cable to use depends on your computer. If you are going to use the parallel interface, the cable must have a 36-pin male Centronics-type connector on the printer end. If you are going to use the serial interface, the cable must have a 9-pin female DB-9 connector on the printer end. The *Interfaces* appendix provides more details.

To connect an interface cable, use the following procedure:

1. Make sure that both your computer and printer are turned off.
2. If you are going to use the parallel interface, plug a parallel cable into the parallel receptacle (see figure 2-18) and lock it into place with the wire locking loops. If you are going to use the serial interface, plug a serial cable into the serial receptacle (see figure 2-19) and use a small slotted screwdriver to tighten the screws that secure the cable to the printer.
3. Connect the other end of the interface cable to the appropriate connector on your computer.

Setting Communications Parameters

METTLER TOLEDO 8846 printers come ready to automatically switch between the parallel and serial ports. To use the parallel port on any model, no further action is necessary. If you want to use the serial interface, however, you may need to first set the serial communications parameters on the printer's Setup menu. You'll need to set them so that they match the serial protocol that your computer uses.

The serial communications parameters consist of the following:

- ✓ *Interface.* (automatic switching).
- ✓ *Baud Rate.* Lets you specify the serial baud rate (that is, the speed of data transmission) that your computer uses.
- ✓ *Parity.* Lets you specify the method of parity error checking that your computer uses.
- ✓ *Data Bits.* Lets you specify the number of data bits in each serial data byte sent from your computer.
- ✓ *Stop Bits.* Lets you specify the number of stop bits in each serial data byte sent from your computer.
- ✓ *Handshake.* Lets you specify the handshaking protocol (that is, the method of printer busy notification) that your computer recognizes.

Refer to the *Control Panel* section of this guide for more information on setting communications parameters.

Section

3

Loading Paper

This section describes how to load various kinds of media into the printer, including single sheets, pin-feed paper, envelopes, multipart forms, labels, and transparencies.

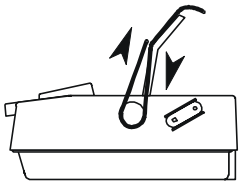
Choosing Paper

The printer can accommodate many different sizes and types of media:

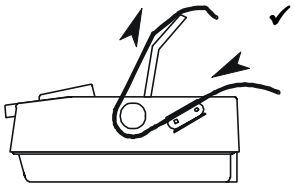
- ✓ Media can be from 3 to 12 inches wide. Single sheets must be at least 2 inches long.
- ✓ Multipart forms can have up to five parts with carbons (0.017 inch maximum thickness).
- ✓ Labels and transparencies must also conform to the preceding dimensions. Transparencies require an ink-absorbent coating and paper backing sheets. You can purchase dot-matrix transparency material at most computer and printer supply outlets.

Paper Paths

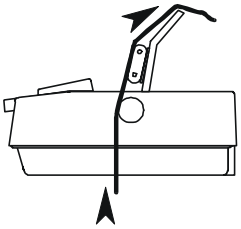
The printer has separate paper paths that you can use to load various types of paper.



- ✓ *Top path.* You use this path to feed single sheets and forms. You can load sheets manually or with an optional sheetfeeder option.



- ✓ *Rear path.* You use this path to feed one- or two-part pin-feed media. This path supports paper movement in both directions.



- ✓ *Bottom-feed path.* You use this path to feed pin-feed media from the bottom of the printer. This bottom path is ideal for thick multipart forms that do not bend easily.

Selecting a Paper Path

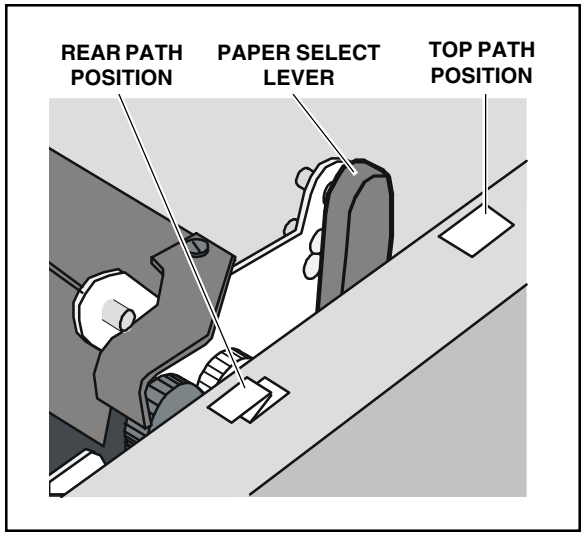


Figure 3-1. Setting the Paper Select Lever

The paper select lever lets you activate the various paper paths:

- *Top path position:* When the lever is toward the back of the printer, the *top* paper path is selected.
- *Rear path position:* When the lever is toward the front of the printer, the *rear* and *bottom* paper paths are selected.

Loading Single Sheets

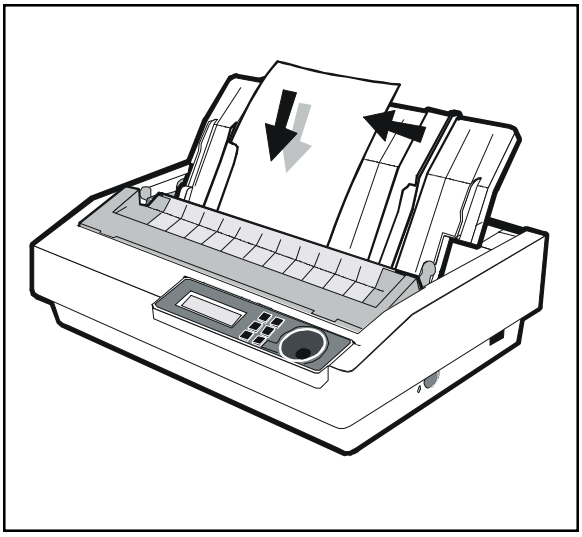


Figure 3-2. Loading a Single Sheet

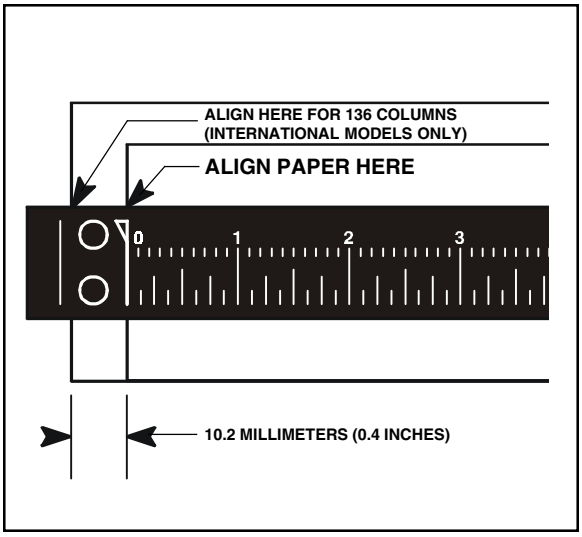


Figure 3-3. Aligning Paper in the Printer

You load single sheets from the top of the printer. After loading a sheet, the printer automatically positions the sheet to the first printable line. After printing, the printer ejects the sheet. If the printer has more information to print, the LOAD PAPER message appears on the control panel display to notify you.

To load a single sheet, use this procedure:

1. Make sure that the paper select lever is in the top path position ( ) and that the paper support is raised.
2. Slide the left paper edge guide on the paper support so that it aligns with the "0" mark ( ) on the paper scale, as shown in figure 3-2.

   ☞**Note:** If your printer is an international model (that is, it requires 220 vac input power) and you are going to print 136 columns across the page, you should slide the left paper edge guide about 10.2 millimeters (0.4 inch) to the left of the "0" mark on the paper scale, as shown in figure 3-3.
3. Set a single sheet into the left paper edge guide and slide the right paper edge guide up against the right edge of the paper, as shown in figure 3-2.
4. You are now ready to feed the paper into the printer. Do this manually by pressing the Form Feed button on the control panel, or automatically by sending data to the printer from your computer.

You can load single sheets with pin-feed paper already loaded, provided that the pin-feed paper is in the *parked* position. You'll learn more about *paper park* later in this section. With a sheetfeeder option, you can load single sheets continually without operator intervention. For information on installing and operating a sheetfeeder option, refer to the *User's Guide* that came with the option.

Positioning a Single Sheet

If necessary, you can reposition a single sheet after loading it. To do so, press the Ready button to disable printing. Then, turn the Select-dial either *clockwise* to advance the sheet or *counterclockwise* to reverse feed the sheet. Then, press the Ready button again to enable printing.

Ejecting a Single Sheet

The printer ejects a single sheet under any of the following conditions:

- ✓ When instructed by your software application.
- ✓ When printing reaches the last print line on the page.
- ✓ When printing reaches the number of lines you or your software application specified for a page.
- ✓ When automatic form feeding is on and printing reaches a half-inch from the bottom of the page.
- ✓ When you press the Form Feed button on the control panel.

Loading Pin-Feed Paper From the Rear

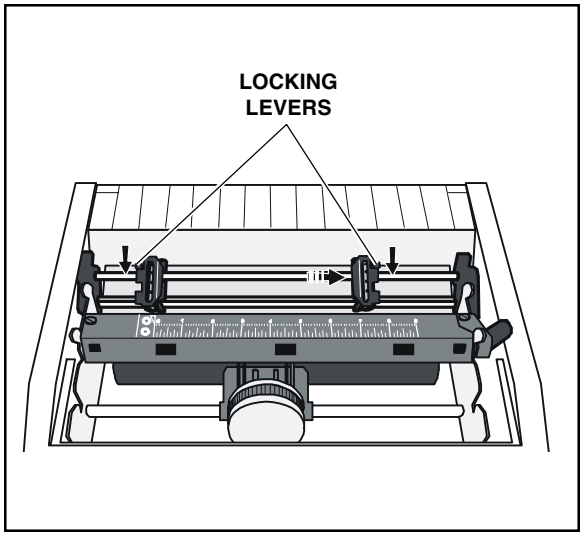


Figure 3-4. Unlocking the Tractors

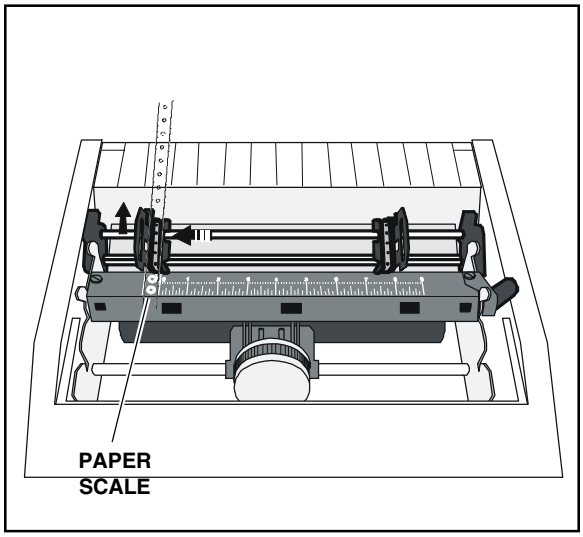


Figure 3-5. Aligning & Locking the Left Tractor

To load pin-feed paper from the rear, use the following procedure:

1. Set the paper select lever to the rear path position ( ).
2. Remove the paper support.
3. Make sure that the forms tractor is installed for rear feeding.
4. Unlock both tractors by moving the lock-ing levers, as shown in figure 3-4.
5. Slide the left tractor as needed so that the pin belt aligns with the circles on the paper scale ( ). Then, lock the left trac-tor into place, as shown in figure 3-5.

   ☞**Note:** If your printer is an inter-national model (that is, it requires 220 vac input power) and you are going to print 136 columns across the page, slide the left tractor about 10.2 millimeters (0.4 inch) to the left of the circles on the paper scale and lock it into place.
6. Open both tractor doors, as shown in figure 3-5.

Loading Pin-Feed Paper From the Rear—continued

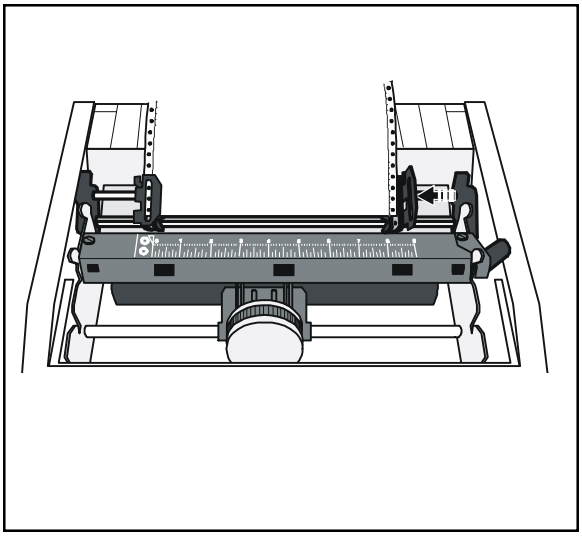


Figure 3-6. Mounting the Paper

7. Mount the paper onto the first three pins of both pin belts, as shown in figure 3-6, and close the tractor doors. You may need to slide the right tractor left or right as needed until its pin belt aligns with the paper holes.
8. Slide the right tractor as needed to make the paper just slightly taut between the tractors, as shown in figure 3-7. Then, lock the right tractor into place.

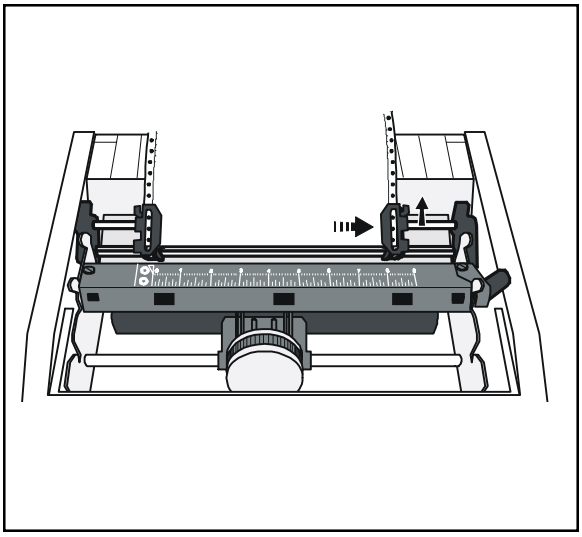


Figure 3-7. Aligning & Locking the Right Tractor

Loading Pin-Feed Paper From the Rear—continued

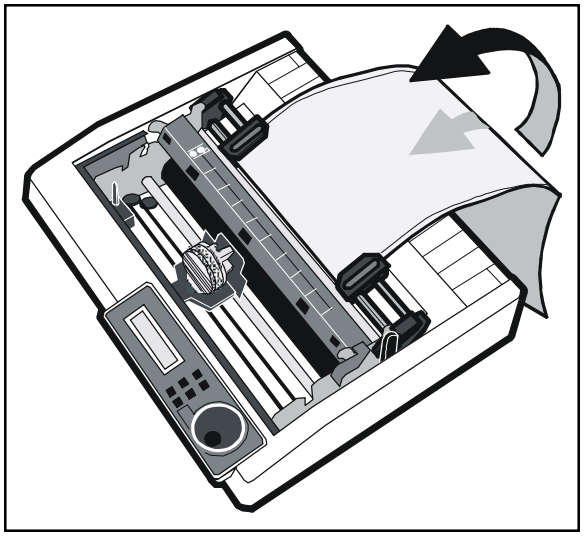


Figure 3-8. Loading Paper From Behind & Below

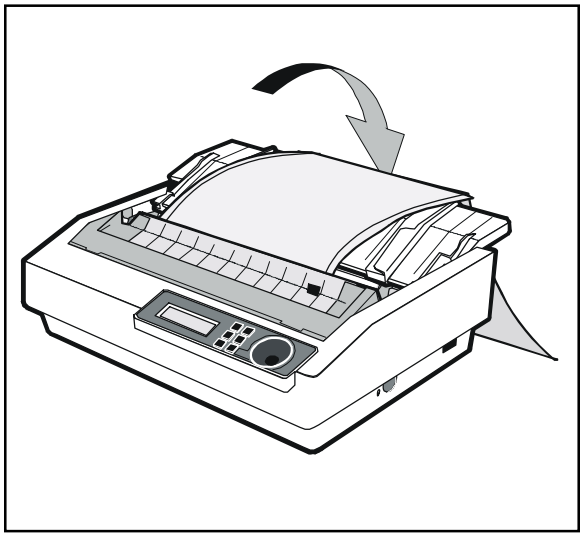


Figure 3-9. Directing Pin-Feed Paper to the Rear

☞**Note:** Always load pin-feed media from behind and below the tractors, as shown in figure 3-8.

9. Install the paper support in the lowered position, as shown in figure 3-9.
10. You are now ready to feed the paper into the printer. Do this manually by pressing the Form Feed button on the control panel, or automatically by sending data to the printer from your computer.

☞**Note:** Always direct pin-fed media to the rear of the printer, as shown in figure 3-9.

☞**Note:** You may need to adjust the paper thickness lever, especially if this is an initial installation or you loaded paper of a different thickness than was used previously.

Positioning Pin-Feed Paper

Although it is usually unnecessary, you can move pin-feed paper forward or backward after loading it. To move pin-feed paper, press the Ready button to disable printing and then turn the Select-dial. Turning the dial *clockwise* advances the paper; turning the dial *counterclockwise* reverse feeds the paper. After positioning the paper, press the Ready button again to re-enable printing.

Advancing Pin-Feed Paper

The printer advances pin-feed paper to the next sheet under any of the following conditions:

- ✓ When instructed by your software application.
- ✓ When printing reaches the number of lines you or your software application specified.
- ✓ When automatic form feeding is on and printing reaches a half inch from the bottom of the page.
- ✓ When you press the Form Feed button on the control panel.

Using the Demand Document Mode

A special feature of the printer is the *demand document* mode. The demand document mode lets you remove a sheet of pin-feed paper without wasting the next sheet. This is especially useful when printing serialized checks or forms where you must account for every page.

To use the demand document mode, you must pull the top window towards the front of the printer to access the tear bar on the bottom window.

With the demand document mode on, pressing the Ready button on the control panel disables printing, displays the DEMND message (instead of the PAUSE message), and advances the bottom of the last printed page to the tear bar. You can then tear off and remove the page.

Using the Demand Document Mode—continued

The printer automatically senses whether or not you tear off the page. Pressing the Ready button again causes one of the following actions:

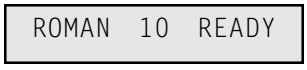
- ✓ If you *removed* the last printed page, the paper reverse feeds to the next top-of-form, the READY message reappears, and printing continues.
- ✓ If you *did not remove* the last printed page, the paper reverse feeds to its original position, the READY message reappears, and printing continues at the point where it left off.

Normally, the demand document mode is off. To turn on the demand document mode, use the following procedure:

With the printer paused or idle, press the Setup button on the control panel to access the Setup menu.

Turn the Select-dial until the DEMAND parameter appears on the display.

While holding down the Alt button, turn the Select-dial until *On* appears. Then, release the Alt button.



Press the Setup button again to return to the status message display.

☞**Note:** You will learn more about the Setup menu, parameters, and parameter settings in the *Control Panel* section of this guide.

Using the Demand Document Mode—continued

Instead of selecting *On* at the DEMAND parameter, you can select *Tear*, *Auto* or *AutoT*. These settings also select the demand document mode, but with special options:

- ✓ *Tear* causes the printer to reverse feed the paper to the next top-of-form when you re-enable printing, whether or not you actually tear off the last printed sheet. This option is useful when printing thick multipart forms that jam when the leading edge of the form is reverse fed below the printhead.
- ✓ *Auto* causes the printer to advance to the bottom of the last printed page to the tear bar whenever the printer is idle—you don't have to press the Ready button. As soon as the printer receives subsequent data to print, the paper reverse feeds as usual.
- ✓ *AutoT* combines the *Tear* and *Auto* settings so that the printer will advance the form for tear off whenever the printer is idle and always reverse feed to the next top-of-form.

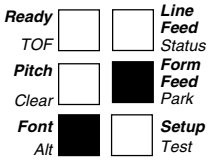
If you want to stop printing mid-form without advancing the perforation to the tear bar, press the Ready button twice in succession. This disables printing and displays the PAUSE message. Pressing the Ready button again re-enables printing and displays the READY message. These are the normal ready/pause conditions of the printer. You'll learn more about them in the *Control Panel* section of this guide.

☞**Note:** You cannot use the demand document mode while feeding pin-feed paper from the bottom of the printer.

Using Paper Park

With the paper park feature, reversing pin-feed paper out of the printer is quick and easy. Reloading paper is even easier. With pin-feed paper parked, you can load a cut sheet.

To park pin-feed paper, use the following procedure:



1. Tear off the last printed sheet at the perforation.
2. Hold down the Alt button and press the Park button on the control panel. The printer reverse feeds the paper until the leading edge of the first sheet is halfway through the tractors.

After the paper parks, you can load a single sheet or you can reload the pin-feed paper:

- ✓ To load a single sheet, set the paper select lever to the top path position ( ). Then, load the sheet in the usual way.
- ✓ To reload the pin-feed paper, press the Form Feed button on the control panel. The printer advances the paper to the first printable line.

Unloading Pin-Feed Paper

To unload pin-feed paper, tear off all printed pages that have exited the printer and then hold down the Alt button and press the Park button on the control panel. Then, turn the Select-dial *counterclockwise* until the pin-feed paper is clear of the tractors.

Loading Pin-Feed Paper From the Bottom

To load pin-feed paper from the bottom of the printer using the top-mounted forms tractor, use the following procedure:

1. Make sure the printer is placed on a stand or table that permits access to the paper feed slot on the bottom of the printer.
2. Set the paper select lever to the rear path position ( ).
3. Remove the printer window.
4. Install the forms tractor in the bottom-feed position.
5. Set the paper thickness lever to one of the thick paper settings. The printhead must not be too close to the platen when you feed paper from the bottom.
6. From the bottom of the printer, push the leading edge of the paper up through the paper feed slot until the leading edge is positioned in front of the tractors.
7. Pull the tractor locking levers towards the front of the printer so that the tractors can slide freely on the shafts.
8. Slide the left tractor so that its pin belt aligns with the circles on the paper scale ( ). Then, push back the locking lever to lock the left tractor into place.

   ☞**Note:** If your printer is an international model (that is, it requires 220 vac input power) and you are going to print 136 columns across the page, slide the left tractor about 10.2 millimeters (0.4 inch) to the left of the circles on the paper scale and lock it into place.
9. Open both tractor doors.

Loading Pin-Feed Paper From the Bottom—continued

10. Mount the first three holes on the left edge of the paper onto the left tractor's pin belt and then close the tractor door.
11. Slide the right tractor so that its pin belt aligns with the holes on the right edge of the paper.
12. Mount the first three holes on the right edge of the paper onto the right tractor's pin belt and then close the tractor door.
13. Fine adjust the right tractor so that the pins are perfectly centered in the paper holes; then, push back the locking lever to lock the right tractor into place.
14. Press the Line Feed button on the control panel until the top of the next page is in front of the printhead.
15. Hold down the Alt button and press the TOF (Top-Of-Form) button.
16. Replace the printer window.

You are now ready to begin printing. It is recommended that you print a self test and adjust the paper thickness levcr to optimize the print quality.

☞**Note:** When the forms tractor is installed for bottom-feeding, do not use the demand document or paper park functions.

Loading Envelopes

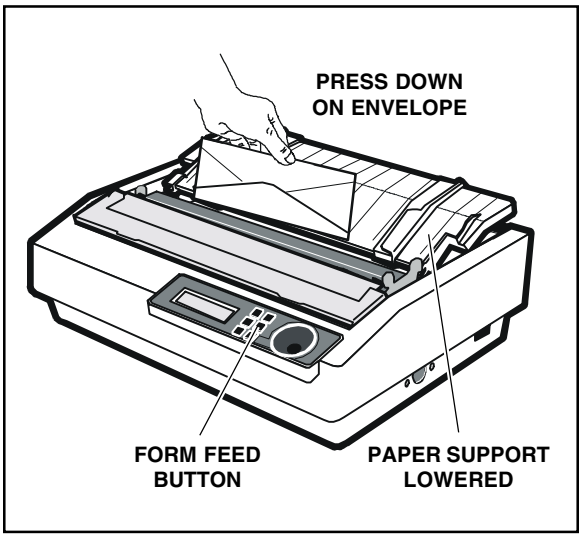


Figure 3-10. Loading Envelopes

You can use individual or pin-feed envelopes in the printer. The procedure for loading envelopes is the same as for loading single sheets or pin-feed paper, except for the following considerations:

- ✓ Envelopes are thicker than normal paper. Therefore, adjusting the paper thickness lever is critical. Always start with the lever all the way towards the front of the printer, then slowly push it back until print density is optimized.
- ✓ Before loading envelopes, install the paper support in the lowered position, as shown in figure 3-10.
- ✓ Load envelopes with the longest edge parallel to the platen, as shown in figure 3-10. This is usually referred to as *horizontal orientation.*
- ✓ Gently press down on the envelope as you press the Form Feed button. This helps push the envelope into the printer.
- ✓ If you have trouble getting envelopes to feed into the printer, it may be time to clean the surface of the platen roller. Look at the black rubber surface of the platen roller to see if there is a build-up of dust, ink or paper fibers, or if the surface appears shiny. If you see any of these conditions, refer to the *Cleaning the Platen and Rollers* procedure in *Cleaning and Maintenance* section of this guide.

Loading Multipart Forms

You can use individual or pin-feed forms that contain up to five parts with carbons. The procedures for loading multipart forms are the same as those for loading single sheets and pin-feed paper, except for the following precautions:

- ✓ Forms are thicker than normal paper. Therefore, adjusting the paper thickness lever is critical. Always start with the lever all the way towards the front of the printer, then slowly push it back until print density is optimized.
- ✓ When using pin-feed forms that do not bend easily or tear apart when you bend them, load them from the bottom of the printer. When you load forms from the bottom, they do not bend around the platen.

Loading Labels

You can use individual labels or those with a pin-feed backing sheet. The procedures for loading labels are the same as those for loading single sheets and pin-feed paper, except for the following precautions:

- ✓ Feed pin-feed labels from the bottom of the printer. This decreases the chance of a label peeling off the backing sheet and jamming inside the printer, or of the printhead hitting the edge of a label as it bends around the platen.
- ✓ Labels are thicker than normal paper. Therefore, adjusting the paper thickness lever is critical. Always start with the lever all the way towards the front of the printer, then slowly push it back until print density is optimized.
- ✓ Do not reverse feed labels and do not use the paper park or demand document funcitons. When labels reverse feed, they can peel off the backing sheet and jam in the printer. To avoid reverse feeding pin-feed labels when you are ready to remove them from the printer, tear them off at a perforation that has not yet entered the printer. Then, press the Form Feed button to eject any labels remaining in the printer.

Loading Transparencies

You can use individual or pin-feed transparencies made for dot-matrix printers. Dot-matrix transparencies contain an ink-absorbent coating to reduce smearing and a paper backing so printer sensors can detect when a transparency is loaded. The procedures for loading transparencies are the same as those for loading single sheets and pin-feed paper, except for the following precautions:

- ✓ Transparencies are thicker than normal paper. Therefore, adjusting the paper thickness lever is critical. Always start with the lever all the way towards the front of the printer, then slowly push it back until print density is optimized. If printing smears, the paper thickness lever is too far towards the back of the printer.
- ✓ For best results when printing on transparencies, use a fairly new ribbon. A ribbon that is more than half-way through its useful life may not transfer enough ink onto the transparency for good projection.

Aligning Preprinted Forms

When you print on preprinted forms, paper alignment is critical. To align a preprinted form in the printer, use the following procedure:

1. Load the preprinted form into the printer.
2. Press the Ready button to disable printing and then turn the Select-dial as necessary to position the first print line under the tip of the printhead.
3. Press the Setup button on the control panel to access the Setup menu. Then turn the Select-dial until the LFT MAR parameter appears on the display.
4. While holding the Alt button, turn the Select-dial as needed to position the printhead over the first print position on the form. Then, release the Alt button.
5. Press the Setup button again. You may now begin printing.

Setting the Page Length

If the printer's page length setting does not reflect the actual current page length, the following problems can occur:

- ✓ Printing may continue beyond the bottom edge of the page.
- ✓ The page may eject before printing is finished.
- ✓ Pin-feed paper may not advance to the correct top-of-form position. Typically, the amount of error increases in proportion to the number of pages you feed.

Ordinarily, software applications set page length for you. If you experience one of these problems, you may have to set the page length manually.

To set the page length, perform the following procedure:

1. Press the Setup button on the control panel to access the Setup menu. Then, turn the Select-dial until the LENGTH parameter appears on the display.
2. While holding down the Alt button, turn the Select-dial until the LENGTH setting equals the actual page length in 1/6-inch increments. For example, if the actual page length is 14 inches, the setting would be 84 (14" x 6). Then, release the Alt button.
3. Press the Setup button to exit the Setup menu.

☞**Note:** The page length setting is defined in 1/6-inch increments regardless of the current lines per inch setting.

Setting the Maximum Print Width

If the printer's maximum print width setting is incorrect, the following problems can occur:

- ✔ Printing may continue beyond the right edge of the page and onto the platen.
- ✔ Printing may not reach the right edge of the page.
- ✔ The printhead may jam against the right edge of the paper as it returns to the left margin.

Ordinarily, software applications set print width for you. If you experience one of these problems, you may have to set the maximum print width manually.

To set the maximum print width, perform the following procedure:

1. Press the Setup button on the control panel to access the Setup menu. Then, turn the Select-dial until the WIDTH parameter appears on the display.
2. While holding down the Alt button, turn the Select-dial to view the possible settings. If your printer requires 115 vac input voltage, you can select *8* or *8.5*. If your printer requires 220 vac input voltage), you can select *8* inches. When the setting you want to select appears, release the Alt button.
3. Press the Setup button to exit the Setup menu.

Section

4

Control Panel

This section describes how to use the printer's control panel, which is shown in figure 4-1. The control panel consists of a sixteen-character display, six buttons and a Select-dial. Using the control panel, you can control almost every aspect of printer operation.

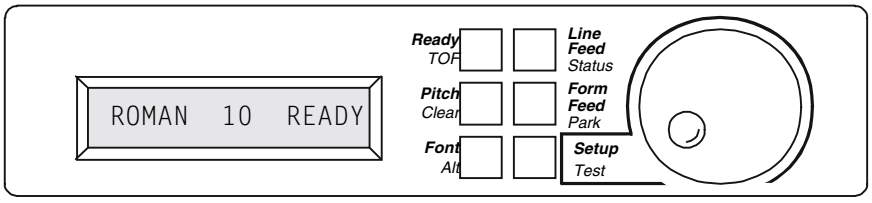
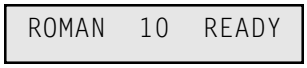


Figure 4-1. Control Panel

Understanding Display Messages

The control panel display can show three kinds of messages.



Status

The *status* message appears when you turn on the printer and during normal printing operations. This message shows the current font and pitch setting, and whether the printer is ready, paused, printing a self test, or in demand document mode.

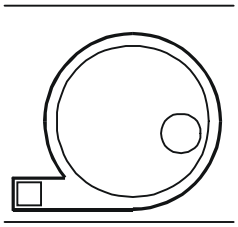
Operator and Error

Many *operator* and *error* messages appear to notify you of printer conditions, actions you must take, and errors that occur. You can find a complete list of operator and error messages in the *Solving Problems* section of this guide.

Setup Menu

The *Setup menu* is a selection list of operations, print modes, page settings, communication settings, and special modes. The menu provides a snapshot view of current printer status. You can change settings as required, then save the settings for use at a later time. You can also specify the power-on default settings. You'll learn more about the Setup menu later in this section.

Using the Select-Dial



You turn the Select-dial to move the paper up and down, move the carriage back and forth, and scroll through the Setup menu.

Moving the Paper Up and Down

To move the paper up or down, press the Ready button to disable printing and then turn the Select-dial. Turning the dial *clockwise* advances the paper; turning the dial *counterclockwise* reverse feeds the paper. After moving the paper, press the Ready button again to re-enable printing. When you move the paper with the dial, printer logic does not change its internal line count. This enables you to decide where the first print line should be and where line counting begins.

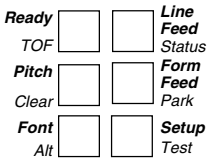
Moving the Carriage Back and Forth

To move the carriage to the right, hold down the Alt button and turn the dial *clockwise*. To move the carriage to the left, hold down the Alt button and turn the dial *counterclockwise*. You may have to move the carriage to install a ribbon cartridge or clear a paper jam. Moving the carriage does not affect the print position. When printing begins, the carriage moves back to its original position.

Scrolling Through the Setup Menu

Whenever the Setup menu is displayed, you use the Select-dial to scroll through the menu and make selections. You'll learn how to make selections later in this section.

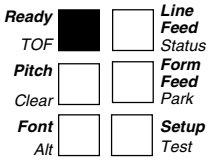
Using the Control Panel Buttons



You press the buttons to set printer parameters and perform operations. The primary function of a button is printed in white; the alternate function is printed in blue. To invoke the primary function of a button, just press the button. To invoke the alternate function of a button, hold down the Alt button and press the button. The printer *beeps* each time you press a control panel button.

Only the Ready button operates while printing. To use any other button while printing, you must first press the Ready button and wait for printing to pause.

Turning Printing On and Off



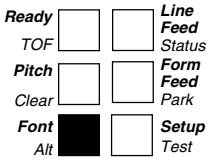
Pressing the Ready button turns printing on or off, and displays either READY or PAUSE. With READY displayed, the printer is free to print any data it receives. With PAUSE displayed, printing cannot occur. If you press the Ready button while printing is in progress, printing will stop at the end of the current line. When you press the Ready button again, printing will continue where it left off.

When the demand document mode is on, pressing the Ready button turns printing off, displays DEMND on the control panel, and advances the bottom edge of the last printed page up to the tear bear. You can then tear off and remove the page if you want to. Pressing the Ready button again performs one of the following actions:

- ✓ If you *removed* the last printed page or you are using the *Tear* or *AutoT* settings, the paper reverse-feeds to the next top-of-form, the READY message reappears, and printing continues.
- ✓ If you *did not remove* the last printed page, the paper reverse-feeds to its original position, the READY message reappears, and printing continues at the point where it left off.

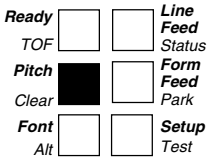
Also, when the demand document mode is on, pressing the Ready button twice in succession disables printing and displays PAUSE on the control panel without advancing the form up to the tear bar. Pressing the Ready button again re-enables printing and the READY message reappears.

Selecting a Font



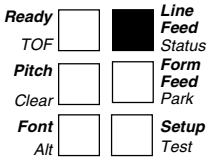
Pressing the Font button selects the next available font (typestyle) and displays the font name. Most printers come with nine fonts: Roman, Sans-Serif, Courier, Prestige Elite, Script, OCR-B, Orator, Draft and High-Speed Draft. Your printer may contain other fonts.

Selecting a Pitch



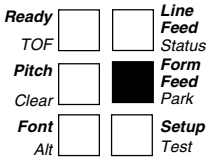
Pressing the Pitch button selects the next available pitch (number of characters per inch) and displays the pitch setting. You can select 10, 12, 13, 15, 17 or 20 characters per inch. When you select a pitch, characters in the current font expand or compress to fit the new spacing.

Line Feeding



Pressing the Line Feed button advances the paper one line space; holding down the Line Feed button causes continuous line feeding. The actual distance that the paper advances for a line feed depends on the current lines per inch (LPI setting). As you line feed, the printer increments the internal line count. If you use the Line Feed button to move paper to the top-of-form, you must press hold down the Alt button and press the TOF button to initialize the line count to zero.

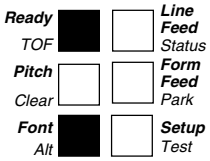
Form Feeding



Pressing the Form Feed button causes one of the following actions to occur:

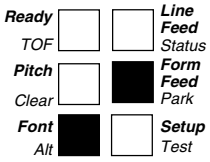
- ✓ If you are loading a single sheet with or without a sheetfeeder, the sheet advances to the top-of-form.
- ✓ If a single sheet is already loaded, the sheet ejects.
- ✓ If you are loading or using pin-feed paper, the paper advances to the next top-of-form.

Setting the Top-of-Form Position



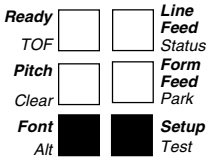
Holding down the Alt button and pressing the TOF button sets the top-of-form position (that is, the first print line on the page) at the current paper position. When you turn on the printer with paper loaded, the top-of-form position is automatically set at the current paper position. Or when you load paper, the top-of-form position is set at the top of the page. To reset the top-of-form position, use the Line Feed button or the Select-dial to position the paper so that the first print line is in front of the printhead. Then, hold down the Alt button and press the TOF button.

Parking Pin-Feed Paper



Holding down the Alt button and pressing the Park button reverse feeds pin-feed paper until the top edge of the first sheet is halfway through the forms tractor. You can then move the paper select lever to the top-feed position ( ) and load a single sheet. When you are ready to resume printing on pin-feed paper, move the paper select lever back to the rear-feed position ( ) and press the Form Feed button. The paper will feed into the printer. For paper park to work correctly, be sure to tear off all but the last printed page before you park the paper.

Printing a Self Test

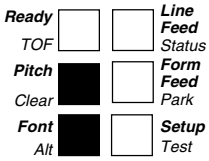


Holding down the Alt button and pressing the Test button prints a repeating pattern of characters in the currently selected font and pitch. The width of the self test depends on the current WIDTH parameter setting on the printer's Setup menu.

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

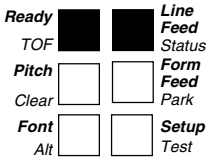
Printing self test enables you to verify that your printer is operating normally and that the print quality is acceptable. Also, you can view many of the available characters in the current font. To terminate the test, just press the Ready button.

Clearing the Buffer



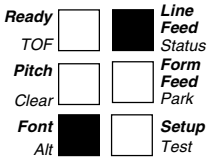
Holding down the Alt button and pressing the Clear button erases any data in the printer input buffer. Since the printer receives incoming data faster than it can be printed, the printer temporarily stores data in a buffer in memory. If you turn printing off or an error occurs, you can erase all of the data in the buffer waiting to be printed. Before you clear the data input buffer, first make sure that your computer is not still sending data to the printer.

Resetting the Printer



Holding down the Ready button and pressing the Line Feed button resets printer logic, clears the data input buffer, and initializes all printing parameters to the power-on defaults. Resetting the printer is like turning the printer off and then back on.

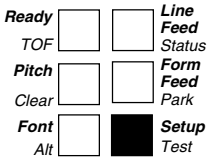
Printing a Printer Status Report



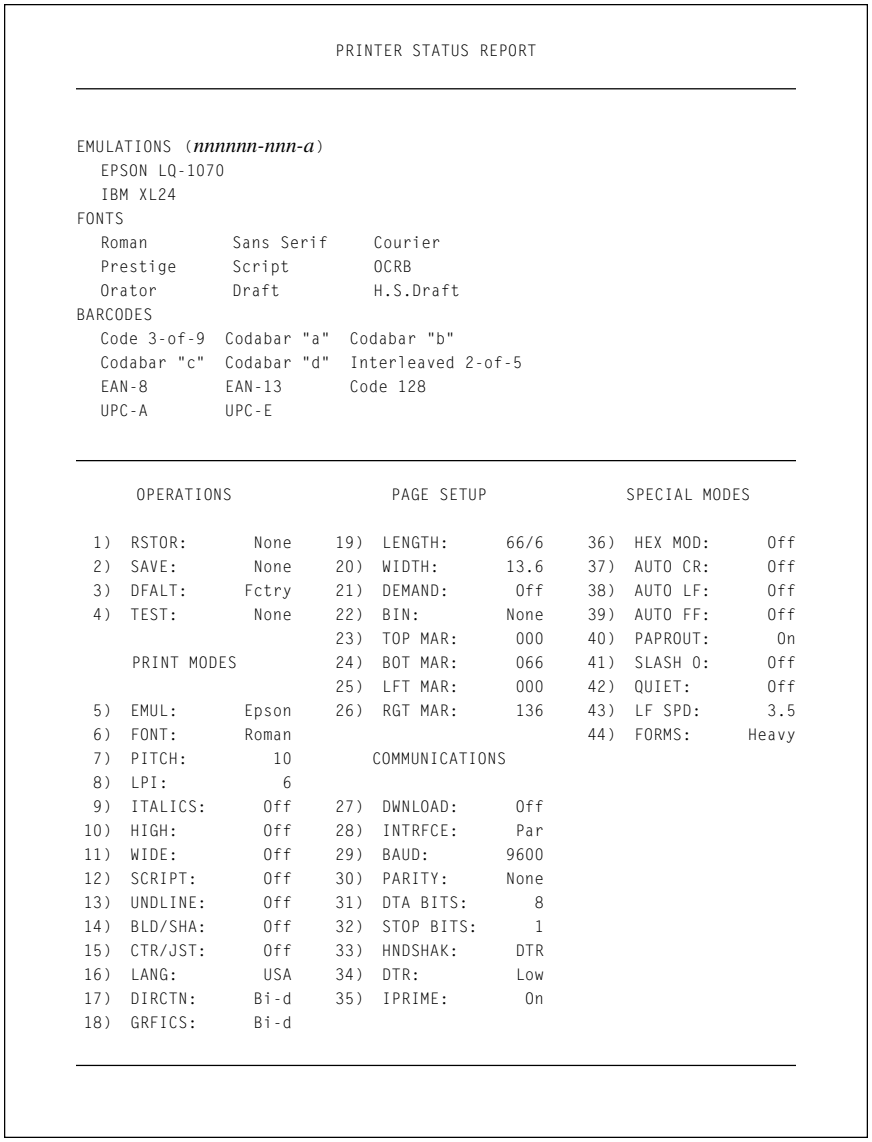
Holding down the Alt button and pressing the Status button prints a *Printer Status Report*. The report consists of a list of the available printer emulations and fonts, and a printout of the Setup menu. The Setup menu is a snap-shot view of current printer settings. To terminate the printing of the report, just press the Ready button. Printing will stop at the end of the current line.

A sample *Printer Status Report* is shown on the next page. The settings in this sample may vary slightly for your particular printer. Since the Setup menu is updated from time-to-time, your report may include additional parameters and be numbered differently. Each parameter and setting is described later in this section.

Displaying the Setup Menu



Pressing the Setup button displays the Setup menu. From the Setup menu, you can view and change most printer settings. If you display but do not use the Setup menu, the status message will reappear automatically after one minute. Pressing any control panel button, except the Alt button, also redisplays the status message.



```
                        PRINTER STATUS REPORT

EMULATIONS (nnnnnn-nnn-a)
   EPSON LQ-1070
   IBM XL24
FONTS
   Roman          Sans Serif     Courier
   Prestige       Script         OCRB
   Orator         Draft          H.S.Draft
BARCODES
   Code 3-of-9  Codabar "a"  Codabar "b"
   Codabar "c"  Codabar "d"  Interleaved 2-of-5
   EAN-8        EAN-13       Code 128
   UPC-A        UPC-E

      OPERATIONS                PAGE SETUP              SPECIAL MODES

  1)  RSTOR:       None    19)  LENGTH:      66/6    36)  HEX MOD:      Off
  2)  SAVE:         None    20)  WIDTH:       13.6    37)  AUTO CR:      Off
  3)  DFALT:       Fctry    21)  DEMAND:       Off    38)  AUTO LF:      Off
  4)  TEST:         None    22)  BIN:         None    39)  AUTO FF:      Off
                            23)  TOP MAR:      000    40)  PAPROUT:       On
      PRINT MODES           24)  BOT MAR:      066    41)  SLASH O:      Off
                            25)  LFT MAR:      000    42)  QUIET:        Off
  5)  EMUL:        Epson    26)  RGT MAR:      136    43)  LF SPD:       3.5
  6)  FONT:        Roman                              44)  FORMS:      Heavy
  7)  PITCH:          10         COMMUNICATIONS
  8)  LPI:             6
  9)  ITALICS:       Off    27)  DWNLOAD:      Off
 10)  HIGH:          Off    28)  INTRFCE:      Par
 11)  WIDE:          Off    29)  BAUD:        9600
 12)  SCRIPT:        Off    30)  PARITY:      None
 13)  UNDLINE:       Off    31)  DTA BITS:       8
 14)  BLD/SHA:       Off    32)  STOP BITS:      1
 15)  CTR/JST:       Off    33)  HNDSHAK:      DTR
 16)  LANG:          USA    34)  DTR:          Low
 17)  DIRCTN:       Bi-d    35)  IPRIME:        On
 18)  GRFICS:       Bi-d
```

Figure 4-2. Sample *Printer Status Report*

Using the Setup Menu

The Setup menu is a selection list of printer parameters, organized into five catagories:

- ✔ Operations
- ✔ Print Modes
- ✔ Page Settings
- ✔ Communications Settings
- ✔ Special Modes

When the Setup menu appears, the control panel display acts like a one-line window over the menu. Each line contains a different parameter. Turning the Select-dial scrolls the menu up or down below the window. Each parameter is numbered so you can always tell where you are in the menu.

Next to each parameter is the current setting for that parameter. Holding down the Alt button and turning the Select-dial cycles through the possible settings. The setting that is displayed when you release the Alt button becomes the current setting. The printer *beeps* to confirm the change.

To leave the Setup menu and redisplay the status message, press the Setup button again. If you display the Setup menu but do not use it for more than one minute, the status message reappears automatically.

You can change the current settings as required, then save them for use at a later time. You can also specify the power-on defaults for the printer to use. You can print the Setup menu by holding down the Alt button and pressing the Status button.

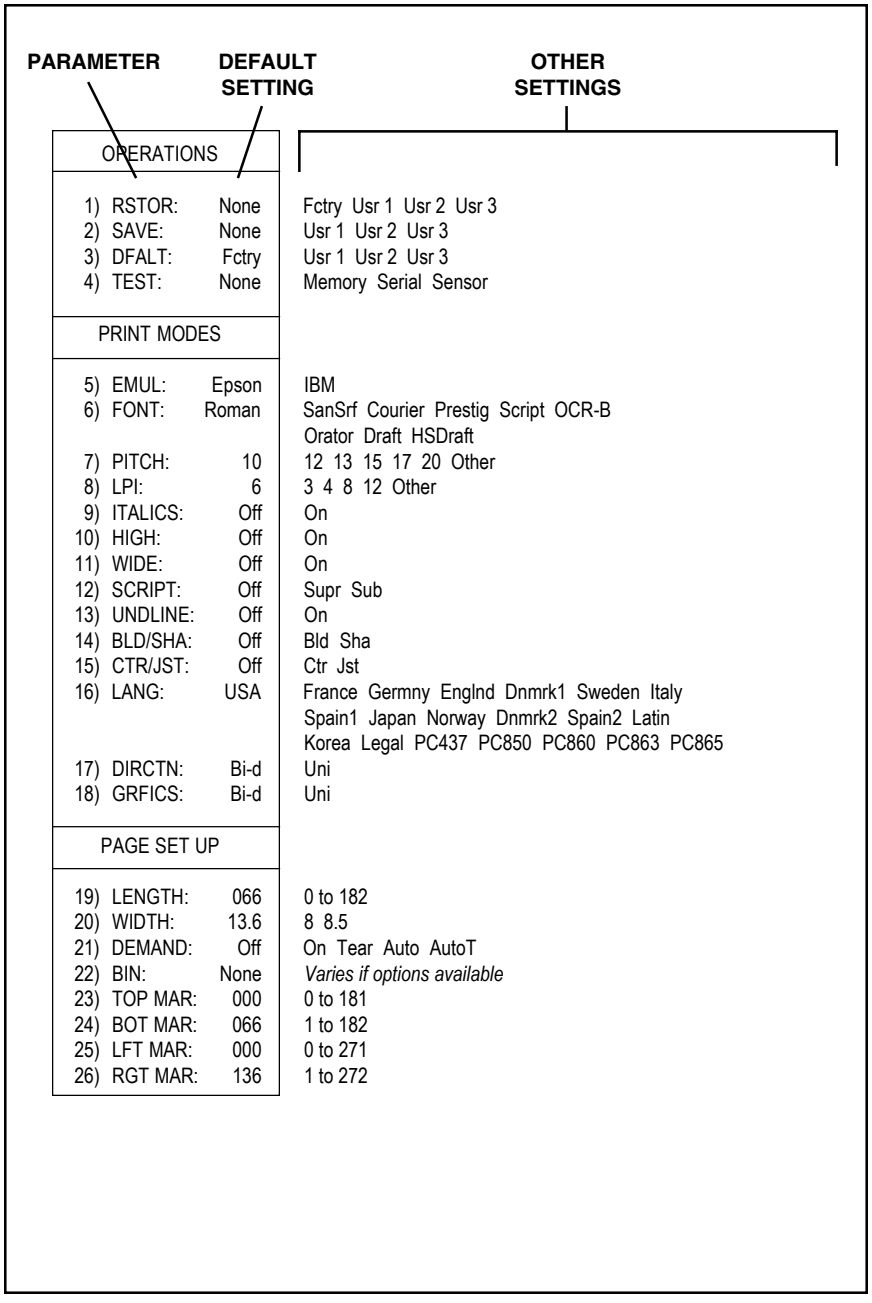


Figure 4-3. Setup Menu

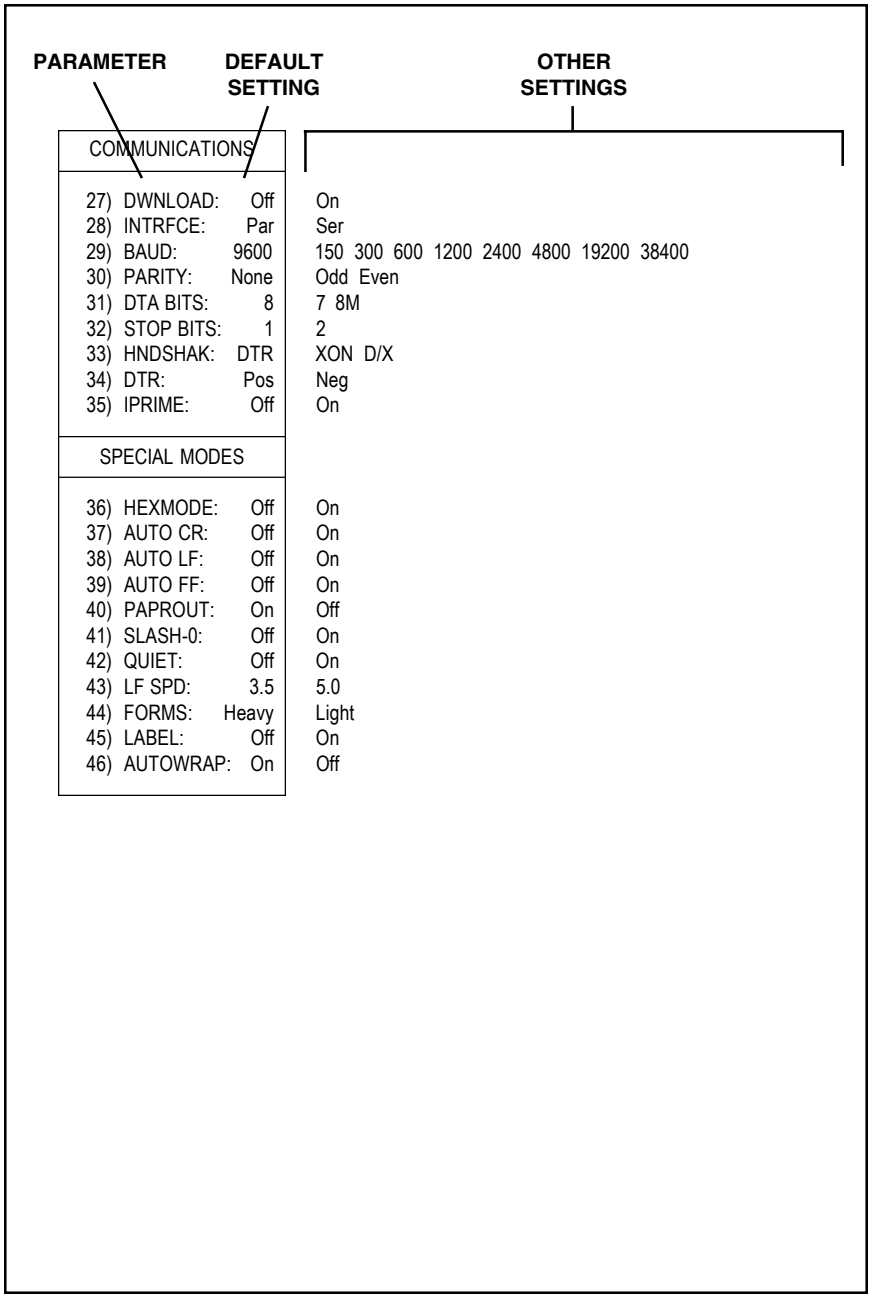


Figure 4-3. Setup Menu—continued

Before describing the parameters on the Setup menu, let's review how to display, scroll through, and change settings on the Setup menu:

`OPERATIONS`	With the status message displayed, press the Setup button; the Setup menu appears.
`6) FNT: Roman`	Turn the Select-dial until the parameter you want to change appears.
`6) FNT: Courier`	While holding down the Alt button, turn the Select-dial to view the possible settings for the parameter. When the setting you want to select appears, release the Alt button. The printer *beeps* to confirm the setting change.
`COURIER 10 READY`	Turn the Select-dial to display another parameter or press the Setup button to redisplay the status message.

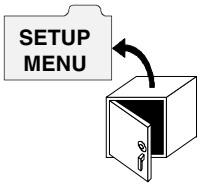
Now that you know how to use the Setup menu, it is time to learn what each parameter does and the possible settings you can select. Parameters are described in the order they appear in the Setup menu.

☞**Note:** Learning Setup menu functions is *not* necessary. These functions are provided for users who want to explore the advanced capabilities of the printer. During normal printing, your software application will control most Setup menu functions automatically.

Selecting Operations

The first section on the Setup menu is operations. Selecting an operation performs a specific action.

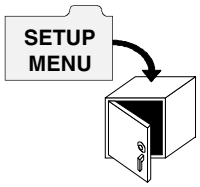
1) RSTOR: None — Restore Printer Settings



RSTOR lets you restore printer settings to the factory settings or to settings you saved previously with a SAVE operation. When you use RSTOR, the printer clears the data input buffer.

You can select *None* to cancel the operation; *Fctry* to restore the factory settings; or *Usr 1*, *Usr 2* or *Usr 3* to restore the settings saved under one of these names.

2) SAVE: None — Save Printer Settings



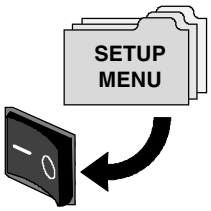
SAVE lets you save the current printer settings in non-volatile memory for use at a later time. Non-volatile memory retains information even when the printer is turned off.

To save the current printer settings, hold down the Alt button and turn the Select-dial to select one of the three user names. As soon as you release the Alt button, the printer saves the current printer settings and assigns the user name that you select. You can use RSTOR to restore the settings you save; you can use DFALT to make your saved settings the power-on default settings.

You can select *None* to cancel the operation; or *Usr 1, Usr 2* or *Usr 3* to save the current settings under one of these names.

3) DFALT: Fctry

Select Power-On Default Settings



DFALT lets you select the printer settings to use as the power-on default settings. You can select the factory settings or the settings you saved previously with a SAVE operation. The printer keeps your DFALT selection in non-volatile memory so it is retained when the printer is off.

You can select *Fctry* to use the factory settings as the power-on defaults or *Usr 1, Usr 2* or *Usr 3* to use the settings saved under one of these names.

4) TEST: None

Run Printer Tests

TEST lets you run a variety of printer tests, including a memory check, serial loopback test, and a sensor check. If a test is unsuccessful, an error message appears to notify you.

You can select *None*, which is always the default and does not perform any test; *Memory*, which checks the printer memory; *Serial*, which requires you to attach a loopback connector for a test of the serial communication lines; and *Sensor*, which runs the sensor check. Printer tests are described in the *Solving Problems* section of this guide. You printer may contain additional tests.

Selecting Print Modes

The second section on the Setup menu is print modes. The most important print mode parameter is emulation, which must be set so that it is compatible with your software application. Selecting print modes changes the way text prints on the page.

```
5) EMUL:   Epson
```

Set Printer Emulation

EMUL lets you select a printer emulation for the printer. Selecting an emulation enables the printer to imitate some other popular printer. When you select an emulation, all current printer settings remain in effect.

On standard printers, you can select *Epson*, which causes the printer to imitate Epson LQ-570 and LQ-1070 printers; or *IBM*, which causes the printer to imitate IBM XL24 Proprinter and Lexmark 2390/2391 printers. Your printer may also contain other emulations that you can choose.

```
6) FNT:    Roman
```

Set Font

A B *C* D
a b *c* d

FNT lets you select a font (type style). Most printers come with the following fonts: *Roman*, *SanSrf* (Sans-Serif), *Courier*, *Prestige*, *Script*, *OCR-B*, *Orator*, *Draft* and *HSDraft* (High-Speed Draft). Your printer may contain other fonts.

☞**Note:** Using the High-Speed Draft font to print multipart forms is not recommended.

```
7) PITCH:    10
```

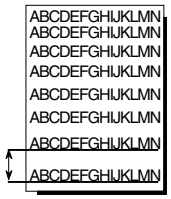
Set Pitch

ABCD
ABCD
ABCD

PITCH lets you specify how many characters to print per inch. You can select *10*, *12*, *13* (13.3), *15*, *17* (17.1) or *20*. If the current setting is *Other*, your software application has set the pitch to some nonstandard value.

```
8) LPI:       10
```

Set Number of Lines Per Inch



LPI lets you specify how many lines to print per inch. You can select *3, 4, 6, 8* or *12* lines per inch. If the current setting is *Other*, then your software application has set the number of lines per inch to some non-standard value.

```
9) ITALICS:   Off
```

Turn Italic Mode On and Off

ITALICS lets you turn the italic mode *On* and *Off*.

```
10) HIGH:     Off
```

Turn Double-High Mode On and Off

HIGH lets you turn the double-high mode *On* and *Off*. In double-high mode, characters stretch upward to twice their normal height.

```
11) WIDE:     Off
```

Turn Double-Wide Mode On and Off

WIDE lets you turn the double-wide mode *On* and *Off*. In double-wide mode, characters stretch rightward to twice their normal width. When you turn on the double-wide mode, the PITCH setting changes to one-half its current value. When you turn off the mode, the PITCH setting returns to its original value.

```
12) SCRIPT:   Off
```

Turn Super/Subscript Modes On and Off

SCRIPT lets you turn on and off the superscript and subscript modes. In superscript mode, characters shrink to about half their normal size and print above the print line. In subscript mode, the same small characters print below the normal print line. You can select *Supr* to turn the superscript mode on; *Sub* to turn the subscript mode on; or *Off* to turn both modes off.

```
13) UNDLINE:  Off
```

Turn Underline Mode On and Off

UNDLINE lets you turn the underline mode *On* and *Off*. In underline mode, all characters and spaces are underlined.

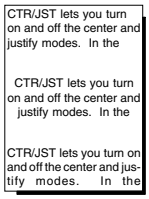
```
14) BLD/SHA:  Off
```

Turn Bold/Shadow Modes On and Off

BLD/SHA lets you turn on and off the bold and shadow modes. In bold mode, characters are printed twice—one on top of the other—to produce bold print. In shadow mode, characters are also printed twice—once and then again slightly offset to the right—to produce shadow print. You can select *Bld* to turn the bold mode on; *Sha* to turn the shadow mode on; or *Off* to turn both modes off.

```
15) CTR/JST:  Off
```

Turn Center/Justify Modes On and Off



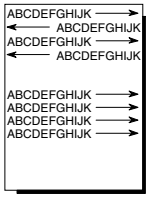
CTR/JST lets you turn on and off the center and justify modes. In the center mode, the printer centers each line of text between the left and right margins. In the justify mode, the printer expands or compresses each line of text as necessary so that it ends at the right margin. If the printer must expand a line to over twice its original length or compress a line so that characters overlap, the line prints unjustified. With both the center and justify modes, a carriage return or line feed code in the print data marks the end of a line. You can select *Ctr* to turn the center mode on; *Jst* to turn the justify mode on; or *Off* to turn both modes off.

16) LANG: USA — Set Language

LANG lets you specify a language for the printer to use when printing text. When you select any language other than *USA*, the printer replaces some of the standard ASCII printable characters with alternate characters that are used in a specific language. You can select from the following:

Setting	*Character Replacements*											
USA	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germny	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
Englnd	£	$	@	[	\	]	^	`	{	|	}	~
Dnmrk1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain1	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Dnmrk2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain2	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	@	[	₩	]	^	`	{	|	}	~
Legal	#	$	§	°	”	’	¶	‘	©	®	†	™
PC437												
PC850	Refer to the tables at the end of the *Code Sets* appendix for the Code Page (PC) character sets.											
PC860												
PC863												
PC865												

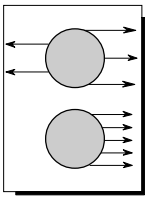
17) DIRCTN: Bi-d — Set Text Printing Direction



DIRCTN lets you specify whether the printer should print text in both directions or from left-to-right only. Printing text from left-to-right only provides the highest possible vertical alignment, but slows down printing. You can select *Bi-d* for bi-directional printing or *Uni* for left-to-right printing.

```
18) GRFICS:  Bi-d
```

Set Graphics Printing Direction



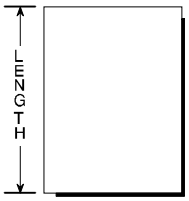
GRFICS lets you specify whether the printer should print graphics in both directions or from left-to-right only. Printing graphics from left-to-right only provides the highest possible vertical alignment, but slows down print-ing. You can select *Bi-d* for bi-directional printing or *Uni* for left-to-right printing.

Selecting Page Setup Parameters

Page setup parameters let you specify page size and margins.

```
19) LENGTH:   066
```

Set Page Length



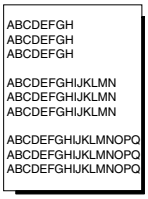
LENGTH lets you specify the length of the paper you are using in 1/6-inch increments. This setting is especially important since it controls continuous-forms feeding.

You can select a number from *0* to *182*. To determine the correct number to use for your paper, multiply the length of the paper in inches by 6. For example, if your paper is 11 inches long, you should select *66* (11 inches × 6 = 66). When you set page length, the printer sets the top-of-form at the current line and clears the top and bottom margins.

If you set LENGTH to *0*, the printer does not keep track of lines per page. When using single sheets, a form feed control code ejects the page; when using pin-feed paper, a form feed control code performs a carriage return.

```
20) WIDTH:    8.5
```

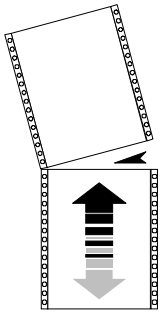
Set Maximum Print Width



WIDTH lets you specify the maximum print width. If the printer receives a line that exceeds the maximum print width, the excess prints at the left margin on the next line. If your printer requires 115 vac, you can specify *8* or *8.5* inches. If your printer requires 220 vac, you can specify *8* inches.

21) DEMAND: Off

Turn Demand Document Mode On and Off



DEMAND lets you turn the demand document mode on and off. The demand document mode lets you remove a pin-feed page without wasting the next page. With the mode on, pressing the Ready button turns printing off, displays DEMND on the control panel, and advances the last printed page up to the tear bar. You can then tear off the page. Pressing the Ready button again causes one of the following actions to occur:

- ✓ If you *removed* the last printed page, the paper reverse feeds to the next top-of-form, the READY message reappears, and printing resumes.
- ✓ If you *did not remove* the last printed page, the paper reverse feeds back to its original position, the READY message reappears, and printing resumes at the point where it left off.

You can select from the following settings:

- ✓ *On* turns the demand document mode on.
- ✓ *Tear* turns the demand document mode on and causes the printer to reverse feed the paper to the next top-of-form when you re-enable printing, whether or not you actually tear off the last printed sheet. This option is useful when printing thick multipart forms that jam when the leading edge of the form is reverse fed below the printhead.
- ✓ *Auto* turns the demand document mode on and causes the printer to present the paper for tear-off whenever the printer is idle; you don't have to press the Ready button. As soon as the printer receives subsequent data to print, the paper reverse feeds as usual.
- ✓ *AutoT* combines the *Tear* and *Auto* settings so that the printer will advance the paper for tear-off whenever the printer is idle and always reverse feeds to the next top-of-form.
- ✓ *Off* turns the demand document mode off.

☞**Note:** If the demand document mode is on and you don't want the paper presented for tear-off, just press the Ready button twice in succession.

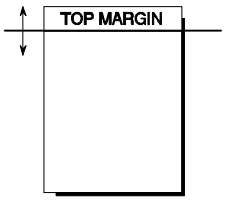
```
22) BIN:     None
```

Select Alternate Paper Path

If your printer has optional, alternate paper paths, you would use this parameter to select one of the options.

```
23) TOP MAR:  000
```

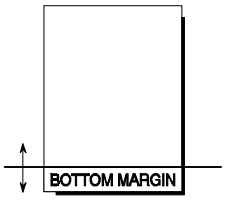
Set Top Margin



TOP MAR lets you specify a top margin. On subsequent form feeds, paper advances to the top margin you specify. The top margin can be from *0* to *181* lines down from the top-of-form; however, you can only select a line that is above the bottom margin setting. The physical location of the top margin on the page is unaffected by subsequent changes to line spacing. If you change the LENGTH (page length) setting, the top margin resets to 0.

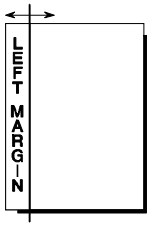
```
24) BOT MAR:  066
```

Set Bottom Margin



BOT MAR lets you specify a bottom margin. After printing on this line, the printer performs a form feed operation automatically; no printing occurs below the bottom margin. The bottom margin can be from *1* to *182* lines down from the top-of-form; however, you can only select a line that is below the top margin setting. The physical location of the bottom margin on the page is unaffected by subsequent changes to line spacing. If you change the LENGTH (page length) setting, the bottom margin resets to the new page length.

25) LFT MAR: 000 *Set Left Margin*



LFT MAR lets you specify a left margin. All subsequent carriage returns cause the carriage to move to the left margin. The left margin can be from *0* to *271* character spaces to the right of the far left print position; however, you can only select a character space that is to the left of the right margin setting. To help you visualize left margin locations as you scroll through the possible settings, the carriage moves to the displayed setting. The physical location of the left margin on the page is unaffected by subsequent pitch changes.

26) RGT MAR: 136 *Set Right Margin*

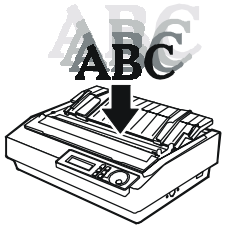
RGT MAR lets you specify a right margin. When printing reaches the right margin on a line, the printer performs a carriage return/line feed and continues printing on the next line. The right margin is also used in the center and justify modes. The right margin can be from *1* to *272* character spaces to the right of the far left print position; however, you can only select a character space that is to the right of the left margin setting. To help you visualize right margin locations as you scroll through the possible settings, the carriage moves to the displayed setting. The physical position of the right margin on the page is unaffected by subsequent pitch changes.

Specifying Communications Parameters

The next section of the Setup menu is communications. These parameters control data communications between the printer and the Host device. Before successful communications can occur, these parameters must be set to match those of the Host device. When you change a communications setting, the printer clears the data input buffer.

27) DWNLOAD: Off

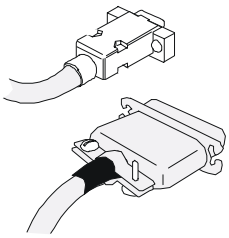
Allocate Memory for User-Defined Characters



DWNLOAD lets you allocate a portion of the printer's memory to hold user-defined characters that are downloaded from the Host device. You can select *On* to allocate memory for user-defined characters or *Off* to allocate all of the printer's memory for data input buffer and optimized graphics printing.

28) INTRFCE: Par

Select Interface

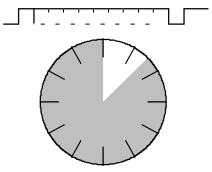


INTRFCE lets you select either the parallel or serial interface port for communications with the Host device. You can select *Par* for parallel or *Ser* for serial. If you select serial, you must also set the BAUD, PARITY, DTA BITS, STOP BITS and HNDSHK parameters to match the serial configuration of the host computer. If you select parallel, these parameters are irrelevant.

☞**Note:** Your printer switches between the parallel and serial ports automatically, so this parameter setting is irrelevant. Port switching is on a first-come, first-serve basis. While receiving data from one port, the printer will set the other port to the busy state. After the data is received, the printer will set both ports to the ready state and wait for subsequent data at either port.

29) BAUD: 9600

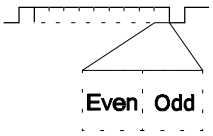
Specify Baud Rate



BAUD lets you tell the printer what serial baud rate your Host device is using. Baud rate is the speed that serial data is transmitted between your Host device and the printer. You can can select *150, 300, 600, 1200, 2400, 4800, 9600, 19200* or *38400*. Both your Host device and the printer must be set to the *same* baud rate.

30) PARITY: None

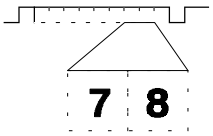
Specify Parity



PARITY lets you tell the printer what parity method your Host device is using. Parity is a technique that lets the printer check for data transmission errors. You must select *None* if your Host device does not support parity; *Odd* if your Host device uses odd parity; or *Even* if your Host device uses even parity. Both your Host device and the printer must be set for the *same* parity method.

31) DTA BITS: 8

Specify Number of Data Bits

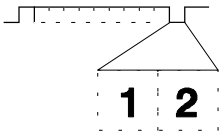


DTA BITS lets you tell the printer how many data bits your Host device is sending in each byte. You select *7* if your Host device sends 7-bit bytes; *8* if your Host device sends 8-bit bytes; or *8M* if your Host device sends 8-bit data and you want the printer to ignore the most significant bit (MSB).

☞**Note:** The *8M* setting affects both serial and parallel communications. With the parallel interface active, the *8M* setting causes the printer to ignore the signal on the MSB data line.

32) STOP BITS: 1

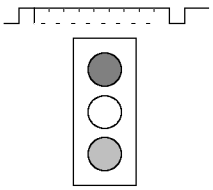
Specify Number of Stop Bits



STOP BITS lets you tell the printer how many stop bits your Host device is sending in each byte. Stop bits are necessary to separate consecutive bytes in the data stream. You must select *1* if your Host device sends one stop bit; or *2* if your Host device send two stop bits.

33) HNDSHAK: DTR

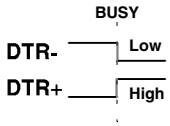
Specify Handshaking Method



HNDSHAK lets you tell the printer what handshaking method your Host device is using. Handshaking starts and stops data transmission between your Host device and the printer. Starting and stopping is important so that neither device receives more data than it can handle. You can specify *DTR* for the DTR hardware method; *XON* for the X-ON/X-OFF software tech-nique; or *D/X* for both the DTR and X-ON/X-OFF methods. Both your Host device and the printer must use the *same* handshaking method(s).

```
34) DTR:      Low
```

Set DTR Signal Polarity



DTR lets you specify the polarity of the Data Terminal Ready (DTR) signal in the printer's serial interface. You can select *Low* for a signal that goes low to disable data transmission; or *High* for a signal that goes high to disable data transmission.

```
35) IPRIME:   On
```

Enable and Disable IPRIME Signal

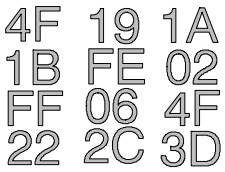
IPRIME lets you enable and disable the parallel IPRIME signal. When you enable the signal, your Host device can reset the printer by setting the IPRIME signal low for at least 50 microseconds. The printer remains in a reset condition until the signal returns high. You can select *On* to enable the IPRIME signal or *Off* to disable it. With most Host devices and software, this signal can be disabled.

Selecting Special Modes

The last section of the Setup menu is Special Modes. These modes let you invoke a variety of special printing features.

```
36) HEX MOD:  Off
```

Turn Hexadecimal Mode On and Off



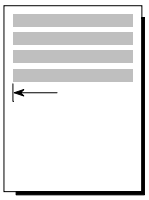
HEX MOD lets you turn the hexadecimal mode on and off. In the hexadecimal mode, the printer prints the hexadecimal and ASCII representation of every byte it receives:

```
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F     !"#$%&"()*+,-./
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F    0123456789:;<=>?
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F    @ABCDEFGHIJKLMNO
```

The printer does not interpret or execute any control sequences, nor does it print any text. Hexadecimal mode is useful when you need to view the codes being sent from the Host device to the printer. You can select *On* to turn the hexadecimal mode on; or *Off* to turn the mode off.

37) AUTO CR: Off

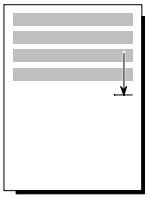
Turn Automatic Carriage Return Mode On and Off



AUTO CR lets you turn the automatic carriage return mode on and off. In the automatic carriage return mode, the printer performs a carriage return/line feed for each line feed code it receives. You can select *On* to turn the automatic carriage return mode on; or *Off* to turn the mode off.

38) AUTO LF: Off

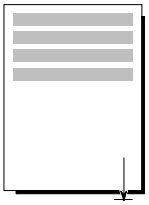
Turn Automatic Line Feed Mode On and Off



AUTO LF lets you turn the automatic line feed mode on and off. In the automatic line feed mode, the printer performs a carriage return/line feed for each carriage return code it receives. You can select *On* to turn the automatic line feed mode on; or *Off* to turn the mode off.

39) AUTO FF: Off

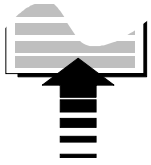
Turn Automatic Form Feed Mode On and Off



AUTO FF lets you turn the automatic form feed mode on and off. In the automatic form feed mode, the printer skips over the perforations of pin-feed paper by setting the top and bottom margins to one-half inch. You can select *On* to turn the automatic form feed mode on; or *Off* to turn the mode off. For the automatic form feed mode to work correctly, the LENGTH (page length) parameter must be set to the correct page length.

40) PAPROUT: On

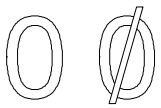
Enable and Disable Paper Out Sensing



PAPROUT lets you disable paper out detection by the printer's paper out sensors. Disabling paper out detection does not affect the printer's ability to load paper. You can select *On* to enable paper out detection and *Off* to disable paper out detection.

41) SLASH 0: Off

Turn Zero Slashing On and Off



SLASH 0 lets you turn zero slashing on and off. You can select *Off* to specify that the numeral zero be printed without a slash (0); or *On* to specify that the numeral zero by printed with a slash (Ø). Your selection affects the printing of the numeral zero in all fonts.

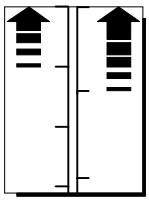
42) QUIET: Off

Turn Quiet Mode On and Off

QUIET lets you turn the quiet mode on and off. In quiet mode, the print speed slows down by about 10% in all modes to decrease the amount of noise that is generated. You can select *On* to turn the quiet mode on or *Off* to turn the mode off.

43) LF SPD: 3.5

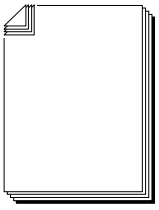
Set Line Feed Speed



LF SPD lets you change the line feed speed (paper slew rate). You can select *3.5* or *5.0* inches per second. Set *3.5* inches per second for use when printing on thick paper or multipart forms.

44) FORMS: Heavy

Select Heavy or Light Forms Printing



FORMS lets you adjust the impact force of the print wires in the printhead. You can select *Heavy* for the maximum impact force or *Light* for a reduced impact force. Use the *Heavy* setting while printing on thick, multipart forms and the *Light* setting while printing on single sheets and thinner stocks.

Reviewing the Setup Menu

Now that you've been introduced to the Setup menu parameters and their possible settings, it's time for a brief review.

Table 4-1. Setup Menu Summary

Parameter	*Description*	*Settings*
	Operations	
RSTOR	Restore printer settings	*None* Fctry Usr 1 Usr 2 Usr 3
SAVE	Save printer settings	*None* Usr 1 Usr 2 Usr 3
DFALT	Select power-on default settings	*Fctry* Usr 1 Usr 2 Usr 3
TEST	Run printer tests	*None* Memory Serial Sensor
	Print Modes	
EMUL	Set printer emulation	*Epson* IBM
FNT	Set font	*Roman* SanSrf Courier Prestig Script OCR-B Orator Draft HSDraft
PITCH	Set pitch (characters per inch)	*10* 12 13 15 17 20 Other
LPI	Set number of lines per inch	3 4 *6* 8 12 Other
ITALIC	Turn italic mode on and off	On *Off*
HIGH	Turn double-high mode on and off	On *Off*
WIDE	Turn double-wide mode on and off	On *Off*

Table 4-1. Setup Menu Summary—continued

Parameter	*Description*	*Settings*
	Print Modes—continued	
SCRIPT	Turn super/subscript mode on and off	Supr Sub *Off*
UNDLINE	Turn underline mode on and off	On *Off*
BLD/SHA	Turn bold/shadow modes on and off	Bld Sha *Off*
CTR/JST	Turn center/justify modes on and off	Ctr Jst *Off*
LANG	Set language	*USA* France Germny Englnd Dnmrk1 Sweden Italy Spain1 Japan Norway Dnmrk2 Spain2 Latin Korea Legal PC437 PC850 PC860 PC863 PC865
DIRCTN	Set text printing direction	*Bi-d* Uni
GRFICS	Set graphics printing direction	*Bi-d* Uni
	Page Setup	
LENGTH	Set page length	*066* 0 to 182
WIDTH	Set maximum print width	8 8.5
DEMAND	Turn demand document mode on and off	On Tear Auto AutoT *Off*
BIN	Select bin or alternate paper path	*None* Bottom

Table 4-1. Setup Menu Summary—continued

Parameter	*Description*	*Settings*
Page Setup—continued		
TOP MAR	Set top margin	*0* 0 to 181
BOT MAR	Set bottom margin	*66* 1 to 182
LFT MAR	Set left margin	*0* 0 to 271
RGT MAR	Set right margin	*85* 1 to 170
Communications		
DOWN-LOAD	Allocate memory for user-defined characters	On *Off*
INTRFCE	Select interface	*Par* Ser
BAUD	Specify baud rate	150 300 600 1200 2400 4800 *9600* 19200 38400
PARITY	Specify parity	Odd Even *None*
DTA BITS	Specify number of data bits	7 *8* 8M
STOP BITS	Specify number of stop bits	*1* 2
HNDSHAK	Specify handshaking method	*DTR* XON D/X
DTR	Set DTR signal polarity	*Low* High
IPRIME	Enable and disable IPRIME signal	*On* Off

Table 4-1. Setup Menu Summary—continued

Parameter	*Description*	*Settings*
	Special Modes	
HEX MOD	Turn hexadecimal mode on and off	On *Off*
AUTO CR	Turn automatic carriage return mode on and off	On *Off*
AUTO LF	Turn automatic line feed mode on and off	On *Off*
AUTO FF	Turn automatic form feed mode on and off	On *Off*
PAPROUT	Enable and disable paper out sensing	*On* Off
SLASH 0	Turn zero slashing on and off	On *Off*
QUIET	Turn quiet mode on and off	On *Off*
LF SPD	Set line feed speed	*3.5* 5.0
FORMS	Select heavy or light forms printing	*Heavy* Light

Section

5

Cleaning and Maintenance

To maintain trouble-free operation and good print quality, you should perform periodic cleaning and preventive maintenance procedures on your printer. This section provides the following procedures:

- ✓ Cleaning the platen and rollers
- ✓ Cleaning the carriage shaft
- ✓ Cleaning the printhead wires
- ✓ Cleaning printer surfaces
- ✓ Inspecting printer parts
- ✓ Replacing the ribbon cartridge
- ✓ Replacing the fuse
- ✓ Installing an expansion cartridge

☞**Note:** Perform periodic maintenance on your printer every three months or 3,000 pages of use, whichever comes first.

Cleaning the Platen and Rollers

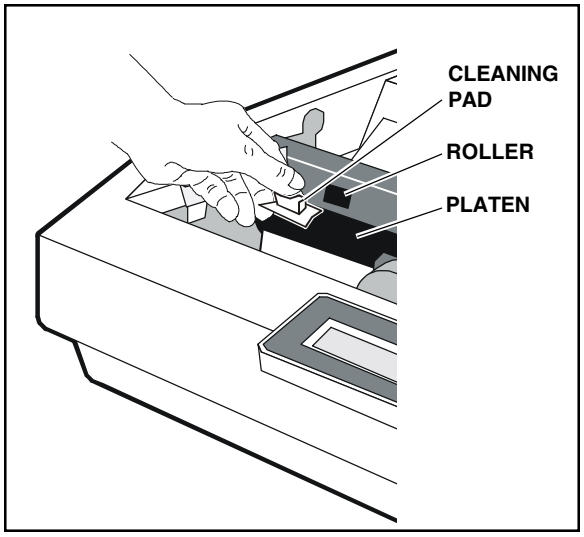


Figure 5-1. Cleaning the Platen and Rollers

You should clean the platen and rollers whenever there is ink or paper fibers on the platen, the platen appears shiny, or printed pages contain vertical smears. To do so, you'll need a cleaning pad moistened with Fedron® platen cleaner (available at most typewriter supply stores). Fedron includes preservatives and lubricants that greatly increase the life of the platen. Always use Fedron sparingly and apply Fedron *only* to the platen and rollers. Fedron is extremely flammable, so be sure to read and follow all precautions on the container.

To clean the platen and rollers, use the following procedure:

1. Remove the printer window.
2. Press the Ready button to pause printing. Make sure that PAUSE appears on the control panel display.
3. Set the paper select lever to the rear-feed position ( ).
4. Use a clean pad moistened with Fedron to wipe the rubber surface of the platen and roller surfaces until they are dull and clean, as shown in figure 5-1. Turn the Select-dial as needed to rotate the platen and rollers.
5. Replace the printer window.
6. Print a self test to verify normal operation and good print quality. Adjust the paper thickness lever as necessary.

Cleaning the Carriage Shaft

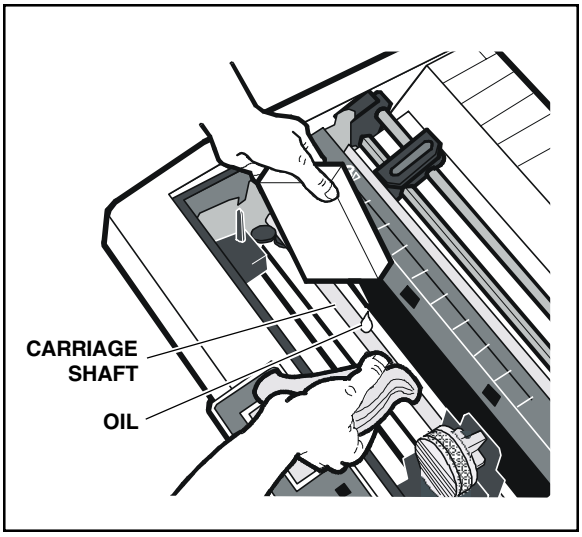


Figure 5-2. Cleaning the Carriage Shaft

The carriage shaft, located directly under the printhead, requires occasional lubrication with 3-In-One® or Singer® sewing machine oil.

To clean the carriage shaft, use the following procedure:

1. Turn off the printer and remove the printer window.
2. Slide the carriage to the far left. Then, use a clean, lint-free cloth to wipe the shaft. Wipe in long strokes *away from* the carriage.
3. Slide the carriage to the far right and wipe the shaft again. Be sure to wipe *away from* the carriage.
4. While holding the cloth below the shaft, apply two or three drops of oil, as shown in figure 5-2. Then, slowly slide the car-riage along the shaft and stop at the far left side.
5. Repeat step 4, only this time slide the carriage back and forth several times to work the oil into the carriage's self-lubricating felt rings.
6. Wipe off any excess oil on the shaft.
7. Replace the printer window.
8. Turn on the printer and print a self test to verify normal operation.

Cleaning the Printhead Wires

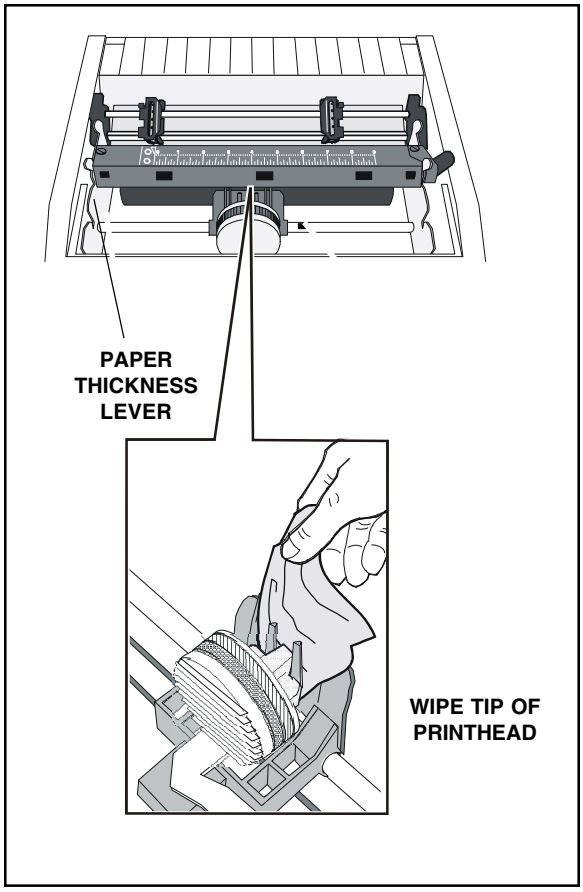


Figure 5-3. Cleaning the Printhead Wires

To prevent excessive ink build-up on the printhead wires, you should periodically wipe them with pure silicone lubricant (LPS-1® or equivalent).

To clean the printhead wires, use the following procedure:

1. Turn off the printer and remove the printer window.
2. If a ribbon cartridge is installed, lift up the cartridge and remove it from the printer.
3. Pull the paper thickness lever all the way toward the front of the printer.
4. Using a soft tissue moistened with pure silicone lubricant, gently wipe the tip of the printhead to remove any ink build-up, as shown in figure 5-3.
5. Replace the printer window.
6. Turn on the printer and print a self test to verify normal operation. Adjust the paper thickness lever as necessary to optimize the print quality.

Cleaning Printer Surfaces

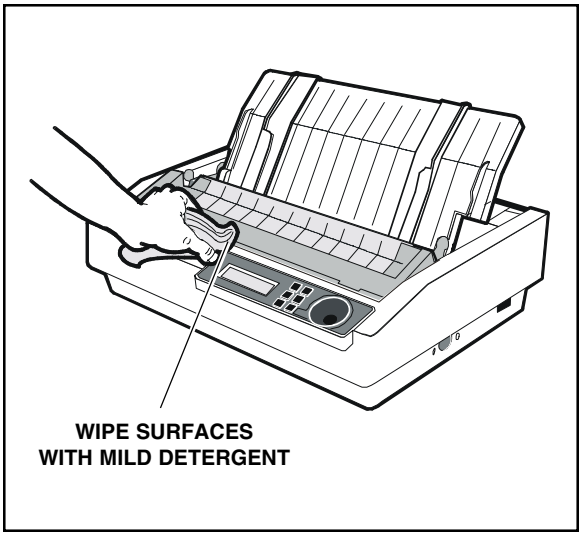


Figure 5-4. Cleaning the Printer Case & Windows

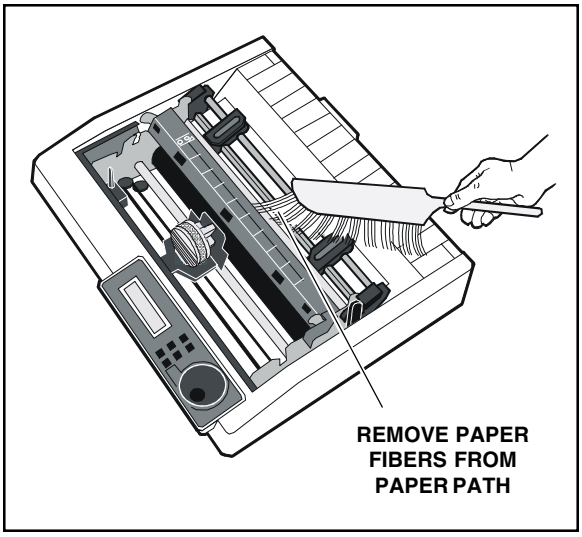


Figure 5-5. Cleaning the Printer Interior

To keep your printer looking new, you should periodically clean its surfaces with glass cleaner (Windex® or equivalent), 91% isopropyl alcohol, or a mild dishwashing detergent (Lux® or equivalent).

To clean the printer surfaces, perform the following procedure:

1. Turn off the printer and unplug the power cord.
2. Use a soft brush or lint-free cloth to dust all of the exterior surfaces. Be sure the cloth is free of grit or other matter.
3. Use a cloth lightly moistened with glass cleaner, 91% isopropyl alcohol, or a mild dishwashing detergent to wipe and clean the printer windows, as shown in figure 5-4.
4. Remove the printer window. Use a soft brush or vacuum to remove all paper fibers, dust and foreign matter from inside the printer, as shown in figure 5-5. Then, replace the printer window.
5. Use a soft brush or vacuum to remove all paper fibers, dust, and foreign matter from the rear forms tractor.
6. Re-attach the power cord and turn on the printer. Then, print a self test to verify normal operation.

Inspecting Printer Parts

You should occasionally inspect printer components so you can prevent problems before they occur. If some component appears to be damaged or worn, contact your Service Representative for a replacement part.

⚠ **Warning:** Before starting your inspection, turn off the printer.

❑ **PAPER SUPPORT**

Inspect for cracks or broken mounting slots. Make sure both paper edge guides are present.

❑ **PRINTER WINDOW**

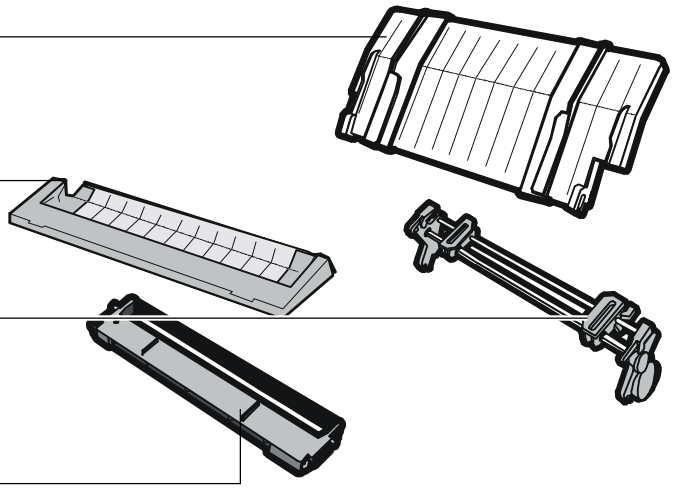
Inspect for cracks or missing tabs. Open and close the top window and feel for binding or stiff movement.

❑ **FORMS TRACTOR**

Open and close the tractor locks and doors. Slide the tractors along the shafts. Inspect for binding or stiff movement.

❑ **RIBBON CARTRIDGE**

Inspect for worn fabric.



❑ **PAPER SELECT LEVER**

Move the lever and feel for binding or stiff movement.

❑ **PLATEN AND ROLLERS**

Inspect surfaces for dull appearance. Look for dents or flaws in the rubber surfaces.

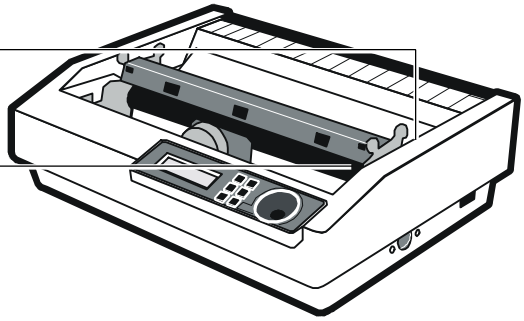


Figure 5-6. Inspecting the Printer, Front

Inspecting Printer Parts—continued

After you complete the inspection checklist on these two pages, turn on the printer and print a self test to verify normal operation.

⚠ **Warning:** Do not inspect the printer with the power turned on.

❑ **PAPER THICKNESS LEVER**

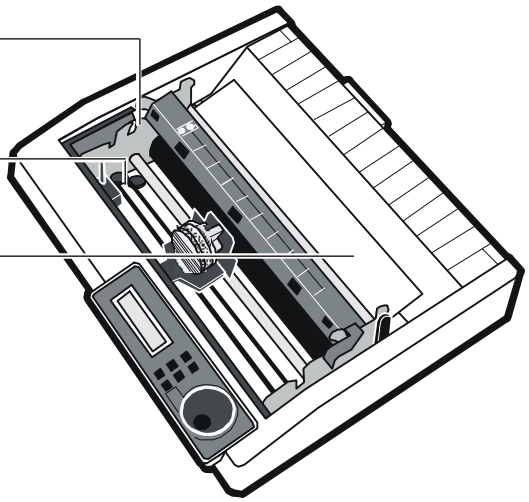
Move the lever and feel for binding or stiff movement.

❑ **PULLEYS AND DRIVE BELTS**

Inspect for damage or looseness.

❑ **PAPER PATHS**

Inspect for obstructions in the paper path. Remove any dust, paper fibers, or other foreign matter from inside the printer.



❑ **INTERFACE CONNECTORS**

Detach the cables. Inspect the cables and connectors for broken wires, frayed or burned insulation, or loose fit.

❑ **AC POWER RECEPTACLE**

Inspect the power cord and receptacle for wear or damage.

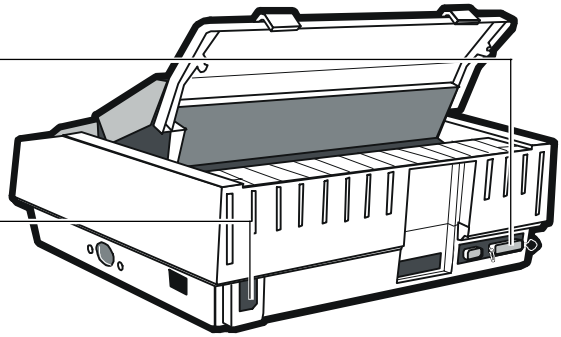


Figure 5-7. Inspecting the Printer, Internal and Rear

Replacing the Ribbon Cartridge

When printing becomes too light, you should replace the ribbon cartridge. Refer to *Installing the Ribbon Cartridge* in the *Set Up* section of this guide for information on replacing the ribbon cartridge.

Replacing the Fuse

When the printer is plugged into a power outlet that you know supplies the correct voltage, but the printer shows no sign of operation, the main power fuse may have blown. A blown fuse is a strong indication that the power line is supplying unstable voltage and you should try a different one. Refer to *Checking the Voltage Select Switch and Fuse* in the *Set Up* section of this guide for information on replacing the fuse.

Section

6

Solving Problems

This section describes printer messages and tells you what corrective action(s) to take. This section also includes a brief troubleshooting guide and information on running printer tests.

Understanding Printer Messages

Printer messages appear on the control panel to warn you of special conditions or notify you of errors. When a special condition or error occurs, several things happen:

- ✓ Printing may pause.
- ✓ The printer *beeps* to alert you.
- ✓ A printer message appears on the control panel display.

When a printer message appears, find it in this section and perform the correction action(s). There are five kinds of messages: *operating errors*, *programming errors*, *warnings*, *communication errors* and *printer errors.*

Correcting Operating Errors

The printer can notify you of three operating errors. When one of these errors occurs, the printer does not lose any buffered data. After you perform the corrective action(s), printing continues where it left off.

```
LOAD PAPER
```

This error occurs when the printer has information to print but no paper is loaded in the printer.

Corrective action: Load paper and press the Ready button.

```
CLEAR PAPER JAM
```

This error occurs when the printer detects a paper jam while ejecting the current page.

Corrective action: Carefully remove the jammed paper and press the Ready button.

```
PAPER ERROR
```

This error occurs when the printer tries to eject a single sheet or perform a paper park operation, but continues to detect paper in the printer.

Corrective actions:

- ✓ If the paper is jammed, carefully remove the jammed paper and press the Ready button.
- ✓ If you're just using a very long cut sheet, press the Form Feed button.
- ✓ If you're using pin-feed paper, tear off the last printed sheet and press the Paper Park button again.
- ✓ If this error recurs with no paper in the printer, one of the paper sensors is falsely detecting paper. Check to see if there is a small scrap of paper caught in front of or behind the platen. If not, try cleaning the platen. The sensors may be sensing a dirty platen surface.

Correcting Programming Errors

The printer can notify you of only one programming error.

```
DOWNLOAD ERROR
```

This error occurs when your computer attempts to download a font to the printer, but you have not allocated enough printer memory to store the font. When a download error occurs, the printer ignores the downloaded font information and continues printing.

Corrective action: Press the Ready button to stop printing and then change the DWNLOAD parameter on the Setup menu to *On*. Then, restart the print job from the beginning.

Understanding Warnings

The printer offers two warnings to notify you of special conditions.

```
TEST IN PROGRESS
```

When you select a printer test on the Setup menu, this message appears to notify you that the printer is executing the test.

Corrective action: None.

```
TEST UNAVAILABLE
```

When you select a printer test on the Setup menu, this message appears to notify you that the test is not contained in your printer and cannot be executed.

Correction action: None.

Correcting Communications Errors

The printer can notify you of four communications errors. When a communications error occurs, printing stops and some or all of the print data is lost. After you perform the corrective action(s), you must restart the print job from the beginning.

```
FRAMING ERROR
```

This error occurs when either the baud rate of the printer and your Host device are not the same, or the number of data bits are not the same.

Corrective action: Change the BAUD and DTA BITS parameters to match your Host device's baud rate and number of data bits. Then, press the Ready button and restart the print job from the beginning.

```
PARITY ERROR
```

This error occurs when the printer, using the selected parity method, detects a data transmission error affecting one or more data bytes.

Corrective action: Change the PARITY setting on the Setup menu to match your Host device's parity method. Then, press the Ready button and restart the print job from the beginning. If the PARITY setting is correct, hold down the Alt button and press the Clear button to clear the data input buffer. Then, press the Ready button and restart the print job from the beginning. If the error recurs, reset your Host device and the printer to use no parity checking and try again.

BUFFER OVERFLOW

This error occurs when the printer's input buffer overflows. A buffer overflow occurs when one of the following conditions exists:

- ✓ The printer and your Host device are using different handshaking methods.
- ✓ The printer and your Host device are not using a handshaking method and the baud rate exceeds the print speed.

Corrective action: Change the HNDSHAK setting on the Setup menu to match your Host device's handshaking method. Then, press the Ready button and restart the print job from the beginning. If your Host device or software application does not use handshaking, you must reduce the baud rate of your Host device and printer to a rate that does not exceed the print speed. (Try a baud rate of 1200 or 2400.)

TxD/RxD ERROR

When you run the *Serial* test on the Setup menu, this message appears to notify you of a serial line failure.

Corrective action: Your serial interface requires servicing. Contact your Service Representative for assistance. To clear the message and return to the Setup menu, turn the Select-dial. If the *Serial* test was performed without a loopback connector installed on the port, the test is invalid.

Correcting Printer Errors

The printer can notify you of four printer errors. Printer errors occur when the printer is unable to continue printing due to a malfunctioning component.

```
MEMORY ERROR
```

This error occurs when printer logic detects defective memory during a printer memory test. Memory tests occur at power up and when you select the *Memory* test on the Setup menu.

Corrective action: You must replace the printer's memory. Contact your Service Representative for assistance. If this message displays during the Setup menu *Memory* test, you may be able to clear the message and return to the Setup menu by turning the Select-dial.

```
CARRIAGE ERROR
```

This error occurs when the printer is unable to index the carriage at the home position due to a jammed ribbon, dirty carriage shaft, or malfunctioning carriage home switch.

Corrective actions:

- ✓ Try replacing the ribbon cartridge (refer to the procedure for *Installing the Ribbon Cartridge* in the *Set Up* section of this guide).
- ✓ If the error recurs, try cleaning the carriage shaft (refer to the procedure for *Cleaning the Carriage Shaft* in the *Cleaning and Maintenance* section of this guide).
- ✓ If the error still recurs, you must adjust or replace the carriage home switch. Contact your Service Representative for assistance.

EEROM ERROR

This error occurs when the printer detects that its non-volatile memory is defective or does not contain the correct information.

Corrective action: Contact your Service Representative for assistance.

REPLACE BATTERY

This message appears when the printer's battery, which refreshes the non-volatile memory when power is off, becomes weak and is not providing reliable operation.

Corrective action: Contact your Service Representative for assistance.

Troubleshooting Problems

If you experience a printer problem that you cannot correct, consult the following troubleshooting guide for help. If you are still unable to solve the problem, contact your Service Representative.

Table 6-1. Troubleshooting Guide

Symptom	*Probable Cause/Corrective Action*
Printer does not turn on.	✓ Power cable is not plugged into power outlet or printer. Check power cable. ✓ Power outlet is not supplying voltage. Check outlet with another appliance. ✓ Main power fuse is blown or defective. If printer has a voltage select switch, check fuse and replace if necessary.
Printer turns on but control panel display remains blank or shows black boxes.	✓ Expansion cartridge is loose. Turn off printer and reinstall expansion cartridge. ✓ Turn off printer, wait five seconds, and then turn on printer. If error recurs, contact your Service Representative for assistance.
Error message appears on control panel display.	✓ Find error message in this section and perform corrective action(s).
Self test does not operate and no error message is displayed.	✓ Printer requires service. Contact your Service Representative for assistance.

Table 6-1. Troubleshooting Guide—continued

Symptom	*Probable Cause/Corrective Action*
Control panel buttons do not work.	✓ Printing is in progress. Wait until printing stops; or, press Ready button to halt printing.
Select-dial does not move paper.	✓ Printing is not paused. Press Ready button and try again.
Self test prints, but printer does not print data sent from computer.	✓ Printing is paused; press the Ready button. ✓ Interface cable to computer is loose, defective or wired incorrectly. Check cable. ✓ Computer is sending data to the wrong output port. Check computer's port assignment. ✓ Interface is fouled up. Turn computer and printer off, then back on; or try a different output port.
Printing is too light.	✓ Print gap is too wide. Push paper thickness lever toward back of printer. ✓ Ribbon is worn. Replace the ribbon cartridge. ✓ Ribbon cartridge is not fully seated in place. Reload the ribbon cartridge.

Table 6-1. Troubleshooting Guide—continued

Symptom	*Probable Cause/Corrective Action*
Printing is smearing.	✓ Print gap is too narrow. Pull paper thickness lever toward front of printer. ✓ Ribbon is tangled. Correct problem or replace the cartridge. ✓ Small piece of paper or debris is lodged in front of printhead. Remove the obstruction. ✓ Paper is not taut between the tractors or around the platen. Reload paper.
Large portions of characters are not printing.	✓ Ribbon is tangled. Correct problem or replace the cartridge. ✓ Printhead is damaged or worn; contact Service Representative for assistance.
Characters are missing one or more dots.	✓ Print gap is too wide. Push paper thickness lever toward back of printer. ✓ Printhead is dirty; clean printhead (see *Cleaning and Maintenance* section). ✓ Printhead is damaged or worn; contact Service Representative for assistance.
Printer prints garbled text and paper moves erratically.	✓ Wrong printer emulation selected. Check EMUL setting on Setup menu.

Table 6-1. Troubleshooting Guide—continued

Symptom	*Probable Cause/Corrective Action*
Paper does not feed properly.	✓ Paper is not loaded properly. Reload paper. ✓ Paper select lever is in wrong position. For single sheets, push lever towards rear of printer; for pin-feed paper, pull lever towards front of printer. ✓ Print gap is too narrow. Pull paper thickness lever toward front of printer.
Pin-feed paper does load properly.	✓ Paper is not loaded properly. Reload paper. ✓ Paper select lever is in wrong position. Pull lever towards front of printer. ✓ Print gap is too narrow. Pull paper thickness lever toward front of printer.
Some or all printer settings change before printing begins.	✓ Software application is over-riding your settings. Change the settings in your software application.
Multipart forms or labels tear during printing; or, labels peel off during printing.	✓ Print gap is too narrow. Pull paper thickness lever toward front of printer. ✓ Forms or labels are too thick to feed around platen. Feed forms from bottom of printer.

Table 6-1. Troubleshooting Guide—continued

Symptom	*Probable Cause/Corrective Action*
Printing goes off right side of page or does not print all the way across the page.	✓ WIDTH setting on Setup menu is incorrect; check setting.
Lines of text print on top of one another.	✓ AUTO LF mode on Setup menu is off; turn it on. ✓ Paper is not taut between tractors or around platen. Reload paper. ✓ Paper select lever is in wrong position. For single sheets, push lever towards rear of printer; for pin-feed paper, pull lever towards front of printer.
Printer leaves blank line after every print line.	✓ AUTO LF mode on Setup menu is on; turn it off. ✓ LPI setting on Setup menu is incorrect; check setting.
Carriage does not return to left margin before printing next line.	✓ AUTO CR mode on Setup menu is off; turn it on.
Printer only prints hexadecimal numbers.	✓ HEXMODE on Setup menu is on; turn it off.
Printing does not start at far left print position.	✓ LFT MAR setting on Setup menu is incorrect; check setting.
Printer does not justify or center text with the JST or CTR mode on.	✓ RGT MAR setting on Setup menu is incorrect; check setting.
Printing starts too far down the page.	✓ TOP MAR setting on Setup menu is incorrect; check setting.

Table 6-1. Troubleshooting Guide—continued

Symptom	*Probable Cause/Corrective Action*
Printer prints on pin-feed paper perforations.	✓ Top-of-form is set incorrectly. Advance paper until first print line is in front of printhead; then hold down the Alt button and press the TOF button. ✓ LENGTH setting on Setup menu is incorrect for the paper you are using; check setting. ✓ AUTO FF mode on Setup menu is off; turn it on.
Last line(s) of page prints on top of next page.	✓ LENGTH setting on Setup menu is incorrect; check setting.
Double-high text overlaps text on the previous line.	✓ Leave a blank line before every double-high line of text.
Double-wide characters overlap.	✓ Leave a blank space after every double-wide character.
Foreign symbols replace some of the standard ASCII characters.	✓ LANG setting on Setup menu is incorrect; check setting.
Vertical line drawing and component characters do not align.	✓ DIRCTN setting on Setup menu is bi-directional; change setting to unidirectional.
Printer ejects cut sheets before finishing the printing on the page.	✓ LENGTH setting on Setup menu is incorrect; check setting.
Forms jam in printer while using the demand document mode.	✓ Forms are snagging on printhead during reverse feed. Change DEMAND setting to *Tear* or *AutoT* and try again.

Running Printer Tests

From the Setup menu, you can run various tests to check out printer components. You can run a memory test, serial interface test, and sensor test.

Checking Memory

The memory test checks printer memory by writing data patterns to all memory locations and reading back the data patterns to verify that they are correct.

`4) TEST: Memory`	To run the test, display the TEST parameter on the Setup menu and select *Memory*.
`TEST IN PROGRESS`	When you release the Alt button, the printer executes the test.
`4) TEST: None`	If the test is successful, the Setup menu reappears.
`MEMORY ERROR`	If the test fails, the MEMORY ERROR message appears. In this case, you should contact your Service Representative for assistance. You may be able to clear the message and return to the Setup menu by turning the Select-dial.

Checking the Serial Interface

The printer can perform a serial interface test to check serial transmit and receive lines for proper operation. For this test, you must attach a serial loopback connector to the 9-pin serial interface connector at the rear of the printer. The serial loopback connector jumpers the RxD (pin 2) and TxD (pin 3) signals together. If data sent on the TxD line does not match data received on the RxD line, the serial loopback test fails and further action is necessary.

`4) TEST: Serial`	To run the test, display the TEST parameter on the Setup menu and select *Serial*.
`Connect Loopback`	When you release the Alt button, the printer reminds you to attach the loopback connector.
`TEST IN PROGRESS`	After you attach the loopback connector, turn the Select-dial to execute the test. If you do not attach a loopback connector, the test is invalid.
`4) TEST: None`	If the test is successful, the Setup menu reappears.
`TxD/RxD ERROR`	If the test fails, an error message appears. In this case, you will need to contact your Service Representative for assistance. You can clear the message and return to the Setup menu by turning the Select-dial.

☞**Note:** To jumper a breakout box for serial loopback, install jumper cords as follows:

Signal	Pin No.	*connects to*	Signal	Pin No.
RxD	2		TxD	3

Checking Sensors and Switches

The printer can perform an interactive test to check the printer sensors and switches. During the test, you are required to perform various actions so that the printer can check the sensors and switches for normal operation. You can check sensors and switches in any order and you can terminate the test whenever you want by turning the Select-dial.

4) TEST: Sensor	To run the test, display the TEST parameter on the Setup menu and select *Sensor*.
SENSOR TEST	When you release the Alt button, the printer executes the test. At this point you can test any printer sensor or switch by performing the appropriate action.
Carriage Sensor	For example, to test the carriage sensor, move the carriage to the far left. If the test is successful, a confirmation message appears. If the test fails, the message will not appear.
Paper Sensor 1	To test the paper sensor that is in front of the platen, insert and remove paper in front of the platen and move side-to-side.
Paper Sensor 2	To test the paper sensor that is behind the platen, insert and remove paper behind the platen and move side-to-side.
Rear Trctr Swtch	To test the tractor sensor, remove or install the forms tractor for rear-feeding.
Tractor Switch	To test the paper select lever, move it between the top feed and rear feed positions.

Checking Sensors and Switches—continued

Ready Button
Pitch Button
Font Button
Line Feed Button
Form Feed Button
Setup Button

To test a control panel button, just press the button and look for a confirmation message.

4) TEST: Sensor

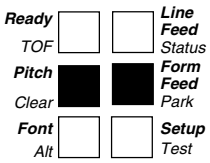
To test the Select-dial, turn the dial. This action terminates the test and returns you to the Setup menu.

If you are unable to get a confirmation message, the selected sensor or switch is malfunctioning. Contact your Service Representative for help.

Using Hidden Parameters

The Setup menu contains special parameters that are normally hidden from the typical user. The parameters are hidden since they are used infrequently and because they must be set with care or poor print quality can result. When set correctly, these parameters fine adjust and fully optimize print quality and other printing characteristics.

Accessing Hidden Parameters



To access the hidden parameters, press the Setup button to display the Setup menu. Turn the Select-dial until the last parameter in the menu is displayed. Then, hold down both the Pitch and Form Feed buttons and turn the Select-dial to display the hidden parameters.

```
47) ADJ.LQ10:   0
```

Adjust Vertical Alignment

```
48) ADJ.HQ10:   0
49) ADJ.DQ10:   0
50) ADJ.DQ12:   0
51) ADJ.DQ17:   0
52) ADJ.DQ20:   0
```

The ADJ parameters let you adjust the vertical alignment of bi-directional text. LQ indicates letter-quality; HQ indicates high-speed draft-quality; and DQ indicates draft-quality. The numbers 10, 12, 17 and 20 indicate the pitch.

```
HHHHHHHHHHHHHHHHH
 HHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHH
 HHHHHHHHHHHHHHHHH
```

After choosing a setting, the printer will print four rows of H's so you can inspect alignment. The H's should fall into discreet columns. If they don't, adjustment is necessary.

```
HHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHH
```

To move the second and fourth rows to the *left,* increase the setting. To move the second and fourth rows to the *right,* decrease the setting.

```
53) TEARBAR:    0
```

Align Forms Perforation With Tearbar

TEARBAR lets you adjust how far the paper advances when presented for tear-off in the demand document mode. The perforation should align with the tearbar so that paper can be easily removed. To advance the paper *more,* increase the setting; to advance *less,* decrease the setting.

```
54) P_SNSR:     0
```

Adjust the Top-Of-Form Position

P_SNSR lets you adjust the top-of-form position (first available print line) on a page. The parameter allows for fine vertical adjustments in 1/60-inch (0.425 mm) increments. To move the top-of-form position *down* the page, increase the setting; to move the top-of-form position *up* the page, decrease the setting.

```
55) H_SNSR:     0
```

Adjust the Left Print Boundary

H_SNSR lets you adjust the position of the left print boundary on the page. The parameter allows for fine horizontal adjustments in 1/120-inch (0.216 mm) increments. To move the left print boundary to the *right,* increase the setting; to move the left print boundary to the *left,* decrease the setting. After you change the setting, the printer will print the message `* * HOME SENSOR ADJUSTMENT * *` at the new boundary.

```
56) ALIGN:
```

Restore Adjustment Parameter Factory Defaults

ALIGN lets you reset the hidden adjustment (ADJ) parameters to the factory default settings. To restore the factory default settings, press the Alt button. After restoring the settings, the message `DONE` displays next to the ALIGN parameter and several rows of H's print in various fonts and pitches. Inspect the printout for proper alignment. If further adjustment is necessary, use the appropriate adjustment parameter.

Appendix

A

Specifications

Table A-1 lists the physical and performance specifications of the METTLER TOLEDO 8846 printer. All specifications are subject to change without notice.

Table A-1. Specifications

Item	*Specifications*
Physical Characteristics	
Height	5.6 inches (14.2 cm)
Width	16.6 inches (42.2 cm)
Depth	13 inches (33 cm)
Weight	21.5 pounds (9.8 kg)

Table A-1. Specifications—continued

Item	*Specifications*
	Printing Characteristics
Printing method	24-pin impact dot-matrix
Dot diameter	0.2 millimeter
Movement	Bi-directional and logic-seeking
Print speeds	
High-speed DQ	320 characters per second at 10 cpi
Draft-quality	270 characters per second at 10 cpi
Letter-quality	90 characters per second at 10 cpi
Maximum print width	8.5 inches (21.6 cm) for U.S. models; 8 inches (20.5 cm) for international models
Noise level	Less than 55 dBA
	Controls and Indicators
Control panel	
Buttons	Ready/TOF, Pitch/Clear, Font/Alt, Line Feed/Status, Form Feed/Park and Setup/Test
Display	16-place, one-line alphanumeric liquid-crystal display (LCD)
Select-dial	For paper/carriage movement and printer setup
Levers	Paper thickness and paper select

Table A-1. Specifications—continued

Item	*Specifications*
Motors, Sensors and Switches	
Motors	Carriage and line feed
Sensors	Carriage, paper (2) and Select-dial (2)
Switches	Power, tractor select and tractor position; *optional* voltage select
Interfaces	
Ports	Centronics-compatible parallel and RS-232-C serial
Connectors	
Parallel	Centronics 36-pin female
Serial	DB-9 male
Serial settings	
Baud rates	150, 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400
Handshaking	DTR, X-ON/OFF and both
Parity	Even, odd and none
Data bits	7, 8 and 8 with MSB ignored
Stop bits	1 and 2
Special feature	Automatic port switching

Table A-1. Specifications—continued

Item	*Specifications*
Emulations, Fonts and Graphics	
Emulations	Epson LQ-570 and LQ-1070, IBM XL24 Proprinter, LEXMARK 2390 and 2391
Fonts	Roman, Sans-Serif, Courier, Prestige, Script, OCR-B, Orator, Draft, High-Speed Draft
Bar code symbologies	Interleaved 2 of 5, Code 3 of 9, EAN-8, EAN-13, UPC-A, UPC-E, Code 128, and Codabar; POSTNET optional
Pitches	10, 12, 13.3, 15, 17.1 and 20 characters per inch
Character sets	Italic, PC 437 (United States), PC 850 (Multi-lingual), PC 860 (Portugal), PC 863 (Canada-French, PC 865 (Norway)
Languages	USA, French, German, UK, Denmark I and II, Sweden, Italy, Spain I and II, Japan, Norway, Latin America, Korea, Legal
Character matrixes	
High-speed DQ	10H x 24V
Draft-quality	12H x 24V
Letter-quality	36H x 24V
Font download	Fully supported

Table A-1. Specifications—continued

Item	*Specifications*
Emulations, Fonts and Graphics—continued	
Attributes	Italic, double-high, double-wide, superscript, subscript, underline, bold or shadow, center and justify
Graphics resolution	Up to 360 H x 360 V
Paper Handling	
Paper paths	Top; rear and bottom with dual-position tractor
Feeding methods	Friction for cut sheets; tractor for pin-fed paper
Special features	Tear bar, first-line printing, automatic paper loading, paper parking, demand document mode, paper out and paper jam sensing
Cut sheet width	From 3 to 12 inches (7.6 to 30.5 cm)
Pin-feed paper width	From 4.5 to 11.5 inches (11.4 to 29.2 cm) including pin-feed tear strips
Page length	From 3 to 30.3 inches (7.6 to 77 cm)
Multipart forms	Up to five parts (0.017 inch thick)
Slew rate	5 and 3.5 inches per second

Table A-1. Specifications–continued

Item	*Specifications*
	Ribbons
Type	Inked nylon fabric stuffed in plastic cartridge
Ink	Black
Length	45 feet (13.7 meters)
Life	5.5 million draft-quality characters
	Memory
Input buffer	32 kilobytes
Expansion slot	One receptacle for expansion cartridge
User save areas	3 independent setups plus factory defaults
	Power and Environmental Requirements
Input voltage U.S. models International models	 90 to 130 vac 180 to 260 vac
Frequency	47 to 63 Hz
Operating Temperature Humidity Altitude	 45° to 95° F (7° to 35° C) 10% to 85% noncondensing -100 to 10,000 feet (-30.5 to 3,050 meters)

Table A-1. Specifications—continued

Item	*Specifications*
Power and Environmental Requirements—continued	
Storage Temperature Humidity Altitude	 -4° to 140° F (-20° to 60° C) 10% to 85% noncondensing -100 to 30,000 feet (-30.5 to 9,150 meters)
ESD immunity	No damage at 10 KV printing or 20 KV static
Diagnostics	
Status printout	Automatic printout of printer status
Self test	Rotating character pattern
Hexadecimal mode	Hexadecimal printout of print data
Diagnostics	Full set of interactive tests to check printer subsystems, including memory, serial interface and sensors
Dynamic polling	On-going error checking and fault reporting
Reliability and Agency Compliances	
Warranty	One-year, parts and labor (return to factory)
Mean Time To Repair (MTTR)	Less than 15 minutes (average)
Mean Time Between Failure (MTBF)	8,000 hours average when operated at 25% duty cycle; 90% confidence level
Agencies US models International models	 UL Listed, C-UL Listed, FCC Class B TÜV, CE
EPA	ENERGY STAR® compliant

Appendix

B

Bar Codes

This appendix describes the printer's bar code symbologies (formats) and explains how to configure the printer to print bar codes.

Introducing Bar Codes

A bar code symbol consists of parallel lines and spaces of varying widths or heights. The bar code symbology describes unambiguous rules for encoding data into the bars and spaces.

Bar Code Symbologies

The printer supports the following bar code symbologies:

- ✓ *Interleaved 2-of-5*. This is a variable-length, self-checking numeric bar code mainly used in the distribution industry.
- ✓ *Code 3-of-9*. This is a variable-length, self-checking, alphanumeric bar code widely used in the automotive industry and many other non-retail industries.
- ✓ *Codabar*. This is a variable-length, self-checking, alphanumeric bar code that can encode digits 0 through 9 and six additional characters. The code is commonly used in libraries, blood banks and air parcel express applications.
- ✓ *UPC-A*. This is a fixed-length, self-checking, numeric bar code used throughout the supermarket and retail industries to identify a product and its manufacturer. UPC-A encodes a series of 12 digits.
- ✓ *UPC-E*. This is a shortened version of UPC-A that encodes six of the 12 digits in a UPC-A message.
- ✓ *EAN-13*. This is a variation of the U.S.-developed UPC bar code format adopted for the international marketplace. It, like UPC-A, is a fixed-length, self-checking, numeric bar code. EAN-13 encodes a series of 13 digits: 12 directly into the symbol and one into a parity pattern of the first six digits.
- ✓ *EAN-8*. This is a shortened version of EAN-13 that encodes a series of 8 digits.
- ✓ *Code 128*. This is a variable-length, self-checking, high-density bar code. It can encode all 128 alphanumeric ASCII characters.
- ✓ *POSTNET* (optional). This is a self-checking, numeric bar code that encodes U.S. Postal Service 5-digit ZIP Codes, 9-digit ZIP+4 Codes, and 11-digit Delivery Point Codes.

Selecting the Bar Code Emulation

Before you can print bar codes, you must select the printer's *Epson* emulation.

Press the Setup button to display the Setup menu. Turn the Select-dial until the EMUL parameter appears. While holding down the Alt button, turn the Select-dial until the *Epson* setting appears. Then, release the Alt button. Press the Setup button to exit the Setup menu.

With the *Epson* emulation selected, the printer can receive Epson control codes and escape sequences *and* bar code escape sequences.

Printing Bar Codes

To print bar codes, the printer must receive special bar code commands from your computer. This requires a software application that is capable of generating and sending bar code commands to the printer. If you want to use a particular software application to print bar codes, contact the software manufacturer for specific details.

☞**Note:** If you are a programmer who would like to generate and send bar code commands from your own software applications, refer to the *Code Sets* appendix of this guide for a listing of the bar code commands.

Bar Code Specifications

Table B-1 lists the printer's bar code specifications.

Table B-1. Bar Code Specifications

Item	*Specification*
Agency Compliances	
Interleaved 2-of-5, Code 3-of-9 and Codabar	American National Standard Institute (ANSI), ANSI MH10.8M-1983
UPC-A and UPC-E	Uniform Code Council, Inc., UPC Symbol Specification 1986
EAN-13 and EAN-8	International Article Numbering Assn., EAN Specification 1987
POSTNET	United States Postal Service, Publication 25
Code 128	Automatic Identification Manufacturers (AIM), Code 128 Standard
Dimensions	
Height	From 1/12 inch to 10 inches in 1/12-inch increments
Width of bars	From 0.01 to 0.5 inch wide in 0.01-inch increments
Width of spaces	From 0.01 to 0.5 inch wide in 0.01-inch increments

Table B-1. Bar Code Specifications—continued

Item	*Specification*
POSTNET Dimensions	
Height of short bars	0.050 inch (±0.010 tolerance)
Height of tall bars	0.125 inch (±0.010 tolerance)
Bar width	0.020 inch (±0.005 tolerance)
Pitch	0.0475 inch (±0.0025 tolerance)
ZIP Codes	Encodes five digits, one correction character, plus two frame bars
ZIP+4 Codes	Encodes nine digits, one correction character, plus two frame bars
Delivery Point Codes	Encodes eleven digits, one correction character, plus two frame bars
Miscellaneous	
Human-readable text	Selectable using current font selection on printer
Command set compatibility	Genicom- and OTC-compatible

Appendix

C

Interfaces

This appendix describes the printer's parallel and serial interfaces, including voltages, signals and timing, cables and connectors, pin assignments and parameters.

Centronics Parallel Interface

The parallel interface conforms to the Centronics standard for parallel data transfer from computers to printers. The interface contains 36 lines.

Voltages

A signal on a line is either high or low, depending on the voltage level. Timed high-to-low and low-to-high transitions of a signal enable the transfer of logical information. The valid parallel voltages are as follows:

- ✓ High (+): +3.5 to +5 volts
- ✓ Low (-): 0 to +0.8 volts

Signals and Timing

The parallel interface consists of a data clock signal, eight data bit signals, two handshaking signals, two printer error signals, two printer control signals, two printer select signals, a power line, fifteen ground lines, and three lines that are not connected.

Data Transfer Signals

The primary function of the interface is to transfer data from the computer to the printer. This function requires eleven signals. To transfer each data byte from the computer to the printer, the following signals are sent:

- ✓ During normal operation, the computer monitors a BUSY signal from the printer. When BUSY goes low, the printer is ready to receive a data byte.
- ✓ When BUSY is low, the computer simultaneously represents the eight bits of the data byte on eight data lines—DB1 through DB8. The least significant bit (LSB) is represented on DB1, the next bit on DB2, and so on. If the bit is logical "0", the signal is high; if the bit is logical "1", the signal is low.
- ✓ After waiting at least 0.5 microsecond, the computer pulses a STROBE- signal for at least 0.5 microsecond to tell the printer that data is present on the data lines. The computer continues to hold the data on the data lines for at least 0.5 microsecond after the STROBE- pulse.
- ✓ Within 0.25 microsecond after the leading edge of the STROBE- pulse, the printer changes the BUSY signal to high to indicate that it is busy.
- ✓ During the next 5 microseconds (or more), the printer reads the data lines and transfers the byte to printer memory.
- ✓ When ready to receive another byte, the printer sets the BUSY signal back to low and pulses an ACK- signal low for at least 4 microseconds.

The timing of each event is critical. Figure C-1 shows the parallel data transfer timing diagram.

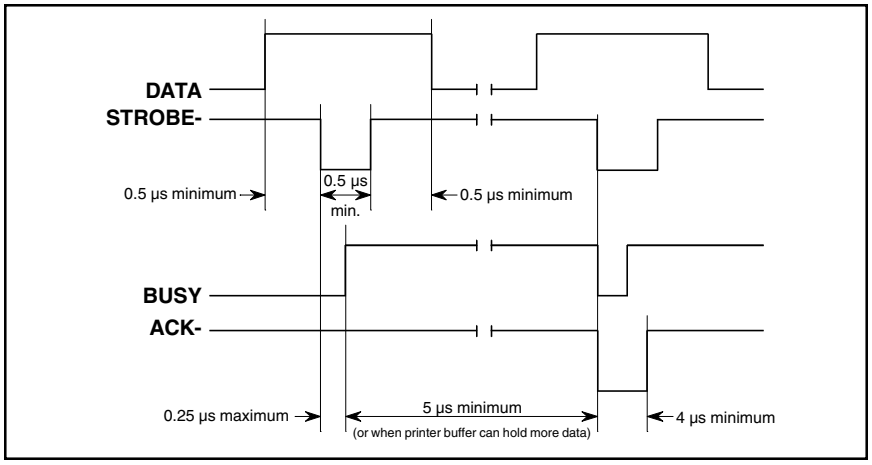


Figure C-1. Parallel Data Transfer Timing Diagram

Printer Error Signals

The printer uses two signals to notify the computer of printer errors: PAPER and ERROR-. PAPER goes high and ERROR- goes low when the printer has data to print but is out of paper. ERROR- also goes low when the printer is off-line or in an error state. PAPER returns low and ERROR- returns high when the error is corrected.

Printer Control Signals

The computer uses two signals to control certain printer operations: AUTO FEED- and IPRIME-. With AUTO FEED- low, the printer advances the paper one line after printing; with AUTO FEED- high or disconnected, no action occurs. When IPRIME- pulses low for at least 50 microseconds, the printer initializes printer settings to the defaults and clears the input buffer; with IPRIME- high or disconnected, no action occurs.

Printer Select Signals

The computer uses a SELIN- signal to select the printer to receive data. The printer uses a SELOUT signal to tell the computer that it is selected and ready to receive data. For the printer's parallel interface to operate, SELIN- must be low or disconnected. SELOUT remains high as long as SELIN- is low or disconnected.

Power Line

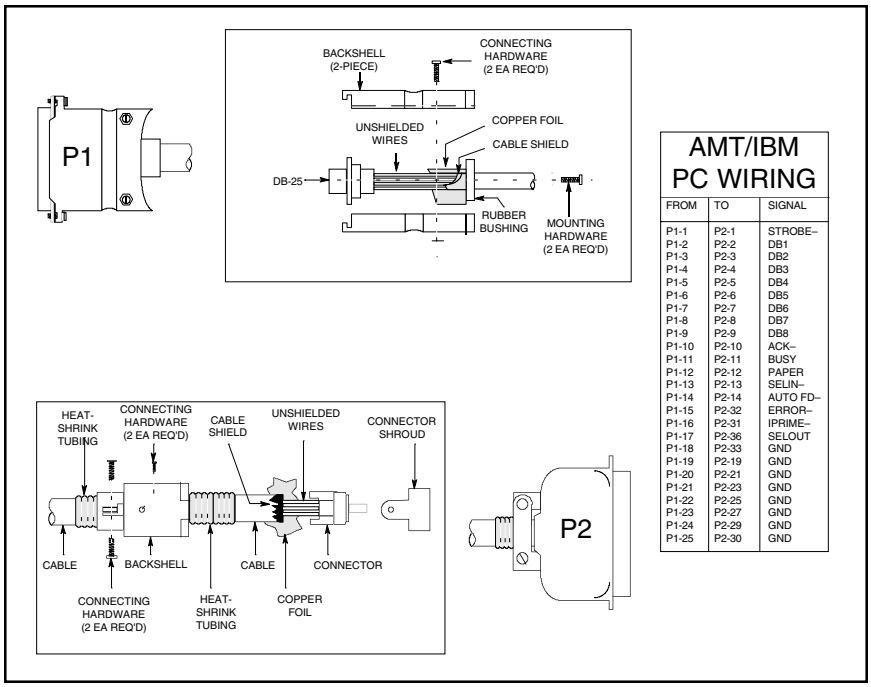
The printer provides a +5 volts dc power line to drive the logic of an external device.

Ground Lines

The printer provides fifteen ground lines consisting of a logic ground, chassis ground, and thirteen signal return grounds.

Cable/Connector Requirements

The parallel connector must be a 36-pin male plug with a metal backshell (Amphenol 157-32360 or equivalent). The cable must be shielded with twisted pair leads (Beldon 9505 or equivalent). The parallel cable must not exceed 10 feet (3 meters). Figure C-2 shows a typical parallel cable assembly.



AMT/IBM PC WIRING

FROM	TO	SIGNAL
P1-1	P2-1	STROBE–
P1-2	P2-2	DB1
P1-3	P2-3	DB2
P1-4	P2-4	DB3
P1-5	P2-5	DB4
P1-6	P2-6	DB5
P1-7	P2-7	DB6
P1-8	P2-8	DB7
P1-9	P2-9	DB8
P1-10	P2-10	ACK–
P1-11	P2-11	BUSY
P1-12	P2-12	PAPER
P1-13	P2-13	SELIN–
P1-14	P2-14	AUTO FD–
P1-15	P2-32	ERROR–
P1-16	P2-31	IPRIME–
P1-17	P2-36	SELOUT
P1-18	P2-33	GND
P1-19	P2-19	GND
P1-20	P2-21	GND
P1-21	P2-23	GND
P1-22	P2-25	GND
P1-23	P2-27	GND
P1-24	P2-29	GND
P1-25	P2-30	GND

Figure C-2. Parallel Cable Assembly

Setting Parallel Parameters

Only two Setup menu parametesr affect the parallel interface: DTA BITS and IPRIME. For more information on these parameters, refer to the *Control Panel* section in this guide.

Pin Assignments

Table C-1 lists the parallel connector pin assignments and signal requirements.

Table C-1. Parallel Pin Assignments

Pin	*Signal*	*Source*	*Printer Usage*
1	STROBE–	Computer	Must pulse low for at least 0.5 microsecond to clock data on DB1-DB8 lines; data must be present for at least 0.5 microsecond before and after pulse
2	DB1	Computer	Must contain eight bits of parallel data byte (DB1 = LSB); high signal represents logical "1", low signal represents logical "0" (you can use the DTA BITS parameter on the Setup menu to force the printer to interpret the DB8 signal as logical "0", regardless of what is received)
3	DB2	Computer	
4	DB3	Computer	
5	DB4	Computer	
6	DB5	Computer	
7	DB6	Computer	
8	DB7	Computer	
9	DB8	Computer	
10	ACK–	Printer	Pulses low for at least 4 microseconds when printer has received data byte on DB1-DB8 lines and is ready for another; also pulses low when printer is turned on or reset

Table C-1. Parallel Pin Assignments—continued

Pin	*Signal*	*Source*	*Printer Usage*
11	BUSY	Printer	Goes high within 0.25 microsecond after STROBE– pulse to suspend further data transfer while printer receives data byte on DB1-DB8 lines; returns low at least 5 microseconds later or when printer buffer can hold another byte
12	PAPER	Printer	Goes high when printer has data to print, but no paper is loaded
13	SELOUT	Printer	Remains high while SELIN– is low or disconnected
14	AUTO FEED–	Computer	May go low to cause printer to advance paper one line after printing; otherwise, must be high or disconnected
15			Not connected
16	LGND		Logic ground
17	CGND		Chassis ground
18	+5V	Printer	+5 volts dc, 200 mA maximum
19	GND		Ground
20	GND		Ground
21	GND		Ground
22	GND		Ground
23	GND		Ground
24	GND		Ground
25	GND		Ground
26	GND		Ground
27	GND		Ground
28	GND		Ground
29	GND		Ground
30	GND		Ground

Table C-1. Parallel Pin Assignments—continued

Pin	*Signal*	*Source*	*Printer Usage*
31	IPRIME–	Computer	May pulse low for at least 50 micro-seconds to initialize printer settings to defaults and clear input buffer; otherwise, must be high or disconnected (you can use the IPRIME parameter on the Setup menu to disable the effects of this signal)
32	ERROR–	Printer	Goes low when printer has data to print but is out of paper, off-line, or in error state; returns high when condition is corrected
33	GND		Ground
34			Not connected
35			Not connected
36	SELIN–	Computer	Must be low or disconnected

RS-232-C Serial Interface

The serial interface conforms to the Electronics Industries Association (EIA) RS-232-C standard for serial communications. This standard describes a data transfer method between data terminal equipment (DTE) and data communications equipment (DCE). DTE refers to computers; DCE refers to modems or other data communications devices. Since the RS-232-C standard does not take printers into account, manufacturers are free to produce printers that operate as either DTE or DCE. The 8846 printer operates as aDTE device.

The RS-232-C serial interface contains nine lines. Only six of these lines carry signals or are grounded; the remaining three lines are not connected.

Voltages

Each line can carry two voltage levels: high and low. Timed high-to-low and low-to-high transitions on these lines enable the transfer of logical information. Valid RS-232-C voltage levels are as follows:

- ✓ High (+): +3 to +12 volts
- ✓ Low (-): -12 to -3 volts

Signals and Data Format

The serial interface consists of five signal lines and one ground line:

- ✓ Request To Send
- ✓ Clear To Send
- ✓ Transmit Data
- ✓ Receive Data
- ✓ Data Terminal Ready
- ✓ Signal Ground

Request To Send

The Request To Send (RTS) signal indicates when the printer is ready to send data. If RTS is high, the printer is ready to send data; if RTS is low, the printer is not ready.

Clear To Send

The Clear To Send (CTS) signal indicates when the computer is ready to receive data. If CTS is high, the computer is ready to receive data; if CTS is low, the computer is not ready.

Transmit/Receive Data

The exchange of data between the computer and printer occurs on two lines: Transmit Data (TxD) and Receive Data (RxD). The printer transmits data on the TxD line and receives data on the RxD line.

Data signals on the TxD and RxD lines must conform to a standard serial data format, consisting of one start bit, seven or eight data bits, an optional parity bit, and at least one stop bit. Figure C-3 shows the data format.

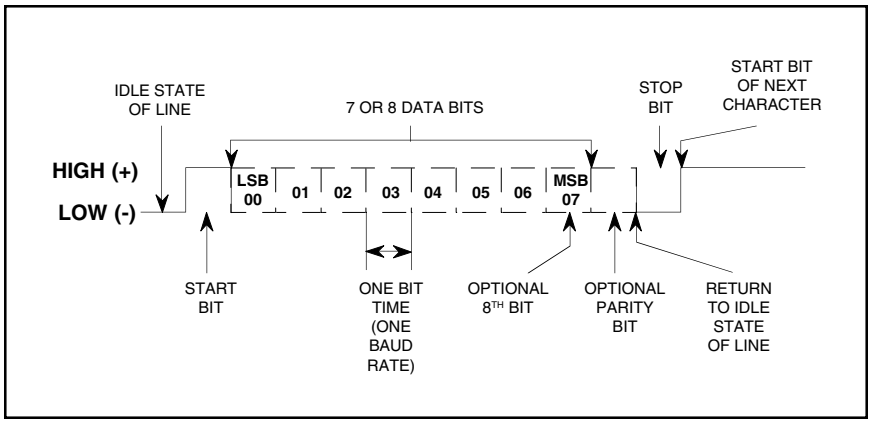


Figure C-3. Serial Data Format

Data Terminal Ready

The Data Terminal Ready (DTR) signal indicates when the computer must stop sending data and when it should continue. This stopping and starting (called handshaking) is necessary to prevent the printer's input buffer from overflowing. If DTR is high, the computer may send data; if DTR is low, the computer must pause.

☞**Note:** You can use the DTR parameter on the printer's Setup menu to reverse the polarity of the DTR signal, should the host computer require an inverted signal.

Signal Ground

Signal Ground (SGND) provides the necessary signal grounding.

Cable/Connector Requirements

The serial cable must have an all-metal DB-9 female plug on the printer end. The cable must be shielded with twisted pair leads and must not be longer than 50 feet (15.25 meters).

Setting Serial Parameters

For successful serial communications, the computer and the printer must use identical communications parameters. These parameters consist of baud rate, parity, data bits, stop bits and handshake protocol. You set these parameters—BAUD, PARITY, DTA BITS, STOP BITS and HNDSHAK—on the printer's Setup menu. For more information on these parameters, refer to the *Control Panel* section of this guide.

Handshaking Methods

The printer supports three handshaking methods:

- ✓ *DTR.* The DTR line in the serial interface provide the DTR handshake. To pause data transfer, the printer sets DTR low; to resume, it sets DTR high.

- ✓ *X-ON/X-OFF*. The printer sends an X-OFF code on its data transmission line to pause data transfer, and an X-ON code to resume. An X-OFF is an ASCII DC3 code (19 decimal, 13 hex); an X-ON is an ASCII DC1 code (17 decimal, 11 hex). When you turn on or reset the printer, it sends an X-ON to enable data transfer.
- ✓ *DTR and X-ON/X-OFF*. This is a combination of both the DTR hardware handshake and the X-ON/X-OFF software handshake.

You specify which handshaking method to use at the HNDSHAK parameter on the Setup menu. Refer to the *Control Panel* section.

Pin Assignments

Table C-2 lists the connector pin assignments and signal requirements for the printer's serial interface.

Table C-2. Serial Pin Assignments

Pin	*Signal*	*Source*	*Printer Usage*
1			Not connected
2	RxD	Host device	Receives data from Host device
3	TxD	Printer	Transmits data to Host device
4	DTR	Printer	Goes low when printer's input buffer is almost full; returns high when input buffer can hold more data (when DTR handshake is turned off, this signal remains high at all times)
5	SGND		Signal ground
6			Not connected
7	RTS	Printer	Remains high at all times
8	CTS	Host device	Must be high or disconnected
9			Not connected

Appendix

D

Code Sets

This appendix describes the printer's code sets, which are compatible with the code sets of the Epson LQ-570, Epson LQ-1070, IBM XL24 Proprinter, and LEXMARK 2390 and 2391. Code sets include all of the character codes, control codes and escape sequences that you can send from your Host device to the printer to control printing operations. The information in this appendix is intended as an overview. For more detailed programming information, consult one of the following manuals:

- ✓ *Epson LQ-570 User Guide* or *Epson LQ-1070 User Guide*
- ✓ *IBM XL24 User's Reference*
- ✓ *IBM Proprinter Family Technical Reference Manual*
- ✓ *LEXMARK 2390/2391 User's Reference Guide*

Character Codes

Most of the 256 codes that a computer can send to the printer are assigned a printable character. When the printer receives a character code, it prints the assigned character at the current print position and then moves the current print position one character space to the right.

Some codes are assigned control functions that override the printable characters. These codes are called *control codes*. To print the character assigned to control codes, it is necessary to use a special code sequence that tells the printer to ignore control functions and print the assigned characters.

One code that is assigned a control function is especially important to the printer—code 27 decimal—which is the ASCII ESCape code. This code tells the printer that an *escape sequence* is beginning. An escape sequence is a series of codes that performs a specific printer function. When a code is sent as part of an escape sequence, the assigned character does not print.

Table D-1 shows the character and control codes assignments. These assignments are for standard ASCII fonts; the actual characters that print may vary depending on the selected font.

Table D-1. Character and Control Code Assignments

NUL 0	► 16	SP ¢ 32	0 48	@ 64	P 80	` 96	p 112	NUL Ç 128	E 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
☺ 1	DC1 ◄ 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	DC1 æ 145	í 161	▓ 177	┴ 193	╤ 209	ß 225	± 241
☻ 2	DC2 ↕ 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	DC2 Æ 146	ó 162	■ 178	┬ 194	╥ 210	Γ 226	≥ 242
ETX ♥ 3	DC3 ‼ 19	# 35	3 51	C 67	S 83	c 99	s 115	ETX â 131	DC3 ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
♦ 4	DC4 ¶ 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	DC4 ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
♣ 5	§ 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
♠ 6	▬ 22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
BEL ● 7	↨ 23	' 39	7 55	G 71	W 87	g 103	w 119	BEL ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
BS ◘ 8	CAN ↑ 24	(40	8 56	H 72	X 88	h 104	x 120	BS ê 136	CAN ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
HT ○ 9	↓ 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
LF ◙ 10	→ 26	* 42	: 58	J 74	Z 90	j 106	z 122	LF è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
VT ♂ 11	ESC ← 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT ï 139	ESC ¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
FF ♀ 12	∟ 28	, 44	< 60	L 76	\ 92	l 108	| 124	FF î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
CR ♪ 13	↔ 29	- 45	= 61	M 77	] 93	m 109	} 125	CR ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	∅ 237	² 253
SO ♫ 14	▲ 30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
SI ☼ 15	▼ 31	/ 47	? 63	O 79	_ 95	o 111	DEL ¬ 127	SI Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	DEL 255

Epson Control Codes and Escape Sequences

When you select *Epson* as the active printer emulation, you can use the code set listed in table D-2. This code set is compatible with the code set of the Epson LQ-570 and LQ-1070. The codes and sequences are organized into eight categories:

- ✓ Basic Functions
- ✓ Vertical Spacing and Motion
- ✓ Horizontal Spacing and Motion
- ✓ Text Styles
- ✓ Character Sets
- ✓ Page Formats
- ✓ Graphics
- ✓ Sheetfeeder Control

An italicized letter in an escape sequence, such as *n*, is a single-byte variable that you define. An italicized word, such as *data*, is a multi-byte variable. An underlined value, such as 0 or 1, is a binary number.

Table D-2. Epson Control Codes and Escape Sequences

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Basic Functions			
ESC @	Initialize printer	1B 40	27 64
DC1	Select printer	11	17
DC3	Deselect printer	13	19
ESC <	Select unidirectional print for one line only	1B 3C	27 60
ESC U *n*	Select unidirectional print continuous, where *n*=1 to select and *n*=0 to deselect	1B 55 *n*	27 85 *n*
ESC =	Set most-significant-bit of incoming data bytes to 0	1B 3D	27 61
ESC >	Set most-significant-bit of incoming data bytes to 1	1B 3E	27 62

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Basic Functions—continued			
ESC #	Cancel most-significant-bit alteration	1B 23	27 35
DEL	Delete previous character	7F	127
CAN	Cancel printing of all text on the current print line	18	24
NUL	No function; ignored	00	0
Vertical Spacing and Motion			
LF	Line feed (If automatic carriage return mode is on, the printer also performs a carriage return.)	0A	10
FF	Form feed	0C	12
ESC + *n*	Set line spacing to *n*/360 inch, where *n* can range from 0 to 255	1B 2B *n*	27 43 *n*
ESC 0	Set 1/8-inch line spacing	1B 30	27 48
ESC 2	Set 1/6-inch line spacing	1B 32	27 50
ESC 3 *n*	Set line spacing to *n*/180 inch, where *n* can range from 0 to 255	1B 33 *n*	27 51 *n*
ESC A *n*	Set line spacing to *n*/60 inch, where *n* can range from 0 to 85	1B 41 *n*	27 65 *n*
ESC J *n*	Perform *n*/180-inch line feed, where *n* can range from 0 to 255	1B 4A *n*	27 74 *n*
VT	Tab vertically	0B	11
ESC B *n1* ... *n16* 0	Set vertical tabs, where *n1* thru *n16* are the line numbers for up to 16 vertical tabs and 0 ends the sequence	1B 42 *n1* ... *n16* 00	27 66 *n1* ... *n16* 0
ESC b *m* *n1*... *n16* 0	Set vertical tabs in channels, where *m* is the number of the vertical tab channel ranging from 0 to 7 and *n1* thru *n16* are the line numbers for up to 16 vertical tabs and 0 ends the sequence	1B 62 *m* *n1*... *n16* 00	27 98 *m* *n1*... *n16* 0

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Vertical Spacing and Motion—continued			
ESC / *n*	Select vertical tab channel, where *n* is the number of the vertical tab channel ranging from 0 to 7	1B 2F *n*	27 47 *n*
ESC (U 1 0 *n*	Define positioning unit as *n*/3600 inch, where *n* can equal 10 (default), 20, 30, 40, 50 or 60	1B 28 55 01 00 *n*	27 40 85 1 0 *n*
ESC (V 2 0 *n1 n2*	Set absolute vertical print position, where variables *n1* and *n2* define the print position in defined units (*n2* x 256) + *n1*	1B 28 56 02 00 *n1 n2*	27 40 86 2 0 *n1 n2*
ESC (v 2 0 *n1 n2*	Set relative vertical print position, where variables *n1* and *n2* define the relative distance to move in defined units; for downward move, use (*n2* x 256) + *n1*, for upward move, first subtract the number of defined units from 65,536 and then use (*n2* x 256) + *n1*	1B 28 76 02 00 *n1 n2*	27 40 118 2 0 *n1 n2*
Horizontal Spacing and Motion			
CR	Carriage return (If automatic line feed mode is on, the printer also performs a line feed.)	0D	13
BS	Move one character space to the left	08	8
SP	Move one character space to the right	20	32
ESC SP *n*	Select intercharacter space, where *n* is the number of 1/120-inch increments in draft-quality or 1/180-inch increments in letter-quality or proportional and ranges from 0 to 127	1B 20 *n*	27 32 *n*
ESC P	Select 10 characters per inch	1B 50	27 80
ESC M	Select 12 characters per inch	1B 4D	27 77
ESC g	Select 15 characters per inch	1B 67	27 103

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Horizontal Spacing and Motion—continued			
ESC c *n1 n2*	Set horizontal spacing of characters (called Horizontal Motion Index or HMI), where *n1* and *n2* define the distance in 1/360-inch increments (*n2* x 256) + *n1*	1B 63 *n1 n2*	27 99 *n1 n2*
HT	Tab horizontally	09	9
ESC D *n1 ... n32* 0	Set horizontal tabs, where *n1* thru *n32* are the column numbers for up to 32 horizontal tabs and 0 ends the sequence (enter the tab columns in ascending order)	1B 44 *n1 ... n32* 00	27 68 *n1 ... n32* 0
ESC $ *n1 n2*	Absolute move to print position, where *n1* and *n2* define the distance in defined units (1/60 inch default) from the left margin (*n2* x 256) + *n1*	1B 24 *n1 n2*	27 36 *n1 n2*
ESC \ *n1 n2*	Relative move to print position, where *n1* and *n2* define the distance in defined units from the current position (1/120 inch default in DQ and 1/180 inch default in LQ); for right move, use (*n2* x 256) + *n1*, for left move, first subtract the number of increments from 65,536 and then use (*n2* x 256) + *n1*	1B 5C *n1 n2*	27 92 *n1 n2*
Text Styles			
ESC x *n*	Select print quality, where *n*=1 for letter-quality (LQ) and *n*=0 for draft-quality (DQ)	1B 78 *n*	27 120 *n*
ESC k *n*	Select font, where *n* can equal the following: 0 for Roman 1 for San-Serif 2 for Courier 3 for Prestige 4 for Script 5 for OCR-B 7 for Orator	1B 6B *n*	27 107 *n*

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Text Styles—continued		
ESC X *m n* 0 *Note:* This sequence is only supported by printers containing the scalable font option.	Select font by pitch and point size, where 360/*m* defines the pitch (cpi) and *n* defines the point size in 0.5-point increments (*n* x 0.5) *m*= 0 for no pitch change *m*= 1 for proportional *m*= 18, 21, 24, 30, 36, 42, 48, 60 or 72 *n*= 0 for no point change *n*= 16, 20, 21, 24, 28, 32, 36, 40, 42, 44, 52, 56, 60 or 64 (for Roman and Sans-Serif fonts) *n*= 21 or 42 (for other fonts) ESC P, M, g, p, ! or @ cancels this function.	1B 58 *m n* 00	27 88 *m n* 0
ESC ! *n*	Select font attributes from the following: 0 for 10 cpi 1 for 12 cpi 2 for proportional spacing 4 for condensed 8 for bold 16 for double-strike 32 for double-wide 64 for italic 128 for underline To determine the correct *n* value, add up the numbers of the desired attributes.	1B 21 *n*	27 33 *n*
ESC E	Select bold mode	1B 45	27 69
ESC F	Cancel bold mode	1B 46	27 70
ESC G	Select double-strike mode	1B 47	27 71
ESC H	Cancel double-strike mode	1B 48	27 72
ESC S 0	Select superscript mode	1B 53 30	27 83 48

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Text Styles—continued			
ESC S 1	Select subscript mode	1B 53 31	27 83 49
ESC T	Cancel superscript and subscript modes	1B 54	27 84
ESC (- 3 0 1 *n1 n2*	Select line scoring, where *n1* defines the scoring technique and *n2* defines the line style: *n1*= 1 for underscore *n1*= 2 for strikethrough *n1*= 3 for overscore *n2*= 0 to cancel line scoring *n2*= 1 for single continuous line *n2*= 2 for double continuous line *n2*= 5 for single broken line *n2*= 6 for double broken line	1B 28 2D 03 00 01 *n1 n2*	27 40 45 3 0 1 *n1 n2*
ESC - *n*	Select underline mode, where *n*=1 to select and *n*=0 to deselect	1B 2D *n*	27 45 *n*
ESC q *n*	Select text style, where *n* can equal the following: 0 for normal 1 for outline 2 for shadow 3 for outline and shadow	1B 71 *n*	27 113 *n*
ESC a *n*	Select text justification, where *n* can equal the following: 0 for left justification 1 for auto centering 2 for right justification 3 for full justification	1B 61 *n*	27 97 *n*
ESC 4	Select italic mode	1B 34	27 52
ESC 5	Cancel italic mode	1B 35	27 53
ESC p *n*	Select proportional mode, where *n*=1 to select and *n*=0 to deselect	1B 70 *n*	27 112 *n*
SI	Select condensed mode	0F	15

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Text Styles—continued			
DC2	Cancel condensed mode	12	18
SO	Select double-wide mode for current line only	0E	14
ESC SO	Select double-wide mode for current line only	1B 0E	27 14
ESC W *n*	Select double-wide mode, where *n*=1 to select and *n*=0 to deselect	1B 57 *n*	27 87 *n*
DC4	Cancel double-wide mode	14	20
ESC w *n*	Select double-high mode, where *n*=1 to select and *n*=0 to deselect	1B 77 *n*	27 119 *n*
Character Sets			
ESC (^ *n1 n2 data*	Print data as characters, where *n1* and *n2* define the number of subsequent bytes to print as characters (*n2* x 256) + *n1* and *data* are the subsequent bytes	1B 28 5E *n1 n2 data*	27 40 94 *n1 n2 data*
ESC 6	Enable printing of characters assigned to control codes above 127 decimal	1B 36	27 54
ESC 7	Cancel printing of characters assigned to control codes above 127 decimal	1B 37	27 55
ESC (t 3 0 *n1 n2* 0	Define character table 0, 1, 2 or 3, where *n1* is the character table number (0, 1, 2, or 3) and *n2* is one of the following values: 0 for italic 1 for USA (PC 437) 3 for Multilingual (PC 850) 7 for Portugal (PC 860) 8 for Canada Fr. (PC 863) 9 for Norway (PC 865)	1B 28 74 03 00 *n1 n2* 00	27 40 116 3 0 *n1 n2* 0
ESC t *n*	Select character table, where *n* is the number of the character table (0, 1, 2 or 3); if *n*=2, user-defined characters 0-127 are remapped to codes 128-255	1B 74 *n*	27 116 *n*

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Character Sets—continued		
ESC R *n*	Select international character set, where *n* can equal the following: 0 for USA 1 for French 2 for German 3 for English (UK) 4 for Danish I 5 for Swedish 6 for Italian 7 for Spanish I 8 for Japanese 9 for Norwegian 10 for Danish II 11 for Spanish II 12 for Latin America 13 for Korean 64 for Legal	1B 52 *n*	27 82 *n*
ESC & 0 *n1 n2 d0 d1 d2 data*	Define user-defined characters, where the *n1, n2, d0, d1, d2* and *data* variables are as follows: *n1* = first character number *n2* = last character number *d0* = left space of character *d1* = body space of character *d2* = right space of character *data* = 3 bytes required for each column; super/subscripts require 2 bytes per column	1B 26 00 *n1 n2 d0 d1 d2 data*	27 38 0 *n1 n2 d0 d1 d2 data*
ESC % *n*	Select user-defined character set, where *n*=1 for user-defined set and *n*=0 for normal set	1B 25 *n*	27 37 *n*
ESC : 0 *n* 0	Copy font in ROM to RAM, where *n* defines the font: 0 for Roman 1 for Sans-Serif 2 for Courier 3 for Prestige 4 for Script 5 for OCR-B 7 for Orator	1B 3A 00 *n* 00	27 58 0 *n* 0

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Page Formats		
ESC (U 1 0 *n*	Define positioning unit as *n*/3600 inch, where *n* can equal 10 (default), 20, 30, 40, 50 or 60	1B 28 55 01 00 *n*	27 40 85 1 0 *n*
ESC C *n*	Set page length in lines, where *n* is the number of lines ranging from 1 to 127	1B 43 *n*	27 67 *n*
ESC C 0 *n*	Set page length in inches, where *n* is the number of inches ranging from 1 to 22	1B 43 00 *n*	27 67 0 *n*
ESC (C 2 0 *n1 n2*	Set page length, where variables *n1* and *n2* define the page length in defined units (*n2* x 256) + *n1*	1B 28 43 02 00 *n1 n2*	27 40 67 2 0 *n1 n2*
ESC N *n*	Set skip over perforation, where *n* is the number of blank lines to leave at the bottom of each page ranging from 1 to 127	1B 4E *n*	27 79 *n*
ESC O	Cancel skip over perforation	1B 4F	27 79
ESC (c 4 0 *m1 m2 n1 n2*	Set top and bottom margins, where variables *m1* and *m2* set the top margin in defined units (*m2* x 256) + *m1* and variables *n1* and *n2* set the bottom margin in defined units (*n2* x 256) + *n1*	1B 28 63 04 00 *m1 m2 n1 n2*	27 40 99 4 0 *m1 m2 n1 n2*
ESC l *n*	Set left margin, where *n* is the column number and ranges from 0 to the right margin column minus one	1B 6C *n*	27 108 *n*
ESC Q *n*	Set right margin, where *n* is the column number and ranges from the left margin column plus one to the right-most column	1B 51 *n*	27 81 *n*
	Graphics		
ESC K *n1 n2 data*	Print 60H x 72V density bit-image graphics, where *n1*and *n2* specify how many bytes are in *data* (*n2* x 256) + *n1* and *data* is the bit-image graphics data	1B 4B *n1 n2 data*	27 75 *n1 n2 data*
ESC L *n1 n2 data*	Same as ESC K described above, except prints 120H x 72V density graphics	1B 4C *n1 n2 data*	27 76 *n1 n2 data*

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Graphics—continued		
ESC Y *n1 n2 data*	Same as ESC K described above, except prints 120H x 72V density graphics	1B 59 *n1 n2 data*	27 89 *n1 n2 data*
ESC Z *n1 n2 data*	Same as ESC K described above, except prints 240H x 72V density graphics	1B 5A *n1 n2 data*	27 90 *n1 n2 data*
ESC (G 1 0 1	Select graphics mode (cancel mode with ESC @)	1B 28 47 01 00 01	27 40 71 1 0 1
ESC * *m n1 n2 data*	Select and print bit-image graphics, where *m* defines the graphics mode, *n1* and *n2* define the number of graphics columns (*n2* x 256) + *n1*, and *data* is the bit-image graphics data containing ((*n2* x 256) + *n1*) x *t*) bytes *m* — Resolution — Pins — Adjacent Dots — *t* 0 — 60H x 60V — 8 — enable — 1 1 — 120H x 60V — 8 — enable — 1 2 — 120H x 60V — 8 — disable — 1 3 — 240H x 60V — 8 — disable — 1 4 — 80H x 60V — 8 — enable — 1 6 — 90H x 60V — 8 — enable — 1 32 — 60H x 180V — 24 — enable — 3 33 — 120H x 180V — 24 — enable — 3 38 — 90H x 180V — 24 — enable — 3 39 — 180H x 180V — 24 — enable — 3 40 — 360H x 180V — 24 — disable — 3	1B 2A *m n1 n2 data*	27 42 *m n1 n2 data*
ESC . *c v h m n1 n2 data*	Print raster graphic, where the variables are as follows: *c* = 0 for full graphics mode or 1 for compressed mode *v* = 10 or 20; vertical dot density 3,600/*v* DPI *h*= 10 or 20; horizontal dot density 3,600/*h* DPI *m* = number of vertical dots (*n2* x 256) + *n1*= total dots *data*= graphics data *Note:* *v*=10 with *h*=20 is invalid	1B 2E *c v h m n1 n2 data*	27 46 *c v h m n1 n2 data*

Table D-2. Epson Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Sheetfeeder Control			
ESC EM *n*	Control paper loading and ejecting, where *n* can equal the following: 1 selects bin 1 of sheetfeeder 2 selects bin 2 of sheetfeeder R ejects the sheet In this sequence, 1 and 2 are ASCII "1" (31 hex, 49 dec) and "2" (32 hex, 50 dec).	1B 19 *n*	27 25 *n*

IBM Control Codes and Escape Sequences

When you select *IBM* as the active printer emulation, you can use the code set listed in table D-3. This code set is compatible with the code sets of the IBM XL24 Proprinter, and LEXMARK 2390 and 2391. The codes and sequences are organized into seven categories:

- ✓ Basic Functions
- ✓ Vertical Spacing and Motion
- ✓ Horizontal Spacing and Motion
- ✓ Text Styles
- ✓ Character Sets
- ✓ Page Formats
- ✓ Graphics

An italicized letter in an escape sequence, such as *n*, is a single-byte variable that you define. An italicized word, such as *data*, is a multi-byte variable. An underlined value, such as 0 or 1, is a binary number.

Table D-3. IBM Control Codes and Escape Sequences

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Basic Functions		
ESC [K 1 0 *n*	Initialize printer or save current settings as user-defined settings, where *n* must equal the following: *n* — Function — Settings — Download Font 0 — Initialize — User — Save 1 — Initialize — User — Erase 4 — Initialize — Factory — Save 5 — Initialize — Factory — Erase 254 — Save — User — N/A 255 — Save — User — N/A	1B 5B 4B 01 00 *n*	27 91 75 1 0 *n*
ESC [K 5 0 *n d1 d2 p1 p2*	Initialize printer or save current settings as user-defined settings, where variable *n* must equal a value shown above in the ESC [K 1 0 *n* sequence, variables *d1, d2* and *p2* may equal any value and variable *p1* is computed as follows: 128 Ignore *p1* function 16 Turn off auto carriage return 8 Turn on auto line feed 4 Set forms length to 12 inches (opposite is 11 inches) 2 Turn on zero slashing 1 Select character set 2 (opposite is character set 1) Add the values of the desired functions to obtain the *p1* value. If a function is not selected, the opposite function is performed.	1B 5B 4B 05 00 *n d1 d2 p1 p2*	27 91 75 5 0 *n d1 d2 p1 p2*
DC1	Select printer	11	17
ESC Q	Deselect printer	1B 51	27 81
DC3	Null	13	19
ESC U *n*	Select unidirectional print continuous, where *n*=1 to select and *n*=0 to deselect	1B 55 *n*	27 85 *n*
CAN	Cancel printing of all text on the current print line	18	24
NUL	No function; ignored	00	0

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Vertical Spacing and Motion		
LF	Line feed (If automatic carriage return mode is on, the printer also performs a carriage return.)	0A	10
FF	Form feed	0C	12
ESC 0	Set 1/8-inch line spacing	1B 30	27 48
ESC 1	Set 7/72-inch line spacing	1B 31	27 49
ESC 2	Activate line spacing set by ESC A *n* sequence	1B 32	27 50
ESC 3 *n*	Set graphics line spacing to *n* vertical units (default vertical unit is 1/216 inch)	1B 33 *n*	27 51 *n*
ESC [\ 4 0 0 0 *n1 n2*	Define vertical unit as 1/180, 1/216 or 1/360 inch, where *n1* and *n2* are: Vertical Unit — *n1* — *n2* 1/180-inch unit — 180 — 0 1/216-inch unit — 216 — 0 1/360-inch unit — 104 — 1	1B 5B 5C 04 00 00 00 *n1 n2*	27 91 92 4 0 0 0 *n1 n2*
ESC A *n*	Define line spacing to *n*/72 inch (send ESC 2 to activate this line spacing)	1B 41 *n*	27 65 *n*
ESC J *n*	Perform a line feed of *n* vertical units (default vertical unit is 1/216 inch)	1B 4A *n*	27 74 *n*
VT	Tab vertically	0B	11
ESC B *n1* ... *n64* 0	Set vertical tabs, where *n1* thru *n64* are the line numbers for up to 64 vertical tabs and 0 ends the sequence	1B 42 *n1* ... *n64* 00	27 66 *n1* ... *n64* 0
ESC 5 *n*	Select automatic line feed on carriage return, where *n*=1 to select and *n*=0 to cancel	1B 35 *n*	27 53 *n*

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Horizontal Spacing and Motion			
CR	Carriage return (If automatic line feed is on, the printer also performs a line feed.)	0D	13
BS	Move one character space to the left	08	8
SP	Move one character space to the right	20	32
HT	Tab horizontally	09	9
ESC D *n1 ... n28* 0	Set horizontal tabs, where *n1* thru *n28* are the column numbers for up to 28 horizontal tabs and 0 ends the sequence (enter the tab columns in ascending order)	1B 44 *n1 ... n28* 00	27 68 *n1 ... n28* 0
ESC R	Reset default tab stops at every eight columns, starting at column 9, and clear all vertical tabs	1B 52	27 82
ESC d *n1 n2*	Relative move to the right, where *n1* and *n2* define the distance to move in 1/120-inch increments (*n2* x 256) + *n1*	1B 64 *n1 n2*	27 100 *n1 n2*
Text Styles			
ESC E	Select bold mode	1B 45	27 69
ESC F	Cancel bold mode	1B 46	27 70
ESC G	Select double-strike mode	1B 47	27 71
ESC H	Cancel double-strike mode	1B 48	27 72
ESC S 0	Select subscript mode	1B 53 30	27 83 48
ESC S 1	Select superscript mode	1B 53 31	27 83 49
ESC T	Cancel superscript and subscript modes	1B 54	27 84

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Text Styles—continued		
ESC [- 2 0 *n1 n2*	Select line scoring, where *n1* defines the scoring technique and *n2* defines the line style: *n1*= 1 for underscore *n1*= 2 for strikethrough *n1*= 3 for overscore *n2*= 0 to cancel line scoring *n2*= 1 for single continuous line *n2*= 2 for double continuous line *n2*= 255 to cancel all underscore, strike-through and overscore modes	1B 5B 2D 02 00 *n1 n2*	27 91 45 2 0 *n1 n2*
ESC _ *n*	Select continuous overscore, where *n*=1 to select and *n*=2 to deselect	1B 5F *n*	27 95 *n*
ESC - *n*	Select underline mode, where *n*=1 to select and *n*=0 to deselect	1B 2D *n*	27 45 *n*
ESC P *n*	Select proportional mode, where *n*=1 to select and *n*=0 to deselect	1B 50 *n*	27 80 *n*
SI	Select condensed printing (17 characters per inch)	0F	15
DC2	Cancel condensed printing and set horizontal spacing to 10 characters per inch	12	18
ESC :	Cancel condensed printing and set horizontal spacing to 12 characters per inch	1B 3A	27 58
SO	Select double-wide mode for current line only	0E	14
ESC W *n*	Select double-wide mode, where *n*=1 to select and *n*=0 to deselect	1B 57 *n*	27 87 *n*
DC4	Cancel double-wide mode	14	20

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Text Styles—continued		
ESC [I 2 0 *n1 n2*	Select typestyle and pitch, where *n1* and *n2* can equal the following: Font — Pitch — *n1* — *n2* Courier 10 0 11 Courier 12 1 235 Courier 15 1 236 Courier 17 1 237 Courier 20 1 238 Courier 20 1 30 Courier PS 0 171 Prestige 10 0 12 Prestige 12 1 239 Prestige 15 1 240 Prestige 17 1 201 Prestige 20 1 202 Prestige 20 1 31 Prestige PS 0 164 Roman 10 0 36 Roman 12 1 143 Roman 15 1 142 Roman 17 1 141 Roman 20 1 140 Roman 20 1 32 Roman PS 1 174 San-Serif 10 0 25 San-Serif 12 1 208 San-Serif 15 1 209 San-Serif 17 1 210 San-Serif 20 1 211 San-Serif 20 1 35 San-Serif PS 0 199 Orator 10 0 5 Orator 12 1 203 Orator 15 1 204 Orator 17 1 205 Orator 20 1 206 Orator 20 1 33 Orator PS 0 198 Script 10 1 212 Script 12 1 213 Script 15 1 214 Script 17 1 215 Script 20 1 216 Script 20 1 36 Script PS 0 200 And others . . . *Note:* An alternate format of this command that includes five additional parameters for font width and code page is also supported.	1B 5B 49 02 00 *n1 n2*	27 91 73 2 0 *n1 n2*

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Text Styles—continued		
ESC [d 1 0 *n*	Select print quality, where *n* can equal the following: 0 = no change 1 - 63 = fast draft-quality 64 - 127 = draft-quality 128 - 191 = letter-quality 192 - 254 = enhanced LQ 255 = default quality	1B 5B 64 01 00 *n*	27 91 100 1 0 *n*
ESC [@ 4 0 *n1* 0 *n2 n3*	Select presentation highlights, where the variables can equal the following: *n1* = 0 for no change *n1* = 1 for italics on *n1* = 2 for italics off *n1* = 4 for outline on *n1* = 8 for outline off *n1* = 16 for shadow on *n1* = 32 for shadow off *n2* = 0 for no change *n2* = 1 for line spacing unchanged; double-high text off *n2* = 2 for line spacing unchanged; double-high text on *n2* = 16 for single line spacing; unchanged text height *n2* = 17 for single line spacing; double-high text off *n2* = 18 for single line spacing; double-high text on *n2* = 32 for double line spacing; unchanged text height *n2* = 33 for double line spacing; double-high text off *n2* = 34 for double line spacing; double-high text on *n3* = 0 for unchanged text width *n3* = 1 for double-wide off *n3* = 2 for double-wide on *n3* = 16 for single-line spacing *n3* = 32 for double-line spacing	1B 5B 40 04 00 *n1* 00 *n2 n3*	27 91 64 4 0 *n1* 0 *n2 n3*

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Text Styles—continued		
ESC I *n*	Select a print mode, where *n* can equal the following: Source / Font / Pitch / *n* Resident: Draft 10 0; Draft 12 8; Draft 17 16; Courier 10 2; Prestige 12 10; Courier 17 18; Courier PS 3 Download: Draft 10 4; Draft 12 12; Draft 17 20; LQ 10 6; LQ 12 14; LQ 17 22; LQ PS 7	1B 49 *n*	27 73 *n*
	Character Sets		
ESC \ *n1 n2 data*	Print data as characters, where *n1* and *n2* define the number of subsequent bytes to print as characters (*n2* x 256) + *n1* and *data* are the subsequent bytes	1B 5C *n1 n2 data*	27 92 *n1 n2 data*
ESC ^ *n*	Print character assigned to control code, where *n* is the control code	1B 5E *n*	27 94 *n*
ESC 6	Enable printing of characters assigned to control codes above 127 decimal	1B 36	27 54
ESC 7	Cancel printing of characters assigned to control codes above 127 decimal	1B 37	27 55
ESC [T 4 0 0 0 *n1 n2*	Select code page, where the values of *n1* and *n2* can be the following: *n1* / *n2* / Code Page 1 181 USA (437) 3 82 Multilingual (850) 3 92 Portugal (860) 3 95 Canada Fr. (863) 3 97 Norway (865)	1B 5B 54 04 00 00 00 *n1 n2*	27 91 84 4 0 0 0 *n1 n2*
ESC =	Download printer characters	1B 3D	27 61

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Page Formats		
ESC C *n*	Set page length in lines, where *n* is the number of lines ranging from 1 to 127	1B 43 *n*	27 67 *n*
ESC C 0 *n*	Set page length in inches, where *n* is the number of inches ranging from 1 to 22	1B 43 00 *n*	27 67 0 *n*
ESC N *n*	Set skip over perforation, where *n* is the number of blank lines to leave at the bottom of each page ranging from 0 to 255	1B 4E *n*	27 78 *n*
ESC O	Cancel skip over perforation	1B 4F	27 79
ESC 4	Set top-of-form at the current vertical position, above which no text can print	1B 34	27 52
ESC X *n1 n2*	Set left and right margins, where *n1* is the column number of the left margin and *n2* is the column number of the right margin	1B 58 *n1 n2*	27 88 *n1 n2*
	Graphics		
ESC [g *n1 n2 m data*	Print bit-image graphics, where *n1* and *n2* specify how many bytes are contained in *data* plus one: *data* bytes = ((*n2* x 256) + *n1*) - 1 *m* equals one of the following: *m* — Resolution — Bits 0 — 60H x 72V — 8 1 — 120H x 72V — 8 2 — 120H x 72V — 8 3 — 240H x 72V — 8 8 — 60H x 180V — 24 9 — 120H x 180V — 24 11 — 180H x 180V — 24 12 — 360H x 180V — 24 13 — 120H x 360V — 48 14 — 180H x 360V — 48 16 — 360H x 360V — 48 and *data* is the bit-image graphics data	1B 5B 67 *n1 n2 m data*	27 91 103 *n1 n2 m data*

Table D-3. IBM Control Codes and Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
Graphics—continued			
ESC K *n1 n2 data*	Print 60H x 72V density bit-image graphics, where *n1* and *n2* specify how many bytes are in *data* (*n2* x 256) + *n1* and *data* is the bit-image graphics data	1B 4B *n1 n2 data*	27 75 *n1 n2 data*
ESC L *n1 n2 data*	Print 120H x 72V density bit-image graphics, where *n1* and *n2* specify how many bytes are in *data* (*n2* x 256) + *n1* and *data* is the bit-image graphics data	1B 4C *n1 n2 data*	27 76 *n1 n2 data*
ESC Y *n1 n2 data*	Print 120H x 72V density bit-image graphics, where *n1* and *n2* specify how many bytes are in *data* (*n2* x 256) + *n1* and *data* is the bit-image graphics data	1B 59 *n1 n2 data*	27 89 *n1 n2 data*
ESC Z *n1 n2 data*	Print 240H x 72V density bit-image graphics, where *n1* and *n2* specify how many bytes are in *data* (*n2* x 256) + *n1* and *data* is the bit-image graphics data	1B 5A *n1 n2 data*	27 90 *n1 n2 data*

Bar Code Escape Sequences

Table D-4 lists the escape sequences that can be sent to the printer to print bar code symbols. For more information on printing bar code symbols, refer to the *Bar Codes* appendix in this guide.

Table D-4. Bar Code Escape Sequences

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
ESC [*p1*;*p2*;*p3*;*p4*;*p5*;*p6*;*p7*;*p8*}	Selects a bar code symbology and defines the bar code height, whether to print a human-readable line of text, and the widths of bar code components. Parameter *p1* in the sequence selects the bar code symbology. The possible *p1* values are as follows: 0 for Interleaved 2-of-5 4 for Code 3-of-9 (default) 5 for EAN-8 6 for EAN-13 9 for Codabar–a 10 for Codabar–b 11 for Codabar–c 12 for Codabar–d 13 for UPC-A 14 for UPC-E 15 for Code 128 Parameter *p2* defines the height of bar code symbols in 1/12-inch intervals. *p2* values can range from 1 to 120. If *p2* is set to 0, the printer will use the default height of 3/4 inch. Parameter *p3* defines whether or not to print a human-readable line of text below each bar code symbol. *p3* must be set to 0 for no human-readable line or 1 to include the human-readable line.	1B 5B *p1* 3B *p2* 3B *p3* 3B *p4* 3B *p5* 3B *p6* 3B *p7* 3B *p8* 7D	27 91 *p1* 59 *p2* 59 *p3* 59 *p4* 59 *p5* 59 *p6* 59 *p7* 59 *p8* 125

Table D-4. Bar Code Escape Sequences—continued

Sequence	*Functional Description*	*Hex Codes*	*Dec Codes*
	Parameters *p4* through *p8* set the widths of bars and spaces in bar code symbols: *Par.* — *Setting* — *Formula* — *Defaults: Value* — *Width* *p4* Narrow bar 0.01 x *p4* inch 1 0.01 *p5* Wide bar 0.01 x *p5* inch 3 0.03 *p6* Narrow space 0.01 x *p6* inch 2 0.02 *p7* Wide space 0.01 x *p7* inch 4 0.04 *p8* Interchar. gap 0.01 x *p8* inch 2 0.02 *Note:* Parameters *p1* through *p8* are optional—you need only include the ones with values that you want to change. You must, however, include all of the semicolons in the command up to the last parameter defined.		
ESC [4 t *data* ESC [0 t	Prints bar code symbol (except Code 128 and POSTNET), where *data* is the actual data to be encoded into the bar code symbol	1B 5B 34 74 *data* 1B 5B 30 74	27 91 52 116 *data* 27 91 48 116
ESC [4 t *data* \ ESC [0 t	Prints Code 128 bar code symbol, where *data* is the actual data to be encoded into the bar code symbol	1B 5B 34 74 *data* 5C 1B 5B 30 74	27 91 52 116 *data* 92 27 91 48 116
ESC [3 t *data* ESC [0 t	Prints bar code symbol (except Code 128 and POSTNET), where *data* is the actual data to be encoded into the bar code symbol	1B 5B 33 74 *data* 1B 5B 30 74	27 91 51 116 *data* 27 91 48 116
ESC z *data* \	Prints POSTNET bar code symbol, where *data* is the actual data to be encoded into the bar code symbol	1B 7A *data 5C*	27 122 *data* 92

Character Tables

☞**Note:** You can select a character table at the LANG parameter on the Setup menu or with the *Epson* ESC t and ESC R sequences or with the *IBM* ESC [T sequence. You can also use the ESC 6 and ESC 7 sequences to select whether hex codes 80 through 9F are characters (ESC 6) or control codes (ESC 7).

Table D-5. Italic Character Table

NUL 0	 16	SP 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	 144	SP 160	*0* 176	*@* 192	*P* 208	*`* 224	*p* 240
 1	 17	! 33	1 49	A 65	Q 81	a 97	q 113	 129	 145	*!* 161	*1* 177	*A* 193	*Q* 209	*a* 225	*q* 241
 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	 130	DC2 146	*"* 162	*2* 178	*B* 194	*R* 210	*b* 226	*r* 242
 3	 19	# 35	3 51	C 67	S 83	c 99	s 115	 131	 147	*#* 163	*3* 179	*C* 195	*S* 211	*c* 227	*s* 243
 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	 132	DC4 148	*$* 164	*4* 180	*D* 196	*T* 212	*d* 228	*t* 244
 5	 21	% 37	5 53	E 69	U 85	e 101	u 117	 133	 149	*%* 165	*5* 181	*E* 197	*U* 213	*e* 229	*u* 245
 6	 22	& 38	6 54	F 70	V 86	f 102	v 118	 134	 150	*&* 166	*6* 182	*F* 198	*V* 214	*f* 230	*v* 246
 7	 23	' 39	7 55	G 71	W 87	g 103	w 119	 135	 151	*'* 167	*7* 183	*G* 199	*W* 215	*g* 231	*w* 247
 8	 24	(40	8 56	H 72	X 88	h 104	x 120	 136	 152	*(* 168	*8* 184	*H* 200	*X* 216	*h* 232	*x* 248
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	*)* 169	*9* 185	*I* 201	*Y* 217	*i* 233	*y* 249
LF 10	 26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	 154	** 170	*:* 186	*J* 202	*Z* 218	*j* 234	*z* 250
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	*+* 171	*;* 187	*K* 203	*[* 219	*k* 235	*{* 251
FF 12	 28	, 44	< 60	L 76	\ 92	l 108	| 124	FF 140	 156	*,* 172	*<* 188	*L* 204	** 220	*l* 236	*|* 252
CR 13	 29	- 45	= 61	M 77	] 93	m 109	} 125	CR 141	 157	*-* 173	*=* 189	*M* 205	*]* 221	*m* 237	*}* 253
SO 14	 30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	 158	*.* 174	*>* 190	*N* 206	*^* 222	*n* 238	*~* 254
SI 15	 31	/ 47	? 63	O 79	_ 95	o 111	 127	SI 143	 159	*/* 175	*?* 191	*O* 207	*_* 223	*o* 239	 255

Table D-6. PC 437 (United States) Graphics Character Table

NUL 0	 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
 1	 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▓ 177	┴ 193	╤ 209	ß 225	± 241
 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	█ 178	┬ 194	╥ 210	Γ 226	≥ 242
 3	 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
 5	 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
 6	 22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
 7	 23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
 8	 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
LF 10	 26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
FF 12	 28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
CR 13	 29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
SO 14	 30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
SI 15	 31	/ 47	? 63	O 79	_ 95	o 111	 127	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	 255

Table D-7. PC 850 (Multilingual) Graphics Character Table

NUL 0	 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	ð 208	Ó 224	– 240
 1	 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	■ 178	┬ 194	Ê 210	Ô 226	‗ 242
 3	 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
 5	 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	Á 181	┼ 197	╞ 213	Õ 229	§ 245
 6	 22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
 7	 23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
 8	 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	• 249
LF 10	 26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	ø 171	╗ 187	╦ 203	█ 219	Ù 235	√ 251
FF 12	 28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	n 252
CR 13	 29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	Ø 157	¡ 173	¢ 189	═ 205	| 221	Y 237	² 253
SO 14	 30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	— 238	■ 254
SI 15	 31	/ 47	? 63	O 79	_ 95	o 111	 127	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	 255

Table D-8. PC 860 (Portugal) Graphics Character Table

NUL 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	À 145	í 161	▓ 177	┴ 193	╤ 209	ß 225	± 241
2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	È 146	ó 162	■ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	22	& 38	6 54	F 70	V 86	f 102	v 118	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Õ 153	Ò 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	Í 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
FF 12	28	, 44	< 60	L 76	\ 92	l 108	| 124	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	Ù 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ã 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
SI 15	31	/ 47	? 63	O 79	_ 95	o 111	127	Â 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Table D-9. PC 863 (Canada-French) Graphics Character Table

NUL 0	 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	| 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
 1	 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	È 145	í 161	▒ 177	┴ 193	╤ 209	ß 225	± 241
 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Ê 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
 3	 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	| 179	├ 195	╙ 211	π 227	≤ 243
 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	Ä 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	∑ 228	⌠ 244
 5	 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	Ï 149	˙ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
 6	 22	& 38	6 54	F 70	V 86	f 102	v 118	¶ 134	û 150	³ 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
 7	 23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	¯ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
 8	 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
LF 10	 26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ù 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
FF 12	 28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
CR 13	 29	- 45	= 61	M 77	] 93	m 109	} 125	‗ 141	Ù 157	¾ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
SO 14	 30	. 46	> 62	N 78	^ 94	n 110	~ 126	À 142	Û 158	« 174	╛ 190	╬ 206	▌ 222	ε 238	■ 254
SI 15	 31	/ 47	? 63	O 79	_ 95	o 111	 127	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	 255

Table D-10. PC 865 (Norway) Graphics Character Table

NUL 0	 16	SP 32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
 1	 17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▓ 177	┴ 193	╤ 209	ß 225	± 241
 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	■ 178	┬ 194	╥ 210	Γ 226	≥ 242
 3	 19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
 4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
 5	 21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
 6	 22	& 38	6 54	F 70	V 86	f 102	v 118	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
 7	 23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
 8	 24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
LF 10	 26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
FF 12	 28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	n 252
CR 13	 29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	Ø 157	¡ 173	╜ 189	═ 205	▌ 221	ø 237	2 253
SO 14	 30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
SI 15	 31	/ 47	? 63	O 79	_ 95	o 111	 127	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	 255

☞**Note:** You can use the *Epson* ESC I sequence or the *IBM* ESC \ or ESC ^ sequence to print the characters shown in table D-11.

Table D-11. Special Characters

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
☺	☻	♥	♦	♣	♠	•	◘	○	◙	♂	♀	♪	♫	☼	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
►	◄	↕	‼	¶	§	▬	↨	↑	↓	→	←	∟	↔	▲	▼
															127 ⌂

Table D-12. Language Character Replacements

Country	Hex Code											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
USA	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
England	£	$	@	[	\	]	^	`	{	|	}	~
Denmark 1	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain 1	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark 2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain 2	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin Am.	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Korea	#	$	@	[	₩	]	^	`	{	|	}	~
Legal	#	$	§	°	"	'	¶	`	©	®	†	™

ASCII Code Table

Table D-13 is an ASCII code table to assist you in decoding hexadecimal printouts.

Table D-13. ASCII Table

ASCII Character	*Dec*	*Hex*	*Binary*	*ASCII Character*	*Dec*	*Hex*	*Binary*
NUL (Ctrl @)	0	00	00000000	DLE (Ctrl P)	16	10	00010000
SOH (Ctrl A)	1	01	00000001	DC1 (Ctrl Q)	17	11	00010001
STX (Ctrl B)	2	02	00000010	DC2 (Ctrl R)	18	12	00010010
ETX (Ctrl C)	3	03	00000011	DC3 (Ctrl S)	19	13	00010011
EOT (Ctrl D)	4	04	00000100	DC4 (Ctrl T)	20	14	00010100
ENQ (Ctrl E)	5	05	00000101	NAK (Ctrl U)	21	15	00010101
ACK (Ctrl F)	6	06	00000110	SYN (Ctrl V)	22	16	00010110
BEL (Ctrl G)	7	07	00000111	ETB (Ctrl W)	23	17	00010111
BS (Ctrl H)	8	08	00001000	CAN (Ctrl X)	24	18	00011000
HT (Ctrl I)	9	09	00001001	EM (Ctrl Y)	25	19	00011001
LF (Ctrl J)	10	0A	00001010	SUB (Ctrl Z)	26	1A	00011010
VT (Ctrl K)	11	0B	00001011	ESC (Ctrl [)	27	1B	00011011
FF (Ctrl L)	12	0C	00001100	FS (Ctrl \)	28	1C	00011100
CR (Ctrl M)	13	0D	00001101	GS (Ctrl])	29	1D	00011101
SO (Ctrl N)	14	0E	00001110	RS (Ctrl 6)	30	1E	00011110
SI (Ctrl O)	15	0F	00001111	US (Ctrl _)	31	1F	00011111

Table D-13. ASCII Table—continued

ASCII Character	*Dec*	*Hex*	*Binary*	*ASCII Character*	*Dec*	*Hex*	*Binary*
SP (Space)	32	20	00100000	<	60	3C	00111100
!	33	21	00100001	=	61	3D	00111101
"	34	22	00100010	>	62	3E	00111110
#	35	23	00100011	?	63	3F	00111111
$	36	24	00100100	@	64	40	01000000
%	37	25	00100101	A	65	41	01000001
&	38	26	00100110	B	66	42	01000010
'	39	27	00100111	C	67	43	01000011
(	40	28	00101000	D	68	44	01000100
)	41	29	00101001	E	69	45	01000101
*	42	2A	00101010	F	70	46	01000110
+	43	2B	00101011	G	71	47	01000111
,	44	2C	00101100	H	72	48	01001000
-	45	2D	00101101	I	73	49	01001001
.	46	2E	00101110	J	74	4A	01001010
/	47	2F	00101111	K	75	4B	01001011
0	48	30	00110000	L	76	4C	01001100
1	49	31	00110001	M	77	4D	01001101
2	50	32	00110010	N	78	4E	01001110
3	51	33	00110011	O	79	4F	01001111
4	52	34	00110100	P	80	50	01010000
5	53	35	00110101	Q	81	51	01010001
6	54	36	00110110	R	82	52	01010010
7	55	37	00110111	S	83	53	01010011
8	56	38	00111000	T	84	54	01010100
9	57	39	00111001	U	85	55	01010101
:	58	3A	00111010	V	86	56	01010110
;	59	3B	00111011	W	87	57	01010111

Table D-13. ASCII Table—continued

ASCII Character	*Dec*	*Hex*	*Binary*	*ASCII Character*	*Dec*	*Hex*	*Binary*
X	88	58	01011000	t	116	74	01110100
Y	89	59	01011001	u	117	75	01110101
Z	90	5A	01011010	v	118	76	01110110
[	91	5B	01011011	w	119	77	01110111
\	92	5C	01011100	x	120	78	01111000
]	93	5D	01011101	y	121	79	01111001
^	94	5E	01011110	z	122	7A	01111010
_	95	5F	01011111	{	123	7B	01111011
`	96	60	01100000	|	124	7C	01111100
a	97	61	01100001	}	125	7D	01111101
b	98	62	01100010	~	126	7E	01111110
c	99	63	01100011	DEL	127	7F	01111111
d	100	64	01100100		128	80	10000000
e	101	65	01100101		129	81	10000001
f	102	66	01100110		130	82	10000010
g	103	67	01100111		131	83	10000011
h	104	68	01101000		132	84	10000100
i	105	69	01101001		133	85	10000101
j	106	6A	01101010		134	86	10000110
k	107	6B	01101011		135	87	10000111
l	108	6C	01101100		136	88	10001000
m	109	6D	01101101		137	89	10001001
n	110	6E	01101110		138	8A	10001010
o	111	6F	01101111		139	8B	10001011
p	112	70	01110000		140	8C	10001100
q	113	71	01110001		141	8D	10001101
r	114	72	01110010		142	8E	10001110
s	115	73	01110011		143	8F	10001111

Table D-13. ASCII Table—continued

ASCII Character	*Dec*	*Hex*	*Binary*	*ASCII Character*	*Dec*	*Hex*	*Binary*
	144	90	10010000		172	AC	10101100
	145	91	10010001		173	AD	10101101
	146	92	10010010		174	AE	10101110
	147	93	10010011		175	AF	10101111
	148	94	10010100		176	B0	10110000
	149	95	10010101		177	B1	10110001
	150	96	10010110		178	B2	10110010
	151	97	10010111		179	B3	10110011
	152	98	10011000		180	B4	10110100
	153	99	10011001		181	B5	10110101
	154	9A	10011010		182	B6	10110110
	155	9B	10011011		183	B7	10110111
	156	9C	10011100		184	B8	10111000
	157	9D	10011101		185	B9	10111001
	158	9E	10011110		186	BA	10111010
	159	9F	10011111		187	BB	10111011
	160	A0	10100000		188	BC	10111100
	161	A1	10100001		189	BD	10111101
	162	A2	10100010		190	BE	10111110
	163	A3	10100011		191	BF	10111111
	164	A4	10100100		192	C0	11000000
	165	A5	10100101		193	C1	11000001
	166	A6	10100110		194	C2	11000010
	167	A7	10100111		195	C3	11000011
	168	A8	10101000		196	C4	11000100
	169	A9	10101001		197	C5	11000101
	170	AA	10101010		198	C6	11000110
	171	AB	10101011		199	C7	11000111

Table D-13. ASCII Table—continued

ASCII Character	*Dec*	*Hex*	*Binary*	*ASCII Character*	*Dec*	*Hex*	*Binary*
	200	C8	11001000		228	E4	11100100
	201	C9	11001001		229	E5	11100101
	202	CA	11001010		230	E6	11100110
	203	CB	11001011		231	E7	11100111
	204	CC	11001100		232	E8	11101000
	205	CD	11001101		233	E9	11101001
	206	CE	11001110		234	EA	11101010
	207	CF	11001111		235	EB	11101011
	208	D0	11010000		236	EC	11101100
	209	D1	11010001		237	ED	11101101
	210	D2	11010010		238	EE	11101110
	211	D3	11010011		239	EF	11101111
	212	D4	11010100		240	F0	11110000
	213	D5	11010101		241	F1	11110001
	214	D6	11010110		242	F2	11110010
	215	D7	11010111		243	F3	11110011
	216	D8	11011000		244	F4	11110100
	217	D9	11011001		245	F5	11110101
	218	DA	11011010		246	F6	11110110
	219	DB	11011011		247	F7	11110111
	220	DC	11011100		248	F8	11111000
	221	DD	11011101		249	F9	11111001
	222	DE	11011110		250	FA	11111010
	223	DF	11011111		251	FB	11111011
	224	E0	11100000		252	FC	11111100
	225	E1	11100001		253	FD	11111101
	226	E2	11100010		254	FE	11111110
	227	E3	11100011		255	FF	11111111

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