

4247 Printer
Model A00



User's Guide

4247 Printer
Model A00



User's Guide

Note!

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Fourth Edition (September 1998)

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications Compliance Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-causing Equipment Regulations.

Avis de conformité aux normes du ministère des Communications du Canada
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United Kingdom Telecommunications Compliance Act

This equipment is approved under approval number NS/G/23/J/100003 for indirect connections to the public telecommunications systems in the United Kingdom.

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Zulassungsbescheinigung laut EMVG vom 9. November 1992

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Der Außsteller der Konformitätserklärung ist die IBM Deutschland Informationssysteme GmbH.

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Japanese VCCI

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Warning:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user will be required to take adequate measures.

EPA Energy Star



The EPA ENERGY STAR program is a partnership effort with manufacturers of data processing equipment to promote the introduction of energy-efficient personal computers, monitors, printers, fax machines, and copiers to help reduce air pollution and global warming caused by electricity generation.

IBM Printing Systems Company participates in this program by introducing printers that reduce power consumption when they are not being used.

As an Energy Star partner, IBM Printing Systems Company has determined that this product meets the Energy Star guidelines for energy efficiency.

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Safety Information

There are three levels of safety notices used in this guide.

Danger

Calls attention to a situation that is potentially lethal or extremely hazardous to people.

Caution

Calls attention to a situation that is potentially hazardous to people.

Attention

Alerts you to the possibility of damage to a program, device, system, or data.

The following notices are the Dangers and Cautions used in this guide. Attention notices and Notes are located throughout this guide but are not listed here.

DANGER

<1> The construction of this printer provides extra protection against the risk of electric shock by grounding appropriate metal parts. The extra protection may not function unless the power cord is connected to a properly-grounded outlet. This printer has a grounding-type (3-wire) power cord because grounding is necessary. It is the responsibility of the customer or the person installing the printer to connect it to a properly-grounded outlet. Seek professional assistance before using an adapter or extension cord; such a device could interrupt the grounding circuit.

If this printer is connected to an outlet that has been incorrectly connected to the building wiring, serious electric shock could result.

DANGER

<2> To prevent serious personal injury from electrical shock when connecting or disconnecting the interface cable, power off (O) the printer and disconnect the power cord from the power source at the receptacle.

DANGER

<3> To avoid personal risk, do not install or reconfigure a communication port or a teleport during a lightning storm.

CAUTION:

<1> The printer (without optional features attached) weighs approximately 24.9 kilograms (55 pounds). Before attempting to lift the printer, get help from another person.

CAUTION:

<2> The printhead may get hot during operation. Be careful when removing or replacing the ribbon cartridge.

CAUTION:

<3> The paper feed motor may get hot during operation. Avoid contact when installing or removing the front tractor.

CAUTION:

<4> Close the gear protector cover immediately after removing the front tractor.

Do not plug in the power cord or power on (I) the printer until instructed to do so.

Preface

The *4247 Printer Model A00 User's Guide* describes the operating procedures for the IBM 4247 Printer Model A00. This guide should be read and used by those who install or operate the printer, or supervise printer operations.

You can use the printer for many different types of applications. This guide includes the procedures necessary for you to put together step-by-step instructions tailored to your operation.

Some editorial changes have been made to this User's Guide to correct formatting and printing errors.

How to Use this Guide

The following list describes the contents of each chapter and each appendix:

- "Chapter 1. Printer Setup" on page 1 provides information about unpacking, setting up, connecting, and operating your printer. You should complete all of this chapter to prepare the printer for your environment.
- "Chapter 2. Considering Other Forms Paths" on page 33 describes how to select a different forms path.
- "Chapter 3. Setting Up Another Forms Path" on page 39 describes setting up a forms path for your printer other than the default path.
- "Chapter 4. Configuring Your Printer" on page 79 describes how to configure the printer for your operating environment.
- "Chapter 5. Attaching Your Printer" on page 123 describes how to attach the printer to your computer.
- "Chapter 6. Operator Tasks" on page 133 provides the information you need for ordering new supplies, replacing worn ribbons, and available printer options.
- "Chapter 7. Resolving Printer Problems" on page 139 describes how to diagnose and solve printer problems. Always start your problem determination procedure with this chapter.
- "Chapter 8. Supplies, Forms, and Cables" on page 151 provides information about ordering ribbon cartridges and cables, and specifying forms.
- "Appendix A. Specifications" on page 159 contains general printer information and planning requirements. It also contains information on the electrical and environmental requirements, cabling information, and forms specifications.
- "Appendix B. Optional Features" on page 169 lists the optional features available for your printer.
- "Appendix C. Native 4247 Commands" on page 171 provides information about the 4247 Native commands.
- "Appendix D. Personal Printer Data Stream (PPDS)" on page 183 contains the programming information for the Personal Printer Data Stream (PPDS) commands.
- "Appendix E. Epson FX-1050 Data Stream" on page 215 contains the programming information for the Epson FX printers data stream commands.
- "Appendix F. Code Pages" on page 245 lists all code pages supported by the 4247 Printer Model A00.

Related Publications

The following publications provide information about the 4247 Printer. Contact your IBM marketing representative to order a publication.

- *4247 Printer Model A00 Quick Reference Guide* (SA24-4405). This guide shows the key functions and the available configuration values, and the process for setting the values. This item is often shipped with the printer.
- *4247 Printer Models A00, 001, and 002 Maintenance Information Manual* (SA24-4400). This manual provides detailed maintenance procedures for problem determination and repair and also contains a parts listing and illustrations of all replacement assemblies and detailed parts for the printer.
- *4247 Printer Safety Notices* (SA24-4406). This manual lists in English and other languages the safety information that is contained in the 4247 Printer customer and service documentation. This manual is **not** shipped with the printer in the United States.
- *4247 Printer Automatic Sheet Feeder Guide* (SA24-4407). This guide describes how to install and operate the optional Automatic Sheet Feeder (ASF). It is shipped with the ASF.
- *Network Print Server for Token-Ring Networks Administrator's Guide* (S246-0112). This guide provides information about configuring and connecting your printer to a token-ring network. This guide is often shipped with your Network Print Server.

The following publication provides helpful information.

- *Advanced Function Printer: Cut Sheet Paper Reference for use with IBM Electrophotographic Printers* (G544-3915).

Chapter 1. Printer Setup

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Information Necessary for Printer Setup

You should complete all of “Chapter 1. Printer Setup” to fully prepare your printer for your environment. You must continue with “Chapter 2. Considering Other Forms Paths” on page 33 if you need to set up a different forms path.

To set up your printer, you will need the following information:

- Is a forms path required other than the Front Push forms path?
The 4247 Printer is shipped to you with the Front Push forms path set as the default. IBM recommends you consider this your primary forms path and use it whenever possible. If you do not intend to keep the Front Push as your primary forms path, “Chapter 2. Considering Other Forms Paths” on page 33 will guide you through making another selection, after you verify correct operation of the Front Push forms path and the Manual Sheet Feed.

You can configure the printer for any one of five forms paths; the Front Push, the Rear Push, the Dual Push, the Rear Pull, or the Push Pull forms paths.

One forms tractor is supplied with the printer; this allows you to setup the Front Push, the Rear Push, or the Rear Pull forms path. If you are setting up either the Dual Push or the Push Pull forms path, install a second (optional) forms tractor. Contact your IBM marketing representative to order this option.

- What type of interface cable was ordered?
See "Ordering Signal Cable" on page 153.
- Was an optional Automatic Sheet Feeder (ASF) ordered?
For information about setting up or using the ASF, refer to the *4247 Printer Automatic Sheet Feeder Guide*.
- Was an optional printer stand ordered?
If you ordered a printer stand, you will find it in a separate shipping container. See "Optional Printer Stand" on page 32 for more information about the optional printer stand. Contact your IBM marketing representative to order this option.

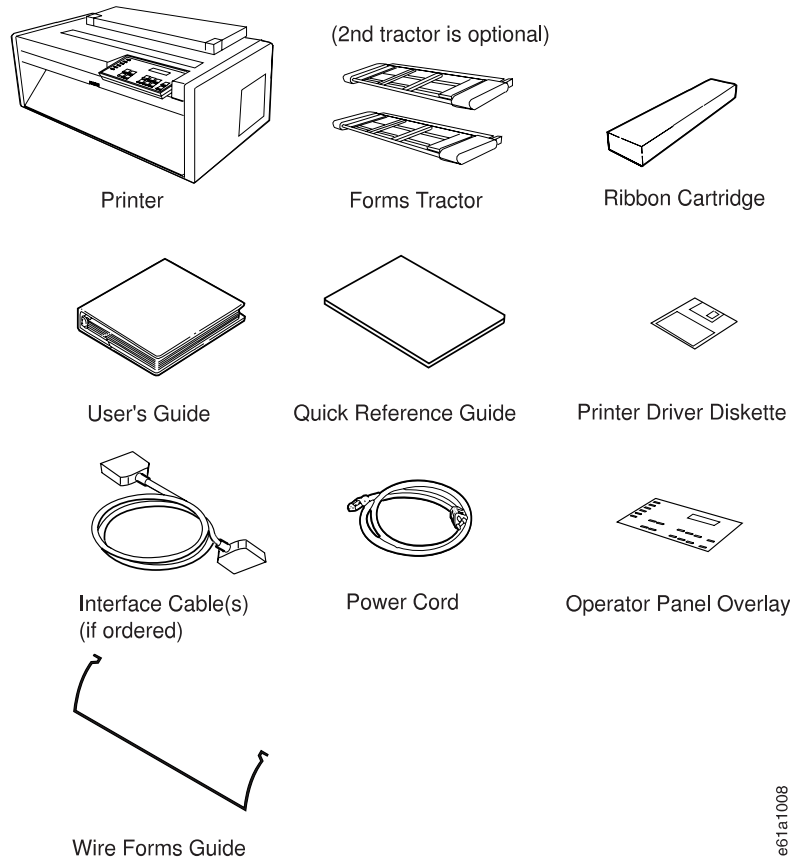
CAUTION:

<1> The printer (without optional features attached) weighs approximately 24.9 kilograms (55 pounds). Before attempting to lift the printer, get help from another person.

Unpacking Your Printer

Check the list below as you unpack the shipping container. Contact your local IBM Branch Office if any of the following items or items listed on the printer order are missing.

- Printer
- One forms tractor (and optional second unit, if ordered)
- Ribbon cartridge
- 4247 Printer Model A00 User's Guide, SA24-4400*
- 4247 Printer Model A00 Quick Reference Guide, SA24-4405*
- Printer driver diskette
- Interface cable (if ordered)
- Power cord
- Operator panel overlay
- Wire forms guide (For Push forms paths)
- 4247 Printer Safety Notices, SA24-4406 (outside USA)*



Additionally, you can order the following options. Contact your IBM marketing representative.

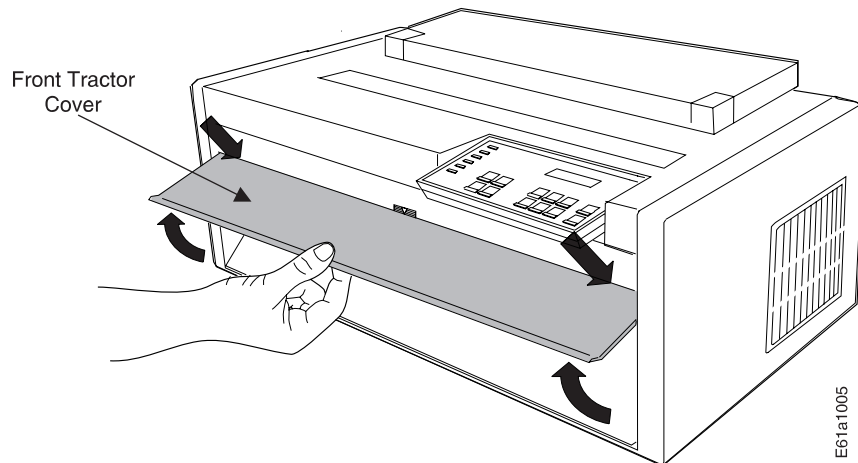
- Automatic Sheet Feeder - Allows feeding of envelopes or from as many as three additional cut sheet forms paths
- Printer stand - Especially helpful when using Dual Push forms path

Setting Up Your Printer

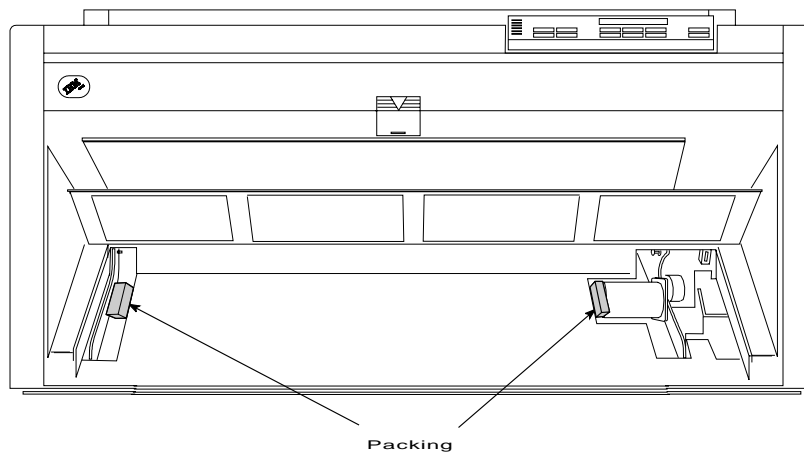
The next few steps guide you through removing all packing materials, installing the operator panel overlay, and installing the wire forms guide.

Removing Packing Materials

1. Remove the printer from the plastic bag.
2. Place the printer on a flat work area, printer stand, or table. Ensure that you have access to both the front and the rear of the printer. See "Appendix A. Specifications" on page 159 for dimensions of the table and the clearances required around the printer.
3. Lift the bottom edge of the front tractor cover into the open position.



4. Remove the packing from each side in the front tractor area.

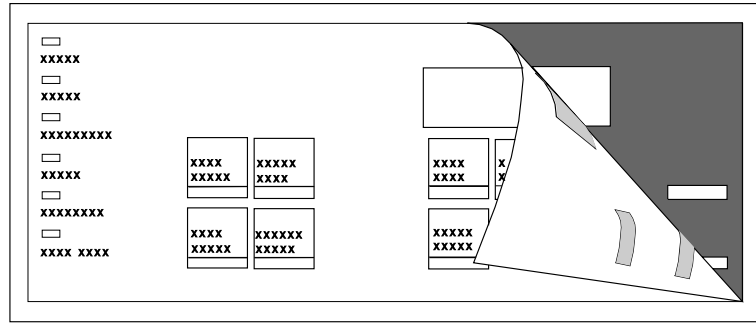


5. Close the front tractor cover.

Installing Operator Panel Overlay

To install the operator panel overlay, perform the following:

1. Remove the paper from the back of the operator panel overlay.
2. Align the bottom of the overlay; align each side.
3. Press the overlay in place at the bottom below the keys and then continue working upwards until the overlay is pressed into place.



Installing Wire Forms Guide

The wire forms guide helps direct the forms for stacking in the Front Push and Rear Push forms paths.

1. Open the acoustic cover and tilt it all the way back until it lays flat on the top cover.
2. Insert one end of the wire forms guide into the hole on the right hinge block of the acoustic cover. See orientation in Figure 1.
3. Insert the other end of the wire forms guide into the hole on the left hinge block of the acoustic cover.

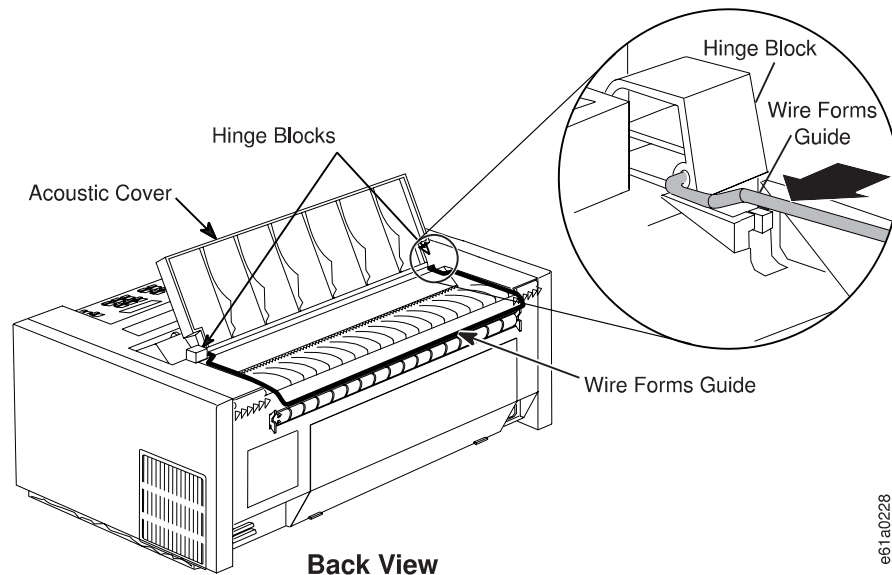
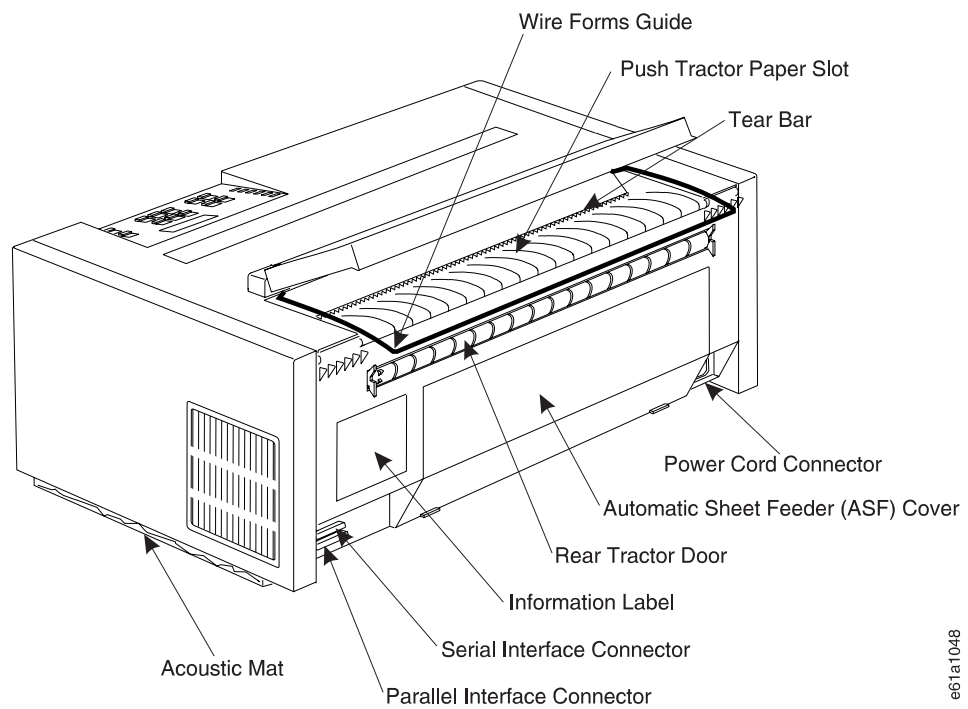
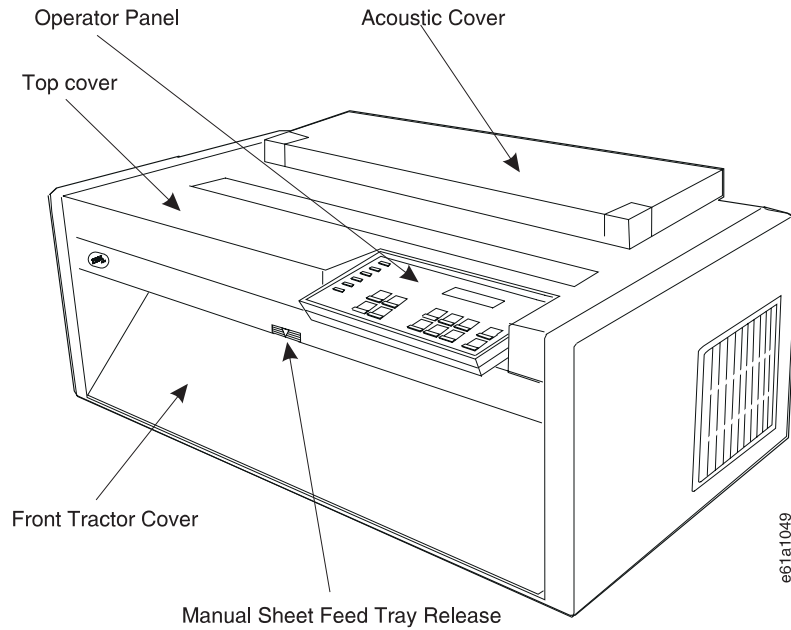


Figure 1. Installing Wire Forms Guide

4. Close the acoustic cover.

Locating Operator Accessible Areas and Controls

As with many IBM printers, a part that is colored blue or has a blue decal on it is for your use in operating the printer. These blue marks indicate tabs and levers that control settings and changes for the machine.



Operator Panel

The operator panel consists of 6 status indicators, a one-line 16-character display, 12 function keys, and an audible alarm. Figure 2 on page 7 illustrates the operator panel.

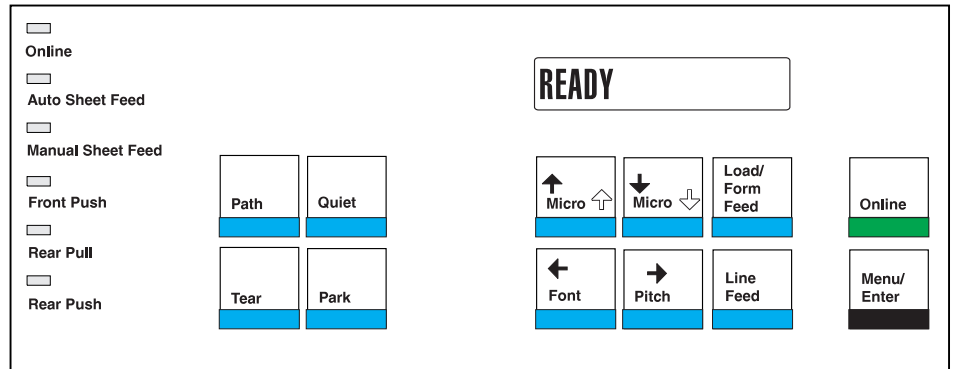


Figure 2. Operator Panel

Throughout this book, procedures instruct you to view the display on the operator panel, to view a status indicator, or to press a function key. The procedure then describes the correct response.

Operator Panel Display

The 16-character display shows several types of messages:

- Information messages
- Intervention required messages
- Power On Configuration messages
- Program Configuration messages
- Error messages

Audible Alarm

The audible alarm beeps to let you know of a printer status condition or an error such as an end-of-forms condition, forms jam, or top cover open.

Some operations you are asked to perform, such as opening the top cover when the printer is online, cause the alarm to sound. In this case, press the **Online** key before you open the top cover to prevent the alarm from sounding.

You can set the audible alarm off in the Power On Configuration menu. See “Alarm” on page 102 for more information.

Status Indicators

Table 1 on page 8 describes the six status indicators shown in Figure 3 on page 8.

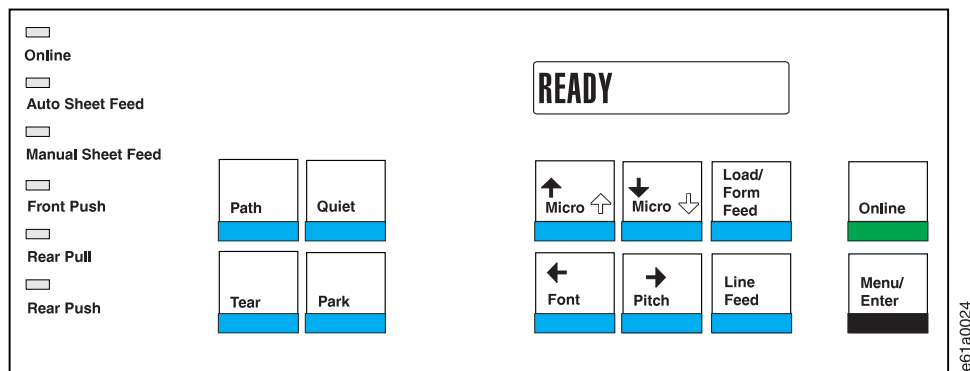


Figure 3. Status Indicators

Table 1. Operator Panel Status Indicators

Status Indicators	Continuously Lighted	Blinking
Online	<ul style="list-style-type: none"> Printer READY Communicating with host Able to receive and print 	Data in input buffer and Printer offline (<i>not ready</i>)
Online	Off	
	Condition 1 Printer disabled and no data in input buffer Condition 2 Printer in one of following modes: <ul style="list-style-type: none"> Power On Configuration Program Configuration Test and Diagnostic 	
Auto Sheet Feed (optional)	Selected	<ul style="list-style-type: none"> Bin empty Forms jam
Manual Sheet Feed	Selected	<ul style="list-style-type: none"> Manual tray empty Forms jam
Front Push	Selected	<ul style="list-style-type: none"> End of forms (EOF) Forms jam
Rear Pull	Selected	<ul style="list-style-type: none"> End of forms (EOF) Forms jam
Rear Push	Selected	<ul style="list-style-type: none"> End of forms (EOF) Forms jam

Table 1. Operator Panel Status Indicators (continued)

Status Indicators	Continuously Lighted	Blinking
Front Push and Rear Pull (Push Pull)	In Push Pull mode, both indicators operate together (this is one forms path, with one set of forms loaded).	
	Push Pull selected	<ul style="list-style-type: none"> • End of forms (EOF) • Forms jam

Function Keys

2 beginning on page 10 describes the 12 function keys shown in Figure 4 and Figure 5 on page 10. You often will see them referred to as *keys*.

The eight keys highlighted in Figure 4 have one function each.

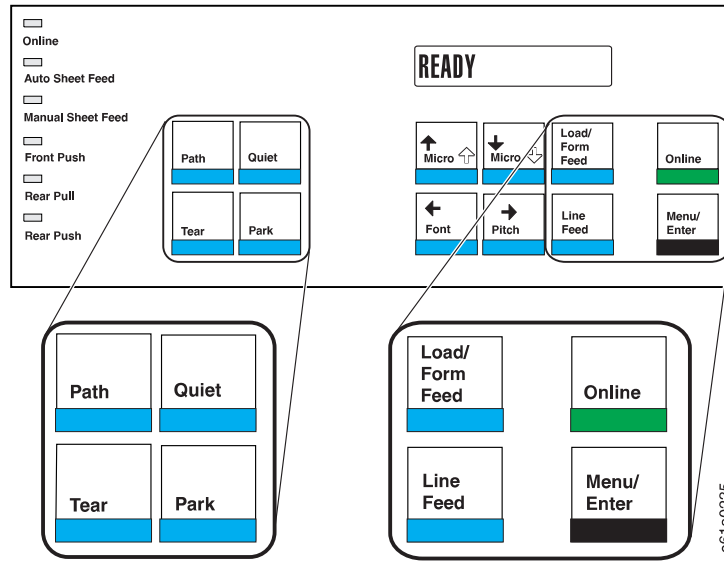


Figure 4. Eight Function Keys with One Function Each

The four keys highlighted in Figure 5 on page 10 each have two functions.

- The **Micro** ↑ key and **Micro** ↓ key position the forms up or down. The **Font** key allows font selection and the **Pitch** key allows pitch selection.

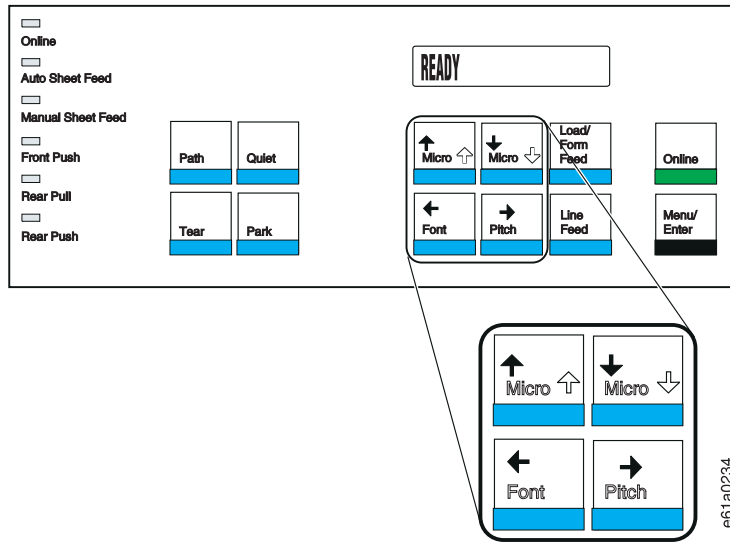


Figure 5. Four Function Keys with Two Functions Each

- The ↑, the ↓, the ←, and the → keys are active only during Power On Configuration mode or Program Configuration mode to allow menu scrolling. See “Chapter 4. Configuring Your Printer” on page 79 for configuration information.

Table 2. Operator Panel Function Keys




Function Key	Description
	<p>Condition 1 If forms are not present in the current path and the printer is in a <i>wait</i> condition (<i>not ready</i>), press Path to select a different forms paths.</p> <p>Condition 2 If forms are present and the printer is in a <i>wait</i> condition (<i>not ready</i>), tear off (at the tear bar) any continuous forms that have been printed, and press Park to park the continuous forms (or eject a single sheet, if loaded). The printer then enters an <i>end-of-forms</i> (EOF) condition. You now can press Path to select the different path modes according to the forms path configurations selected in the Power On Configuration menu.</p>
	<p>If the printer is <i>ready</i> or a <i>wait</i> condition exists, press Tear to:</p> <ul style="list-style-type: none"> • Move the forms up to the tear line for tearing (see “Tearing Off Forms” on page 24). • Move a form backward to its initial position [after a 10 second (approximate) timeout occurs].
	<p>Reduces the printing noise level by two or three decibels; however, the printer runs at half speed and throughput is reduced by one half.</p>

Table 2. Operator Panel Function Keys (continued)




Function Key	Description
	<p>Condition 1 Press Park, if continuous forms are loaded in the print area. The message 94 PARK:SURE? displays.</p> <p>Press Park again (within 3 seconds), to park the continuous forms that are in the Front Push, Rear Push, or Push Pull forms path or to eject the forms in the Rear Pull path.</p> <p>Before parking a form in the Front Push or Rear Push forms path, press Tear and then tear the form at the tear bar.</p> <p>Before parking a form in the Rear Pull or Push Pull forms paths, tear the form off at the perforation below the front tractor cover.</p> <p>Condition 2 If the printer is currently in Manual Sheet Feed mode, press Park to eject a single cut-sheet page. The message 91 EJECT FORM displays.</p> <p>Condition 1 and Condition 2</p> <p>If parking or ejecting does not result in clearing the forms jam sensor within 24 inches, forms movement is stopped and a 02 FORMS JAM message displays. Press Online to clear the message.</p> <p>If you wish to leave the Park function, press Online again.</p>
	<p>Function 1 Micro ↑ Use this key for adjusting forms.</p> <p>Press this key. The message MICRO FEED UP displays and the forms move up in micro steps at an increasing speed (runs at a reduced speed when the cover is open and the printer is offline).</p> <p>Press and hold the Micro ↑ to process a continuous movement of the forms.</p> <p>For safety reasons, when the cover is open and the printer is offline, only Micro ↑ and Micro ↓ are operational.</p> <p>Function 2 ↑ Active only in Power On Configuration or Program Configuration mode.</p> <p>Press ↑ to scroll backward to the previous configuration menu items.</p>
	<p>Function 1 Font Use this key to select the available fonts (DP, DP Text, Courier, Gothic, OCR-A, or OCR-B) for printing.</p> <p>If you press Font while a job is printing, the current line finishes printing before the new font takes affect.</p> <p>If you select an available font which is not compatible with the pitch currently selected, the default pitch for that font is automatically selected.</p> <p>Function 2 ← Active only in Power On Configuration mode or Program Configuration mode.</p> <p>Press ← to scroll backward through the previous values of a selected configuration menu item.</p>

Table 2. Operator Panel Function Keys (continued)



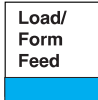



Function Key	Description
	<p>Function 1 Micro ↓ Press this key to adjust forms. The message MICRO FEED DOWN displays, and the forms move down in micro steps at increasing speed (reduced speed when the cover is open and the printer is offline).</p> <p>Hold down Micro ↓ to continuously feed forms.</p> <p>For safety reasons, when the cover is open and the printer is offline, only Micro ↑ and Micro ↓ are operational.</p> <p>Function 2 ↓ Active only in Power On Configuration mode or Program Configuration mode.</p> <p>Press ↓ to scroll forward to the next configuration menu item.</p>
	<p>Function 1 Pitch Press this key to select the available horizontal spacings (5 CPI, 6 CPI, 7.5 CPI, 8.5 CPI, 10 CPI, 12 CPI, 15 CPI, 17.1 CPI, 20 CPI, or Prop) on the printer.</p> <p>If you press Pitch while a job is printing, the current line finishes printing before the new pitch value takes affect.</p> <p>If you select an available font which is not compatible with the pitch currently selected, the default pitch for that font is automatically selected.</p> <p>Function 2 →</p> <p>Active only in Power On Configuration mode or Program Configuration mode.</p> <p>Press → to scroll forward through the values of a selected configuration menu item.</p>
	<p>Condition 1 If the printer is <i>ready</i> and forms are not loaded, press Load/Form Feed to automatically load the forms according to the forms types selected in the Program Configuration menu.</p> <p>Condition 2 If the printer is <i>ready</i> and forms already are loaded, press Load/Form Feed to clear the forms path by ejecting the single sheet or execute a form feed on the continuous forms. If ejecting does not result in clearing the paper jam sensor within 24 inches, a 02 FORMS JAM message displays.</p> <p>Press Online to clear the message.</p> <p>Condition 3 If the ASF option is installed and selected, and the forms path is not empty, press Load/Form Feed to eject the single form. If the forms path is empty, a new single sheet will be loaded.</p>
	<p>Advances the forms to the next printable line.</p> <p>Press and hold Line Feed to continuously feed forms. Release the key to stop feeding forms.</p>

Table 2. Operator Panel Function Keys (continued)

Function Key	Description
	<p>Condition 1 (<i>power on initialization</i>) Enters <i>test</i> mode and prints the self test printout.</p> <p>Condition 2 (<i>test mode</i>) Stops the self test printout.</p> <p>Condition 3 (<i>wait</i>)</p> <ul style="list-style-type: none"> • Makes the printer <i>ready</i> if no error condition appears on the display. • Clears status messages from the display and turns off the alarm. • If an EOF condition exists, prints the data buffer when forms are loaded. • If Tear has been previously pressed, causes the forms to move backward from the tear position to the print line position. <p>Condition 4 (<i>ready</i>)</p> <ul style="list-style-type: none"> • Takes the printer offline. • If a job is printing, stops the printer after the line is printed. <p>Condition 5 (<i>Power On Configuration</i>) Prints the bidirectional adjustment test pattern.</p> <p>Condition 6 (<i>Program Configuration</i>) Clears the input buffer, sends a break signal to the host, and displays a 99 RESET message.</p>
	<p>Condition 1 Press and hold this key while powering on (O) the printer to enter the Power On Configuration menu.</p> <p>Condition 2 If the printer is in a <i>wait</i> condition (Online indicator off) or <i>ready</i> without printing, press Menu/Enter to enter the Program Configuration menu.</p> <p>Condition 3</p> <p>If the printer is in Power On Configuration mode or Program Configuration mode, press this key to exit configuration mode.</p>

Default Forms Path

When your printer was shipped, it was configured for the Front Push forms path. This is the default and preferred forms path. You install the forms tractor for this path, and also use it in this location for the Dual Push and the Push Pull forms paths.

It is important that you verify that the Front Push forms path correctly feeds forms, and that the printer prints with good print quality before setting up any other forms path. Setting up this forms path first familiarizes you with setting and installing a forms tractor, correctly loading, stacking, and tearing forms, and installing a ribbon.

After this verification, you maintain the printer with this forms path, or you may configure the printer for any one of four other forms paths. IBM recommends you use the Front Push forms path. See “Chapter 2. Considering Other Forms Paths” on page 33 to select a different forms path, and “Preparing Printer for Selected Forms Path” on page 44 set up a different forms path.

The front forms-tractor and rear forms-tractors are interchangeable. Either forms tractor can be used in either location after you have set it for the forms path you have selected.

Setting Up Front Push Forms Path (Default)

Figure 6 shows the Front Push forms path with the Manual Sheet Feed forms path.

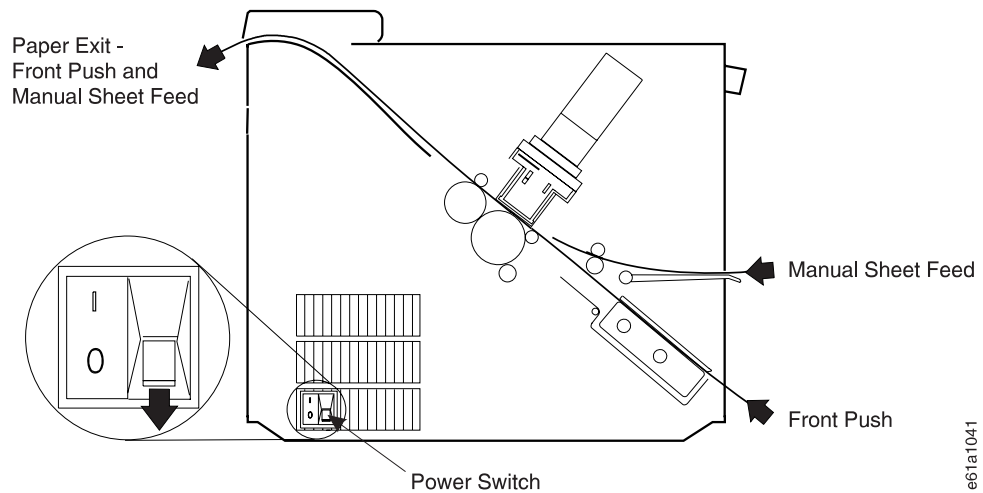


Figure 6. Front Push Forms Path (with Manual Sheet Feed)

Setting Front Push Tractor

The Front Push forms tractor should be set to position **(2)**, as shown in Figure 7 on page 15.

If the tractor is set to position **(1)**, perform the following:

1. Hold the tractor face-down with the electrical connector tab on the right side, and pointing toward you.
2. Pull the bottom release levers toward you with your finger tips and push the movable edge of the tractor down toward the flat surface with your thumbs or the palms of your hands (position **2**).

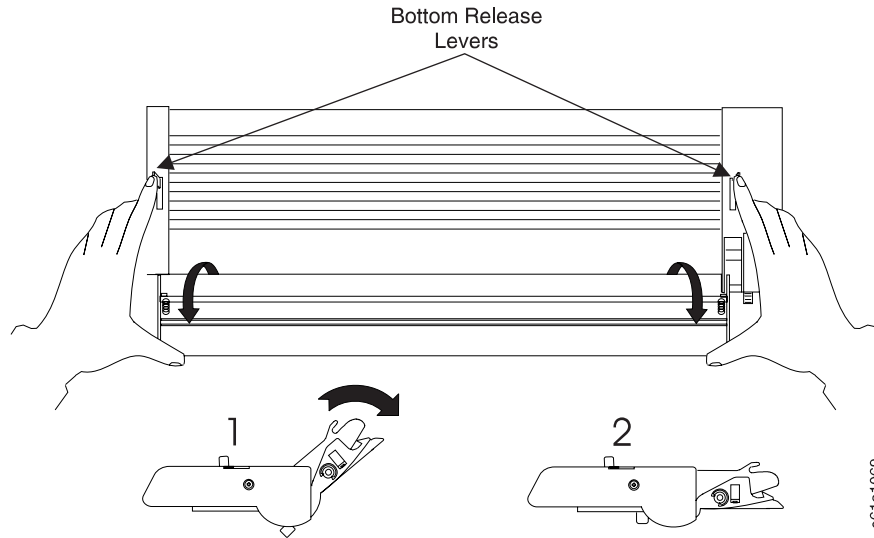


Figure 7. Setting the Front Push Tractor to Straight (Viewed From Bottom)

Installing Front Push Tractor

Install the tractor in the Front Push forms path, as follows:

1. Ensure the printer is powered off (O).
2. Lift the bottom edge of the front tractor cover into the open position.

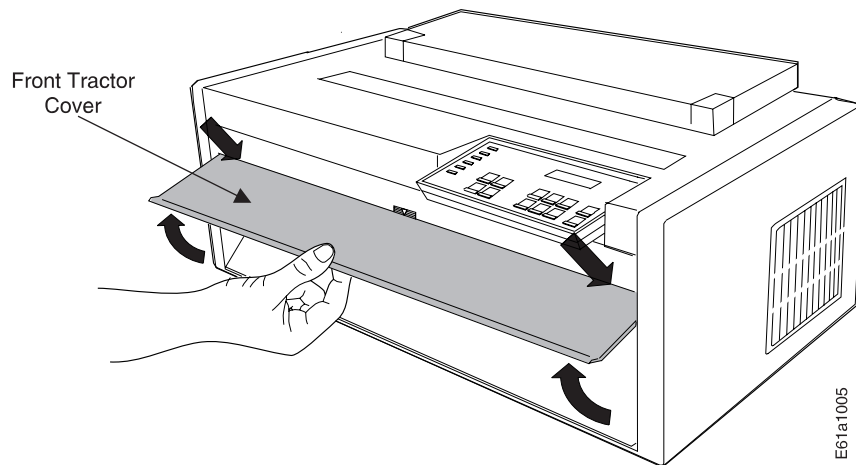


Figure 8. Opening Front Tractor Cover

CAUTION:

<3> The paper feed motor may get hot during operation. Avoid contact when installing or removing the front tractor.

3. Rotate the hinged gear-protector cover forward and down. The cover must be below the motor screw or the tractor will not seat.

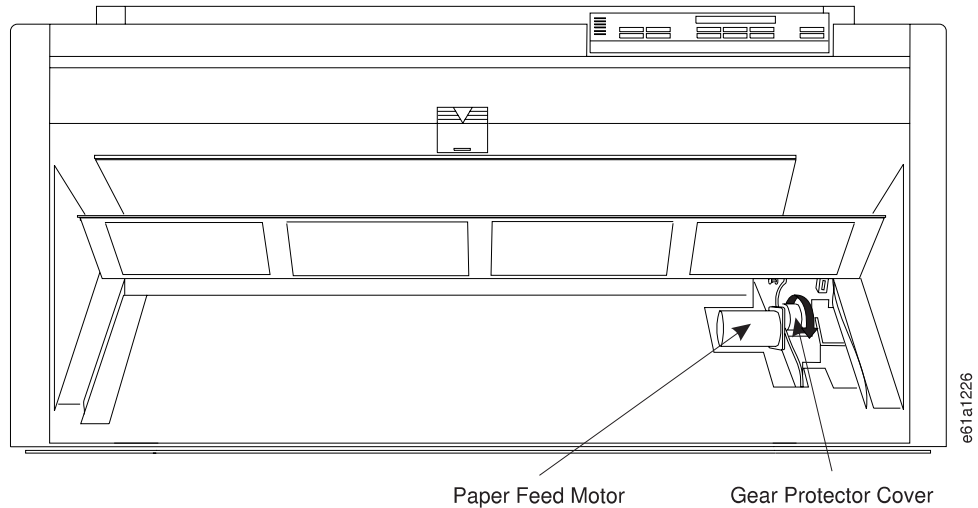


Figure 9. Opening Gear Protector Cover

4. If it is in place, remove the (black protective) cap from the electrical connector on the tractor. Save this cap for future storage or shipping of the forms tractor.
5. Stand facing the front of the printer, holding the forms tractor with the tractor doors facing up and the electrical connector tab on the right.
6. With both hands supporting the tractor shaft, hold down the tractor release lever while gently pushing the forms tractor upward until the forms tractor clicks into place on both sides. Ensure the tractor release levers are locked into place. The electrical connector tab must be fully seated in the connector and the bottom of the forms tractor should be even with the base of the printer.

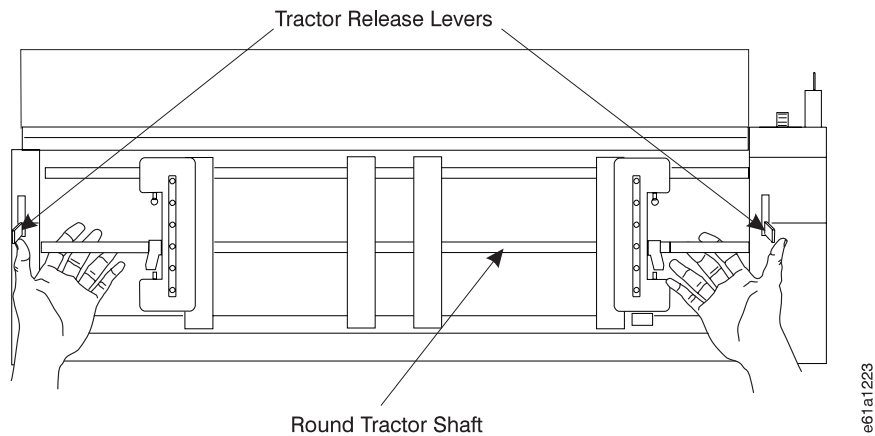


Figure 10. Installing Front Tractor

7. Close the front tractor cover.

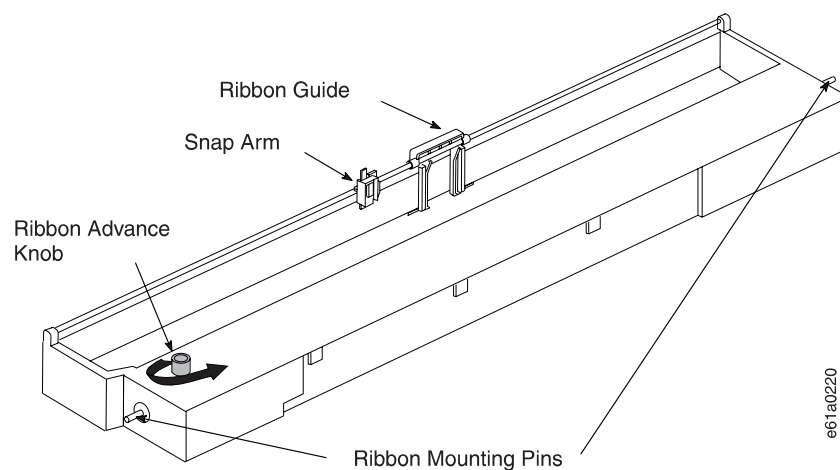
Your printer may have arrived with a second forms tractor. You will learn about installing and using this forms tractor after completing “Chapter 1. Printer Setup” on page 1.

Installing Ribbon Cartridge

Note: IBM recommends that you use the IBM ribbon cartridge (Part Number 1053685). To order ribbon cartridges, contact your place of printer purchase or call Lexmark at 1-800-438-2468.

To install the ribbon cartridge, follow these steps:

1. Remove the ribbon cartridge from the package. Locate the ribbon guide, snap arm, ribbon advance knob, and the ribbon mounting pins.



2. Turn the ribbon advance knob in the direction of the arrow to take up any slack in the ribbon. If the ribbon does not move, contact your place of ribbon purchase to replace the ribbon cartridge.
3. Ensure the printer is powered off (O).
4. Open the top cover.
5. Slide the printhead to the center of the printer.

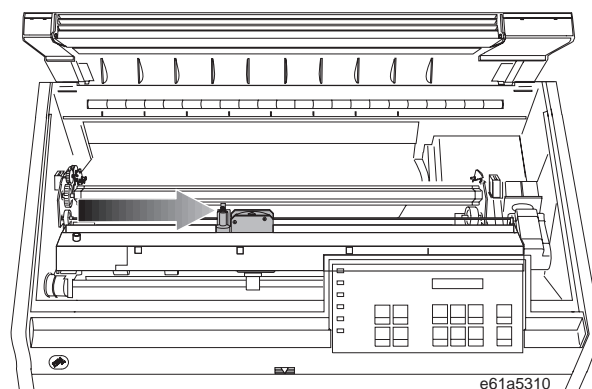
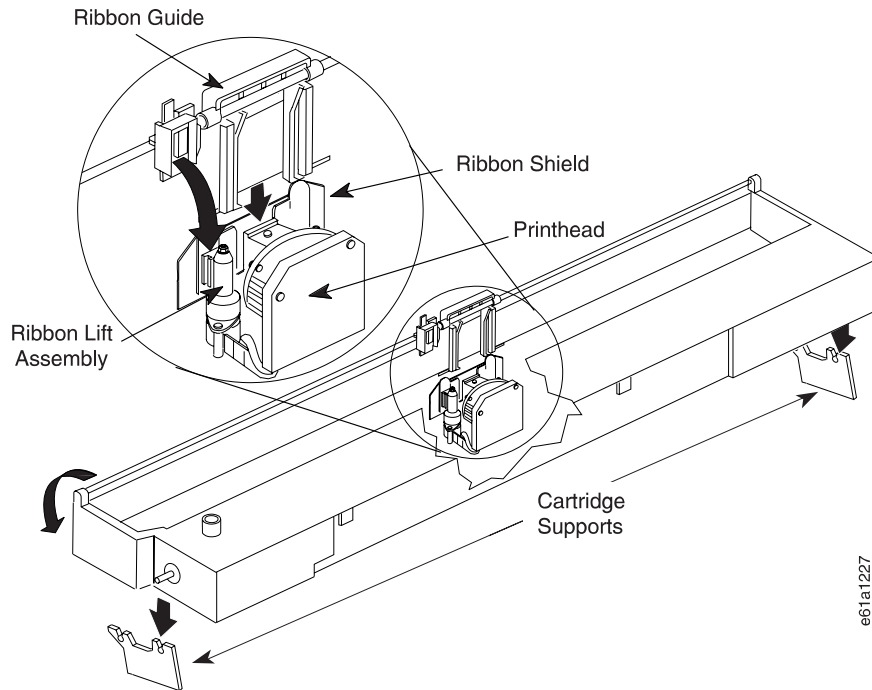


Figure 11. Sliding the Printhead to the Center of the Printer

6. With the snap arm raised higher than the ribbon lift assembly, insert the ribbon guide between the ribbon shield and the printhead. Position the snap arm with the small lever up onto the ribbon lift assembly. Push the snap arm down onto the ribbon lift assembly until it snaps into place.



7. Align the ribbon mounting pins on the left and right side of the ribbon cartridge with the slots in the cartridge supports. Snap the ribbon cartridge down into place.
8. Turn the ribbon advance knob again in the direction of the arrow to take up slack in the ribbon.
9. Slide the printhead back and forth to ensure that the ribbon guide runs freely along the ribbon.
10. If the ribbon is not running freely, or to ensure you have installed the ribbon cartridge correctly, check that:
 - a. The left and right ribbon mounting pins are securely snapped into the cartridge supports
 - b. There are no twists or folds in the ribbon
 - c. The ribbon is not catching on the printhead
 - d. The ribbon moves when you turn the ribbon advance knob in the direction of the arrow. If the ribbon does not move, replace the ribbon cartridge. Contact your place of ribbon cartridge purchase.
11. Close the top cover.

You can read about removing a ribbon cartridge in “Removing Ribbon Cartridge” on page 133.

Connecting Electrical Power

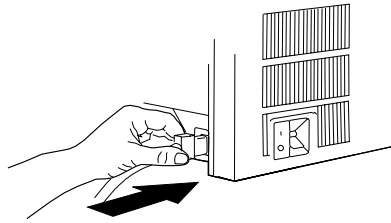
Read the following safety information, and follow the steps for connecting electrical power to the printer.

1. The power switch is located on the lower left side of the printer. Ensure the printer is powered off (O). **DANGER**

<1> The construction of this printer provides extra protection against the risk of electric shock by grounding appropriate metal parts. The extra protection may not function unless the power cord is connected to a properly-grounded outlet. This printer has a grounding-type (3-wire) power cord because grounding is necessary. It is the responsibility of the customer or the person installing the printer to connect it to a properly-grounded outlet. Seek professional assistance before using an adapter or extension cord; such a device could interrupt the grounding circuit.

If this printer is connected to an outlet that has been incorrectly connected to the building wiring, serious electric shock could result.

2. The power connector is located at the lower left rear of the printer. Connect the power cord to the power connector on the printer. Press firmly to ensure that the plug is securely seated.



3. Plug the power cord into a properly-grounded electric receptacle.

Changing Display Language

The printer default language that appears in the operator panel display of your printer is English. You can change the language by following these steps:

1. If the printer is powered on (I), power off (O) the printer.
2. Enter **Power On Configuration** mode. Press and continue to hold **Menu/Enter** while powering on (I) the printer until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
3. Release **Menu/Enter**. The message PRINT OUT=N0 displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → and the message FRONT TEAR=NORM displays.
6. Press ↓ until the message MENU=xxxxxxx displays (where xxxxxxxx can be ENGLISH, ITALIANO, FRANCAIS, ESPANOL, DEUTSCH, PORTUGUES, DANSK, or NEDERLANDS).
7. Press ← or → until the language you want to use displays.
8. Press **Menu/Enter** to save the setting and exit Power On Configuration mode.

Regardless of the language you select, STARTING UP always appears in English.

Stacking Forms for Front Push Forms Path

Before you load forms into the printer you must consider the stacking of forms after they pass through the printer. See Figure 12 for forms stacking recommendation for the Front Push forms path.

The top of the input forms stack *must* be lower than the bottom of the printer when parking forms.

Consider ordering the optional printer stand designed specifically for your printer. Contact your IBM marketing representative for information.

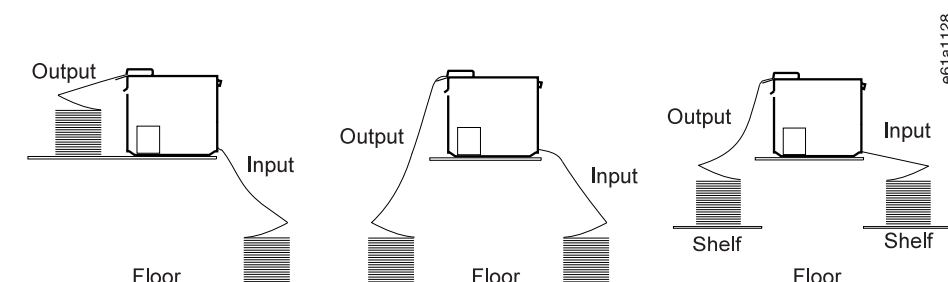


Figure 12. Stacking Forms for Front Push. See “Optional Printer Stand” on page 32 if your printer uses the optional printer stand. Consider ordering this option to serve as a shelf for the forms stack.

Loading Forms into Front Push Forms Path

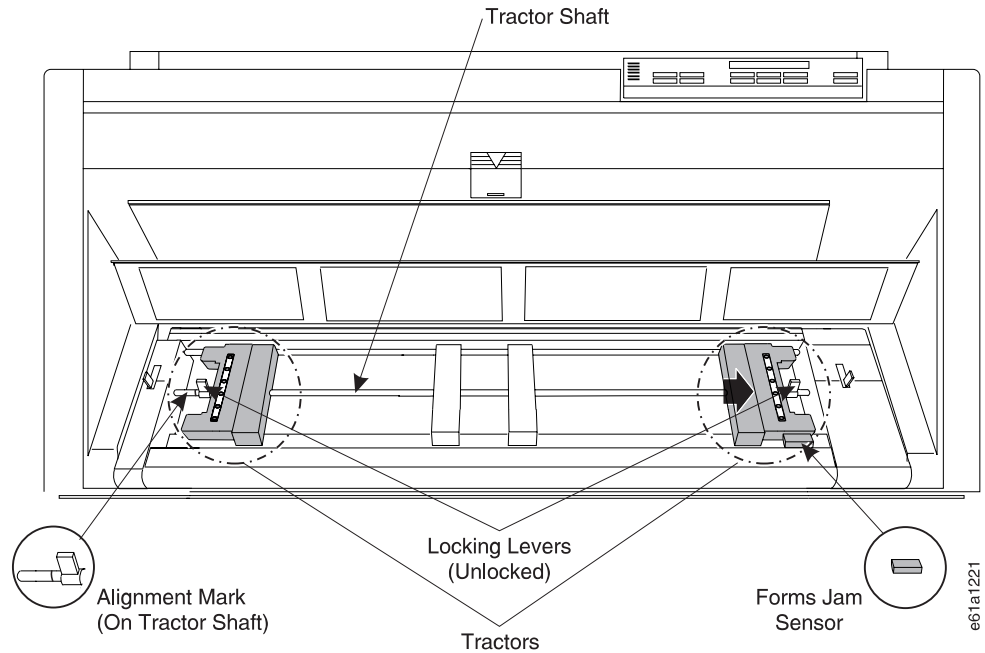
The term “loading forms” can have two interpretations:

- Physically putting the forms into the forms tractor
- Using the functions of the **Load/Form Feed** key

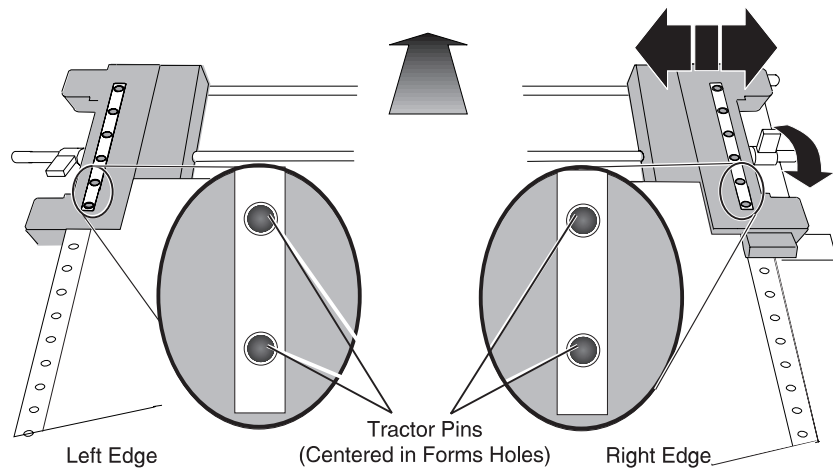
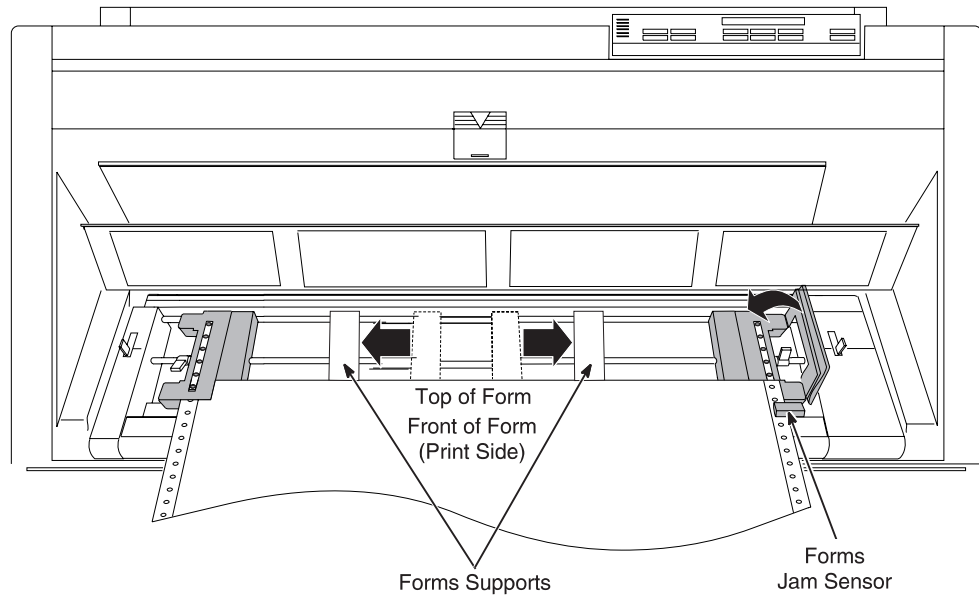
Here you will physically load the forms into the tractor, and then use one function of the **Load/Form Feed** key to move the form to the print position. See “Function Keys” on page 9 for a more complete description of **Load/Form Feed**.

Load the forms as follows:

1. Ensure the printer is powered off (O).
2. Open the front tractor cover to reveal the front forms-tractor.
3. Move the tractor locking levers to vertical to unlock the tractors.
4. Move the right tractor to the extreme right.
5. Move the left tractor to the tractor alignment mark on the tractor shaft. (This controls the left print edge.)
6. Pull the left locking lever forward to lock the left tractor in place at the alignment mark.

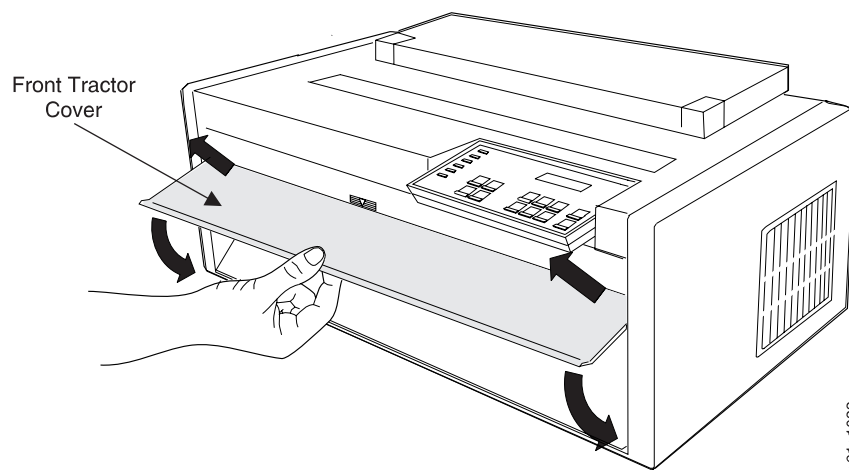


7. Move the forms supports to be approximately equidistant between each other and the tractors.
8. Lift the inner edge of each tractor to open the tractor doors.
9. Place the left edge of the form on the left tractor pins so that the form engages about three left tractor pins. Close the left tractor door.
10. Move the right tractor to the left and under the forms until the holes along the right edge of the form engage the same number of pins on the right tractor. Ensure that the right edge of the forms is under the forms jam sensor. Close the right tractor door.
11. If necessary, slide the right tractor either left or right to remove any slack in the form, ensuring that the left and right tractor pins are centered in the holes of the forms. Hold the right tractor in place. Pull the locking lever forward to lock the right tractor.



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12. Close the front tractor cover.



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13. Power on (I) the printer.

14. After the printer warms up, if the **Front Push** indicator is not blinking, press **Path** until the **Front Push** indicator is blinking and the message 01 END OF FORMS displays.
15. Press **Load/Form Feed** to feed the forms.
16. Press **Online** to make the printer *ready*.

Creating Print Test Sample (Self Test Printout-with Firmware Level)

Note: This pattern is intended for 14-inch forms. For optimum analysis, if available load full-width [14 in. (355.6 mm)] forms before printing the Print Test Sample.

The Print Test function allows you to print a sample. You can check printer operations and print quality by running and reviewing this “Self Test Printout.” You also can identify the level of firmware that is installed in your printer. The Print Test can be printed using any forms path.

1. Ensure that the printer is powered off (O).
2. Press and continue to hold **Online** while powering on (I) the printer until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
3. Release **Online**. The message PRINT TEST displays. The Print Test will start printing. Allow the test to fill at least one page.
4. Press **Online** to stop the Print Test after a full page has printed, or when you feel you have a large enough printout to analyze.

Once the print test stops, compare your printout with the sample illustrated on the next page. If you notice unsatisfactory results, see “Chapter 7. Resolving Printer Problems” on page 139.

Save this printout for future reference.

Note: If the printer is configured for FRONT TEAR=NO or REAR TEAR=NO, you cannot back up the forms to park them. Break the forms at a perforation ahead of where they enter the printer. Press **Park** twice, and the forms will move forward until ejected from the printer.

Choosing Tear-Off Option

You can choose one of three tear-off options for the Front Push and the Rear Push forms paths.

NORM (default)

Pressing TEAR moves the form to the tear line. After a 10-second delay the forms will move back into the printer.

AUTO

When printing finishes, the forms automatically move up to the tear-off line. When the next print job arrives, the forms move back into the printer.

NO

Select **NO** for forms that should **not** be moved in a reverse direction through the printer, such as forms with attached labels or forms with overlays. Choosing **NO** disables the **Tear** key.

Note: Setting this option modifies how forms park. See “Parking Continuous Forms” on page 29.

To change or check the Tear Mode, do the following:

1. Ensure the printer is powered off (O).
2. Press and continue to hold **Menu/Enter** while powering on (I) the printer until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx or REAR TEAR=xxxx displays. xxxx can be NORM, AUTO, or NO. If you want to select a value other than the one displayed, press ← or →.
6. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored. The printer may take a few seconds to accept a change.

Checking and Adjusting Tear-Off Position

When the perforation on a form aligns with the serrated edge on the top cover, the forms will break easily without creasing or leaving ragged edges. If the top of the form that returns into the printer is ragged, ripped, torn, or creased, it may cause a jam.

Checking Tear-off Position

To check the tear-off position, follow these steps:

1. Load forms.
2. Press **Load/Form Feed** to feed one form.
3. Press **Tear** to move the forms up to the top cover tear line.

4. Open the acoustic cover, grasp one side of the form, pull it toward you, and break the perforation against the serrated edge of the top cover.

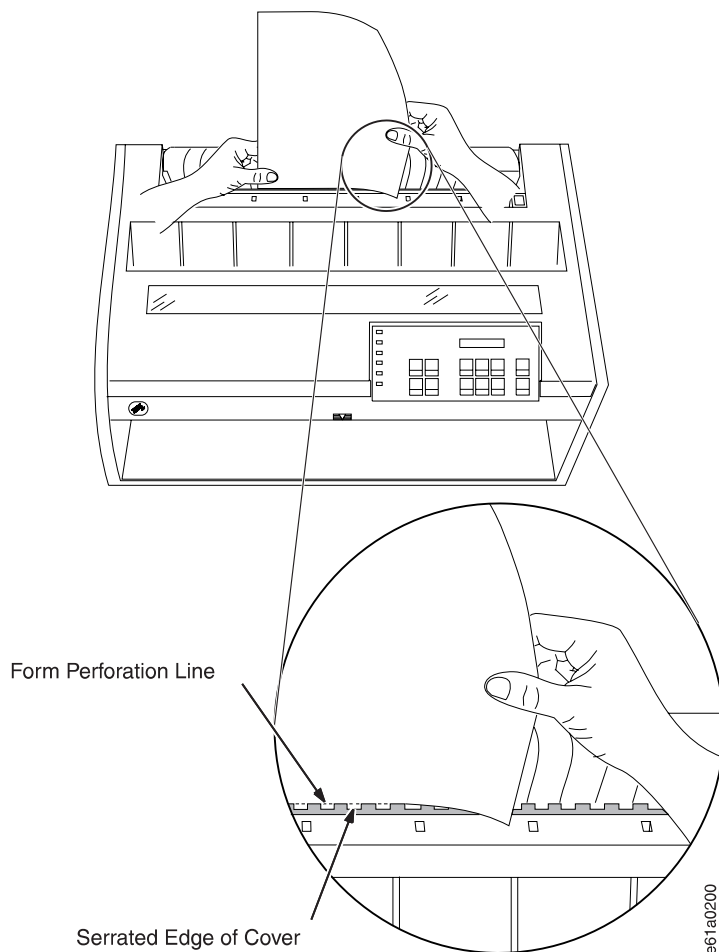


Figure 13. Tear-Off Location. Shown With 11-Inch Long Forms

The perforation should align with the top cover tear line, and the tear should be clean.

5. Close the acoustic cover.

Adjusting Tear-off Position

If, after checking the tear-off position, the perforation does not align with the top cover tear line or if the tear is not clean, adjust the tear-off position.

1. Press **Menu/Enter** and PRINT OUT=NO displays.
2. Press ↓ and TEAR POS. ADJUST displays.
3. Press → and FRONT PATH=XXX displays. To adjust the tear-off position higher, press →, increasing XXX. To adjust the tear-off position lower, press ←, decreasing XXX.
4. If your printer uses the Rear Push forms path, press ↓ and REAR PATH=XXX displays. To adjust the tear-off position higher, press →, increasing XXX. To adjust the tear-off position lower, press ←, decreasing XXX.

To save your change:

1. Press **Menu/Enter** and STORE=QUIT displays.

2. Press **→** and STORE=SAVE displays.
3. Press **Menu/Enter** again to save your change.

To quit without saving your change:

1. Press **Menu/Enter**. STORE=QUIT displays.
2. Press **Menu/Enter** to quit without saving any changes.

Checking Configuration

Printer configuration consists of Power On Configuration and Program Configuration. “Chapter 4. Configuring Your Printer” on page 79 discusses printer configuration.

If you change the forms path, you will need to configure the printer for your selected forms path. Forms path configuration is discussed under the appropriate forms path information in “Chapter 3. Setting Up Another Forms Path” on page 39.

There are many options to both Power On Configuration and Program Configuration. You should print and save the current configuration. See “Chapter 4. Configuring Your Printer” on page 79 for instructions about changing configuration items.

Printing Power On Configuration Setup

IBM recommends that you print the Power On Configuration at initial setup and after you have changed your configuration. Save this printout for future reference.

To print the Power On configuration:

1. Power off (O) the printer.
2. Press and continue to hold **Menu/Enter** while powering on (I) the printer until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. To print the current settings on the printer, press **→**. The message PRINT OUT=YES displays and the Power On Configuration setup printout starts printing. Your printout will look similar to the sample in Figure 14 on page 28. This sample also depicts the default settings.

Configuration Setup Printout

```
PULL          NO
JAM SENSORS  YES
BIDI ADJUST   0

PARALLEL INTF  INTF CX PARALLEL SERIAL INTERFACE  INTF      RS-232C
SELECT-IN     HOST          BAUD       9600
DATA BITS     8            DATA BITS  8
BUFFER        32K          PARITY     NONE
NATIVE        4247         PACING     DTR
CHAR SET      PC2          CONNECT    LOCAL
LANG          CP437        BUFFER     32K
AUTO CR       NO           NATIVE     4247
AUTO LF       NO           CHAR SET   PC2
20 CPI        NO           LANG      CP437
NLQ           COURIER      AUTO CR   NO
                                           AUTO LF   NO
                                           20 CPI   NO
                                           NLQ      COURIER

FUNCTIONS      FRONT TEAR  NORM
               REAR TEAR  NORM
               PAPER OVERLY NO
               SEQUENCE   NONE
               ALARM      YES
               AUTOLOAD   YES
               MENU       ENGLISH
```

Figure 14. Power On Configuration Printout

Printing Program Configuration Setup

IBM recommends that you print the Program Configuration at initial setup and after you have changed your configuration. Save this printout for future reference.

You can save the configuration settings for as many as five forms paths. To print the Program Configuration:

1. Press **Menu/Enter**. The printer goes offline, and the message PRINT OUT=NO displays.
2. To print the settings on the printer, press **→**. The message PRINT OUT=YES displays and the setup for the Program Configuration is printed.

Your printout will look similar to the sample in Figure 15 on page 29. This sample printout shows three forms paths configured, and also depicts the default settings. As shown in the sample, Rear Push is included on your printout even though your printer may not be set up for the Rear Push forms path.

Program Setup Printout

```

TEAR POS. ADJUST   FRONT PATH   0
                   REAR PATH   0

1 FORM PER PATH

PATH MANUAL FEED   PATH FRONT PUSH   PATH REAR PUSH
-----
IMPACT             SOFT             IMPACT             SOFT             IMPACT             SOFT
PERF SAFE         NO             PERF SAFE         NO             PERF SAFE         NO
AFTA              0             AFTA              0             AFTA              0
HORIZ ADJUST     10            HORIZ ADJUST     10            HORIZ ADJUST     10
VERT ADJUST       0             VERT ADJUST       0             VERT ADJUST       0
LINE SP          6 LPI          LINE SP          6 LPI          LINE SP          6 LPI
LINE SP LOCK     NO             LINE SP LOCK     NO             LINE SP LOCK     NO
PAGE LENGTH      LTR             PAGE LENGTH      66            PAGE LENGTH      66
TOP OF FORM       0             TOP OF FORM       0             TOP OF FORM       0
SKIP PERF         0             SKIP PERF         0             SKIP PERF         0
FONT              DP             FONT              DP             FONT              DP
PITCH            10 CPI          PITCH            10 CPI          PITCH            10 CPI
PITCH LOCK       NO             PITCH LOCK       NO             PITCH LOCK       NO
LEFT MARGIN       0             LEFT MARGIN       0             LEFT MARGIN       0
RIGHT MARGIN      80            RIGHT MARGIN     136           RIGHT MARGIN     136
SLASH ZERO        NO             SLASH ZERO        NO             SLASH ZERO        NO
    
```

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Figure 15. Program Configuration Printout

After printing the Program Configuration, the display returns to PRINT OUT=NO. Press **Menu/Enter** twice to exit configuration mode.

Parking Continuous Forms

Parking forms means that a forms type unloads from the print area, but still remains on the tractors. When the forms in one forms path are parked, another forms path or the Manual Sheet Feed can be selected, and the forms in that path will be loaded in the print area. This can be configured to occur automatically, but you must have performed the tear off. See “Checking and Adjusting Tear-Off Position” on page 25.

Note: For successful forms parking, the top of the input forms stack *must* be lower than bottom of the printer. See Figure 12 on page 20.

To park a forms type, follow these steps:

1. Press **Tear**. Tear off the forms at the top cover tear line.
2. Press **Park** and the message 94 PARK:SURE? displays.
3. Press **Park** immediately again to park the form.

Note: If you set TEAR=NO, tear off the forms at the forms-input side of the printer. When you press the **Park** key, the message 92 EJECT:SURE? displays. Press **PARK** to eject the forms.

For additional information, see “Parking One Continuous Form and Loading Another (Dual Push)” on page 59.

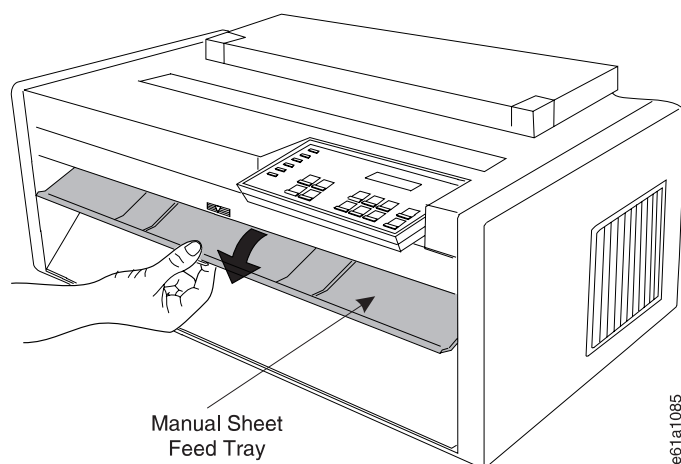
Setting Up Manual Sheet Feed Path

The 4247 Printer provides the ability to print on either single-part or multiple-part, cut-sheet forms using the Manual Sheet Feed forms path. Manual Sheet Feed can be used with the Front Push, the Rear Push, and the Dual Push forms paths. See Figure 18 on page 41 for a depiction of the various paths.

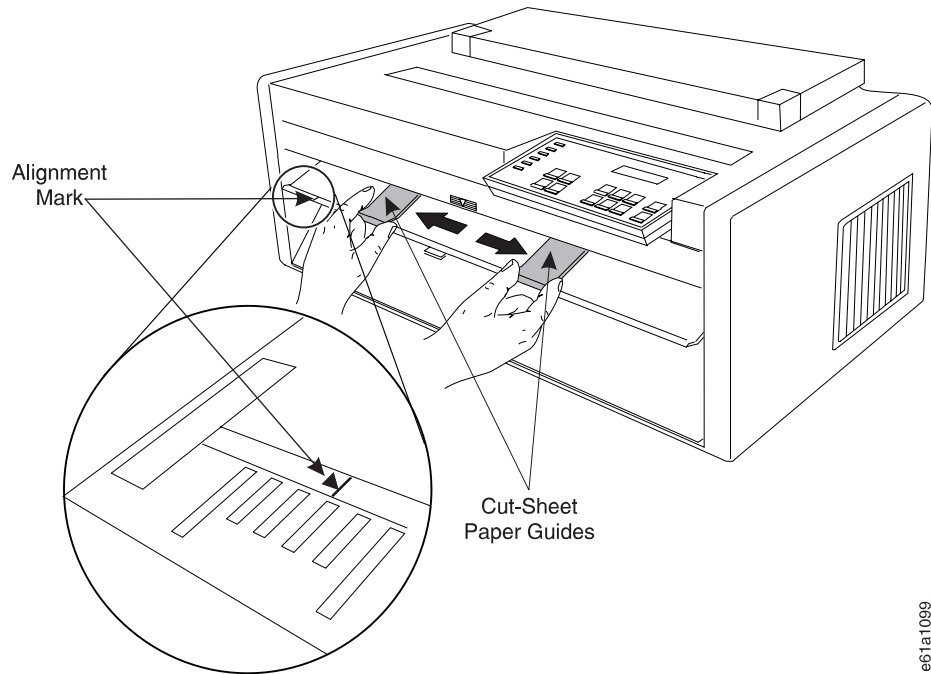
The Manual Sheet Feed also allows you to overlay a single sheet on top of continuous forms from another forms path, if your total page count does not exceed 8 parts. See “Choosing a Forms Path for Special Forms” on page 35 for limitations.

Setup the Manual Sheet Feed as follows:

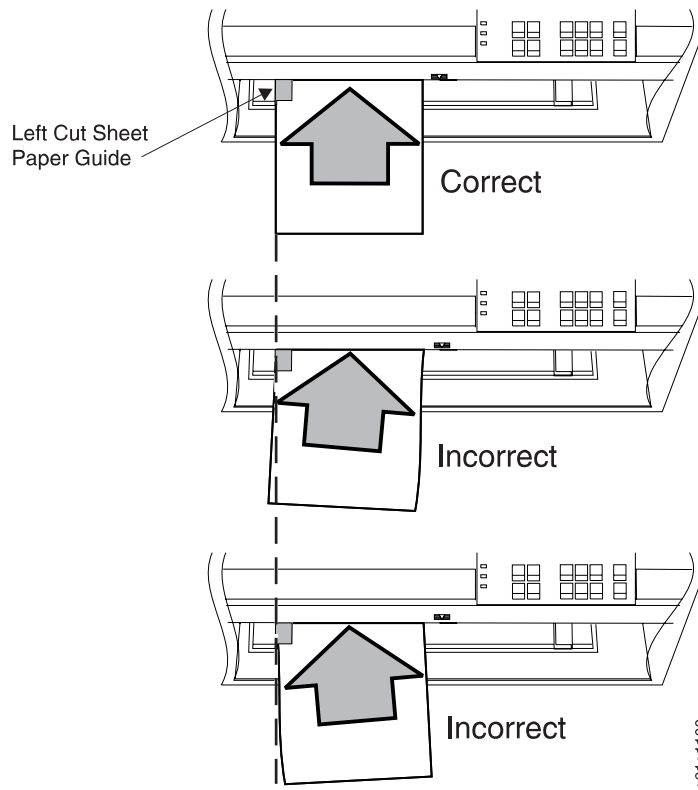
1. Insert your thumb into the center opening and pull down to open the Manual Sheet Feed tray.



2. Press **Path** until the **Manual Sheet Feed** indicator is blinking and the message 06 MANUAL FEED displays.
3. Move the left cut-sheet paper guide to the left alignment mark. Move the right cut-sheet paper guide to the extreme right. You will not use the right cut-sheet paper guide on this printer model.



4. Push the paper into the printer until it covers the black patch on the input shelf. Ensure the paper is straight against the left cut-sheet paper guide (shown as shaded in the drawing).



5. To verify printer operation, print the Program Configuration as described in "Printing Program Configuration Setup" on page 28.

6. With Automatic Load set to **YES** in the Power On Configuration menu, after a three-second timeout the paper is fed automatically into the printer, and your job is printed.
7. When you are finished using the Manual Sheet Feed, return to Front Push by pressing **Path** until the **Front Push** indicator is blinking, and the message 01 END OF FORMS displays.

Optional Printer Stand

The optional printer stand supports the printer and provides easier access to some of the forms paths.

Load the forms as depicted in Figure 16. Input Front depicts where you load and stack forms for the Front Push, Push Pull, and Dual Push forms paths. Input Rear depicts where you load and stack forms for the Rear Push and Dual Push forms paths. The Output is the same for Input Front and Input Rear.

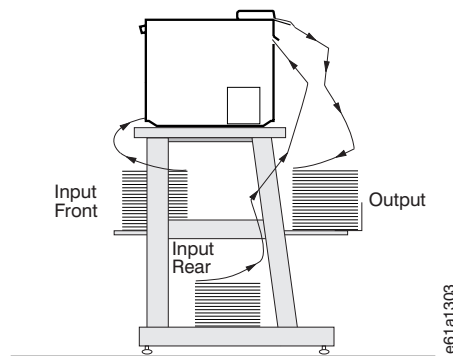


Figure 16. Optional Printer Stand

Summary

By completing this chapter, you have set up your printer to use the Front Push forms path and the Manual Sheet Feed.

If you are setting up the printer for a different forms path, proceed to “Chapter 2. Considering Other Forms Paths” on page 33.

If your printer will use only the Front Push forms path with the Manual Sheet Feed, and the factory default configuration is the correct choice for your printer, go to “Chapter 5. Attaching Your Printer” on page 123 to learn how to attach the printer to your computer.

See “Chapter 4. Configuring Your Printer” on page 79 to learn about changing the printer configuration.

Chapter 2. Considering Other Forms Paths

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Choosing Other Forms Paths

IBM recommends you use the Front Push forms path whenever possible. A second choice is the Rear Push. If the Front Push forms path does not meet your needs, you can set up and configure the printer for other forms paths. You use a method similar to that used when you set up the Front Push forms path in “Chapter 1. Printer Setup” on page 1.

“Chapter 2. Considering Other Forms Paths” helps you choose a forms path other than the default Front Push forms path. “Chapter 3. Setting Up Another Forms Path” on page 39 helps you set up that forms path.

You may configure the printer for any one of five forms paths, plus the Manual Sheet Feed path with the Front Push, the Rear Push, or the Dual Push paths (see “Preparing Printer for Selected Forms Path” on page 44). Figure 17 on page 34 illustrates the five forms paths and the Manual Sheet Feed.

Each forms path is shown with the necessary tractors installed, and where the forms input and output stacks should be located.

Notes:

1. The forms tractors are interchangeable between push and pull forms paths, and front and rear forms paths.
2. The paper bail is installed for four of the five forms paths; it must be removed for the Rear Pull forms path.
3. The Manual Sheet Feed can be used with three of the five forms paths.
4. The adjustable edge of each pin feed assembly must be set to properly guide the forms in that forms path.
5. IBM recommends you test the performance in the printer of any forms you intend to use.

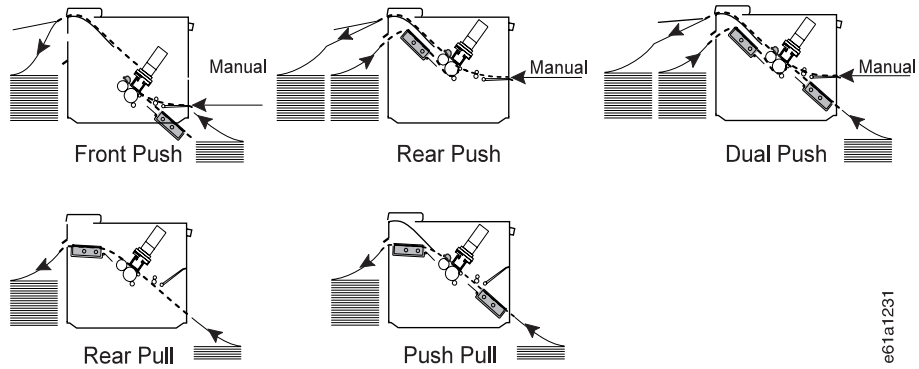


Figure 17. 4247 Printer Forms Paths

For the Dual Push forms paths or the Push Pull forms path, you will need to have ordered and installed the optional, second forms tractor. Also consider ordering the optional printer stand (see “Optional Printer Stand” on page 32). Contact your IBM marketing representative for details or to order either item.

Choosing a Forms Path for Your Needs

Note: IBM recommends that whenever possible you use the Front Push forms path for all your printing needs.

You might select a forms path based on other operating needs. Use the following table when you are selecting a path. See “Chapter 8. Supplies, Forms, and Cables” on page 151 for information about forms weights and thicknesses.

Table 3. Considerations For Choosing a Path

Function	Front Push	Rear Push	Rear Pull	Push Pull	Manual Sheet Feed	Comments
Autoload	X	X				
Document on Demand (DOD) / Tear Off	X	X				
Tear Off Adjustment	X	X				
Dual Path Forms Input	X	X				Requires 2 tractors. IBM recommends optional Printer Stand.
Park	X	X				Requires manual tear off
Quiet Key	X	X	X	X	X	Reduces throughput by 50%
AFTA	X	X	X	X	X	
Top of Form	X	X				
Vertical Adjustment	X	X				
Horizontal Adjustment	X	X	X	X		
ASF Mountable	X	*				* See note 1.
Notes:						
1. IBM recommends you remove the ASF before loading forms into the Rear Push forms path.						
2. To use the Push Pull or Dual Push forms paths you must install the optional, second forms tractor.						

Choosing a Forms Path for Special Forms

Note: IBM recommends selecting first the Front Push then the Rear Push as your choices for forms paths.

The 4247 Printer can print on various sizes, dimensions, and weights of forms. IBM recommends you test all forms for your application before ordering large quantities. Use the following table when you are choosing which path to use for special forms or paper.

Table 4. Selecting Forms Types

Forms Type	Front Push	Rear Push	Rear Pull	Push Pull	Manual Sheet Feed	Comments
Black-Back Forms		X				
Labels	X		X	X	X	For Front Push, do not use Park
1-Part to 4-Part	X	X	X	X	X	
5-Part to 8-Part	X		X	X	X	
Greater than 21 lb	X		X	X	X	
Greater than 0.014 in. thick	X		X	X	X	
Prenumbered Forms	X	X				
Critical Registration	X			X		Easiest to load in Front Push. Set PERF SAFE=YES for 8-part forms
Form stock with stickon card or form, or forms of varying thickness			X		X	If multiple thicknesses on each sheet, remove Paper Bail
<p>Note: This printer does not support the following types of forms:</p> <ul style="list-style-type: none"> Greater than 8-part forms Greater than 40 lb paper Greater than 0.64 mm (0.025 in.) total forms thickness Less than 15 lb paper Less than 0.08 mm (0.003 in.) paper thickness 						

Other Considerations for Forms

Consider the following items, unless Table 3 on page 34 or Table 4 provides other direction.

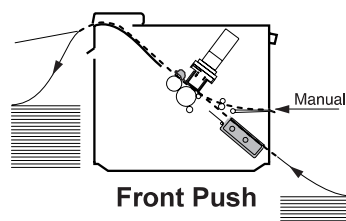
- IBM recommends you test the Park function when you intend to run multiple-part forms. If you notice forms feed problems, disable the Park function, and use the Push Pull forms path.
- When your printer is loaded with different forms in the Front Push and the Rear Push tractors, your job (or the operator) can select the desired source and alternate between the two paths. The operator will need to tear off the forms for the path from which the printer is alternating.
- See “Chapter 8. Supplies, Forms, and Cables” on page 151 for recommended paper weight and thickness.

- For forms stacking convenience, consider ordering the optional printer stand. See “Optional Printer Stand” on page 32, or contact your IBM marketing representative to order.
- Consider the following when using the optional Automatic Sheet Feeder:
 - You cannot use Rear Pull or Push Pull with the optional Automatic Sheet Feeder installed.
 - To improve access, remove the ASF when loading the Rear Push forms path.

Description of Each Forms Path

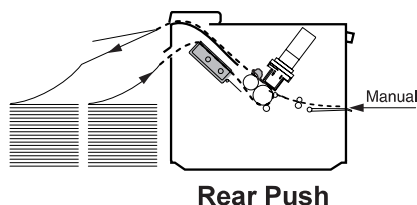
Use the following information and the information in “Choosing a Forms Path for Your Needs” on page 34 and “Choosing a Forms Path for Special Forms” on page 35 to help you select an alternate forms path for your forms and needs.

Front Push Forms Path

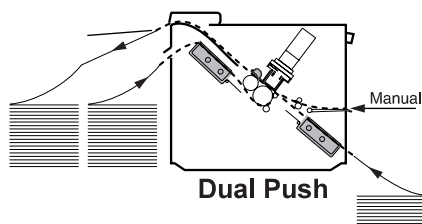


The Front Push forms path is the default forms path that you set up in “Default Forms Path” on page 13.

Rear Push Forms Path

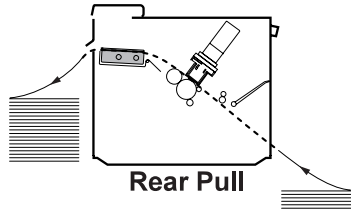


Dual Push Forms Paths

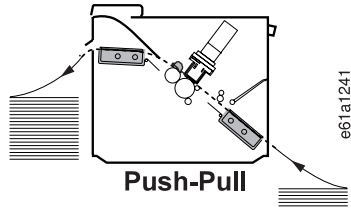


The Dual Push forms paths is a combination of the Front Push and the Rear Push forms paths. This provides *two paths* into which the forms can be loaded. You can alternate printing between the two paths.

Rear Pull Forms Path



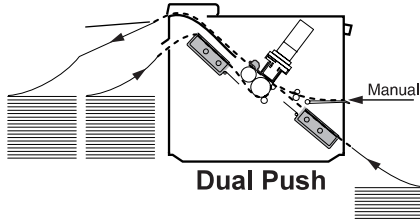
Push Pull Forms Path



The Push Pull forms path is a combination of the Front Push and the Rear Pull forms paths. Unlike the Dual Push paths into which you can load two forms, the Push Pull forms path is *one path*.

Manual Sheet Feed

Manual Sheet Feed can be used with the Front Push, the Rear Push, and the Dual Push forms paths. It is shown here in use with the Dual Push forms path, which is a combination of the Front Push and the Rear Push forms paths.



Chapter 3. Setting Up Another Forms Path

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Summarizing Forms Path Set Up

Table 5 summarizes the settings for all forms paths. See Figure 18 on page 41 to help you understand the numbers used in Table 5. The remainder of this chapter describes the settings for all the forms paths except for the Front Push and Manual Sheet Feed which you read about in “Chapter 1. Printer Setup” on page 1.

Table 5. Review of Forms Paths Settings

Forms Path	Forms Guide Deflector	Push-Pull Selector	Paper Bail	Forms Tractor
Front Push	Open	Push	Installed	2
Rear Push	Open	Push	Installed	2
Dual Push	Open	Push	Installed	Rear, 2 Front, 2
Rear Pull	Closed	Pull	Not installed	1

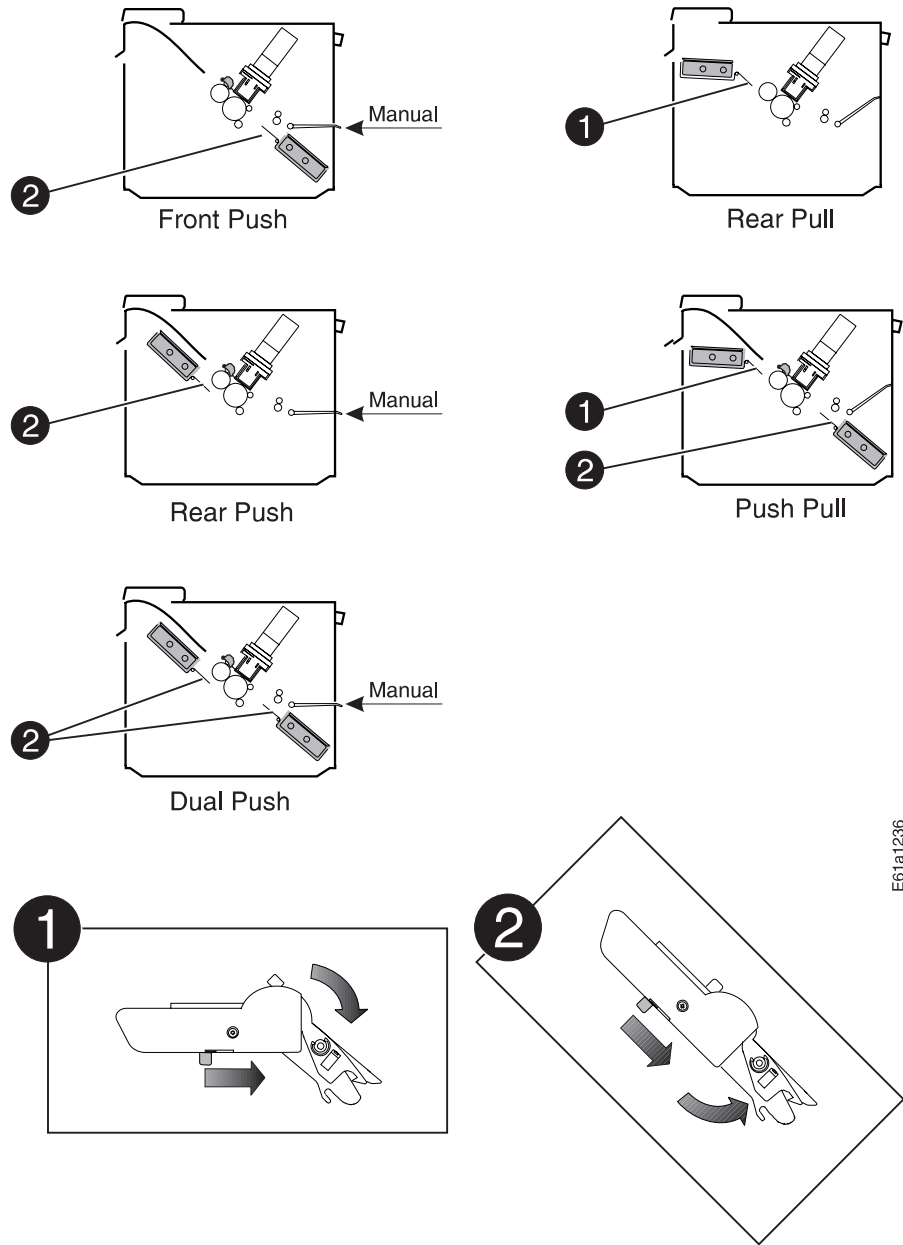
Table 5. Review of Forms Paths Settings (continued)

Forms Path	Forms Guide Deflector	Push-Pull Selector	Paper Bail	Forms Tractor
Push-Pull	Closed	Pull	Installed	Rear, 1 Front, 2
Manual	Open	—*	Installed	—*
Note: * Your choice is not affected by these settings.				

Table 6 summarizes the configuration settings for all the forms paths.

Table 6. Review of Configuration Settings

Forms Path Setting	Power on Configuration Menu		Press Path Key Until Indicator is Blinking for:
	PULL=	SEQUENCE	
Front Push	No	None	Front Push
Rear Push	No	None	Rear Push
Dual Push	No	None if different forms in each path FR+RR if same forms in each path	Front Push or Rear Push
Rear Pull	Yes	None	Rear Pull
Push-Pull	Push+Pull	None	Rear Pull and Front Push
Manual	—*	—*	Manual Sheet Feed
Note: * The setting you choose is not affected by the value in this category.			



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Figure 18. Tractors and Forms Paths

Changing to a Different Forms Path

To change the forms path, you will perform the following tasks:

1. Identify the existing forms path (see “Identifying Existing Forms Path” on page 42).
2. Identify the new forms path (see “Identifying New Forms Path” on page 42).
3. Remove the existing forms tractor, if necessary (see “Removing Existing Forms Tractor” on page 42).
4. Prepare the new forms path (see “Preparing Printer for Selected Forms Path” on page 44).

If your printer has an optional Automatic Sheet Feeder (ASF) installed, see the *4247 Printer Automatic Sheet Feeder Guide* for any information concerning this option. Figure 19 illustrates the Automatic Sheet Feature.

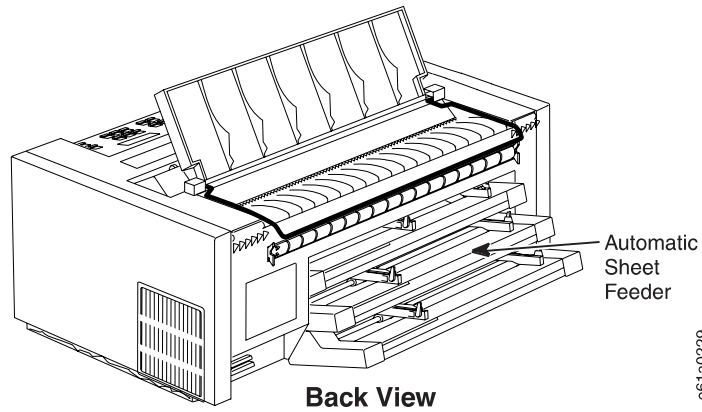


Figure 19. Automatic Sheet Feeder

Identifying Existing Forms Path

Figure 20 illustrates the five forms paths and the Manual Sheet Feed. It also depicts the forms tractors used in each forms path. Notice that the Manual Sheet Feed can be used only with the Front Push, Rear Push, and Dual Push forms paths.

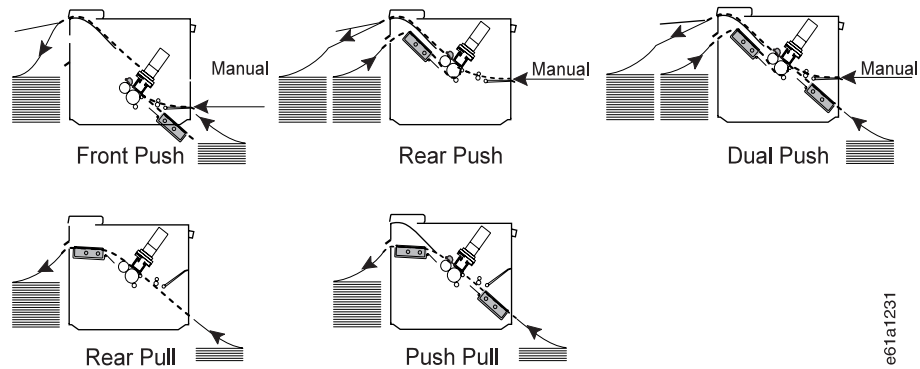


Figure 20. Forms Paths with Forms Tractor Locations

Identifying New Forms Path

If you have not selected a forms path, see “Chapter 2. Considering Other Forms Paths” on page 33.

Removing Existing Forms Tractor

If you need to remove a forms tractor, go to the appropriate topic listed below:

Removing Front Forms Tractor

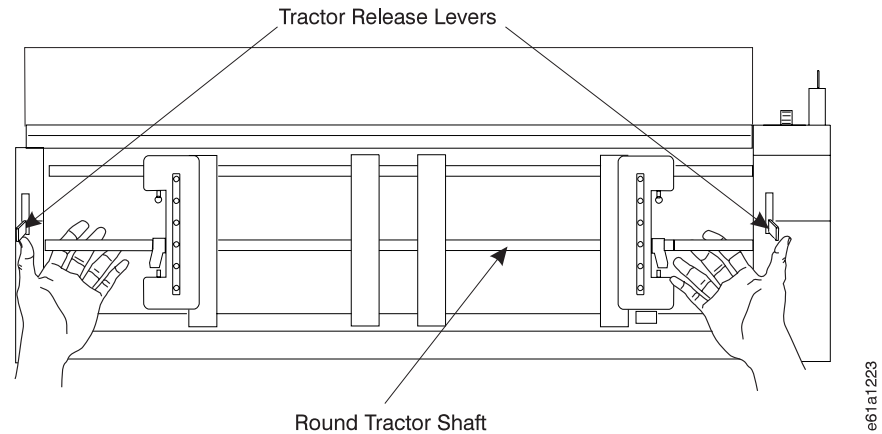
1. Power off (O) the printer.

2. Open the front tractor cover.

CAUTION:

<3> The paper feed motor may get hot during operation. Avoid contact when installing or removing the front forms tractor.

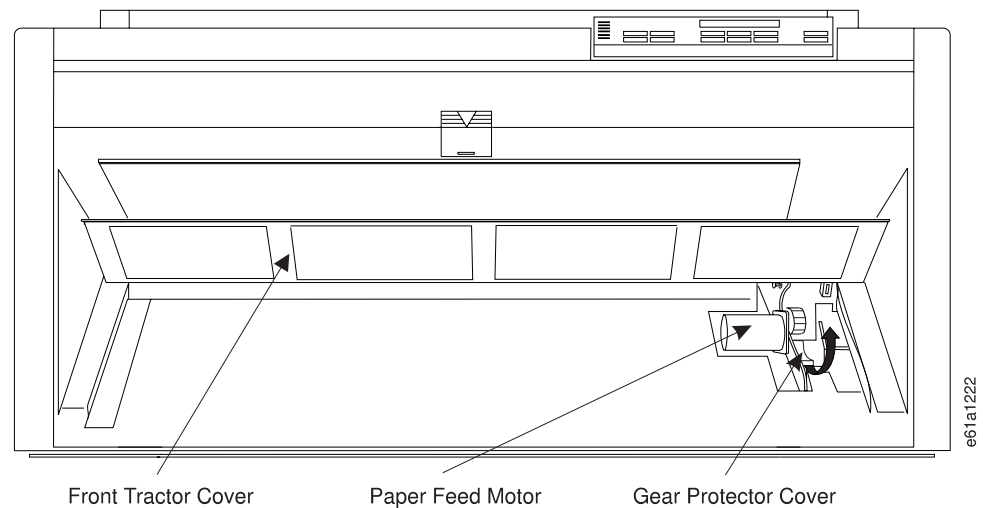
3. While holding both sides of the forms tractor by the round shaft, release the lever on each side of the forms tractor. Lift out the forms tractor.



CAUTION:

<4> Close the gear protector cover immediately after removing the front forms tractor.

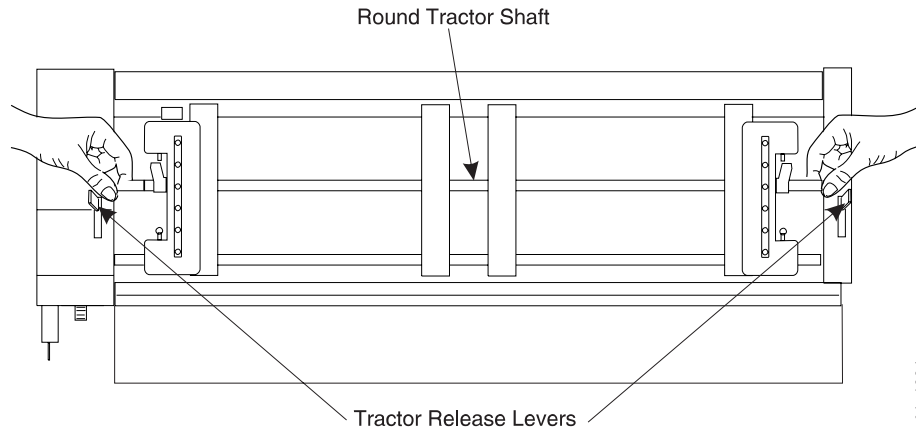
4. Close the gear protector cover and the front tractor cover.



5. Reinstall the black protective cap on the electrical connector if you are not installing this forms tractor into the printer. Store the forms tractor.

Removing Rear Forms Tractor

1. Power off (O) the printer.
2. Open the top cover and the forms guide.
3. While holding both sides of the forms tractor by the round shaft, release the lever on each side of the forms tractor. Lift out the forms tractor.



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4. Close the forms guide and the top cover.
5. Reinstall the black protective cap on the electrical connector if you are not installing this forms tractor into the printer. Store the forms tractor.

Preparing Printer for Selected Forms Path

You must perform the following procedures for the forms path you have chosen:

1. "Setting Forms Guide Deflector"
2. "Setting Push-Pull Selector" on page 46
3. "Removing or Installing Paper Bail" on page 47
4. "Setting Forms Tractors" on page 50

Setting Forms Guide Deflector

See Table 7 for the correct setting for your selected forms path.

Table 7. Setting the Forms Guide Deflector

	Front Push with Manual	Rear Push with Manual	Dual Push with Manual	Rear Pull	Push Pull
Forms Guide Deflector	Open	Open	Open	Closed	Closed

Set the forms guide deflector as follows:

1. Press **Online** to take the printer offline.
2. Open the top cover and the forms guide (see Figure 21 on page 45).

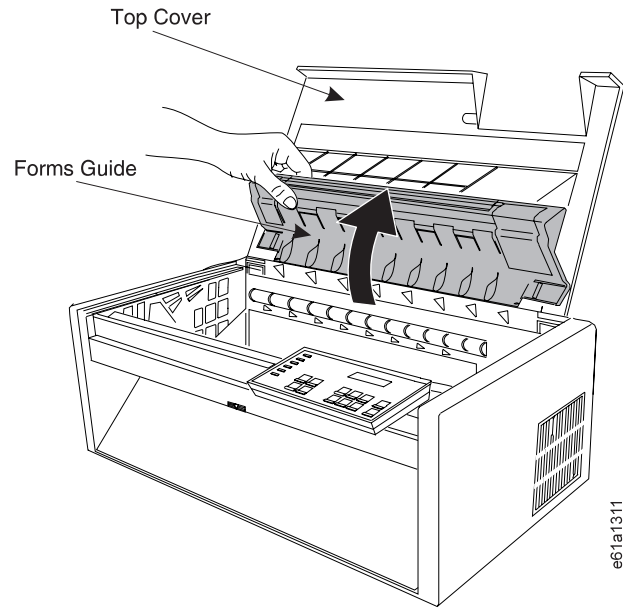


Figure 21. Forms Guide

Figure 22 on page 46 shows the two settings for the forms guide deflector. Use the **open** position for **push**, and the **closed** position for **pull** (see Table 7 on page 44).

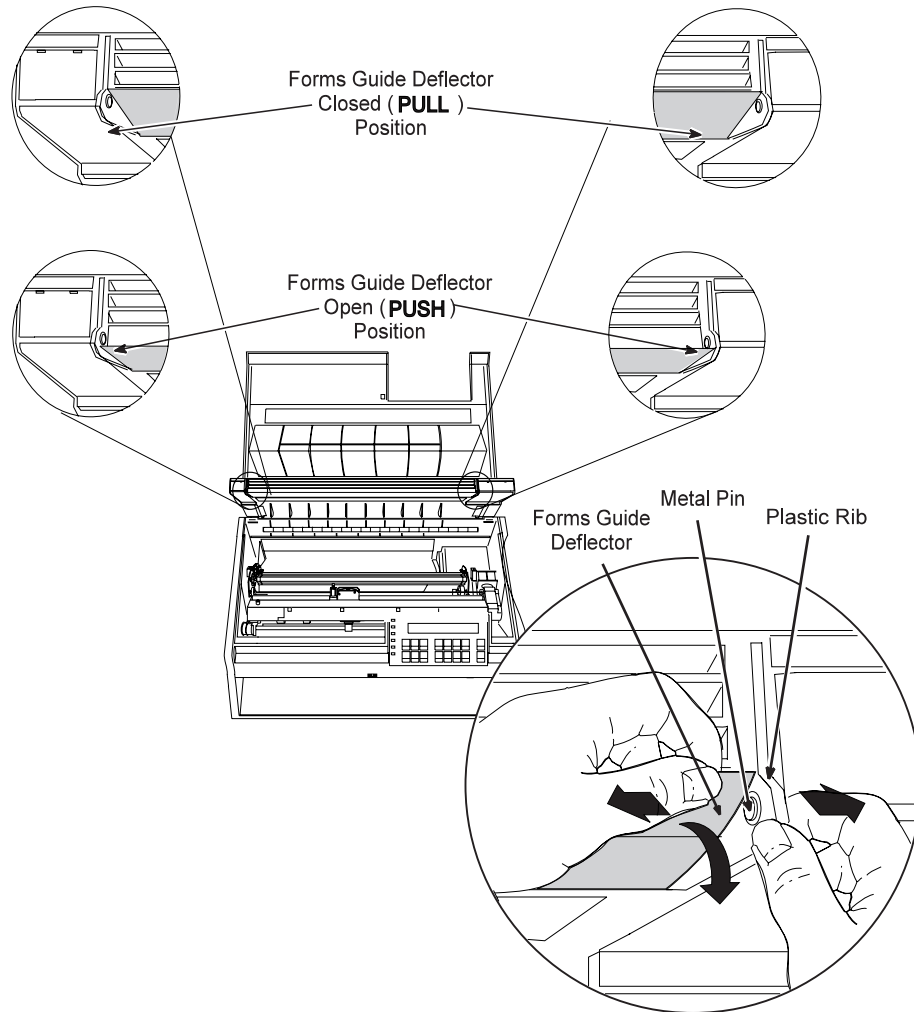


Figure 22. Forms Guide Deflector

3. Grasp the forms guide deflector with one hand and the plastic rib on the forms guide with the other hand.
4. While pulling the forms guide deflector and the plastic rib apart, move first the right side then the left side of the forms guide deflector to be either above or below the metal pins. The correct position is noted in Table 7 on page 44.

Figure 22 shows the forms guide deflector being moved from the **closed (pull)** position to the **open (push)** position.

5. Close the forms guide and the top cover.

Setting Push-Pull Selector

See Table 8 for the correct setting you will make for your selected forms path.

Table 8. Setting the Push-Pull Selector

	Rear Push with Manual	Dual Push with Manual	Rear Pull	Push Pull	
Push-Pull Selector	Push	Push	Push	Pull	Pull

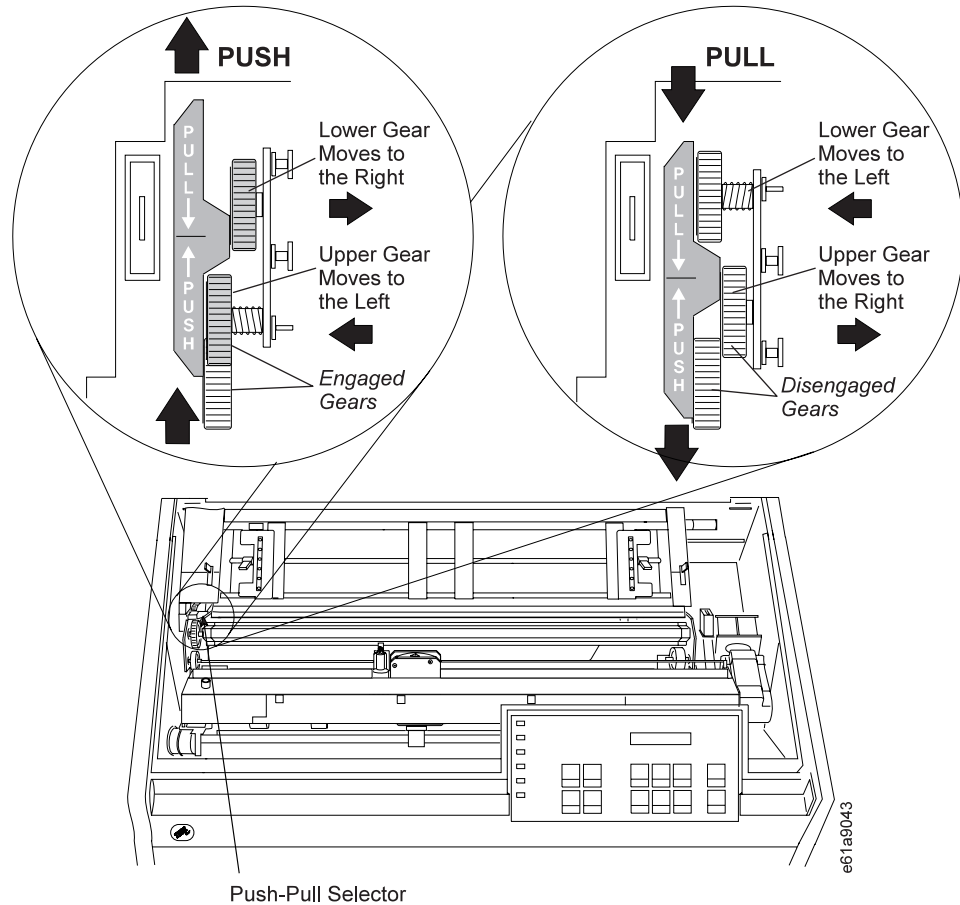


Figure 23. The Push-Pull Selector. The arrows and words “Push” and “Pull” are provided here for clarity.

Set the Push-Pull selector as follows:

1. Press **Online** to take the printer offline.
2. Open the top cover and the forms guide, and locate the Push Pull selector. Use Table 8 on page 46 to help you set the selector.

Push position—Slide the **Push-Pull selector** down and to the rear. Ensure that the upper and the lower gears are correctly positioned, as shown for **push**.

Pull position—Slide the **Push-Pull selector** up and to the front. Ensure that the upper and the lower gears are correctly positioned, as shown for **pull**.

3. Close the forms guide and the top cover.

Removing or Installing Paper Bail

See Table 9 to determine if the paper bail should be installed or not installed for your selected forms path.

Table 9. Installing or Not Installing the Paper Bail

	Front Push with Manual	Rear Push with Manual	Dual Push with Manual	Rear Pull	Push Pull
Paper Bail	Installed	Installed	Installed	Not Installed	Installed

Removing Paper Bail

1. Open the top cover and the forms guide.
2. Remove the ribbon cartridge. See “Removing Ribbon Cartridge” on page 133.
3. Move the printhead to the far right.
4. Grasp the paper bail and rotate it toward the front of the printer until it snaps loose. Some force is required.

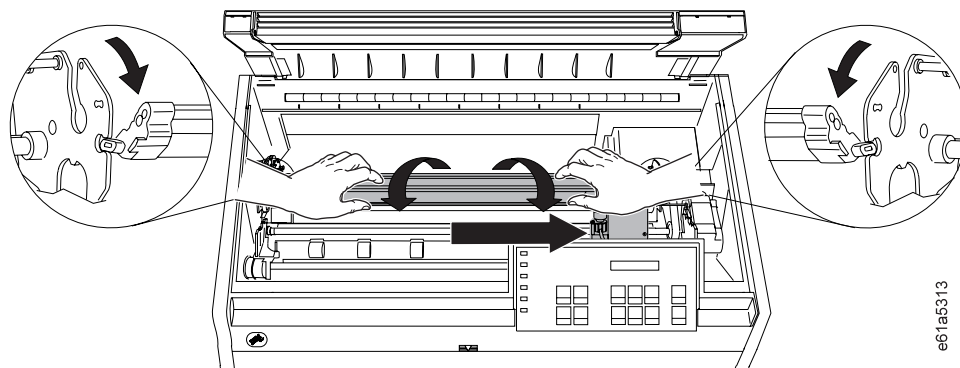


Figure 24. Rotating the Paper Bail

5. Using care not to damage the thin plastic strip on the paper bail, lift the paper bail up and out of the printer.

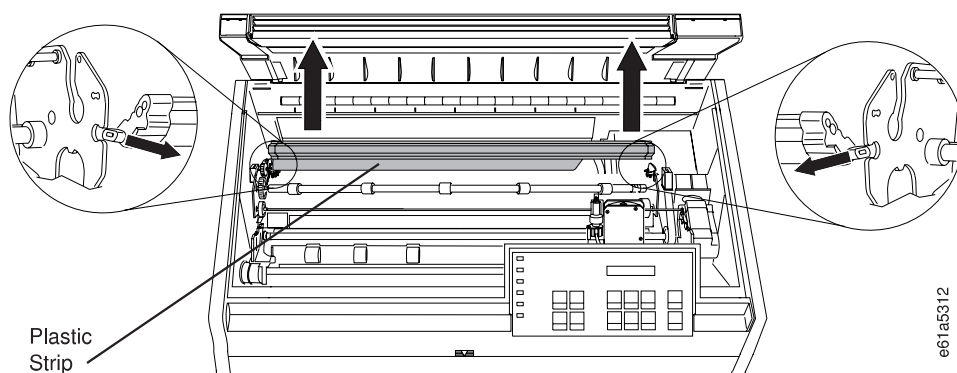


Figure 25. Removing the Paper Bail

6. Install the ribbon cartridge. See “Installing Ribbon Cartridge” on page 17.
7. Close the forms guide and the top cover.
8. Store the paper bail. You may need to reinstall the paper bail if you change the forms path.

Installing Paper Bail

1. Press **Online** to take the printer offline.
2. Open the top cover and forms guide.
3. Remove the ribbon. (See “Removing Ribbon Cartridge” on page 133.)
4. Move the printhead to the far right.
5. Hold the paper bail with the plastic strip toward you. Rotate the paper bail so the plastic strip is pointing down.

- Using care not to damage the plastic strip on the paper bail, insert the ends of the bail into the printer frame as shown in Figure 26.

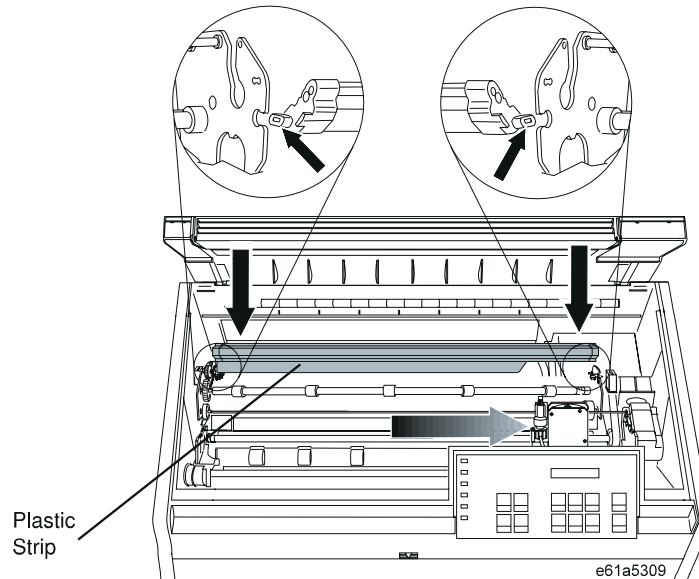


Figure 26. Installing the Paper Bail

- Rotate the paper bail, moving the top toward the rear, as shown in Figure 27. Ensure the paper bail snaps into place.

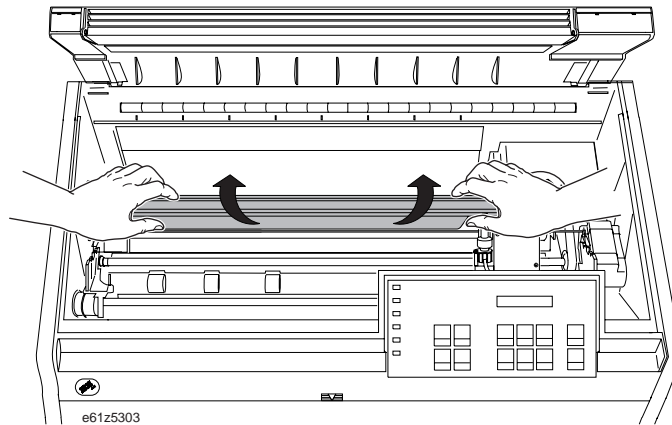


Figure 27. Rotating the Paper Bail into Position

- Ensure that the paper bail (level 1 or level 2) is installed correctly. Press on the areas that are identified by arrows in Figure 28 on page 50. If your printer has a level 1 paper bail, ensure the paper bail is snapped into the closed position. See Figure 28 on page 50.

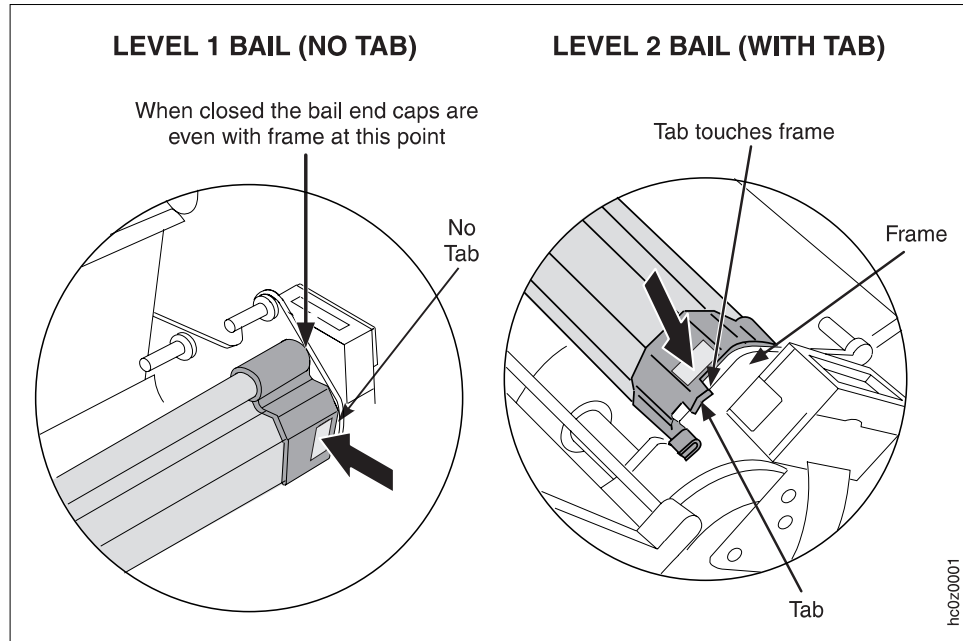


Figure 28. Correct Installation of Either a Level 1 or a Level 2 Paper Bail

9. Install the ribbon cartridge. See “Installing Ribbon Cartridge” on page 17.
10. Close the forms guide and the top cover.

Setting Forms Tractors

See Table 10 and Figure 29 on page 51 for the correct tractor settings for each forms path.

Table 10. Setting the Tractors. Numbers in Table Match Numbers in Figure 29 on page 51.

	Front Push with Manual	Rear Push with Manual	Dual Push with Manual	Rear Pull	Push Pull
Tractor Settings	2	2	2 (Front Push) and (Rear Push)	1	1 (Rear Pull) 2 (Front Push)

Set the forms tractors to Position 1 or Position 2 for your forms path, as shown in Figure 29 on page 51.

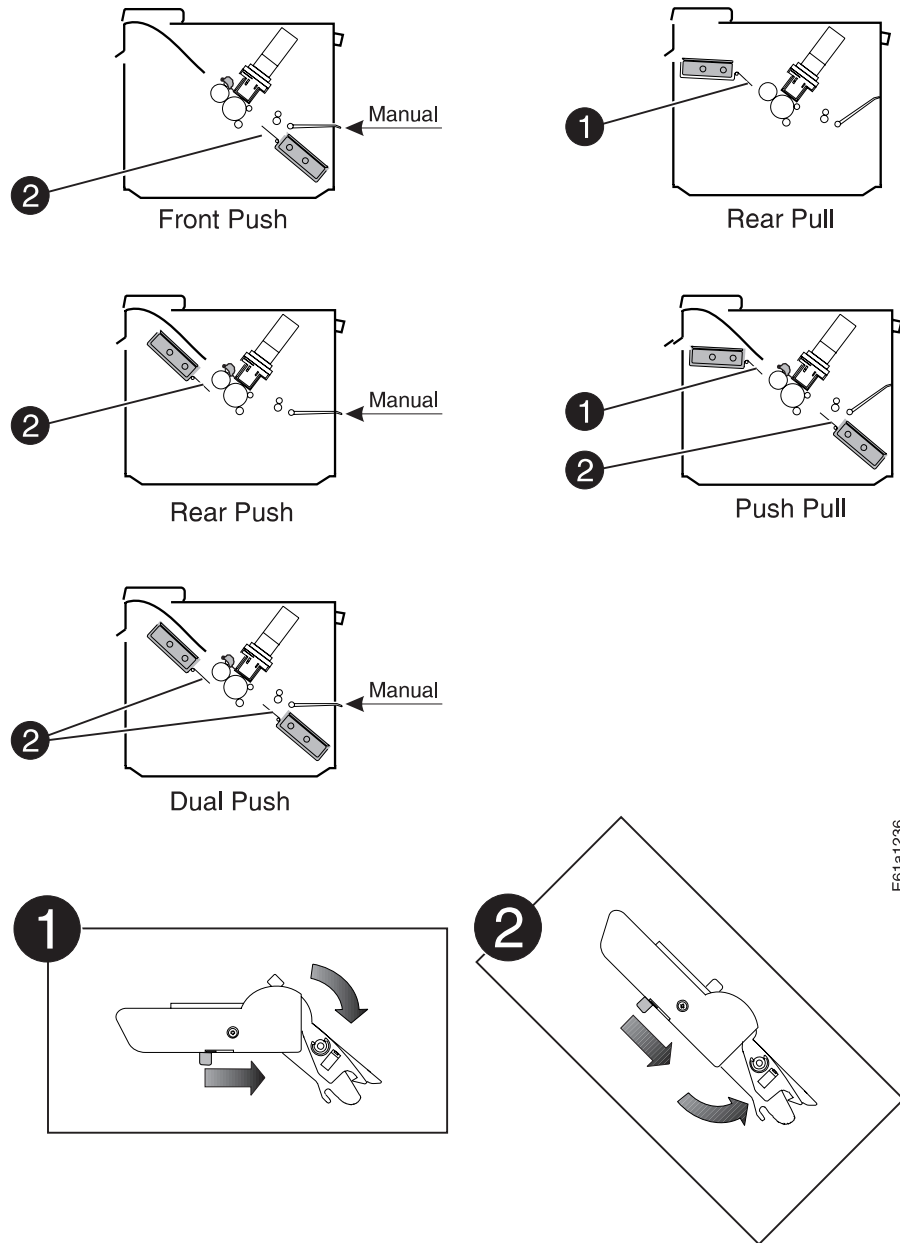


Figure 29. Setting Forms Tractors

If a forms tractor is not set to the desired position, perform the following:

1. With the forms tractor positioned as shown in Figure 29, move the release levers in the direction indicated and move the edge of the forms tractor to the new position.
2. Ensure that the forms tractor fully locks into position. Position 1 is for the Rear Pull forms tractor in either the Rear Pull or Push Pull mode.

Next, you will perform the following tasks for your selected forms path.

1. Install the necessary tractors.
2. Configure the printer for the selected forms path.
3. Load your forms.
4. Print the configuration for future reference and to verify printer operation.

Table 11 directs you to information about the forms path of your choice.

Table 11. Information About Your Selected Forms Path

Forms Path	Where to Find Your Next Task
Front Push	"Setting Up and Configuring Front Push Forms Path"
Rear Push	"Setting Up Rear Push Forms Path" on page 53
Dual Push	"Setting Up Dual Push Forms Paths" on page 57
Rear Pull	"Setting Up Rear Pull Forms Path" on page 60
Push Pull	"Setting Up Push Pull Forms Path" on page 70

Setting Up and Configuring Front Push Forms Path

Figure 30 shows the Front Push forms path with Manual Sheet Feed.

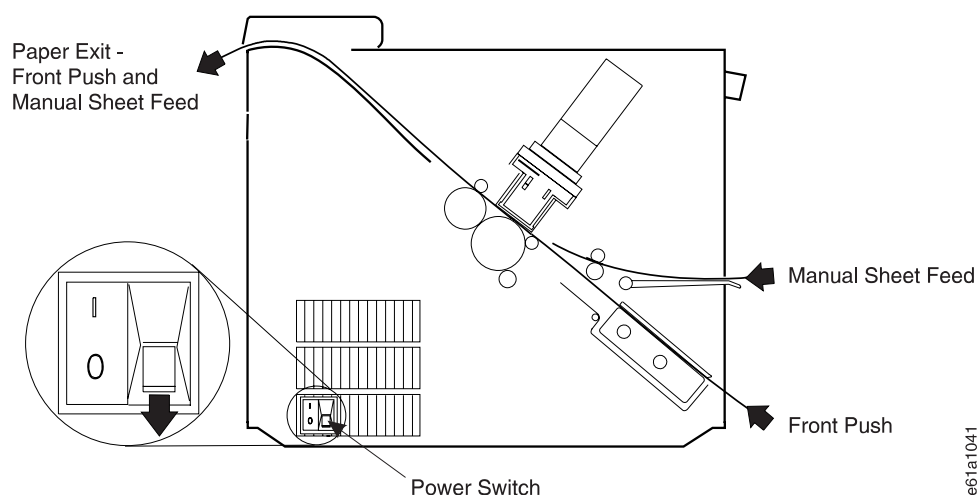


Figure 30. Front Push and Manual Sheet Feed Forms Paths

The Front Push tractor is used for the Dual Push and the Push Pull forms paths, as well as the Front Push forms path. The printer is shipped to you with the Front Push forms path set as the default.

1. Ensure the correct settings are made for the Front Push forms path. Refer to the tables in "Summarizing Forms Path Set Up" on page 39.
2. Perform the steps in "Installing Front Push Tractor" on page 15.
3. Configure the printer for the Front Push forms path by following these steps:
 - a. Power off (O) the printer.
 - b. Enter Power On Configuration mode. To do this, press and continue to hold **Menu/Enter** while powering on (I) the printer, until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
 - c. Release **Menu/Enter** and the message PRINT OUT=N0 displays.
 - d. Press ↓ and the message PULL=xxxxxxx displays, where xxxxxxxx can be N0, YES, or PUSH+PULL. If xxxxxxxx is not N0, press ← or → until N0 is displayed.

- e. Press **Menu/Enter** to save the settings and exit Power On Configuration mode. This takes a few seconds. Do not press any keys until this completes.
 - f. Press **Path** until the **Front Push** indicator is blinking and the message 01 END OF FORMS displays.
 - g. Press **Online** to quiet the alarm and put the printer online.
4. Perform the steps in “Loading Forms into Front Push Forms Path” on page 20.

Your 4247 Printer is ready to print. See “Printing Power On Configuration Setup” on page 27 and “Printing Program Configuration Setup” on page 28 to print the configuration. If you do not want to use the printer defaults for forms settings (such as Line Spacing, Page Length, or Top of Form), see “Program Configuration” on page 106.

Setting Up Rear Push Forms Path

Figure 31 shows the Rear Push forms path with Manual Sheet Feed.

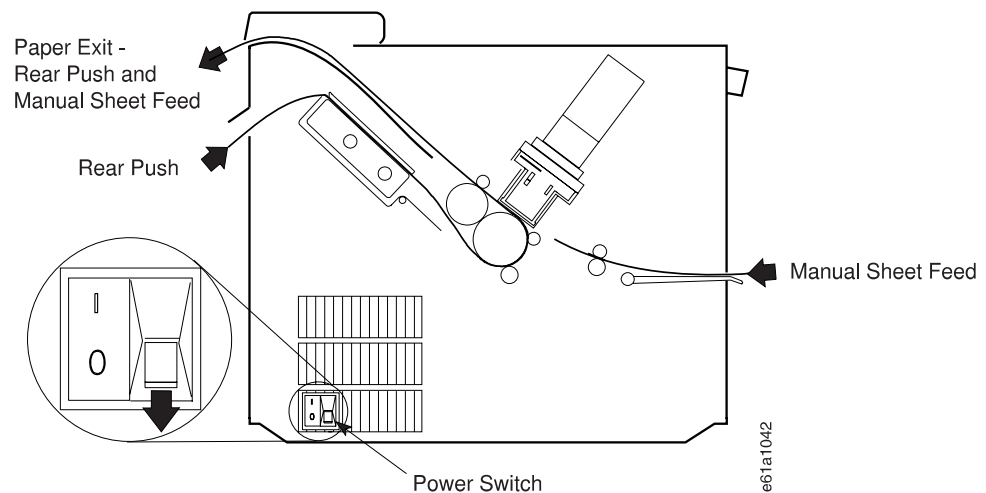


Figure 31. Rear Push Forms Path with Manual Sheet Feed

Ensure the correct settings are made for the Rear Push forms path. Refer to the tables in “Summarizing Forms Path Set Up” on page 39.

Additionally you will need to perform the following tasks:

1. “Installing Rear Push Tractor”
2. “Configuring Forms Path for Rear Push” on page 54
3. “Loading Forms For Rear Push” on page 55

Installing Rear Push Tractor

Install the forms tractor in the Rear Push forms path as follows:

1. Power off (O) the printer.
2. Open the top cover and the forms guide.

3. Stand facing the front of the printer. Hold the forms tractor with the tractor doors toward you, and the electrical connector tab on the left pointing down.
4. Use both hands to support the forms tractor by the tractor shaft. Position the electrical connector tab above the rear tractor electrical connector on the left side of the printer and the two lowest pins on the right. The forms tractor will rest on the lowest pin on the right, and lock onto the next higher pin.

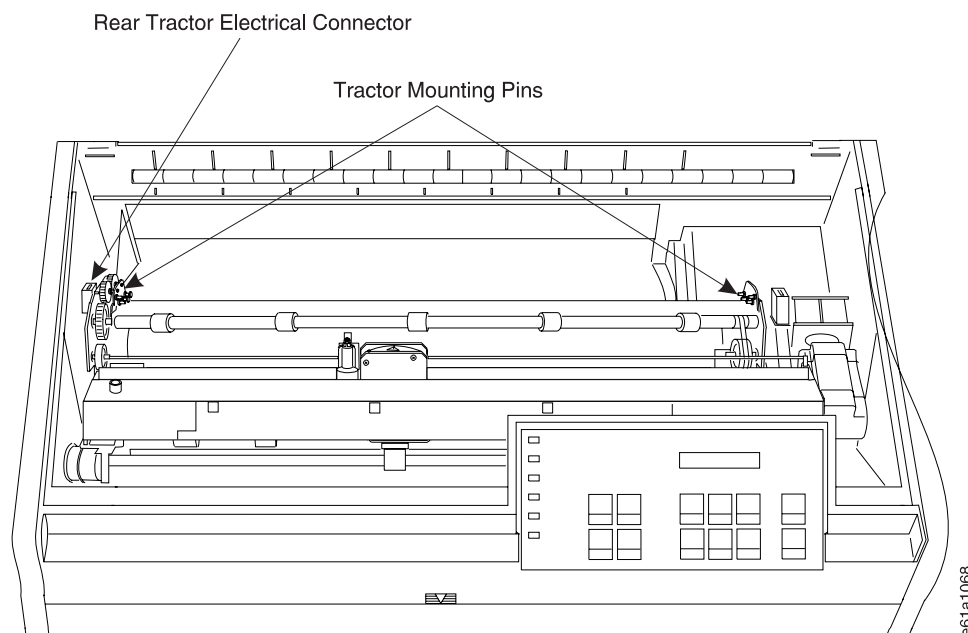


Figure 32. Installing Rear Push Tractor. Paper bail shown removed for clarity.

5. Adjust the forms tractor until it clicks on both sides and the electrical connector tab is fully seated in the connector receiver.
6. Close the forms guide and the top cover.

Configuring Forms Path for Rear Push

To configure the printer for the Rear Push forms path:

1. Power off (O) the printer.
2. Enter Power On Configuration mode. To do this, press and continue to hold **Menu/Enter** while powering on (I) the printer, until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
3. Release **Menu/Enter** and the message PRINT OUT=N0 displays.
4. Press ↓ and the message PULL=xxxxxxxx displays, where xxxxxxxxx can be N0, YES, or PUSH+PULL. If xxxxxxxxx is not N0, press ← or → until N0 is displayed.
5. Press **Menu/Enter** to save the settings and exit Power On Configuration mode. This takes a few seconds. Do not press any keys until this completes.
6. Press **Path** until the **Rear Push** indicator is blinking and the message 01 END OF FORMS displays.
7. Press **Online** to quiet the alarm and put the printer online.

Loading Forms For Rear Push

Note: IBM recommends you remove the Automatic Sheet Feeder before loading forms into the Rear Push forms path.

The Rear Push forms path can accept up to 4-part forms with a maximum thickness of 0.35 mm (0.014 in.).

1. Stack the forms as shown in Figure 33. The top of the input forms stack should be lower than the bottom of the printer.

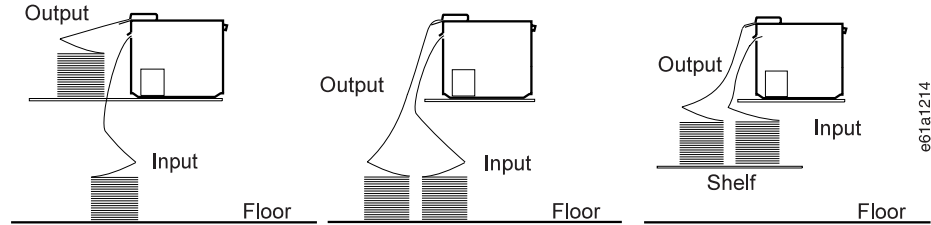
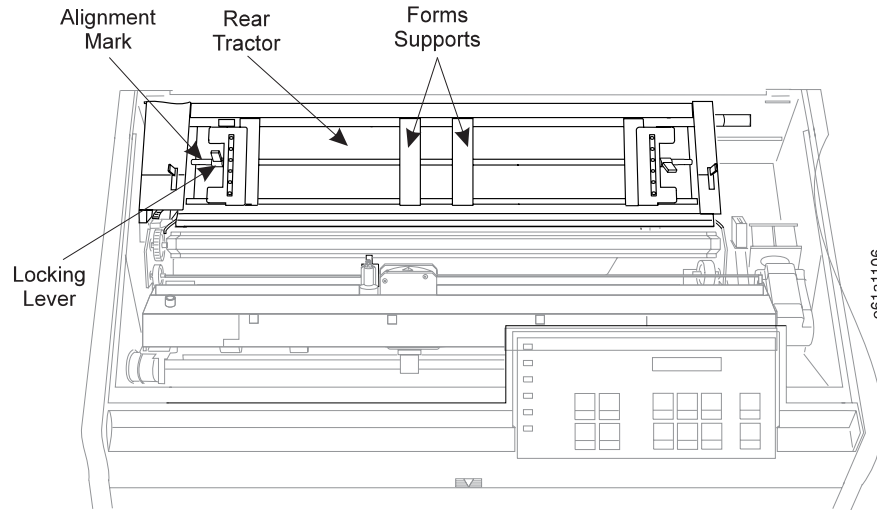


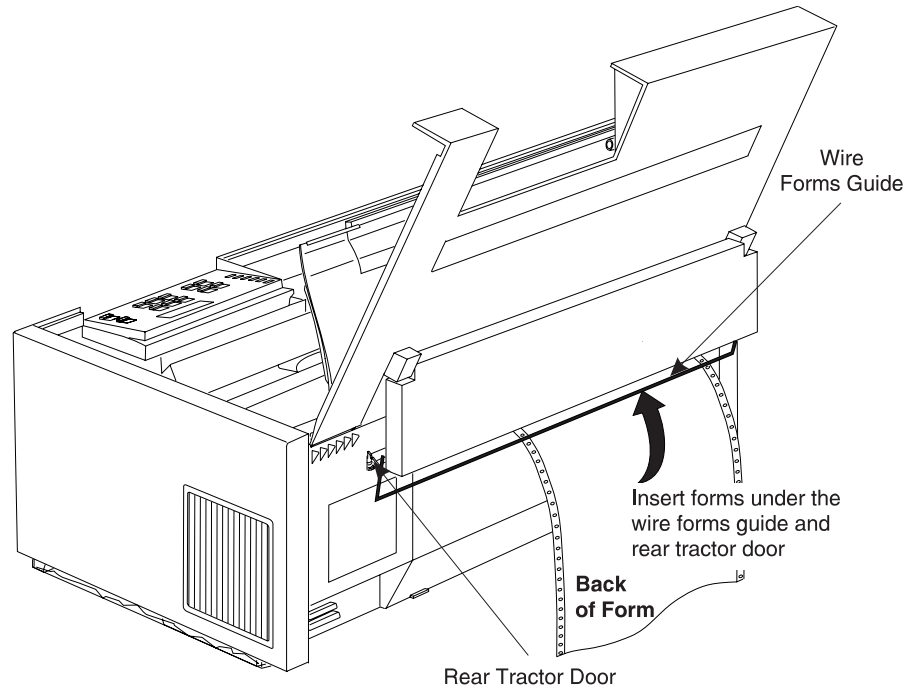
Figure 33. Stacking Forms for Rear Push. See page 32 if your printer uses the optional printer stand. Consider ordering this option to serve as a shelf for the forms stacks.

2. Press **Online** to take the printer offline.
3. Open the rear tractor door located at the back of the printer (see Figure 34 on page 56 for location).
4. Open the top cover and the forms guide.
5. Move the tractor locking levers to unlock the tractors.
6. Move the right tractor to the extreme right.
7. Move the left tractor to the alignment mark on the tractor shaft. This controls the left print edge.
8. Move the left locking lever to the lock position to lock the left tractor in place at the alignment mark.
9. Move the forms supports to support the width of the forms.



10. Open the tractor doors.

11. From the back of the printer, insert the forms (with the print side facing down) through the rear tractor door. Guide the forms over the forms tractors.



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Figure 34. Installing Forms at the Rear of the Printer

12. From the front of the printer, place the left edge of the form under the forms jam sensor, and on the left tractor pins so that the form engages about three left tractor pins. Close the left tractor door.
13. Move the right tractor to the left and under the form until the holes along the right edge of the form engage the same number of pins on the right tractor. Close the right tractor door.
14. If necessary, slide the right tractor either left or right to remove any slack in the form, ensuring that the left and right tractor pins are centered in the holes of the form. Hold the right tractor in place and lock the right locking-lever by pushing it away from you.

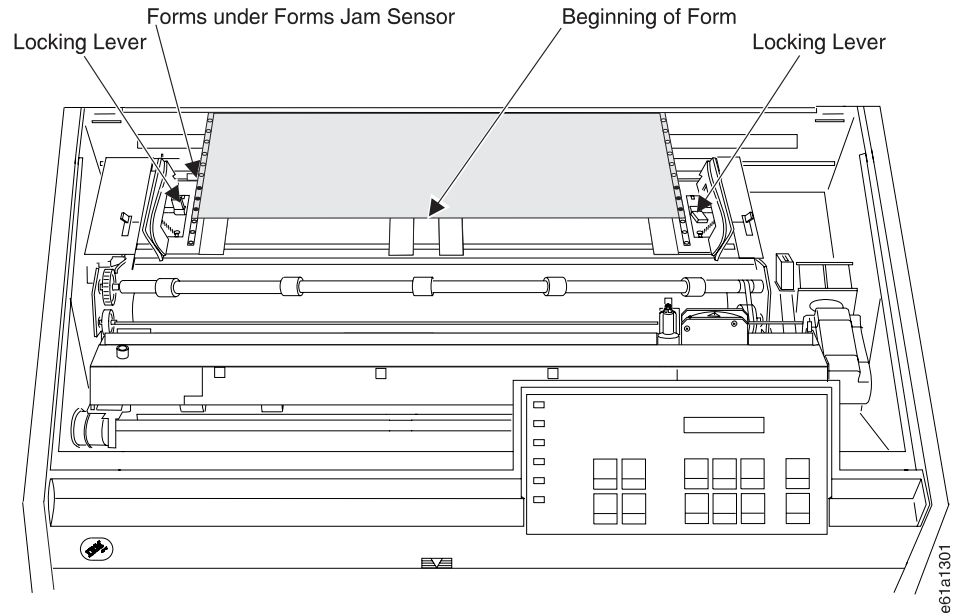


Figure 35. Aligning Forms for Rear Push Forms Path

15. Close the forms guide and the top cover.
16. Press **Load/Form Feed** to load the forms.
17. Press **Online** to make the printer *ready*.

Your 4247 Printer is ready to print. See “Printing Power On Configuration Setup” on page 27 and “Printing Program Configuration Setup” on page 28 to print the configuration. If you do not want to use the printer defaults for forms settings (such as Line Spacing, Page Length, or Top of Form), see “Program Configuration” on page 106.

Setting Up Dual Push Forms Paths

This forms path configuration lets you alternate between the Front Push and Rear Push forms paths. You can have forms loaded in the Front Push position and additional forms loaded in the Rear Push position, or you can have the same type of forms loaded in both positions. If the same type of forms are loaded in both forms paths and you want the printer to alternate automatically from Front Push to Rear Push or vice versa, set **Sequence=FR+RR** in the Power On Configuration Menu (see “Configuring Printer for Linking Dual Push” on page 59).

If you have different forms types loaded in the Front Push forms path than in the Rear Push forms path, the operator or the job must ensure that the correct forms path is used. See “Parking One Continuous Form and Loading Another (Dual Push)” on page 59.

Figure 36 on page 58 shows the Dual Push forms paths with Manual Sheet Feed.

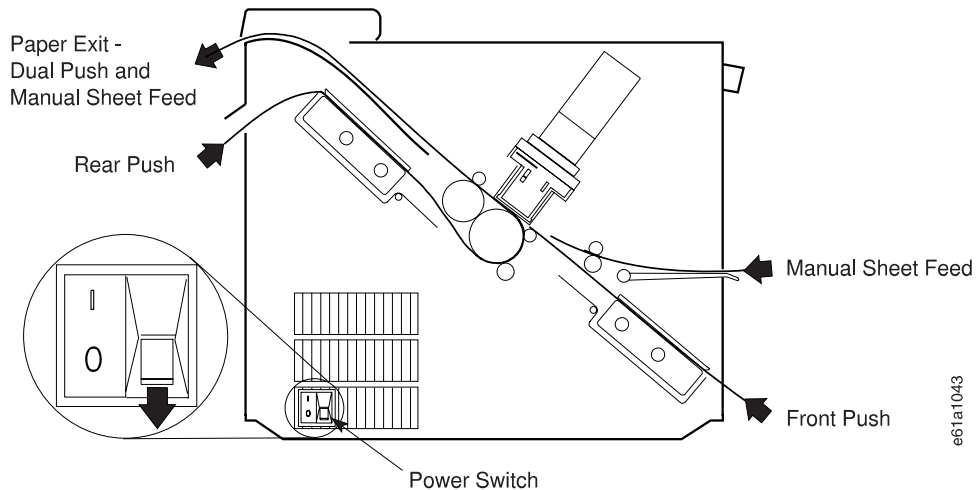


Figure 36. Dual Push Forms Paths with Manual Sheet Feed

Ensure the correct settings are made for the Dual Push forms path. Refer to the tables in “Summarizing Forms Path Set Up” on page 39.

Preparing Dual Push Forms Paths

Because this forms path configuration lets you alternate (either manually or automatically) between the Front Push and Rear Push forms paths, you will load forms into both forms paths.

1. Stack the forms as shown in Figure 37. The top of the input forms stack should be lower than the bottom of the printer.

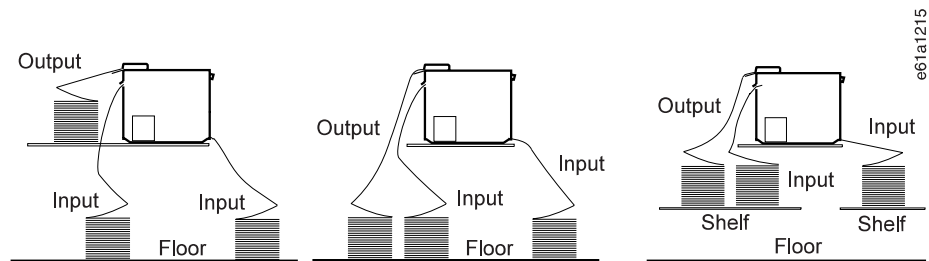


Figure 37. Stacking Forms for Dual Push. See page 32 if your printer uses the optional printer stand.

2. If the Front Push forms path is not setup, go to “Setting Up and Configuring Front Push Forms Path” on page 52 and set up the Front Push forms path, and then return here to step 3.
3. Park the forms in the Front Push forms path (see “Parking Continuous Forms” on page 29), and then return here to step 4.
4. If the Rear Push forms path is not setup, go to “Setting Up Rear Push Forms Path” on page 53 and set up the Rear Push forms path. Return here to step 5.
5. Park the forms in the Rear Push forms path (see “Parking Continuous Forms” on page 29). Return here to “Configuring Printer for Linking Dual Push” on page 59.

Go to “Configuring Printer for Linking Dual Push” if you intend to load the *same* forms in both the Front Push and the Rear Push forms paths. Go to “Parking One Continuous Form and Loading Another (Dual Push)” if you intend to load *different* forms in the Front Push forms path than in the Rear Push forms path.

Configuring Printer for Linking Dual Push

If you are using the same type of forms in the Front Push and Rear Push tractors and you want the printer when it runs out of forms in the front forms path to switch automatically to the forms in the rear forms path, continue with these steps. This is known as linking.

Configure the printer for linked Dual Push by following these steps:

1. Enter Power On Configuration mode:
 - a. Press and hold **Menu/Enter** while powering on (I) the printer.
 - b. Continue holding **Menu/Enter** until the message STARTING UP appears, the sixteen boxes on the operator panel are solidly filled in, and all printer motion has stopped.
2. Release **Menu/Enter** and the message PRINT OUT=NO displays.
3. Press ↓ until the message FUNCTIONS displays.
4. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.
5. Press ↓ until the message SEQUENCE=xxxxxx displays, where xxxxxx can be NONE, FR+RR, ASF1+2, or ASF123. If xxxxxx is not FR+RR, press ← or → until FR+RR is displayed.
6. Press **Menu/Enter** to save the settings and exit Power On Configuration mode. This takes a few seconds. Do not press any keys until this completes.

Your 4247 Printer is ready to print. See “Printing Power On Configuration Setup” on page 27 and “Printing Program Configuration Setup” on page 28 to print the configuration. If you do not want to use the printer defaults for forms settings (such as Line Spacing, Page Length, or Top of Form), see “Program Configuration” on page 106.

Parking One Continuous Form and Loading Another (Dual Push)

If you have different continuous forms loaded in the Front Push and the Rear Push forms paths, the operator can have the printer switch between forms paths. This section explains how you can take advantage of this feature and free yourself from having to reload forms when you need to print on a different form.

Parking Continuous Forms

Parking forms means that a forms type unloads from the print area, but still remains on the tractors. When the forms in one continuous forms path are parked, another forms path or the Manual Sheet Feed can be selected, and the forms in that path will be loaded for printing. This can be configured to occur automatically, but you must have performed the tear off. See “Checking and Adjusting Tear-Off Position” on page 25.

For successful forms parking, the input forms stack *must* be lower than the printer. Figure 37 on page 58 provides an example.

Park forms as follows:

1. Press **Tear** and tear off forms at the top cover tear line.
2. Press **Park** and 94 PARK:SURE? displays.
3. Press **Park** immediately again to park the forms.

If the printer is configured for FRONT TEAR=NO or REAR TEAR=NO, you cannot back up the forms to park them. Break the forms at a perforation before they enter the printer. Press **Park** twice, and the forms will move forward until ejected from the printer.

Switching the Forms Path

Follow these steps to select another forms path:

1. Ensure that a form is in the tractors of the desired, alternate forms path. (You may want to review "Preparing Printer for Selected Forms Path" on page 44.)
2. Press **Path** until the indicator for the other forms path lights. The new form will load automatically.

Your 4247 Printer is ready to print. See "Printing Power On Configuration Setup" on page 27 and "Printing Program Configuration Setup" on page 28 to print the configuration. If you do not want to use the printer defaults for forms settings (such as Line Spacing, Page Length, or Top of Form), see "Program Configuration" on page 106.

Setting Up Rear Pull Forms Path

To use this forms path, the following *must* be removed from the printer:

- Automatic Sheet Feeder (ASF)
- Front Push forms tractor (See "Setting Front Push Tractor" on page 14.)
- Paper bail (See "Removing or Installing Paper Bail" on page 47.)

Note: It is *not* recommended to select **Manual** when the printer is set for either the Rear Pull or the Push Pull forms paths. **Manual** can be selected from the operator panel, but to use it, you will need to re-configure the forms path both before and after using **Manual**. See "Summarizing Forms Path Set Up" on page 39.

Figure 38 on page 61 shows the Rear Pull forms path.

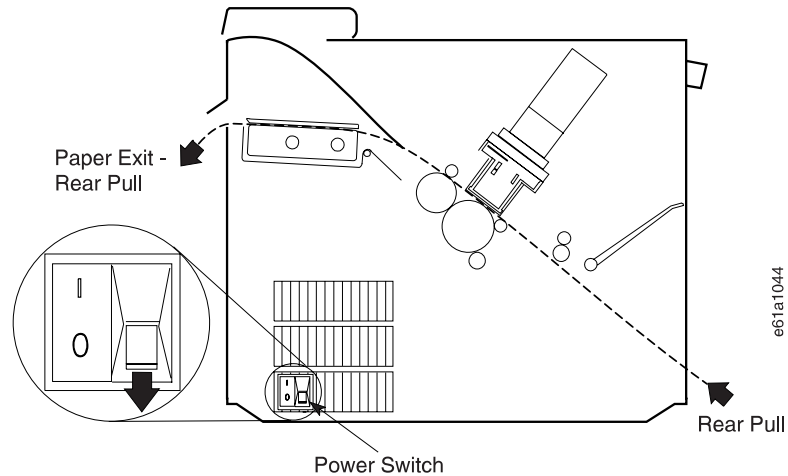


Figure 38. Rear Pull Forms Path

Ensure the correct settings are made for the Rear Pull forms path. Refer to the tables in “Summarizing Forms Path Set Up” on page 39.

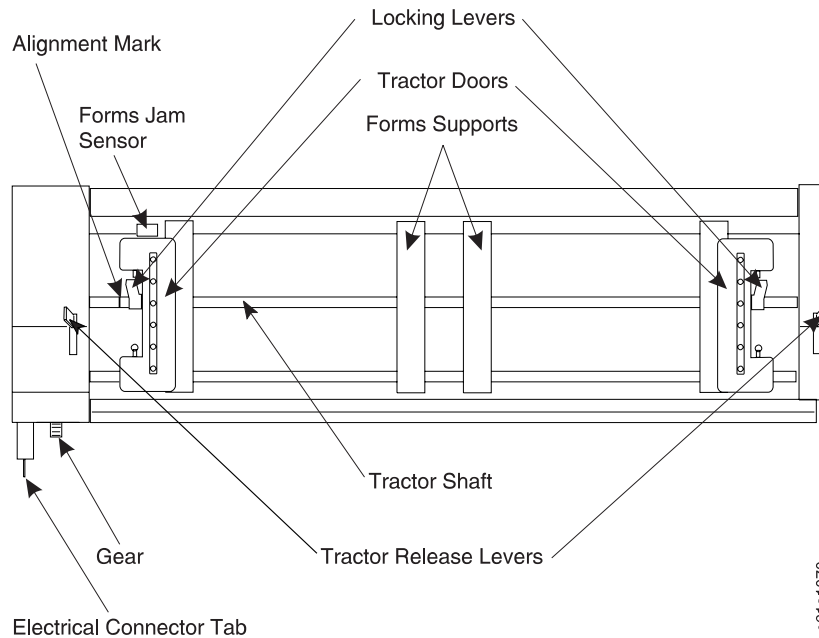
Additionally, you will need to perform the following tasks:

1. “Installing Rear Pull Tractor”
2. “Configuring Forms Path for Rear Pull” on page 63
3. “Loading Forms For Rear Pull” on page 64

Installing Rear Pull Tractor

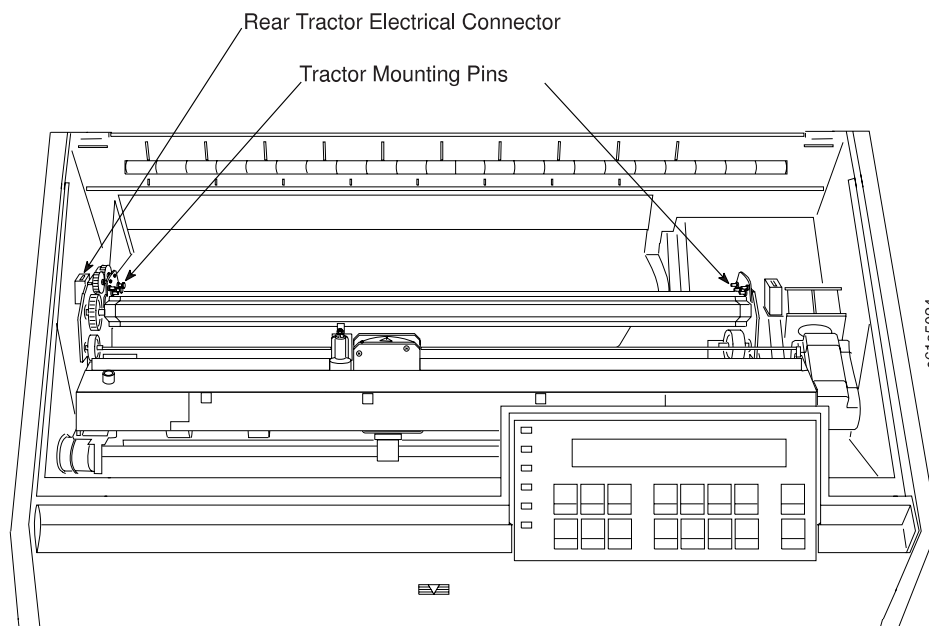
Install the forms tractor in the Rear Pull forms path as follows (see Figure 38):

1. Power off (O) the printer.
2. Open the top cover and the forms guide.
3. Stand facing the front of the printer. Hold the forms tractor with the tractor doors toward you and the electrical connector tab on the left.



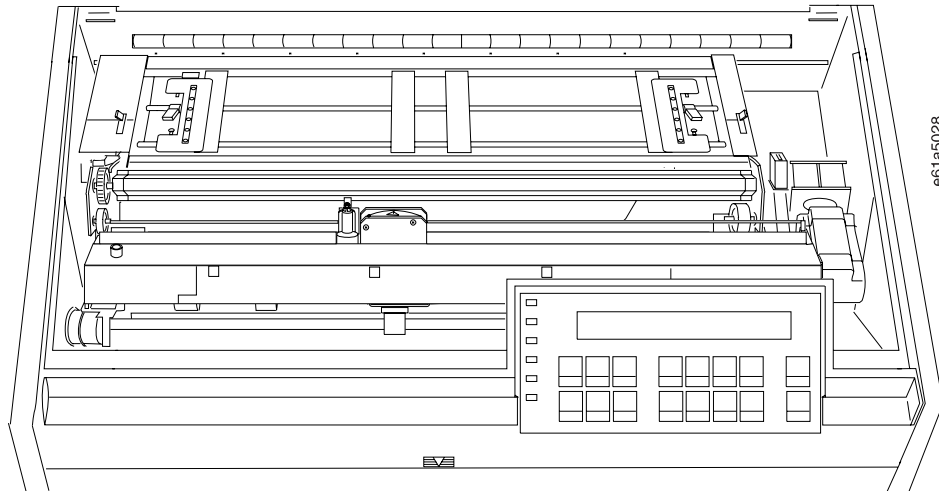
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4. To install the rear forms tractor, support the tractor with both hands on the round tractor shaft. Position the electrical connector tab above its connector on the left side of the printer and the two lowest pins on the right.

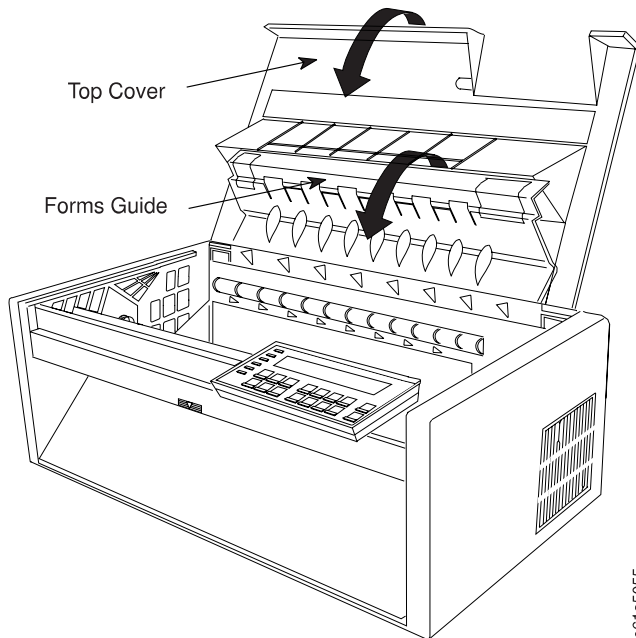


e61a5024

5. Adjust the forms tractor until it clicks on both sides and the electrical connector tab is fully seated in the connector.



6. Close the forms guide and top cover.



Configuring Forms Path for Rear Pull

To configure the printer for the Rear Pull forms path:

1. Enter Power On Configuration mode:
 - a. Press and continue to hold **Menu/Enter** while powering on (I) the printer, until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release the key or press any other keys until this completes.
 - b. Press **Online** to quiet the audible alarm.
2. Release **Menu/Enter** and the message PRINT OUT=N0 displays.
3. Press ↓ and the message PULL=xxxxxxxx displays, where xxxxxxxx can be N0, YES, or PUSH+PULL. If xxxxxxxx is not YES, press ← or → until YES is displayed.

4. Press **Menu/Enter** to save the settings and exit Power On Configuration mode. This takes a few seconds. Do not press any keys until this completes.
5. Press **Path** until the **Rear Pull** indicator is blinking and the message 01 END OF FORMS displays.

Loading Forms For Rear Pull

The Rear Pull forms path can accept up to 8-part forms with a maximum thickness of 0.64 mm (0.025 in.).

1. Stack the forms as shown in Figure 39. The top of the input forms stack should be lower than the bottom of the printer.

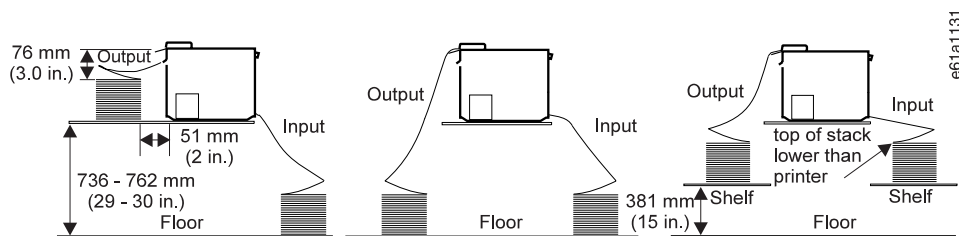
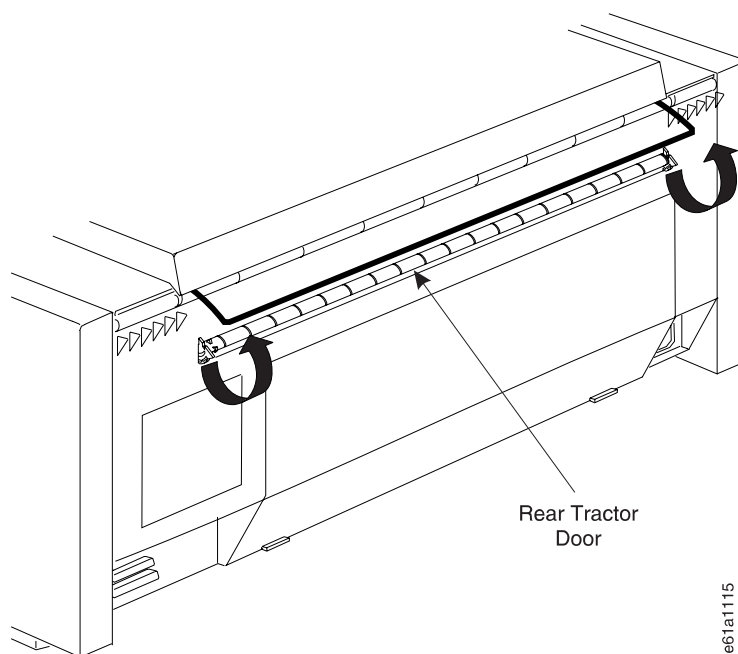
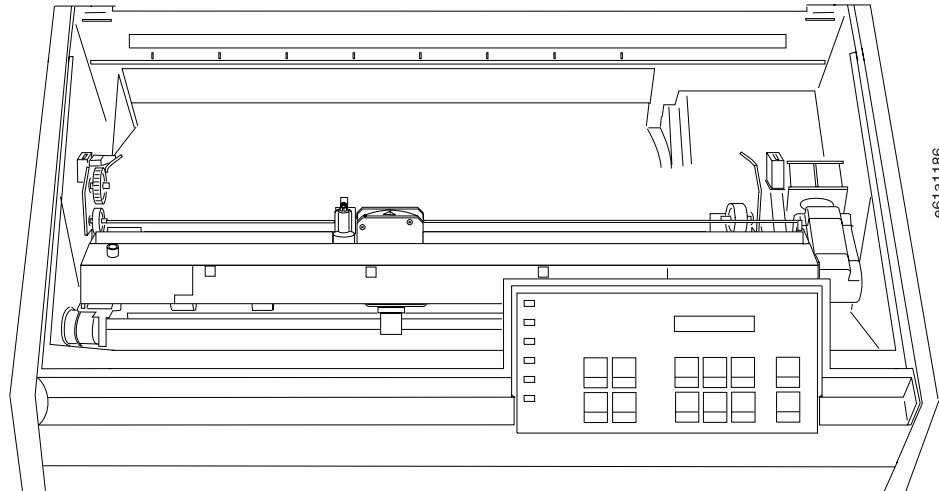


Figure 39. Stacking Forms for Rear Pull. See page 32 if your printer uses the optional printer stand.

2. Press **Load/Form Feed** to move the printhead to the extreme right.
3. If necessary, press **Online** to take the printer offline.
4. Lift open the rear tractor door.

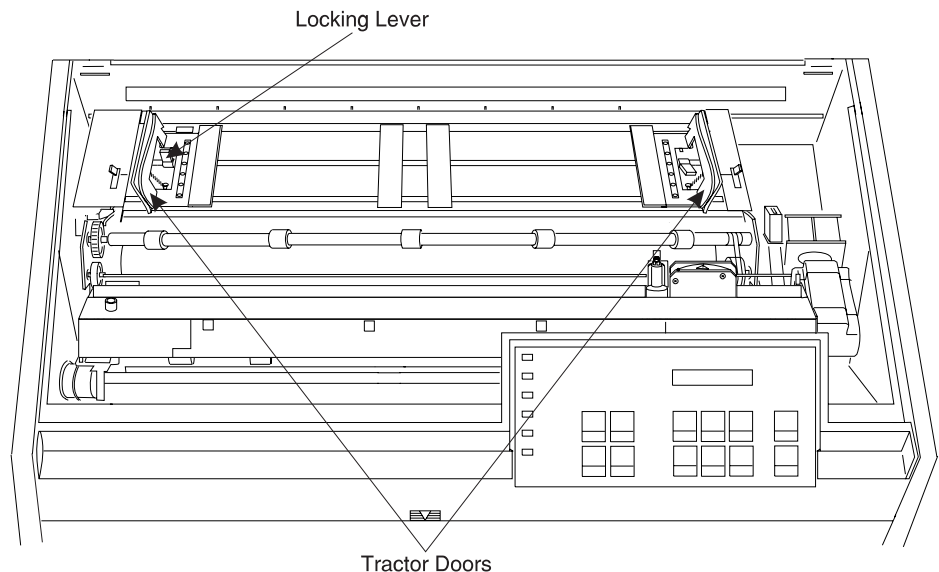


5. Open the top cover and the forms guide.
6. Unlock the locking levers on the tractors. Move the right tractor to the extreme right.
7. Move the left tractor to the tractor alignment mark.



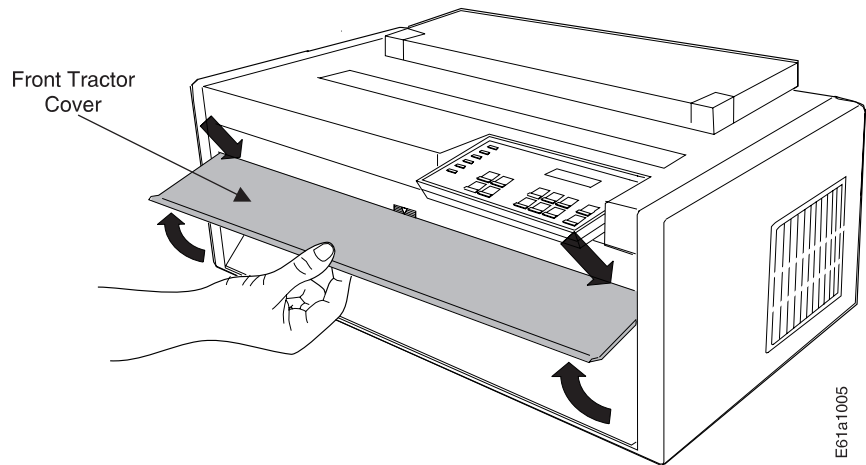
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- 8. Lock the left locking lever.
- 9. Open both tractor doors.

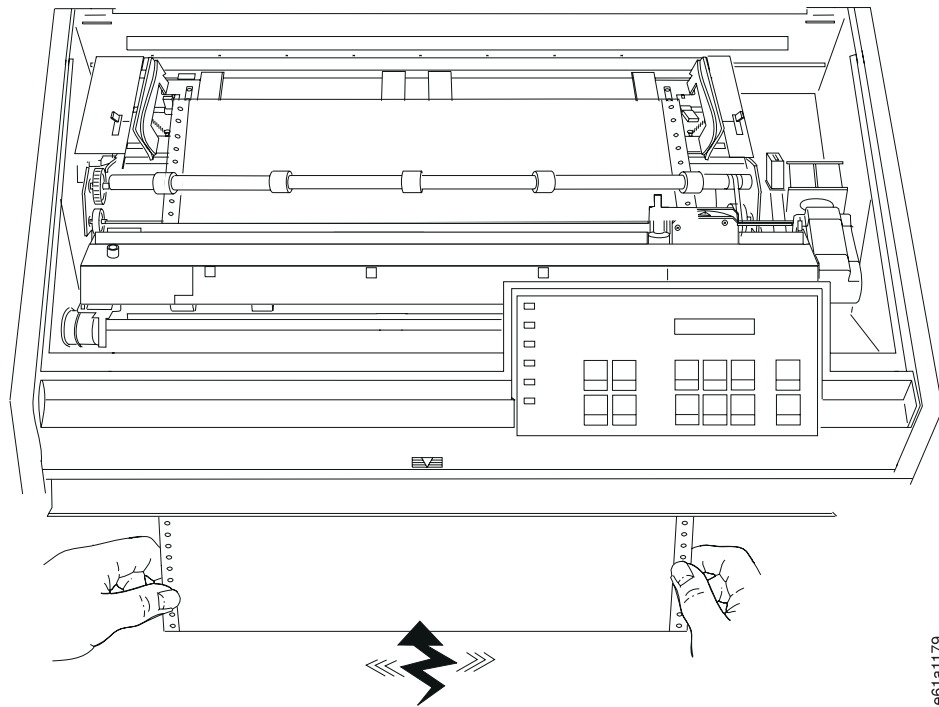


e61a1187

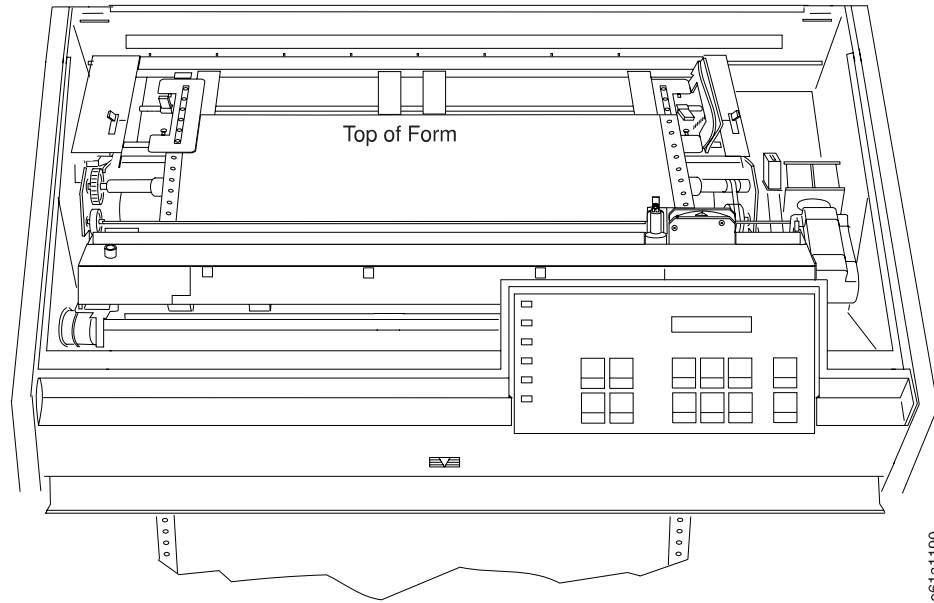
- 10. Lift open the front tractor cover.



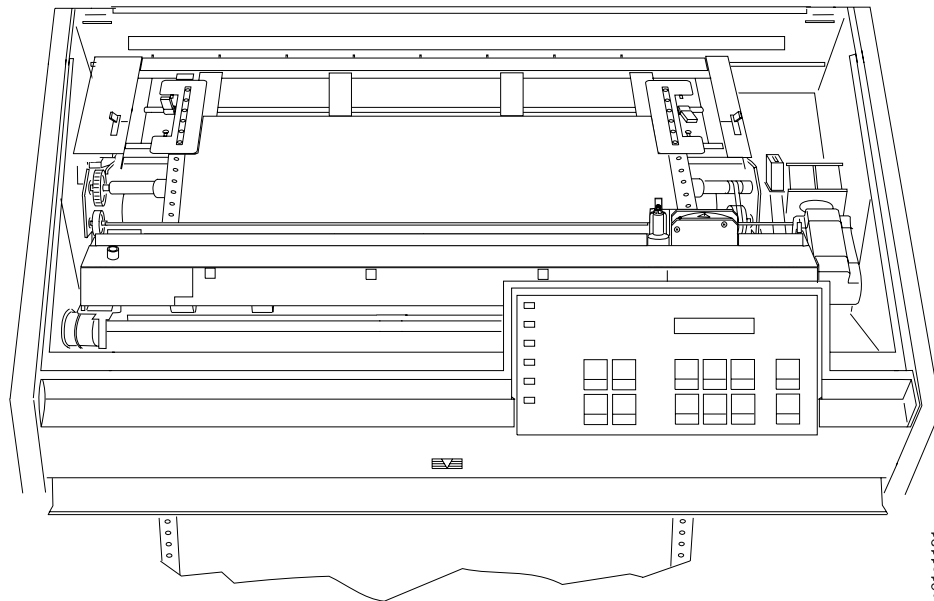
11. Insert the forms through the front tractor opening and slide them from side to side as you push them into the forms path.



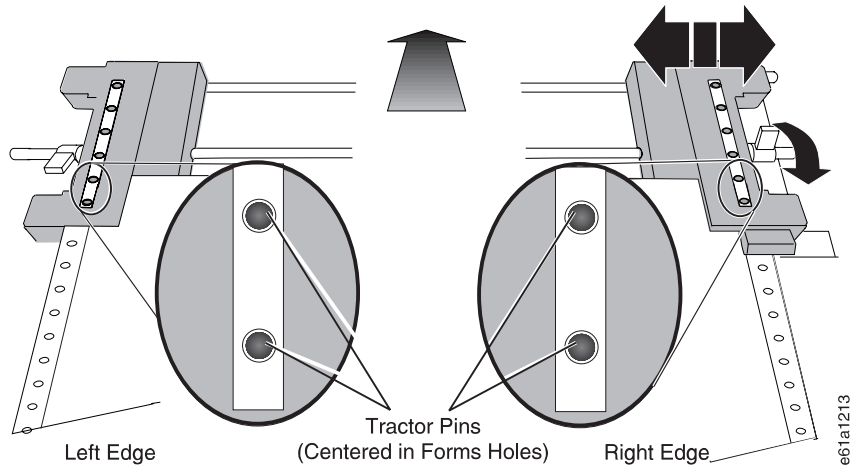
12. Grasp the first form as it appears from under the ribbon, and pull it up onto the rear forms tractor.
13. Place the left edge of the form on the left tractor pins so that the form engages about three left tractor pins. Close the left tractor door.



14. Move the right tractor to the left and under the form until the holes along the right edge of the form engage the same number of pins as the left tractor. Close the right tractor door.



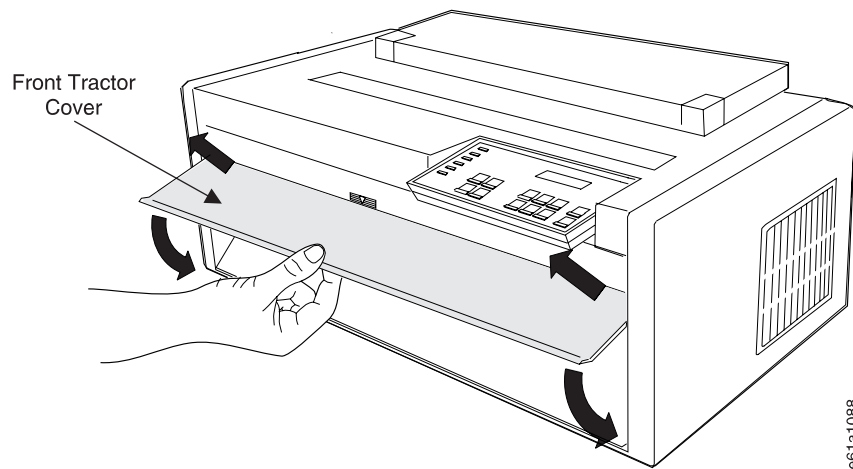
15. If necessary, slide the right tractor either left or right to remove any slack in the form, ensuring that the left and right tractor pins are centered in the holes of the form.



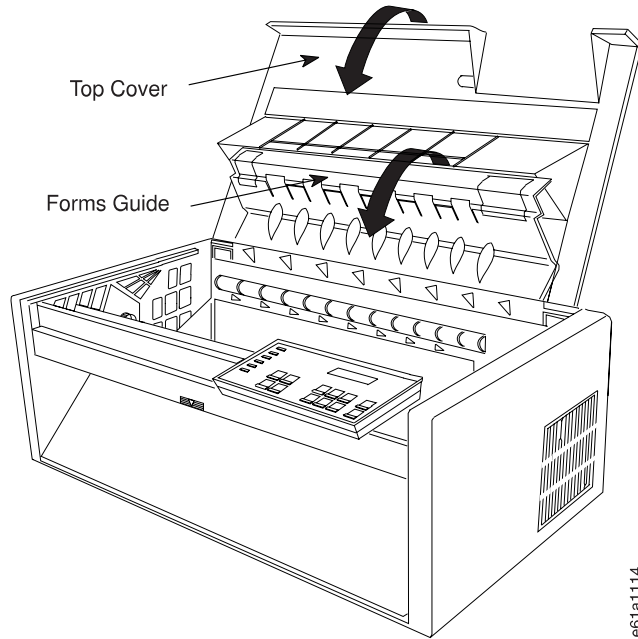
16. While holding the right tractor in place, lock the right locking lever.
17. Move the forms supports along the tractor shaft to support the width of the forms.
18. Press **Micro ↑** until the first perforation advances to be visible behind the ribbon.

Note: If the perforation behind the ribbon is not plainly visible to you, you may want to remove the forms, mark the first perforation, and reload the forms into the printer.

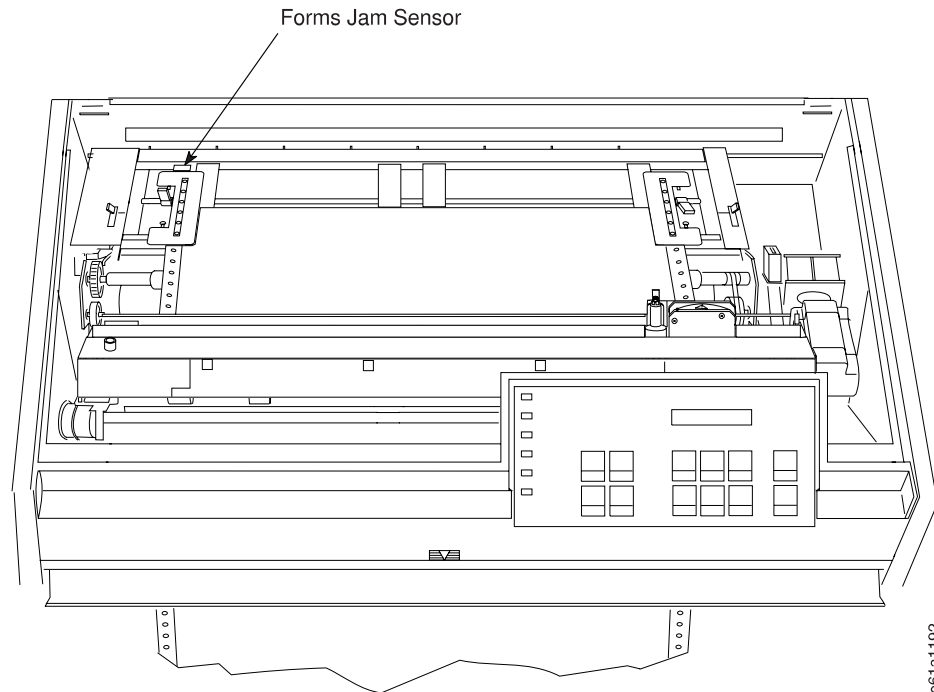
19. Close the front tractor cover.



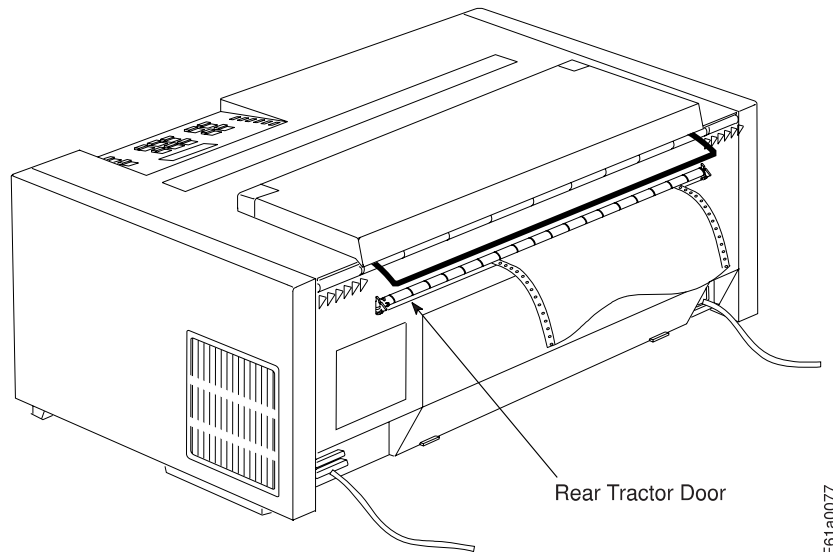
20. Close the forms guide and the top cover.



21. Press **Online**.
22. Press **Load/Form Feed** to feed the forms.
Ensure the forms pass under the forms jam sensor. The printer senses a forms



- jam when the forms are not under the forms jam sensor.
23. Ensure the forms exit through the rear tractor door (see Figure 40 on page 70).



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Figure 40. Forms Exiting Rear of Printer

Your 4247 Printer is ready to print. See “Printing Power On Configuration Setup” on page 27 and “Printing Program Configuration Setup” on page 28 to print the configuration. If you do not want to use the printer defaults for forms settings (such as Line Spacing, Page Length, or Top of Form), see “Program Configuration” on page 106.

Setting Up Push Pull Forms Path

This forms path configuration allows you to load forms into the printer through the Front Push forms tractor and out through the Rear Pull forms tractor. Because the printer will be using two forms tractors and a straight forms path, this forms path provides improved forms handling for difficult situations like thicker, multiple-part forms or a high humidity environment.

You must remove the optional Automatic Sheet Feeder (ASF) from the printer to use this forms path. See the *4247 Printer Automatic Sheet Feeder Guide*.

IBM recommends that you *not* select **Manual** when the printer is set for either the Rear Pull or the Push Pull forms paths. **Manual** can be selected from the operator panel, but to use it you will need to re-configure the forms path both before and after using **Manual**. See “Summarizing Forms Path Set Up” on page 39.

Figure 41 on page 71 shows the Push Pull forms path.

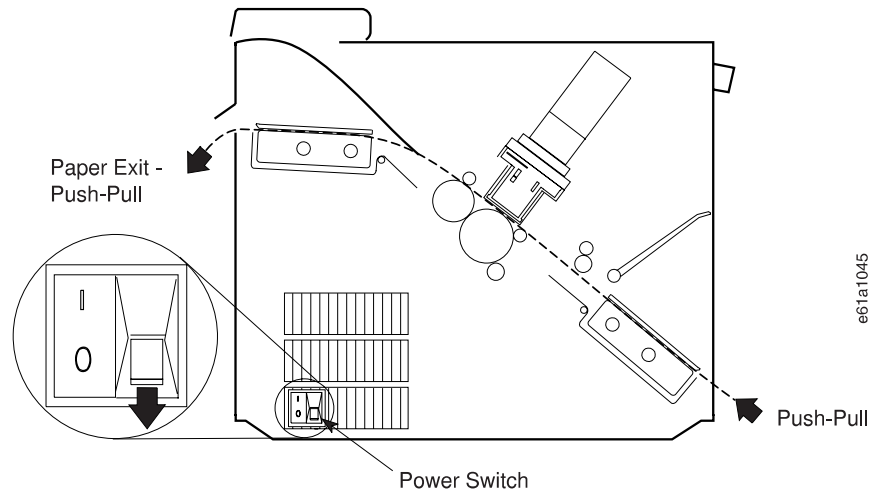


Figure 41. Push Pull Forms Path

Ensure the correct settings are made for the Push Pull forms path. Refer to the tables in “Summarizing Forms Path Set Up” on page 39.

Additionally, you will need to perform the following tasks:

1. “Installing Push Pull Tractors”
2. “Configuring Forms Path for Push Pull”
3. “Loading Forms For Push Pull” on page 72

Installing Push Pull Tractors

Install the tractors in the Front Push (see “Installing Front Push Tractor” on page 15) and the Rear Pull (see “Installing Rear Pull Tractor” on page 61) forms paths. Return here to perform “Configuring Forms Path for Push Pull”.

Configuring Forms Path for Push Pull

To configure the printer for the Push Pull forms path:

1. Enter Power On Configuration mode. To do this, press and continue holding **Menu/Enter** while powering on (I) the printer, until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
2. Release **Menu/Enter** and the message PRINT OUT=NO displays.
3. Press ↓ and the message PULL=xxxxxxxx displays, where xxxxxxxxxx can be NO, YES, or PUSH+PULL. If xxxxxxxxxx is not PUSH+PULL, press ← or → until PUSH+PULL is displayed.
4. Press **Menu/Enter** to save the settings and exit Power On Configuration mode. This takes a few seconds. Do not press any keys until this completes.
5. Press **Path**. The **Front Push** and **Rear Pull** indicators are blinking and the message 01 END OF FORMS displays.

Loading Forms For Push Pull

Notes:

1. Before you start this procedure, see Figure 42 for information on stacking height limits, and “Forms Specifications” on page 151 for information on acceptable forms thickness and weight.
2. The Push Pull forms path can accept up to 8-part forms with a maximum thickness of 0.64 mm (0.025 in.).

To load forms for the Push Pull forms path:

1. Stack the forms as shown in Figure 42. The top of the input forms stack should be lower than the bottom of the printer.

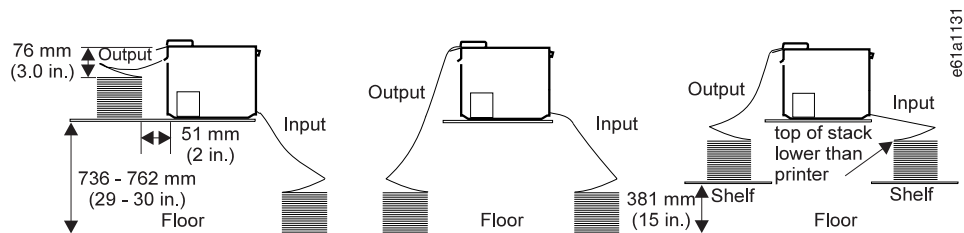
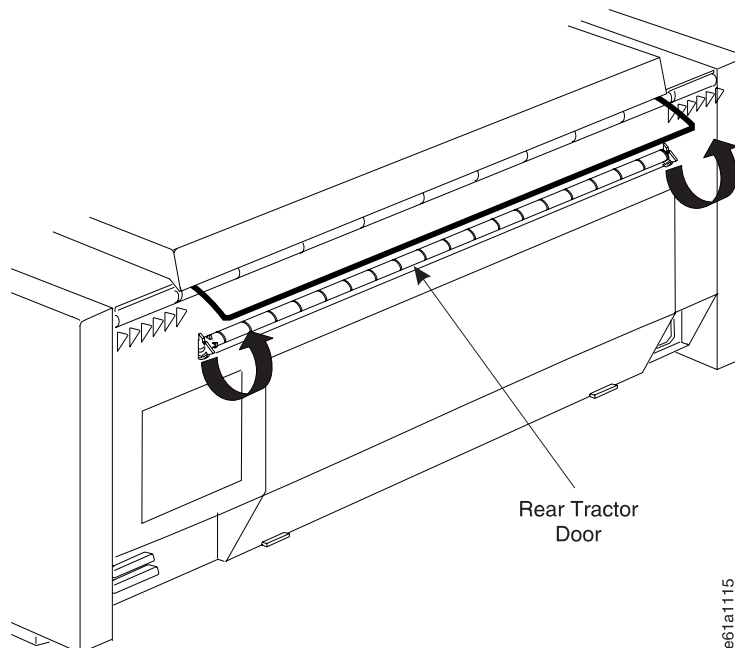


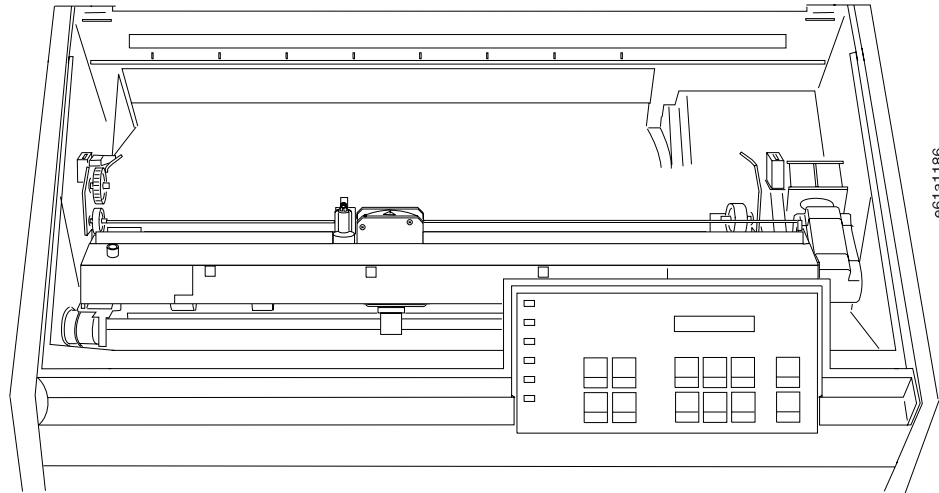
Figure 42. Stacking Forms for Push Pull. See page 32 if your printer uses the optional printer stand.

2. Load the forms into the Front Push forms tractor. Go to “Loading Forms into Front Push Forms Path” on page 20, and perform the procedure through step 11 on page 21. Return here and continue with these steps.
3. Advance the forms to the Rear Pull forms tractor by pressing **Load/Form Feed**.
4. Lift open the rear tractor door.



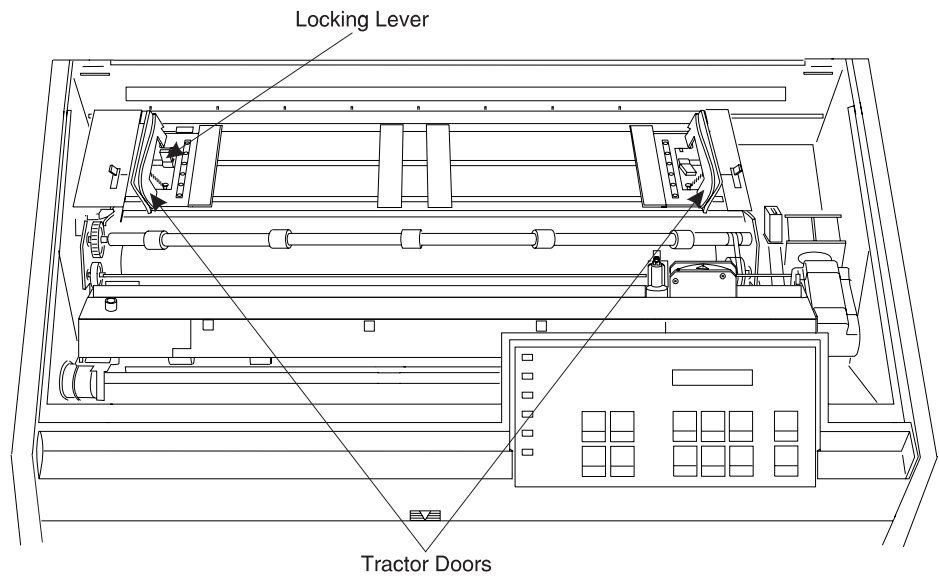
5. Open the top cover and the forms guide.

6. Unlock the locking levers on the rear tractors. Move the right tractor to the extreme right.
7. Move the left tractor to the tractor alignment mark.



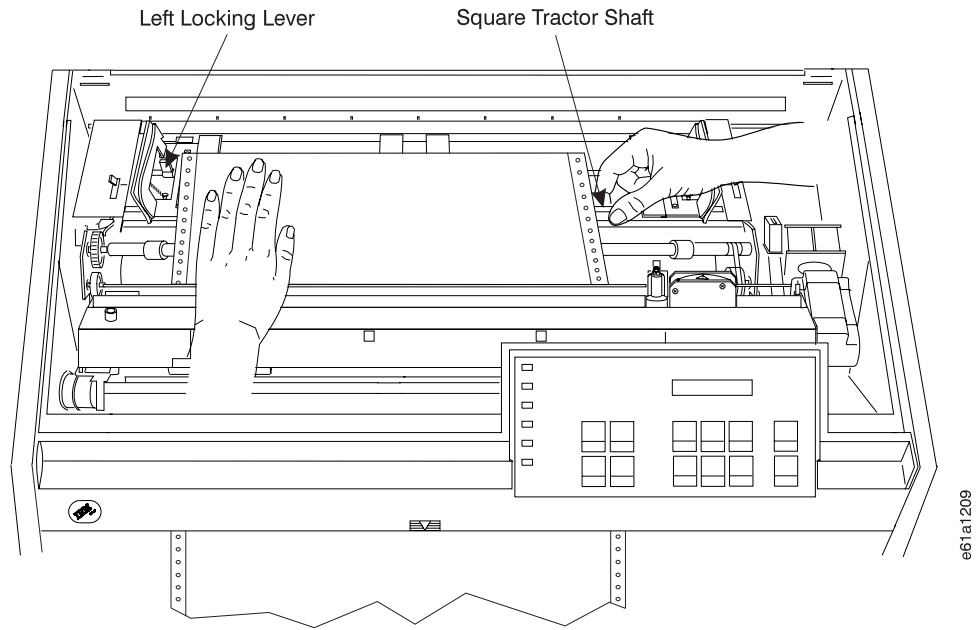
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8. Lock the left locking lever.
9. Open both tractor doors.

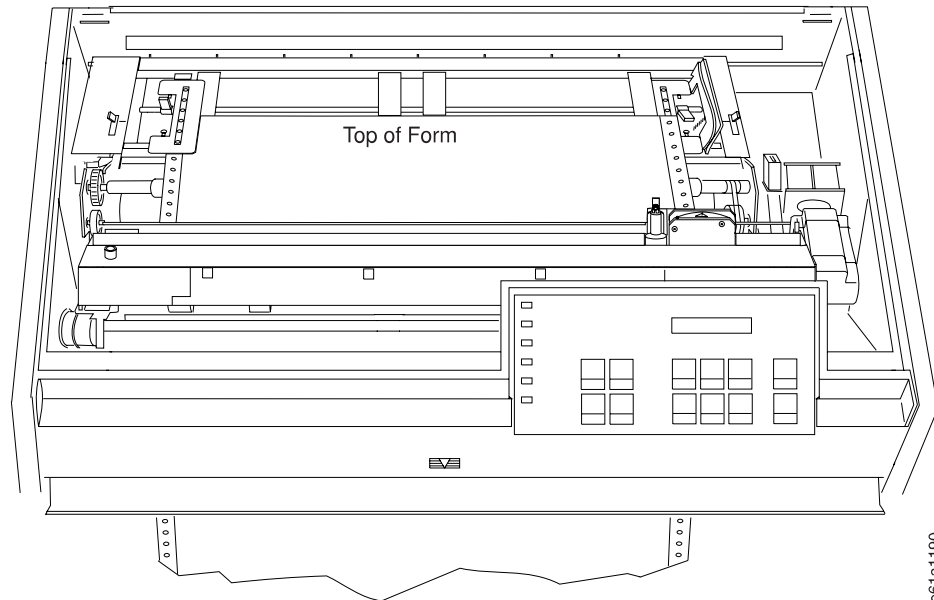


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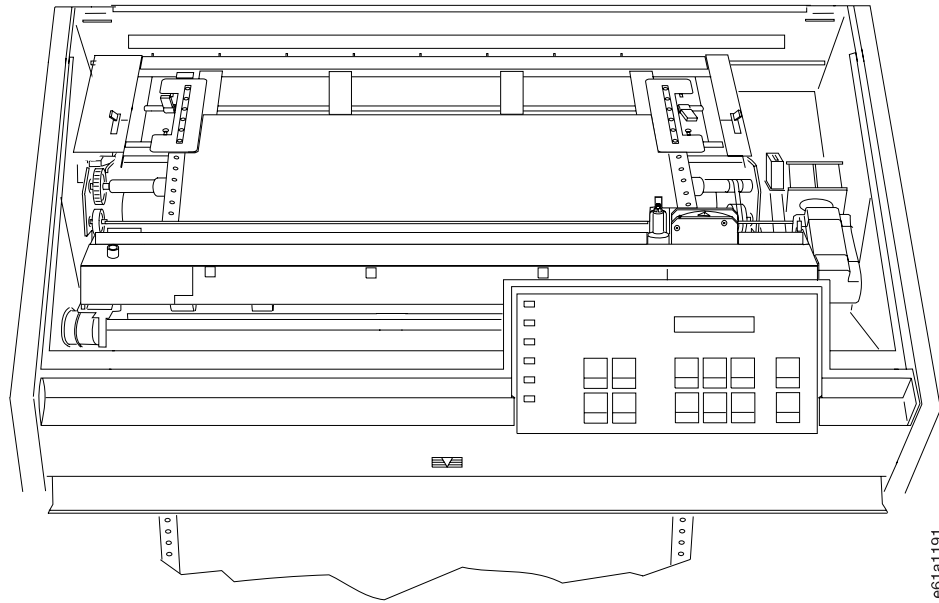
10. If necessary, press **Micro ↑** to feed enough forms to cover the first four holes of the rear tractors.
11. While rotating the square tractor shaft, align the holes of the form with the pins of the left tractor.



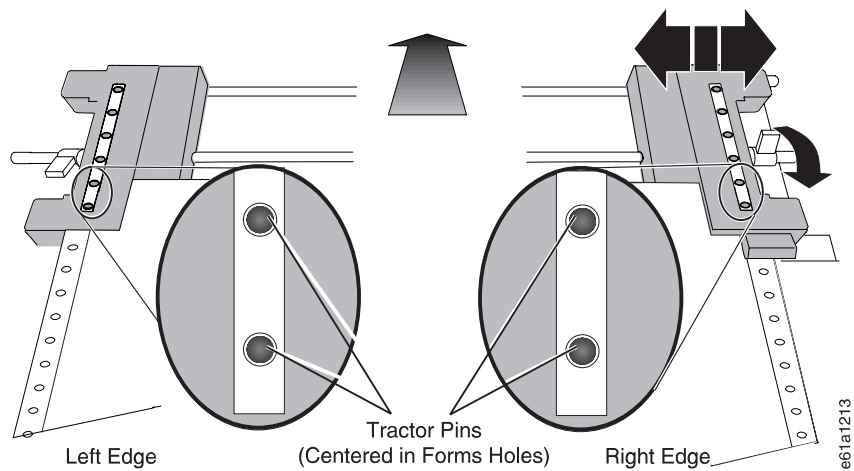
12. While holding the form in place, close the left tractor door.



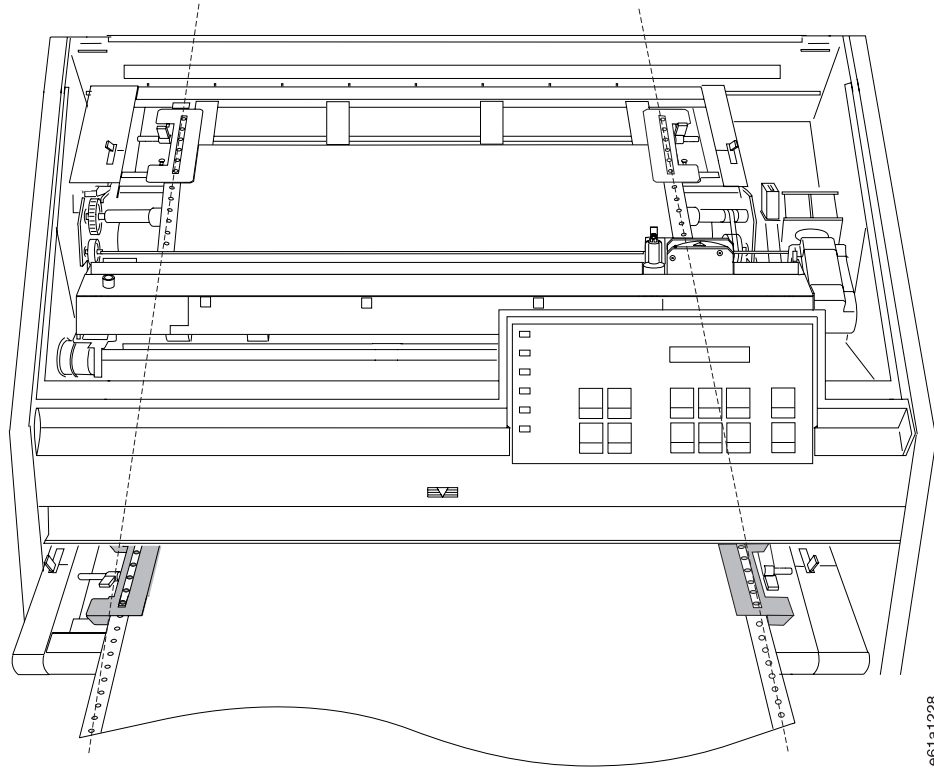
13. Move the right tractor to the left and under the form until the holes along the right edge of the form engage the same number of pins as the left tractor. Close the right tractor door.



14. If necessary, slide the right tractor either left or right to remove any slack in the form, ensuring that the left and right tractor pins are centered in the holes of the form.

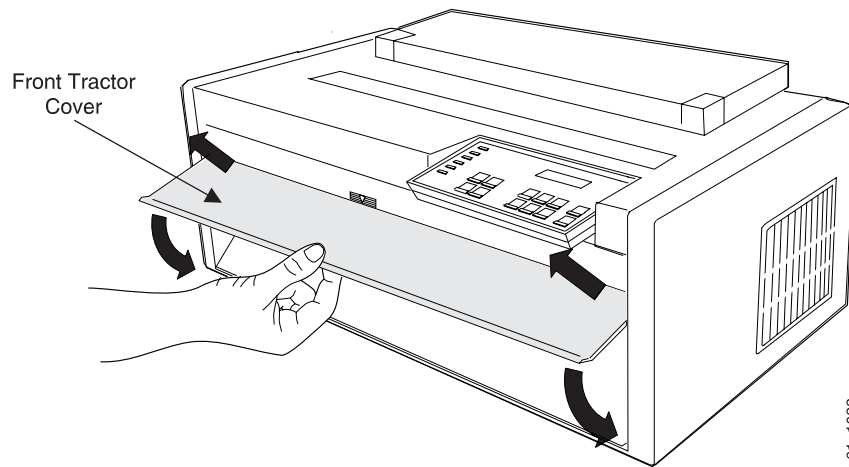


15. While holding the right tractor in place, lock the right locking lever.
16. Move the forms supports along the tractor shaft to support the width of the forms.
17. Ensure that all four tractors are aligned.



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18. Close the front tractor cover.

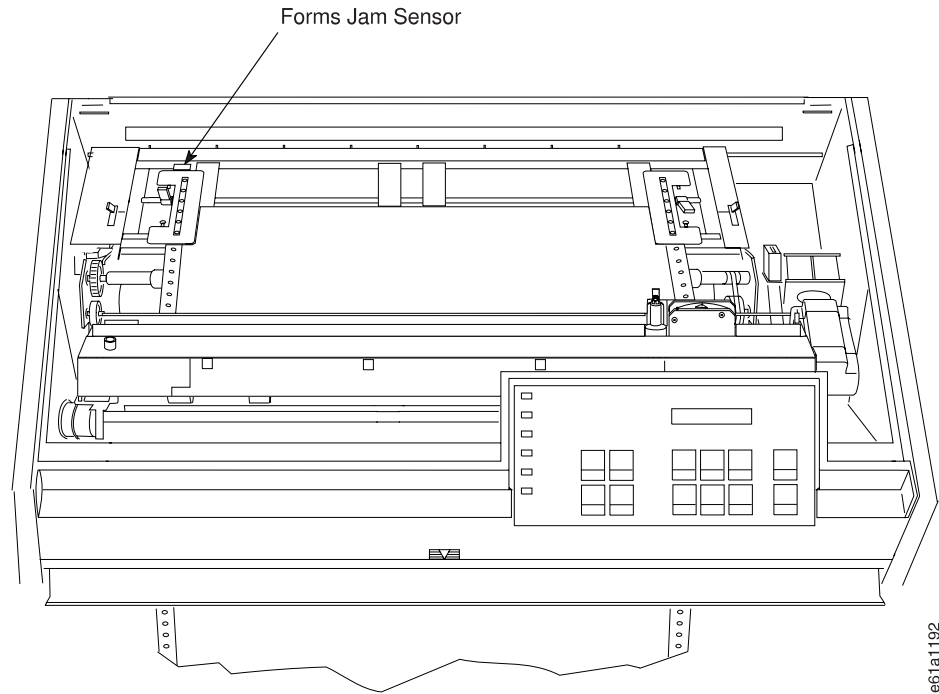


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19. Close the forms guide and the top cover.

20. Press **Online**.

21. If the forms are not exiting through the rear tractor door, press **Load/Form Feed** to feed the forms.



Ensure the forms pass under the forms jam sensor. The printer senses a forms jam when the forms are not under the forms jam sensor.

22. Ensure the forms exit through the rear tractor door (see Figure 43).

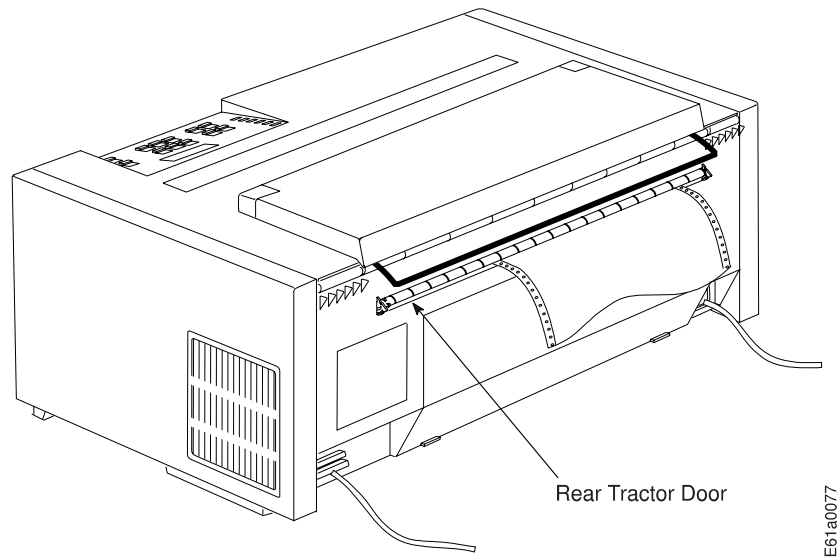


Figure 43. Forms Exiting Rear of Printer

Note: When loading the form into the rear forms tractor, do not open the front tractor door or hold the form with your hand. Press **Micro** ↑ to advance the forms to the rear forms tractor.

Your 4247 Printer is ready to print. See “Printing Power On Configuration Setup” on page 27 and “Printing Program Configuration Setup” on page 28 to print the

configuration. If you do not want to use the printer defaults for forms settings (such as Line Spacing, Page Length, or Top of Form), see “Program Configuration” on page 106.

Chapter 4. Configuring Your Printer

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Operator Panel Function Keys Used for Configuration

The four keys highlighted in Figure 44 on page 81 have two functions. The ↑, the ↓, the ←, and the →, keys are active only during Power On Configuration mode or Program Configuration mode. The ↑ and ↓ keys allow you to scroll to select a configuration item from a configuration menu. The ← and → allow you to scroll within a list of values for the selected configuration item. These key functions are not active during normal printer operation.

During normal printer operation, these function keys have the following functions:

- **Micro ↑** key and **Micro ↓** key move the forms up or down.
- **Font** key allows font selection; the **Pitch** key allows pitch selection.

See Table 1 on page 8 for a discussion of each key.

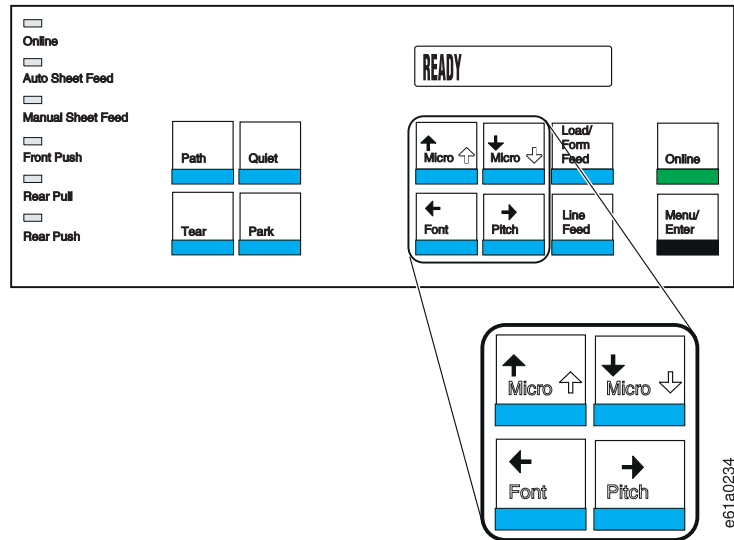


Figure 44. Function Keys with Two Functions

The printer has two configuration modes, Power On Configuration mode and Program Configuration mode. The values for these parameters are stored in the printer nonvolatile memory (NVM), an internal printer storage location that is not erased when the printer is powered off or unplugged. Updating storage can take as long as 15 seconds to complete.

- **Power On Configuration Mode:** A printer state that allows you to personalize hardware and emulation-specific printer parameters. A discussion of this begins on page 82.
- **Program Configuration Mode:** A printer state that allows you to complete the customization of your printer. Program Configuration values can be saved for each of as many as five forms paths. This mode is always selected while the printer is in a *wait* condition (Online indicator off) or *ready* condition without printing. A discussion of this begins on page 106.

See 119 for an additional entry point to the Power On Configuration menu.

Entering Printer Configuration

Use the **Menu/Enter** key to enter the Printer Configuration menus.

Power On Configuration:

1. Power off (O) the printer.
2. Press and hold **Menu/Enter**.
3. Power on (I) the printer.
4. Release **Menu/Enter** after power-on initialization is complete.

For more information about power-on configuration values, see “Power On Configuration” on page 82, and for more information about entering power on configuration from another path, see “Additional Entry Point to Power On Configuration Menu” on page 119.

Program Configuration:

1. Power on (I) the printer if it is not powered on).

2. Press **Menu/Enter**. The printer goes offline (*not ready*).

For more information about program configuration values, see “Program Configuration” on page 106.

To move within the Power On or Program Configuration menus, use the ↑, ↓, ←, and →.

Exiting Printer Configuration

Power On Configuration:

After having set the desired values in the Power On Configuration menu, press **Menu/Enter** to exit. The new values will be saved automatically.

Program Configuration:

After having set the desired values in the Program Configuration menu, scroll down using the ↓ key until the message STORE=SAVE displays. Press **Menu/Enter** to save these values in nonvolatile memory (NVM).

There are two other exit options, STORE=QUIT and STORE=CURRENT. STORE=QUIT exits without saving the new values; the old values remain valid. STORE=CURRENT exits without saving the new values in NVM, but the new values are valid until the printer is powered off.

Power On Configuration

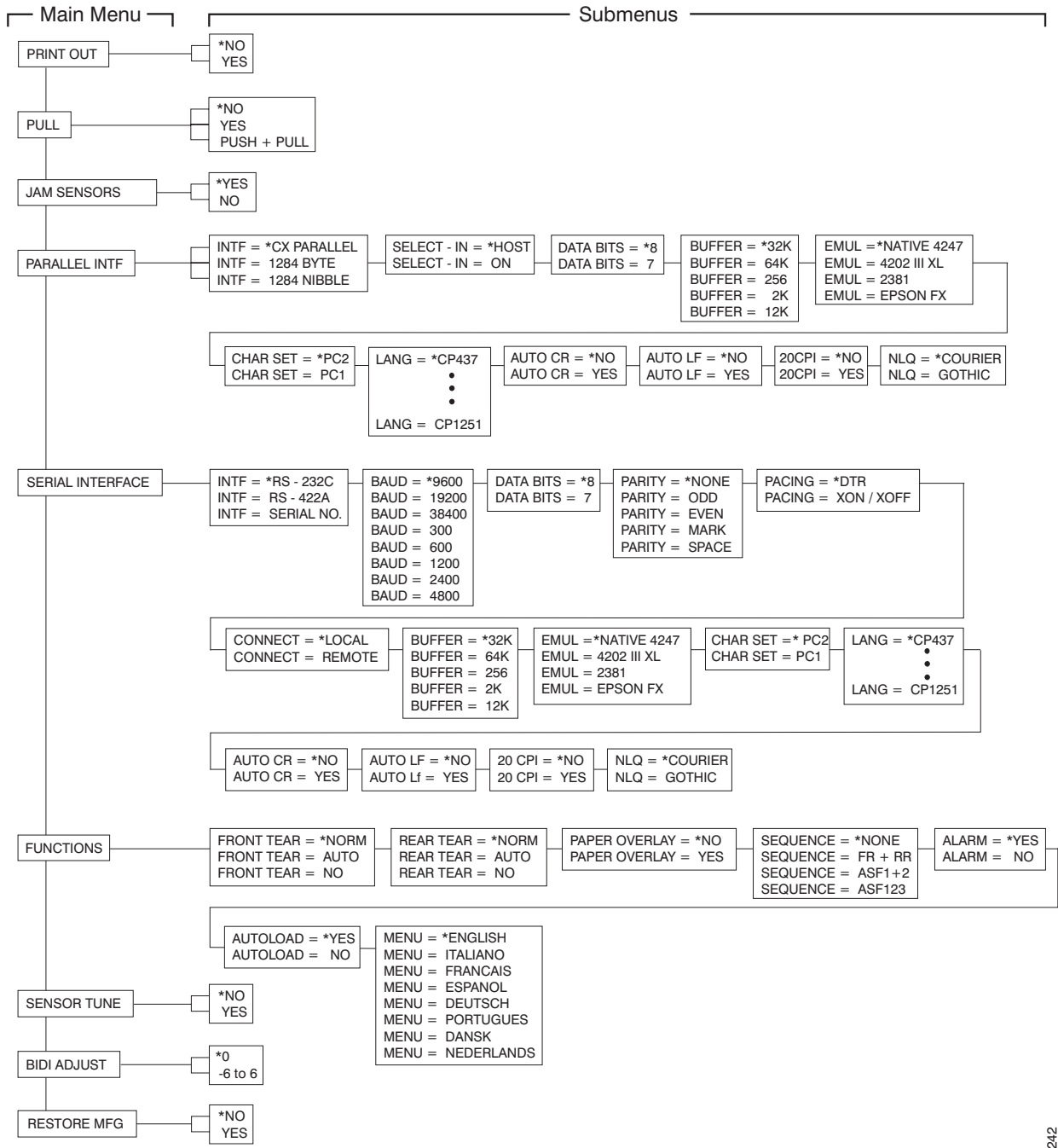
This section lists the categories available, the options for each category, and the manufacturing defaults for the Power On Configuration menu. Each category is described in detail on the pages following Figure 45 on page 83.

Notes:

1. After you make configuration changes, IBM recommends that you print your changes and save the printout for future reference. For more information, see “Printing Power On Configuration Setup” on page 105.
2. For information about entering and exiting printer configuration mode, see “Entering Printer Configuration” on page 81 and “Exiting Printer Configuration” on page 82.
3. For information about entering power on configuration from the Program Configuration menu, see “Additional Entry Point to Power On Configuration Menu” on page 119.
4. You can change the following configuration items only for the forms path for which your printer is configured:
 - Front Tear
 - Rear Tear
 - Paper Overlay
 - Sequence
 - Autoload

Power On Configuration Menu Tree

Figure 45 provides a view of the path you can take through the Power On Configuration menus. An emulation other than Native 4247 provides other choices.



* Manufacturing Default

Figure 45. Power On Configuration Menu Tree

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Pull

This category selects the physical printer configuration of the forms handling. You can set Pull to one of the following values:

- No (default)** Enables the Front Push path or the Rear Push path. If a second optional tractor is installed, PULL=N0 configures the printer for both a tractor in the Front Push and a tractor in the Rear Push position.
- Yes** Enables the Rear Pull forms path.
- Push+Pull** Enables the Front Push and Rear Pull forms path to handle the same continuous form. By configuring the printer in Push+Pull, you have the use of both tractors for forms handling.

To change or check the Pull category:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=N0 displays.
4. Press ↓ and the message PULL=xxx displays, where xxx can be N0, YES, or PUSH+PULL. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Jam Sensors

You can set Jam Sensors to either of the following values:

- Yes (default)** Enables the forms jam sensors on the front and rear tractors. This setting alerts the operator with an 02 FORMS JAM message on the operator panel display when a jammed form is detected in one of the forms paths.
- No** Disables the forms jam sensors.

To change or check the Jam Sensors category:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=N0 displays.
4. Press ↓ until the message JAM SENSORS=xxx displays, where xxx can be N0 or YES. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Parallel Interface

Select this category if your printer is connected to your host computer with a parallel interface cable. There are several parameters available:

- Interface Types

- Select-In Signal
- Data Bit
- Buffer Size
- Emulation
- Character Sets
- Print Language
- Automatic Carriage Return on Line Feed
- Automatic Line Feed on Carriage Return
- 20 CPI
- NLQ

Interface Type

You can set the system interface to match the interface that is attached to your printer.

- CX Parallel (default)
- 1284 Byte
- 1284 Nibble

To change or check the Interface Types:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE. If you want to select a value other than the one displayed, press ← or →.
6. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Select-In Signal

You can set the select-in signal to:

- On** The Select-In signal is ignored and treated as always on.
- Host (default)** The printer checks the Select-In signal from the host.

To change or check the Select-In Signal:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message SELECT-IN=xxxx displays, where xxxx can be ON or HOST. If you want to select a value other than the one displayed, press ← or →.

7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Data Bits

You can set the data bit to either of the following values:

- 8 (default)
- 7

To change or check the Data Bits:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message DATA BITS=x displays, where x can be 8 or 7. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Buffer Size

You can set the buffer to one of the following values:

- 256
- 2K
- 12K
- 32K (default)
- 64K

To change or check the Buffer Size:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message BUFFER=xxx displays, where xxx can be 256, 2K, 12K, 32K, or 64K. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Emulation

You can set the emulation type to any of the following values:

- Native 4247 (default)

- 4202 III XL
- 2381
- Epson FX

To change or check the Emulation type:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message EMUL=xxxxxxxxxx displays, where xxxxxxxxxxxx can be NATIVE 4247, 4202 III XL, 2381, or EPSON FX. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Character Set

You can set the character set to one of the following values:

- PC1 (PC Character Set 1)
- PC2 (PC Character Set 2) (default)
- Italic (Epson FX only)

To change or check the Character Set:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message CHAR SET=xxxxxx displays, where xxxxxx can be PC1, PC2, or ITALIC. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Print Language

You can select any print language that is available for your printer. The following print languages are available when printer emulation is set to Native 4247, 4202 III XL, 2381, or Epson FX:

Arabic	CP864
Arabic Extended	CP1046
Baltic Multilingual	CP921
Canadian French	CP863
Cyrillic	CP855

Cyrillic (ISO 8859-5)	CP915
Cyrillic 2 (Personal Computer)	CP866
Cyrillic Windows	CP1251
Danish/Norwegian	CP865
Estonian	CP922
Estonian (Personal Computer)	CP1116
Farsi (Personal Computer)	CP1098
Greek/Latin (ISO 8859-7)	CP813
Hebrew	CP862
Icelandic	CP861
Latin 1 (ISO 8859-1)	CP819
Latin 2 (ISO 8859-2)	CP912
Latin 2/ROECE	CP852
Latin 3 (ISO 8859-3)	CP913
Latin 4 (ISO 8859-4)	CP914
Latin 5 (ISO 8859-9)	CP920
Latin 6 (ISO 8859-6)	CP1089
Latin 8 (ISO 8858-8)	CP916
Latvian (Personal Computer)	CP1117
Lithuanian (Personal Computer)	CP1118
Multilingual	CP850
New Greek	CP869
OCR-A	CP876
OCR-B	CP877
Old Greek	CP851
Portuguese	CP860
Thai	CP874
Turkish 1	CP853
Turkish 2	CP857
Urdu	CP1006
USA (Personal Computer)*	CP437

* Manufacturing default with emulation set to Native 4247, 4202 III XL, or 2381

These additional print languages are only available if the printer emulation is set to Epson FX:

Denmark 1
Denmark 2
England
France
French Canadian
Germany
Italy
Japan
Latin American 1
Latin American 2
Norway
Spain 1
Spain 2
Sweden
USA*

* Manufacturing default with emulation set to Epson FX

To change or check the Print Language:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message LANG=xxxxxxx displays, where xxxxxxxx can be CP437 through CP1098 when emulation is set Native 4247, 4202 III XL, or 2381 or where xxxxxxxx can be USA through CP1098 when emulation is set to Epson FX. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Automatic Carriage Return on Line Feed

You can set the printer to perform an automatic carriage return at a line feed. You can set this value to:

- No (default)** No automatic carriage return is performed at a line feed.
Yes An automatic carriage return is performed after a line feed.

To change or check the Automatic Carriage Return after Line Feed:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message AUTO CR=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Automatic Line Feed on Carriage Return

You can set the printer to perform an automatic line feed at a carriage return. You can set this value to:

- No (default)** No line feed is performed after a carriage return.
Yes An automatic line feed is performed after a carriage return.

Host (Epson FX only)

Host will determine whether an automatic line feed is performed after a carriage return.

To change or check the Automatic Line Feed on Carriage Return:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.

3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message AUTO LF=xxx displays, where xxx can be NO, YES, or HOST. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

20 CPI

You can set the printer to allow 20 characters-per-inch (CPI) condensed print from the data stream. For more information, see “Shift In (SI) / Condensed Print” on page 190. You can set this value to:

- No (default)** A combination of 12 CPI and a condensed print data stream command (Shift In) sets the printer to 12 CPI.
- Yes** A combination of 20 CPI and a condensed print data stream command (Shift In) sets the printer to 20 CPI.

To change or check the 20 CPI value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.
5. Press → until the message INTF=xxxxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press ↓ until the message 20 CPI=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

NLQ

Note: Using NLQ reduces printer throughput by approximately 50%.

You can change the font for Near Letter Quality (NLQ) printing, available through the operator panel **Font** key, to either of the following values:

- Courier (default)
- Gothic

To change or check the NLQ font value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message PARALLEL INTF displays.

5. Press **→** until the message INTF=xxxxxxxxx displays, where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE.
6. Press **↓** until the message NLQ=xxxxxxx displays, where xxxxxxxx can be COURIER or GOTHIC. If you want to select a value other than the one displayed, press **←** or **→**.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Serial Interface

Select this category if your printer is connected to your host computer through an RS-232C or RS-422A interface. There are several different parameters available:

- Interface Type
- Baud Rate
- Data Bit
- Parity
- Pacing Protocol
- Connection Type
- Buffer Size
- Emulation
- Character Set
- Print Language
- Automatic Carriage Return on Line Feed
- Automatic Line Feed on Carriage Return
- 20 CPI
- NLQ

Interface Type

You can set the system interface to any of the following values:

- Serial No
- RS-232C (default)
- RS-422A

To change or check the Interface Types:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press **↓** until the message SERIAL INTERFACE displays.
5. Press **→** until the message INTF=xxxxxxxxx displays, where xxxxxxxxxxxx can be SERIAL NO, RS-232C, or RS-422A. If you want to select a value other than the one displayed, press **←** or **→**.
6. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Baud Rate

You can set baud rate to any of the following values:

- 300
- 600
- 1200
- 2400
- 4800
- 9600 (default)
- 19200
- 38400

To change or check the Baud Rate:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message BAUD=xxxxx displays, where xxxxx can be 300, 600, 1200, 2400, 4800, 9600, 19200, or 38400. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Data Bits

You can set data bit to either of the following values:

- 8 (default)
- 7

To change or check the Data Bits:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message DATA BITS=x displays, where x can be 8 or 7. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Parity

You can set parity to any of the following values:

- None (default)
- Odd
- Even
- Mark
- Space

To change or check the Parity:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message PARITY=xxxxx displays, where xxxxx can be NONE, ODD, EVEN, MARK, or SPACE. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Pacing Protocol

You can set pacing protocol to either of the following values:

- DTR (default)
- XON/XOFF

To change or check the Pacing Protocol:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message PACING=xxxxxxx displays, where xxxxxxxx can be DTR or XON/XOFF. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Connection Type

You can set the connection type to either of the following values:

Local (default)

Printer is connected locally to a host computer.

Remote Printer is connected remotely to a host computer through an external modem.

To change or check the Connection Type:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message CONNECT=xxxxxx displays, where xxxxxx can be LOCAL or REMOTE. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Buffer Size

You can set the buffer to one of the following values:

- 256
- 2K
- 12K
- 32K (default)
- 64K

To change or check the Buffer Size:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message BUFFER=xxx displays, where xxx can be 256, 2K, 12K, 32K, or 64K. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Emulation

You can set the emulation type to any of the following values:

- Native 4247 (default)
- 4202 III XL
- 2381
- Epson FX

To change or check the Emulation type:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message EMUL=xxxxxxxxx displays, where xxxxxxxxxxxx can be NATIVE 4247, 4202 III XL, 2381, or EPSON FX. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Character Set

You can set the character set to any of the following values:

- PC1 (PC Character Set 1)
- PC2 (PC Character Set 2) (default)
- Italic (Epson FX only)

To change or check the Character Set:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message CHAR SET=xxxxxx displays, where xxxxxx can be PC1, PC2, or ITALIC. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Print Language

You can select any print language that is available for your printer. The following print languages are available when printer emulation is set to Native 4247, 4202 III XL, 2381, or Epson FX:

Arabic	CP864
Arabic Extended	CP1046
Baltic Multilingual	CP921
Canadian French	CP863
Cyrillic	CP855
Cyrillic (ISO 8859-5)	CP915
Cyrillic 2 (Personal Computer)	CP866
Cyrillic Windows	CP1251
Danish/Norwegian	CP865
Estonian	CP922

Estonian (Personal Computer)	CP1116
Farsi (Personal Computer)	CP1098
Greek/Latin (ISO 8859-7)	CP813
Hebrew	CP862
Icelandic	CP861
Latin 1 (ISO 8859-1)	CP819
Latin 2 (ISO 8859-2)	CP912
Latin 2/ROECE	CP852
Latin 3 (ISO 8859-3)	CP913
Latin 4 (ISO 8859-4)	CP914
Latin 5 (ISO 8859-9)	CP920
Latin 6 (ISO 8859-6)	CP1089
Latin 8 (ISO 8858-8)	CP916
Latvian (Personal Computer)	CP1117
Lithuanian (Personal Computer)	CP1118
Multilingual	CP850
New Greek	CP869
OCR-A	CP876
OCR-B	CP877
Old Greek	CP851
Portuguese	CP860
Thai	CP874
Turkish 1	CP853
Turkish 2	CP857
Urdu	CP1006
USA (Personal Computer)*	CP437

* Manufacturing default with emulation set to Native 4247, 4202 III XL, or 2381

These additional print languages are only available if the printer emulation is set to Epson FX:

Denmark 1
Denmark 2
England
France
French Canadian
Germany
Italy
Japan
Latin American 1
Latin American 2
Norway
Spain 1
Spain 2
Sweden
USA*

* Manufacturing default with emulation set to Epson FX

To change or check the Print Language:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.

3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message LANG=xxxxxxx displays, where xxxxxxxx can be CP437 through CP1098 when emulation is set Native 4247, 4202 III XL, or 2381 or where xxxxxxxx can be USA through CP1098 when emulation is set to Epson FX. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Automatic Carriage Return on Line Feed

You can set the printer to perform an automatic carriage return on a line feed. You can set this value to:

- No (default)** No automatic carriage return is performed at a line feed.
- Yes** An automatic carriage return is performed after a line feed.

To change or check the Automatic Carriage Return after Line Feed:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (!) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message AUTO CR=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Automatic Line Feed on Carriage Return

You can set the printer to perform an automatic line feed on carriage return. You can set this value to:

- No (default)** No line feed is performed after a carriage return.
- Yes** An automatic line feed is performed after a carriage return.

To change or check the Automatic Line Feed on Carriage Return:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (!) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxx displays, where xxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.

6. Press ↓ until the message AUTO LF=xxxx displays, where xxxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

20 CPI

You can set the printer to allow 20 CPI condensed print from the data stream. For more information, see “Shift In (SI) / Condensed Print” on page 190. You can set this value to:

- No (default)** A combination of 12 CPI and a condensed print data stream command (Shift In) sets the printer to 12 CPI.
- Yes** A combination of 12 CPI and a condensed print data stream command (Shift In) sets the printer to 20 CPI.

To change or check the 20 CPI value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message 20 CPI=xxx displays, where xxxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

NLQ

Note: Using NLQ reduces printer throughput by approximately 50%.

You can change the font for Near Letter Quality (NLQ) printing, available through the operator panel **Font** key, to either of the following values:

- Courier (default)
- Gothic

To change or check the NLQ font value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message SERIAL INTERFACE displays.
5. Press → until the message INTF=xxxxxxxx displays, where xxxxxxxxx can be SERIAL NO, RS-232C, or RS-422A.
6. Press ↓ until the message NLQ=xxxxxxx displays, where xxxxxxxx can be COURIER or GOTHIC. If you want to select a value other than the one displayed, press ← or →.

7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Functions

This category defines forms condition variables that can be set, as well as other miscellaneous conditions available on the printer. There are several different parameters available:

- Front Tear Mode (for Push paths)
- Rear Tear Mode (for Push paths)
- Paper Overlay (for Push paths and Manual Sheet Feed)
- Sequence (for Push paths and ASF bins)
- Alarm
- Automatic Load (for Manual Sheet Feed)
- Display Language

Front Tear Mode

This parameter selects the tear-off function for forms that are loaded in the Front Push forms path. See “Checking and Adjusting Tear-Off Position” on page 25 for more information about adjusting the tear-off position. Your choices are:

Norm (default)

Press **Tear** to move the form to the tear line. After a 10-second delay the forms move back down to the print position. Press **Tear** again to move the forms back without waiting for the 10-second delay.

Auto

Once printing finishes, the forms automatically move up to the tear-off line. The forms remain there until another job is sent to the printer. When a job is sent, the forms move back down to the print position, and printing continues.

No

This option disables reverse forms movement. Select **No** for forms that should not be moved through the printer in a reverse direction, such as forms with attached labels and forms with overlays.

Note: Setting this parameter to **No** modifies how forms park. See “Parking One Continuous Form and Loading Another (Dual Push)” on page 59 and “Parking Continuous Forms” on page 29.

To change or check the Front Tear Mode value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO. If you want to select a value other than the one displayed, press ← or →.
6. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM. It takes a few seconds for the new value to be accepted.

Rear Tear Mode

This parameter selects the tear-off function for forms that are loaded in the Rear Push forms path. (See “Checking and Adjusting Tear-Off Position” on page 25 for more information about adjusting the tear-off position.) Your choices are:

Norm (default)

This is the default option. Press **Tear** to move the form to the tear line. After a 10 second delay the forms will back down into the printer. Press **Tear** again to move the forms back without waiting for the 10-second delay.

Auto

Once printing finishes, the forms automatically move up to the tear-off line. The forms remain there until another job is sent to the printer. When a job is sent, the forms move down to the print position and printing continues.

No

This option disables reverse forms movement. Select **No** for forms that should not be moved through the printer in a reverse direction, such as forms with attached labels and forms with overlays.

Note: Setting this parameter to **No** modifies how forms park. See “Parking One Continuous Form and Loading Another (Dual Push)” on page 59 and “Parking Continuous Forms” on page 29.

To change or check the Rear Tear Mode value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.
6. Press ↓ until the message REAR TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM. It takes a few seconds for the new value to be accepted.

Paper Overlay

The paper overlay function allows you to simultaneously feed (and overlay) a single sheet of paper from the Manual Sheet Feed while processing forms through one of the push paths (Front Push or Rear Push forms path). You can set forms overlay to one of the following values:

No (default) Disables the printer from feeding simultaneously from the Manual Sheet Feed and one of the forms paths.

Yes Enables the printer to feed simultaneously from the Manual Sheet Feed and one of the forms paths.

Notes:

1. The Paper Overlay function cannot be used with the Rear Pull or Push+Pull forms paths.

2. If Paper Overlay is set to **YES**, when loading cut-sheet paper into the printer, hold the paper firmly in place until it is fed into the printer.

To change or check the Paper Overlay value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.
6. Press ↓ until the message PAPER OVERLY=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM and the printer becomes *ready*.
8. If a continuous form is present in the forms path, press **Tear**, tear off at output and park the form.
9. Press **Path** until the indicators for Manual Sheet Feed and the desired continuous forms path light.

Sequence

This parameter defines the automatic loading sequence. When forms are depleted from the primary forms path, the printer automatically loads forms from the alternate path.

None (default)

Defines the automatic loading sequence as disabled.

This setting is used when the printer is set for dual push, but has different forms loaded in the front push and rear push paths.

FR+RR

Defines automatic forms loading from the Front Push forms path and then the Rear Push forms path.

This setting is used when the printer is set for dual push with the same forms loaded in the front push and rear push paths.

ASF1+2

Defines the automatic forms loading sequence for the ASF from tray 1 and then tray 2.

ASF123

Defines the automatic forms loading sequence for the ASF from tray 1, tray 2, then tray 3.

To change or check the Sequence value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.

6. Press ↓ until the message SEQUENCE=xxxxxx displays, where xxxxxx can be NONE, FR+RR ASF1+2, ASF123. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Alarm

The audible alarm will sound after you interrupt a *ready* condition. You can stop the alarm after it begins sounding by pressing a key.

You can set the audible alarm by selecting one of the following values:

Yes (default) Alarm will sound.

No Alarm will not sound.

To change or check the Alarm control value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.
6. Press ↓ until the message ALARM=xxx displays, where xxx can be YES or NO. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Automatic Load

This parameter is available only for Manual Sheet Feed. You can set automatic load to one of the following values:

Yes (default) Enables the quick printing function. This means that a single sheet form will be loaded automatically when inserted into the printer.

No Disables the quick printing function. This means that a single sheet form will not be loaded automatically when inserted into the printer. To load the form, press **Load/Form Feed**.

To change or check the Automatic Load value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.
6. Press ↓ until the message AUToload=xxx displays, where xxx can be YES or NO. If you want to select a value other than the one displayed, press ← or →.

7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Display Language

You can choose the language in which the operator panel display appears. Your choices are:

- English (default)
- Italiano
- Francais
- Espanol
- Deutsch
- Portugues
- Dansk
- Nederlands

To change or check the Display Language value:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press ↓ until the message FUNCTIONS displays.
5. Press → until the message FRONT TEAR=xxxx displays, where xxxx can be NORM, AUTO, or NO.
6. Press ↓ until the message MENU=xxxxxxxx displays, where xxxxxxxxxx can be ENGLISH, ITALIANO, FRANCAIS, ESPANOL, DEUTSCH, PORTUGUES, DANSK, NEDERLANDS. If you want to select a value other than the one displayed, press ← or →.
7. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Sensor Tune

This category establishes the black light threshold levels for the paper-present sensors. This adjustment is set initially by IBM when the printer is manufactured and may have to be adjusted for long-term aging of the sensor if a false end-of-forms occurs.

You can set sensor tune to either of the following values:

- No (default)
- Yes

To change or check the Sensor Tune category:

1. Remove all paper or forms from the printer.
2. Power off (O) the printer.
3. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
4. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.

5. Press **↓** until the message SENSOR TUNE=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press **←** or **→**.
If you set SENSOR TUNE=YES, press **↓**. The sensors will be tuned and the message SENSOR TUNE=NO will display indicating completion.
6. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.

Bidirectional Adjustment

This category lets you adjust dot registration and print quality by running the bidirectional adjustment test pattern. The bidirectional alignment may need periodic adjustment to maintain print quality.

The test pattern consists of these parts:

- Two groups of **Hs** (four lines each) with the current alignment value inserted between them.
- A line of **Hs** and **Is** printed on one line.

You can set bidirectional adjustment from -6 to 6 (where each unit is 0.212 mm [1/120 in.]). The default value is 0.

To change or check the Bidirectional adjustment:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press **↓** until the message BIDI ADJUST=xx displays, where xx can be -6 to 6. If you want to select a value other than the one displayed, press **←** or **→**.
Once you change a value, press **Online** to print the adjustment test pattern. After the test is completed the forms will advance above the tear bar so you can view the printed pattern. If the quality is not acceptable, repeat step 4 again to select another value.
5. Once you have acceptable print quality, press **Menu/Enter** to exit from the Power On Configuration menu. Your new value is stored in NVM.

Restore Manufacturing Defaults

Use this category to exit from the Power On Configuration Menu and restore the factory default values. Your choices are:

- No (default)
- Yes

To Restore Manufacturing Defaults:

1. Ensure the printer is powered off (O).
2. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. Press **↓** until the message RESTORE MFG=xxx displays, where xxx can be NO or YES. If NO is selected, you exit from the Power On Configuration Menu and any

new values selected will be stored in NVM. If YES is selected, you exit from the Power On Configuration Menu and all values are restored to those set at the factory.

Printing Power On Configuration Setup

Once you have made all your configuration changes, IBM recommends that you print your changes and save the printout for future reference.

To print the power on configuration:

1. Ensure the printer is powered off (O).
2. Press and continue to hold **Menu/Enter** while powering on (I) the printer until (1) the message STARTING UP appears, (2) the boxes on the operator panel display are solidly filled in, and (3) the printhead stops. This takes about fifteen seconds. Do not release this key or press any other keys until this completes.
3. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
4. To print the current settings on the printer, press →. The message PRINT OUT=YES displays and the power on configuration setup printout starts printing.

Your printout will look similar to this sample. This sample depicts the default settings.

Configuration Setup Printout

	PULL	NO			
	JAM SENSORS	YES			
	BIDI ADJUST	0			
PARALLEL INTF	INTF CX PARALLEL		SERIAL INTERFACE	INTF	RS-232C
	SELECT-IN	HOST		BAUD	9600
	DATA BITS	8		DATA BITS	8
	BUFFER	32K		PARITY	NONE
	NATIVE	4247		PACING	DTR
	CHAR SET	PC2		CONNECT	LOCAL
	LANG	CP437		BUFFER	32K
	AUTO CR	NO		NATIVE	4247
	AUTO LF	NO		CHAR SET	PC2
	20 CPI	NO		LANG	CP437
	NLQ	COURIER		AUTO CR	NO
				AUTO LF	NO
				20 CPI	NO
				NLQ	COURIER
FUNCTIONS	FRONT TEAR	NORM			
	REAR TEAR	NORM			
	PAPER OVERLY	NO			
	SEQUENCE	NONE			
	ALARM	YES			
	AUTOLOAD	YES			
	MENU	ENGLISH			

Program Configuration

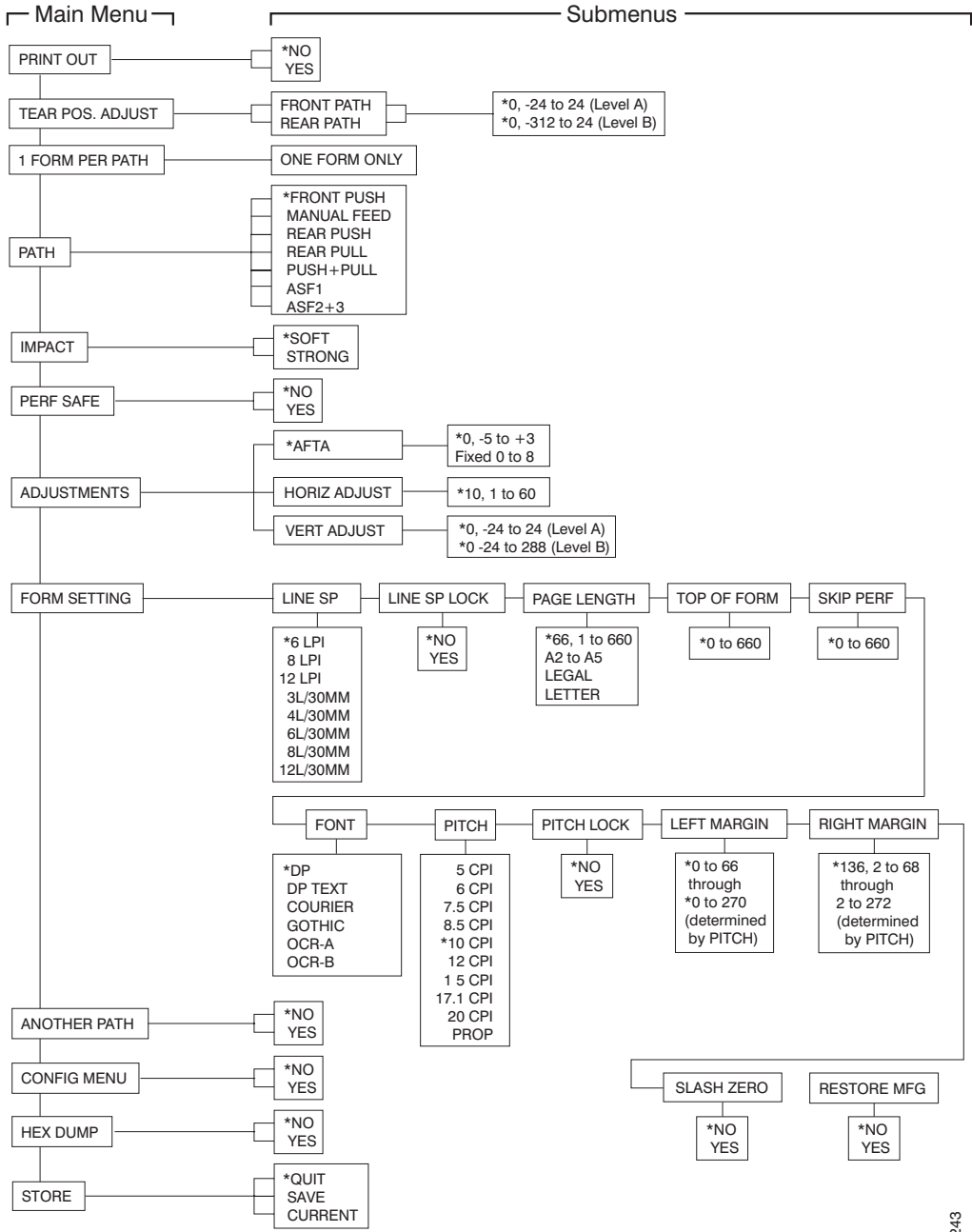
This section lists the categories available and the manufacturing defaults for the Program Configuration menu.

Notes:

1. Each category is described in detail in the sections following the chart.
2. After you make configuration changes, IBM recommends that you print your changes and save the printout for future reference. For more information, see "Printing Program Configuration Setup" on page 121.
3. For information about entering and exiting printer configuration mode, see "Entering Printer Configuration" on page 81 and "Exiting Printer Configuration" on page 82.

Program Configuration Menu Tree

Figure 46 provides a view of the path you can take through the Program Configuration menus.



* Manufacturing Default (except Manual Sheet Feed)

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Figure 46. Program Configuration Menu Tree

After printing the program configuration, the display returns to PRINT OUT=N0. Press **Menu/Enter** twice to exit configuration mode.

Tear Position Adjustment

This category adjusts the tear off position for your forms. You can select either of the following parameters. See “Checking and Adjusting Tear-Off Position” on page 25 for the full tear-off adjustment procedure.

- Front Path
- Rear Path

Note: When either tear position (Front Path or Rear Path) is adjusted, you must adjust the Vertical configuration item in the opposite direction. For example, if you adjust the tear position to 24, you must adjust the Vertical to -24. See “Vertical” on page 112.

Front Path

You can adjust the tear position for forms loaded in the Front Push forms path from -24 to 24 (where each unit is 0.176 mm [1/144 in.]). The default value is 0.

To change or check the Front Path tear position:

1. Press **Menu/Enter**. The message PRINT OUT=N0 displays.
2. Press ↓ and the message TEAR POS. ADJUST displays.
3. Press → and the message FRONT PATH=xxx displays, where xxx can be -24 to 24. If you want to select a value other than the one displayed, press ← to increment from 24 to -24 or press → to increment from -24 to 24.
4. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**. If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Once you change the value and save it, press **Tear** to verify the new tear off position. If this position is still not where you want it, repeat the above steps to change the value.

Rear Path

You can adjust the tear position for forms loaded in the Rear Push forms path from -24 to 24 (where each unit is 0.176 mm [1/144 in.]). The default value is 0.

To change or check the Rear Path tear position:

1. Press **Menu/Enter**. The message PRINT OUT=N0 displays.
2. Press ↓ and the message TEAR POS. ADJUST displays.
3. Press → and the message FRONT PATH=xxx displays, where xxx can be -24 to 24.
4. Press ↓ and the message REAR PATH=xxx displays, where xxx can be -24 to 24. If you want to select a value other than the one displayed, press ← to increment from 24 to -24 or press → to increment from -24 to 24.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**. If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Once you change the value and save it, press **Tear** to verify the new tear off position. If this position is still not where you want it, repeat the above steps to change the value.

1 Form Per Path

You can set this category to either of the following values:

1 Form Per Path (default)

When forms are loaded from the operator panel or by the software, those forms will use the parameters that are defined for the forms path that is selected in the Paper Paths category.

One Form Only

When you load the forms, only the current values on the printer apply to these forms. The printer does not associate the values that were previously stored for the selected forms path.

To change or check the Paper Path Setup:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until either the message 1 FORM PER PATH or ONE FORM ONLY displays. If you want to select a value other than the one displayed, press ← or →.
3. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**. If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Path

The values that are available in this category depend on which paths were selected in the Power On Configuration menu. See “Power On Configuration” on page 82 for information on this menu. The forms path setting can be set to any of the following values:

Note: Use the Automatic Sheet Feeder (ASF) only with the Front Push and Manual Sheet Feed paths. Remove the ASF to set up your printer for any other forms path.

Front Push (default)

Forms are fed from the Front Push tractor.

Manual Feed

Cut-sheet feeding from the Manual Sheet Feed forms path. This path is always standard with any of the other forms paths.

Note: This option always is available with Front or Rear Push forms paths.

Rear Push

Forms feeding from the Rear Push tractor (forms enter and exit from the rear of the printer). If this path is selected, the Rear Pull and Push+Pull paths are not available.

Note: This value will be the default if you install a second optional Rear Push tractor.

Rear Pull

Forms feeding from the front entry of the printer and pulling

by the Rear Pull tractor. If this path is selected, the Rear Push and Push+Pull paths are not available. See “Pull” on page 84 for more information.

- Push+Pull** Forms feed from the Front Push tractor and are pulled by the rear tractor. This path is only available if a second tractor is installed and PUSH+PULL was selected in the Power On Configuration menu. If this path is selected, the Rear Push and Rear Pull forms paths are not available.
- ASF1** Forms feeding from the Automatic Sheet Feeder Tray 1. This path is available only if the Automatic Sheet Feeder is installed.
- ASF2+3** Forms feeding from the Automatic Sheet Feeder Trays 2 and 3. This path is available only if the Automatic Sheet Feeder is installed.

To change or check the Paper Path:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message PATH=xxxxxxxxx displays, where xxxxxxxxxxxx can be FRONT PUSH, MANUAL FEED, REAR PUSH, REAR PULL, PUSH+PULL, ASF1, or ASF2+3. If you want to select a value other than the one displayed, press ← or →.
3. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.

If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Impact Strength

With this category you can select the impact force applied by the printhead to the ribbon and the forms. You can select either of the following impact values:

- Soft (default)** For single-part continuous and cut-sheet forms. If *soft* is set and a thicker form is detected or graphics are printed, then the printer automatically switches to *strong*.
- Strong** For multiple-part forms. If *strong* is set and a single-part form is detected, the impact stays at *strong*.

To change or check the Impact Strength:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message IMPACT=xxxxxx displays, where xxxxxx can be SOFT or STRONG. If you want to select a value other than the one displayed, press ← or →.
3. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Perforation Safety

You can set perforation safety to either of the following values:

- No (default)** The printhead is **not** parked all the way to the right of the print line while the perforation of the form is passing through the mylar opening.
- Yes** The printhead is parked all the way to the right of the print line so that the perforation of the form can advance through the mylar without the printhead touching the form. This setting is recommended for thick multiple-part forms.

To change or check the Perforation Safety value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message PERF SAFE=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
3. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**. If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Adjustments

This category contains the following parameters:

- Automatic Forms Thickness (AFTA)
- Horizontal
- Vertical

Automatic Forms Thickness (AFTA)

This adjustment allows you to set the distance or gap between either the printhead and the forms or the printhead and the platen. The Automatic Forms Thickness Adjustment can be set to one of the following ranges:

-5 to +3 (0=default)

Sets the gap between the printhead and the forms. Each increment equals 0.03 mm (0.0012 in.). The default setting of 0 corresponds to a gap of 0.15 mm (0.006 in.).

Fixed 0 to 8

Sets the gap between the printhead and the platen to a fixed distance. When a fixed value is selected, the printer will maintain that dimension regardless of the thickness of the forms. Each increment of 0.5 corresponds to 0.05 mm (0.002 in.) and is added to the default gap of 0.15 mm (0.006 in.). Select this choice for forms like labels with varying thicknesses. The default value is 0.

To change or check the AFTA:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message ADJUSTMENTS displays.
3. Press → and the message AFTA=xx or FIXED AFTA=x displays, where xx can be -5 to +3 or x can be 0 to 8. If you want to select a value other than the one displayed, press ← or →.

4. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Horizontal

Note: You can find similar information in “Left Margin” on page 117 and “Right Margin” on page 117.

This parameter adjusts the distance of the first print position to the left margin from 1 to 60 units (where each unit is 0.706 mm [1/36 in.]). The default is 10 units. The total range of adjustment is 41.5 mm (1.63 in.).

To change or check the Horizontal adjustment:

1. Press **Menu/Enter**. The message PRINT OUT=N0 displays.
2. Press ↓ until the message ADJUSTMENTS displays.
3. Press → and the message AFTA=xx or FIXED AFTA=x displays, where xx can be -5 to +3 or x can be 0 to 8.
4. Press ↓ until the message HORIZ ADJUST=xx displays, where xx can be 1 to 60. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Note: If the horizontal adjust value is set and it is too large for the current print line, a 35 MARGIN ERROR will occur. For more information on the message, see “Chapter 7. Resolving Printer Problems” on page 139.

Vertical

This parameter adjusts the distance of the first printable line to the top of the forms from -24 to 24 units (where each unit is 0.176 mm [1/144 in.]). The default value is 0.

Notes:

1. When the Vertical configuration item is adjusted, you must adjust the tear position in the opposite direction. For example, if you adjust the Vertical configuration item to -24, you must adjust the tear position to 24. See “Checking and Adjusting Tear-Off Position” on page 25 or “Tear Position Adjustment” on page 108, depending on your forms path. Adjust the Vertical configuration before you adjust the Tear Position.
2. You Park and reload forms to get the new position.
3. You can find similar information in “Top of Form” on page 114.

To change or check the Vertical adjustment:

1. Press **Menu/Enter**. The message PRINT OUT=N0 displays.
2. Press ↓ until the message ADJUSTMENTS displays.
3. Press → and the message AFTA=xx or FIXED AFTA=x displays, where xx can be -5 to +3 or x can be 0 to 8.

4. Press ↓ until the message VERT ADJUST=xxx displays, where xxx can be -24 to 24. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**. If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Form Setting

This category contains the following parameters for setting a specific forms path:

- Line Spacing
- Line Spacing Lock
- Page Length
- Top of Form
- Perforation Skipping
- Font
- Pitch
- Pitch Lock
- Left Margin
- Right Margin
- Slashed Zero
- Restore Mfg Defaults

Line Spacing

You can set vertical spacing in lines-per-inch or in lines-per-30 mm on your printer. Available values are:

- 6 LPI (default)
- 8 LPI
- 12 LPI
- 3L/30MM
- 4L/30MM
- 6L/30MM
- 8L/30MM
- 12L/30MM

To change or check the Line Spacing value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM. If you want to select a value other than the one displayed, press ← or →.
4. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**. If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Line Spacing Lock

You can set this value to:

- No (default)** The host can override the vertical spacing value (lines per inch or lines per 30 mm).
- Yes** The host cannot override the vertical spacing value (lines per inch or lines per 30 mm) that was set through the operator panel.

To change or check the Line Spacing Lock value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message LINE SP LOCK=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Page Length

You can set the page length for continuous forms to a defined number of lines (1 to 660), or for cut-sheet paper to any of the standard formats (Letter, Legal, A2, A3, A4, or A5). To compute the page length, multiply the line spacing value by the physical length of the page. The default value is **66** lines for continuous forms and **LTR** (Letter) for cut-sheet paper.

To change or check the Page Length value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message PAGE LENGTH=xxx displays, where xxx can be 1 to 660, A5, A4, A3, A2, LGL, or LTR. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Top of Form

Note: You can find similar information in “Vertical” on page 112.

The top of form is where you want your first line of printing to start on a page. You can adjust the top-of-form position from 0 to 660 units (where each unit is 4.23 mm [1/6 in.]). The default value is 0.

To change or check the Top of Form value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message TOP OF FORM=xxx displays, where xxx can be 0 to 660. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Perforation Skipping

You can set the number of units you want skipped over the perforation from 0 to 660 units (where each unit is 4.23 mm [1/6 in.]). The default value is 0.

To change or check the Perforation Skipping value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message SKIP PERF=xxx displays, where xxx can be 0 to 660. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Font

You can set the font on your printer to any of the following values:

- DP (default)
- DP Text
- Courier
- Gothic
- OCR-A
- OCR-B

To change or check the Font value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message FONT=xxxxxxx displays, where xxxxxxxx can be DP, DP TEXT, COURIER, GOTHIC, OCR-A, or OCR-B. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.

If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Pitch

You can set the horizontal spacing (characters per inch) on your printer to any of the following values:

- 5 CPI
- 6 CPI
- 7.5 CPI
- 8.5 CPI
- 10 CPI (default)
- 12 CPI
- 15 CPI
- 17.1 CPI (DP quality only)
- 20 CPI (DP quality only)
- Prop (Proportional)

To change or check the Pitch value:

1. Press **Menu/Enter**. The message PRINT OUT=N0 displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message PITCH=xxxxxxx displays, where xxxxxxxx can be 5 CPI, 6 CPI, 7.5 CPI, 8.5 CPI, 10 CPI, 12 CPI, 15 CPI, 17.1 CPI, 20 CPI, or PROP. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Pitch Lock

You can set this value to:

- No (default)** The host can override the horizontal spacing value (characters per inch).
- Yes** The host cannot override the horizontal spacing value (characters per inch) that was set through the operator panel.

To change or check the Pitch Lock value:

1. Press **Menu/Enter**. The message PRINT OUT=N0 displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message PITCH LOCK=xxx displays, where xxx can be N0 or YES. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.

If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Left Margin

Note: You can find similar information in “Horizontal” on page 112 and “Right Margin”.

This parameter selects the left margin defined as a number of blank print positions starting from the position set in Horizontal Adjustment (“Horizontal” on page 112) in relation to the current pitch (characters-per-inch setting). Available values are:

- 0 (default)
- 0 to 66 (at 5 CPI)
- 0 to 79 (at 6 CPI)
- 0 to 100 (at 7.5 CPI)
- 0 to 114 (at 8.5 CPI)
- 0 to 134 (at 10 CPI and Prop)
- 0 to 161 (at 12 CPI)
- 0 to 202 (at 15 CPI)
- 0 to 231 (at 17.1 CPI)
- 0 to 270 (at 20 CPI)

To change or check the Left Margin:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message LEFT MARGIN=xxx displays, where xxx can be a value from 0 to 270 depending on your character-per-inch setting. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.

If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Right Margin

Note: You can find similar information in “Horizontal” on page 112 and “Left Margin”.

This parameter selects the right margin, which is defined as a number of blank print positions (+2) starting from the left margin, and extending to the maximum number of characters-per-line, at the current pitch. Available values are:

- 136 (default)
- 2 to 68 (at 5 CPI)
- 2 to 81 (at 6 CPI)
- 2 to 102 (at 7.5 CPI)
- 2 to 116 (at 8.5 CPI)

- 2 to 136 (at 10 CPI and Prop)
- 2 to 163 (at 12 CPI)
- 2 to 204 (at 15 CPI)
- 2 to 233 (at 17.1 CPI)
- 2 to 272 (at 20 CPI)

To change or check the Right Margin:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message RIGHT MARGIN=xxx displays, where xxx can be a value from 2 to 272 depending on your character-per-inch setting. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Slashed Zero

You can set this value to:

- No (default)** All printed zeros will appear without a slash through them.
- Yes** All printed zeros will appear with a slash through them.

To change or check the Slashed Zero:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.
3. Press → until the message LINE SP=xxxxxxx displays, where xxxxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press ↓ until the message SLASH ZERO=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press ← or →.
5. To exit from Program Configuration, press ↓ until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Restore Manufacturing Defaults

You can set this value to:

- No (default)** Save the new values of the selected forms path.
- Yes** Return to the manufacturing default values of the selected forms path.

To change or check the Manufacturing Default values:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message FORM SETTING displays.

3. Press **→** until the message LINE SP=xxxxxxx displays, where xxxxxx can be 6 LPI, 8 LPI, 12 LPI, 3L/30MM, 4L/30MM, 6L/30MM, 8L/30MM, or 12L/30MM.
4. Press **↓** until the message RESTORE MFG=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press **←** or **→**.
5. To exit from Program Configuration, press **↓** until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press **←** or **→** to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Another Path

You can set this category to either one of the following values:

- No (default)** Does not allow you to select another default forms path to configure.
- Yes** Lets you return to the Paper Path category in the Program Configuration menu to configure another default forms path.

To change or check the Another Paper Path value:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press **↓** until the message ANOTHER PATH=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press **←** or **→**.
3. To exit from Program Configuration, press **↓** until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press **←** or **→** to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Additional Entry Point to Power On Configuration Menu

Note: You cannot access the Pull category or the Forms Jam category from this entry point. You must use the method outlined in “Power On Configuration” on page 82.

You can enter the Power On Configuration menu without powering off and powering on the printer by using the Program Configuration menu. Available values for this category are:

- No (default)** Does not allow you to return to the Power On Configuration menu.
- Yes** Allows you to return to the Power On Configuration menu. If you press **↑** or **↓**, you will return to the start of the menu, PRINT OUT=NO. Entering the Power On Configuration menu through the Program Configuration menu does not allow you to access the PULL or JAM SENSORS categories.

To enter the Power On Configuration menu from the Program Configuration menu:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press **↓** until the message CONFIG MENU=xxx displays, where xxx can be NO or YES. If you want to select a value other than the one displayed, press **←** or **→**.
3. To exit from Program Configuration, press **↓** until the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.

If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.

Hexadecimal Printing

You can set hexadecimal printing to either of the following values:

- No (default)
- Yes

If set to **YES**, any character sent to the printer will be printed in a hexadecimal value. This lets you see a readable printout of all characters sent by the host to the printer even if they are control code characters (for example, ESC, DC4, CR, LF).

To select Hexadecimal Printing, follow these steps:

1. Press **Menu/Enter**. The message PRINT OUT=NO displays.
2. Press ↓ until the message HEX DUMP=NO displays. If you want to get a hexadecimal printout, press ← or → to select HEX DUMP=YES.
3. To exit from Program Configuration, press ↓ and the message STORE=QUIT displays. If you want to exit without saving the new value, press **Menu/Enter**.
If you want to save the new value, press ← or → to select either STORE=SAVE (new value is stored in NVM) or STORE=CURRENT (new value remains valid until the printer is powered off (O)). Press **Menu/Enter** to save the new value.
If you save HEX DUMP=YES, all characters will print in hex until you reset the value to NO.

Store Mode

Once you made changes to any of the Program Configuration values, you have three choices available for saving them:

- | | |
|-----------------------|---|
| Quit (default) | Exit Program Configuration mode and no changes are saved in NVM. All previous values remain valid. |
| Save | Exit Program Configuration mode and save new values in NVM. |
| Current | Exit Program Configuration mode and the new values remain valid until the printer is powered off (O). |

To select Store Mode in either of two ways:

1. Press **Menu/Enter** and the message STORE=QUIT displays.

or

Press ↓ until the message STORE=QUIT displays.

2. If you want to exit without saving the new values, press **Menu/Enter**.
3. If you want to save the new values, press ← or → to select either STORE=SAVE (new values are stored in NVM) or STORE=CURRENT (new values remain valid until the printer is powered off (O)).
4. Press **Menu/Enter** to save the new values.

Printing Program Configuration Setup

Once you have made all your configuration changes, IBM recommends that you print your changes and save the printout for future reference. You can save up to five different forms paths.

To print the program configuration:

1. Press **Menu/Enter**. The printer goes offline, and the message PRINT OUT=NO displays.
2. To print the settings on the printer, press →. The message PRINT OUT=YES displays and the program configuration setup printout is printed.

This sample printout shows three forms paths configured and also depicts the default settings.

Program Setup Printout

```
TEAR POS. ADJUST    FRONT PATH    0
                   REAR PATH    0

1 FORM PER PATH

PATH MANUAL FEED    PATH FRONT PUSH    PATH REAR PUSH
-----
IMPACT              SOFT    IMPACT              SOFT    IMPACT              SOFT
PERF SAFE          NO      PERF SAFE          NO      PERF SAFE          NO
AFTA                0      AFTA                0      AFTA                0
HORIZ ADJUST      10     HORIZ ADJUST      10     HORIZ ADJUST      10
VERT ADJUST        0      VERT ADJUST        0      VERT ADJUST        0
LINE SP           6 LPI    LINE SP           6 LPI    LINE SP           6 LPI
LINE SP LOCK      NO      LINE SP LOCK      NO      LINE SP LOCK      NO
PAGE LENGTH      LTR      PAGE LENGTH       66     PAGE LENGTH       66
TOP OF FORM       0      TOP OF FORM       0      TOP OF FORM       0
SKIP PERF         0      SKIP PERF         0      SKIP PERF         0
FONT              DP      FONT              DP      FONT              DP
PITCH            10 CPI    PITCH            10 CPI    PITCH            10 CPI
PITCH LOCK        NO      PITCH LOCK        NO      PITCH LOCK        NO
LEFT MARGIN       0      LEFT MARGIN       0      LEFT MARGIN       0
RIGHT MARGIN      80     RIGHT MARGIN     136     RIGHT MARGIN     136
SLASH ZERO        NO      SLASH ZERO        NO      SLASH ZERO        NO
```

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After printing the program configuration, the display returns to PRINT OUT=NO. Press **Menu/Enter** twice to exit configuration mode.

Chapter 5. Attaching Your Printer

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Attaching to Your Computer

This section provides specific instructions on attaching the printer to your computer. Supported devices include:

- Personal Computers
 - IBM compatible personal computers with an RS-232C, RS-422A, or Centronics Parallel interface
 - IBM Personal System/2 COMx or LPTx ports
- IBM RISC System/6000
- IBM AS/400
 - IBM AS/400 with ASCII workstation controller
 - IBM AS/400 twinaxial terminals including IBM 348X, IBM 3477, and IBM 3197 display stations
- LAN Features
 - Ethernet 10BaseT (RJ45) Network Print Server
 - Ethernet 10Base2 (BNC) Network Print Server
 - Token-Ring Media Type 1 Network Print Server (with 9-pin D-sub connector)
 - Token-Ring Media Type 3 Network Print Server (unshielded twisted-pair)
- IBM S/390 and S/370 using an IBM 3174 workstation controller with an Asynchronous Emulation Adapter

For cable part number and specification information, see “Chapter 8. Supplies, Forms, and Cables” on page 151 or contact your IBM marketing representative.

Attaching Parallel Cable

DANGER

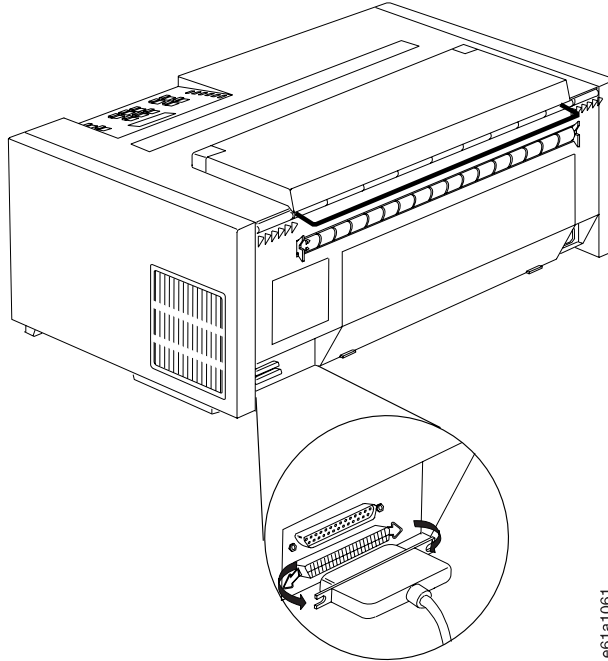
<2> To prevent serious personal injury from electrical shock when connecting or disconnecting the interface cable, power off (O) the printer and disconnect the power cord from the power source at the receptacle.

DANGER

<3> To avoid personal risk, do not install or reconfigure a communication port or a teleport during a lightning storm.

To attach a parallel cable:

1. Power off (O) the printer. Disconnect the power cord from the receptacle.
2. Standing behind the printer, insert the parallel interface cable into the lower connector at the bottom left of the printer.



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3. Push the clips at each end of the connector into the notches on the parallel cable.
4. Refer to your computer system documentation for information on attaching the cable to your computer.
5. After you complete the attachment of the computer end of the interface cable, connect the power cord to the printer and to the electrical receptacle.
6. Power on (I) the printer.

Attaching Serial Cable

DANGER

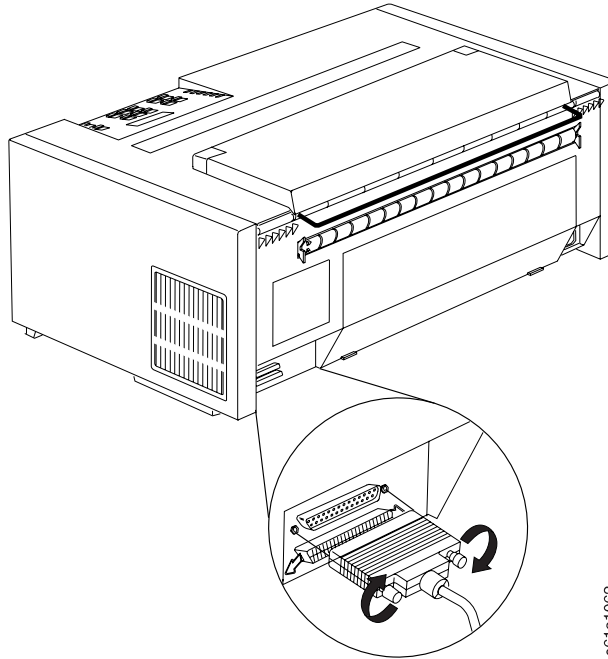
<2> To prevent serious personal injury from electrical shock when connecting or disconnecting the interface cable, power off (O) the printer and disconnect the power cord from the power source at the receptacle.

DANGER

<3> To avoid personal risk, do not install or reconfigure a communication port or a teleport during a lightning storm.

To attach a serial cable:

1. Power off (O) the printer. Disconnect the power cord from the receptacle.
2. Standing behind the printer, insert the serial interface cable into the upper connector at the bottom left of the printer.



3. Tighten the two locking screws to hold the cable in place.
4. Refer to your computer system documentation for information on attaching the cable to your computer.
5. After you complete the attachment of the computer end of the interface cable, connect the power cord to the printer and to the electrical receptacle.
6. Power on (I) the printer.

Installing Printer Drivers

The IBM 4247 Printer is supported by the following operating systems or environments:

- AIX version 3.2.5 and later
- OS/400 version 2.3 Host Print Transform
- OS/2 version 2.1 and later
- Windows version 3.0 and later

AIX Operating Systems Installation

Use the *Printer Driver Diskette* shipped with your printer. The files in the **AIX** subdirectory enable the user to add a 4247 as a printer device and add virtual printers in three emulation modes:

- IBM 2381 Personal Printer
- IBM 4202 Proprinter III XL
- Epson FX

To use the printer driver, establish a virtual printer queue for each emulation desired.

OS/400 Operating Systems Installation

Use the *Printer Driver Diskette* shipped with your printer. The files in the **OS400** subdirectory enable the user to add a 4247 as a printer object. Support for 4247 unique commands is limited to Host Print Transform. Six new 4247 workstation customization tables are based on tables used for the 2381 Printer. Modifications to the tables were made to support various 4247 forms handling capabilities, fonts, and print qualities.

OS/2 and Windows Operating Environment Installation

Use one of the following drivers (not shipped with the printer) that is provided with your operating environment. When using these drivers, some of the 4247 advanced features will not be selectable from the data stream. You may, however, use the operator panel to select these features.

- IBM 2381 Personal Printer
- IBM 4202 Proprinter III XL
- Epson FX 1050

AIX Driver Installation

The AIX driver files reside on a DOS formatted diskette in the **AIX** subdirectory. The files are:

license.txt	AIX printer driver license statement
4247.txt	Driver installation instructions
4247.tar	Drivers and additional information for AIX 3.2.5
ibm4247.tar	Drivers and additional information for AIX 4.1

To read the diskette, use the `cd` command for the directory of choice (such as **/tmp**), and issue the following commands:

- `# dosread -a /AIX/license.txt license.txt`
- `# dosread -a /AIX/4247.txt 4247.txt`
- `# dosread /AIX/4247.tar 4247.tar`
- `# dosread /AIX/ibm4247.tar ibm4247.tar`

Use the more or pg command to view the license agreement in the **license.txt** file, and the installation instructions in the **4247.txt** file. You must understand and agree to the terms and conditions stated in the **license.txt** file before installing the AIX driver.

OS/400 Printer Object Installation

The OS/400 printer object files reside on a DOS-formatted diskette in the **OS400** subdirectory. The files are:

license.txt	OS/400 printer objects license statement.
read.1st	OS/400 printer object upload and installation instructions.
4247.doc	Explains the use and function of the OS/400 printer objects. Read this file before you attempt to upload any of the following .txt files.
ibm4247m.txt	Source file for the 4247 workstation customization object when the 4247 is configured with one forms path or the user wants to select the forms path method from the operator panel.
ibm4247.txt	Source file for the 4247 workstation customization object when the 4247 is configured with two forms paths.
ib4247a2.txt	Source file for the 4247 workstation customization object when the 4247 is configured for the optional Automatic Sheet Feeder (ASF). Required for use with pre-V3R1 operating systems; this object limits AS/400 selection to two 4247 ASF paper bins.
ib4247a3.txt	Source file for the 4247 workstation customization object when the 4247 is configured for the optional Automatic Sheet Feeder (ASF). Required for use with V3R1 and later operating systems; this object provides AS/400 selection of all three 4247 ASF paper bins.
ib4247x2.txt	Source file for the 4247 workstation customization object when the 4247 user wants to select between one continuous forms feed or bin 1 of the optional Automatic Sheet Feeder. Required for use with pre-V3R1 operating systems; this object limits AS/400 selection to two 4247 forms paths.
ib4247x3.txt	Source file for the 4247 workstation customization object when the 4247 user wants to select one forms path or bin 1 or bin 2 of the optional Automatic Sheet Feeder (required for use with V3R1 and later operating systems). This object provides AS/400 selection of three 4247 forms paths.

Use the text editor that came with your personal computer operating system (such as Windows 3.0 WRITE or OS/2 E) to view the license agreement in the **license.txt** file and to view the **read.1st** and **4247.doc** files.

To print the **read.1st** file (or any of the files), use an operating system command such as:

- copy a:\os400\read.1st lpt1:

You must understand and agree to the terms and conditions stated in the **license.txt** file before installing the OS/400 printer object.

OS/2 or Windows Printer Driver Installation

See the *Printer Driver Installation* section in the respective product User's Guides.

Attaching Network Print Server

The Network Print Server feature eliminates the need for third party Token-Ring and Ethernet attachments. The servers contain the intelligence needed to make your printer fully accessible to all network users. Its multiple protocol support lets you print from Novell NetWare, IBM LAN Server, IBM AIX, and other TCP/IP networks. The Network Print Server has its own unique network address, and interprets data transmitted on the network to the print data stream used by the 4247 Printer. There are four servers available for attachment to your printer:

- Ethernet 10BaseT (RJ45)
- Ethernet 10Base2 (BNC)
- Token-Ring Media Type 1 (with 9-pin, D-sub connector)
- Token-Ring Media Type 3 (RJ45 unshielded twisted-pair)

The Network Print Server feature plugs directly into the printer's parallel port. To install your server, perform the following:

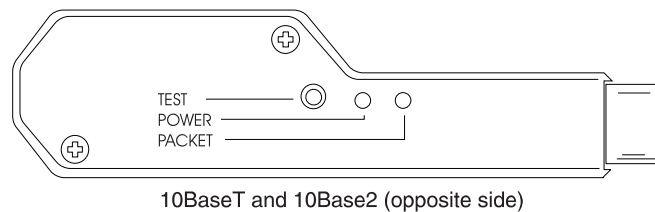
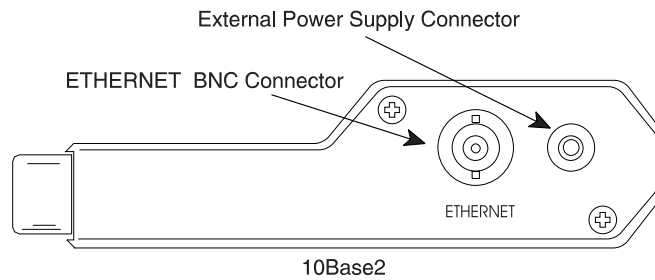
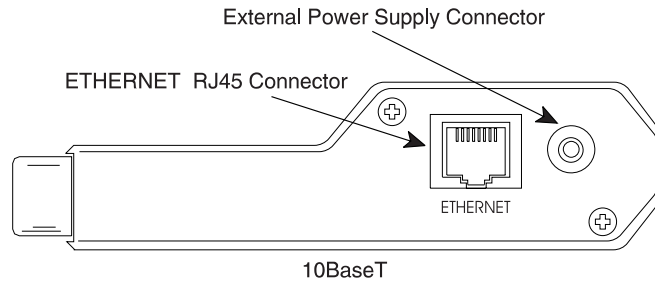
Ethernet 10BaseT or 10Base2

DANGER

<2> To prevent serious personal injury from electrical shock when connecting or disconnecting the interface cable, power off (O) the printer and disconnect the power cord from the power source at the receptacle.

DANGER

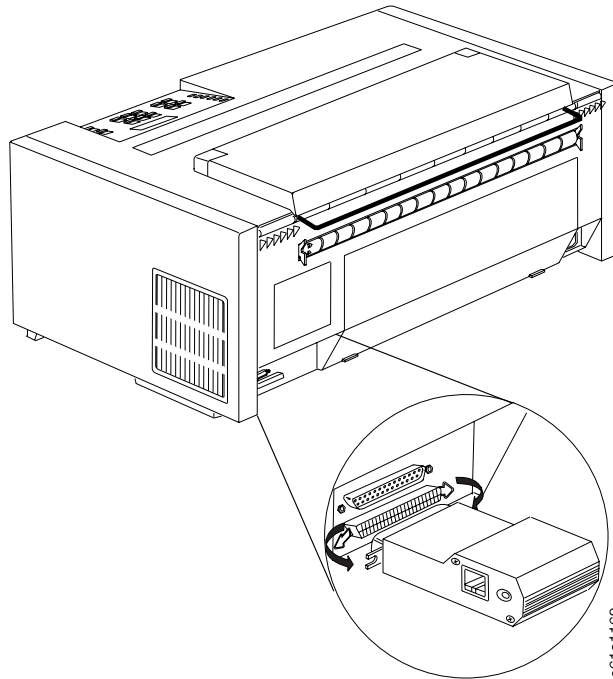
<3> To avoid personal risk, do not install or reconfigure a communication port or a teleport during a lightning storm.



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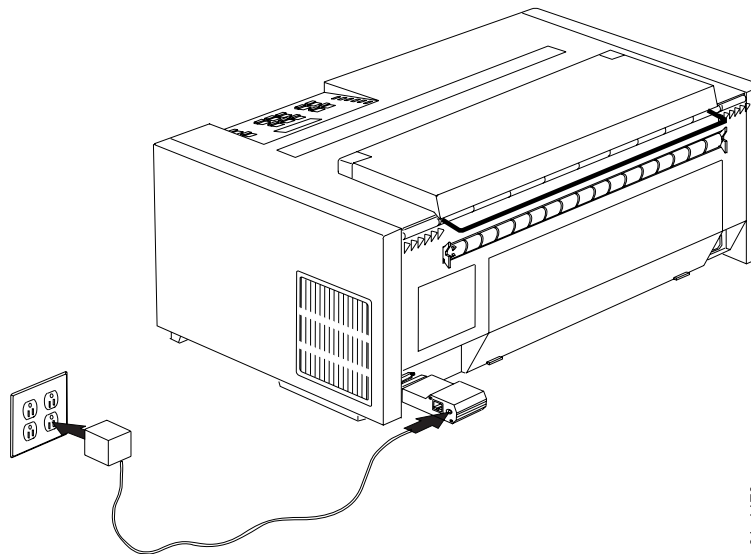
1. Make sure your printer parallel interface is set to CX PARALLEL. To change or check the Interface Type:
 - a. Power off (O) the printer.
 - b. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
 - c. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
 - d. Press ↓ until the message PARALLEL INTF displays.
 - e. Press → until the message INTF=xxxxxxxxxx displays. Where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE. If the value is not CX PARALLEL, press ← or → until CX PARALLEL displays.
 - f. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.
2. Power off (O) the printer.
3. Attach the Network Print Server to your parallel port.

Note: With this server attached, the printer is supplied by two power cords. One is the 4247 Printer power cord and the other is the Network Print Server power cord.



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4. Connect the external power supply to an approved power source.



e61a1170

The PACKET indicator will flash during power-on and self-test. When the indicator stops flashing and remains unlighted, the Network Print Server is ready for use.

5. Power on (I) the printer. Make sure forms are loaded in the printer.
6. Press and hold the TEST button until the PACKET indicator starts to flash, then release the button to print a print test sample. This sample lists the software revision and the basic setup of your Network Print Server.
7. For more information on configuring and connecting your printer to an Ethernet Network, see *Network Print Server for Ethernet Networks Administrator's Guide*, (S246-0111) that was shipped with your Network Print Server.

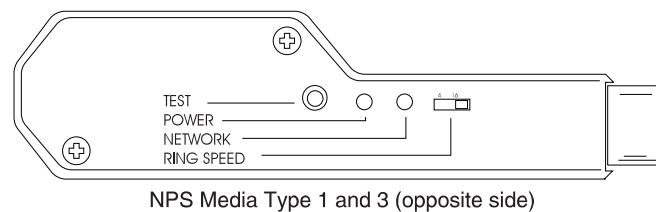
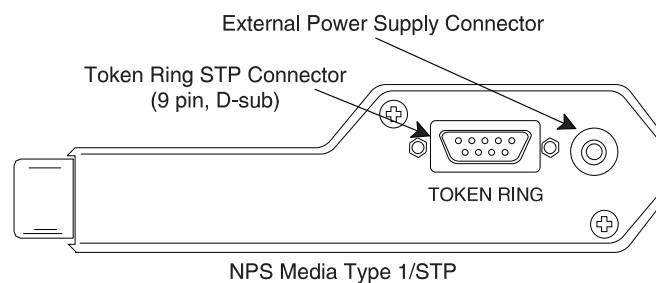
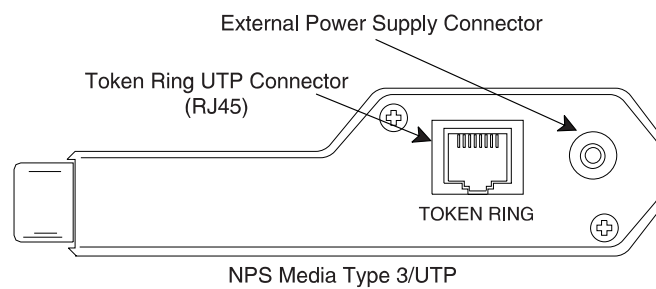
Token-Ring UTP or STP

DANGER

<2> To prevent serious personal injury from electrical shock when connecting or disconnecting the interface cable, power off (O) the printer and disconnect the power cord from the power source at the receptacle.

DANGER

<3> To avoid personal risk, do not install or reconfigure a communication port or a teleport during a lightning storm.

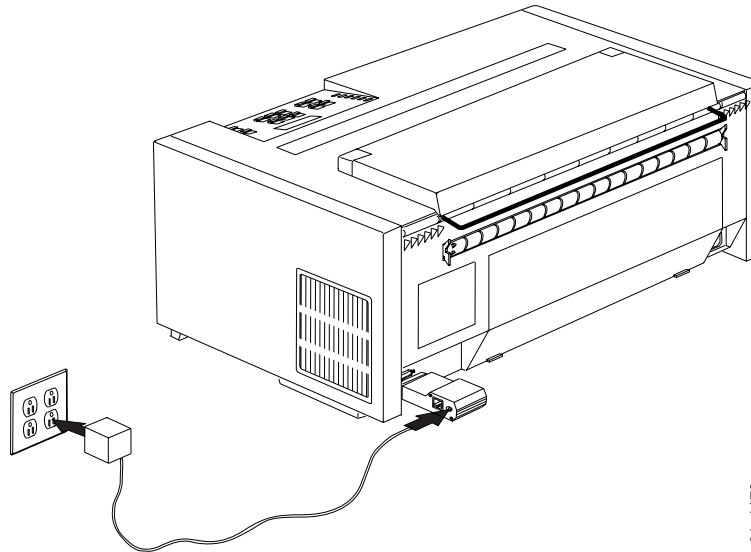


1. Make sure your printer parallel interface is set to CX PARALLEL. To change or check the Interface Type:
 - a. Power off (O) the printer.
 - b. Press and hold **Menu/Enter** while powering on (I) the printer. The message STARTING UP displays.
 - c. After start-up is complete, release **Menu/Enter** and the message PRINT OUT=NO displays.
 - d. Press ↓ until the message PARALLEL INTF displays.
 - e. Press → until the message INTF=xxxxxxxxxx displays. Where xxxxxxxxxxxx can be CX PARALLEL, 1284 BYTE, or 1284 NIBBLE. If the value is not CX PARALLEL, press ← or → until CX PARALLEL displays.

- f. To exit from Power On Configuration, press **Menu/Enter**. Your new value is stored in NVM.
2. Power off (O) the printer.
3. Attach the Network Print Server to your parallel port.

Note: With this server attached, the printer is supplied by two power cords. One is the 4247 Printer power cord and the other is the Network Print Server power cord.

4. Connect the external power supply to an approved power source.



e61a1170

The NETWORK indicator will flash during power-on and self-test. When the indicator stops flashing and remains unlighted, the Network Print Server is ready for use.

5. Power on (I) the printer. Ensure forms are loaded in the printer.
6. Press and hold the TEST button until the NETWORK indicator starts to flash, then release the button to create a print test sample. This sample lists the software revision and the basic setup of your Network Print Server.
7. For more information on configuring and connecting your printer to a token-ring network, see *Network Print Server for Token-Ring Networks Administrator's Guide* (S246-0112) that was shipped with your Network Print Server.

Chapter 6. Operator Tasks

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Removing Ribbon Cartridge	133
Installing Ribbon Cartridge	135
Cleaning Printer	137
Cleaning Inside of Printer.	137
Cleaning Covers	137
Clearing Forms Jams and Restarting a Print Job	137

About This Chapter

The operator is responsible to perform the following procedures which are described in this chapter:

- Changing the ribbon cartridge
- Cleaning the printer
- Clearing forms jams and restarting a print job

Changing Ribbon Cartridge

IBM recommends that you use IBM ribbon cartridge (part number 1053685) for the 4247 Printer. Contact your place of purchase or call Lexmark at 1-800-438-2468 to order ribbon cartridges.

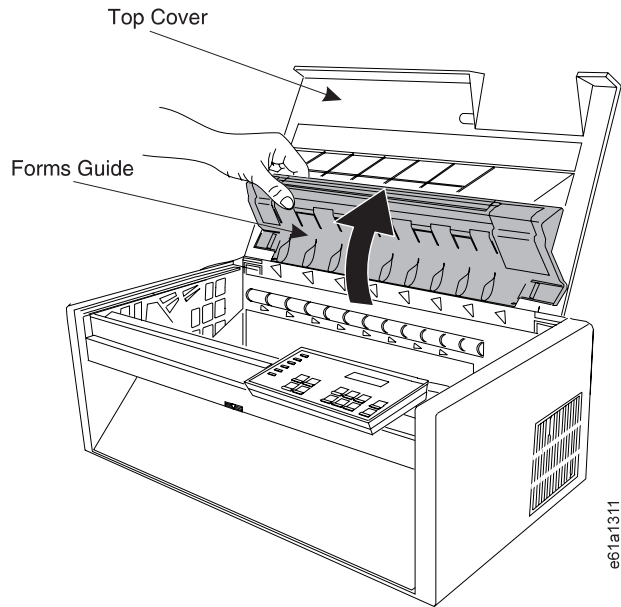
Removing Ribbon Cartridge

CAUTION:

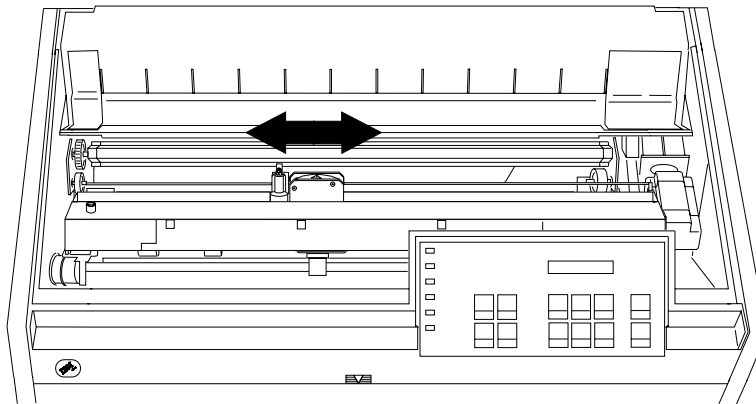
<2> The printhead may get hot during operation. Be careful when removing or replacing the ribbon cartridge.

To remove an existing ribbon cartridge, follow these steps:

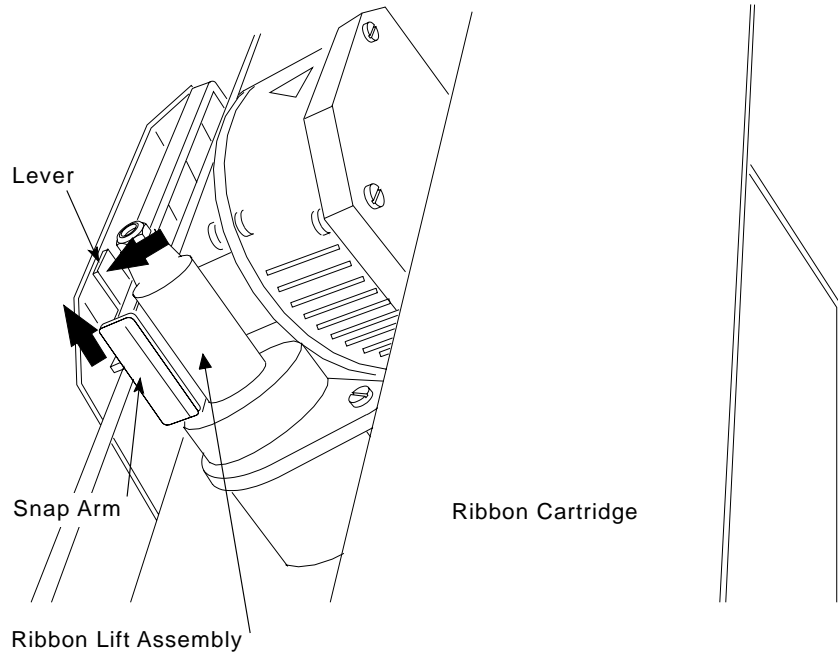
1. If the printer is powered on (I), and the **Online** indicator is lighted, press **Online** to make the printer *not ready*. Power off (O) the printer.
2. Open the top cover and the forms guide.



3. Slide the printhead to the center of the printer.



4. Pull the ribbon cartridge up until each end snaps free from the cartridge support.
5. Push and hold the lever away from the ribbon lift assembly, and remove the ribbon cartridge from the printer.

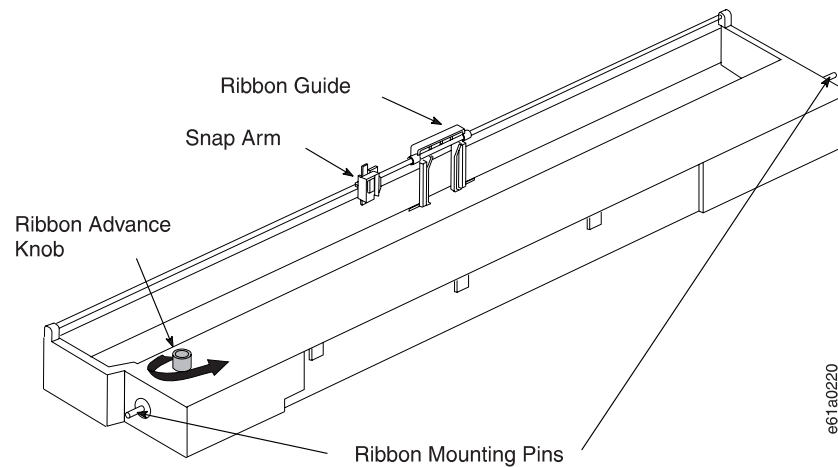


Installing Ribbon Cartridge

Note: IBM recommends that you use the IBM ribbon cartridge (part number 1053685). To order ribbon cartridges, contact your place of purchase or call Lexmark at 1-800-438-2468.

To install the ribbon cartridge, follow these steps:

1. Remove the ribbon cartridge from the package. Locate the ribbon guide, snap arm, ribbon advance knob, and the ribbon mounting pins.



2. Turn the ribbon advance knob in the direction of the arrow to take up any slack in the ribbon. If the ribbon does not move, contact your place of purchase to replace the ribbon cartridge.
3. Ensure the printer is powered off (O).
4. Open the top cover and the forms guide.

5. Slide the printhead to the center of the printer.

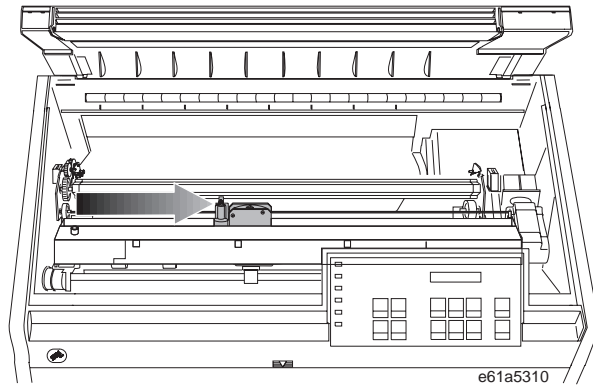
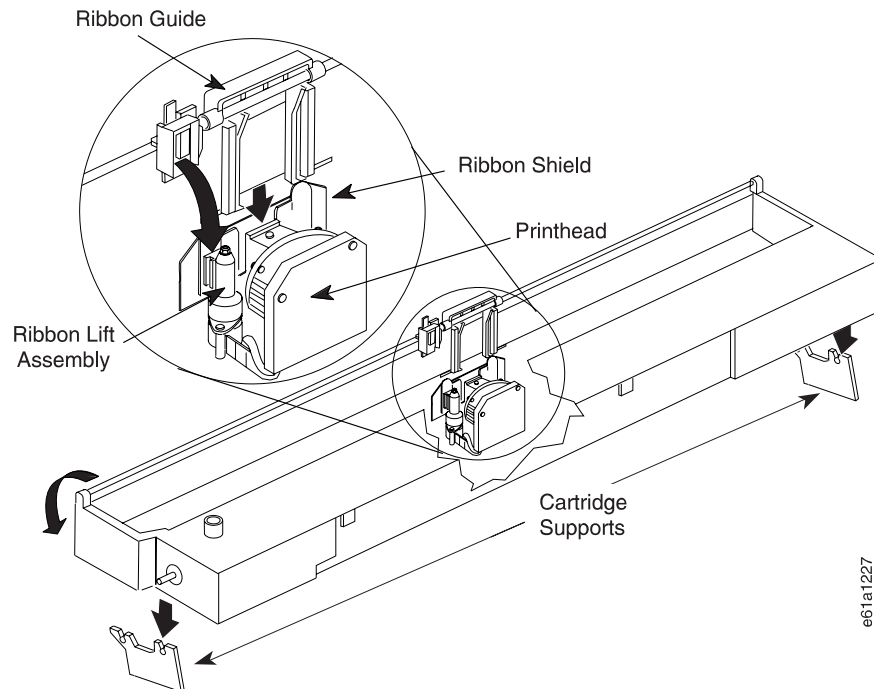


Figure 47. Sliding the Printhead to the Center of the Printer

6. With the snap arm raised higher than the ribbon lift assembly, insert the ribbon guide between the ribbon shield and the printhead. Position the snap arm with the small lever up onto the ribbon lift assembly. Push the snap arm down onto the ribbon lift assembly until the snap arm snaps into place.



7. Align the ribbon mounting pins on the left and right side of the ribbon cartridge with the slots in the cartridge supports. Snap the ribbon cartridge down into place.
8. Turn the ribbon advance knob again in the direction of the arrow to take up slack in the ribbon.
9. Slide the printhead back and forth to ensure that the ribbon guide runs freely along the ribbon.
10. If the ribbon is not running freely, or to ensure you have installed the ribbon cartridge correctly, check that:

- a. The left and right ribbon mounting pins are securely snapped into the cartridge supports
 - b. There are no twists or folds in the ribbon
 - c. The ribbon is not catching on the printhead
 - d. The ribbon moves when you turn the ribbon advance knob in the direction of the arrow. If the ribbon does not move, replace the ribbon cartridge. Contact your place of ribbon cartridge purchase.
11. Close the forms guide and the top cover.
 12. Power on (I) the printer.
 13. Press **Online** to make the printer *ready*.

You can read about removing a ribbon cartridge in “Removing Ribbon Cartridge” on page 133.

Cleaning Printer

Periodic cleaning ensures good printer performance.

Before you clean the printer:

1. Power off (O) the printer.
2. Unplug the power cord from the receptacle.
3. Remove any forms that limit your access.
4. Wait at least 15 minutes for the printhead to cool before beginning this procedure.

Cleaning Inside of Printer

1. Every few months, use a soft brush and a vacuum cleaner to remove dust, ribbon lint, and pieces of paper. Remove the ribbon cartridge to prevent the ribbon from going into the vacuum cleaner. (See “Removing Ribbon Cartridge” on page 133.) Vacuum around the printhead and in the printer cavity.

Note: Do not allow any staples, paper clips, or small metal pieces to fall inside the printer.

2. Reinstall the ribbon cartridge. See “Installing Ribbon Cartridge” on page 135.
3. Reload the forms you removed. See “Chapter 1. Printer Setup” on page 1 or “Chapter 3. Setting Up Another Forms Path” on page 39.

Cleaning Covers

Clean the outside of the printer with a damp cloth and mild soap. Do not use any spray-type or chemical cleaners anywhere on your printer. Do not put any liquids or spray near the air vents. For stubborn stains (such as ink stains) on the cover, use a commercial, mechanics hand cleaner.

Clearing Forms Jams and Restarting a Print Job

Use the following steps to clear a forms jam, reload the forms, and restart your print job.

1. If the printer is powered on (|), and the **Online** indicator is lighted, press **Online** to make the printer *not ready*.
2. Open the top cover.
3. Tear off the forms at a perforation ahead of where they enter the printer.
4. Open the tractor doors and remove the forms from the tractors.
5. Remove the ribbon cartridge. See "Removing Ribbon Cartridge" on page 133.
Attention: In the next step, if you cannot easily move the printhead, **do not force it**.
6. Move the printhead to the far right.
7. Remove the jammed forms by pulling them in the direction of printing. If this clears the jam, go to step 9. If the jam still exists, remove the paper bail. Do not reinstall the ribbon cartridge or close the forms guide or the top cover until you have cleared the jam. See "Removing Paper Bail" on page 48.
8. Remove jammed forms by pulling in the direction of printing.
9. Reinstall the paper bail and the ribbon cartridge, and close the forms guide and the top cover. See "Installing Paper Bail" on page 48.
10. Cancel the print job at your computer.
11. To clear buffered print data (buffered data is indicated by a blinking **Online** indicator), press **Menu/Enter** and then press **Online**. The message 99 RESET momentarily displays.
12. Reload forms. See "Chapter 1. Printer Setup" on page 1 or "Chapter 3. Setting Up Another Forms Path" on page 39.
13. Press **Online** to make the printer *ready*.
14. Resend your print job.

Chapter 7. Resolving Printer Problems

About This Chapter	139
Status Codes and Messages	139
Various Problems	142
Printed Output Problems	142
Other Problems	143
Print Quality and Ribbon Problems	147
Configuration Problems	150
Miscellaneous Problems	150

About This Chapter

Use this chapter to resolve problems that prevent you from printing a job. See the following information to resolve your printer problem.

- See “Status Codes and Messages” to learn about a status code or message that appears in the display
- Page 142 for possible causes and recovery action for a physical problem such as a forms jam
- Page 147 to correct poor print quality
- Page 150 for configuration problems
- Page 150 for miscellaneous problems

Status Codes and Messages

When a problem with the printer occurs, the printer may display a status code and a message. Find the code listed in numeric order on the following pages and perform the steps necessary to fix the problem. Only codes for which an operator can take action are included.

Notes:

1. If you get a code that you cannot find in this chapter, record the code and run the job again. If you get the same code, call for service.
2. If you cannot fix the problem, power off (O) the printer. Wait 10 seconds. Power on (I) the printer. If the problem still exists, call for service.

01 END OF FORMS

Message: An end-of-forms condition exists in one or more of the forms paths. One or more of the status indicator lights will blink showing you which path is out of forms.

Recovery:

1. Load forms in the appropriate forms path.
Depending on your forms, see Chapter 1. Printer Setup or Chapter 3. Setting Up Another Forms Path.
2. Press **Load/Form Feed**.
3. Press **Online**.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

02 FORMS JAM CHECK PATH

Message: A forms jam was detected by the front or rear tractor motion sensor or by the paper present sensor. One or more of the status indicator lights will blink showing you which path contains jammed forms.

Recovery:

1. Clear the jammed or torn forms. See “Clearing Forms Jams and Restarting a Print Job” on page 137.
2. Ensure the paper bail and the forms guide deflector are in the correct positions. See Table 5 on page 39.
3. If you are printing using the Rear Push, Rear Pull, or Push Pull forms path, make sure the rear paper door is open for the forms to pass through.
4. Press **Online** to clear the error message.
5. Press **Online** again to resume printing.
6. Perform the actions under “Forms buckle, twist, jam, or tear”. See “Printed Output Problems” on page 142.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

05 MANUAL FEED INSERT FORM

Message: A forms overlay condition is requested.

Recovery: Insert a form in the Manual Sheet Feed path. See “Setting Up Manual Sheet Feed Path” on page 30.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

06 MANUAL FEED

Message: You requested to use the Manual Sheet Feed path.

Recovery:

1. Insert a form in the Manual Sheet Feed path. See “Setting Up Manual Sheet Feed Path” on page 30.
2. Press **Load/Form Feed**.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

11 LOAD BIN 1

Message: An end-of-forms condition was detected in the ASF bin 1.

Recovery:

1. Load forms into bin 1.
2. Press **Load/Form Feed**.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

11 LOAD BIN 2

Message: An end-of-forms condition was detected in the ASF bin 2.

Recovery:

1. Load forms into bin 2.
2. Press **Load/Form Feed**.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

11 LOAD BIN 3

Message: An end-of-forms condition was detected in the ASF bin 3.

Recovery:

1. Load forms into bin 3.
2. Press **Load/Form Feed**.

If the message displays again, tune the sensor. See “Sensor Tune” on page 103.

If the message still displays, call for service.

20 DSR ERROR CHECK INTF

Message: The printer detected a remote connection serial interface error. The Data Set Ready or Data Carrier Detect signal was not sensed.

Recovery:

1. Power off (O) the printer.
2. Check that the interface cable is connected to the printer and to the modem.
3. Check that the serial configuration parameters are set correctly. See “Serial Interface” on page 91.
4. Power on (I) the printer.
5. If the message displays again, call for service.

21 OVFL ERROR CHECK INTF

Message: An overflow condition occurred in the buffer—data has been lost.

Recovery:

1. Press **Online** to clear the error message.
2. Check BUFFER size and PACING protocol values in the SERIAL INTERFACE category in the Power On Configuration Menu. See “Serial Interface” on page 91.
3. Restart the print job.

4. If the message displays again, call for service.

35 MARGIN ERROR

Message: An error occurred because the Horizontal Adjustment value that was set in the Program Configuration menu is too large and would cause the printhead to hit the right side of the printer frame.

Recovery:

1. Press **Online** to clear the error message.
The printer will automatically reset the Horizontal Adjustment value to 10 (manufacturing default) and continue printing.
2. If you do not want to use the manufacturing default value, try another value less than the value you previously set. See "Horizontal" on page 112.

55 AFTA ERROR

Message: The Automatic Forms Thickness Adjustment (AFTA) is not operational.

Recovery:

1. Power off (O) the printer.
2. Wait 10 seconds. Power on (I) the printer.
3. If the message displays again, call for service.

56 PRINT ERROR

Message: A printhead position error was detected.

Recovery:

1. Press **Online** to clear the error message.
2. Press **Online** again to resume printing.
3. If the message displays again, call for service.

70 SW ERR x y zz

Message: An error was detected by the Supervisor Module software.

Recovery:

1. Power off (O) the printer.
2. Wait 10 seconds. Power on (I) the printer.
3. If the message displays again, call for service.

71 SW ERR x y zz

Message: An error was detected by the Interpreter (data stream) Module software.

Recovery:

1. Power off (O) the printer.
2. Wait 10 seconds. Power on (I) the printer.
3. If the message displays again, call for service.

72 SW ERR x y zz

Message: An error was detected by the Print Manager Module software.

Recovery:

1. Power off (O) the printer.
2. Wait 10 seconds. Power on (I) the printer.
3. If the message displays again, call for service.

73 SW ERR x y zz

Message: An error was detected by the Print Manager Module software.

Recovery:

1. Power off (O) the printer.
2. Wait 10 seconds. Power on (I) the printer.
3. If the message displays again, call for service.

89 RIBBON JAM CHECK RIBBON

Message: The ribbon motion sensor detected an error.

Recovery:

1. Press **Online** to clear the error message.
2. Remove the ribbon cartridge. See "Removing Ribbon Cartridge" on page 133.
3. Turn the ribbon advance knob to ensure the ribbon is advancing correctly. If the ribbon does not advance correctly, replace the ribbon cartridge.
4. Reinstall the ribbon. See "Installing Ribbon Cartridge" on page 135.
5. Press **Online** to resume printing.
6. If the message displays again, call for service.

90 CLOSE COVER

Message: Displays when the printer is offline and the top cover is open.

Recovery: Close the top cover.

91 EJECT FORM

Message: Displays when **Park** was pressed and a cut-sheet form is in the Manual Sheet Feed path.

Recovery:

1. Insert a form in the manual feed path.
2. Press **Load/Form Feed**.

92 EJECT: SURE?

Message: Displays the confirmation that **Park** was pressed, and one of the following conditions exists on the printer:

- Forms are loaded in the front path and FRONT TEAR=NO is selected in the Power On Configuration menu.
- or
- Forms are loaded in the rear path and REAR TEAR=NO is selected in the Power On Configuration menu.

Recovery: Press **Park** again immediately to eject the forms and clear the message.

93 CONFIRM PARK

Message: Displays if continuous forms were loaded in the front or rear forms paths and a command sequence was sent from the host to park the forms.

Recovery: Press **ONLINE** to park the forms and clear the message.

94 PARK: SURE?

Message: Displays the confirmation that **Park** was pressed.

Recovery: Immediately press **Park** again to park the continuous forms if forms are currently installed in the Front Push or Rear Push path or eject the forms if forms are installed in the Rear Pull path.

95 CHANGE NVM

Message: Displays at power-on when the firmware EPROM is changed.

Recovery: No action required.

96 COVER OPEN

Message: Displays when the printer is in an **Online** ready state and the top cover is open. The audible alarm also will beep if ALARM is set to YES in the Power On Configuration menu.

Recovery: Close the top cover.

97 STACKER ERROR

Message: Displays when the Automatic Sheet Feeder stacker is removed from the printer.

Recovery:

1. Power off (O) the printer.
2. Plug in the stacker again.
3. Make sure all parts of the Automatic Sheet Feeder (ASF) are installed correctly. See the *4247 Printer Automatic Sheet Feeder Guide* to install or remove the ASF. See Chapter 4. Configuring Your Printer after removing the ASF.
4. Power on (I) the printer.

99 RESET

Message: Displays when **Online** was pressed while the printer was in the Program Configuration, or when **Online** was pressed to cancel a print job. The message displays momentarily and is cleared.

Recovery: No action required.

Various Problems

Some problems may occur on your printer for which no status code or message will occur such as poor print quality, a visual problem, or a forms-advance problem.

Printed Output Problems

You may notice problems with the printed output from the printer. Locate your symptom in the table. To correct the condition, go to the page listed for that problem and follow the steps provided.

Table 12. Printed Output Problems

Problem	Page
Forms do not advance, or overprint occurs	143, 144
Forms buckle, twist, jam, or tear	144
Forms jam or do not feed into printer	145
Forms do not feed past the printhead	146
Top right corner of 14 7/8 inch-wide form being folded over	146

Table 12. Printed Output Problems (continued)

Problem	Page
Forms do not stack	146
Cut-sheet form fed from the Manual Sheet Feed does not overlay continuous form properly	147

Table 13. Print Quality/Ribbon Problems

Problem	Page
Characters off registration	147
Incomplete characters print	148
Missing dots	148
No print	148
Partial print characters	149
Partial print lines	149
Printing too light	149
Printing too dark	148
Smudging	148
Ribbon moving continuously	150
Ribbon folding, snagging, tearing, or not moving	149
Irregular characters	148
Variations in print densities (light, dark, or cut-off printing) within the same line of print	149
Wavy print	149
Unreadable characters	147
Line-to-line horizontal misregistration	150

Other Problems

You may notice other problems with your printer. Locate your symptom in the following tables. Correct the condition by following the steps listed for that problem.

Table 14. Configuration Problems

Problem	Page
Messages display in wrong language	150
Wrong print language	150
Printer does not print or prints wrong characters	150

Table 15. Miscellaneous Problems

Problem	Page
Throughput at half speed	150
Printer has no power	150

Problem: Forms do not advance or overprint occurs

1: The forms tractor is not snapped in.

Solution: Check the installation of the tractor unit.

2: The ribbon is getting caught on the forms.

Solution: Check the ribbon for twists or folds.

3: The *Push-Pull selector* is not set to the correct position.

Solution: If the forms tractor is in the Front Push or the Rear Push position, set the push-pull selector to the **push** position. If the forms tractor is in the rear pull or push-pull position, set the push-pull selector to the **pull** position. See "Setting Push-Pull Selector" on page 46.

4: The printer is failing.

Solution: Power off (O) the printer. Wait 10 seconds, and power on (I) the printer. If you get a status code, go to "Status Codes and Messages" on page 139. If no code displays, press **Micro ↑** several times. If forms do not feed each time you press **Micro ↑**, call for service.

Problem: Overprint occurs at top or bottom line of page

1: There is a problem with the application program.

Solution: See your programmer.

Problem: Forms buckle, twist, jam, or tractor holes tear

1: The right tractor is adjusted incorrectly.

Solution: Move the right tractor to obtain the correct forms width. The tractor pins should be in the center of the tractor holes. See "Loading Forms into Front Push Forms Path" on page 20 or the appropriate section in Chapter 3. Setting Up Another Forms Path for information about adjusting the tractor tension.

2: The forms tractor is installed incorrectly.

Solution: Check the forms tractor installation. See "Loading Forms into Front Push Forms Path" on page 20 or the appropriate section in Chapter 3. Setting Up Another Forms Path.

3: The paper bail and forms guide deflector are not in their correct operating positions.

Solution: See "Setting Forms Guide Deflector" on page 44 or "Removing or Installing Paper Bail" on page 47.

4: The printer is not at the edge of the table.

Solution: Move the front of the printer to the edge of the table if you are using the front forms path; move the rear of the printer to the edge of the table if you are using the rear forms path. Consider using the optional printer stand mentioned in "Optional Printer Stand" on page 32.

5: The forms supply is not below the level of the printer.

Solution: Move the forms supply to the floor or to a shelf that is below the level of the printer. Consider using the optional printer stand mentioned in “Optional Printer Stand” on page 32.

6: The forms supply is not aligned with the printer.

Solution: Reposition the forms supply so that the forms feed evenly. Depending on your forms path, see “Loading Forms into Front Push Forms Path” on page 20 or the appropriate section in Chapter 3. Setting Up Another Forms Path.

7: The forms are catching on the carton edge.

Solution: Remove the uneven carton edges, or remove the forms from the carton.

Note: As the forms reach the bottom of the box, this problem can occur more often.

8: Top right corner of 14 7/8 inch-wide forms is being folded over.

Solution: See “Top right corner of 14 7/8 inch-wide form being folded over”

9: The ribbon is twisted or folded.

Solution: Check the ribbon for folds or twists.

10: The forms contain excessive moisture.

Solution: Store the forms in a cool, dry place before using them, or store the forms in the printer area for 24 hours.

11: The forms are defective.

Solution: Try unloading, then reloading forms. Forms should meet the requirements specified in Chapter 8. Supplies, Forms, and Cables. Depending on your forms, see Chapter 1. Printer Setup or the appropriate section in Chapter 3. Setting Up Another Forms Path for loading instructions.

Problem: Forms jam or do not feed into printer

1: The forms tractor is installed incorrectly.

Solution: Check the forms tractor installation. See “Loading Forms into Front Push Forms Path” on page 20 or the appropriate section in Chapter 3. Setting Up Another Forms Path.

2: The ribbon is twisting or folding.

Solution: Try moving the printhead back and forth while turning the ribbon

advance knob. If the ribbon advance knob does not turn, replace the ribbon. See “Removing Ribbon Cartridge” on page 133.

- 3: The printer forms path was not configured.

Solution: Set the correct forms path setting in the Power On Configuration Menu. See Chapter 4. Configuring Your Printer.

- 4: The message 02 FORMS JAM CHECK PATH displays on the operator panel, but there are no forms jam in any forms path.

Solution: The sensors need to be tuned. See “Sensor Tune” on page 103.

Problem: Forms do not feed past printhead

- 1: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be changed.

- 2: The forms tractor is not installed properly.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under Program Configuration in Chapter 4. Configuring Your Printer.

- 3: The ribbon is twisting or folding.

Solution: Try moving the printhead back and forth while turning the ribbon advance knob. If the ribbon advance knob does not turn, replace the ribbon. See “Removing Ribbon Cartridge” on page 133.

- 4: You are using thick, multiple-part forms.

Solution: See the procedure for setting perforation safety to Yes through the operator panel under Program Configuration in Chapter 4. Configuring Your Printer.

Problem: Top right corner of 14 7/8 inch-wide form being folded over

- 1: Ensure that the left tractor is located at the tractor alignment mark. See “Loading Forms into Front Push Forms Path” on page 20.

- 2: If the problem still occurs, move both tractors to the right about 1/8 in. (3mm) and increase the horizontal adjustment setting in the Program Configuration Menu by +5. (Example: Make HORIZ ADJ = 15.) See “Horizontal” on page 112.

Problem: Forms do not stack correctly

- 1: The forms do not stack correctly on the table.

Solution:

- Use the recommended table size. See Appendix A. Specifications.

Note: Up to 101.6 mm (4 in.) of forms may stack on the table behind the printer without degradation to forms stacking.

- Check for obstructions to the forms path (cables, cords, or other items). If you find an obstruction, remove or relocate it. For more information, see “Loading Forms into Front Push Forms Path” on page 20 or the appropriate section in Chapter 3. Setting Up Another Forms Path.

2: The forms do not meet IBM specifications.

Solution: The forms may be outside nominal specifications. See Chapter 8. Supplies, Forms, and Cables.

3: The forms contain excessive moisture.

Solution: Store the forms in a cool, dry place before using them or leave in the printer for 24 hours.

Note: Forms stack best when the forms are 203.2 to 304.8 mm (8 to 12 in.) long. Using a forms length outside this range may require operator assistance.

4: The forms are too dry.

Solution: Condition the forms for 24 hours or more at the forms manufacturer’s recommended temperature and humidity settings.

Problem: Characters are off registration

1: The first print position is adjusted incorrectly.

Solution: Check your settings for the left margin, horizontal adjustment, vertical adjustment, and the top of form position. See Chapter 4. Configuring Your Printer for information on adjusting these settings.

2: Left tractor or cut-sheet feed alignment guide not set to left alignment mark.

Solution: Set the left tractor to the left tractor alignment mark or set the left cut-sheet feed alignment guide to the alignment mark.

Problem: Cut-sheet form fed from the Manual Sheet Feed does not overlay continuous forms properly

1: The cut-sheet form is skewed as it goes into the printer or does not feed into the printer at all.

Solution: Hold the cut-sheet form firmly in place until the form is fed into the printer.

Print Quality and Ribbon Problems

Problem: Unreadable characters

1: The ribbon is dry or worn.

Solution: Check the ribbon and replace it if it is dry or worn. See “Changing Ribbon Cartridge” on page 133.

- 2: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be decreased.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under “Automatic Forms Thickness (AFTA)” on page 111.

- 3: Poor quality multiple-part forms.

Solution: Try new forms.

Problem: Missing dots or irregular characters

- 1: The ribbon is worn.

Solution: Check the ribbon for wear; replace it if necessary. See “Changing Ribbon Cartridge” on page 133.

- 2: The ribbon is twisted or folded.

Solution: Try moving the printhead back and forth while turning the ribbon advance knob. If the ribbon advance knob does not turn, replace the ribbon. See “Changing Ribbon Cartridge” on page 133.

- 3: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be changed.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under “Automatic Forms Thickness (AFTA)” on page 111.

- 4: The forms tractor is not seated correctly.

Solution: Check the forms tractor installation. See “Loading Forms into Front Push Forms Path” on page 20 or the appropriate section in Chapter 3. Setting Up Another Forms Path.

Problem: Ribbon smudging forms

- 1: The ribbon is twisted or folded.

Solution: Try moving the printhead back and forth while turning the ribbon advance knob. If the ribbon advance knob does not turn, replace the ribbon. See “Changing Ribbon Cartridge” on page 133.

- 2: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be increased.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under “Automatic Forms Thickness (AFTA)” on page 111.

- 3: The ribbon cartridge is defective.

Solution: Replace the ribbon cartridge. See “Changing Ribbon Cartridge” on page 133.

4: The ribbon is over-inked.

Solution: Replace the ribbon. See “Changing Ribbon Cartridge” on page 133.

Problem: Printing is too light or partial characters print

1: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be changed.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under “Automatic Forms Thickness (AFTA)” on page 111.

2: The ribbon guide is seated incorrectly or the white snap arm is not snapped in place.

Solution: Remove the ribbon and reinstall it. See “Changing Ribbon Cartridge” on page 133.

Problem: Wavy print lines

1: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be changed.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under “Automatic Forms Thickness (AFTA)” on page 111.

2: The forms are loaded incorrectly.

Solution: Check to see that the forms are loaded properly.

Problem: Ribbon snagging, tearing, or not moving

1: The ribbon is worn.

Solution: Replace the ribbon cartridge. See “Changing Ribbon Cartridge” on page 133.

2: The ribbon cartridge is not properly installed.

Solution: Remove and then reinstall the same ribbon. See “Changing Ribbon Cartridge” on page 133. If the ribbon still does not move, replace the ribbon.

3: The Automatic Forms Thickness Adjustment (AFTA) setting needs to be changed.

Solution: See the procedure for adjusting the forms thickness setting through the operator panel under “Automatic Forms Thickness (AFTA)” on page 111.

4: The printhead is catching on the ribbon.

Solution: Call for service.

Problem: Ribbon moves continuously

1: The ribbon drive circuit is failing.

Solution: Call for service.

Problem: Line-to-line horizontal misregistration

1: The dot registration of the characters printed is not aligned.

Solution: Perform the Bidirectional Adjustment test in the Power On Configuration menu. See “Bidirectional Adjustment” on page 104.

Configuration Problems

Problem: Messages on the operator display panel are in the wrong language

1: Wrong language set selected.

Solution: See “Changing Display Language” on page 19.

Problem: Wrong Print Language

1: Wrong print language set.

Solution: See “Print Language” on page 87 for information about selecting language sets.

Problem: Printer doesn't print or prints wrong characters

1: Nothing is printed or the wrong characters print.

Solution:

- Make sure the printer cable is attached to the host.
- Check the Power On Configuration menu host interface settings. See Chapter 4. Configuring Your Printer.

Miscellaneous Problems

Problem: Throughput of printer at half speed

1: The Quiet Print function is set on.

Solution: Press **Quiet**. If the message QUIET PRINT=ON displays, press **Quiet** again to disable the function. The printer will now print at its normal speed.

Problem: Printer has no power

1: The power cord is not connected.

Solution: Ensure the power cord is plugged into the printer and into the receptacle. Ensure that the receptacle is working correctly.

Chapter 8. Supplies, Forms, and Cables

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This chapter describes how to order ribbon cartridges, how to define your forms needs, and how to specify a signal cable. Ribbon cartridges and forms are the only supplies you need for your printer.

Ordering Ribbon Cartridges

Use IBM part number 1053685 when ordering a new ribbon cartridge. Contact your place of purchase or call Lexmark at 1-800-438-2468 to order cartridges.

Forms Specifications

The 4247 Printer prints on continuous forms and cut-sheet forms. Before ordering volumes of forms, test and evaluate all forms in the anticipated physical environment. Consider the affects of such factors as temperature and humidity on forms handling, print registration, and print quality. The forms you select should meet the following specifications.

Note: With the addition of the optional Automatic Sheet Feeder you can print on individual sheets of cut-sheet, xerographic paper, and on envelopes. Refer to the *4247 Printer Automatic Sheet Feeder Guide* for paper information.

Paper Criteria	Characteristics	Forms Paths		
		Continuous Forms		Cut Sheet
		Front Push, Rear Pull, Push Pull	Rear Push	Manual Feed
Dimensions	Width	76.2 to 431.8 mm 3 to 17 in.	76.2 to 431.8 mm 3 to 17 in.	114.3 to 444.5 mm 4.5 to 17.5 in. (Note 8)
	Length	76.2 to 609.6 mm 3 to 24 in.	76.2 to 609.6 mm 3 to 24 in.	101.6 to 609.6 mm 4 to 24 in. (Note 8)
Single Part	Weight	55 to 150 g/m ² 15 to 40 lb	55 to 80 g/m ² 15 to 21 lb	50 to 120 g/m ² 13.3 to 32 lb
	Thickness (minimum)	0.08 mm 0.003 in.	0.08 mm 0.003 in.	0.08 mm 0.003 in.
Multiple Part	Maximum parts (Original + Copies)	8	4	8
	Overall Thickness	0.08 to 0.635 mm 0.003 to 0.025 in.	0.08 to 0.35 mm 0.003 to 0.014 in.	0.08 to 0.635 mm 0.003 to 0.025 in.
	Weight of top part	55 to 150 g/m ² 15 to 40 lb	55 to 80 g/m ² 15 to 21 lb	55 to 150 g/m ² 15 to 40 lb
	Attached sheet individual weight	45 to 75 g/m ² 12 to 20 lb	45 to 75 g/m ² 12 to 20 lb	45 to 75 g/m ² 12 to 20 lb
	Carbon paper individual weight	14 to 35 g/m ² 4 to 9 lb	14 to 35 g/m ² 4-9 lb	14 to 35 g/m ² 4 to 9 lb
See these notes for each forms path.		1, 2, 3, 5, 6	1, 2, 3, 4	7, 8, 9

Paper Criteria	Characteristics	Forms Paths		
		Continuous Forms		Cut Sheet
		Front Push, Rear Pull, Push Pull	Rear Push	Manual Feed

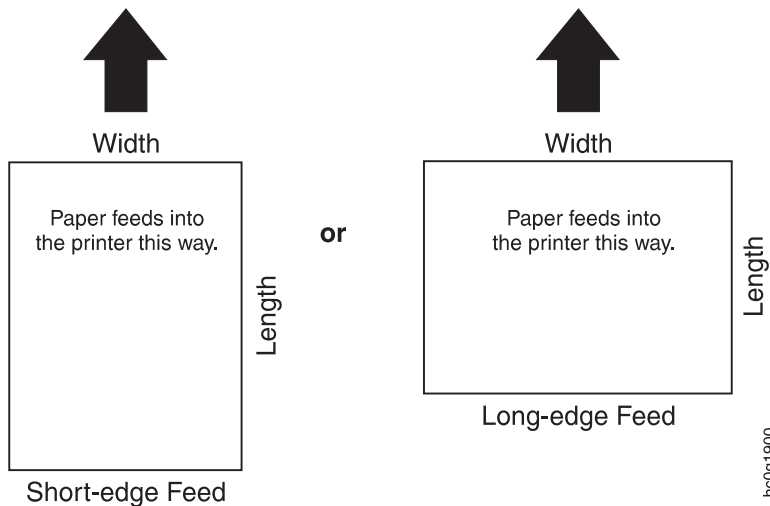
Notes:

Continuous Forms

1. Test forms less than 152.4 mm (6 in.) in length or width for satisfactory stacking. These forms may require additional operator attention.
2. For optimum performance, restrict the printable area to be within 6.4 mm (0.25 in.) from all edges, holes, or folds on the forms.
3. Some multiple-part forms (such as mailers, thick/heavy perforations) may cause problems when using the Park function. Try the forms first. To minimize parking problems, discuss your needs with your forms supplier when selecting forms.
4. IBM does not recommend continuous forms with adhesive labels.
5. To prevent the separation of labels from continuous-forms when using the **Tear** or **Park** keys, set FRONT TEAR=NO or REAR TEAR=NO in the Power On Configuration menu. Making this configuration change does the following:
 - Disables the **Tear** key tear-off function
 - Modifies how the **Park** key works for forms in the Front Push and Rear Push forms paths. You cannot back up the forms to park them. Break the forms at a perforation before they enter the printer. Press **Park** twice, and the forms will move forward until ejected from the printer.
6. Black-back forms cannot be used in these forms paths. They can only be used in the Rear Push, Manual Sheet Feed, and Auto Sheet Feed (bins 1, 2, and 3) forms paths.

Cut-Sheet Forms

7. The following sizes of cut-sheet forms may be used in the Manual Sheet Feed forms path: A5, A4, A3, A2, Letter, Legal, Executive.
8. For optimum performance, restrict printing to 12.7 mm (0.5 in.) from all edges, holes, or folds on the forms.
9. The term *length* applies to the forms dimension parallel to the forms motion.



Ordering Signal Cable

You can order signal cables and connectors through your IBM marketing representative. You also can purchase the cables and connectors from other suppliers. However, the cables and connectors from suppliers other than IBM must conform to IBM specifications.

A signal cable connects the printer to other controllers or computers. The printer does not come with a signal cable.

It is your responsibility to obtain, install, and maintain the signal cable. In addition, it is your responsibility to ensure the cabling meets the applicable local, state, and federal building codes. The cables are available in bulk sizes or in pre-cut lengths. You can purchase components or preassembled cables from IBM.

Use the information on the following pages to order the correct cable. For additional information on cabling requirements, refer to the *Guide to Operations* for the computer to which you are attaching the printer.

Serial Attachment

The 4247 Printer attaches to a host or controller by one of two serial interfaces, RS-232C or RS-422A. A single, 25-pin D-connector mounted directly on the adapter card allows attachment to either interface.

The RS-232C interface uses a standard serial cable up to 15.2 m (50 ft) in length, with transmission rates up to 19.2 Kbps.

The RS-422A interface uses a serial cable up to 1219 m (4,000 ft) in length, with transmission rates up to 38.4 Kbps.

RS-232C Connector Pin Assignments

Pin Number	Signal Name	Description
2	TXD	Transmit Data
3	RXD	Receive Data
4	RTS	Request to Send
5	CTS	Clear to Send
6	DSR	Data Set Ready
7	SG	Signal Ground
20	DTR	Data Terminal Ready

RS-422A Connector Pin Assignments

Pin Number	Signal Name	Description
15	- RXD	Receive Data
17	+ RXD	Receive Data
19	- TXD	Transmit Data
25	+ TXD	Transmit Data

Attachment Cables for PCs and Compatible Serial Ports

The table below lists part numbers to use when ordering a cable.

Note: Before you place an order, IBM recommends you contact your IBM marketing representative to verify the current part number.

Interface Type	Cable Part Number	IBM Standard Length
RS-232C	8509386	6.1 m (20 ft)
RS-422A	70X8652	15.2 m (50 ft)

Attachment Cables for AS/400 Workstation Controllers

The table below lists part numbers to use when ordering a cable.

Note: Before you place an order for a cable, IBM recommends you contact your IBM marketing representative to verify the current part number.

Interface Type	Cable Part Number	IBM Standard Length
RS-232C	21F4342	12.2 m (40 ft)
RS-422A	21F4346	30.5 m (100 ft)

Attachment Cable for RISC System/6000

The table below lists a part number to use when ordering a cable.

Note: Before you place an order for a cable, IBM recommends you contact your IBM marketing representative to verify the current part number.

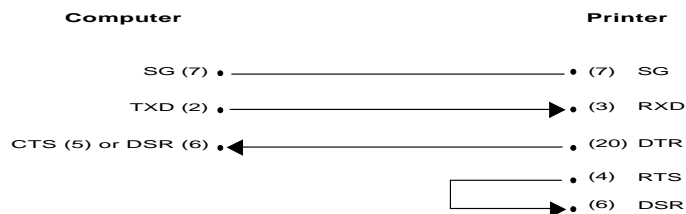
Interface Type	Cable Part Number
RS-232C Serial Cable Kit: IBM Async Cable EIA-232/V.24 and Printer/Terminal Interposer EIA-232	08H6957

Cable Configurations

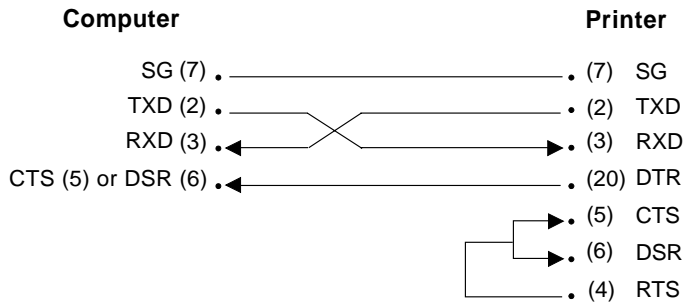
Cable configurations depend on the computer or devices and machines in the controlling system. The following diagrams show some of the possible configurations for the RS-232C and RS-422A connection.

RS-232C

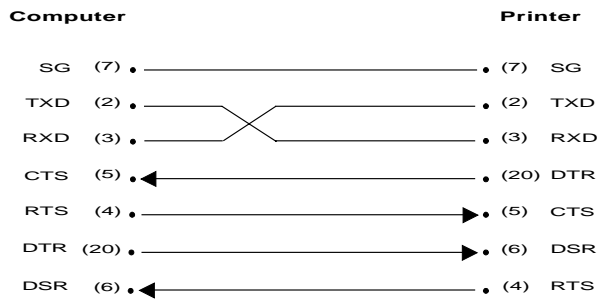
Local Simplex – DTR Pacing



Local Duplex – DTR or XON/XOFF Pacing

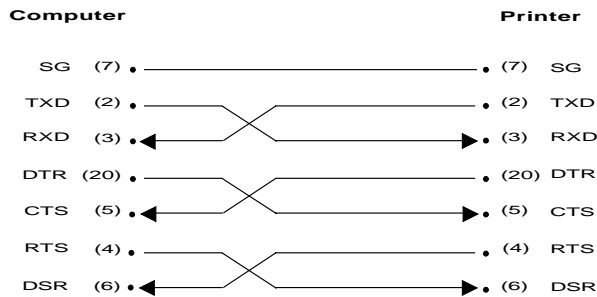


Local Duplex – DTR or XON/XOFF Pacing

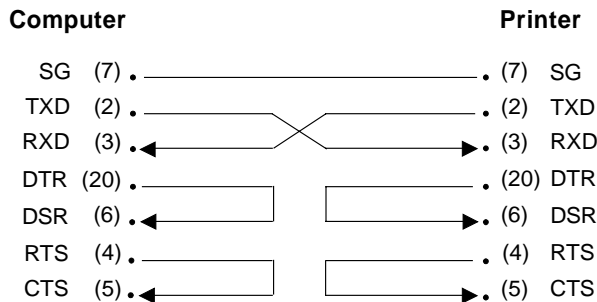


Note: This configuration is compatible with IBM cable part number 8509386.

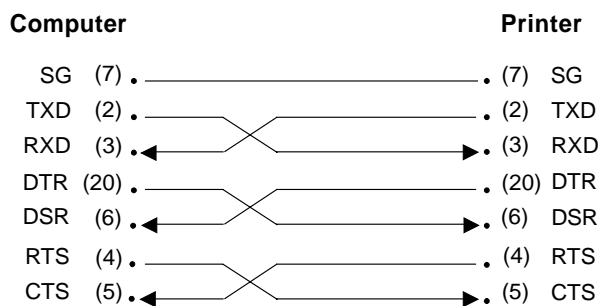
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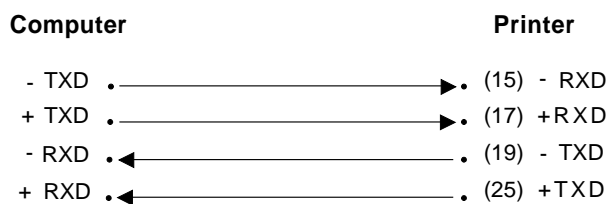
Local Duplex – XON/XOFF Pacing



Local Duplex – XON/XOFF Pacing



RS-422A



IBM Parallel Attachment

The 4247 Printer supports the IBM Parallel printer interface. A single, 36-pin connector is mounted on the adapter card.

The PC-parallel interface attaches to the host with a standard PC Parallel printer cable (IBM part number 92F3176) up to 1.8 m (6 ft) in length.

Table 16. IBM Parallel Connector Pin Assignments

Pin Number	Signal Name	Description
1	-STROBE	Strobe
2 - 9	DATA	Eight Data Lines
10	-ACKNLG	Acknowledge
11	BUSY	Busy
12	PE	Out of Forms
13	SLCT	Printer Selected
14	-AUTO FEED XT	Automatic Line Feed on EOL
15	Unused	
16	LOGIC GND	Logic Ground
17	CHASSIS GROUND	Chassis Ground
18	Unused	
19 - 30	GROUND	Ground
31	-INIT	Initialize Printer
32	-ERROR	Printer Error
33	GROUND	Ground
34, 35	Unused	

Table 16. IBM Parallel Connector Pin Assignments (continued)

Pin Number	Signal Name	Description
36	-SLCT IN	Make printer selected

Appendix A. Specifications

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Site Location

The site that you select for your new printer must meet the specifications and conditions shown on the following pages.

Place your printer so that the printer is not affected by electrostatic discharges, which can cause discomfort to persons. Such discharges also can cause problems with the printer operation or the machines to which the printer connects. Avoid the factors that cause the buildup of electrostatic charges, such as:

- Floor surfaces with low resistance to electrical charges
- Carpeting without antistatic properties
- Plastic seat coverings
- Metal-frame furniture
- Low-humidity environment

If the printer is set up on a raised floor, you should remember that the power cord and the signal cable exit from the rear of the printer at the base.

For reliable forms feeding, IBM recommends a printer stand or table that is approximately 381 mm (15 in.) deep, at least 762 mm (30 in.) wide, and 762 mm (30 in.) high. The shelf should be approximately 381 mm (15 in.) from the floor. If you use a table outside this range, you reduce efficiency or stability, and thus may have to monitor printer operation.

Notes:

1. An optional printer stand is available for your 4247 Printer. For more information on this printer stand, see "Optional Printer Stand" on page 32 or contact your IBM marketing representative.

- For additional information on stacking, see “Setting Up Manual Sheet Feed Path” on page 30 or “Chapter 3. Setting Up Another Forms Path” on page 39, depending on your forms path.

Environmental Requirements

The printer operates best in business offices.

Attention: To prevent printer damage, do not power on (I) the printer immediately after the printer has been moved from an environment that does not meet the following operating requirements. Introduce the printer to the new operating environment at least 24 hours before you power it on (I).

Operating Environment

The following tables show the operating environment requirements for the printer.

Variable	Range or Value
Temperature	10° to 40° C (50° to 104°F) 16° to 32° C (60° to 90°F) with ASF
Relative humidity	8% to 80%
Maximum wet bulb temperature	26.7°C (80.0°F) 22.8°C (73.0°F) with ASF

Note: The best conditions for feeding and stacking are within a temperature range of 15.6° to 32.2°C (60° to 90°F) and a relative humidity range of 26% to 62%.

Nonoperating Environment

The following tables show the non-operating environment requirements for the printer.

Variable	Range or Value
Temperature	10° to 51°C (50° to 125°F) 10° to 43°C (50° to 109°F) with ASF
Relative humidity	8% to 80%
Maximum wet bulb temperature	26.7°C (80°F) 27.0°C (80.6°F) with ASF

Shipping Environment

The following table shows the shipping environment requirements for the printer.

Variable	Range or Value
Temperature	-40° to 60°C (-40° to 140°F)
Relative humidity	5% to 100% (including condensation, excluding rain)
Maximum wet bulb temperature	30°C (86°F)

Note: The printer must be covered in plastic.

Storage Environment

The following table shows the storage environment requirements for the printer.

Variable	Range or Value
Temperature	1° to 60°C (34° to 140°F)
Relative humidity	5% to 80%
Maximum wet bulb temperature	30°C (86°F)

Note: Extended exposure to temperatures in excess of 41°C (105°F) degrades ribbon performance and print quality.

Physical Requirements

Dimensions

Table 17 provides the dimensions of the printer.

Table 17. Printer Dimensions

Dimensions	Standard	With ASF
Width	679.5 mm (26.75 in.)	679.5 mm (26.75 in.)
Depth	400 mm (15.75 in.)	673.1 mm (26.5 in.). See Note
Height	311.2 mm (12.25 in.)	431.8 mm (17.0 in.)

Note: Depth is with all three ASF bins installed.

Clearance

Table 18 provides the recommended clearance you should maintain around the printer. Also see Figure 49 on page 167 and Figure 50 on page 168.

Table 18. Printer Clearance

Location	Clearance
Top	400 mm (16 in.)
Front	450 mm (18 in.)
Rear	450 mm (18 in.)
Left	150 mm (6 in.)
Right	150 mm (6 in.)

Weight

CAUTION:

<1> The printer (without optional features attached) weighs approximately 24.9 kilograms (55 pounds). Before attempting to lift the printer, get help from another person.

Electrical Requirements

Use the following tables to plan your site power requirements. The tables list the voltage inputs, grounding, plugs, and receptacles necessary for your new printer. All voltages are single-phase.

Nominal Operating Voltages

Countries	100 V to 127 V 50 or 60 Hz	200 V to 240 V 50 or 60 Hz
United States, Canada	X	
Central American, South American, and Far Eastern	X	X
European, Middle Eastern, and African	Saudi Arabia only	X

Electrical Safety

Safety is a major consideration in the design and manufacture of IBM products.

Proper electrical grounding is essential for safety and for reliable operation of the printer. If you have any questions about the grounding of your receptacle, ask your electrician.

Periodically review "Safety Information" on page xvi to maintain your awareness.

Plugs and Receptacles by Country

The following table shows, by country, which power plugs are shipped with the printer. The alphabetic references in these tables correspond to the power plugs shown in Figure 48 on page 164.

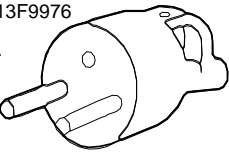
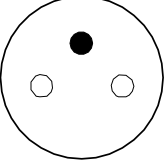
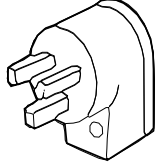
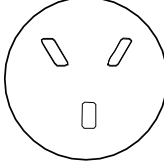
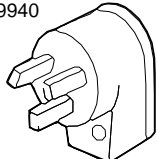
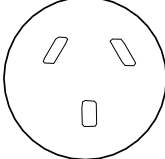
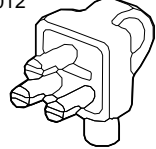
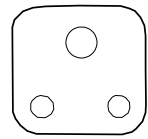
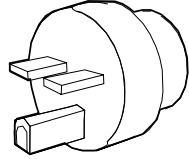
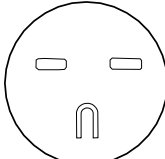
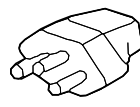
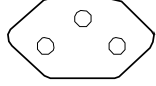
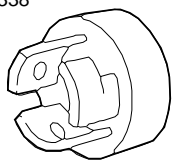
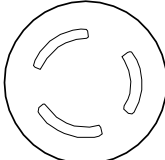
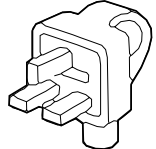
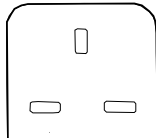
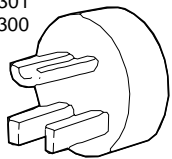
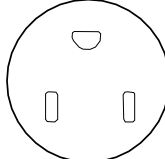
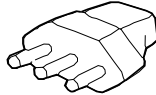
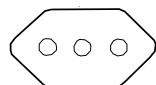
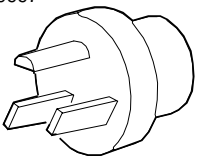
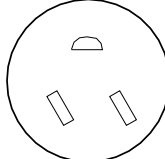
COUNTRY	VOLTAGE RANGE		COUNTRY	VOLTAGE RANGE	
	125 V	250 V		125 V	250 V
Afghanistan		A	Kenya		L
Algeria		A	Korea		A
Argentina		B	Kuwait		L
Australia		B	Liberia	E	
Austria		A	Libya		M
Bahamas	E		Malaysia		L
Bahrain		L	Malta		L
Bangladesh		J	Mexico	E	
Barbados	E		Nepal		L
Belgium		A	Netherland Antilles	E	

COUNTRY	VOLTAGE RANGE		COUNTRY	VOLTAGE RANGE	
	125 V	250 V		125 V	250 V
Bermuda		L	Netherlands		A
Bolivia	E		New Guinea		A
Brazil	E		New Zealand		B
Brunei		L	Nicaragua	E	
Bulgaria		A	Nigeria		L
Burma		J	Norway		A
Canada	E		Oman		L
Channel Islands		L	Pakistan		J
Chile		M	Panama	E	
China		LB	Paraguay		B
Colombia		B	Peru		C
Costa Rica	E		Philippines		C
Cyprus		L	Poland		A
Denmark		G	Polynesia		L
Dominican Republic	E		Portugal		A
Ecuador	E		Qatar		L
El Salvador	E		Romania		A
Ethiopia		M	Saudi Arabia	E	
Finland		A	Sierra Leone		L
France		A	Singapore		L
Germany		A	South Africa		J
Guatemala	E		Spain		A
Guyana		L	Sri Lanka		J
Haiti	E		Sweden		A
Honduras		C	Switzerland		K
Hungary		A	Taiwan		C
Iceland		A	Tanzania		L
India		L	Thailand		C
Indonesia		A	Trinidad	E	
Iran		A	Uganda		L
Iraq		L	United Kingdom		L
Ireland		L	United States	E	
Israel		H	Uruguay		B
Italy		M	Venezuela	E	
Jamaica	E		Yugoslavia		A
Japan	ED	C	Zambia		L

- Other Asian and Latin American countries not listed will ship with plug E attached to cord.
- Other European, Middle Eastern, and African countries not listed will ship with plug A attached to cord.

Plug and Receptacle Depictions

The following chart shows the power cord part numbers and their corresponding power plugs and receptacles that are used with the printer. The current rating is that of the power cord or plug, whichever is less.

Plug (Three Dimensional View)	Receptacle	Plug (Three Dimensional View)	Receptacle
P/N 13F9979 P/N 13F9976 10A A  250 V		P/N 14F0087 10A H  250 V	
P/N 6952291 P/N 13F9940 10A B  250 V		P/N 14F0015 P/N 14F0012 10A J  250 V	
P/N 1838574 10A C  250 V		P/N 14F0051 10A K  250 V	
P/N 6952338 10A D 125 V Locking  250 V		P/N 14F0033 10A L  250 V	
P/N 6952301 P/N 6952300 10A E 125 V NEMA 5-15P  250 V	 NEMA 5-15R	P/N 14F0069 10A M  250 V	
P/N 13F9997 10A G  250 V			

Note: All power plugs except **D** are nonlocking.

Figure 48. Plugs and Receptacles

Power Cord

Position the printer so the power cord can plug into the power receptacle without putting stress on the power cord. The standard power cord length in the U.S.A. and in all other countries is 2.74 m (9 ft). A 1.83 m (6 ft) power cord also is available in the U.S.A.

Branch Circuits and Grounding

A machine must be properly grounded. It is recommended that an insulated green-wire ground, the same size as the phase wire, be installed between the branch circuit panel and the receptacle.

For personal safety, the ground should have sufficiently low impedance to limit the voltage to ground and to facilitate the operation of circuit-protective devices in the circuit. For example, the ground path must not exceed 1 ohm for 120-volt, 20-ampere branch circuit devices.

DANGER

<1> The construction of this printer provides extra protection against the risk of electric shock by grounding appropriate metal parts. The extra protection may not function unless the power cord is connected to a properly-grounded receptacle. This machine has a grounding-type (3-wire) power cord because grounding is necessary. It is the responsibility of the customer or the person installing the machine to connect it to a properly-grounded receptacle. Seek professional assistance before using an adapter or extension cord; such a device could interrupt the grounding circuit.

If this printer is connected to a receptacle that has been incorrectly connected to the building wiring, serious electric shock could result.

Power Consumption

Category	100 V to 127 V 50 or 60 Hz	200 V to 240 V 50 or 60 Hz
Maximum (Peak)	0.200 kVA	0.260 kVA
Operating (Maximum Typical)	0.200 kVA	0.230 kVA
Idle	0.050 kVA	0.050 kVA

Heat Output

Category	100 V to 127 V 50 or 60 Hz	200 V to 240 V 50 or 60 Hz
Maximum (Peak)	150 Watts (512 BTU/hr)	140 Watts (478 BTU/hr)
Operating (Maximum Typical)	110 Watts (376 BTU/hr)	110 Watts (376 BTU/hr)
Idle	20 Watts (68 BTU/hr)*	20 Watts (68 BTU/hr)*

* EPA Energy Star rating

Airflow

The printer uses two fans to cool its internal parts. Ensure that you do not block the air vents. Lack of correct cooling and ventilation can cause printer failures and improper operation.

Declaration of IBM Product Noise Emission Values

The following tables show the noise emission values for the 4247 Printer.

Table 19. 4247 Printer Model A00

Impulsive Noise	Prominent Discrete Tones
No	No

Table 20. Sound Emission Levels - 4247 Standard Covers

Sound Emission Category	Operating	Idling
LWAd	7.0 bels	3.9 bels
<LpA>m	56 dB	24 dB

Table 21. Sound Emission Levels - Automatic Sheet Feeder Covers

Sound Emission Category	Operating	Idling
LWAd	7.3 bels	4.0 bels
<LpA>m	60 dB	25 dB

Notes:

1. LWAd is the declared sound power emission level for a production series of machines.
2. <LpA>m is the mean value of the space-averaged sound pressure emission levels at the one-meter positions for a production series of machines.

All measurements are made in accordance with the American National Standards Institute (ANSI) S12.10 and reported in conformance with the International Organization for Standardization (ISO) 9296.

Operator and Service Clearance

You must be able to reach the front and rear of the printer to operate the printer. Your service representative must be able to access all sides of the printer while performing maintenance. Use Table 18 on page 161, and Figure 49 on page 167 (or Figure 50 on page 168 if your printer has the Automatic Sheet Feeder installed) to determine the clearance you need for your printer, and to select the location for your printer.

Symbols that appear in specification drawings are defined in the following table.

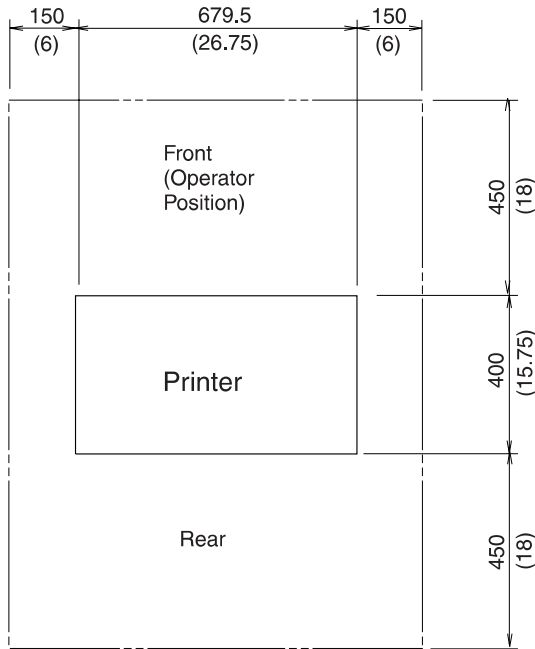
Symbol	Depicts
—	Required clearance
⊕	Signal cable entry/exit

Symbol



Depicts

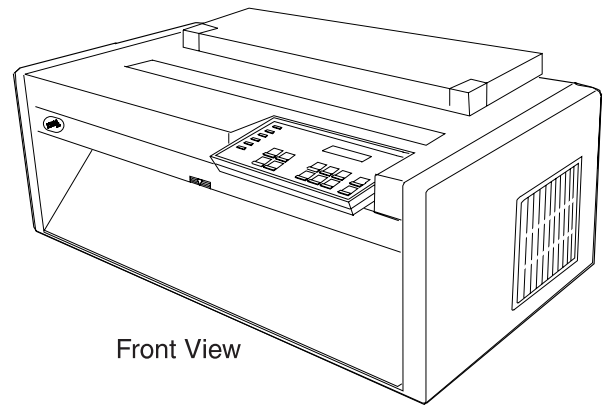
Power cord



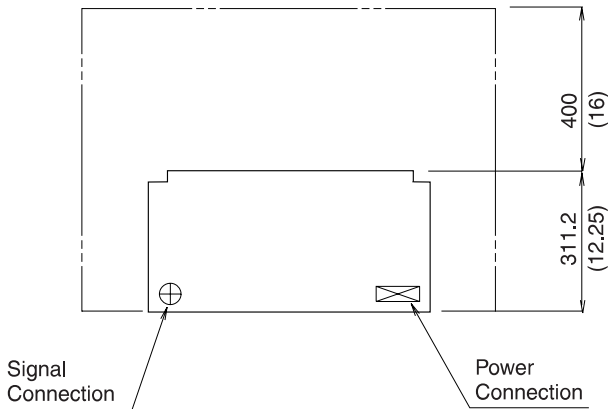
Top View

Printer Clearance
(Figures not to scale)

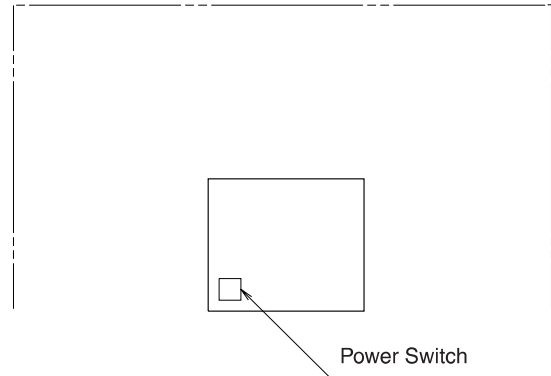
Measurements in parentheses are shown in inches.



Front View

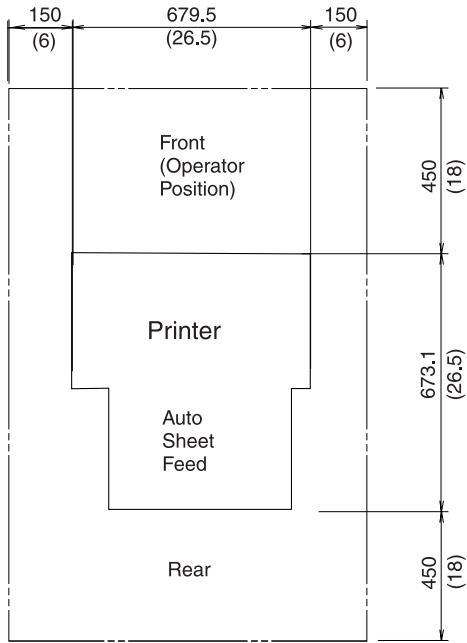


Rear View

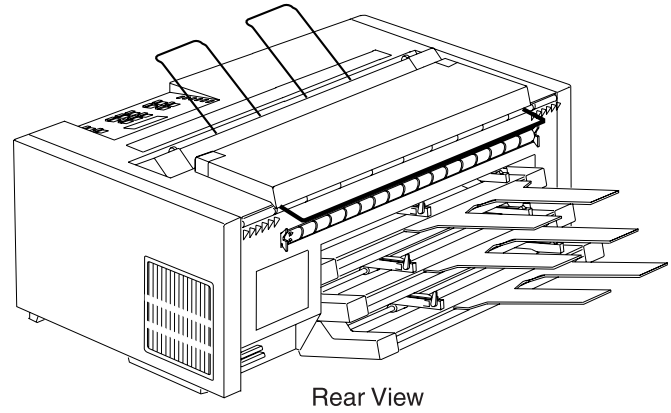


Left Side View

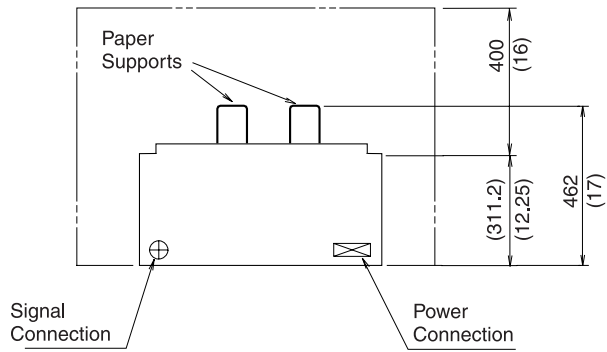
Figure 49. Clearance - Base Printer



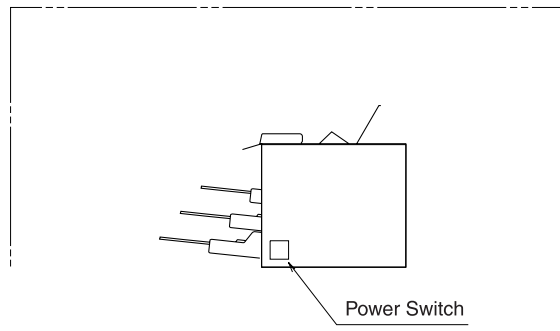
Top View



Rear View



Rear View



Left Side View

Figure 50. Clearance - Printer with ASF

Appendix B. Optional Features

Available options for your printer are listed below:

- Automatic Sheet Feeder (ASF) includes cover, stacker, and one input bin
For additional information on the ASF, see *4247 Printer Automatic Sheet Feeder Guide*.
- Additional Input Bin for ASF (maximum of two for a total of three bins)
- Additional Forms Tractor
- Parallel Interface Cable
- RS-232 Serial Interface Cable
- RS-422 Serial Interface Cable
- AS/400 Workstation Controller RS-232
- AS/400 Workstation Controller RS-422
- RISC System/6000 RS-232 Serial Cable Kit:
 - IBM Async Cable EIA-232/V.24
 - Printer/Terminal Interposer EIA-232
- Ethernet 10BaseT (RJ45) Network Print Server
- Ethernet 10Base2 (BNC) Network Print Server
- Token-Ring Media Type 3 Network Print Server
- Token-Ring Media Type 1 Network Print Server
- Printer Stand

For additional information, see “Optional Printer Stand” on page 32.

For more information on these optional features, contact your IBM marketing representative.

Appendix C. Native 4247 Commands

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Native Commands

The 4247 Printer supports all the Native 4247 commands in this appendix as well as the commands in Appendix D. Personal Printer Data Stream (PPDS) and in Appendix E. Epson FX-1050 Data Stream. The Native 4247 commands can be used with PPDS commands and the Epson FX-1050 commands, regardless of the selected emulation.

Items in the following table enclosed in {} are variable data fields.

Control	Hex	Name
Bar Code Commands		
DC4 DC4 ESC ! {HT} 1 {HR} EM	14 14 1B 21 {HT} 01 {HR} 19	Select EAN-8 Bar Code
DC4 DC4 ESC ! {HT} 2 {HR} EM	14 14 1B 21 {HT} 02 {HR} 19	Select EAN-13 Bar Code
DC4 DC4 ESC ! {HT} 3 {HR} EM	14 14 1B 21 {HT} 03 {HR} 19	Select UPC-A Bar Code
DC4 DC4 ESC ! {HT} 4 {HR} EM	14 14 1B 21 {HT} 04 {HR} 19	Select MSI Bar Code
DC4 DC4 ESC ! {HT} 5 {HR} EM	14 14 1B 21 {HT} 05 {HR} 19	Select UPC-E Bar Code
DC4 DC4 ESC ! {HT} 6 {HR} EM	14 14 1B 21 {HT} 06 {HR} 19	Select UPC 2-Digit Bar Code (Magazine)
DC4 DC4 ESC ! {HT} 7 {HR} EM	14 14 1B 21 {HT} 07 {HR} 19	Select UPC 5-Digit Bar Code (Magazine)
DC4 DC4 ESC ! {HT} 17 {HR} EM	14 14 1B 21 {HT} 11 {HR} 19	Select 2 of 5 INTERLEAVED Bar Code
DC4 DC4 ESC ! {HT} 18 {HR} EM	14 14 1B 21 {HT} 12 {HR} 19	Select 2 of 5 INDUSTRIAL Bar Code
DC4 DC4 ESC ! {HT} 19 {HR} EM	14 14 1B 21 {HT} 13 {HR} 19	Select 2 of 5 MATRIX Bar Code
DC4 DC4 ESC ! {HT} 20 {HR} EM	14 14 1B 21 {HT} 14 {HR} 19	Select CODE 3 of 9 Bar Code
DC4 DC4 ESC ! {HT} 22 {HR} EM	14 14 1B 21 {HT} 16 {HR} 19	Select CODABAR Bar Code
DC4 DC4 ESC ! {HT} 23 {HR} EM	14 14 1B 21 {HT} 17 {HR} 19	Select CODE 128 Bar Code

Control	Hex	Name
DC4 DC4 ESC ! {HT} 24 {HR} EM	14 14 1B 21 {HT} 18 {HR} 19	Select POSTNET Bar Code
DC4 DC4 ESC (GS {O ₁ } {data ₁ } GS {O ₂ } {data ₂ }... EM	14 14 1B 28 1D {O ₁ } {data ₁ } 1D {O ₂ } {data ₂ }... 19	Print Bar Code Selection
Reinitialize Printer Command		
DC4 DC4 ESC @	14 14 1B 40	Reinitialize Printer
Set Vertical Spacing Commands		
DC4 DC4 ESC 1 {NN}	14 14 1B 31 {NN}	Set Vertical Spacing {NN}/144 Inch
DC4 DC4 ESC 3 1	14 14 1B 33 31	Set Vertical Spacing to 12 Lines/30mm
DC4 DC4 ESC 3 3	14 14 1B 33 33	Set Vertical Spacing to 3 Lines/30mm
DC4 DC4 ESC 3 4	14 14 1B 33 34	Set Vertical Spacing to 4 Lines/30mm
DC4 DC4 ESC 3 6	14 14 1B 33 36	Set Vertical Spacing to 6 Lines/30mm
DC4 DC4 ESC 3 8	14 14 1B 33 38	Set Vertical Spacing to 8 Lines/30mm
Character (Horizontal) Spacing Command		
DC4 DC4 ESC A {CS}	14 14 1B 41 {CS}	Set 15, 17.1, or 20 CPI
Forms Path Control Commands		
DC4 DC4 ESC 4	14 14 1B 34	Select ASF Bin 3
DC4 DC4 ESC 5	14 14 1B 35	Eject Single Sheet or Form Feed
DC4 DC4 ESC 8	14 14 1B 38	Select ASF Bin 1
DC4 DC4 ESC 9	14 14 1B 39	Select ASF Bin 2
DC4 DC4 ESC N {LP}	14 14 1B 4E {LP}	Load or Park Fanfold from a Rear Path
DC4 DC4 ESC T {LP}	14 14 1B 54 {LP}	Load or Park Fanfold from a Front Path
Select Resident Font Command		
DC4 DC4 ESC g {RF}	14 14 1B 67 {RF}	Select Resident font
Select Emulation Command		
DC4 DC4 ESC Y {SE}	14 14 1B 59 {SE}	Select Emulation
Select AFTA in Column Command		
DC4 DC4 ESC Z {AA}	14 14 1B 5A {AA}	Select AFTA in Column
Select / Deselect ASF Bin Commands		
//1//	2F 2F 31 2F 2F	Select ASF Bin 1
//2//	2F 2F 32 2F 2F	Select ASF Bin 2
//3//	2F 2F 33 2F 2F	Select ASF Bin 3
//C//	2F 2F 43 2F 2F	Select ASF Bin 1, Bin 2
//R//	2F 2F 52 2F 2F	Deselect ASF

Bar Code Commands

To print bar codes with the Native 4247 commands, use the SELECT and PRINT commands. Both commands are required.

Command	Purpose
SELECT	<ul style="list-style-type: none">• Select the type of bar code to be printed.• Determine the bar code height.• Determine whether or not to print human readable information.
PRINT	<ul style="list-style-type: none">• Causes the bar code to print on the paper• Determines the position on the line at which the bar code will print.

Note: The PRINT command will permit multiple bar codes to be printed on a single line using a single PRINT command. You also may issue multiple PRINT commands for a single SELECT command, if the format and bar code topology do not change.

The following pages show the general command structure for all bar code types. See “Valid Bar Code Data” on page 177 for specific bar code types, valid data field contents, and control information.

Notes:

1. Highlighted fields require input as defined below each table.
2. Decimal values shown are for use in application programs.

SELECT Command Format

ASCII	DC4	DC4	ESC	!	HT	BT	HR	EM
HEX	14	14	1B	21	HT	BT	HR	19
DECIMAL	20	20	27	33	HT	BT	HR	25

HT

Byte HT of the SELECT command sets the height of the bar code to be printed. HT is a one-byte hexadecimal number that specifies the height of the bar code symbol in units of 1/6 inches.

RANGE: 01 to 0C (hexadecimal), 1 to 12 (decimal)

EFFECT: 1/6 inch to 12/6 inch (approx. 0.423 cm to 5.08 cm) bar code height, with a maximum height of 2 inches (approx. 5.08 cm)

BT

Byte BT is used to select the bar code type.

Hex	Decimal	Bar Code Type
01	1	EAN-8
02	2	EAN-13
03	3	UPC-A
04	4	MSI (Also known as PLESSEY)
05	5	UPC-E
06	6	UPC 2-Digit (Magazine)
07	7	UPC 5-Digit (Magazine)
11	17	2 of 5 Interleaved
12	18	2 of 5 Industrial
13	19	2 of 5 Matrix
14	20	Code 3 of 9
16	22	CODABAR
17	23	CODE 128
18	24	POSTNET

HR

Byte HR is used to select whether or not to print human readable characters.

Hex	Decimal	Action
00	0	Do not print human readable characters
01	1	Print human readable characters

Note: POSTNET bar codes will not print human readable characters, even if **HR** is set to 1.

PRINT Command Format

ASCII	DC4	DC4	ESC	(	GS	O ₁	data ₁	...	GS	O ₊	data ₊	EM
HEX	14	14	1B	28	1D	O ₁	data ₁	...	1D	O ₊	data ₊	19
DECIMAL	20	20	27	40	29	O ₁	data ₁	...	29	O ₊	data ₊	25

Multiple bar codes may be printed using multiple field sets: GS O₁ data₁, GS O₂ data₂,... GS O₊ data₊. Terminate the command with EM after the last data field to be printed.

Note: Bar code symbols will print over any descenders in the previous character box, if any text is present.

O₁...O₊

⁺ Bytes O₁ through O₊ are used to offset the bar code from the beginning of the line, left margin, last printed position (without carriage return), or as an offset between bar code symbols, in multiples of 1/72 inch. For example, use a hex value of 03 (or decimal value of 3) to start the bar code 3/72 inches from the left margin. If this same value is used for subsequent O₊ data sets, the result will have 3/72 inch spacing between the bar codes. (See the examples on the next page.)

Notes:

- When the last column in the line is reached, all additional data will be truncated, without an error message.
- The maximum offset that can be specified is 255/72 (≈3.5+) inches. For larger offset, you must print blanks ahead of the barcode.

data₁...data₊

⁺ This portion of the command represents the actual bar code data. To print the data in a human readable form, the HR byte in the SELECT command must be set to the “print human readable” option as described under the SELECT Command Format.

Each bar code type has rules for the data₊ field that specify valid contents and characters that may be used as start (first) and stop (last) characters. See “Valid Bar Code Data” on page 177 for valid characters.

Bar Code Examples

Example 1: Printing a single EAN-8 bar code

SELECT Command

Select an EAN-8 bar code symbol *with* human readable characters.

```
ASCII:  DC4 DC4 ESC ! ETX SOH SOH EM
HEX:    14 14 1B 21 03 01 01 19
DECIMAL: 20 20 27 33 3 1 1 25
```

PRINT Command

Print an EAN-8 bar code symbol of 1/2-inch height, one inch from the left margin, and with the data set of 12345678.

```
ASCII:  DC4 DC4 ESC ( GS H 12345678 EM
HEX:    14 14 1B 28 1D 48 31 32 33 34 35 36 37 38 19
DECIMAL: 20 20 27 40 29 72 49 50 51 52 53 54 55 56 25
```

Result



Example 2: Printing two 3 of 9 bar codes on a single line

SELECT Command

Select Code 3 of 9 bar code symbol *with* human readable characters.

```
ASCII:  DC4 DC4 ESC ! ACK DC4 SOH EM
HEX:    14 14 1B 21 06 14 01 19
DECIMAL: 20 20 27 33 6 20 1 25
```

PRINT Command

Print two Code 3 of 9 bar code symbols, of one inch height, the first symbol on the left margin, the second symbol one inch to the right of the first symbol, and an asterisk (*) used as the start (first) and stop (last) characters. The data sets are ABC+0123 and 1234.

```
ASCII:  DC4 DC4 ESC ( GS NUL *ABC+0123* GS H *01234* EM
HEX:    14 14 1B 28 1D 00 2A 41 42 43 2B 30 31 32 33 2A
        1D 48 2A 30 31 32 33 34 2A 19
DECIMAL: 20 20 27 40 29 00 42 65 66 67 43 48 49 50 51 42
        29 72 42 48 49 50 51 52 42 25
```

Result



Valid Bar Code Data

Bar Code Type	Number of Characters	Valid Characters (ASCII)	Valid First/Last Characters
EAN-8	Must be 8 digits, including check digit	0 through 9	Check Digit (required, rightmost position)
EAN-13	Must be 13 digits, including check digit	0 through 9	Check Digit (required, rightmost position)
UPC-A	Must be 12 digits, including the first/last characters	0 through 9	System Digit (in leftmost position) Check Digit (required, rightmost position)
UPC-E	Must be 6 digits, including the first/last characters	0 through 9	No system digit Check digit (implied)
MSI (PLESSEY)	No defined length	0 through 9	None
UPC 2-Digit (Magazine)	Must be 3 digits long, including check digit	0 through 9	Check digit (required, rightmost position)
UPC 5-Digit (Magazine)	Must be 6 digits long, including check digit	0 through 9	Check Digit (required, rightmost position)
2 of 5 Interleaved	Any number, but must be an even number (including the check digit)	0 through 9	None
2 of 5 Industrial	Any number	0 through 9	None
2 of 5 Matrix	Any number	0 through 9	None
Code 3 of 9	Any number	0 through 9 A through Z Space - . \$ / + %	Must use * as first and last character
CODABAR	Any number	0 through 9 - \$: / . +	A B C D

Bar Code Type	Number of Characters	Valid Characters (ASCII)	Valid First/Last Characters
Code 128 (See Note 1)	Any number	Any ASCII character with hex equivalent of 00 through 7F, except X'19' and X'1D'	Code start subset A, B, or C (in leftmost position coded) Check digit (required, rightmost position)
POSTNET	Any number, but must include a check digit	0 through 9 (See Note 2)	Check digit (required, rightmost position)
Note:			
1. Human Readable Characters will be centered below the bar code, and can be wider than the encoded area. Allow space for Human Readable Characters to print without overlapping adjacent data.			
2. If the data field contains other than 0 through 9, all zeros will be printed.			

Reinitialize Printer Command

This command reinitializes the printer. It resets the printer mode and clears the buffer of printable data.

ASCII	DC4	DC4	ESC	@
HEX	14	14	1B	40
DECIMAL	20	20	27	64

Set Vertical Spacing (Inches)

This command sets a line spacing value for subsequent line feeds.

ASCII	DC4	DC4	ESC	1	NN
HEX	14	14	1B	31	NN
DECIMAL	20	20	27	49	NN

NN

NN is a one-byte hexadecimal number that specifies the line spacing value of NN/144 inches. The possible values for NN are:

- Hexadecimal, 01 through FF
- Decimal, 1 through 255

Set Vertical Spacing (Metric)

This command sets a line spacing value for subsequent line feeds.

ASCII	DC4	DC4	ESC	3	LM
HEX	14	14	1B	33	LM
DECIMAL	20	20	27	51	LM

LM

Byte LM defines the number of lines per 30 mm as the vertical spacing between lines. The possible values for LM are:

ASCII	Hex	Decimal	Number of Lines per 30mm
1	31	49	12
3	33	51	3
4	34	52	4
6	36	54	6
8	38	56	8

Character (Horizontal) Spacing

This command sets the character spacing, in characters per inch.

ASCII	DC4	DC4	ESC	A	CS
HEX	14	14	1B	41	CS
DECIMAL	20	20	27	65	CS

CS

CS specifies the character spacing value. The possible values for CS are:

Hex	Decimal	Character Spacing
04	4	15 CPI
05	5	17.1 CPI
06	6	20 CPI

Forms Path Control

This command causes single sheet load/eject.

ASCII	DC4	DC4	ESC	FP
HEX	14	14	1B	FP
DECIMAL	20	20	27	FP

This command controls load or park for a specified path.

ASCII	DC4	DC4	ESC	FP	LP
HEX	14	14	1B	FP	LP
DECIMAL	20	20	27	FP	LP

FP

FP selects the forms path for loading, parking, or ejecting a form. The possible values for FP are:

ASCII	Hex	Decimal	Result
4	34	52	Single sheet loaded from ASF bin 3
5	35	53	Single sheet ejected (cutsheet), or single form feed (continuous)
8	38	56	Single sheet loaded from ASF bin 1
9	39	57	Single sheet loaded from ASF bin 2
N	4E	78	Loads or Parks form from rear path
T	54	84	Loads or Parks form from front path

LP

LP causes the form to load or park in the path specified by **FP**. LP is used only when **FP=N** or **FP=T**. The possible values for LP are:

Hex	Decimal	Result
00	0	Loads the form (after parking or ejecting any other forms)
01	1	Parks the form (requests 93 CONFIRM PARK before parking the form)

Select Resident Font

This command selects the type of resident font to be used for printing.

ASCII	DC4	DC4	ESC	g	RF
HEX	14	14	1B	67	RF
DECIMAL	20	20	27	103	RF

RF

RF specifies the character spacing value. The possible values for RF are:

Hex	Decimal	Resident Font
00	0	Courier
01	1	Gothic
80	128	OCR-B
81	129	OCR-A

Select Emulation

This command selects the printer emulation mode.

ASCII	DC4	DC4	ESC	Y	SE
HEX	14	14	1B	59	SE
DECIMAL	20	20	27	89	SE

SE

SE specifies the emulation mode. The possible values for SE are:

Hex	Decimal	Emulation Mode
01	Epson FX 1050	
02	2	4202 Proprinter III XL
05	5	Native 4247 or 2381

Select AFTA in Column

This command selects the column at 10 CPI where Automatic Forms Thickness Adjustment (AFTA) will be made.

ASCII	DC4	DC4	ESC	Z	AA
HEX	14	14	1B	5A	AA
DECIMAL	20	20	27	90	AA

AA

The value for AA is the column number. This value should not exceed the maximum number of columns in the line.

Select/Deselect ASF Bin

This command selects the ASF bin to feed a new form or deselects (disables) the printer after ejecting a printed form.

Note: This command must start and finish with a carriage return, line feed, or both; otherwise, it will be handled as if it were printable data.

ASCII	/	/	BN	/	/
HEX	2F	2F	BN	2F	2F
DECIMAL	47	47	BN	47	47

BN specifies the ASF bin number to feed a new form, or BN is used to disable printing after ejecting a printed form. The possible values for BN are:

ASCII	Hex	Decimal	Result
1	31	49	Feed new form, ASF bin 1
2	32	50	Feed new form, ASF bin 2
3	33	51	Feed new form, ASF bin 3
C	43	67	Feed new form, ASF bin 1; then forms from ASF bin 2
R	52	82	Disable printer to print after ejecting printed form

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About This Appendix

The IBM 4247 Printer implements a subset of PPDS. The environment in which the printer data stream processor operates is described below.

If you are using the PPDS data stream commands, you use the commands in this appendix, as well as those in Appendix C. Native 4247 Commands.

Print Job Processing

There are no PPDS controls that explicitly define print job boundaries. A print job for the 4247 is established by the host system and consists of any set of related print objects. A print job could be as short as one character or could be many pages long.

Program Configuration parameter values can be changed at any time; however, to obtain predictable results, changes to operator panel configuration parameter values should be made **before** the print job is sent to the printer and **after** the previous print job has completed printing. Changing configuration parameter values while a print job is in progress may cause unpredictable results.

IBM recommends the following to ensure that your print jobs run correctly:

- Establish a known print environment, and end any previous print job. Start each print job with a Set Initial Conditions control. This control resets the printer environment to the default settings. You can then set additional controls depending on your print job environment.
- End each print job with a Form Feed control. This control causes all data to be printed, and the current position is set to the top-of-form position.
- If a print job is terminated abnormally, the job should be canceled. To cancel a print job:
 - Press **Online** to stop printing.
 - Stop the print job at the host computer.
 - Press **Menu/Enter** and then **Online**.

The print buffers are cleared and the printer is in an offline *not ready* state. Press **Online** again to make the printer online and *ready*.

Page Printing Concept

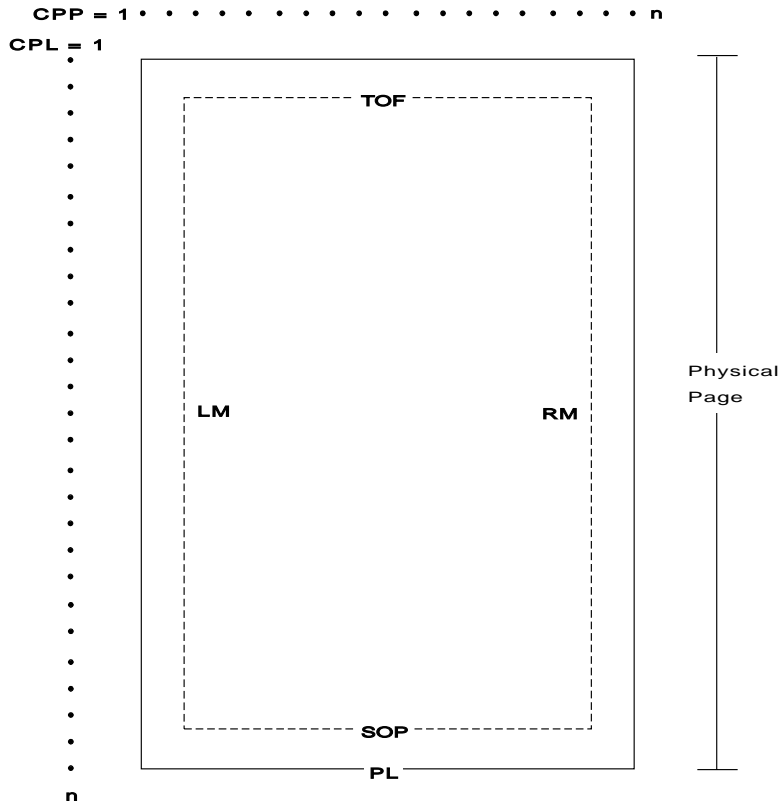
The 4247 processes print jobs in terms of pages, as well as in lines and columns. A page is a logical entity whose boundaries are defined by the page width and the page length. These boundaries are established during printer initialization using the printer defaults, and can be changed using the Configuration menu or by issuing the appropriate data stream controls.

As a job prints, the printer controller maintains both the logical position and the physical position on the page. If a print job does not end with a proper job terminator (for example, Form Feed), then:

- All data for the current page may not print.
- The next print job may be misaligned on the form.
- Residual data from a previous job could print with the new job.

Page Presentation

Many PPDS commands (tabs, margins, line spacing, for example) are described in terms of the presentation surface. A presentation surface is a two-dimensional surface upon which the printer positions symbols according to controls embedded in the incoming data stream. The presentation surface is defined in absolute terms by the width and depth parameters of the page size control commands (Set Page Length, Set Horizontal Margins, for example). The physical print position does not move outside the range of these two parameters. The left margin (LM) and right margin (RM) are variable parameters within the presentation surface. The logical print position does not move outside the range of the vertical margins nor outside the horizontal margins + 1. The following figure shows the presentation surface and the relationships of some of these parameters.



CPP Current Print Position ($LM \leq CPP \leq RM$).

CPL Current Print Line

TOF Top of Form

LM Left Margin

RM Right Margin

SOP Skip Over Perforation

PL Page Length

Notes:

1. The host should set the limits of the presentation surface if the default or previous values are not acceptable.
2. The operator should align the physical paper so that it matches the logical presentation surface.

Also created with this surface is a pair of numbers (CPL and CPP) which specify the line number and column number where the next graphic will be printed. These internal values are the logical position on the presentation surface.

The variable parameters have default values which are established when the printer is initialized. The standard power-on defaults are:

TOF Operator panel setting

PL Operator panel setting

CPI Operator panel setting

LPI Operator panel setting

LM	0 inches (Column 1)
RM	Operator panel setting
SOP	Operator panel setting
HT	Horizontal tabs are set at each 8th column, starting with column 9 (9, 17, 25, 33, and so on)
VT	Vertical tabs are all cleared

Graphic and Control Character Sequences

PPDS uses an ASCII encoding scheme to define controls and printable graphics. Multiple code pages for printable graphics are supported. Control characters are interpreted based on the environment established by any preceding control characters and signals.

The 4247 Printer supports several ASCII code pages. Within a code page, a code point can be treated as a printable character (including space) or as a control code. The following data stream controls affect how a code point is interpreted:

ESC 6 Select PC Character Set 2

ESC 7 Select PC Character Set 1

**ESC ** Print All Characters

ESC ^ Print Single Character

ESC [K
Set Initial Conditions

The following code points are interpreted as control characters:

- PC Character Set 1
 - X'00' to X'1F'
 - X'7F' (treated as NULL)
 - X'80' to X'9F'
- PC Character Set 2
 - X'00' to X'02'
 - X'07' to X'1F'
 - X'7F' (treated as NULL)

Note: No characters are treated as controls when they are part of a Print Single Character or Print All Characters control.

The following code points are interpreted as printable graphic characters:

- PC Character Set 1
 - X'20' (space)
 - X'21' to X'7E'
 - X'A0' to X'FE'
 - X'FF' (required space)
- PC Character Set 2
 - X'03' to X'06'
 - X'20' (space)
 - X'20' to X'7E'

- X'80' to X'FE'
- X'FF' (required space)

Note: All characters are treated as printable graphic characters when they are part of a Print Single Character or Print All Characters control.

PPDS Compatibility

PPDS is supported in Native 4247 mode and in IBM 2381 Personal Printer and IBM 4202 Proprinter III XL emulation modes. When Native 4247 mode is selected, PPDS control codes are supported in the same manner as if emulating the IBM 2381 Personal Printer. The emulation mode can be selected from the Program Configuration menu, using the operator panel. Emulation mode also may be selected using the Set Initial Conditions (ESC [K) control sequence, if the printer is set to Native 4247 or 2381 emulation mode.

One-Byte Controls

Note: Control hex values within parentheses (nn) are recognized only within PC Character Set 1.

The printer uses the following one-byte controls:

Control	Hex	Name
NUL	00 (80)	Null (no operation)
BEL	07 (87)	Bell
BS	08 (88)	Backspace
HT	09 (89)	Horizontal Tab
LF	0A (8A)	Line Feed
VT	0B (8B)	Vertical Tab
FF	0C (8C)	Form Feed
CR	0D (8D)	Carriage Return
SO	0E (8E)	Shift Out (Double-Wide Print)
SI	0F (8F)	Shift In (Condensed Print)
DC1	11 (91)	Device Control 1 (Select, XON)
DC2	12 (92)	Device Control 2 (Set 10 CPI)
DC3	13 (93)	Device Control 3 (Deselect, XOFF)
DC4	14 (94)	Device Control 4 (Cancel Double-Wide Print)
CAN	18 (98)	Cancel
ESC	1B (99)	Escape (Multiple-byte control prefix)
SP	20	Space

Null (NUL)

00

This control terminates the Set Horizontal Tab and Set Vertical Tab control codes. The printer ignores NUL by itself.

Bell (BEL)

07

This control causes the audible alarm to sound, if enabled. The alarm may be disabled or enabled from the Power On Configuration menu.

Backspace (BS)

08

This control moves the print position horizontally one character width to the left. If the current print position is at the left margin, the printer ignores this command.

Horizontal Tab (HT)

09

This control moves the print position to the next horizontal tab stop. If there are no tab stops to the right, or if the next tab stop is beyond the current right margin, the control is ignored.

Line Feed (LF)

0A

This control advances the paper one line. The horizontal position does not change unless automatic carriage return mode is activated from the operator panel Configuration menu. If the paper advance crosses the bottom margin, the printer completes all deferred printing on the current page and then does an automatic form feed.

If skip perforation mode is active and the bottom margin is crossed, the vertical position on the new page following the automatic form feed will be the top-of-form position. If skip perforation is not active, the vertical position on the new page is the point immediately following the previous print line.

Vertical Tab (VT)

0B

This control causes the vertical print position to be advanced to the next vertical tab stop. The horizontal position is not affected unless automatic carriage return mode is activated from the operator panel Configuration menu. If there are no tab stops past the current vertical print position, Vertical Tab is treated as a Line Feed.

Form Feed (FF)

0C

This control causes a new page to be started. Form Feed is a line end and page end control; it causes all deferred printing that may have been buffered for the current page to be completed and the form physically advanced to eject the current page. The vertical print position advances to the top margin and the horizontal print position is set to the left margin for subsequent printing.

Carriage Return (CR)

0D

This control moves the current horizontal print position to the left margin. The vertical print position does not change unless automatic line feed mode is active (see “Set Auto Line Feed (ESC 5)” on page 197).

Shift Out (SO) / Double-Wide Print

0E

This control causes the printer to start double-width printing. Double-width printing prints the characters twice as wide as the current character spacing. This results in half as many characters per inch. Each character takes up the space of two single-width characters. A Carriage Return, Line Feed, Form Feed, Vertical Tab, Double-Wide Continuous Mode, or Cancel Double-Wide Print with vertical movement specified cancels the Shift Out control code.

Shift In (SI) / Condensed Print

0F

This control prints graphic characters in condensed pitch (17.1 CPI or 20 CPI).

Shift In is a buffer terminating control; if printable data at a different character-per-inch setting is buffered, that data is printed before the setting is changed. The current print position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line, and this control changes the maximum number of characters that can be printed on one line.

A combination of 10 CPI and Condensed Print sets the printer to 17.1 CPI regardless of the 20 CPI setting in the Power On Configuration menu.

A combination of 12 CPI and Condensed Print sets the printer to 20 CPI when 20 CPI=YES is set in the Power On Configuration Menu. A combination of 12 CPI and Condensed Print sets the printer to 12 CPI when 20 CPI=NO is set in the Power On Configuration menu.

Device Control 1 (DC1) / Select or XON

11

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Select):** DC1 selects the printer.
- **Serial interface (XON):** DC1 is treated as a NUL if received from the host. The printer sends DC1 (XON) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 2 (DC2) / Select 10 CPI

12

This control sets 10 characters per inch. DC2 is a buffer terminating control; if printable data at a different characters-per-inch setting is buffered, that data is

printed before the setting is changed. The current print position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line.

Device Control 3 (DC3) / Deselect or XOFF

13

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Deselect):** DC3 is treated as a NUL.
- **Serial interface (XOFF):** DC3 is treated as a NUL if received from the host. The printer sends DC3 (XOFF) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 4 (DC4) / Cancel Double-Wide Print

14

This control cancels double-wide printing if double wide was selected with the Shift Out control. The characters-per-inch setting returns to the previous value.

Cancel (CAN)

18

This control purges all buffered data. All data received after the most recent buffer terminating control is discarded. For a list of buffer terminating controls, see “Buffer Terminating Conditions” on page 213. Any data received after Cancel is processed normally. Cancel does not change the current print position.

Escape (ESC)

1B

This control is a prefix used in combination with supplementary control bytes to provide an extended set of control functions.

Space (SP)

20

This control moves the print position one character space to the right.

Escape Sequence Controls

Escape sequence controls have an ESC followed by one or more control parameters. Supported escape sequence controls are:

Control	Hex	Name
ESC NUL	1B 00	Null (no operation)
ESC BEL	1B 07	Bell
ESC BS	1B 08	Backspace
ESC HT	1B 09	Horizontal Tab

Control	Hex	Name
ESC LF	1B 0A	Line Feed
ESC VT	1B 0B	Vertical Tab
ESC FF	1B 0C	Form Feed
ESC CR	1B 0D	Carriage Return
ESC SO	1B 0E	Shift Out (Double-Wide Print)
ESC SI	1B 0F	Shift In (Condensed Print)
ESC DC1	1B 11	Device Control 1 (Select, XON)
ESC DC2	1B 12	Device Control 2 (Set 10 CPI)
ESC DC3	1B 13	Device Control 3 (Deselect, XOFF)
ESC DC4	1B 14	Device Control 4 (Cancel Double-Wide Print)
ESC CAN	1B 18	Cancel
ESC EM	1B 19	Turn Automatic Sheet Feeder On or Off
ESC -	1B 2D	Auto Underscore
ESC 0	1B 30	Set 1/8 Inch Line Spacing
ESC 1	1B 31	Set 7/72 Inch Vertical Spacing
ESC 2	1B 32	Invoke Text Line Spacing
ESC 3	1B 33	Set Graphics Line Spacing
ESC 4	1B 34	Set Top of Form
ESC 5	1B 35	Set Auto Line Feed
ESC 6	1B 36	Select PC Character Set 2
ESC 7	1B 37	Select PC Character Set 1
ESC :	1B 3A	Set 12 CPI
ESC <	1B 3C	Unidirectional Printing
ESC =	1B 3D	Character Font Image Download
ESC A	1B 41	Select n/72 Inch Spacing
ESC B	1B 42	Set Vertical Tabs
ESC C	1B 43	Set Page Length (Lines or Inches)
ESC D	1B 44	Set Horizontal Tabs
ESC E	1B 45	Begin Emphasized Print
ESC F	1B 46	End Emphasized Print
ESC G	1B 47	Begin Double-Strike Print
ESC H	1B 48	End Double-Strike Print
ESC I	1B 49	Change Font
ESC J	1B 4A	Relative Move Baseline
ESC K	1B 4B	Normal Density Bit Image Graphics
ESC L	1B 4C	Dual Density Bit Image Graphics, Type 1
ESC N	1B 4E	Begin Skip Perforation
ESC O	1B 4F	End Skip Perforation
ESC P	1B 50	Proportional Space Mode
ESC Q	1B 51	Deselect on Positive Query Reply

Control	Hex	Name
ESC R	1B 52	Set Default Tabs
ESC S	1B 53	Begin Subscript/Superscript
ESC T	1B 54	End Subscript/Superscript
ESC U	1B 55	Set Print Direction
ESC W	1B 57	Double-Wide Continuous Mode
ESC X	1B 58	Set Horizontal Margins
ESC Y	1B 59	Dual Density Bit Image Graphics Type 2
ESC Z	1B 5A	High Density Bit Image Graphics
ESC \	1B 5C	Print All Characters
ESC]	1B 5D	Reverse Line Feed
ESC ^	1B 5E	Print Single Character
ESC _	1B 5F	Continuous Overscore
ESC d	1B 64	Relative Move Right
ESC e	1B 65	Relative Move Left
ESC [- (See note)	1B 5B 2D	Select Line Scoring
ESC [@	1B 5B 40	Set Presentation Highlights (SPH)
ESC [I (See note)	1B 5B 49	Set Font Global (SFG)
ESC [K	1B 5B 4B	Set Initial Conditions (SIC)
ESC [T (See note)	1B 5B 54	Select Code Page (SCP)
ESC [d (See note)	1B 5B 64	Set Print Quality (SPQ)

Note: This command is only available in Native 4247 or 2381 emulation mode.

Null (ESC NUL)

1B	00
----	----

The printer ignores the NUL control by itself.

Bell (ESC BEL)

1B	07
----	----

This control causes the audible alarm to sound, if enabled. The alarm may be disabled or enabled from the Configuration menu.

Backspace (ESC BS)

1B	08
----	----

This control moves the print position horizontally one character width to the left. If the current print position is at the left margin, the printer ignores this command.

Horizontal Tab (ESC HT)

1B	09
----	----

This control moves the print position to the next horizontal tab stop. If there are no tab stops to the right, or if the next tab stop is beyond the current right margin, the control is ignored.

Line Feed (ESC LF)

1B	0A
----	----

This control advances the paper one line. The horizontal position does not change unless automatic carriage return mode is activated from the operator panel Configuration menu. If the paper advance crosses the bottom margin, the printer completes all deferred printing on the current page and then does an automatic form feed.

If skip perforation mode is active and the bottom margin is crossed, the vertical position on the new page following the automatic form feed will be the top-of-form position. If skip perforation is not active, the vertical position on the new page is the point immediately following the previous print line.

Vertical Tab (ESC VT)

1B	0B
----	----

This control causes the vertical print position to be advanced to the next vertical tab stop. The horizontal position is not affected unless automatic carriage return mode is activated from the operator panel Configuration menu. If there are no tab stops past the current vertical print position, Vertical Tab is treated as a Line Feed.

Form Feed (ESC FF)

1B	0C
----	----

This control causes a new page to be started. Form Feed is a line end and page end control; it causes all deferred printing that may have been buffered for the current page to be completed and the form physically advanced to eject the current page. The vertical print position advances to the top margin and the horizontal print position is set to the left margin for subsequent printing.

Carriage Return (ESC CR)

1B	0D
----	----

This control moves the current horizontal print position to the left margin. The vertical print position does not change unless automatic line feed mode is active (see "Set Auto Line Feed (ESC 5)" on page 197).

Shift Out (ESC SO) / Double-Wide Print

1B	0E
----	----

This control causes the printer to start double-width printing. Double-width printing prints the characters twice as wide as the current character spacing. This results in half as many characters per inch. Each character takes up the space of two single-width characters. A Carriage Return, Line Feed, Form Feed, Vertical Tab,

Double-Wide Continuous Mode, or Cancel Double-Wide Print with vertical movement specified cancels the Shift Out control code.

Shift In (ESC SI) / Condensed Print

1B	0F
----	----

This control prints graphic characters in condensed pitch (17.1 CPI or 20 CPI).

Shift In is a buffer terminating control; if printable data at a different character-per-inch setting is buffered, that data is printed before the setting is changed. The current print position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line, and this control changes the maximum number of characters that can be printed on one line.

A combination of 10 CPI and Condensed Print sets the printer to 17.1 CPI regardless of the 20 CPI setting in the Power On Configuration menu.

A combination of 12 CPI and Condensed Print sets the printer to 20 CPI when 20 CPI=YES is set in the Power On Configuration Menu. A combination of 12 CPI and Condensed Print sets the printer to 12 CPI when 20 CPI=NO is set in the Power On Configuration menu.

Device Control 1 (ESC DC1) / Select or XON

1B	11
----	----

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Select):** DC1 selects the printer.
- **Serial interface (XON):** DC1 is treated as a NUL if received from the host. The printer sends DC1 (XON) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 2 (ESC DC2) / Select 10 CPI

1B	12
----	----

This control sets 10 characters per inch. DC2 is a buffer terminating control; if printable data at a different characters-per-inch setting is buffered, that data is printed before the setting is changed. The current print position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line.

Device Control 3 (ESC DC3) / Deselect or XOFF

1B	13
----	----

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Deselect):** DC3 is treated as a NUL.
- **Serial interface (XOFF):** DC3 is treated as a NUL if received from the host. The printer sends DC3 (XOFF) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 4 (ESC DC4) / Cancel Double-Wide Print

1B	14
----	----

This control cancels double-wide printing if double wide was selected with the Shift Out control. The characters-per-inch setting returns to the previous value.

Cancel (ESC CAN)

1B	18
----	----

This control purges all data in the preceding print buffer. Any data received after Cancel is processed normally. Cancel does not change the current print position.

Turn Auto Sheet Feeder On or Off (ESC EM)

1B	19	NN
----	----	----

This command selects or deselects the Automatic Sheet Feeder (ASF). This command must start and finish with a carriage return, line feed, or both; otherwise, it will be handled as if it were printable data.

The following values are used for NN:

- 0** Disable ASF. Ejects any form loaded from bin 1, 2, or 3, and selects Manual Sheet Feed paper path.
- 1** Selects bin 1 if no forms are loaded; otherwise, the next form is loaded from bin 1 when data is received.
- 2** Selects bin 2 if no forms are loaded; otherwise, the next form is loaded from bin 2 when data is received.
- 3** Selects bin 3 if no forms are loaded; otherwise, the next form is loaded from bin 3 when data is received.
- 4** Selects the last bin in use after the Deselect ASF command. A form will be loaded when data is received.
- C** Selects bin 1 for the first form; then selects bin 2 for all subsequent forms.
- R** Ejects the currently loaded cut-sheet form.

Auto Underscore (ESC -)

1B	2D	NN
----	----	----

This control turns on and off the continuous underscore function.

If NN is 1, the printer underscores all text characters and spaces following this sequence. The printer does not underscore white space caused by horizontal tabs.

If NN is 0, the printer stops the underscore of all data following this sequence.

Set 1/8 Inch Line Spacing (ESC 0)

1B	30
----	----

This control sets the line spacing to eight lines per inch.

The application program is responsible for keeping track of the vertical position on the current page relative to the current line spacing. Changing the line spacing within a print job without changing the page length can cause printing on the page perforation. For additional information, see “Set Page Length (ESC C)” on page 200.

Set 7/72 Inch Line Spacing (ESC 1)

1B	31
----	----

This control sets the line spacing to 7/72 inch.

The application program is responsible for keeping track of the vertical position on the current page relative to the current line spacing. Changing the line spacing within a print job without changing the page length can cause printing on the page perforation. For additional information, see “Set Page Length (ESC C)” on page 200.

Invoke Text Line Spacing (ESC 2)

1B	32
----	----

This control sets the line spacing at the value set by the last Set Text Line Spacing (ESC A) control received. The printer sets the line spacing to six lines per inch if no ESC A has been issued.

Set Graphics Line Spacing (ESC 3)

1B	33	NN
----	----	----

This control changes the line spacing to the value specified by NN.

NN is a value that specifies the line spacing in units of 1/216 inch. Valid values are 0 to 255. If N equals 0, the printer ignores this control. The printer will adjust the line spacing to the nearest 1/144 inch.

The application program is responsible for keeping track of the vertical position on the current page relative to the current line spacing. Changing the line spacing within a print job without changing the page length can cause printing on the page perforation. For additional information, see “Set Page Length (ESC C)” on page 200.

Set Top of Form (ESC 4)

1B	34
----	----

This control establishes the current vertical position as the top of form.

Set Auto Line Feed (ESC 5)

1B	35	NN
----	----	----

This control sets the automatic line feed mode of the printer. When automatic line feed is on, the printer does a line feed each time it receives a carriage return. When

automatic line feed if off, a carriage return is processed normally. This control overrides the automatic line feed mode set in the operator panel Configuration menu.

If NN is 1, the printer turns automatic line feed mode on.

If NN is 0, the printer turns automatic line feed mode off.

Select PC Character Set 2 (ESC 6)

1B	36
----	----

This control selects PC character set 2 as the active character set. In PC character set 2, code points X'03' to X'06', X'15', and X'80' to X'9F' are treated as graphic characters (not controls). See “Graphic and Control Character Sequences” on page 187.

Select PC Character Set 1 (ESC 7)

1B	37
----	----

This control selects PC character set 1. In PC character set 1, code points X'03' to X'06', X'15', and X'80' to X'9F' are treated as controls (not printable graphics). See “Graphic and Control Character Sequences” on page 187.

Set 12 CPI (ESC :)

1B	3A
----	----

This control sets the pitch to 12 characters per inch. If the current font is proportionally spaced, this control selects a horizontal resolution of 240 dots per inch. If the active font is OCR, the printer does not prohibit the change in pitch; however, the printed OCR characters may be unreadable by automatic identification equipment.

Unidirectional Printing (ESC <)

1B	3C
----	----

This command selects unidirectional printing for one line only. The printhead moves to the home position at the left side of the printer and prints one line, left to right. The command is then cancelled by the carriage return that sends the printhead back to the home position.

Character Font Image Download (ESC=)

1B	3D	LL	HH	FF	LF	W	H	CP	N	XX .. XX
----	----	----	----	----	----	---	---	----	---	----------

This control downloads special character images.

A two-byte count (LL HH) indicates the number of bytes that follow in this control.

LL is the least significant byte of the count; HH is the most significant byte of the count. The number of bytes that follows should equal $HH \times 256 + LL$. If the count equals X'0000', the control is ignored.

FF is the format byte and must equal X'13'.

LF is a one-byte font identifier that specifies the previously initialized or selected font to be modified. See "Change Font (ESC I)" on page 201.

W is a one-byte value that specifies the width of the character cells in options. For DP fonts, the value is X'0A'. For fixed pitch DP Text and NLQ fonts, the value is X'14'. For DP Text and NLQ, proportional fonts values may vary. However, for all code points downloaded with this control, all character cells defined will be *Width* options wide.

H is a one-byte value that specifies the height of the character cells in dots. Valid values are X'09' for DP and DP Text and X'12' for NLQ.

CP is a one-byte value. This parameter specifies the first code point to download. A single code point or multiple code points can be downloaded. If the font being downloaded was previously initialized, the downloaded characters overlay the resident characters in the font.

N is a one-byte value that specifies the number of code points defined by this control. If the starting code point plus the number of code points is greater than 256, the control is ignored.

XX .. XX is the font image download data. These data bytes define the character cells. Multiple bytes define each vertical slice of the character cell. The slice data for each code point is in a contiguous format (run-together) as follows:

- If the slice data is nine-bits high, byte 1 is put into the high-order bits in slice 1 and the high-order bit of byte 2 is the low order bit of slice 1. The remaining seven bits of byte 2 are put into the high-order seven bits of slice 2, and so on.
- If the slice data is 18-bits high, bytes 1 and 2 are put into the high-order bits of the first slice and the two high-order bits of byte 3 complete the first slice. Slice 2 is composed similarly, starting with the remaining six bits in byte 3.

Note: The contiguous format (run-together) does not occur from one code point to the next. The top dot of the leftmost slice of each code point is always in the high-order bit of the first byte of image data for that code point.

The number of data bytes required to define the image for each code point can be calculated as follows:

$$\text{Image Length} = (\text{Width} \times \text{Height}) \div 8$$

Note: If there is a remainder from the division by 8, add 1 to the quotient.

Example: To define an image for a standard DP font where Width = 10 and Height = 9:

$$\begin{aligned}\text{Image Length} &= (10 \times 9) \div 8 \\ \text{Image Length} &= 11 \text{ with a remainder of } 2 \\ \text{Image Length} &= 12 \text{ bytes per character}\end{aligned}$$

If both printer provided images and downloaded images are to be printed from the same local font ID, IBM recommends that the downloaded images be sent, using this control, at the start of a print job when the print environment for the job is established. This ensures that the actual printed output appears as intended.

It also is recommended that image data bits for the last vertical column of NLQ character patterns be all zeros. The last vertical column will be clipped if NLQ character patterns are expanded for graphics printing. Resident NLQ text character patterns do not contain image data (dots) in the last column of the character box.

Select n/72 Inch Line Spacing (ESC A)

1B	41	NN
----	----	----

This control stores the line spacing value, in units of 1/72 inch, which is later selected by Invoke Text Line Spacing (ESC 2). The valid values for NN are X'01' to X'FF' (1 to 255). The default line spacing is X'0C' (six lines per inch).

A value of 0 is not valid and causes the printer to ignore this command. Following are example values for NN:

X'00' No Change
X'18' 3 LPI
X'12' 4 LPI
X'0C' 6 LPI
X'09' 8 LPI
X'08' 9 LPI
X'06' 12 LPI

Set Vertical Tabs (ESC B)

1B	42	TT .. TT	00
----	----	----------	----

This control sets the vertical tab stops. The maximum number of tab stops supported is 64. The Null control code terminates this sequence. If the Null terminator is missing, the printer treats the next 64 bytes as tab stops and ignores all the data bytes following these 64 bytes until a Null is received. If the printer receives this sequence without any tabs specified, all tab stops are cleared.

TT ...TT are the tab values that specify the tab stops as line numbers, relative to the top of the physical page. Tab stops must be specified in ascending order; entries not in ascending order are ignored.

Set Page Length (ESC C)

1B	43	LL	IN
----	----	----	----

This control sets the physical page length in lines or inches and resets skip perforation mode.

LL is a one-byte hexadecimal number that specifies the page length in lines. The value is converted to inches based upon the current line spacing. Valid values for LL are X'01' to X'FF', but the resulting page length in inches must be less than 113.8 inches (2890 mm). If LL equals 0, then parameter II (length is inches) is used.

IN is a one-byte hexadecimal number that specifies the page length in inches. IN is present only if parameter LL equals 0. Valid values for IN are X'01' to X'71'. If IN is greater than the maximum value, the maximum value is used. If both LL and IN are zero, the control is ignored.

Set Horizontal Tabs (ESC D)

1B	44	TT .. TT	00
----	----	----------	----

This control sets the horizontal tab stops. The maximum number of tab stops supported is 28. The sequence terminates with the NUL control code. If the null terminator is missing, the printer treats the next 28 bytes as tab stops and ignores all the data bytes following the 28 bytes until a Null is received. If the printer receives this control code with no tabs, all horizontal tab stops are cleared.

TT is the list of tab stops as character positions relative to the left edge of the physical page. Valid values are X'01' to X'FF'. Tab stops must be specified in ascending order. Entries not in ascending order are ignored.

Begin Emphasized Print (ESC E)

1B	45
----	----

This control starts emphasized print mode (bold style). Emphasized printing continues until the printer receives an End Emphasized Print (ESC F) control or the printer is initialized.

End Emphasized Print (ESC F)

1B	46
----	----

This control ends emphasized print mode (bold style).

Begin Double-Strike Print (ESC G)

1B	47
----	----

This control starts double-strike printing (all text characters are double struck). Double-strike printing continues until the printer receives an End Double-Strike Print control (ESC H) or the printer is initialized.

End Double-Strike Print (ESC H)

1B	48
----	----

This control ends double-strike printing.

Change Font (ESC I)

1B	49	NN
----	----	----

This control selects the font to be used for printing.

NN is the one-byte local font identifier number that specifies the font. The mapping of the local font identifier is dependent upon the printer's emulation mode setting. In

the Power On Configuration menu, if the emulation mode is set to 4202 III XL, the Change Font control code selects fonts compatible with the 4202 Proprinter III XL. If the emulation mode is set to 2381 or Native 4247, Change Font selects the fonts compatible with the 2381 Personal Printer.

Supported local font identifiers are shown in the following table.

Local Font Identifier (Hex)	Native 4247 and 2381 Emulation Mode	4202 III XL
00	Default (op. panel selection)	DP
01	DP	DP
02	DP Text	DP Text
03	NLQ (Courier/Gothic)	NLQ (Courier/Gothic)
04	DP Text Proportional	DP (Download)
05	NLQ Proportional (Courier/Gothic)	DP (Download)
06	DP	DP Text (Download)
07	Reserved	NLQ (Download)
08-0F	Reserved	Reserved
10	OCR-A	Reserved
11	OCR-B	Reserved
12-5F	Reserved	Reserved
60	Reserved	Default (operator panel selection)
61	Reserved	DP (Gothic)
62	Reserved	NLQ Proportional (Courier/Gothic)
63	Reserved	OCR-A
64	Reserved	OCR-B
65	Reserved	DP
66-FF	Reserved	Reserved

Notes:

1. If a downloaded font has not been previously downloaded with a Character Font Image Download control (CFID), a Change Font control to select a downloaded font is ignored.
2. The NLQ font style is selected as defined in the Power On Configuration menu: NLQ=GOTHIC or NLQ=COURIER.

Relative Move Baseline (ESC J)

1B	4A	NN
----	----	----

This control performs a vertical move relative to the current print position.

NN is a one-byte hexadecimal value that specifies the move amount in units of 1/216 inch. The printer will adjust the value to the nearest 1/144 inch. If Automatic Carriage Return on Line Feed is set in the operator panel Power On Configuration menu, a carriage return also is performed when a Relative Move Baseline code is received (see "Carriage Return (CR)" on page 190).

Normal Density Bit Image Graphics (ESC K)

1B	4B	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 60 horizontal pel by 72 vertical pel. Bit image data can be mixed with text data on the same line.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follows should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

Dual Density Bit Image Graphics Type 1 (ESC L)

1B	4C	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 120 horizontal by 72 vertical pel. Bit image data can be mixed with text data on the same line.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follows should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

Begin Skip Perforation (ESC N)

1B	4E	NN
----	----	----

This control sets the number of lines to be skipped at the bottom of each page. Once this function is activated, it stays active until the End Skip Perforation (ESC O) or Set Page Length (ESC C) control is received or the printer is initialized.

NN is a one-byte hexadecimal value that specifies the number of lines to skip at the bottom of each page. This value must be zero or greater and less than the length of the page in lines (from 0 to 255). Once Begin Skip Perforation is activated, the number of lines that may be printed on a page is the page length minus NN.

End Skip Perforation (ESC O)

1B	4F
----	----

This control ends skip perforation.

Proportional Space Mode (ESC P)

1B	50	NN
----	----	----

This control starts or stops proportional space mode.

NN is a one-byte hexadecimal value that sets proportional space mode on or off.

- If NN is 1, proportional space mode is on
- If NN is 0, proportional space mode is off

Note: Code pages OCR-A (code page 876), OCR-B (code page 877), Arabic (code page 864), Cyrillic (code page 855), Thai (code page 874), Extended Arabic (code page 1046), and Farsi Bilingual (code page 1098) are not supported in proportional space mode.

Deselect on Positive Query Reply (ESC Q)

1B	51	NN
----	----	----

This control operates differently depending upon the interface in use.

- **Parallel interface:** The printer is deselected if the response to the query is positive.
- **Serial interface:** The printer transmits the printer ID back to the host if the response to the query is positive.

NN is the query printer identifier. If the value matches the printer's ID, the query response is positive and the printer deactivates the Select line (parallel interface) or echoes back to the ID (serial interface). If the query is not positive, the control is ignored. For the parallel interface, the printer must be reselected using a DC1 control after a positive response to ESC Q if the printer is to be used.

Query Identifiers: If the emulation mode is set to 4202 III XL, the printer ID is X'16'. If the emulation mode is set to Native 4247 or 2381, the printer ID is X'B8'.

Set Default Tabs (ESC R)

1B	52
----	----

This control resets both the horizontal and vertical tab stops. The horizontal tab stops are set to every eighth position starting with the ninth column (9, 17, 25,...). The vertical tab stops are cleared.

Begin Subscript / Superscript Mode (ESC S)

1B	53	NN
----	----	----

This control activates subscript and superscript printing. Once this printing is active, it stays active until another Begin Subscript/Superscript Mode control changes the mode, an End Subscript/Superscript Mode control is received, or the printer is initialized.

NN is a one-byte hexadecimal value that activates subscript or superscript printing.

- If NN is 1, subscript mode is active.
- If NN is 0, superscript mode is active.

End Subscript/Superscript Mode (ESC T)

1B	54
----	----

This control stops subscript and superscript printing.

Set Print Direction (ESC U)

1B	55	NN
----	----	----

This control specifies bidirectional or unidirectional printing.

- If NN is 1, unidirectional printing is selected.
- If NN is 0, bidirectional printing (default) is selected.

Double-Wide Continuous Mode (ESC W)

1B	57	NN
----	----	----

This control turns double-wide printing on or off. When double-wide printing is on, the width of subsequent graphic characters is doubled (the characters per inch value is half of the single character value). For tabs, the font width is not doubled (tab distance is based upon single character width).

NN is a one-byte hexadecimal value that turns double-wide printing on or off.

- If NN is 1, double-wide printing is turned on.
- If NN is 0, double-wide printing is turned off.

Note: Double-Wide Continuous Mode does the same function as Shift Out, except double wide printing is not canceled when a new line begins.

Set Horizontal Margins (ESC X)

1B	58	LL	RR
----	----	----	----

This control sets the left and right margins. The margins are specified in character positions relative to the left edge of the physical page.

LL is a one-byte hexadecimal value from X'00' to X'FF', which specifies the starting print position relative to the left edge of the physical page. If LL equals 0, the left margin is unchanged.

RR is a one-byte hexadecimal number from X'00' to X'FF' that specifies the rightmost print position relative to the left edge of the physical page. If RR equals 0, the right margin is unchanged.

Notes:

1. Set Horizontal Margins should be followed by a carriage return (CR) control to set the print position to the new left margin.
2. LL should be at least one character width less than the page width.
3. If RR is greater than the page width or is less than LL, RR is set to the page width (MPP).

Dual Density Bit Image Graphics Type 2 (ESC Y)

1B	59	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 120 horizontal pel by 72 vertical pel. Bit image data can be mixed with text data on the same line. Horizontally adjacent dots are not allowed and will be removed if specified.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follows should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

High Density Bit Image Graphics (ESC Z)

1B	5A	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 240 horizontal per by 72 vertical pel. Bit image data can be mixed with text data on the same line.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follows should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

Print All Characters (ESC \)

1B	5C	LL	HH
----	----	----	----

This control forces a specified number of characters to be interpreted as graphic characters, including those that occur in the space normally reserved for controls.

A two-byte count (LL HH) indicates the number of bytes to be interpreted as printable graphics. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follows should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

Reverse Line Feed (ESC])

1B	5D
----	----

This command causes the contents of the buffer to be printed and advances the paper one line in the reverse direction from the paper path.

Note: If AUTO CR=YES is set in the Power On Configuration menu, the next print position is print position 1 at the left margin. If AUTO CR=N0, the next print position is the current print position.

Print Single Character (ESC ^)

1B	5E
----	----

This control specifies that the next character to follow is to be interpreted as a graphic character, including those characters that occur in the space normally reserved for controls.

Continuous Overscore (ESC _)

1B	5F	NN
----	----	----

This control turns on and off the continuous overscore function. All graphic characters and spaces that are bounded by start and stop versions of this control are overscored. White space caused by horizontal tabs is not overscored.

NN is a one-byte hexadecimal value that turns overscore on or off.

- If NN is 1, continuous overscore is on.
- If NN is 0, continuous overscore is off.

Relative Move Right (ESC d)

1B	65	N1	N2
----	----	----	----

This command moves the print position to the right (from the current position) in increments of 1/120 of an inch.

Bytes N1 and N2 indicate the move distance based on the following:

$$(N1 + [N2 \times 256])/120.$$

Relative Move Left (ESC e)

1B	64	N1	N2
----	----	----	----

This command moves the print position to the left (from the current position) in increments of 1/120 of an inch.

Bytes N1 and N2 indicate the move distance based on the following:

$$(N1 + [(N2 \times 256)]/120.$$

Select Line Scoring (ESC [-)

1B	5B	2D	02	00	N1	N2
----	----	----	----	----	----	----

This command selects underscore, strikethrough, and overscore. This command is supported in Native 4247 and 2381 emulation modes only.

The values for N1 are:

X'01' Underscore

X'02' Strikethrough

X'03' Overscore

The values for N2 are:

X'00' Cancel

X'01' Single Line

X'02' Double Line

Set Presentation Highlight (SPH) (ESC [@)

1B	5B	40	LL	HH	M1	M2	M3	M4
----	----	----	----	----	----	----	----	----

SPH activates or deactivates double wide, double high, and italic printing. This command is supported in Native 4247, 4202 III XL, and 2381 emulation with some exceptions, as noted.

Once these highlights are active, they remain active until terminated, either by another SPH command or an initialization. If double wide printing is activated by an SPH, a DC4 control also can cancel it.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is X'00' to X'04'. HH is always X'00'. If the count equals X'0000', the control is ignored.

M1 .. M4 turn double wide, double high, or italics on or off.

M1 is a one-byte hexadecimal value that turns italics on or off as follows:

X'00' No change

X'01' Italics on (2381 and 4247 only)

X'02' Italics off (2381 and 4247 only)

M2 is always X'00'.

M3 is a one-byte hexadecimal that controls line feeds and character height (vertical spacing) as follows:

X'00' No change to line feed, no change to character height

X'01' Line feeds unchanged, standard character height

X'02' Line feeds unchanged, double character height

X'10' Single line feeds, character height unchanged (4202 only)

X'11' Single line feeds, standard character height

X'12' Single line feeds, double character height

X'20' Double line feeds, character height unchanged (4202 only)

X'21' Double line feeds, standard character height

X'22' Double line feeds, double character height

M4 is a one-byte hexadecimal value that turns double wide on or off as follows:

X'00' No Change

- X'01'** Turn double wide off
- X'02'** Turn double wide on
- X'10'** Single line feeds (2381 and 4247 only)
- X'20'** Double line feeds (2381 and 4247 only)

Set Font Global (SFG) (ESC [I)

1B	5B	49	02	00	HF	LF
----	----	----	----	----	----	----

This control selects font and pitch based on the values of HF and LF. (Supported in Native 4247 or 2381 emulation mode only.)

HF	LF	Font and Pitch
00	0B	Courier 10
01	EB	Courier 12
01	EC	Courier 15
01	ED	Courier 17
01	EE	Courier 20
00	AB	Courier Proportional
00	24	Gothic 10
01	8F	Gothic 12
01	8E	Gothic 15
01	8D	Gothic 17
01	8C	Gothic 20
00	AE	Gothic Proportional

Set Initial Conditions (SIC) (ESC [K)

1B	5B	4B	LL	HH	INIT	ID	P1	P2
----	----	----	----	----	------	----	----	----

This control initializes the printer.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (HH is always X'00' for this command.) The number of bytes is counted from the INIT byte.

The INIT byte is processed the same way in Native 4247, 4202 III XL, or 2381 emulation mode, but causes different results in the P1 and P2 parameters, depending on the ID byte. The values for the INIT byte are:

INIT	Mode Byte	
X'00'		Initializes printer to user-defined settings; downloaded fonts are not initialized.
X'01'		Initializes printer to user-defined settings; downloaded fonts are initialized.
X'04'		Initializes printer to factory settings; downloaded fonts are not initialized.
X'05'		Initializes printer to factory settings; downloaded fonts are initialized.

X'FE' Initializes printer to user-defined settings; downloaded fonts are initialized. Settings are saved in non-volatile memory (NVM).

X'FF' Initializes printer to factory settings; downloaded fonts are initialized. Settings are saved in non-volatile memory (NVM).

ID Printer ID Byte:

X'B6' For Native 4247 or 2381 emulation

X'03' or X'16' For 4202 III XL emulation

P1 Parameter Byte for Native 4247 or 2381 Emulation

X'00' No emulation change

X'01' Switch to 2381 emulation

X'02' Switch to Epson FX printer emulation

X'03' to X'FF' No emulation change

P1 Parameter Byte for 4202 III XL Emulation

Bit	On	Off
7 Discard Byte	Ignore	Process
6 Reserved		
5 Alarm	Disable	Enable
4 Auto CR	CR on Vertical Movement	No CR on Vertical Movement
3 Auto LF	Auto LF after CR	No Auto LF after CR
2 Form Length	12 inch forms	11 inch forms
1 Zero	Slashed Zero	Normal Zero
0 Character Set	PC Char Set 2	PC Char Set 1

P2 Parameter Byte for 4202 III XL Emulation

Bit	On	Off
7 Discard Byte	Ignore	Process
6 Print Language	CP 850 Multilingual	CP 437 ASCII
5 Direction	Unidirectional	Bidirectional
4 20 Condense	12+Condense = 12 CPI	12+Condense = 20 CPI
3 Select NLQ	NLQ Gothic	NLQ Courier
2 Form Feed	Ignore FF if at TOF	Honor all FF
1 Line Length	8 inch line	13.6 inch line
0 Sheet Feeder	Enable	Disable

Note: The following parameters are NOT modified by the INIT control byte.

Power On Configuration Menu:

- Pull
- Jam Sensors
- Parallel Interface:
 - Interface Types, Select-In Signal, Data Bits, Buffer Size, and Emulation

- Serial Interface:
 - Interface Types, Baud Rate, Data Bits, Parity, Pacing, Connection Type, Buffer Size, and Emulation
- Functions:
 - Front Tear, Rear Tear, Paper Overlay, Sequence, Automatic Load, and Display Language
- Bidi Adjust

Program Configuration Menu:

- Tear Position Adjustment:
 - Front Path, Rear Path
- Paper Path(s) Setup
 - 1 Form per Path, One Form Only
- Perforation Safety
- Adjustments:
 - AFTA, Horizontal, Vertical
- Form Setting:
 - Line Spacing Lock, Top of Form, Perforation Skipping, and Pitch Lock

Select Code Page (SCP) (ESC [T)

1B	5B	54	04	00	00	00	HC	LC
----	----	----	----	----	----	----	----	----

This control selects a code page for printing where HC and LC specify the code page in hexadecimal. (Supported in 4247 or 2381 emulation mode only.)

The following table shows the values for HC and LC:

HC	LC	Character Set
01	B5	CP437 USA (Personal Computer)
03	2D	CP813 Greek/Latin (ISO 8859-7)
03	33	CP819 Latin 1 (ISO 8859-1)
03	52	CP850 Multilingual
03	53	CP851 Old Greek
03	54	CP852 Latin/2 Roecce
03	55	CP853 Turkish
03	57	CP855 Cyrillic
03	59	CP857 Turkish
03	5C	CP860 Portuguese
03	5D	CP861 Icelandic
03	5E	CP862 Hebrew
03	5F	CP863 Canadian French
03	60	CP864 Arabic
03	61	CP865 Danish/Norwegian
03	62	CP866 Cyrillic 2 (Personal Computer)
03	65	CP869 New Greek

HC	LC	Character Set
03	6A	CP874 Thai
03	6C	CP876 OCR-A
03	6D	CP877 OCR-B
03	90	CP912 Latin 2 (ISO 8859-2)
03	91	CP913 Latin 3 (ISO 8859-3)
03	92	CP914 Latin 4 (ISO 8859-4)
03	93	CP915 Cyrillic (ISO 8859-5)
03	94	CP916 Latin 8 (ISO 8859-8)
03	98	CP920 Latin 5 (ISO 8859-9)
03	99	CP921 Baltic Multilingual
03	9A	CP922 Estonian
03	EE	CP1006 Urdu
04	16	CP1046 Arabic Extended
04	41	CP1089 Latin 6 (ISO 8859-6)
04	4A	CP1098 Farsi (Personal Computer)
04	5C	CP1116 Estonian (Personal Computer)
04	5D	CP1117 Latvian (Personal Computer)
04	5E	CP1118 Lithuanian (Personal Computer)
04	E3	CP1251 Cyrillic Windows

Note: The following languages are all supported within code page 850 (PC Multilingual):

Austrian/German	Italian
Austrian/German (alternate)	Japanese English
Belgian	Spanish/Spanish speaking
Brazilian	Spanish (Spain-alternate)
Finnish/Swedish	English (United Kingdom)
Finnish/Swedish (alternate)	English (U.S.A./Canada)
French/French Azerty	Yugoslav

Set Print Quality (SPQ) (ESC [d)

1B	5B	64	01	00	QQ
----	----	----	----	----	----

This control allows the host application to specify the desired print quality when the printer is in Native 4247 mode or emulating the IBM 2381 Personal Printer. The setting remains in effect until changed by another Set Print Quality control or until the printer is initialized. Bit image graphics (ESC K, L, Y, and Z) are not affected. Highlighting modes, such as italics, emphasized, and double wide remain active if they were active when the SPQ control was activated.

QQ specifies the quality of subsequent printing. Valid values are X'00' to X'FE' as follows:

Hex	Function
X'00'	No change (Default)
X'01 - 3F'	Low quality level (highest speed)
X'40 - 7F'	Medium quality level (medium speed)
X'80 - FE'	High quality level (lowest speed)
X'FF'	Printer Initialization (Default)

Buffer Terminating Conditions

The following controls cause buffered data to be released for printing:

- Carriage Return
- Line Feed
- Reverse Line Feed
- Form Feed
- Horizontal Tab (if there is printhead movement)
- Vertical Tab
- Backspace
- Set 1/8 Inch Line Spacing
- Set 7/72 Inch Line Spacing
- Set Graphics Line Spacing
- Select n/72 Inch Line Spacing
- Invoke Text Line Spacing (if the line spacing is changed)
- Relative Move Right
- Relative Move Left
- Relative Move Baseline
- Shift In/Condensed Print
- Shift Out/Double-Wide Print
- Device Control 4/Cancel Double-Wide Print
- Begin Subscript/Superscript
- End Subscript/Superscript
- Begin Double-Strike Print
- End Double-Strike Print
- Begin Emphasized Print
- End Emphasized Print
- Set Presentation Highlight
- Continuous Overscore
- Auto Underscore
- Device Control 2/Select 10 CPI
- Set 12 CPI
- Proportional Space Mode
- Change Font
- Normal Density Bit Image Graphics
- Dual Density Bit Image Graphics Type 1
- Dual Density Bit Image Graphics Type 2
- High Density Bit Image Graphics

- Set Initial Conditions
- Select Score Line (2381 and 4247 only)
- Unidirectional Printing
- Set Horizontal Margins

The following conditions also cause buffered data to be released for printing:

- Serial BREAK or parallel -INIT
- Automatic Line Wrap

An automatic line wrap consists of a carriage return and line feed inserted after the maximum number of characters has been printed on a line. The next character is then printed at the left margin on the following line. Automatic line wrap occurs for text data but not for bit image graphics.

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About This Appendix

If you are using the Epson FX-1050 data stream commands, you use the commands in this appendix, as well as those in Appendix C. Native 4247 Commands.

When the 4247 Printer is in Epson emulation mode, the printer can print files coded for the Epson FX-1050 printer using the Epson ESC/P printer control language. Use the Power On Configuration menu to select Epson FX emulation mode as the active printer configuration.

Print Job Processing

There are no Epson FX-1050 controls that explicitly define print job boundaries. A print job for the 4247 Printer is established by the host system and consists of any set of related print objects. A print job could be as short as one character or could be many pages long.

Program Configuration parameter values can be changed at any time; however, to obtain predictable results, changes to operator panel configuration parameter values should be made **before** the print job is sent to the printer and **after** the previous print job has completed printing. Changing configuration parameter values while a print job is in progress may cause unpredictable results.

IBM recommends the following to ensure that your print jobs run correctly:

- Establish a known print environment, and end any previous print job. Start each print job with an Initialize Printer control. This control resets the printer environment to the default settings. You can then set additional controls depending on your print job environment.
- End each print job with a Form Feed control. This control causes all data to be printed, and the current position is set to the top-of-form position.
- If a print job is abnormally terminated, the job should be canceled. To cancel a print job:
 - Press **Online** to stop printing.
 - Stop the print job at the host computer.
 - Press **Menu/Enter** and then **Online**.

The print buffers are cleared and the printer is in an offline *not ready* state. Press **Online** again to make the printer online and *ready*.

Page Printing Concept

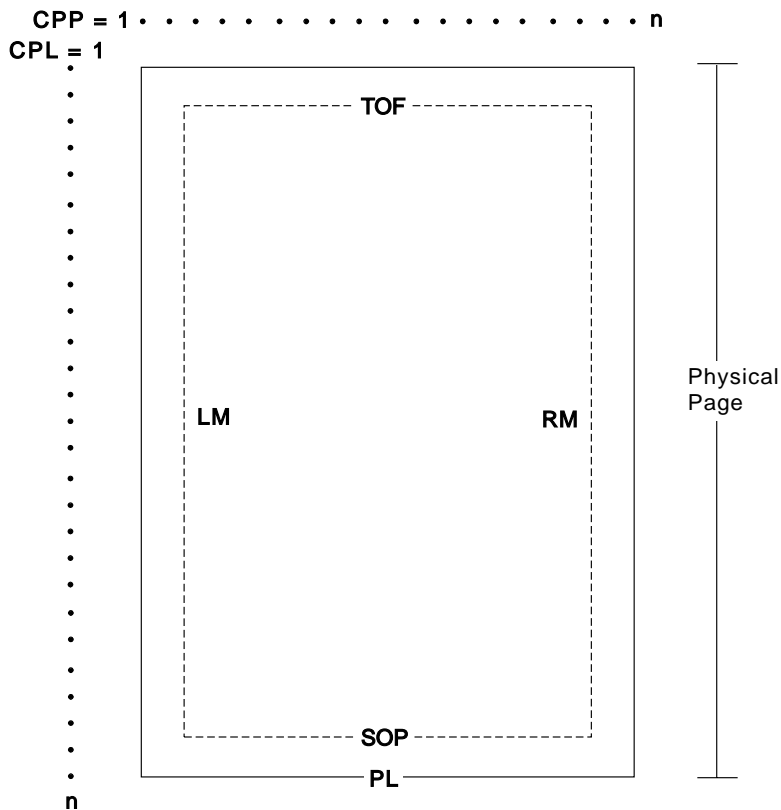
The 4247 processes print jobs in terms of pages, as well as in lines and columns. A page is a logical entity whose boundaries are defined by the width and the page length. These boundaries are established during printer initialization using the printer defaults, and can be changed using the Configuration menu or by issuing the appropriate data stream controls.

As a job prints, the printer controller maintains both the logical position and the physical position on the page. If a print job does not end with a proper job terminator (for example, Form Feed), then:

- All data for the current page may not print
- The next print job may be misaligned on the form
- Residual data from a previous job could print with the new job.

Page Presentation

Many Epson ESC/P commands (tabs, margins, line spacing, for example) are described in terms of the presentation surface. A presentation surface is a two-dimensional surface upon which the printer positions symbols according to controls embedded in the incoming data stream. The presentation surface is defined in absolute terms by the width and depth parameters of the page size control commands (Set Page Length, Set Horizontal Margins, for example). The physical print position does not move outside the range of these two parameters. The left margin (LM) and right margin (RM) are variable parameters within the presentation surface. The logical print position does not move outside the range of the vertical margins nor outside the horizontal margins + 1. The following figure shows the presentation surface and the relationships of some of these parameters.



- CPP** Current Print Position ($LM \leq CPP \leq RM$)
- CPL** Current Print Line
- TOF** Top of Form
- LM** Left Margin

- RM** Right Margin
- SOP** Skip Over Perforation
- PL** Page Length

Notes:

1. The host should set the limits of the presentation surface if the default or previous values are not acceptable.
2. The operator should align the physical paper so that it matches the logical presentation surface.

Also created with this surface is a pair of numbers (CPL and CPP) which specify the line number and column number where the next graphic will be printed. These internal values are the logical position on the presentation surface.

The variable parameters have default values which are established when the printer is initialized. The standard power-on defaults are:

- TOF** Operator panel setting
- PL** Operator panel setting
- CPI** Operator panel setting
- LPI** Operator panel setting
- LM** 0 inches (Column 1)
- RM** Operator panel setting
- SOP** Operator panel setting
- HT** Horizontal tabs are set at each 8th column, starting with column 9 (9, 17, 25, 33, and so on)
- VT** Vertical tabs are all cleared

One-Byte Controls

Note: Control hex values within parentheses are recognized only within PC Character Set 1.

The printer uses the following one-byte controls:

Control	Hex	Name
NUL	00 (80)	Null (no operation)
BEL	07 (87)	Bell
BS	08 (88)	Backspace
HT	09 (89)	Horizontal Tab
LF	0A (8A)	Line Feed
VT	0B (8B)	Vertical Tab
FF	0C (8C)	Form Feed
CR	0D (8D)	Carriage Return
SO	0E (8E)	Shift Out (Double-Wide Print)
SI	0F (8F)	Shift In (Condensed Print)
DC1	11 (91)	Device Control 1 (Parallel Select, Serial XON)

Control	Hex	Name
DC2	12 (92)	Device Control 2 (Cancel Condensed Print)
DC3	13 (93)	Device Control 3 (Parallel Deselect, Serial XOFF)
DC4	14 (94)	Device Control 4 (Cancel Double-Wide Print)
CAN	18 (98)	Cancel
SP	20	Space
DEL	7F	Delete Character

Null (NUL)

00

This control terminates the Set Horizontal Tab and Set Vertical Tab control codes. The printer ignores NUL by itself.

Bell (BEL)

07

This control causes the audible alarm to sound.

Backspace (BS)

08

This control moves the print position horizontally one character width to the left. If the current print position is at the left margin, the printer ignores this command.

Horizontal Tab (HT)

09

This control moves the print position to the next horizontal tab stop. If there are no tab stops to the right, or if the next tab stop is beyond the current right margin, the control is ignored.

Line Feed (LF)

0A

This control advances the paper one line. The horizontal position does not change unless automatic carriage return mode is activated from the operator panel Configuration menu. If the paper advance crosses the bottom margin, the printer completes all deferred printing on the current page and then does an automatic form feed.

If skip perforation mode is active and the bottom margin is crossed, the vertical position on the new page following the automatic form feed will be the top-of-form position. If skip perforation is not active, the vertical position on the new page is the point immediately following the previous print line.

Vertical Tab (VT)

0B

This control causes the vertical presentation position to be advanced to the next vertical tab stop. The horizontal position is not affected unless automatic carriage return mode is activated from the operator panel Configuration menu. If there are no tab stops past the current vertical presentation position, Vertical Tab is treated as a Line Feed.

Form Feed (FF)

0C

This control causes a new page to be started. Form Feed is a line end and page end control; it causes all deferred printing that may have been buffered for the current page to be completed and the form physically advanced to eject the current page. The vertical presentation position advances to the top margin and the horizontal presentation position is set to the left margin for subsequent printing.

Carriage Return (CR)

0D

This control moves the current horizontal print position to the left margin. If Carriage Return equals Carriage Return + Line Feed, a Line Feed is executed when Carriage Return is received. Otherwise, the vertical position does not change. Carriage Return is a line ending control code that causes buffered data to print.

Shift Out (SO) / Double-Wide Print

0E

This control causes the printer to start double-width printing. Double-width printing prints the characters twice as wide as the current character spacing. This results in half as many characters per inch. Each character takes up the space of two single-width characters. A Carriage Return, Line Feed, Form Feed, Vertical Tab, Double-Wide Continuous Mode, Cancel Double-Wide Print, or Set Presentation Position with vertical movement specified cancels the Shift Out control code.

Shift In (SI) / Condensed Print

0F

This control prints graphic characters in condensed pitch (15, 17.1, or 20 CPI). If the current print option is 10 CPI this control will condense printing to 17.1 CPI. If the current print option is 12 CPI this control will condense printing to 20 CPI. If the current print option is 15 CPI there is no change in density. This control changes the maximum number of characters that can be printed on one line. Shift In is a buffer terminating control; if printable data at a different character-per-inch setting is buffered, that data is printed before the setting is changed. The current presentation position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line.

Device Control 1 (DC1) / Select or XON

11

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Select):** DC1 selects the printer.
- **Serial interface (XON):** DC1 is treated as a NUL if received from the host. The printer sends DC1 (XON) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 2 (DC2) / Cancel Condensed Print

12

This control cancels or ends condensed (17.1 or 20 CPI) printing. DC2 is a buffer terminating control; if printable data at a different characters-per-inch setting is buffered, that data is printed before the setting is changed. The current presentation position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line.

Device Control 3 (DC3) / Deselect or XOFF

13

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Deselect):** DC3 is treated as a NUL.
- **Serial interface (XOFF):** DC3 is treated as a NUL if received from the host. The printer sends DC3 (XOFF) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 4 (DC4) / Cancel Double-Wide Print

14

This control cancels double-wide printing if double wide was selected with the Shift Out control. The characters-per-inch setting returns to the previous value.

Cancel (CAN)

18

This control purges all buffered data. All data received after the most recent buffer terminating control is discarded. For a list of buffer terminating controls, see “Buffer Terminating Conditions” on page 241. Any data received after Cancel is processed normally. Cancel does not change the current presentation position.

Space (SP)

20

This control moves the print position one character space to the right.

Delete Character (DEL)

7F

This control removes the last text character on the print line and does not affect control codes.

Escape Sequence Controls

Escape sequence controls have an ESC followed by one or more control parameters. Supported escape sequence controls are:

Control	Hex	Name
ESC	1B	Escape
ESC NUL	1B 00	Null (no operation)
ESC BEL	1B 07	Bell
ESC BS	1B 08	Backspace
ESC HT	1B 09	Horizontal Tab
ESC LF	1B 0A	Line Feed
ESC VT	1B 0B	Vertical Tab
ESC FF	1B 0C	Form Feed
ESC CR	1B 0D	Carriage Return
ESC SO	1B 0E	Shift Out (Double-Wide Print)
ESC SI	1B 0F	Shift In (Condensed Print)
ESC DC1	1B 11	Device Control 1 (Select, XON)
ESC DC2	1B 12	Device Control 2 (Cancel Condensed Print)
ESC DC3	1B 13	Device Control 3 (Deselect, XOFF)
ESC DC4	1B 14	Device Control 4 (Cancel Double-Wide Print)
ESC CAN	1B 18	Cancel
ESC EM	1B 19	Turn Automatic Sheet Feeder On or Off
ESC SP	1B 20	Set Intercharacter Spacing
ESC !	1B 21	Master Select
ESC #	1B 23	Cancel MSB Control
ESC \$	1B 24	Set Absolute Print Position
ESC %	1B 25	Select User-defined Set
ESC &	1B 26	Define User-defined Characters
ESC *	1B 2A	Select Graphics Mode
ESC -	1B 2D	Auto Underscore
ESC /	1B 2F	Select Vertical Tab Channel
ESC 0	1B 30	Set 1/8 Inch Line Spacing (8 LPI)
ESC 1	1B 31	Set 7/72 Inch Vertical Spacing
ESC 2	1B 32	Set 1/6 Inch Line Spacing (6 LPI)
ESC 3	1B 33	Set n/216 Inch Line Spacing
ESC 4	1B 34	Select Italic Mode

Control	Hex	Name
ESC 5	1B 35	Cancel Italic Mode
ESC 6	1B 36	Printable Code Area Expansion
ESC 7	1B 37	Cancel Printable Code Area Expansion
ESC : NUL	1B 3A	Copy ROM to RAM
ESC <	1B 3C	Set Unidirectional Mode (1 line only)
ESC =	1B 3D	Set MSB to 0
ESC >	1B 3E	Set MSB to 1
ESC ?	1B 3F	Reassign Graphics Mode
ESC @	1B 40	Initialize Printer
ESC A	1B 41	Select n/72 Inch Line Spacing
ESC B	1B 42	Set Vertical Tabs
ESC C	1B 43	Set Page Length (Lines or Inches)
ESC D	1B 44	Set Horizontal Tabs
ESC E	1B 45	Begin Emphasized Print
ESC F	1B 46	End Emphasized Print
ESC G	1B 47	Begin Double-Strike Print
ESC H	1B 48	End Double-Strike Print
ESC I	1B 49	Printable Code Area Expansion
ESC J	1B 4A	Perform N/216 Inch Line Feed
ESC K	1B 4B	Select Single Density Graphics Mode
ESC L	1B 4C	Select Double Density Graphics Mode
ESC M	1B 4D	Select 12 CPI
ESC N	1B 4E	Begin Skip Perforation
ESC O	1B 4F	End Skip Perforation
ESC P	1B 50	Select 10 CPI
ESC Q	1B 51	Set Right Margin
ESC R	1B 52	Select Character Set
ESC S	1B 53	Begin Subscript/Superscript
ESC T	1B 54	End Subscript/Superscript
ESC U	1B 55	Set Print Direction
ESC W	1B 57	Double-Wide Continuous Mode
ESC Y	1B 59	Dual Density Bit Image Graphics Type 2
ESC Z	1B 5A	High Density Bit Image Graphics
ESC \	1B 5C	Set Relative Position
ESC a	1B 61	Set Letter Quality Justification
ESC b	1B 62	Set Vertical Tabs in Channel
ESC d	1B 64	Relative Move Right (n/120)
ESC e	1B 65	Relative Move Left (n/120)
ESC g	1B 67	Set 15 CPI
ESC j	1B 6A	Feed Paper n/216 Reverse
ESC k	1B 6B	Select NLQ Font

Control	Hex	Name
ESC l	1B 6C	Set Left Margin
ESC p	1B 70	Turn Proportional Mode On/Off
ESC s	1B 73	Quiet Printing
ESC t	1B 74	Select Character Table
ESC w	1B 77	Double High Printing
ESC x	1B 78	Select NLQ or DP Print Quality

Escape (ESC)

1B

This control is a prefix used in combination with supplementary control bytes to provide an extended set of control functions.

Null (ESC NUL)

1B	00
----	----

The printer ignores the NUL control by itself.

Bell (ESC BEL)

1B	07
----	----

This control causes the audible alarm to sound, if enabled. The alarm may be disabled or enabled from the Power On Configuration menu.

Backspace (ESC BS)

1B	08
----	----

This control moves the print position horizontally one character width to the left. If the current print position is at the left margin, the printer ignores this command.

Horizontal Tab (HT)

1B	09
----	----

This control moves the print position to the next horizontal tab stop. If there are no tab stops to the right, or if the next tab stop is beyond the current right margin, the control is ignored.

Line Feed (ESC LF)

1B	0A
----	----

This control advances the paper one line. The horizontal position does not change unless automatic carriage return mode is activated from the operator panel Configuration menu. If the paper advance crosses the bottom margin, the printer completes all deferred printing on the current page and then does an automatic form feed.

If skip perforation mode is active and the bottom margin is crossed, the vertical position on the new page following the automatic form feed will be the top-of-form position. If skip perforation is not active, the vertical position on the new page is the point immediately following the previous print line.

Vertical Tab (ESC VT)

1B	0B
----	----

This control causes the vertical presentation position to be advanced to the next vertical tab stop. The horizontal position is not affected unless automatic carriage return mode is activated from the operator panel Configuration menu. If there are no tab stops past the current vertical presentation position, Vertical Tab is treated as a Line Feed.

Form Feed (ESC FF)

1B	0C
----	----

This control causes a new page to be started. Form Feed is a line end and page end control; it causes all deferred printing that may have been buffered for the current page to be completed and the form physically advanced to eject the current page. The vertical presentation position advances to the top margin and the horizontal presentation position is set to the left margin for subsequent printing.

Carriage Return (ESC CR)

1B	0D
----	----

This control moves the current horizontal print position to the left margin. The vertical print position does not change unless automatic line feed mode is active.

Shift Out (ESC SO) / Double-Wide Print

1B	0E
----	----

This control causes the printer to start double-width printing. Double-width printing prints the characters twice as wide as the current character spacing. This results in half as many characters per inch. Each character takes up the space of two single-width characters. A Carriage Return, Line Feed, Form Feed, Vertical Tab, Double-Wide Continuous Mode, Cancel Double-Wide Print, or Set Presentation Position with vertical movement specified cancels the Shift Out control code.

Shift In (ESC SI) / Condensed Print

1B	0F
----	----

This control prints graphic characters in condensed pitch (15, 17.1, or 20 CPI). If the current print option is 10 CPI this control will condense printing to 17.1 CPI. If the current print option is 12 CPI this control will condense printing to 20 CPI. If the current print option is 15 CPI there is no change in density. This control changes the maximum number of characters that can be printed on one line. Shift In is a buffer terminating control; if printable data at a different character-per-inch setting is buffered, that data is printed before the setting is changed. The current presentation position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line.

Device Control 1 (ESC DC1) / Select or XON

1B	11
----	----

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Select):** DC1 selects the printer.
- **Serial interface (XON):** DC1 is treated as a NUL if received from the host. The printer sends DC1 (XON) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 2 (ESC DC2) / Cancel Condensed Print

1B	12
----	----

This control cancels or ends condensed (17.1 or 20 CPI) printing. DC2 is a buffer terminating control; if printable data at a different characters-per-inch setting is buffered, that data is printed before the setting is changed. The current presentation position becomes the next printable column at the new character-per-inch setting. CPI can be changed within a print line.

Device Control 3 (ESC DC3) / Deselect or XOFF

1B	13
----	----

This control has different meanings depending upon the currently active interface.

- **Parallel interface (Deselect):** DC3 is treated as a NUL.
- **Serial interface (XOFF):** DC3 is treated as a NUL if received from the host. The printer sends DC3 (XOFF) to the host to control data pacing if XON/XOFF pacing is selected.

Device Control 4 (ESC DC4) / Cancel Double-Wide Print

1B	14
----	----

This control cancels double-wide printing if double wide was selected with the Shift Out control. The characters-per-inch setting returns to the previous value.

Cancel (ESC CAN)

1B	18
----	----

This control purges all buffered data. All data received after the most recent buffer terminating control is discarded. For a list of buffer terminating controls, see “Buffer Terminating Conditions” on page 241. Any data received after Cancel is processed normally. Cancel does not change the current presentation position.

Turn Auto Sheet Feeder On or Off (ESC EM)

1B	19	NN
----	----	----

This command selects or deselects the Automatic Sheet Feeder (ASF). This command must start and finish with a carriage return, line feed, or both; otherwise, it will be handled as if it were printable data.

The following values are used for NN:

- 0** Disable ASF. Ejects any form loaded from bin 1, 2, or 3, and selects Manual Sheet Feed forms path.
- 1** Selects bin 1 if no forms are loaded; otherwise, the next form is loaded from bin 1 when data is received.
- 2** Selects bin 2 if no forms are loaded; otherwise, the next form is loaded from bin 2 when data is received.
- 3** Selects bin 3 if no forms are loaded; otherwise, the next form is loaded from bin 3 when data is received.
- 4** Selects the last bin in use after the Deselect ASF command. A form will be loaded when data is received.
- C** Selects bin 1 for the first form; then selects bin 2 for all subsequent forms.
- R** Ejects the currently loaded cut-sheet form.

Set Intercharacter Spacing (ESC SP)

1B	20	NN
----	----	----

This control sets the amount of space to be added to the right of each character. The number of units of space is equal to NN, from 0 to 127. Each unit of space is 1/120th of an inch.

Master Select (ESC !)

1B	21	NN
----	----	----

This control selects any valid combination of the modes in the table below. To determine the value of the NN, add together the values of the modes you select from the table.

Mode	Decimal	Hex
10 CPI	0	00
12 CPI	1	01
Proportional	2	02
Condensed	4	04
Emphasized	8	08
Double-Strike	16	10
Double-Wide	32	20
Italic	64	40
Underline	128	80

This control applies to DP and NLQ. Proportional cannot be condensed and 10 CPI cannot be combined with 12 CPI. Proportional overrides condensed if both proportional and condensed are selected. Double-strike is ignored in NLQ.

Cancel MSB Control (ESC #)

1B	23
----	----

Cancels the most significant bit (MSB) control.

Set Absolute Print Position (ESC \$)

1B	24	N1	N2
----	----	----	----

This control specifies the distance that subsequent characters are to be printed from the set left margin in 1/60 inch units. Where the total number of dots equals $N1 + (N2 \times 256)$. If the position is beyond the right margin, the control is ignored and the previous setting remains active. If the position is within the right margin, subsequent characters will be printed at $(N1 + [N2 \times 256])/60$ inches.

Select User-Defined Set (ESC %)

1B	25	NN	00
----	----	----	----

This control specifies the character set as default or user-defined. The following are the values of NN:

- 0 Selects the default character set.
- 1 Selects the user-defined character set.

Define User-Defined Characters (ESC &)

1B	26	NN	MM	W0	W1	W2	D0 .. DN
----	----	----	----	----	----	----	----------

This control allows the definition of special characters that are not present in the character sets.

NN and MM are two decimal numbers that define the first and last characters to be replaced in the character set in use. If you want to replace only one character, MM must be equal to NN. Any value in the range of 0 to 127 is accepted, even code 32, which is the space character.

W0, W1, and W2 are numbers that specify the width of the character and the space around it. The space on the left of the character (in columns of dots) is specified by W0; the space on the right of the character is specified by W2. W1 specifies the number of columns of dots that must be printed to design the character.

The following table lists the maximum value for W0, W1, and W2:

Printing	W0 + W1	W0 + W1 + W2
DP	9	12
NLQ at 10 CPI	35	36
NLQ at 12 CPI	29	30
Proportional	41	42

D0 .. DN is the data of the character that is printed. Three bytes are needed for each column because it is composed of 24 dot positions. In this way, the number of data bytes is $W1 \times 3$. You can define a character in superscript or subscript. Two bytes are needed for each column because it is composed of 16 dot positions. The number of data bytes is $W1 \times 2$.

Select Graphics Mode (ESC *)

1B	2A	MM	N1	N2
----	----	----	----	----

This control selects the graphics mode MM from the table below. The total number of columns equals $N1 + (N2 \times 256)$.

Option	Alternate Code	MM	Horizontal Density (dots/in.)
Single-Density	ESC K	0	60
Double-Density	ESC L	1	120
High-Speed Double-Density *	ESC Y	2	120
Quadruple-Density *	ESC Z	3	240
CRT I	NONE	4	80
Plotter (1:1)	NONE	5	72
CRT II	NONE	6	90
Double-Density Plotter	NONE	7	144

Note: (*) Adjacent dots cannot be printed in this mode

Auto Underscore (ESC -)

1B	2D	NN
----	----	----

This control turns on and off the continuous underscore function.

If NN is an odd value (1, 3, 5 ...), the printer underscores all text characters and spaces following this sequence. The printer does not underscore white space caused by horizontal tabs.

If NN is an even value (0, 2, 4 ...), the printers stops the underscore of all data following this sequence.

Select Vertical Tab Channel (ESC /)

1B	2F	CH
----	----	----

This control selects the vertical tab channel. The values for CH are 0 to 7. The channel selected by this control is used for all subsequent vertical tab commands. Channel 0 is used if no channel has been selected.

Set 1/8 Inch Line Spacing (ESC 0)

1B	30
----	----

This control sets the line spacing to eight lines per inch.

The application program is responsible for keeping track of the vertical position on the current page relative to the current line spacing. Changing the line spacing within a print job without changing the page length can cause printing on the page perforation. For additional information, see "Set Page Length (ESC C)" on page 233.

Set 7/72 Inch Line Spacing (ESC 1)

1B	31
----	----

This control sets the line spacing to 7/72 inch.

The application program is responsible for keeping track of the vertical position on the current page relative to the current line spacing. Changing the line spacing within a print job without changing the page length can cause printing on the page perforation. For additional information, see “Set Page Length (ESC C)” on page 233.

Set 1/6 Inch Line Spacing (ESC 2)

1B	32
----	----

This control sets the line spacing at the value set by the last Set Text Line Spacing (ESC A) control received. The printer sets the line spacing to six lines per inch if no ESC A has been issued.

Set n/216 Inch Line Spacing (ESC 3)

1B	33	NN
----	----	----

This control changes the line spacing to the value specified by NN.

NN is a value that specifies the line spacing in units of 1/216 inch. Valid values are 0 to 255. If NN equals 0, the printer ignores this control. The printer will adjust the line spacing to the nearest 1/144 inch.

The application program is responsible for keeping track of the vertical position on the current page relative to the current line spacing. Changing the line spacing within a print job without changing the page length can cause printing on the page perforation. For additional information, see “Set Page Length (ESC C)” on page 233.

Select Italic Mode (ESC 4)

1B	34
----	----

This control turns on italic character printing. This control is valid even if the Epson Extended Graphics character set has been selected by the Character Table (ESC t) or the operator panel, but character graphics cannot be italicized. This control is used in both DP and NLQ.

Cancel Italic Mode (ESC 5)

1B	35	NN
----	----	----

This control cancels italic character printing.

Printable Code Area Expansion (ESC 6)

1B	36
----	----

This control enables codes X'80' through X'9F' from the active character set to become printable characters instead of control characters.

Cancel Printable Code Area Expansion (ESC 7)

1B	37
----	----

This control cancels Printable Code Area Expansion (ESC 6).

Copy ROM into Ram (ESC : NUL)

1B	3A	00	00	00
----	----	----	----	----

This control copies the characters in ROM into RAM. Specific characters may be redefined.

Select Unidirectional Mode (one line only) (ESC <)

1B	3C
----	----

This control selects unidirectional printing from left to right for one line only. ESC < is cancelled by a Carriage Return. The printhead begins the line at the Home position, prints to the end of the line, then is cancelled by the CR that returns the printhead to Home.

Set MSB to 0 (ESC =)

1B	3D
----	----

This control sets the most significant bit (MSB) of all incoming data to 0. The MSB is bit 7. This control only affects text and control code data. This control can prevent the problem of some system applications that always send data with the MSB set to 1, which results in italic or graphics printing in Epson printers.

Set MSB to 1 (ESC >)

1B	3E
----	----

This control sets the most significant bit (MSB) of all incoming data to 1. The MSB is 7. This control only affects text and control code data.

Reassign Graphics Mode (ESC ?)

1B	3F	S	NN
----	----	---	----

This control reassigns a graphics command (ESC K, ESC L, ESC Y, or ESC Z) to a different mode (K, L, Y, or Z).

Option	Alternate Code	NN	Horizontal Density (dots/in.)
Single-Density	ESC K	0	60
Double-Density	ESC L	1	120
High-Speed Double-Density *	ESC Y	2	120

Option	Alternate Code	NN	Horizontal Density (dots/in.)
Quadruple-Density *	ESC Z	3	240
CRT I	NONE	4	80
Plotter (1:1)	NONE	5	72
CRT II	NONE	6	90
Double-Density Plotter	NONE	7	144

Note: (*) Adjacent dots cannot be printed in this mode

Initialize Printer (ESC @)

1B	40
----	----

This control resets all print-related parameters to values previously saved and clears the buffer of printable data.

Select n/72 Inch Line Spacing (ESC A)

1B	41	NN
----	----	----

This control sets a line spacing value for subsequent line feeds.

NN is a one-byte hexadecimal number that specifies the line spacing value of NN/72 inches. The value of NN is 0 to 85.

Following are example values for NN:

X'18' 3 LPI
X'12' 4 LPI
X'0C' 6 LPI
X'09' 8 LPI
X'08' 9 LPI
X'06' 12 LPI

Set Vertical Tabs (ESC B)

1B	42	N1	N2...00
----	----	----	---------

This control sets the vertical stops. The maximum number of tab stops supported is 16. The settings are not affected by subsequent changes in line spacing. The tab settings must be in ascending order (N1, N2, etc.) with the 0 character indicating the end of the command. Values of N are 1 to 255. All settings are stored in Channel 0. See "Select Vertical Tabs in Channels (ESC b)" on page 239. To clear the tab settings, use ESC B 0.

Set Page Length (ESC C)

1B	43	LL	IN
----	----	----	----

This control sets the physical page length in lines or inches and resets skip perforation mode.

LL is a one-byte hexadecimal number that specifies the page length in lines. The value is converted to inches based upon the current line spacing. Valid values for LL are X'01' to X'FF', but the resulting page length in inches must be less than 113.8 inches (2890 mm). If LL equals 0, then parameter II (length is inches) is used.

IN is a one-byte hexadecimal number that specifies the page length in inches. IN is present only if parameter LL equals 0. Valid values for IN are X'01' to X'71'. If IN is greater than the maximum value, the maximum value is used. If both LL and IN are zero, the control is ignored.

Set Horizontal Tabs (ESC D)

1B	44	TT .. TT	00
----	----	----------	----

This control sets the horizontal tab stops. The maximum number of tab stops supported is 32. The sequence terminates with the NUL control code. If the null terminator is missing, the printer treats the next 32 bytes as tab stops and ignores all the data bytes following the 32 bytes until a Null is received. If the printer receives this control code with no tabs, all horizontal tab stops are cleared.

TT is the list of tab stops as character positions relative to the left edge of the physical page. Valid values are X'01' to X'FF'. Tab stops must be specified in ascending order. Entries not in ascending order are ignored.

Begin Emphasized Print (ESC E)

1B	45
----	----

This control starts emphasized print mode (bold style). Emphasized printing continues until the printer receives an End Emphasized Print (ESC F) control, or the printer is initialized.

End Emphasized Print (ESC F)

1B	46
----	----

This control ends emphasized print mode (bold style).

Begin Double-Strike Print (ESC G)

1B	47
----	----

This control starts double-strike printing (all text characters are double struck). Double-strike printing continues until the printer receives an End Double-Strike Print control (ESC H), or the printer is initialized.

End Double-Strike Print (ESC H)

1B	48
----	----

This control ends double-strike printing.

Printable Code Area Expansion (ESC I)

1B	49
----	----

This control defines whether codes X'00' through X'1F' and codes X'80' through X'9F' are printable characters or control characters of the active character set.

When NN equals X'01', the codes become printable characters, which allows them to be used as user-defined characters.

When NN equals X'00', the codes are returned to non-printable characters.

Perform n/216 Inch Line Feed (ESC J)

1B	4A	NN
----	----	----

This control performs a vertical move relative to the current presentation position.

NN is a one-byte hexadecimal value that specifies the move amount in units of 1/216 inch. The printer will adjust the value to the nearest 1/144 inch. This control performs an immediate line feed, but does not affect subsequent line spacing and does not produce a CR.

Select Single Density Graphics Mode (ESC K)

1B	4B	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 60 horizontal pel by 72 vertical pel. Bit image data can be mixed with text data on the same line.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follow should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

Select Double Density Graphics Mode (ESC L)

1B	4C	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 120 horizontal by 72 vertical pel. Bit image data can be mixed with text data on the same line.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follow should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

Select 12 CPI (ESC M)

1B	4D
----	----

This control selects 12 characters-per-inch printing.

Begin Skip Perforation (ESC N)

1B	4E	NN
----	----	----

This control sets the number of lines to be skipped at the bottom of each page. Once this function is activated, it stays active until the End Skip Perforation (ESC O) or Set Page Length (ESC C) control is received, or the printer is initialized.

NN is a one-byte hexadecimal value that specifies the number of lines to skip at the bottom of each page. This value must be greater than zero and less than the length of the page in lines (from 0 to 127). If the value is not valid, the control is ignored. Once Begin Skip Perforation is activated, the number of lines that may be printed on a page is the page length minus NN.

End Skip Perforation (ESC O)

1B	4F
----	----

This control ends skip perforation.

Select 10 CPI (ESC P)

1B	50
----	----

This control selects 10 CPI printing and is normally used to cancel 12 CPI.

Select Right Margin (ESC Q)

1B	51	NN
----	----	----

This control sets the right margin to N columns at the current character width. Where NN is the number of columns from the right edge of the physical page to the end of the print line.

Select Character Set (ESC R)

1B	52	NN
----	----	----

This control specifies an international character set as shown in the table below and is available in both DP and NLQ. The following values for NN are:

N	Character Set	Hex Codes											
		23	24	40	5b	5c	5d	5e	60	7b	7c	7d	7e
0	USA	#	\$	@	[	\	\]	^	'	{	|	}	~
1	France	#	\$	à	°	ç	§	^	'	é	ù	è	..
2	Germany	#	\$	§	Ä	Ö	Ü	^	'	ä	ö	ü	β
3	United Kingdom	£	\$	@	[	\	\]	^	'	{	|	}	~

N	Character Set	Hex Codes											
		23	24	40	5b	5c	5d	5e	60	7b	7c	7d	7e
4	Denmark I	#	\$	@	Æ	Ø	Å	^	'	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	\$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain I	Pt	\$	@	i	Ñ	¿	^	'	..	ñ	}	~
8	Japan	#	\$	@	[	¥	]	^	'	{	|	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
a	Denmark II	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
b	Spain II	#	\$	á	i	Ñ	¿	é	'	í	ñ	ó	ú
c	Latin America I	#	\$	á	i	Ñ	¿	é	ü	í	ñ	ó	ú
d	French Canadian	#	\$	à	â	ç	ê	î	ô	é	ù	è	û
e	Latin America II	#	\$	@	[	Ñ	]	ú	í	ó	á	é	ü

Begin Subscript/Superscript Mode (ESC S)

1B	53	NN
----	----	----

This control activates subscript and superscript printing. Once this printing is active, it stays active until another Begin Subscript/Superscript Mode control changes the mode, an End Subscript/Superscript Mode control is received, or the printer is initialized.

NN is a one-byte hexadecimal value that activates subscript or superscript printing.

- If NN is an odd value (1, 3, 5, ...), subscript mode is active.
- If NN is an even value (0, 2, 4, ...), superscript mode is active.

End Subscript/Superscript Mode (ESC T)

1B	54
----	----

This control stops subscript and superscript printing.

Set Print Direction (ESC U)

1B	55	NN
----	----	----

This control specifies bidirectional or unidirectional printing.

- If NN is an odd value (1, 3, 5, ...) unidirectional printing is selected.
- If NN is an even value (0, 2, 4, ...), bidirectional printing (default) is selected.

Double-Wide Continuous Mode (ESC W)

1B	57	NN
----	----	----

This control turns double-wide printing on or off. When double-wide printing is on, the width of subsequent graphic characters is doubled (the characters-per-inch

value is half of the single character value). For tabs, the font width is not doubled (tab distance is based upon single character width).

NN is a one-byte hexadecimal value that turns double-wide printing on or off.

- If NN is an odd value (1, 3, 5, ...), double-wide printing is turned on.
- If NN is an even value (0, 2, 4, ...), double-wide printing is turned off.

Note: Double-Wide Continuous Mode does the same function as Shift Out, except double wide printing is not canceled when a new line begins.

Dual Density Bit Image Graphics Type 2 (ESC Y)

1B	59	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 120 horizontal pel by 72 vertical pel. Bit image data can be mixed with text data on the same line. Horizontally adjacent dots are not allowed and will be removed if specified.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follow should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

High Density Bit Image Graphics (ESC Z)

1B	5A	LL	HH	NN .. NN
----	----	----	----	----------

This control prints the supplied bit image data at 240 horizontal per by 72 vertical pel. Bit image data can be mixed with text data on the same line.

A two-byte count (LL HH) indicates the number of bytes that follow in this control. LL is the least significant byte of the count; HH is the most significant byte. (The number of bytes that follow should equal $HH \times 256 + LL$.) If the count equals X'0000', the control is ignored.

NN .. NN are the bytes containing the bit image data. The data format is in 8-bit vertical slices, with the least significant bit the bottom dot and the most significant bit the top dot. B'1' indicates a pel to be printed; B'0' indicates an unprinted pel. Data that exceeds the right margin is discarded.

Set Relative Position (ESC \)

1B	5C	N1	N2
----	----	----	----

This control moves the printhead to a horizontal print position relative to the current print position using 1/120 inch increments. To calculate the correct values for N1 and N2, determine the displacement required in 1/120 of an inch. Send the resulting number using the formula total number of dots equals $N1 + (N2 \times 256)$. If the desired formula is to the left, subtract the number from 65536 before using the

formula. The printhead will move $(N1 + [N2 \times 256])/120$ inches relative to the current print position. The control is ignored if it would move the printhead beyond the page margins.

Set Letter Quality Justification (ESC a)

1B	61	NN
----	----	----

This control selects print justification according to the following values of NN:

- 0 Selects left justification
- 1 Selects center justification
- 2 Selects right justification
- 3 Selects full justification

Notes:

1. Left justification is the default setting (NN = 0).
2. The commands HT and BS are valid only when left justification is active.
3. For full justification, there must be no carriage returns within a paragraph.

Select Vertical Tabs in Channels (ESC b)

1B	62	CH	N1	N2..00
----	----	----	----	--------

This control sets vertical tabs to channels selected by the Set Vertical Tab Channel (ESC /) control. The value of CH is 0 through 7 and the value of N1 is 0 through 255.

The distance of each tab stop from top of form is the current line spacing times the number of lines given in N1.

If paper movement is commanded to a value of N1 greater than the page length, the paper movement command is ignored. The values of N1 must be in ascending order. If they are not, the sequence up to and including the out of sequence number is ignored. Skip over perforation is ignored. You can clear any channel by sending ESC b CH 0, where CH is the channel number.

Move Right n/120 (ESC d)

1B	64	N1	N2
----	----	----	----

This control spaces forward in 1/120s of an inch. To find the values for N1 and N2, determine the required displacement in 1/120s of an inch. Send the resulting number in the formula: $N1 + (N2 \times 256)$.

Move Left n/120 (ESC e)

1B	65	N1	N2
----	----	----	----

This control spaces backward in 1/120s of an inch. To find the values for N1 and N2, determine the required displacement in 1/120s of an inch. Send the resulting number in the formula: $N1 + (N2 \times 256)$.

Set 15 CPI (ESC g)

1B	67
----	----

This control prints any data stored in the print buffer, and initializes following text to print at 15 CPI.

Feed Paper n/216 Reverse (ESC j)

1B	6A
----	----

This command causes fanfold paper to feed backwards n/216 of an inch.

Select NLQ Font (ESC k)

1B	6B	NN
----	----	----

This control selects an NLQ font based on the following values of NN:

- 0** Courier
- 1** Gothic

This control affects only NLQ.

Set Left Margin (ESC l)

1B	6C	NN
----	----	----

This control sets the left margin to NN columns from the left edge of the physical page to the beginning of the print line. Where NN is a hex value. The number of inches in the margin does not vary if the font, character width, or horizontal dot density changes. This command automatically clears and resets horizontal tabs to every eight characters, then performs a cancel operation. The smallest possible space between the left margins is the width of one double-wide, 10 CPI character. If a margin control code violates this minimum distance, it is ignored. Settings in proportional mode are treated as 10 CPI.

Turn Proportional Mode On/Off (ESC p)

1B	70	NN
----	----	----

This control sets proportional mode on or off to the following values of NN:

- 0** Mode is Off
- 1** Mode is On

This control overrides condensed and is available for DP, NLQ, and user-defined characters.

Quiet Printing (ESC s)

1B	73	NN
----	----	----

This control activates and deactivates Quiet Mode. Quiet mode creates half-speed printing. The following are the values for NN:

- 0 Set Quiet Mode Off
- 1 Set Quiet Mode On

Select Character Table (ESC t)

1B	74	NN
----	----	----

This control selects italic characters from the Epson Italic character set. The characters selected are ASCII codes 128 to 255 (X'80' through X'FF').

The following values of NN are:

- X'0'** Select Epson Italic character set
- X'1'** Selects Epson Extended Graphics Italic character set (actually Code Page 437)
- X'2'** Remap DLL character set from positions 0 - 127 to 128 - 255.

Selecting Epson Extended Graphics does not disable italic printing. The value of NN must equal X'00' or X'01'.

Double High Printing (ESC w)

1B	77	NN
----	----	----

This control activates and deactivates double-high printing. The following are the values for NN:

- 0 Set Double-High Mode Off
- 1 Set Double-High Mode On

Superscript, subscript, and condensed modes are not valid in double-high mode. This command is available for both DP and NLQ printing.

Select NLQ or DP Print Quality (ESC x)

1B	78	NN
----	----	----

This control selects NLQ or DP from the following values of NN:

- 0 Selects DP mode
- 1 Selects NLQ mode

This control overrides the operator panel print quality selections.

Buffer Terminating Conditions

The following controls cause buffered data to be released for printing:

- Carriage Return
- Line Feed
- Form Feed
- Reverse Line Feed
- Horizontal Tab
- Vertical Tab

- Backspace
- Set 1/8 Inch Line Spacing
- Set 7/72 Inch Line Spacing
- Set 1/6 Inch Line Spacing
- Set n/216 Inch Line Spacing
- Set n/72 Inch Line Spacing
- Invoke Text Line Spacing (if the line spacing is changed)
- Move Right n/120
- Move Left n/120
- Feed Paper n/216 Reverse
- Relative Move Baseline
- Shift Out/Double-Wide Print
- Device Control 4/Cancel Double-Wide Print
- Begin Subscript/Superscript
- End Subscript/Superscript
- Begin Double-Strike Print
- End Double-Strike Print
- Begin Emphasized Print
- End Emphasized Print
- Set Presentation Highlight
- Continuous Overscore
- Auto Underscore
- Device Control 2/Select 10 CPI
- Set 12 CPI
- Shift In/Condensed Print
- Proportional Space Mode
- Change Font
- Normal Density Bit Image Graphics
- Dual Density Bit Image Graphics Type 1
- Dual Density Bit Image Graphics Type 2
- High Density Bit Image Graphics
- Unidirectional Printing
- Set Horizontal Margins
- Set Initial Conditions

The following conditions also cause buffered data to be released for printing:

- Serial BREAK or parallel -INIT
- Automatic Line Wrap An automatic line wrap consists of a carriage return and line feed inserted after the maximum number of characters has been printed on a line. The next character is then printed at the left margin on the following line. Automatic line wrap occurs for text data but not for bit image graphics or advanced function graphics.

Unsupported Command Processing

The following Epson controls are not supported by the 4247 Printer. If any of these commands are received, they are ignored.

- Select 9-Pin Graphic Mode (ESC ^)
- Disable Paper-Out Sensor (ESC 8)
- Enable Paper-Out Sensor (ESC 9)
- Select Color (ESC r)
- Assign Character Table (ESC (t)

Appendix F. Code Pages

ASCII Code Pages	245
USA (Personal Computer)	247
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Turkish	255
Portuguese	256
Icelandic	257
Hebrew	258
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Baltic Multilingual.	273
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ASCII Code Pages

The table below lists the ASCII code pages used by the 4247 Printer, and also provides page references so you can determine what code page contains the characters you want to use.

Code Page	Character Set Name	See Page
437	USA (Personal Computer)	247

Code Page	Character Set Name	See Page
813	Greek/Latin (ISO 8859-7)	248
819	Latin 1 (ISO 8859-1)	249
850	Multilingual	250
851	Old Greek	251
852	Latin 2/ROECE	252
853	Turkish	253
855	Cyrillic	254
857	Turkish	255
860	Portuguese	256
861	Icelandic	257
862	Hebrew	258
863	Canadian French	259
864	Arabic	260
865	Danish/Norwegian	261
866	Cyrillic 2 (Personal Computer)	262
869	New Greek	263
874	Thai	264
876	OCR-A	265
877	OCR-B	266
912	Latin 2 (ISO 8859-2)	267
913	Latin 3 (ISO 8859-3)	268
914	Latin 4 (ISO 8859-4)	269
915	Cyrillic (ISO 8859-5)	270
916	Latin 8 (ISO 8859-8)	271
920	Latin 5 (ISO 8859-9)	272
921	Baltic Multilingual	273
922	Estonian	274
1006	Urdu	275
1046	Arabic Extended	276
1089	Latin 6 (ISO 8859-6)	277
1098	Farsi (Personal Computer)	278
1116	Estonian (Personal Computer)	279
1117	Latvian (Personal Computer)	280
1118	Lithuanian (Personal Computer)	281
1251	Cyrillic Windows	282
	Epson Extended Graphic	283
	Epson Italic	283

USA (Personal Computer)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á				α	≡
-1	☺	◀	!	1	A	Q	a	q	ü	æ	í				β	±
-2	☹	↕	"	2	B	R	b	r	é	Æ	ó				Γ	≥
-3	♥	!!	#	3	C	S	c	s	â	ô	ú				π	≤
-4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ				Σ	ƒ
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ				σ	J
-6	♠	■	&	6	F	V	f	v	å	û	æ				μ	÷
-7	•	↕	'	7	G	W	g	w	ç	ù	º				τ	≈
-8	■	↑	(	8	H	X	h	x	ê	ÿ	¿				Φ	°
-9	○	↓	)	9	I	Y	i	y	ë	Ö	⌌				Θ	•
-A	●	→	*	:	J	Z	j	z	è	Ü	⌌				Ω	·
-B	♂	←	+	;	K	[	k	{	ï	ø	½				δ	√
-C	♀	⌌	,	<	L	\	l	|	î	£	¼				∞	ⁿ
-D	♪	↔	-	=	M	]	m	}	ì	¥	ì				φ	²
-E	♫	▲	.	>	N	^	n	~	Ä	Pts	«				ε	■
-F	☀	▼	/	?	O	_	o	◊	Å	f	»				∩	(RSP)

Code Page 00437

Greek/Latin (ISO 8859-7)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	í GI730000	Π GP020000	ύ GU730000	π GP010000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			‘ SP190000	± SA020000	A GA020000	P GR020000	α GA010000	ρ GR010000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			’ SP200000	² ND021000	B GB020000		β GB010000	ς GS610000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000	Γ GG020000	Σ GS020000	γ GG010000	σ GS010000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000				’ SD110000	Δ GD020000	T GT020000	δ GD010000	τ GT010000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000				’ SD730000	E GE020000	Υ GU020000	ε GE010000	υ GU010000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			¡ SM650000	’ GA120000	Z GZ020000	Φ GF020000	ζ GZ010000	φ GF010000
-7			’ SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	· SD630000	H GE320000	X GH020000	η GE310000	χ GH010000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	’ GE120000	Θ GT620000	Ψ GP620000	ϑ GT610000	ψ GP610000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			© SM520000	’ GE720000	I GI020000	Ω GO320000	ι GI010000	ω GO310000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000				’ GI120000	K GK020000	İ GI180000	κ GK010000	ï GI170000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			« SP170000	» SP180000	Λ GL020000	ÿ GU180000	λ GL010000	ÿ GU170000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			¬ SM660000	’ GO120000	M GM020000	ά GA110000	μ GM010000	ό GO110000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000	N GN020000	έ GE110000	ν GN010000	ύ GU110000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000				’ GU120000	Ξ GX020000	ή GE710000	ξ GX010000	ώ GO710000
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000				— SM120000	’ GO720000	O GO020000	ί GI110000	ο GO010000	

Code Page 00813

Latin 1 (ISO 8859-1)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	À LA140000	Ð LD620000	à LA130000	ð LD630000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			i SP030000	± SA020000	Á LA120000	Ñ LN200000	á LA110000	ñ LN190000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			¢ SC040000	² ND021000	Â LA160000	Ò LO140000	â LA150000	ò LO130000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000	Ã LA200000	Ó LO120000	ã LA190000	ó LO110000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			¤ SC010000	' SD110000	Ä LA180000	Ô LO160000	ä LA170000	ô LO150000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			¥ SC050000	µ SM170000	Å LA280000	Õ LO200000	å LA270000	õ LO190000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			¡ SM650000	¶ SM250000	Æ LA520000	Ö LO180000	æ LA510000	ö LO170000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	· SD630000	Ç LC420000	× SA070000	ç LC410000	÷ SA060000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	¸ SD410000	È LE140000	Ø LO620000	è LE130000	ø LO610000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			© SM520000	¹ ND011000	É LE120000	Ù LU140000	é LE110000	ù LU130000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			ª SM210000	º SM200000	Ê LE160000	Ú LU120000	ê LE150000	ú LU110000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			« SP170000	» SP180000	Ë LE180000	Û LU160000	ë LE170000	û LU150000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			¬ SM660000	¼ NF040000	Ì LI140000	Ü LU180000	ì LI130000	ü LU170000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000	Í LI200000	Ý LY200000	í LI110000	ý LY110000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			® SM530000	¾ NF050000	Î LI160000	Þ LT640000	î LI150000	þ LT630000
-F			/ SP120000	? SP150000	O LO020000	_ SP090000	o LO010000				- SM150000	¿ SP160000	Ï LI180000	ß LS610000	ï LI170000	ÿ LY170000

Code Page 00819

Multilingual

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á			ø	Ó	(SHY)
-1	☺	◀	!	1	A	Q	a	q	ü	æ	í			Ð	ß	±
-2	☹	↕	"	2	B	R	b	r	é	Æ	ó			Ê	Ô	=
-3	♥	!!	#	3	C	S	c	s	â	ô	ú			Ë	Ò	¾
-4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ			È	õ	¶
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á		ı	Õ	§
-6	♠	■	&	6	F	V	f	v	å	û	ə	Â	ã	Í	μ	÷
-7	•	↕	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	,
-8	■	↑	(	8	H	X	h	x	ê	ÿ	ı	©		İ	þ	°
-9	○	↓	)	9	I	Y	i	y	ë	Ö	®			Ú	¨	¨
-A	●	→	*	:	J	Z	j	z	è	Ü	¬			Û	·	·
-B	♂	←	+	;	K	[	k	{	ï	ø	½			Ü	¹	¹
-C	♀	⌞	,	<	L	\	l	|	î	£	¼			Ý	³	³
-D	♪	↔	-	=	M	]	m	}	ì	Ø	ı	¢		ı	Ý	²
-E	🎵	▲	.	>	N	^	n	~	Ä	×	«	¥		ı	-	■
-F	☀	▼	/	?	O	—	o	◊	Å	f	»			'	(RSP)	(RSP)

Code Page 00850

Old Greek

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	Ɔ	ï	☐	☐	T	ζ	(SHY)
-1	☺	◀	!	1	A	Q	a	q	ü		í	☐	☐	Y	η	±
-2	☹	↕	"	2	B	R	b	r	é	Ɔ	ó	☐	☐	Φ	ρ	υ
-3	♥	!!	#	3	C	S	c	s	â	ô	ú	☐	☐	X	ι	φ
-4	♦	¶	\$	4	D	T	d	t	ä	ö	A	☐	☐	Ψ	κ	χ
-5	♣	§	%	5	E	U	e	u	à	Ɔ	B	K	☐	Ω	λ	§
-6	♠	▬	&	6	F	V	f	v	À	û	Γ	Λ	Π	α	μ	ψ
-7	•	↕	'	7	G	W	g	w	ç	ù	Δ	M	P	β	ν	,
-8	■	↑	(	8	H	X	h	x	ê	Ω	E	N	☐	γ	ξ	°
-9	○	↓	)	9	I	Y	i	y	ë	Ö	Z	☐	☐	ο	¨	
-A	●	→	*	:	J	Z	j	z	è	Û	H	☐	☐	π	ω	
-B	♂	←	+	;	K	[	k	{	ï	á	½	☐	☐	■	ρ	ÿ
-C	♀	⌞	,	<	L	\	l	|	î	£	Θ	☐	☐	■	σ	ύ
-D	♪	↔	-	=	M	]	m	}	Ɔ	é	I	Ξ	☐	δ	ς	ώ
-E	♫	▲	.	>	N	^	n	~	Ä	ή	«	Ο	☐	ε	τ	■
-F	☀	▼	/	?	O	_	o	⏏	Ɔ	í	»	☐	Σ	■	'	(RSP)

Code Page 00851

Latin 2/ROECE

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á	☐	☐	đ	Ó	(SHY)
-1	☺	◀	!	1	A	Q	a	q	ü	Ł	í	☐	☐	Đ	ß	"
-2	☹	↕	"	2	B	R	b	r	é	Í	ó	☐	☐	Ď	Ô	˘
-3	♥	!!	#	3	C	S	c	s	â	ô	ú	☐	☐	Ě	Ň	˘
-4	♦	¶	\$	4	D	T	d	t	ä	ö	Ą	☐	☐	ď	ń	˘
-5	♣	§	%	5	E	U	e	u	û	Ľ	ą	Á	☐	Ň	ñ	§
-6	♠	—	&	6	F	V	f	v	é	ĭ	Ž	Â	Ă	Í	Š	÷
-7	•	↕	'	7	G	W	g	w	ç	Ś	ž	Ě	ă	Î	š	˘
-8	■	↑	(	8	H	X	h	x	ł	ś	Ę	Ş	☐	ě	Ř	°
-9	○	↓	)	9	I	Y	i	y	ë	Ö	ę	☐	☐	Ú	˘	˘
-A	●	→	*	:	J	Z	j	z	Ő	Ü		☐	☐	í	˘	˘
-B	♂	←	+	;	K	[	k	{	õ	Ť	ź	☐	☐	■	Ů	ů
-C	♀	└	,	<	L	\	l	|	î	ı	Č	☐	☐	■	ý	Ř
-D	♪	↔	-	=	M	]	m	}	Ž	Ł	ş	Ž	☐	Ţ	Ý	ř
-E	🎵	▲	.	>	N	^	n	~	Ä	×	«	ž	☐	Û	ı	■
-F	☀	▼	/	?	O	—	o	◊	Ć	č	»	☐	☐	■	'	(RSP)

Code Page 00852

Turkish

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á				Ó	(SH̄Y)
-1	☺	◀	!	1	A	Q	a	q	ü	è	í				ß	
-2	☹	↕	"	2	B	R	b	r	é	Ĉ	ó			Ê	Ô	ł
-3	♥	!!	#	3	C	S	c	s	â	ô	ú			Ë	Ò	'n
-4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ			È	Ĝ	˘
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á		ı	ğ	§
-6	♠	■	&	6	F	V	f	v	ê	û	Ĝ	Â	Ŝ	Í	μ	÷
-7	•	↕	'	7	G	W	g	w	ç	ù	ğ	À	ŝ	Î	Ĥ	˙
-8	■	↑	(	8	H	X	h	x	ê	î	Ĥ	Ş		İ	ĥ	°
-9	○	↓	)	9	I	Y	i	y	ë	Ö	ĥ			Ú		¨
-A	●	→	*	:	J	Z	j	z	è	Ü				Û		·
-B	♂	←	+	;	K	[	k	{	ï	ê	½			Ù		
-C	♀	└	,	<	L	\	l	|	î	£	Ĵ			Ů		³
-D	♪	↔	-	=	M	]	m	}	ì	Ĝ	ş	Ž		ű		²
-E	🎵	▲	.	>	N	^	n	~	Ä	×	«	ž		İ	·	■
-F	☀	▼	/	?	O	_	o	◊	Ĉ	ĵ	»			'		(RSP)

Code Page 00853

Cyrillic

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	ђ	љ	а			л	Я	(ШҮ)
-1	☺	◀	!	1	A	Q	a	q	Ђ	Љ	А			Л	р	ы
-2	☹	↕	"	2	B	R	b	r	ѓ	њ	Б			М	Р	Ы
-3	♥	!!	#	3	C	S	c	s	Ѓ	Њ	Б			М	с	з
-4	♦	¶	\$	4	D	T	d	t	ё	ћ	Ц			н	С	З
-5	♣	§	%	5	E	U	e	u	Ё	Ћ	Ц			Н	т	ш
-6	♠	▬	&	6	F	V	f	v	ё	ќ	Д			Х	к	о
-7	•	↕	'	7	G	W	g	w	Є	Ќ	Д			И	К	О
-8	■	↑	(	8	H	X	h	x	ѕ	ђ	е			И	п	У
-9	○	↓	)	9	I	Y	i	y	Ѕ	Ђ	Е			И	ж	Щ
-A	●	→	*	:	J	Z	j	z	і	ц	Ф			И	Ж	Щ
-B	♂	←	+	;	К	[	k	{	І	Ц	Ф			И	В	Ч
-C	♀	└	,	<	L	\	l	|	ї	ю	Г			И	В	Ч
-D	♪	↔	-	=	M	]	m	}	Ї	Ю	Г			И	П	Ь
-E	♫	▲	.	>	N	^	n	~	ј	ь	«			И	Я	Ь
-F	☀	▼	/	?	O	_	o	⏏	Ј	Ъ	»			И	№	(RSP)

Code Page 00855

Turkish

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á	☐	☐	ø	Ó	(SHY)
-1	☺	◀	!	1	A	Q	a	q	ü	æ	í	☐	☐	ª	ß	±
-2	☹	↕	"	2	B	R	b	r	é	Æ	ó	☐	☐	Ê	Ô	
-3	♥	!!	#	3	C	S	c	s	â	ô	ú	☐	☐	Ë	Ò	¾
-4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ	☐	☐	È	õ	¶
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	☐		Õ	§
-6	♠	■	&	6	F	V	f	v	å	û	Č	Â	ã	Í	μ	÷
-7	•	↕	'	7	G	W	g	w	ç	ù	ğ	À	Ã	Î		¸
-8	■	↑	(	8	H	X	h	x	ê	ï	ı	©	☐	İ	×	°
-9	○	↓	)	9	I	Y	i	y	ë	Ö	®	☐	☐	☐	Ú	¨
-A	●	→	*	:	J	Z	j	z	è	Ü	¬	☐	☐	☐	Û	·
-B	♂	←	+	;	K	[	k	{	ï	ø	½	☐	☐	■	Ü	¹
-C	♀	└	,	<	L	\	l	|	î	£	¼	☐	☐	■	ì	³
-D	♪	↔	-	=	M	]	m	}	ı	Ø	ı	☐	☐	ı	ÿ	²
-E	♫	▲	.	>	N	^	n	~	Ä	Ş	«	¥	☐	İ	-	■
-F	☀	▼	/	?	O	_	o	◊	Å	ş	»	☐	☐	■	'	(RSP)

Code Page 00857

Portuguese

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á				α	≡
-1	☺	◀	!	1	A	Q	a	q	ü	À	í				β	±
-2	☹	↕	"	2	B	R	b	r	é	È	ó				Γ	≥
-3	♥	!!	#	3	C	S	c	s	â	ô	ú				π	≤
-4	♦	¶	\$	4	D	T	d	t	ã	õ	ñ				Σ	ƒ
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ				σ	J
-6	♠	■	&	6	F	V	f	v	Á	Ú	ª				μ	÷
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-9	○	↓)	9	I	Y	i	y	Ê	Ï	Ò				Θ	•
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Code Page 00860

Icelandic

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
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		SM590000	SP010000	ND100000	SM050000	LP020000	SD130000	LP010000	LC420000	LE120000	LA110000	SF140000	SF020000	SF460000	GA010000	SA480000
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	SS000000	SM630000	SP020000	ND010000	LA020000	LQ020000	LA010000	LQ010000	LU170000	LA510000	LI110000	SF150000	SF070000	SF470000	LS610000	SA020000
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	SS010000	SM760000	SP040000	ND020000	LB020000	LR020000	LB010000	LR010000	LE110000	LA520000	LO110000	SF160000	SF060000	SF480000	GG020000	SA530000
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	SS020000	SP330000	SM010000	ND030000	LC020000	LS020000	LC010000	LS010000	LA150000	LO150000	LU110000	SF110000	SF080000	SF490000	GP010000	SA520000
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	SS030000	SM250000	SC030000	ND040000	LD020000	LT020000	LD010000	LT010000	LA170000	LO170000	LA120000	SF090000	SF100000	SF500000	GS020000	SS260000
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	SS040000	SM240000	SM020000	ND050000	LE020000	LU020000	LE010000	LU010000	LA130000	LT630000	LI200000	SF190000	SF050000	SF510000	GS010000	SS270000
-6	♠	▬	&	6	F	V	f	v	å	û	Ó				μ	÷
	SS050000	SM700000	SM030000	ND060000	LF020000	LV020000	LF010000	LV010000	LA270000	LU150000	LO120000	SF200000	SF360000	SF520000	GM010000	SA060000
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	SM570000	SM770000	SP050000	ND070000	LG020000	LW020000	LG010000	LW010000	LC410000	LY120000	LU120000	SF210000	SF370000	SF530000	GT010000	SA700000
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	SM570001	SM320000	SP060000	ND080000	LH020000	LX020000	LH010000	LX010000	LE150000	LY110000	SP160000	SF220000	SF380000	SF540000	GF020000	SM190000
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	SM750000	SM330000	SP070000	ND090000	LI020000	LY020000	LI010000	LY010000	LE170000	LO180000	SM680000	SF230000	SF390000	SF040000	GT620000	SA790000
-A	●	→	*	:	J	Z	j	z	è	Ü	ƒ				Ω	•
	SM750002	SM310000	SM040000	SP130000	LJ020000	LZ020000	LJ010000	LZ010000	LE130000	LU180000	SM660000	SF240000	SF400000	SF010000	GO320000	SD630000
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	SM280000	SM300000	SA010000	SP140000	LK020000	SM060000	LK010000	SM110000	LD620000	LO610000	NF010000	SF250000	SF410000	SF610000	GD010000	SA800000
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	SM290000	SA420000	SP080000	SA030000	LL020000	SM070000	LL010000	SM130000	LD630000	SC020000	NF040000	SF260000	SF420000	SF570000	SA450000	LN011000
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	SM930000	SM780000	SP100000	SA040000	LM020000	SM080000	LM010000	SM140000	LT640000	LO620000	SP030000	SF270000	SF430000	SF580000	GF010001	ND021000
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	SM910000	SM600000	SP110000	SA050000	LN020000	SD150000	LN010000	SD190000	LA180000	SC060000	SP170000	SF280000	SF440000	SF590000	GE010000	SM470000
-F	☀	▼	/	?	O	_	o	◊	Å	f	»				∩	(RSP)
	SM690000	SV040000	SP120000	SP150000	LO020000	SP090000	LO010000	SM790000	LA280000	SC070000	SP180000	SF030000	SF450000	SF600000	SA380000	SP300000

Code Page 00861

Hebrew

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
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-7	•	↕	'	7	G	W	g	w	ק	ר	ø				τ	≈
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-9	○	↓)	9	I	Y	i	y	ת	ש	∟				Θ	•
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Code Page 00862

Canadian French

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		SM590000	SP010000	ND100000	SM050000	LP020000	SD130000	LP010000	LC420000	LE120000	SM650000	SF140000	SF020000	SF460000	GA010000	SA480000
-1	☺	◀	!	1	A	Q	a	q	ü	È	'	☐	☐	☐	β	±
	SS000000	SM630000	SP020000	ND010000	LA020000	LQ020000	LA010000	LQ010000	LU170000	LE140000	SD110000	SF150000	SF070000	SF470000	LS610000	SA020000
-2	☹	↕	"	2	B	R	b	r	é	Ê	ó	☐	☐	☐	Γ	≥
	SS010000	SM760000	SP040000	ND020000	LB020000	LR020000	LB010000	LR010000	LE110000	LE160000	LO110000	SF160000	SF060000	SF480000	GG020000	SA530000
-3	♥	!!	#	3	C	S	c	s	â	ô	ú	☐	☐	☐	π	≤
	SS020000	SP330000	SM010000	ND030000	LC020000	LS020000	LC010000	LS010000	LA150000	LO150000	LU110000	SF110000	SF080000	SF490000	GP010000	SA520000
-4	♦	¶	\$	4	D	T	d	t	Â	Ë	¨	☐	☐	☐	Σ	ƒ
	SS030000	SM250000	SC030000	ND040000	LD020000	LT020000	LD010000	LT010000	LA160000	LE180000	SD170000	SF090000	SF100000	SF500000	GS020000	SS260000
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	SS040000	SM240000	SM020000	ND050000	LE020000	LU020000	LE010000	LU010000	LA130000	LI180000	SD410000	SF190000	SF050000	SF510000	GS010000	SS270000
-6	♠	▬	&	6	F	V	f	v	¶	û	³	☐	☐	☐	μ	÷
	SS050000	SM700000	SM030000	ND060000	LF020000	LV020000	LF010000	LV010000	SM250000	LU150000	ND031000	SF200000	SF360000	SF520000	GM010000	SA060000
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	SM570000	SM770000	SP050000	ND070000	LG020000	LW020000	LG010000	LW010000	LC410000	LU130000	SM150000	SF210000	SF370000	SF530000	GT010000	SA700000
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	SM570001	SM320000	SP060000	ND080000	LH020000	LX020000	LH010000	LX010000	LE150000	SC010000	LI160000	SF220000	SF380000	SF540000	GF020000	SM190000
-9	○	↓	)	9	I	Y	i	y	ë	Ô	∟	☐	☐	☐	Θ	•
	SM750000	SM330000	SP070000	ND090000	LI020000	LY020000	LI010000	LY010000	LE170000	LO160000	SM680000	SF230000	SF390000	SF040000	GT620000	SA790000
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	SM750002	SM310000	SM040000	SP130000	LJ020000	LZ020000	LJ010000	LZ010000	LE130000	LU180000	SM660000	SF240000	SF400000	SF010000	GO320000	SD630000
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	SM280000	SM300000	SA010000	SP140000	LK020000	SM060000	LK010000	SM110000	LI170000	SC040000	NF010000	SF250000	SF410000	SF610000	GD010000	SA800000
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	SM290000	SA420000	SP080000	SA030000	LL020000	SM070000	LL010000	SM130000	LI150000	SC020000	NF040000	SF260000	SF420000	SF570000	SA450000	LN011000
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	SM930000	SM780000	SP100000	SA040000	LM020000	SM080000	LM010000	SM140000	SM100000	LU140000	NF050000	SF270000	SF430000	SF580000	GF010001	ND021000
-E	♪	▲	.	>	N	^	n	~	À	Û	«	☐	☐	☐	ε	■
	SM910000	SM600000	SP110000	SA050000	LN020000	SD150000	LN010000	SD190000	LA140000	LU160000	SP170000	SF280000	SF440000	SF590000	GE010000	SM470000
-F	☀	▼	/	?	O	—	o	⏏	§	f	»	☐	☐	☐	∩	(RSP)
	SM690000	SV040000	SP120000	SP150000	LO020000	SP090000	LO010000	SM790000	SM240000	SC070000	SP180000	SF030000	SF450000	SF600000	SA380000	SP300000

Code Page 00863

Arabic

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
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-1	☺	◀	!	1	A	Q	a	q	•	∞	(SHY)	ا	ء	ر	ف	س
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-9	☒	↓)	9	I	Y	i	y	☒	لا	ب	٩	ة	ع	ي	لا
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Code Page 00864

Danish/Norwegian

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p	Ç	É	á				α	≡
-1	☺	◀	!	1	A	Q	a	q	ü	æ	í				β	±
-2	☹	↕	"	2	B	R	b	r	é	Æ	ó				Γ	≥
-3	♥	!!	#	3	C	S	c	s	â	ô	ú				π	≤
-4	♦	¶	\$	4	D	T	d	t	ä	ö	ñ				Σ	ƒ
-5	♣	§	%	5	E	U	e	u	à	ò	Ñ				σ	J
-6	♠	■	&	6	F	V	f	v	å	û	æ				μ	÷
-7	•	↕	'	7	G	W	g	w	ç	ù	º				τ	≈
-8	■	↑	(8	H	X	h	x	ê	ÿ	¿				Φ	°
-9	○	↓)	9	I	Y	i	y	ë	Ö	⌈				Θ	•
-A	●	→	*	:	J	Z	j	z	è	Ü	⌋				Ω	·
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Code Page 00865

Cyrillic 2 (Personal Computer)

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-2	☹	↕	"	2	В	Р	в	р	В	Т	в				т	€
-3	♥	!!	#	3	С	S	с	s	Г	У	г				у	€
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-5	♣	§	%	5	E	U	e	u	E	X	e				x	ı
-6	♠	▬	&	6	F	V	f	v	Ж	Ц	ж				ц	Ў
-7	•	↕	'	7	G	W	g	w	З	Ч	з				ч	ў
-8	■	↑	(8	H	X	h	x	И	Ш	и				ш	°
-9	○	↓)	9	I	Y	i	y	Й	Щ	й				щ	•
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Code Page 00866

New Greek

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-4	♦	¶	\$	4	D	T	d	t			A	☐	☐	Ψ	κ	χ
-5	♣	§	%	5	E	U	e	u		Υ	B	K	☐	Ω	λ	§
-6	♠	■	&	6	F	V	f	v	Α	ÿ	Γ	Λ	Π	α	μ	ψ
-7	•	↕	'	7	G	W	g	w		©	Δ	M	P	β	ν	'
-8	■	↑	(8	H	X	h	x	•	Ω	E	N	☐	γ	ξ	°
-9	○	↓)	9	I	Y	i	y	∩	²	Z	☐	☐	ο	¨	
-A	●	→	*	:	J	Z	j	z	ı	³	H	☐	☐	π	ω	
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Code Page 00869

Thai

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-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	' SD130000	p LP010000			' BZ100300	๐ BT200000	๑ BP400000	๒ BA200000	๓ BE200000	๔ ND100002
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			ก BK100000	ข BT300000	ฃ BM100000	๕ BA100000	๖ BE300000	๗ ND010002
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			ข BK200000	ฃ BT400000	๕ BY200000	๖ BA300000	๗ BO200000	๘ ND020002
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			ข BK300000	ฃ BN200000	๕ BR100000	๖ BA400000	๗ BA500000	๘ ND030002
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			ค BK400000	ฃ BD200000	๕ BR200000	๖ BI100000	๗ BA600000	๘ ND040002
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			ค BK500000	ฃ BT500000	๕ BL100000	๖ BI200000	๗ BA700000	๘ ND050002
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			ข BK600000	ฃ BT600000	๕ BL200000	๖ BU100000	๗ BQ100000	๘ ND060002
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			ง BN100000	ก BT700000	๕ BW100000	๖ BU200000	๗ BE100000	๘ ND070002
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			จ BC100000	ฃ BT800000	๕ BS200000	๖ BU300000	๗ BZ100000	๘ ND080002
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			จ BX100000	ฃ BN300000	๕ BS300000	๖ BU400000	๗ BZ200000	๘ ND090002
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			ช BS100000	๕ BB100000	๖ BS400000	๗ BQ300000	๘ BZ300000	๙ BQ500000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			ช BX200000	๕ BP100000	๖ BH100000	๗ BZ200300	๘ BZ400000	๙ BQ600000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			ฃ BX300000	๕ BP200000	๖ BL300000	๗ BZ300300	๘ BZ500000	๙ SC040000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			ฃ BY100000	๕ BF100000	๖ BO100000	๗ BZ400300	๘ BN400000	๙ SM660000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			ฃ BD100000	๕ BP300000	๖ BH200000	๗ BZ500300	๘ BE400000	๙ SM650000
-F			/ SP120000	? SP150000	O LO020000	_ SP090000	o LO010000				ฃ BT100000	๕ BF200000	๖ BQ200000	๗ SC130000	๘ BQ400000	๙ SP300000 (RSP)

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OCR-A

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	п SO020000	p LP010000								
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000								
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000		Æ LA520000						
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000								
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000								
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000		Ñ LN200000						
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000								
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000		Ø LO620000						
-8	— SO150000	(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000									
-9		) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000		Ö LO180000							
-A		* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000		Ü LU180000							
-B		+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000									
-C		, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SO130000		£ SC020000							
-D		- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000		¥ SC050000							
-E		. SP110000	> SA050000	N LN020000	^ SM090000	n LN010000	ſ SO000000	Ä LA180000								
-F		/ SP120000	? SP150000	O LO020000	Ү SO010000	o LO010000	■ SO140000	Å LA280000								

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OCR-B

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000								
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000	ü LU170000	æ LA510000					ß LS610000	
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000		Æ LA520000						
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000								
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000	ä LA170000	ö LO170000						
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			Ñ LN200000					§ SM240000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000	å LA270000		ø LO610000					
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			Ø LO620000					Š SD410000
-8	— SO150000	(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000									
-9		) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000		Ö LO180000	— SP090000	ij LI510000					¨ SD170000
-A		* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000		Ü LU180000		IJ LI520000					
-B		+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000		^ SD150000							
-C		, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	l SO130000		£ SC020000							
-D		- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000		¥ SC050000							
-E		. SP110000	> SA050000	N LN020000	^ SM090000	n LN010000	~ SD190000	Ä LA180000								
-F		/ SP120000	? SP150000	O LO020000	— SD470000	o LO010000	■ SO140000	Å LA280000					⊘ SC010000		' SD110000	

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Latin 2 (ISO 8859-2)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	Ř LR120000	Đ LD620000	í LR110000	ď LD610000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			Ą LA440000	ą LA430000	Á LA120000	Ñ LN120000	á LA110000	ń LN110000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			˘ SD230000	˙ SD430000	Â LA160000	Ñ LN220000	â LA150000	ň LN210000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			Ł LL620000	ł LL610000	Ǻ LA240000	Ó LO120000	ǻ LA230000	ó LO110000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			Ɔ SC010000	' SD110000	Ä LA180000	Ô LO160000	ä LA170000	ô LO150000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			Ľ LL220000	ĺ LL210000	Ĺ LL120000	Ő LO260000	í LL110000	õ LO250000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			Ś LS120000	ś LS110000	Ć LC120000	Ö LO180000	ć LC110000	ö LO170000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	˘ SD210000	Ç LC420000	×	ç LC410000	÷ SA060000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	˙ SD410000	Č LC220000	Ř LR220000	č LC210000	ř LR210000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			Š LS220000	š LS210000	É LE120000	Û LU280000	é LE110000	û LU270000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			Ş LS420000	ş LS410000	Ę LE440000	Ú LU120000	ę LE430000	ú LU110000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			Ť LT220000	ť LT210000	Ě LE180000	Ů LU260000	ě LE170000	ů LU250000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			Ž LZ120000	ž LZ110000	Ě LE220000	Ü LU180000	ě LE210000	ü LU170000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	" SD250000	Í LI120000	Ý LY120000	í LI110000	ý LY110000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			Ž LZ220000	ž LZ210000	Î LI160000	Ŧ LT420000	î LI150000	ŧ LT410000
-F			/ SP120000	? SP150000	O LO020000	_ SP090000	o LO010000				Ž LZ300000	ž LZ290000	Ď LD220000	β LS610000	ď LD210000	· SD290000

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Latin 3 (ISO 8859-3)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-	
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	À LA140000		à LA130000		
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			Ĥ LH620000	ĥ LH610000	Á LA120000	Ñ LN200000	á LA110000	ñ LN190000	
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			˘ SD230000	² ND021000	Â LA160000	Ô LO140000	â LA150000	ò LO130000	
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000		Ó LO120000		ó LO110000	
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			⌘ SC010000	' SD110000	Ä LA180000	Ô LO160000	ä LA170000	ô LO150000	
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000				μ SM170000	Č LC300000	Ď LG300000	č LC290000	ď LG290000	
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			Ĥ LH160000	ĥ LH150000	Ĉ LC160000	Ö LO180000	ĉ LC150000	ö LO170000	
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	· SD630000	Ç LC420000	× SA070000	ç LC410000	÷ SA060000	
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	˙ SD410000	È LE140000	Ĝ LG160000	è LE130000	ĝ LG150000	
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			İ LI300000	ı LI610000	É LE120000	Û LU140000	é LE110000	ù LU130000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			Ş LS420000	ş LS410000	Ê LE160000	Ú LU120000	ê LE150000	ú LU110000	
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			Ď LG240000	ď LG230000	Ë LE180000	Û LU160000	ë LE170000	û LU150000	
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			Ĵ LJ160000	ĵ LJ150000	Ì LI140000	Û LU180000	ì LI130000	ü LU170000	
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000	Í LI120000	Ů LU240000	í LI110000	ů LU230000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000					Î LI160000	Ŝ LS160000	î LI150000	ŝ LS150000	
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000					Ž LZ300000	ž LZ290000	Ī LI180000	β LS610000	ï LI170000	· SD290000

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Latin 4 (ISO 8859-4)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	Ā LA320000	Ð LD620000	ā LA310000	đ LD610000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			Ą LA440000	ą LA430000	Á LA120000	Ń LN420000	á LA110000	ŋ LN410000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			κ LK610000	ı SD430000	Â LA160000	Ō LO320000	â LA150000	ō LO310000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			Ŕ LR420000	ŗ LR410000	Ã LA200000	Ɔ LK420000	ã LA190000	ķ LK410000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			Ɔ SC010000	' SD110000	Ä LA180000	Ô LO160000	ä LA170000	ô LO150000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			İ LI200000	ĩ LI190000	Å LA280000	Õ LO200000	å LA270000	õ LO190000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			Ł LL420000	ł LL410000	Æ LA520000	Ö LO180000	æ LA510000	ö LO170000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	˘ SD210000	Į LI440000	×	į LI430000	÷ SA060000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			˙ SD170000	˘ SD410000	Č LC220000	Ø LO620000	č LC210000	ø LO610000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			Š LS220000	š LS210000	É LE120000	Ū LU440000	é LE110000	ų LU430000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			Ě LE320000	ě LE310000	Ę LE440000	Ú LU120000	ę LE430000	ú LU110000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			Ġ LG420000	ğ LG410000	Ë LE180000	Û LU160000	ë LE170000	û LU150000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			ƒ LT620000	ƒ LT610000	Ě LE300000	Û LU180000	ě LE290000	ü LU170000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	Ń LN620000	Í LI120000	Ū LU200000	í LI110000	ũ LU190000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			Ž LZ220000	ž LZ210000	Î LI160000	Ū LU320000	î LI150000	ū LU310000
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000				- SD310000	ŋ LN610000	Ī LI320000	ß LS610000	ī LI310000	· SD290000

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Cyrillic (ISO 8859-5)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) 0 SP010000 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000				(RSP) A P SP300000 KA020000 KR020000	a p KA010000 KR010000	N° SM000000			
-1			! 1 SP020000 ND010000	A Q LA020000 LQ020000	a q LA010000 LQ010000						Ё Б С KE180000 KB020000 KS020000	б с ё KB010000 KS010000 KE170000				
-2			" 2 SP040000 ND020000	B R LB020000 LR020000	b r LB010000 LR010000						Ъ В Т KD620000 KV020000 KT020000	в т ъ KV010000 KT010000 KD610000				
-3			# 3 SM010000 ND030000	C S LC020000 LS020000	c s LC010000 LS010000						Ѓ Г У KG120000 KG020000 KU020000	г у ѓ KG010000 KU010000 KG110000				
-4			\$ 4 SC030000 ND040000	D T LD020000 LT020000	d t LD010000 LT010000						Є Д Ф KE160000 KD020000 KF020000	д ф є KD010000 KF010000 KE150000				
-5			% 5 SM020000 ND050000	E U LE020000 LU020000	e u LE010000 LU010000						Ѕ Е Х KZ160000 KE020000 KH020000	е х ѕ KE010000 KH010000 KZ150000				
-6			& 6 SM030000 ND060000	F V LF020000 LV020000	f v LF010000 LV010000						І Ж Ц K1120000 KZ220000 KC020000	ж ц і KZ210000 KC010000 K1110000				
-7			' 7 SP050000 ND070000	G W LG020000 LW020000	g w LG010000 LW010000						Ї З Ч K1180000 KZ020000 KC220000	з ч ії KZ010000 KC210000 K1170000				
-8			(8 SP060000 ND080000	H X LH020000 LX020000	h x LH010000 LX010000						Ј И Ш KJ020000 KI020000 KS220000	и ш ј KI010000 KS210000 KJ010000				
-9			) 9 SP070000 ND090000	I Y LI020000 LY020000	i y LI010000 LY010000						Љ Ы Щ KL420000 KJ120000 KS160000	щ љ њ KJ110000 KS150000 KL410000				
-A			* : SM040000 SP130000	J Z LJ020000 LZ020000	j z LJ010000 LZ010000						Њ К Ъ KN120000 KK020000 KU220000	к ъ њ KK010000 KU210000 KN110000				
-B			+ ; SA010000 SP140000	K [k { LK020000 SM060000	[k { LK010000 SM110000						Ѣ Л Ы KC120000 KL020000 KY020000	л ы ѣ KL010000 KY010000 KC110000				
-C			, < SP080000 SA030000	L \ l | LL020000 SM070000	l | LL010000 SM130000						Ќ М Ь KK120000 KM020000 KX120000	м ь к KM010000 KX110000 KK110000				
-D			- = SP100000 SA040000	M] m } LM020000 SM080000	m } LM010000 SM140000						(SHY) Н Э SP320000 KN020000 KE140000	н э § KN010000 KE130000 SM240000				
-E			. > SP110000 SA050000	N ^ n ~ LN020000 SD150000	n ~ LN010000 SD190000						Ў О Ю KU240000 KO020000 KU160000	о ю ў KO010000 KU150000 KU230000				
-F			/ ? SP120000 SP150000	O _ o LO020000 SP090000	o LO010000						Ц П Я KG220000 KP020000 KA160000	п я ц KP010000 KA150000 KG210000				

Code Page 00915

Latin 8 (ISO 8859-8)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000			א HX330000	נ HNO10000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000				± SA020000			ב HB010000	ס HS010000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			¢ SC040000	² ND021000			ג HG010000	ע HX350000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000			ד HD010000	ף HP610000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			¤ SC010000	' SD110000			ה HH010000	פ HP010000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			¥ SC050000	μ SM170000			ו HW010000	ץ HS610000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			ı SM650000	¶ SM250000			ז HZ010000	צ HS450000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	• SM570000			ח HH450000	ק HQ010000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	ˆ SD410000			ט HT450000	ך HR010000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			© SM520000	¹ ND011000			י HY010000	ש HS210000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			× SA070000	÷ SA060000			ך HK610000	ת HT010000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			« SP170000	» SP180000			כ HK010000	
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			¬ SM660000	¼ NF040000			ל HL010000	
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000			ם HM610000	
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			® SM530000	¾ NF050000			מ HM010000	
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000				- SM150000			= SM100000	ן HN610000	

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Latin 5 (ISO 8859-8)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	À LA140000	Č LG240000	à LA130000	ğ LG230000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			i SP030000	± SA020000	Á LA120000	Ñ LN200000	á LA110000	ñ LN190000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			¢ SC040000	² ND021000	Â LA160000	Ò LO140000	â LA150000	ò LO130000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000	Ã LA200000	Ó LO120000	ã LA190000	ó LO110000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			¤ SC010000	' SD110000	Ä LA180000	Ô LO160000	ä LA170000	ô LO150000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			¥ SC050000	µ SM170000	Å LA280000	Õ LO200000	å LA270000	õ LO190000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			ı SM650000	¶ SM250000	Æ LA520000	Ö LO180000	æ LA510000	ö LO170000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	· SD630000	Ç LC420000	× SA070000	ç LC410000	÷ SA060000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	˙ SD410000	È LE140000	Ø LO620000	è LE130000	ø LO610000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			© SM520000	¹ ND011000	É LE120000	Ù LU140000	é LE110000	ù LU130000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			ª SM210000	º SM200000	Ê LE160000	Ú LU120000	ê LE150000	ú LU110000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			« SP170000	» SP180000	Ë LE180000	Û LU160000	ë LE170000	û LU150000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			¬ SM660000	¼ NF040000	Ì LI140000	Ü LU180000	ì LI130000	ü LU170000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000	Í LI120000	İ LI300000	í LI110000	ı LI610000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			® SM530000	¾ NF050000	Î LI160000	Ş LS420000	î LI150000	ş LS410000
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000				– SM150000	¿ SP160000	Ï LI180000	ß LS610000	ï LI170000	ÿ LY170000

Code Page 00920

Baltic Multilingual

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	Ą LA440000	Š LS220000	ą LA430000	š LS210000
-1			! SP020000	1 ND010000	À LA020000	Q LQ020000	a LA010000	q LQ010000			” SP220000	± SA020000	ı LI440000	Ń LN120000	ı LI430000	ń LN110000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			¢ SC040000	² ND021000	Ā LA320000	Ņ LN420000	ā LA310000	ņ LN410000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000	Ć LC120000	Ó LO120000	ć LC110000	ó LO110000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			¤ SC010000	“ SP210000	Ä LA180000	Ö LO320000	ä LA170000	ö LO310000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			„ SP230000	µ SM170000	Å LA280000	Õ LO200000	å LA270000	õ LO190000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			¦ SM650000	¶ SM250000	Ę LE440000	Ö LO180000	ę LE430000	ö LO170000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	• SD630000	Ē LE320000	×	ē LE310000	÷ SA080000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			Ø LO620000	ø LO610000	Č LC220000	Ū LU440000	č LC210000	ų LU430000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			© SM520000	¹ ND011000	É LE120000	Ł LL620000	é LE110000	ł LL610000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			Ŕ LR420000	ŗ LR410000	Ż LZ120000	Ś LS120000	ż LZ110000	ś LS110000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			« SP170000	» SP180000	È LE300000	Ū LU320000	è LE290000	ū LU310000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			¬ SM660000	¼ NF040000	Ģ LG420000	Ü LU180000	ģ LG410000	ü LU170000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000	Ķ LK420000	Ž LZ300000	ķ LK410000	ž LZ290000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			® SM530000	¾ NF050000	Ī LI320000	Ž LZ220000	ī LI310000	ž LZ210000
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000				Æ LA520000	æ LA510000	Ł LL420000	ß LS610000	ł LL410000	’ SP200000

Code Page 00921

Estonian

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000	° SM190000	À LA140000	Š LS220000	à LA130000	š LS210000
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000			i SP030000	± SA020000	Á LA120000	Ñ LN200000	á LA110000	ñ LN190000
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000			¢ SC040000	² ND021000	Â LA160000	Ô LO140000	â LA150000	ò LO130000
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000			£ SC020000	³ ND031000	Ã LA200000	Ó LO120000	ã LA190000	ó LO110000
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			¤ SC010000	' SD110000	Ä LA180000	Ô LO160000	ä LA170000	ô LO150000
-5			% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000			¥ SC050000	µ SM170000	Å LA280000	Õ LO200000	å LA270000	õ LO190000
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000			¦ SM650000	¶ SM250000	Æ LA520000	Ö LO180000	æ LA510000	ö LO170000
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000			§ SM240000	· SD630000	Ç LC420000	× SA070000	ç LC410000	÷ SA080000
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000			¨ SD170000	˙ SD410000	È LE140000	Ø LO620000	è LE130000	ø LO610000
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000			© SM520000	¹ ND011000	É LE120000	Ù LU140000	é LE110000	ù LU130000
-A			* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000			ª SM210000	º SM200000	Ê LE160000	Ú LU120000	ê LE150000	ú LU110000
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000			« SP170000	» SP180000	Ë LE180000	Û LU160000	ë LE170000	û LU150000
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			¬ SM660000	¼ NF040000	Ì LI140000	Ü LU180000	ì LI130000	ü LU170000
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000	½ NF010000	Í LI120000	Ý LY120000	í LI110000	ý LY110000
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000			® SM530000	¾ NF050000	Î LI160000	Ž LZ220000	î LI150000	ž LZ210000
-F			/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000				— SM150000	¿ SP160000	Ï LI180000	ß LS610000	ï LI170000	ÿ LY170000

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Urdu

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) 0	@	P	`	p				(RSP)	ا	چ	ش	ف	و
			SP010000	ND100000	SM050000	LP020000	SD130000	LP010000			SP300000	AA010000	AC210000	AS230003	AF010003	AW010000
-1			!	1	A	Q	a	q			.	ا	چ	ص	ق	ه
			SP020000	ND010000	LA020000	LQ020000	LA010000	LQ010000			ND100001	AA010002	AC210003	AS450006	AQ010000	AH020000
-2			"	2	B	R	b	r			ا	ا	ح	ص	ق	پ
			SP040000	ND020000	LB020000	LR020000	LB010000	LR010000			ND010001	AA010006	AH450000	AS450003	AQ010003	AH020003
-3			#	3	C	S	c	s			ا	ب	د	ض	ک	ہ
			SM010000	ND030000	LC020000	LS020000	LC010000	LS010000			ND020001	AB010000	AH450003	AD450006	AK010006	AH020004
-4			\$	4	D	T	d	t			ا	ب	خ	ض	ک	ھ
			SC030000	ND040000	LD020000	LT020000	LD010000	LT010000			ND030001	AB010003	AH470000	AD450003	AK010003	AH030000
-5			%	5	E	U	e	u			ا	پ	خ	ط	گ	ء
			SM020007	ND050000	LE020000	LU020000	LE010000	LU010000			ND040004	AP010000	AH470003	AT450000	AG010000	AX300000
-6			&	6	F	V	f	v			ا	پ	د	ظ	گ	ئ
			SM030000	ND060000	LF020000	LV020000	LF010000	LV010000			ND050004	AP010003	AD010000	AZ450000	AG010003	AY320000
-7			'	7	G	W	g	w			ا	ة	ڈ	ع	ل	ئ
			SP050000	ND070000	LG020000	LW020000	LG010000	LW010000			ND060001	AT020000	AD030000	AC470000	AL010000	AY320002
-8			(	8	H	X	h	x			ا	ت	ذ	ع	ل	ئ
			SP060000	ND080000	LH020000	LX020000	LH010000	LX010000			ND070004	AT010000	AD470000	AC470002	AL010006	AY320003
-9			)	9	I	Y	i	y			ا	ت	ر	ع	ا	ی
			SP070000	ND090000	LI020000	LY020000	LI010000	LY010000			ND080001	AT010003	AR010000	AC470003	AL010004	AY020000
-A			*	:	J	Z	j	z			ا	ٹ	ژ	ع	م	ی
			SM040007	SP130000	LJ020000	LZ020000	LJ010000	LZ010000			ND090001	AT030000	AR030000	AC470004	AM010000	AY020002
-B			+	;	K	[	k	{			ا	ٹ	ز	غ	م	ی
			SA010000	SP140000	LK020000	SM060000	LK010000	SM110000			SP080007	AT030003	AZ010000	AG310000	AM010003	AY020003
-C			,	<	L	\	l	|			ا	ٹ	ژ	غ	س	ئ
			SP080000	SA030000	LL020000	SM070000	LL010000	SM130000			SP140007	AT470000	AZ210000	AG310002	AN020000	AY340000
-D			-	=	M	]	m	}			(SHY)	ٹ	س	غ	ن	ے
			SP100000	SA040000	LM020000	SM080000	LM010000	SM140000			SP320000	AT470003	AS010006	AG310003	AN010000	AY040000
-E			.	>	N	^	n	~			؟	ج	س	غ	ن	س
			SP110000	SA050000	LN020000	SD150000	LN010000	SD190000			SP150007	AG230000	AS010003	AG310004	AN010003	AX100000
-F			/	?	O	_	o				آ	چ	ش	ف	ؤ	س
			SP120000	SP150000	LO020000	SP090000	LO010000				AA210000	AG230003	AS230006	AF010000	AW310000	AX100004

Code Page 01006

Arabic Extended

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) 0	@	P	`	p	ل	ـ	(RSP)	.	ع	ذ	ـ	ـ	ـ
-1			!	1	A	Q	a	q	×	ـ	آ	ا	ء	ر	ف	س
-2			"	2	B	R	b	r	÷	س	أ	آ	ز	ق	هـ	هـ
-3			#	3	C	S	c	s	سر	هـ	ل	أ	س	ك	ق	ق
-4			\$	4	D	T	d	t	شر	ـ	آ	ع	و	ش	ل	ك
-5			%	5	E	U	e	u	صر	ع	ل	هـ	ا	ص	م	ل
-6			&	6	F	V	f	v	ضر	ع	ت	هـ	ض	ن	ـ	ـ
-7			'	7	G	W	g	w	ء	ي	ب	ا	ط	هـ	آ	آ
-8			(	8	H	X	h	x		ي	ت	ا	ب	ظ	و	آ
-9			)	9	I	Y	i	y	■	غ	ث	ة	ع	ي	ل	ل
-A			*	:	J	Z	j	z	□	غ	ج	ش	ت	غ	ي	لا
-B			+	;	K	[	k	{	□	غ	ح	؛	ث	ع	ـ	ـ
-C			,	<	L	\	l	|	□	آ	،	ص	ج	آ	هـ	ن
-D			-	=	M	]	m	}	□	آ	(SHY)	ض	ح	أ	هـ	هـ
-E			.	>	N	^	n	~	□	لا	خ	ع	خ	ا	ـ	هـ
-F			/	?	O	~	o		□	لا	س	؟	د	ف	ـ	ـ

Code Page 01046

Latin 6 (ISO 8859-6)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000			(RSP) SP300000			ذ AD470009	ـ SM860000	َ AI050009
-1			! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000					ء AX300009	ر AR010009	ف AF010009	س AX100009
-2			" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000					آ AA210009	ز AZ010009	ق AQ010009	ه AE050009
-3			# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000					أ AA310009	س AS010009	ك AK010009	
-4			\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000			ؠ SC010000		ؤ AW310009	ش AS230009	ل AL010009	
-5			% SM020007	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000					إ AA310409	ص AS450009	م AM010009	
-6			& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000					ء AY310009	ض AD450009	ن AN010009	
-7			' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000					ا AA010009	ط AT450009	ه AH010009	
-8			(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000					ب AB010009	ظ AZ450009	و AW010009	
-9			) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000					ة AT020009	ع AC470009	ى AA020009	
-A			* SM040007	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000					ت AT010009	غ AG310009	ي AY010009	
-B			+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000				؛ SP140007	ث AT470009		‘ AA070009	
-C			, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000			، SP080007		ج AG230009		ﻩ AU070009	
-D			- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000			(SHY) SP320000		ح AH450009		ء AI070009	
-E			. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000					خ AH470009		‘ AA050009	
-F			/ SP120000	? SP150000	O LO020000	~ SP090000	o LO010000					؟ SP150007	د AD010009		ء AU050009	

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Farsi (Personal Computer)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶	(SP)	0	@	P	`	p		ق	ح			ع	ک	(SH̄Y)
		SM590000	SP010000	ND100000	SM050000	LP020000	SD130000	LP010000		AW310000	AH450003	SF140000	SF020000	AC470002	AK010006	SP320000
-1	☺	◀	!	1	A	Q	a	q		ک	خ			ع	ک	ی
	SS000000	SM630000	SP020000	ND010000	LA020000	LQ020000	LA010000	LQ010000		AY320003	AH470000	SF150000	SF070000	AC470003	AK010003	AY020002
-2	☹	↕	"	2	B	R	b	r	،	ب	ذ			ع	گ	پ
	SS010000	SM760000	SP040000	ND020000	LB020000	LR020000	LB010000	LR010000	SP080007	AB010000	AH470003	SF160000	SF060000	AC470004	AG010000	AY020003
-3	♥	!!	#	3	C	S	c	s	؛	ب	د			غ	گ	ـ
	SS020000	SP330000	SM010000	ND030000	LC020000	LS020000	LC010000	LS010000	SP140007	AB010003	AD010000	SF110000	SF080000	AG310000	AG010003	SM860000
-4	♦	¶	\$	4	D	T	d	t	؟	پ	ذ			غ	ل	ه
	SS030000	SM250000	SC030000	ND040000	LD020000	LT020000	LD010000	LT010000	SP150007	AP010000	AD470000	SF090000	SF100000	AG310002	AL010000	ND100003
-5	♣	§	%	5	E	U	e	u	ء	پ	ر			غ	ل	ا
	SS040000	SM240000	SM020007	ND050000	LE020000	LU020000	LE010000	LU010000	AA070009	AP010003	AR010000	AD450006	SF050000	AG310003	AL010003	ND010001
-6	♠	■	&	6	F	V	f	v	آ	ت	ز			ظ	م	٢
	SS050000	SM700000	SM030000	ND060000	LF020000	LV020000	LF010000	LV010000	AA210000	AT010000	AZ010000	AD450003	AZ450002	AG310004	AM010000	ND020001
-7	•	↕	،	7	G	W	g	w	آ	ت	ژ			ع	ف	٣
	SM570000	SM770000	SP050000	ND070000	LG020000	LW020000	LG010000	LW010000	AA210002	AT010003	AZ210000	AT450001	AC470000	AF010000	AM010003	ND030001
-8	■	↑	(	8	H	X	h	x	ک	ث	س			ف	ن	٤
	SM570001	SM320000	SP060000	ND080000	LH020000	LX020000	LH010000	LX010000	AA210006	AT470000	AS010006	AT450002	SF380000	AF010003	AN010000	ND040003
-9	○	↓	)	9	I	Y	i	y	ا	ث	س			ن	٥	
	SM750000	SM330000	SP070000	ND090000	LI020000	LY020000	LI010000	LY010000	AA010000	AT470003	AS010003	SF230000	SF390000	SF040000	AN010003	ND050004
-A	●	→	*	:	J	Z	j	z	ا	ج	ش			و	٦	
	SM750002	SM310000	SM040007	SP130000	LJ020000	LZ020000	LJ010000	LZ010000	AA010002	AG230000	AS230006	SF240000	SF400000	SF010000	AW010000	ND060003
-B	♂	←	+	;	K	[	k	{	ا	ج	ش			ه	٧	
	SM280000	SM300000	SA010000	SP140000	LK020000	SM060000	LK010000	SM110000	AA010006	AG230003	AS230003	SF250000	SF410000	SF610000	AH010000	ND070001
-C	♀	⌞	,	<	L	\	l	|	ء	چ	ص			ه	٨	
	SM290000	SA420000	SP080000	SA030000	LL020000	SM070000	LL010000	SM130000	AX300000	AC210000	AS450006	SF260000	SF420000	SF570000	AH010003	ND080001
-D	♪	↔	-	=	M	]	m	}	ا	چ	ص			ق	٩	
	SM930000	SM780000	SP100000	SA040000	LM020000	SM080000	LM010000	SM140000	AA310000	AC210003	AS450003	SC160000	SF430000	AQ010000	AH010004	ND090001
-E	♪	▲	.	>	N	^	n	~	ا	×	«			ق	٩	■
	SM910000	SM600000	SP110000	SA050000	LN020000	SD150000	LN010000	SD190000	AA310002	SA070000	SP170000	AZ450001	SF440000	AQ010003	AH210000	SM470000
-F	☀	▼	/	?	O	o	o	⏏	ا	ح	»			ی	(RSP)	
	SM690000	SV040000	SP120000	SP150000	LO020000	SP090000	LO010000	SM790000	AA310006	AH450000	SP180000	SF030000		SF600000	AY020000	SP300000

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Estonian (Personal Computer)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶ SM590000	(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000	Ç LC420000	É LE120000	á LA110000	☐ SF140000	☐ SF020000	š LS210000	Ó LO120000	(ŠĪY) SP320000
-1	☺ SS000000	◀ SM630000	! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000	ü LU170000	æ LA510000	í LI110000	☐ SF150000	☐ SF070000	Š LS220000	ß LS610000	± SA020000
-2	☹ SS010000	↕ SM760000	" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000	é LE110000	Æ LA520000	ó LO110000	☐ SF160000	☐ SF060000	Ê LE160000	Ô LO160000	= SM100000
-3	♥ SS020000	!! SP330000	# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000	â LA150000	ô LO150000	ú LU110000	☐ SF110000	☐ SF080000	Ë LE180000	Ò LO140000	¾ NF050000
-4	♦ SS030000	¶ SM250000	\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000	ä LA170000	ö LO170000	ñ LN190000	☐ SF090000	☐ SF100000	È LE140000	õ LO190000	¶ SM250000
-5	♣ SS040000	§ SM240000	% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000	à LA130000	ò LO130000	Ñ LN200000	Á LA120000	☐ SF050000	ı LI610000	Õ LO200000	§ SM240000
-6	♠ SS050000	▬ SM700000	& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000	å LA270000	û LU150000	ə SM210000	Â LA160000	ã LA190000	Í LI200000	μ SM170000	÷ SA060000
-7	• SM570000	↕ SM770000	' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000	ç LC410000	ù LU130000	º SM200000	À LA140000	Ã LA200000	Î LI160000	ž LZ210000	‚ SD410000
-8	■ SM570001	↑ SM320000	(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000	ê LE150000	ÿ LY170000	ı SP160000	© SM520000	☐ SF380000	İ LI180000	Ž LZ220000	° SM190000
-9	○ SM750000	↓ SM330000	) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000	ë LE170000	Ö LO180000	® SM530000	☐ SF230000	☐ SF390000	☐ SF040000	Ú LU120000	¨ SD170000
-A	● SM750002	→ SM310000	* SM040000	:	J LJ020000	Z LZ020000	j LJ010000	z LZ010000	è LE130000	Ü LU180000	⌋ SM660000	☐ SF240000	☐ SF400000	☐ SF010000	Û LU160000	• SD630000
-B	♂ SM280000	← SM300000	+ SA010000	;	K LK020000	[SM060000	k LK010000	{ SM110000	ï LI170000	ø LO610000	½ NF010000	☐ SF250000	☐ SF410000	■ SF610000	Ü LU140000	¹ ND011000
-C	♀ SM290000	⌋ SA420000	, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000	î LI150000	£ SC020000	¼ NF040000	☐ SF260000	☐ SF420000	■ SF700000	Ý LY110000	³ ND031000
-D	♪ SM930000	↔ SM780000	- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000	ì LI130000	Ø LO620000	ı SP030000	☐ SC040000	☐ SF430000	ı SM650000	Ý LY120000	² ND021000
-E	♪ SM910000	▲ SM600000	. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000	Ä LA180000	× SA070000	« SP170000	¥ SC050000	☐ SF440000	İ LI140000	- SM150000	■ SM470000
-F	☀ SM690000	▼ SV040000	/ SP120000	? SP150000	O LO020000	_ SP090000	o LO010000	◊ SM790000	Å LA280000	f SC070000	» SP180000	☐ SF030000	☐ SC010000	■ SF600000	' SD110000	(RSP) SP300000

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Latvian (Personal Computer)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶ SM590000	(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000	Ć LC120000	É LE120000	Ā LA320000	☐ SF140000	☐ SF020000	☐ SF460000	Ó LO120000	(Šȳ) SP320000
-1	☺ SS000000	◀ SM630000	! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000	ü LU170000	Ž LZ300000	Ī LI320000	☐ SF150000	☐ SF070000	☐ SF470000	β LS610000	± SA020000
-2	☹ SS010000	↕ SM760000	" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000	é LE110000	ž LZ290000	ó LO110000	☐ SF160000	☐ SF060000	☐ SF480000	Ō LO320000	æ LA510000
-3	♥ SS020000	!! SP330000	# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000	ā LA310000	ō LO310000	ų LU430000	☐ SF110000	☐ SF080000	☐ SF490000	Ń LN120000	Æ LA520000
-4	♦ SS030000	¶ SM250000	\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000	ä LA170000	ö LO170000	Ą LA440000	☐ SF090000	☐ SF100000	☐ SF500000	õ LO190000	¶ SM250000
-5	♣ SS040000	§ SM240000	% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000	ġ LG410000	Ģ LG420000	ą LA430000	☐ SF190000	☐ SF050000	☐ SF510000	Õ LO200000	⊘ SC010000
-6	♠ SS050000	▬ SM700000	& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000	ā LA270000	ū LU310000	Ž LZ220000	☐ SF200000	☐ SF360000	☐ SF520000	Š LS220000	÷ SA060000
-7	• SM570000	↕ SM770000	' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000	ć LC110000	ś LS120000	ž LZ210000	☐ SF210000	☐ SF370000	☐ SF530000	š LS210000	ø LO610000
-8	■ SM570001	↑ SM320000	(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000	ł LL610000	ś LS110000	Ę LE440000	☐ SF220000	☐ SF380000	☐ SF540000	Ų LK420000	◦ SM190000
-9	○ SM750000	↓ SM330000	) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000	ē LE310000	Ö LO180000	ę LE430000	☐ SF230000	☐ SF390000	☐ SF040000	ķ LK410000	∅ LO620000
-A	● SM750002	→ SM310000	* SM040000	: SP130000	J LJ020000	Z LZ020000	j LJ010000	z LZ010000	è LE290000	Ü LU180000	Ě LE300000	☐ SF240000	☐ SF400000	☐ SF010000	Ū LU320000	• SD630000
-B	♂ SM280000	← SM300000	+ SA010000	; SP140000	K LK020000	[SM060000	k LK010000	{ SM110000	ì LI430000	ń LN110000	ź LZ110000	☐ SF250000	☐ SF410000	☐ SF610000	Ų LU440000	ŕ LR410000
-C	♀ SM290000	└ SA420000	, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000	ī LI310000	Ł LL420000	č LC220000	☐ SF260000	☐ SF420000	☐ SF700000	ł LL410000	Ŕ LR420000
-D	♪ SM930000	↔ SM780000	- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000	Ž LZ120000	Ł LL620000	Į LI440000	☐ SF270000	☐ SF430000	☐ SF800000	Ē LE320000	„ SP230000
-E	♪ SM910000	▲ SM600000	. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000	Ä LA180000	×	« SP170000	☐ SF280000	☐ SF440000	☐ SF900000	Ņ LN420000	“ SP210000
-F	☀ SM690000	▼ SV040000	/ SP120000	? SP150000	O LO020000	— SP090000	o LO010000		Å LA280000	č LC210000	» SP180000	☐ SF030000	☐ SF450000	☐ SF600000	ņ LN410000	(RSP) SP300000

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Lithuanian (Personal Computer)

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0		▶ SM590000	(SP) SP010000	0 ND100000	@ SM050000	P LP020000	` SD130000	p LP010000	Ç LC420000	É LE120000	á LA110000	☐ SF140000	☐ SF020000	ą LA430000	α GA010000	≡ SA480000
-1	☺ SS000000	◀ SM630000	! SP020000	1 ND010000	A LA020000	Q LQ020000	a LA010000	q LQ010000	ü LU170000	æ LA510000	í LI110000	☐ SF150000	☐ SF070000	č LC210000	β GB010000	± SA020000
-2	☹ SS010000	↕ SM760000	" SP040000	2 ND020000	B LB020000	R LR020000	b LB010000	r LR010000	é LE110000	Æ LA520000	ó LO110000	☐ SF160000	☐ SF060000	ę LE430000	Γ GG020000	≥ SA530000
-3	♥ SS020000	!! SP330000	# SM010000	3 ND030000	C LC020000	S LS020000	c LC010000	s LS010000	â LA150000	ô LO150000	ú LU110000	☐ SF110000	☐ SF080000	è LE290000	π GP010000	≤ SA520000
-4	♦ SS030000	¶ SM250000	\$ SC030000	4 ND040000	D LD020000	T LT020000	d LD010000	t LT010000	ä LA170000	ö LO170000	ñ LN190000	☐ SF090000	☐ SF100000	ì LI430000	Σ GS020000	„ SP230000
-5	♣ SS040000	§ SM240000	% SM020000	5 ND050000	E LE020000	U LU020000	e LE010000	u LU010000	à LA130000	ò LO130000	Ñ LN200000	Å LA440000	☐ SF050000	š LS210000	σ GS010000	“ SP210000
-6	♠ SS050000	▬ SM700000	& SM030000	6 ND060000	F LF020000	V LV020000	f LF010000	v LV010000	å LA270000	û LU150000	ə SM210000	Č LC220000	Ų LU440000	ų LU430000	μ SM170000	÷ SA060000
-7	• SM570000	↕ SM770000	' SP050000	7 ND070000	G LG020000	W LW020000	g LG010000	w LW010000	ç LC410000	ù LU130000	º SM200000	Ę LE440000	Ū LU320000	ū LU310000	τ GT010000	≈ SA700000
-8	■ SM570001	↑ SM320000	(SP060000	8 ND080000	H LH020000	X LX020000	h LH010000	x LX010000	ê LE150000	ÿ LY170000	ı SP160000	È LE300000	☐ SF380000	ž LZ210000	Φ GF020000	° SM190000
-9	○ SM750000	↓ SM330000	) SP070000	9 ND090000	I LI020000	Y LY020000	i LI010000	y LY010000	ë LE170000	Ö LO180000	┘ SM680000	☐ SF230000	☐ SF390000	☐ SF040000	Θ GT620000	• SA790000
-A	● SM750002	→ SM310000	* SM040000	:	J LJ020000	Z LZ020000	j LJ010000	z LZ010000	è LE130000	Ü LU180000	┘ SM660000	☐ SF240000	☐ SF400000	☐ SF010000	Ω GO320000	• SD290000
-B	♂ SM280000	← SM300000	+ SA010000	;	K LK020000	[SM060000	k LK010000	{ SM110000	ï LI170000	ø SC040000	½ NF010000	☐ SF250000	☐ SF410000	■ SF610000	δ GD010000	√ SA800000
-C	♀ SM290000	┘ SA420000	, SP080000	< SA030000	L LL020000	\ SM070000	l LL010000	| SM130000	î LI150000	£ SC020000	¼ NF040000	☐ SF260000	☐ SF420000	■ SF570000	∞ SA450000	ⁿ LN011000
-D	♪ SM930000	↔ SM780000	- SP100000	= SA040000	M LM020000	] SM080000	m LM010000	} SM140000	ì LI130000	¥ SC050000	ı SP030000	┘ LI440000	☐ SF430000	■ SF580000	φ GF010000	² ND021000
-E	♪ SM910000	▲ SM600000	. SP110000	> SA050000	N LN020000	^ SD150000	n LN010000	~ SD190000	Ä LA180000	Pts SC060000	« SP170000	Š LS220000	☐ SF440000	■ SF590000	ε GE010000	■ SM470000
-F	☀ SM690000	▼ SV040000	/ SP120000	? SP150000	O LO020000	_ SP090000	o LO010000	◊ SM790000	Å LA280000	f SC070000	» SP180000	☐ SF030000	Ž LZ220000	■ SF600000	∩ SA140000	(RSP) SP300000

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Cyrillic Windows

HEX DIGITS 1ST → 2ND ↓	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(SP) 0 SP010000 ND100000	@ SM050000	P LP020000	` p SD130000 LP010000	Ђ ђ KD620000 KD610000	(RSP) ° SP300000 SM190000	А Р KA020000 KR020000	а р KA010000 KR010000						
-1		!	1 ND010000	А Q LA020000 LQ020000	а q LA010000 LQ010000	Ѓ ‘ KG120000 SP190000	Ў ± KU240000 SA020000	Б С KB020000 KS020000	б с KB010000 KS010000							
-2		"	2 ND020000	В R LB020000 LR020000	в r LB010000 LR010000	, ‘ SP260000 SP200000	Ѓ ѓ KU230000 KI120000	В Т KV020000 KT020000	в т KV010000 KT010000							
-3		#	3 ND030000	С S LC020000 LS020000	с s LC010000 LS010000	ѓ “ KG110000 SP210000	Ј ј KJ020000 KI110000	Г У KG020000 KU020000	г у KG010000 KU010000							
-4		\$	4 ND040000	Д T LD020000 LT020000	д t LD010000 LT010000	„ ” SP230000 SP220000	Ў џ SC010000 KG290000	Д Ф KD020000 KF020000	д ф KD010000 KF010000							
-5		%	5 ND050000	Е U LE020000 LU020000	е u LE010000 LU010000	... • SV520000 SM570000	Г г KG300000 SM170000	Е Х KE020000 KH020000	е х KE010000 KH010000							
-6		&	6 ND060000	Ф V LF020000 LV020000	ф v LF010000 LV010000	† - SM340000 SS680000	Љ љ SM650000 SM250000	Ж Ц KZ220000 KC020000	ж ц KZ210000 KC010000							
-7		'	7 ND070000	Г W LG020000 LW020000	г w LG010000 LW010000	‡ — SM350000 SM900000	§ · SM240000 SD630000	З Ч KZ020000 KC220000	з ч KZ010000 KC210000							
-8		(	8 ND080000	Н X LH020000 LX020000	н x LH010000 LX010000		Ё ё KE180000 KE170000	И Ш KI020000 KS220000	и ш KI010000 KS210000						
-9		)	9 ND090000	І Y LI020000 LY020000	і y LI010000 LY010000	‰ ™ SM560000 SM540000	© № SM520000 SM000000	Й Щ KJ120000 KS160000	й щ KJ110000 KS150000					
-A		*	: SP130000	Ј Z LJ020000 LZ020000	ј z LJ010000 LZ010000	Љ љ KL420000 KL410000	Є є KE160000 KE150000	К Ъ KK020000 KU220000	к ъ KK010000 KU210000							
-B		+	; SP140000	К [LK020000 SM060000	к { LK010000 SM110000	< > SP270000 SP280000	« » SP170000 SP180000	Л Ы KL020000 KY020000	л ы KL010000 KY010000							
-C		,	< SA030000	Л \ LL020000 SM070000	л | LL010000 SM130000	Њ њ KN120000 KN110000	⌈ j SM660000 KJ010000	М Ъ KM020000 KX120000	м ъ KM010000 KX110000							
-D		-	= SA040000	М] LM020000 SM080000	м } LM010000 SM140000	Ќ ќ KK120000 KK110000	(SHY) S SP320000 KZ160000	Н Э KN020000 KE140000	н э KN010000 KE130000							
-E		.	> SA050000	Н ^ LN020000 SD150000	н ~ LN010000 SD190000	Ћ ћ KC120000 KC110000	® s SM530000 KZ150000	О Ю KO020000 KU160000	о ю KO010000 KU150000							
-F		/	? SP150000	О _ LO020000 SP090000	о o LO010000	Џ џ KG220000 KG210000	İ ï KI180000 KI170000	П Я KP020000 KA160000	п я KP010000 KA150000							

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Epson FX-series Code Pages

The following Epson code charts provide information on the character tables available for Epson FX-series emulation mode.

Extended Graphics Character Table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			sp	0	@	P	'	p	Ç	É	á	⋮	⊥	⊥	α	≡
1			!	1	A	Q	a	q	ü	æ	í	⋮	⊥	⊥	β	±
2			"	2	B	R	b	r	é	Æ	ó	⋮	⊥	⊥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	|	|	⊥	π	≤
4			\$	4	D	T	d	t	ä	ö	ñ	|	—	⊥	Σ	∫
5			%	5	E	U	e	u	à	ò	Ñ	|	|	F	ς	J
6			&	6	F	V	f	v	â	û	ª	|	|	π	μ	÷
7			'	7	G	W	g	w	ç	ù	º	π	|	|	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	|	⊥	⊥	φ	°
9			)	9	I	Y	i	y	ë	Ö	¬	|	|	⊥	θ	●
A			*	:	J	Z	j	z	è	Ü	¬	|	⊥	⊥	Ω	•
B			+	;	K	[	k	{	ï	ç	½	|	|	■	δ	√
C			,	<	L	\	l	|	î	£	¼	|	|	■	∞	ⁿ
D			—	=	M	]	m	}	ì	¥	¡	|	=	|	φ	²
E			.	>	N	^	n	~	Ä	¤	<<	|	|	|	ε	▪
F			/	?	O	_	o		Å	f	>>	|	⊥	■	∩	0

Italic Character Table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			sp	0	@	P	'	p				<i>0</i>	<i>@</i>	<i>P</i>	<i>'</i>	<i>p</i>
1			!	1	A	Q	a	q			!	1	A	Q	a	q
2			"	2	B	R	b	r			"	2	B	R	b	r
3			#	3	C	S	c	s			#	3	C	S	c	s
4			\$	4	D	T	d	t			\$	4	D	T	d	t
5			%	5	E	U	e	u			%	5	E	U	e	u
6			&	6	F	V	f	v			&	6	F	V	f	v
7			'	7	G	W	g	w			'	7	G	W	g	w
8			(	8	H	X	h	x			(	8	H	X	h	x
9			)	9	I	Y	i	y			)	9	I	Y	i	y
A			*	:	J	Z	j	z			*	:	J	Z	j	z
B			+	;	K	[	k	{			+	;	K	[	k	{
C			,	<	L	\	l	|			,	<	L	\	l	|
D			—	=	M	]	m	}			—	=	M	]	m	}
E			.	>	N	^	n	~			.	>	N	^	n	~
F			/	?	O	_	o				/	?	O	_	o	0

Epson Extended Character Variables

The following table shows characters that vary, by language, from the Epson Extended Character Graphics set.

The code points shown are the only ones that vary. For example, in the United Kingdom, only code point X'23' is different from the basic Epson table shown on 283.

Country	Code Point (in hexadecimal)											
	23	24	40	5b	5c	5d	5e	60	7b	7c	7d	7e
U S A	#	\$	@	[	\	\]	^	'	{	|	}	~
France			à	°	ç	§			é	ù	è	¨
Germany			§	Ä	Ö	Ü			ä	ö	ü	ß
U K	£											
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			í	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	í	Ñ	¿	é		í	ñ	ó	ú
Latin America I			á	í	Ñ	¿	é	ü	í	ñ	ó	ú
French Canadian			à	â	ç	ê	î	ô	é	ù	è	û
Latin America II					Ñ		ú	í	ó	á	é	ü

Glossary

The following terms are defined as they apply to the 4247 Printer documentation. Italicized text indicates terms found elsewhere in this glossary. If you do not find the term you need, refer to the index or to the *IBM Dictionary of Computing*, ZC20-1699.

A

A2-size paper. Paper that measures 420 by 594 mm (16.5 x 23.4 in.).

A3-size paper. Paper that measures 297 by 420 mm (11.7 x 16.5 in.).

A4-size paper. Paper that measures 210 by 297 mm (8.3 x 11.7 in.).

A5-size paper. Paper that measures 148 by 210 mm (5.8 x 8.3 in.).

adhesive label. Special-application material; typically consists of paper labels coated on one side with an adhesive mixture temporarily affixed to backing material. See also *carrier*.

AFTA. Automatic Forms Thickness Adjustment.

application. The use to which an information processing system is put.

application program. A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll.

application programmer. A person who develops application programs. Contrast with *system programmer*.

ASF. Automatic Sheet Feeder option.

automatic load. A *Manual Sheet Feed* function that automatically feeds a form.

B

B4-size paper. Paper that measures 257 mm x 363 mm (10.1 in. x 14.33 in.).

B5-size paper. Paper that measures 182 mm x 257 mm (7.17 in. x 10.12 in.).

bar code. A code representing characters by sets of parallel bars of varying thickness and separation that are read optically by transverse scanning.

basis weight. The weight in pounds of a ream (500 sheets) of paper cut to a given standard size for that grade; for example, 25 x 38 inches for book papers, 17 x 22 inches for bond papers, and other sizes for other grades.

baud. A unit of signaling speed equal to the number of signals usually expressed in bits per second.

binder holes. A series of holes or slots punched at set intervals that allow a sheet to be inserted in a loose-leaf or ring binder.

bond (paper). Paper formulated with at least 80% wood pulp. Bond-paper works best in the printer.

C

caliper. The thickness of forms. This is usually expressed in thousandths-of-an-inch.

carrier. The backing material for labels. Labels consist of the printable material, the adhesive, and the carrier. See also *adhesive label*.

character. A letter, number, punctuation mark, or special graphic used for the production of text.

character set. (1) A finite set of different characters that is complete for a given purpose; for example, the character set in ISO Standards 646, "7-bit Coded Character Set of Information Processing Interchange." (2) A group of characters used for a specific reason; for example, the set of characters a printer can print. character set.

code page. A font library member that associates code points and character identifiers.

code point. An element of a code page or site in a code table to which a character can be assigned.

command. A control signal that initiates an action or the beginning of a sequence of actions.

configuration. The arrangement of a computer system or network as defined by the nature, the number, and the chief characteristics of its functional units. More specifically, the term configuration may refer to a hardware configuration or a software configuration.

configure. The procedure used to customize the printer to a specific operating and/or communication environment.

connector. A mechanical device for establishing electrical flow.

constant data. Data that does not change; for example, the company letterhead and standard text in form letters, or the headings and boxes on a preprinted form. Contrast with *variable data*.

constant-spaced font. A font in which the graphic characters are contained in character cells of uniform size. The distance between reference points of adjacent graphic characters is constant in the in-line progression. The white spaces between graphic characters may vary. Synonymous with *fixed-space font*. Contrast with *proportionally-spaced font*.

controlling computer. The processing unit to which the printer is attached through a communication attachment.

controlling computer system. The data processing system to which a network is connected and with which the system can communicate.

control storage. A portion of storage that contains microcode and other data.

control unit (CU). (1) A device that controls input and output operations at one or more devices. (2) The electronics and code that control the printer and the communication attachment.

CPI. characters-per-inch

CU. See *control unit*.

curl. See *paper curl*.

customer engineer (CE). An IBM service representative who performs maintenance services for IBM hardware. Synonymous with *IBM service representative*.

cut-sheet paper. Paper that, unlike continuous forms, is cut into sheets.

D

data stream. (1) All data transmitted through a data channel in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form, using a defined format.

default. An alternative value, attribute, or option that is assumed when none has been specified.

degraded operation. A loss in performance caused by environmental or system conditions.

diagnostic. Pertaining to the detection and isolation of errors in programs and faults in equipment.

disable. To make non-functional. Contrast with *enable*.

DOD. document on demand.

DP. data processing. This describes the quality of certain fonts.

E

Electronic Industries Association (EIA). A business association whose members set standards for electrical and electronic equipment.

enable. To make functional. Contrast with *disable*.

end-of-forms. A condition sensed by the printer that assumes it is time to add forms to the input area of the printer.

EPROM. erasable programmable read-only memory.

Ethernet. A 10-megabit baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection (CSMA/CD).

executive-size paper. Paper that measures 184.2 mm x 266.7 mm (7.25 in. x 10.5 in.).

F

factory default. A value, attribute, or option that is set or chosen at the time of manufacture. Synonym for *manufacturing default*.

feature code. A code used by IBM to process hardware and software orders.

firmware. (1) An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in *read-only memory*. (2) another term for microcode.

fixed-space font. Synonym for *uniformly-spaced font*.

font. (1) A family or assortment of characters of a given size and style; for example, 6-point Courier. (2) A font is data used to create an image of each graphic character; for example, a raster pattern.

format. (1) The arrangement or layout of data on a data medium. (2) The size, style, type of page, margins, printing requirements, and so on, of a printed page.

forms. A continuous length of media such as paper or labels, upon which the printer can be instructed to print.

forms path. The entire route that *forms* travel through the printer from an input stack to an output stack.

G

graphic. A symbol produced by a process such as handwriting, drawing, or printing.

H

hardware. Physical equipment used in data processing, as opposed to programs, procedures, rules, and associated documentation. Contrast with *software*.

host processor. The processing unit to which the printer is attached through a defined interface.

host system. (1) The primary or controlling computer in a multiple-computer installation. (2) A computer used to prepare programs for use on another computer or on another data processing system; for example, a computer used to compile, link edit, or test programs to be used on another system.

Hz. Hertz.

I

IBM branch office. The local IBM sales or service office.

IBM customer engineer (CE). An IBM representative who services IBM products.

IBM marketing representative. An IBM representative who takes product orders.

IBM service representative. An IBM representative who services IBM products. See also *customer engineer (CE)*.

icon. A pictorial representation of an object.

impact printer. A printer in which printing is the result of mechanical impacts.

input. The data that is entered into a device for processing or storage.

input key. A key that performs a specified set of operations when it is pressed.

installation. (1) In system development, preparing and placing a functional unit in position for use. (2) A particular computing system, including the work it does and the people who manage it, operate it, apply it to problems, service it, and use the results it produces.

interface. A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

internal print job. A print job originated on the printer itself; for example, a test print or a configuration print-out.

intervention. An unexpected condition that requires user intervention to clear it; for example, out of toner.

ISO paper sizes. Pertaining to a set of paper sizes selected from those standardized by the International Organization for Standardization (ISO) for use in data processing.

J

jam. In a printer, a condition where forms have become blocked or wedged in the forms path so the printer cannot operate.

K

key. A switch on the operator panel that allows the user to communicate with the printer.

key operator. A user assigned to perform routine maintenance and configuration of the printer.

L

lean. See *stack lean*.

LED. light-emitting diode.

ledger-size paper. Paper that measures 279 mm x 432 mm (11 in. x 17 in.).

legal-size paper. Paper that measures 216 mm x 356 mm (8.5 in. x 14.0 in.).

letter-size paper. Paper that measures 216 mm x 279 mm (8.5 in. x 11.0 in.).

line printer. A printer that formats a line of characters as a unit.

linking. While using the same type of forms in the Front Push and Rear Push tractors, you choose to allow the printer to switch automatically from one forms path to the other forms path, when the first forms path reaches an end-of-forms.

logo. An identifying emblem, statement, or motto of a company.

lpi. lines-per-inch. A measure of the number of lines per vertical inch of paper.

M

Manual Sheet Feed option. This option allows you to feed into the printer a single sheet of paper or a single, multi-part form.

manufacturing default. A value, attribute, or option that is set or chosen at the time of manufacture. Synonymous with *factory default*.

MB. Megabyte; 1 048 576 bytes.

menu. A list of procedures or actions available for selection.

microcode. Refers to the microprogramming stored in the printer. Microcode is used by the control unit to manage the printer and its functions.

mm. millimeter.

MSF. Manual Sheet Feed option.

multi-part form. Printer forms that contain more than a single sheet.

N

nonvolatile memory (NVM). Memory that retains its contents after electrical power is shut off.

NPS. Network Print Server

NVM. *nonvolatile memory*

O

offline. Not connected to an installed and enabled attachment. Contrast with *online*.

online. Connected to an installed and enabled attachment. Contrast with *offline*.

operating environment. The physical environment; for example, temperature, humidity, layout, or power requirements.

operating requirements. A list of requirements, such as environmental, electrical, and space, that must be satisfied before the printer can be installed.

operator panel overlay. See *overlay*.

overlay. (1) A plastic sheet that is superimposed over the operator panel, and contains text. (2) The printer operating mode that allows print media from the *MSF* to simultaneously process with forms from another forms path.

P

paper curl. The curve or bend of the paper.

paper path. The entire route that paper travels through the printer from a tray to a stacker. Deprecated term for *forms path*.

parameter. A variable that is given a constant value during printer and attachment configuration.

parking. A printer state in which a forms type is unloaded from the print area, but still remains on the tractors. When the forms in one forms path are parked, another forms path or the manual sheet feed can be selected, and the forms in that path will be loaded into the print area.

pica. A typographer's unit of measurement for the size of characters. 6 picas equal 1 inch.

pitch. A unit of measurement for the width of type (or a printed character), based on the number of characters that can be set (or printed) in one linear inch; for example, 10-pitch has 10 characters-per-inch. Uniformly-spaced fonts are measured in pitch.

point. A unit of measurement for describing type sizes. There are 12 points to a pica, about 72 points to 1.008 inches.

power off. The action you take to remove power from the printer.

power on. The action you take to provide power to the printer.

power on configuration mode. A printer state that allows you to personalize printer parameters. You store these parameters in *nonvolatile memory (NVM)*.

preprinted form. A sheet of paper (form) containing a preprinted design of constant data on which variable data can be printed.

preventive maintenance. Maintenance specifically intended to prevent faults from occurring. Corrective maintenance and preventive maintenance are both performed during maintenance time.

printer. A device that writes output data from a system onto paper or other media.

printer stand. An optional printer table available from your IBM marketing representative.

print position. The physical positions of the characters constituting a print line relative to the form.

print quality. The quality of printed output relative to existing standards and in comparison with jobs printed earlier.

print surface. The side of a form that receives the printed image.

process direction. Describes a direction that is parallel to the movement of the paper path.

program configuration mode. (1) A printer state that allows you to set the functions you use in your daily job. You can save these values in *nonvolatile memory (NVM)*. (2) A diagnostic condition.

PROM. programmable read-only memory.

prop. A short form of the term "proportional" meaning *proportionally-spaced font*.

proportionally-spaced font. A font in which the graphic characters are contained in character cells that may vary with the size of each graphic character and have varying character increments. This allows for even spacing between printed characters and eliminates excess white space around narrow characters. Contrast with *constant-spaced font*.

R

RAM. random access memory.

read-only. A type of access to data that allows it to be read but not copied, printed, or modified.

registration. In printing, refers to the relative print positions of images that are printed at different times. For example, when you process preprinted forms, the registration is good if the new image printed by the printer aligns correctly with the preprinted image. Print that extends beyond box edges and text that overlaps other text are examples of poor registration.

resident font. Those font data sets that are resident within the printer.

ROM. read-only memory.

S

scrolling. Moving a display image vertically in order to view data not otherwise visible within the boundaries of the display.

scroll keys. Keys which are used to move through menus. They are marked with arrows that indicate direction.

sheet. In reference to print media, a single, two-sided page of print media like paper or labels.

shielded twisted-pair (STP). A transmission medium of two twisted conductors with a foil or braided shield. Contrast with *unshielded twisted pair*.

sizing. A process where paper is treated to give it resistance against penetration of liquids.

skew. Refers to the angle that the paper is taking while going through the forms path. This will cause the printing lines to not be aligned properly.

software. Programs, procedures, rules, and associated documentation pertaining to the operation of a computer system or word-processing system. Contrast with *hardware*.

special-application materials. Materials such as adhesive labels and preprinted paper on which the printer can print.

stack lean. A measurable slope from the vertical of a stack of forms. Excessive stack lean can cause failures when feeding paper.

storage. (1) The retention of data in a storage device. (2) In word processing, a unit into which recorded text can be entered, in which it can be retained and processed, and from which it can be retrieved. (3) A device, or part of a device, that can retain data.

STP. shielded twisted-pair.

system administrator. The person at a computer installation who designs, controls, and manages the use of the computer system.

system programmer. A programmer who plans, generates, maintains, extends, and controls the use of an operating system, with the aim of improving overall productivity of an installation. Contrast with *application programmer*.

T

task. A basic unit of work to be accomplished by a device or an operator.

text. A graphic representation of information on an output medium. Text can consist of alphanumeric characters and symbols arranged in paragraphs, tables, columns, and other shapes.

throughput. A measure of the amount of work performed by the printer over a period of time; for example, number of jobs per day.

token ring. A network with a ring topology that passes tokens from one attaching device to another; for example, the IBM Token-Ring Network.

transmission. The sending of a print data set to a printer.

twisted pair. A transmission medium that consists of two insulated electrical conductors twisted together to reduce electrical noise. Contrast with *shielded twisted-pair*.

typeface. A specific type style, such as Courier or Gothic.

U

uniformly-spaced font. A font in which the character increment for each character is the same. Contrast with *proportionally-spaced font*.

unshielded twisted-pair (UTP). A transmission medium of two twisted conductors with no shield. Contrast with *shielded twisted pair*.

user. Anyone who requires the services of a computing system.

UTP. unshielded twisted-pair.

V

variable data. Data that can vary. Examples are the names and addresses in form letters. Contrast with *constant data*.

X

xerographic paper. A paper that is manufactured specifically for the xerographic process, in which key paper qualities are carefully controlled.

Z

zero tear. Conserves forms by not requiring the operator to tear off any of the forms when parking or changing forms types.

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Part Number: 63H6366



Printed in the United States of America
on recycled paper containing 10%
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