Intermec

Programmer's Reference Manual

IPL (Intermec Printer Language)

Document Change Record

This page records changes to this document. The document was originally released as version -001.

Revision	Date	Description of Change
003	10/2000	Revised throughout to include EasyCoder F4 printer information.
004	04/2001	Revised to include 3400e series printer information.
005	12/2001	Revised to include 44X0 printer information.
006	03/2003	Revised to include: • IPL v1.4 and 2.0 functionality. • Command information for the EasyCoder PF2i, PF4i, and PM4i printers.
007	10/2003	Revised to include minor changes. Added new Slash Zero, Enable or Disable command.
008	06/2004	Revised to include: • IPL v2.30 functionality. • Command information for the EasyCoder PX4i and PX6i printers.
009	11/2004	Revised to include PC41 printer information.
010	02/2005	Revised to include minor changes for IPL v2.50, which includes support for the Planet bar code. Other minor changes were made throughout the manual.
011	06/2005	Revised to include changes for IPL v2.60, which includes support for RFID commands and new RFID tag formats. Other minor changes were made throughout the manual.
012	12/2005	Revised to include changes for IPL v2.70.0, which includes additional support for RFID commands.
013	06/2006	Revised to include PD41 printer information. Symbology modifier information for the Bar Code, Select Type command was moved to Appendix F. Other minor changes were made throughout Chapter 7, "IPL Command Reference."

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Before You Begin

This section provides you with safety information, technical support information, and sources for additional product information.

Safety Information

Your safety is extremely important. Read and follow all cautions in this document before handling and operating Intermec equipment. Your equipment and data can be damaged if you do not follow the safety cautions.

This section explains how to identify and understand the cautions and notes that are in this document.

Caution

A caution alerts you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.

Note: Notes either provide extra information about a topic or contain special instructions for handling a particular condition or set of circumstances.

Global Services and Support

Warranty Information

To understand the warranty for your Intermec product, visit the Intermec web site at www.intermec.com and click **Service & Support** > **Warranty**.

Disclaimer of warranties: The sample code included in this document is presented for reference only. The code does not necessarily represent complete, tested programs. The code is provided "as is with all faults." All warranties are expressly disclaimed, including the implied warranties of merchantability and fitness for a particular purpose.

Web Support

Visit the Intermec web site at www.intermec.com to download our current manuals (in PDF). To order printed versions of the Intermec manuals, contact your local Intermec representative or distributor.

Visit the Intermec technical knowledge base (Knowledge Central) at intermec.custhelp.com to review technical information or to request technical support for your Intermec product.

Telephone Support

These services are available from Intermec.

Services	Description	In the USA and Canada call 1-800-755-5505 and choose this option
Order Intermec products	• Place an order. • Ask about an existing order.	1 and then choose 2
Order Intermec media	Order printer labels and ribbons.	1 and then choose 1
Order spare parts	Order spare parts.	1 or 2 and then choose 4
Technical Support	Talk to technical support about your Intermec product.	2 and then choose 2
Service	• Get a return authorization number for authorized service center repair. • Request an on-site repair technician.	2 and then choose 1
Service contracts	• Ask about an existing contract. • Renew a contract. • Inquire about repair billing or other service invoicing questions.	1 or 2 and then choose 3

Outside the U.S.A. and Canada, contact your local Intermec representative. To search for your local representative, from the Intermec web site, click **Contact**.

Who Should Read This Manual

This document explains how to use the Intermec Printer Language (IPL) to program Intermec printers and has a command reference chapter that provides a complete list of the commands.

Before you use IPL, you should be familiar with your network, general networking terms, such as IP address, and your bar code label printers.

Related Documents

The Intermec web site at **www.intermec.com** contains our documents (as PDF files) that you can download for free.

To download documents

1 Visit the Intermec web site at **www.intermec.com**.

2 Click **Service & Support** > **Manuals**.

3 In the **Select a Product** field, choose the product whose documentation you want to download.

To order printed versions of the Intermec manuals, contact your local Intermec representative or distributor.

1 Introduction to IPL Commands

This chapter describes Intermec's approach to printing labels and introduces the Intermec Printer Language (IPL) command set. The chapter also explains how to switch between Print and Program modes, how to send IPL files to a printer, and how to use ASCII control characters in IPL commands. The chapter concludes with a roadmap to the rest of the manual.

In this manual, "printer" can refer to the 3240, 3400, 3440, 3600, 4100, 4400, 4420, 4440, 4630, 4830, 7421, PC41, EasyCoder F4, EasyCoder PD41, EasyCoder PF2i, EasyCoder PF4i, EasyCoder PM4i, EasyCoder PX4i, or EasyCoder PX6i bar code label printer.

What Is IPL?

Intermec Printer Language (IPL) is one of the programming languages that has been developed for use with Intermec printers. IPL is an easy-to-use programming language that lets you:

*   design formats (templates) for bar code labels (media).

*   download bar code label formats to the printer.

*   modify a bar code label that is stored in the printer.

*   download data to fill in a bar code label and RFID tag information and print the label.

*   enable or disable printer features and options.

*   query the printer for hardware diagnostic data and status of print jobs.

*   abort print jobs and reset the printer.

What Are IPL Commands?

There are five types of IPL commands (Print, Program, Test and Service, Configuration, and Immediate) and these types are related to the printer's three operating modes (Print, Program, and Test and Service). That is, in order to execute an IPL command, the printer must be in the operating mode that corresponds to the IPL command's type.

IPL Command Types and Descriptions

IPL Command Type	Printer Operating Mode	Uses for This Type of IPL Command
Print	Print mode	Download data to the printer and print bar code labels.
		(RFID) Pass data to formats and print labels. Read RFID tag information.
Program	Program mode	Design label formats.
		(RFID) Handle interaction with the chip in the RFID tag.
Test and Service	Test and Service mode	Query the printer for hardware diagnostic information.
Configuration	Print mode	Enable or disable printer features and options.
		(RFID) Handles how the RFID tag interacts with the printer.
Immediate	Any operating mode	Query the printer on the status of print jobs, abort print jobs, and reset the printer.

Note: The printer executes Immediate commands as soon as it receives them, even if there are other IPL commands waiting to be executed.

The printer does not execute a command that does not match the current operating mode. For example, if you send a Program command while the printer is in Print mode, the printer ignores the Program command. See your printer user's manual for help changing the mode of your printer, or see "Switching Between Print Mode and Program Mode" on page 7.

What's New for IPL v2.71.0?

With this revision of the programmer's reference manual, the following changes were added to support IPL v2.71.0:

• Symbology modifiers for the Aztec bar code. Use these modifiers with the Bar Code Type, Select command. For more information, see "Aztec Modifiers" on page 223.

• Command reference information was revised to indicate commands supported by the EasyCoder PD41 printer.

Note: For the PF2i, PF4i, PM4i, PX4i, and PX6i printers, this release of IPL firmware is version 2.71.0. The same release of the firmware for the PD41 printer is version 10.0.0. This manual supports both versions. For more information on Intermec printer firmware, contact your Intermec sales representative.

Programming for Intermec Printers

When you program in IPL, you must understand the approach that Intermec uses to print bar code labels. It is a two-step process:

1 Design the format (or template) for the bar code label, and then send the format to the printer, where it is stored in memory.

2 Send another command to the printer that specifies the data for the fields of the format and prints the label.

Note: It is not always necessary to send the format and the data to the printer separately. You can send fixed data formats or even variable data formats that include the data in the same file.

If you skip Step 1 and do not specify a format, the printer assumes you want to use the default format, which is stored permanently in the printer. The printer will print the label using that format. The default format is called format 0.

You can store multiple formats on your printer. Many Intermec printers can store up to 19 formats, but some printers (such as the 3240 and 3440) can store up to 99. To learn how many formats your printer can store, see "Format, Create or Edit" on page 139.

Learning the Structure of IPL Commands

This section describes general principles to follow when creating or downloading IPL commands.

Note: The syntax of each IPL command is described in detail in Chapter 7, "IPL Command Reference."

- IPL commands are case sensitive. Type them as they appear in this manual. For example, if the command is an uppercase "A," do not enter it as a lowercase "a."

- Each command string that you download to a printer must begin with the start of text character <STX> and end with the end of text character <ETX>.

Note: When the printer is in XON/XOFF mode, you can send data and print multiple labels without using the <ETX> character.

- The <STX> and <ETX> commands mark the beginning and end of a message. The semicolon (;) is the command terminator. All commands in Program mode or Test and Service mode must end with this terminator except the last command in a string. Commands in Print mode do not require the semicolon command terminator.

  For example, a simple IPL command string looks like this:

  ```
  <STX>E2;F2<ETX>
  ```

Using Control Characters in IPL Command Strings

Formats that you design with IPL commands require you to enter ASCII control characters in your command strings. To create ASCII control characters, either:

- enter a control code

or

- type the printable command characters.

Many word processing programs have the ability to represent ASCII control characters such as <ETX> by entering a control code. For example, to enter the hexadecimal equivalent of the ASCII character <ETX> on your computer, you would type the control code 03. For help finding the hexadecimal equivalent of a control character, consult the full ASCII table in Appendix A.

If it is difficult for you to edit or transmit IPL command files that contain ASCII control characters, you can use printable control characters instead.

A printable control character (or "readable character") is a text string, enclosed in angle brackets, that represents an ASCII control character. For example, instead of entering a control code for the ASCII start of text character, you can type these five readable characters:

```
<STX>
```

To determine the readable character for each ASCII control character, see the full ASCII table in Appendix A. Simply enclose the text string in the ASCII column in angle brackets to create the readable character.

The printer automatically detects whether you are using ASCII control characters or readable characters by the start of text (<STX>) character, which marks the beginning of an IPL command message. All characters in a message must be in the same form (ASCII control character or readable characters) as the start of text character. For example, if you begin a message with the readable characters <STX>, the printer executes only the readable characters in the message and throws away any ASCII control characters in the message.

Using readable characters may consume more space and time, but it has the distinct advantage of displaying everything on the screen in readable characters.

Example of Using Control Codes
```
^B^Og1,567^C
```

where:

^B is the control code representation of hex 02 (the <STX> character).

^O is the control code representation of hex 0F (the <SI> character).

^C is the control code representation of hex 03 (the <ETX> character).

Example of Using Printable Control Characters
```
<STX><SI>g1,567<ETX>
```

Sending IPL Commands to the Printer

Before you can send IPL commands to the printer, you need to:

• connect the printer to a PC.

• create an ASCII text file of IPL commands.

To connect the printer to a PC

1 Connect the printer to the serial port on your PC using the correct cable. For help selecting a cable, see your user's manual.

2 Configure the PC for a serial connection to the printer by typing this command at the DOS prompt and pressing **Enter**. This example assumes that your serial connection is COM1.

```
MODE COM1 96,E,7,1,N
```

These serial connection characteristics are the default for the printer.

3 Make sure the printer is configured for the hardware flow control (XON/XOFF) communications protocol. This protocol is the default. For help, see your printer user's manual.

Note: If you receive the "write fault error" error message, it indicates that either you are sending the data to the wrong COM port or your cable does not support hardware flow control. Try sending the data via Windows using the information below.

To create an ASCII text file of IPL commands

1 Create a set of IPL commands. For help, see Chapter 2, "Downloading Fonts to the Printer," or Chapter 3, "Designing Bar Code Labels."

2 Type the commands into the text file using any text editor or word processor and save the file as an ASCII text file. Your ASCII text file can contain an entire label format or just a single configuration command that you use often.

For example, if you need to set the media sensitivity number often, you may want to create a text file that contains the IPL command line: `<STX><SI>g1,567<ETX>`.

You can send IPL commands to the printer in many ways. This section describes two simple methods:

• Downloading commands from Windows

• Sending a string of commands through an application

Downloading Commands From Windows

After you create a text file of IPL commands, you can use Windows HyperTerminal to send the file to the printer.

To download commands using HyperTerminal

1 Start the HyperTerminal application.

2 In the Connection Description dialog box, enter a name for your new connection and click **OK**.

3 In the Phone number dialog box, select a serial port from the **Connect using** list box and click **OK**.

4 In the COM Properties dialog box, set the port settings to your printer communication settings. If you have not changed the printer default settings, enter the following information and click **OK**:

Bits per second	9600
Data bits	7
Parity	even
Stop bit	1
Flow control	XON/XOFF

5 From the Main menu bar, select **Transfer**.

6 From the Transfer list box, select **Send Text File**.

7 In the Send Text File dialog box, locate your .txt file and click **Open**.

HyperTerminal sends the .txt file to your printer. Your command text file will either change a configuration setting in the printer or print your label format.

Sending a String of Commands Through an Application

You can send a string of IPL commands through a PC communications application, a terminal emulation application, or a host terminal. See the application's documentation for instructions.

The disadvantage of sending a string of commands is that you must retype the entire command string if you make an error while entering the commands. It is easier to retype a command if you keep the command strings short; therefore, you should design your label formats as combinations of several short command strings rather than one very long string.

To illustrate this idea, consider the next examples, which show two ways to send a bar code label format to the printer. Example 1 uses several short command strings to define the format. Example 2 combines all of the commands into a single string.

Example 1
```
<STX><ESC>P<ETX>
<STX>E3;F3;<ETX>
<STX>H0;o81,100;f0;c0;d0,16;h1;w1;<ETX>
<STX>H1;o81,120;f0;c0;d0,16;h1;w1;<ETX>
<STX>H2;o81,150;f0;c2;d0,14;h1;w1;<ETX>
<STX>H3;o81,190;f0;c2;d0,16;h1;w1;<ETX>
<STX>B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@;<ETX>
<STX>R<ETX>
```

Example 2
```
<STX><ESC>P;E3;F3;H0;o81,100;f0;c0;d0,16;h1;w1;H1;o81,120;
f0;c0;d0,16;h1;w1;H2;o81,150;f0;c2;d0,14;h1;w1;H3;o81,190;
f0;c2;d0,16;h1;w1;B4;o81,0;f0;c0,1;h50;w1;d0,11;i0;p@;
R<ETX>
```

In Example 1, each line begins with the start of text character <STX> and finishes with the end of text character <ETX>. If you make a mistake, you need to retype only the line with the mistake. In Example 2, if you made a mistake anywhere in the string, you must retype the entire format. Example 1 takes slightly longer to download, but is much easier to read and debug.

Switching Between Print Mode and Program Mode

Print mode and Program mode are two different operating modes of the printer. Before you download information to the printer, make sure that you are in the correct mode:

- Use Program mode to define formats, pages, fonts, and characters.

- Use Print mode to print labels, to download data to the printer, to download configuration commands to the printer, or to upload information from an RFID tag.

To enter Program mode on any printer

- Type this command:

  `<STX><ESC>P<ETX>`

  Send this command every time that you download formats, even if you think the printer is already in Program mode. If the printer is already in Program mode, it ignores this command.

To enter Print mode on any printer

- Type this command:

  `<STX>R<ETX>`

  Send this command before each set of data or as your last format command. If the printer is already in Print mode, it ignores this command.

Note: The R command may be treated as data if the data to the printer does not include a <CAN> or field pointer to clear the fields.

Working With RFID Tags

If a printer has an RFID module installed, the RFID mode is automatically turned on. You need to configure the printer, declare a format that includes commands to read and write to the tag, and print the format to a label. The printer aligns the tag with the antenna, executes the RFID commands, repositions the label, prints the image buffer to the label, and then positions the next label for printing.

How to Write Data to an RFID Tag

To write data to an RFID tag you need to do two things: specify an area in the tag's memory and define the data that will be written to the tag. To specify an area in the tag's memory, you define an RFID tag write field. This field specifies which segment is written to, the start position, length of data (in bytes) and the format of the data.

How Data is Stored on an RFID Tag

Data written to the RFID tag is stored from the left starting with the byte that is defined as the start of field byte and then going the length of the defined field (in bytes).

Writing Hex or ASCII Formats

If the tag format is hex or ASCII and the field source data string is shorter than the allocated number of bytes, the data string's least significant bytes (from the right) are padded with zeroes until they fill the length of the field.

If the field source data string is longer than the allocated number of bytes, the error <EOT> is sent and nothing is written to the tag. If auto-transmit level 3 is enabled, an <EOT> status response is returned to the host.

Writing Numerical Formats

If the tag format is numerical (NUM), the data is stored as a numerical value. In this tag format, if the field source data string is shorter than the allocated number of bytes, the data string's most significant bytes (from the left) are padded with zeroes until they fill the length of the field.

Note: The number of bytes needed to represent a numerical value is never greater than the number of bytes needed to represent the number as a data string.

What to Read Next

Now that you have been introduced to IPL commands, you can use this manual to learn how to perform these tasks:

For Help With This Task	See
To download any font to the printer	Chapter 2
To design and code the formats for bar code labels	Chapter 3
To diagnose and solve problems with IPL commands	Chapter 4
To learn how to use printer memory efficiently, how to increase throughput, and when to use Emulation mode	Chapter 5
To find a specific IPL command	Chapter 6
To look up the exact syntax and description of any IPL command	Chapter 7
To refer to the Full ASCII table	Appendix A
To see the character set tables	Appendix B
To create your own fonts and graphics	Appendix C
To refer to the user-defined interface tables	Appendix D
To download direct graphics	Appendix E
To configure symbology settings with the Bar Code, Select Type command modifiers	Appendix F

2 Downloading Fonts to the Printer

This chapter explains how to download fonts to your Intermec printer. You can use PrintSet, IPL commands, or third-party software applications.

What Types of Fonts Can I Download?

You can download these types of fonts to most Intermec printers:

- Bitmap
- Outline (TrueType and Speedo)

Note: The 3400, 3400e, 3440, 4420, 4440, PD41, PF2i, PF4i, PM4i, F4, PX4i, and PX6i printers support the use of scalable TrueType fonts. Bitmap fonts can be used on any Intermec printer, including those TrueType fonts you have converted to bitmap using PrintSet. The PD41, PF2i, PF4i, PM4i, F4, PX4i, and PX6i do not support Speedo fonts.

In addition to the fonts permanently resident in your printer, you can download fonts in the form of user-defined bitmap or outline (scalable) fonts. Use this section to learn about the differences between bitmap and outline fonts and how to choose the type of font you want to use.

Bitmap fonts commonly:

- print in one fixed size. (If you magnify the font, they print but are ragged.)
- print quickly.
- are memory intensive when defined as large characters.

Outline fonts commonly:

- vary in size. You can print any size character up to 10.16 cm (4 in).
- print smooth characters.
- image slower than bitmap fonts.

Your printer supports two types of outline fonts: TrueType (support available only on the 3400, 3400e, 3440, 4420, 4440, F4, PD41, PF2i, PF4i, PM4i, PX4i, and PX6i printers) and Speedo (not supported on the F4, PD41, PF21, PF4i, PM4i, PX4i, or PX6i). TrueType fonts are the most popular outline fonts, and several are available through Windows on your PC. For help locating Speedo fonts, contact Intermec Technical Support.

See the next table to decide which fonts best suit your needs.

Font Selection Table

Concern	Bitmap	TrueType	Speedo
image speed	fastest	medium	fast
availability	extensive	extensive with Windows	limited
storage space	varies	50 - 80K per font usually; Japanese, Chinese and Korean are considerably larger	20 - 30K per font
size	fixed	variable	variable

You can download fonts to the printer and store them in the non-volatile memory. Although the printer reserves 16 font ID numbers (3 to 6, and 8 to 19) for you to download fonts, memory constraints may limit the number of fonts you can store.

Using PrintSet to Download Fonts

The easiest way to download fonts to the printer is with the PrintSet (v2.0 or later) printer configuration application. This application is on the CD that shipped with your printer. You can also download the latest release of PrintSet from the Intermec web site at www.intermec.com. You can use PrintSet to select fonts and directly download them to your printer.

Bitmap fonts can be memory intensive, so you may decide not to download the entire font to the printer. You can use PrintSet to define a subset of the font (only the numbers, for example). Then you can download the subset, saving storage space on the printer. The printer requires that bitmap fonts be in one of these formats: one bit per byte or six bits per byte. PrintSet automatically converts all bitmap fonts into the six bits per byte format.

PrintSet automatically converts scaleable outline fonts into nibblized data that you can download to the printer. PrintSet can also convert fixed outline fonts into bitmap fonts that you can download to the printer.

For more information on using PrintSet to download fonts, see the PrintSet online documentation.

Installing International Character Sets Using GLOBE

Intermec's goal is to help you easily localize your printer with the font set you choose. To support this goal, Intermec printers now use GLOBE (Global Languages On Bar Code Equipment) technology to download and access single- and double-byte international character sets.

What Types of Fonts Does GLOBE Support?

Use GLOBE technology to install international character sets on your printer. GLOBE technology is part of PrintSet, the Windows-based configuration program that came on the CD with your printer. You can use PrintSet to install these types of fonts:

• TrueType fonts

• Bitmap fonts generated from TrueType fonts using PrintSet

TrueType fonts are scaleable fonts that retain smooth contours at any size. Since TrueType fonts may be very complex, they tend to image slower than bitmap fonts. You cannot subset a TrueType font. You must download the entire font to the printer.

Note: When using TrueType fonts, your printer must be configured to operate in 8 bit mode. Intermec also recommends the following printer configuration: highest supported bits per second (Baud rate), 8 data bits, no parity, 1 stop bit, XON/XOFF flow control.

Your TrueType fonts must be compatible with Microsoft Windows. To generate bitmap fonts from TrueType fonts for a particular language, you must run PrintSet under that language version of Microsoft Windows. You can run PrintSet Version 2.0 and later under Windows 95/98/NT 4.0/2000/XP.

PrintSet 2.1 or later is required to install a Chinese, Japanese, or Korean TrueType font. You must locate and install the necessary code page tables to use with these language fonts. For help, **see "Installing Code Page Tables" on page 16.**

Note: The EasyCoder F4 does not support bitmap or TrueType Chinese, Japanese, or Korean fonts.

Do You Need to Purchase Additional RAM?

If you wish to install a TrueType font in your printer, you must have enough memory available to contain the entire font file. The size of the TrueType font file, in bytes, is the minimum amount of memory you must have available in your printer. Bitmap fonts generated from TrueType files will vary in size, depending on the point size and number of characters you create. The larger the point size you choose, the larger the resulting file size.

Chinese, Japanese, and Korean languages contain thousands of characters. If you wish to use these languages, you will need to purchase expanded flash memory to store them in your printer. The amount of memory depends on the size and number of fonts you wish to install.

Use the next table to determine the approximate size of some Asian TrueType fonts. The approximate size is shown in dots per inch (dpi).

Approximate Sizes – Asian TrueType Fonts

TrueType Font	Point Size	Approximate Size (400 dpi)	Approximate Size (200 dpi)
Korean KSC-5601	12 pt	1.6MB	0.5MB
	16 pt	2.7MB	0.8MB
	24 pt	5.8MB	1.5MB
Traditional Chinese Big 5	12 pt	3.1MB	0.9MB
	16 pt	5.25MB	1.6MB
Simplified Chinese GB	12 pt	3.5MB	1MB
	16 pt	6.2MB	1.8MB

Approximate Sizes – Asian TrueType Fonts

TrueType Font	Point Size	Approximate Size (400 dpi)	Approximate Size (200 dpi)
Japanese Shift-JIS	12 pt	3.9MB	1.1MB
	16 pt	6.75MB	2MB

Some TrueType fonts require large amounts of dynamic RAM to operate. If you receive an error code 37 when printing a label using TrueType fonts, you may need to purchase expanded dynamic RAM.

Licensing Your Fonts

Although Intermec provides you with a tool to download international characters sets, you must license the fonts that you purchase and install in your printers. Contact your font vendor for licensing information.

These companies provide TrueType fonts compatible with Intermec printers:

Galapagos Design Group
256 Great Road
Suite 15
Littleton, MA 01360-1916
Tel: 978-952-6200
Fax: 978-952-6260
e-mail: info@galapagosdesign.com

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
Tel: 425-882-8080
www.microsoft.com

Dynalab Inc.
2055 Gateway Place
Suite 400
San Jose, CA 95110
Tel: 408-490-4224
Fax: 408-490-2233
www.dynalab.com

Note: Dynalab provides Chinese, Japanese, and Korean fonts. You can also purchase fonts from their offices in Taiwan and Hong Kong. See the Dynalab web page for the address of these offices.

Creating Bitmap Fonts From TrueType Fonts

To create bitmap fonts from TrueType fonts, you must run PrintSet under the correct language version of Windows. For example, to create a Traditional Chinese font, you must run PrintSet under Traditional Chinese Microsoft Windows. In addition, you must install the font using Microsoft Windows in order for PrintSet to correctly convert it to a bitmap font.

The advantage of bitmap fonts is that they may require less RAM and the printer can image them faster. When you download bitmap characters to the printer, you must select the size of the characters. Make sure that you select the size you want to use in your formats. If you magnify the character size in the printer, the edges of the characters will be jagged.

Note: You can create Traditional or Simplified Chinese bitmap fonts up to a size of 16 points at 400 dpi or 32 points at 200 dpi. The EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, and PX6i do not support bitmapped Chinese, Japanese, or Korean fonts.

For more information, see the PrintSet online documentation.

Selecting the Printer Language

When you install a TrueType font, you must select the correct printer language. To choose the correct language, use the IPL command, Printer Language, Select. If the language setting you have chosen does not work, use the default language setting.

Installing Code Page Tables

If you install a Japanese, Chinese, or Korean TrueType font, you must also install the code page tables. For a list of code pages, see the "Printer Language, Select" command on page 118. You can download code pages from Intermec's web site at www.intermec.com, and then from the **Service & Support** menu, choose **Software Downloads**. The files were compressed using Microsoft WinZip application and have the file extension .ZIP. After decompressing the file, install your code page as described in the procedure below.

To install the code page tables in your printer

1 Copy the tables you wish to use to your PC:

   SJIS.PCF - Japanese (Shift JIS)
   BIG5.PCF - Traditional Chinese (Big 5)
   GB.PCF - Simplified Chinese (GB 2312)
   KSC.PCF - Korean (KSC5601)

2 Use Windows HyperTerminal to configure the PC to match the printer settings. When using double-byte fonts, the recommended printer configuration is COM 1, 19,200 bits per second, no parity, 8 data bits, 1 stop bit, and XON\XOFF flow control.

   a Start HyperTerminal. (HyperTerminal is often located inside the Accessories folder.) The Connection Description screen appears.

   b In the **Name** field, enter a name for this connection (such as Printer) and select an icon (optional). Click **OK**. The Connect To screen appears.

   c In the Connect Using list box, select the appropriate port. Click **OK**. The port properties screen appears.

d   Enter data, matching the PC's settings to the printer settings. Click **OK**. The HyperTerminal main menu appears.

e   From the **Transfer** menu, select **Send File**. The Send File screen appears.

f   In the **Name** field, locate your file, and then click **Send**.

Using IPL Commands to Download Fonts

Although the easiest way to download fonts is with PrintSet, you can also use the IPL command set to create and download user-defined bitmap and outline fonts to your Intermec printer.

Downloading Bitmap Fonts

To learn more about bitmap font formats, see **"Creating User-Defined Bitmap Fonts" on page 181.**

Downloading Outline Fonts

If you need to download an outline font but you cannot use PrintSet, you can:

• create a program to convert the outline font to a format you can download to the printer.

• manually convert the outline font to a format you can download to the printer.

When you convert an outline font to a format you can download to the printer, you must change the font character data into nibblized data that the printer can interpret. When you nibblize data, you divide each byte of data into two bytes.

For example:

byte 0xAB becomes two bytes: 0x41, 0x42 or text string "AB"

To manually download an outline font to your printer

1   Nibblize the font data.

Divide the nibblized data into separate lines preceded by the j command. (For more information, see the **"Outline Font, Download" command on page 147.**) Remember to wrap the entire line in <STX> and ;<ETX>. You need short lines for limited message length protocols and to make modifying easier by using an editor or word processing program.

2   Include IPL commands to instruct the printer what to do with the font data. For help, see the following example and Chapter 7, "IPL Command Reference."

3   Send the commands to the printer using one of the methods described in Chapter 1.

This is an example of a nibblized outline font file that includes IPL commands to send it directly to a printer.

Nibblized Outline Font File Example

Command	Definition
`<STX>R<ESC>C<ESC>P<ETX>`	Enter Program mode.
`<STX>J03,Times,1;<ETX>`	Create TrueType font 3 and give it the name Times.
`<STX>j0001000000110100000400604c545348efe24cd00000;<ETX>`	TrueType data string.
`<STX>j00ebf468646d78d956f5ab0001135800001508686561;<ETX>`	TrueType data string.
`<STX>j0d2000012f04000006a3706f7374d43c8176000135a8;<ETX>`	TrueType data string.
: : :	Several TrueType data strings not shown due to space constraints.
`<STX>j00b3008200b0008725ba0000;<ETX>`	Last TrueType data string.
`<STX>R<ETX>`	Exit Program mode.

Using Third-Party Software Applications to Download Fonts

Use your third-party software to download fonts into a user-defined font format that the printer can interpret. Refer to your third-party documentation for more information.

3 Designing Bar Code Labels

This chapter explains how to design and print your own labels using IPL commands. It covers the basic elements of label design and provides examples to guide you in designing your own labels.

Introduction to Formats

To print a label on an Intermec printer, you must create a label format, send that format to the printer, send data to fill in the fields in the format, and then print the label.

A format is a template that defines how the information prints on a label. For example, if you want to print a number on a label, the format must indicate the location of the number, its font and size, and whether the number has a vertical or horizontal orientation.

You can define a format either by downloading IPL commands or by using a label generation program. The printer stores the format in its RAM or flash module. You can use the format at any time. You can call it up to print labels, or call it up in Program mode to modify one or more of its fields on the host.

If you intend to regularly reload a format, you can use the temporary format parameter (*) with some printers. The use of format * results is an optimal use of flash-based storage memory because the printer stores it in RAM and deletes it when the printer power is turned off.

Tutorial for Designing and Creating a Label Format

Label formats are composed of several different fields that determine where and how different types of data appear in the label design. The fields on a label may differ in size, location, orientation, and data type. You must define information that you plan to print on the label as a field in the label format. Once you define the fields, you can pass data into the fields and print them.

This tutorial assumes that you are using IPL commands.

To design a basic label format

1 Using a label from your roll of media, sketch an example of a format that you want to create. Your format can include any or all of these fields:

   • Human-readable

   • Bar code

   • Line

   • Box

   • User-defined characters (UDCs) or graphics

   In this example, you will design a simple label that includes a human-readable field, a line field, and a bar code field.

2 Determine the placement of each field from the label origin. The label origin (oØ,Ø) is the top left corner of the label.

- To determine the horizontal or X origin of each field, measure the distance from the left side of the label to the upper left corner of the field.

- To determine the vertical or Y origin of each field, measure the distance from the top of the label to the upper left corner of the field.

Note: On the 4400, 7421, and PC41 printers, be sure to use the label width command to set the actual width of your labels; otherwise, the Y origins will be incorrect.

When you combine the two numbers, they form the field origin oX,Y.

In the illustration below, the horizontal or X origin of the human-readable field measures 12.7 mm (0.5 in) from the left side of the label and the vertical or Y origin measures 6.35 mm (0.25 in) from the top of the label.

field origin = X, Y
label origin = oØ,Ø   y

Label motion from printer

0.25"

x   THIS IS THE SAMPLE LABEL

0.5"

Code
39
label

IPL.002
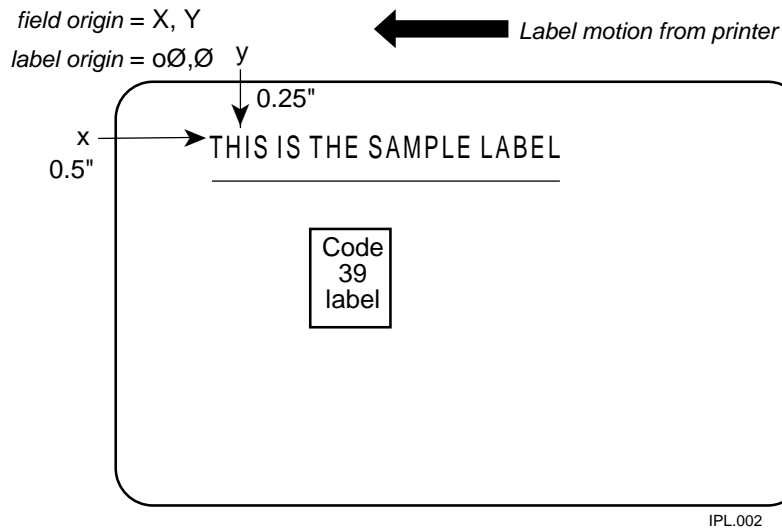
3 Convert the measurements for the human-readable field from inches to dots. Use this equation:

25.4 mm (1 in) = 203 dots
1 mm = 16 dots

In this example, the human-readable field origin in dots is:

12.7 mm (0.5 in) x 203 dots = 102 dots (X dimension)
6.35 mm (0.25 in) x 203 dots = 51 dots (Y dimension)

The origin for the human-readable field is o102,51 (oX,Y).

Note: If you have a 300 dpi or 406 dpi printer, substitute your dpi where you see 203 dots in these equations.

4 Convert the measurements for the line field and the bar code field to complete this example.

To create or program the label format

1 Choose a bar code symbology and a human-readable font that suit your needs.

For this example, you are going to use the proportional outline font and the Code 39 symbology. See Chapter 7, "IPL Command Reference," for information on the different symbologies and fonts available to you.

2 Define the parameters for each type of field in the format.

Field Type in Label	Represented By
Human-readable	H
Bar code	B
Line	L
Box	W
User-defined characters (UDCs) or graphics	U

See **"Commands Listed by Task" on page 68** for a list of the parameters you can define for each type of field. For example, you need to define the following parameters for a human-readable field:

Parameter	Value for this Example
Field type	H0
Field origin	o102,51
Font	c25 (outline font)
Field direction	f0 (horizontal)
Height	h20 (multiplied 20 times)
Width	w20 (multiplied 20 times)
Field source and number of characters	d0,30

3 Create command strings for each type of field. You must bracket your field information between the start of text character (<STX>) and the end of text character (<ETX>).

When you combine the parameters in the previous table into a command string, it should look like this:

```
<STX>H0;o102,51;c25;f0;h20;w20;d0,30;<ETX>
```

4 Combine the command strings you defined into one file and add the following commands bracketed by <STX> and <ETX>:

Command	Description
<ESC>C	Selects Advanced mode
<ESC>P	Enters Program mode
E4;F4;	Erases what was in format 4 and creates a new format 4
R	Saves the format and exits to Print mode
<ESC>E4	Accesses format 4
<ETB>	Prints the format

5 Create the data lines for the human-readable field and the bar code field. Do this by completing the following tasks:

a Type the information that you want to appear in the human-readable field and the bar code field in two separate lines.

b Separate the information with a <CR> at the end of the first text string.

The <CR> tells the printer to enter the text into different fields. The first line will be the text for the human-readable field and so on.

c Preface the data lines with the <CAN> command. It erases all data in the current format.

Your command strings should look like this:

Command String	Definition
<CAN>	Erases all data in current format
THIS IS THE SAMPLE LABEL<CR>	Text for the human-readable field
SAMPLE	Text for the bar code field

d Bracket the command strings between <STX> and <ETX>.

6 Combine all of the command strings into one format and it should look like the following example.

Note: The difference between the lowercase letter "l" and the numeral "1" is not very noticeable in the Courier font. Make sure that you enter the correct command.

Sample Label Command Strings

Command	Definition
`<STX><ESC>C<ETX>`	Select Advanced mode
`<STX><ESC>P<ETX>`	Enter Program mode
`<STX>E4;F4;<ETX>`	Erase format 4, create format 4
`<STX>H0;o102,51;f0;c25;h20;w20;d0,30;<ETX>`	Edit/create human-readable field 0
`<STX>L1;o102,102;f0;l575;w5;<ETX>`	Edit/create line field 1
`<STX>B2;o203,153;c0,0;h100;w2;i1;d0,10;<ETX>`	Edit/create Code 39 bar code field 2 with interpretive field enabled
`<STX>I2;h1;w1;c20;<ETX>`	Create interpretive field to go with bar code field 2
`<STX>R;<ETX>`	Save format and exit to Print mode
`<STX><ESC>E4<ETX>`	Access format 4
`<STX><CAN><ETX>`	Erase all data
`<STX>THIS IS THE SAMPLE LABEL<CR><ETX>`	Data for human-readable field 0
`<STX>SAMPLE<ETX>`	Data for bar code field 2
`<STX><ETB><ETX>`	Print

Note: The line breaks in the preceding example are shown for formatting purposes only and do not necessarily represent carriage returns.
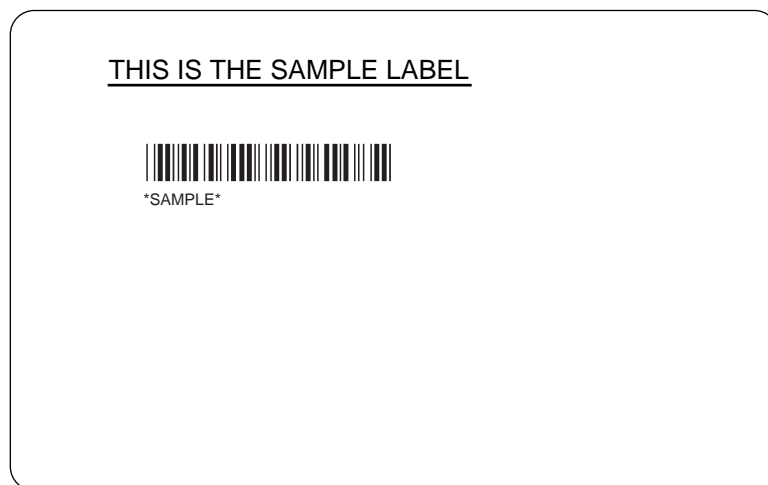
IPL004.eps

Sample Label

Defining Label Design Fields

Define each type of field to hold a certain type of data. You can define:

- Bar code fields (with or without interpretive fields)
- Human-readable fields
- Graphic fields
- Line fields
- Box fields

You must define the data you plan to print on your label as a field in the label format. Each field type gives you options for interpreting your data. The fields that contain the most options are bar code fields and human-readable fields.

Bar Code Fields

You can print bar codes in any of these symbologies:

• Codabar	• Code 93	• MaxiCode
• Code 2 of 5	• Code 128	• MicroPDF 417
• Code 11	• Code One	• QR Code
• Code 16K	• Data Matrix	• PDF 417
• Code 39	• HIBC	• POSTNET
• Code 49	• Interleaved 2 of 5	• UPC/EAN

See Chapter 7, "IPL Command Reference," for a complete list of commands to select the appropriate bar code symbology. **"Commands Listed by Task" on page 68** lists the command options available for editing bar code fields.

Human-Readable Fields

You can print human-readable fields in any one of the printer's internal fonts or user-defined fonts. The printer contains several resident bitmap fonts in a range of sizes and styles.

You can change the size of the font character by using the width and height magnification or by using the pitch or point-size commands. The fonts themselves remain unchanged. The font character charts in Appendix B, "Character Sets," illustrate the complete character set for each font.

The printer supports nine different international character sets for each command set mode. In Emulation mode, the international character substitution is compatible with Intermec 8636/8646 printers. In Advanced mode, the substitution complies with the ISO standards. The printer may also contain character sets for IBM translation and code pages.

The internal bitmap fonts of the printer include:

- Standard bitmap fonts measured in dots
- Bitmap fonts recognized by optical character recognition (OCR) programs
- Bitmap fonts measured in point sizes
- Outline fonts
- Bitmap monospaced fonts

Line and Box Fields

Use the command set (see Chapter 7, "IPL Command Reference") to define line or box fields on a label. You can use the commands to determine whether a box or line appears vertically or horizontally and to set the line length and thickness.

The following example uses vertical and horizontal lines to separate fields on a label and uses a box field to make a label border. This format uses bold text to highlight the lines that contain line or box fields. This label format prints the label shown on the next page.

Lines and Boxes Format

```
<STX><ESC>C0<ETX>
<STX><ESC>P;<ETX>
<STX>E4;F4,DEMO 4;<ETX>
<STX>L1;o11,447;f0;l1207;w4;<ETX>
<STX>L2;o11,285;f0;l1207;w4;<ETX>
<STX>W3;o11,0;f0;l1207;h802;w4;<ETX>
<STX>B4;o658,650;f0;h102;w2;c0,0;i1;r1;d0,11;<ETX>
<STX>I4;o658,752;f0;h1;w1;c20;r0;b0;<ETX>
<STX>B5;o87,650;f0;h102;w2;c0,0;i1;r1;d0,11;<ETX>
<STX>I5;o87,752;f0;h1;w1;c20;r0;b0;<ETX>
<STX>H6;o34,183;f0;h1;w1;c22;r0;b0;d0,17;<ETX>
<STX>H7;o35,143;f0;h1;w1;c21;r0;b0;d3,BASIS WT. 39-4838;<ETX>
<STX>H8;o389,305;f0;h1;w1;c21;r0;b0;d3,ROLLS;<ETX>
<STX>H9;o40,305;f0;h1;w1;c21;r0;b0;d3,ROLL WIDTH;<ETX>
<STX>L10;o11,609;f0;l1207;w4;<ETX>
<STX>H12;o1022,508;f0;h1;w1;c22;r0;b0;d0,7;<ETX>
<STX>H13;o1022,467;f0;h1;w1;c21;r0;b0;d3,WEIGHT;<ETX>
<STX>H14;o539,508;f0;h1;w1;c22;r0;b0;d0,11;<ETX>
<STX>H15;o539,467;f0;h1;w1;c21;r0;b0;d3,LOCATION;<ETX>
<STX>H16;o42,508;f0;h1;w1;c22;r0;b0;d0,15;<ETX>
<STX>H17;o43,467;f0;h1;w1;c21;r0;b0;d3,CUSTOMER ORDER NUMBER;<ETX>
<STX>H18;o840,346;f0;h1;w1;c22;r0;b0;d0,13;<ETX>
<STX>H19;o840,305;f0;h1;w1;c21;r0;b0;d3,ORDER ITEM NUMBER;<ETX>
<STX>H20;o389,346;f0;h1;w1;c22;r0;b0;d0,7;<ETX>
<STX>H21;o34,346;f0;h1;w1;c22;r0;b0;d0,11;<ETX>
<STX>H22;o747,183;f0;h1;w1;c22;r0;b0;d0,15;<ETX>
<STX>H23;o743,143;f0;h1;w1;c21;r0;b0;d3,GRADE DESCRIPTION;<ETX>
<STX>H24;o13,0;f0;h51;w34;c25;r0;b3;d3,        SHIPPING LABEL          ;<ETX>
<STX>R<ETX>
<STX><ESC>E4<CAN><ETX>
<STX><ESC>F4<LF>INTERMEC<ETX>
<STX><ESC>F5<LF>372181192<ETX>
```

```
<STX><ESC>F6<LF>38448379237<ETX>
<STX><ESC>F12<LF>230<ETX>
<STX><ESC>F14<LF>3839494<ETX>
<STX><ESC>F16<LF>372181192<ETX>
<STX><ESC>F18<LF>234-LOFT<ETX>
<STX><ESC>F20<LF>12<ETX>
<STX><ESC>F21<LF>338438<ETX>
<STX><ESC>F22<LF>A-PLUS QTY<ETX>
<STX><ETB><FF><ETX>
```

SHIPPING LABEL

BASIS WT. 39-4838	GRADE DESCRIPTION
38448379237	A - PLUS QTY

ROLL WIDTH	ROLLS	ORDER ITEM NUMBER
338438	12	234 - LOFT

CUSTOMER ORDER NUMBER	LOCATION	WEIGHT
372181192	3839494	230

INTERMEC

372181192

IPL006.eps

Sample Label in Lines and Boxes Format: *This illustration shows the label printed using the command strings.*

Graphic Fields

You must define a graphic field if you want to print a graphic image on a label. Before you can use this field, you need to download the graphic to the printer. Once you download the graphic, you can use it in any format.

Use the PrintSet printer installation software to easily download graphics to the printer. PrintSet automatically converts the graphic into a six bits per byte format that your printer can understand.

If you are using third-party label-generation software, it converts your graphic file to a UDC format that the printer can interpret and downloads it to the printer.

If you want to design your own graphic, refer to **"Creating User-Defined Bitmap Graphics" on page 176**. You must send graphics as either one bit per byte or six bits per byte bitmap images. The maximum size that you can define a graphic to be is limited by the capacity of your printer. The maximum size can be increased to 4 inches by 4 (1600 dots by 1600 dots) inches if you install expansion RAM. Due to message length constraints, you must design large graphics in the six bits per byte format.

You can use Direct Graphics mode to reduce the time it takes to download and print an image. For more information on direct graphics, see Appendix E, "Using Direct Graphics Mode."

Editing Label Formats and Working With Fields

In addition to understanding the different types of printable fields on the printer, you need to know how to arrange them to define or change the format of a label. The following sections use examples to describe the commands that position, size, rotate, and edit label fields. For a complete list of all programming commands, see Chapter 6, "Finding IPL Commands in This Manual."

Whenever you create a format, the printer automatically creates a human-readable field zero (H0) along with it. The printer creates the H0 field with all field parameters set to the default setting. You can only delete field zero after you create one or more other fields. You cannot delete the last field in a format.

Defaults for the H0 Field

Command	Definition
o0,0;	Field origin is 0,0.
f0;	Field direction is horizontal with respect to the label motion from printer.
h1;	Field height magnification is one.
w1;	Field width magnification is one.
c2;	Selects the 10 x 14 standard font.
b0;	Selects no border around human-readable field.
r0;	Selects horizontal orientation of characters.
d0,30;	You enter variable data in Print mode. The maximum number of characters you can enter into this field is 30.

When creating a new format field, it is not possible to specify field zero as anything other than human-readable field zero (H0) without creating another field first. For example, you cannot make field zero a bar code field by doing the following:

```
<STX><ESC>P;E1;F1;B0;<ETX>
```

To make field zero a bar code field, you have to delete human-readable field 0 and then define bar code field 0. To do this, you must create a temporary field (L39) before you delete human-readable field zero (H0):

```
<STX><ESC>P;E1;F1;L39;D0;B0;D39;<ETX>
```

The next table describes each command in the string.

Label Format Editing Command Examples

Command	Definition
<ESC>P;	Enters Program mode
E1;	Erases format 1
F1;	Creates format 1
L39;	Creates line field (temporary field)
D0;	Deletes field zero
B0;	Creates bar code field zero
D39;	Deletes the temporary line field

When numbering the fields in a format, it is important to remember to give every field a different number. Never use a field number more than once. You can have up to 200 fields numbering from 0 to 199. The importance of field numbering comes into play when you are in Print mode and are entering data into the label format. At this point, you can only identify the fields by a number, not by the type of field.

Each bar code field can have an interpretive field associated with it. For example, bar code field B33 would have an interpretive field I33. All interpretive fields use up a field location, starting from the top of the field directory; if B33 is the first bar code field with interpretive text, then field I33 would use location 199. You can see how the printer uses the fields internally by uploading the format and examining where the interpretives appear. For help, see the Format, Transmit command on page 105. If you need to use more fields than IPL can accommodate in a single format (because of interpretive fields), you can use pages to combine several formats on one label.

Also keep in mind that you enter data into fields according to their numeric value if you use a <CR> to separate the data. In other words, the first string of data you enter goes into the lowest numbered field, the second string of data you enter goes into the next lowest numbered field, and so on.

Editing Existing Fields

If you make a mistake in a label format, you may not have to download the entire format again depending on the severity of the mistake. You can change a specific field in a format by sending a command in Program mode. You can modify just the incorrect format fields instead of having to download the entire format again.

When the printer is in Program mode, it uses a field pointer to point to the field to be modified. The pointer continues to point to the most recently selected field until you select a different format or field.

For the next example, assume that you used the following format:

Sample Format

Command	Description
`<STX><ESC>C<ETX>`	Selects Advanced mode
`<STX><ESC>P<ETX>`	Enters Program mode
`<STX>E3;F3;<ETX>`	Erases format 3, Creates format 3
`<STX>H0;o80,100;f0;c0;d0,16;h1;w1;<ETX>`	Creates field H0
`<STX>H1;o80,120;f0;c0;d0,16;h1;w1;<ETX>`	Creates field H1
`<STX>H2;o80,150;f0;c2;d0,14;h1;w1;<ETX>`	Creates field H2
`<STX>H3;o80,190;f0;c2;d0,16;h1;w1;<ETX>`	Creates field H3
`<STX>B4;o80,0;f0;c0,1;h50;w1;d0,11;i0;p@;<ETX>`	Creates field B3
`<STX>R;<ETX>`	Saves and exits to Print mode

To change the height and width of field 3 to 2 dots, download this command string:

`<STX><ESC>P;F3;H3;h2;w2;R;<ETX>`

The following table describes each command in this string:

Field Editing Commands in the Sample Format

Command	Description
<ESC>P;	Enters Program mode
F3;	Accesses format number 3 from memory
H3;	Accesses field 3
h2;	Sets the height to 2 dots
w2;	Sets the width to 2 dots
R;	Returns to Print mode

Note: The <STX> and <ETX> commands mark the beginning and end of a message. The semicolon (;) is the command terminator. Except for the last command in a message, all commands in Program mode must end with this terminator.

Deleting Fields

It is possible to delete any field from a format except for the last field. Use the following command string to delete field 3 from format 4.

`<STX><ESC>P;F4;D3;R;<ETX>`

The following table describes each command in this string:

Command String Descriptions

Command	Description
<ESC>P;	Enters Program mode
F4;	Accesses format 4
D3;	Deletes field 3
R;	Returns to Print mode

Positioning Fields

Using the IPL command language to position fields is the trickiest part of designing labels. Since you cannot tell exactly how the field looks until it prints, you may need to make several test prints before you get the field positioned correctly.

For all types of fields, determine the print position by defining the coordinates of the upper left corner of the unrotated field.

The field origin is the upper left corner of an unrotated field. To define the coordinates of the field origin, use the origin command (oX,Y) where o is the command that specifies origin, X is the distance from the left side of the label, and Y is the distance from the top of the label.

Note: On the 4400, 7421, and PC41 printers, be sure to use the label width command to set the printer for the correct label width; otherwise, the Y origins will be incorrect.

The X and Y coordinates of the field origin use dots as their form of measurement. There are 203 dots per inch or 8 dots per millimeter.

Note: The 3400e with 400 dots per inch, 3240, and 3440 printers have 406 dots per inch or 16 dots per mm. The 4X30 printers have 300 dots per inch or 12 dots per mm.

To position a field to print approximately 0.25 inch from the left side and 0.5 inch from the top of your label, the origin command is o51,102.

A = o51, 102   C = o51, 305
B = o51, 203   D = o355, 102

IPL007.eps
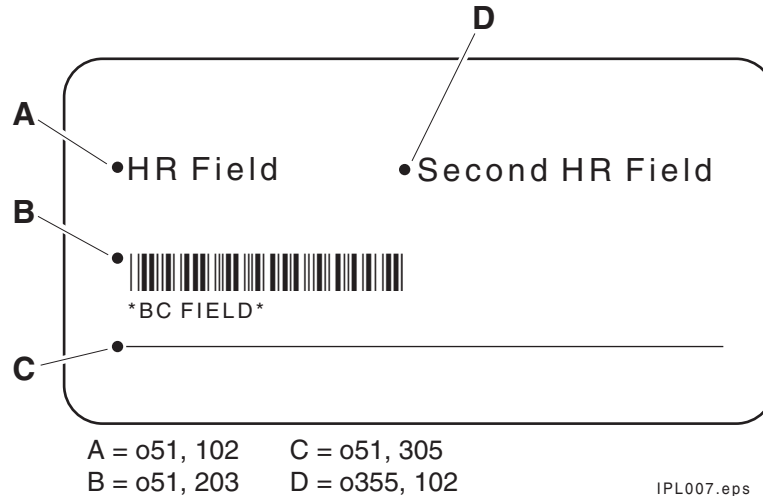
Field Positioning: *This illustration shows the relative positions of four fields with different origin points.*

Note: If you are operating your printer in Emulation mode, the dot sizes are doubled (101 dots per inch or 4 dots per mm), so the origin for 1 inch from the top of the label and 0.5 inch from the left side is o25,51.

Rotating Fields

You can rotate any type of printable field in increments of 90 degrees counterclockwise around the field origin. To position a rotated field, you should keep in mind that the field origin remains on the corner where it was before you rotated the field. If you rotate a field 90 degrees counterclockwise, the origin that was at the upper left corner is now at the lower left corner. Use the Field Direction command fn to define the field rotation. See Chapter 7, "IPL Command Reference," for more information.

• To rotate a field 90 degrees, you must position the lower left corner of the rotated field.

• To rotate a field 180 degrees, you must position the lower right corner of the rotated field.

• To rotate a field 270 degrees, you must position the upper right corner of the rotated field.
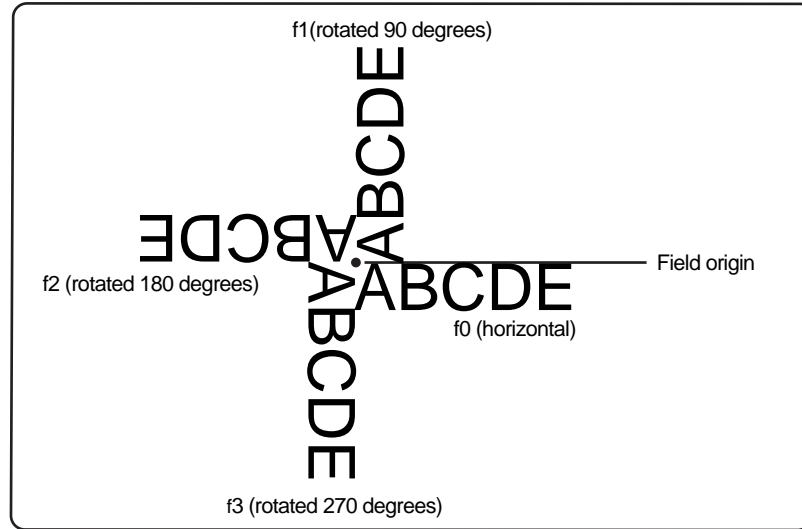
Field Rotation: *This illustration shows the effects of rotating a field by using the Field Direction command.*

Scaling Fields

You can determine the size of a field by the font or graphic you use and the field magnification factors you apply. The human-readable fonts and bar code symbologies have default sizes, and the user-defined character fields print as large as you design them (up to the maximum), but you can scale each of these fields even further by using magnification commands.

Magnifying Fonts and Character Fields

The internal fonts in the printer already have sizes associated with them. For example, the letters in font c0 are 7 dots wide by 9 dots high, with a 1-dot gap between characters. If you design a field that prints 10 letters in font c0, the field will be 79 dots wide by 9 dots high.

By applying magnification factors (h for height and w for width), you can increase a field's height or width. If you increase the height to 2 (h2) for the field described above, the field height doubles, and the final field prints 79 dots long by 18 dots high. If you change the height magnification to h3, the field height triples, and the field prints 79 dots by 27 dots.

The default human-readable field H0 prints the 7 x 9 font as follows (assuming you enter the word "example" as data):

EXAMPLE

IPL.009

When you apply a magnification factor of 3 to human-readable field H0, the font now prints the image below:

EXAMPLE

IPL.010

Increasing the width of a text field to 2 makes each letter in the field twice as wide. If you did this to the example above, with field height h2, the final field would print 158 dots wide by 18 dots high.

When you magnify a bitmap font, the edges of the characters become jagged. If you want to print large text characters (greater than 1 inch or 2.54 cm), use an outline font such as c25 (Swiss Mono 721 standard outline font).

Magnifying Bar Code Fields

You can also use height and width commands to modify bar code fields, but the commands do not behave the same as with human-readable fields.

For bar code fields, the height magnification is the actual dot height of the bar code. If you choose a height magnification of h20, the height of the bar code field will be 20 dots.

Printing narrow bar codes conserves space on each label as well as media; however, if you plan to scan bar codes from a distance, you may need to magnify the bar code widths.

The width magnification factor for bar code fields refers to the width of the narrowest element of the bar code. When you specify a narrow element width of w3, the width of the narrowest element in the symbology is 3 dots wide. The spaces and large element widths grow according to preset ratios for each symbology.

Note: You can only print a bar width of 1 if you are printing in drag mode (bars perpendicular to the print head). If you select a width of 1 in picket mode (bars parallel to the print head), the printer defaults to 2.

The default height for bar code fields is 50 dots, and the default width for narrow elements is 1 dot.

Note: If you are using the POSTNET symbology, follow the rules for magnifying fonts.

Designing Pages

A page is a collection of one or more formats that you combine to print at the same time. This feature is helpful when you need to print several different labels for an application at once. For example, you may need to attach one type of label to a product and a different type of label to its container. With the page printing capability, you can print both labels at the same time. Because you can print pages of several formats at once, you can also print labels on media rolls that have different sizes and shapes of labels already precut.

When you group label formats into a page, you assign the formats to positions designated by the letters a through z. You can print the formats used in pages independent of each other. The next example shows how to create a page that contains five different formats.

Label Format - Example

The format example on this page is a complex label designed to demonstrate the different types of data that you can print with your printer. This example contains human-readable fields, a bar code field, line fields, a box field, and a graphic field (the diamond).

IPL011.eps

Complex Label: *This illustration shows a label that includes human-readable, box, bar code, line, and graphic fields.*

Graphic for Example

Download the six bits per byte diamond graphic explained in **"Creating Six Bits Per Byte User-Defined Graphics" on page 179**.

Format for Example

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E5;F5;<ETX>
<STX>H0;o35,40;c25;d3,Cat.;k12;<ETX>
<STX>H1;o35,70;c25;d3,No.;k12;<ETX>
<STX>H2;o165,0;c25;d3,432-3221;k36;<ETX>
<STX>H3;o785,40;c25;d3,Std.;k12;<ETX>
<STX>H4;o785,70;c25;d3,Qty.;k12;<ETX>
<STX>H5;o915,0;c25;d3,100;k36;<ETX>
<STX>L6;o740,10;f3;l130;w8;<ETX>
<STX>L7;o25,140;l1130;w8;<ETX>
<STX>H8;o30,165;c25;f3;r1;d3,Size;k12;<ETX>
<STX>H9;o80,170;c25;d3,1 ";k30;<ETX>
<STX>H10;o150,165;f3;r1;c25;d3,3/4;h3;w7;<ETX>
<STX>L11;o300,140;f3;l130;w8;<ETX>
<STX>L12;o25,270;l275;w8;<ETX>
```

```
<STX>H13;o60,560;f1;c25;d0,20;h3;w2;<ETX>
<STX>L14;o140,270;f3;l310;w8;<ETX>
<STX>H15;o360,120;c22;d3,DUPLEX ANGLE CONNECTOR;h3;w1;<ETX>
<STX>H16;o170,320;c25;d3,- For Flexible Steel Conduit and .375" -
.625";k12;<ETX>
<STX>H17;o212,375;c25;d3,Diameter Armored and Nonmetallic Sheath
Cables;k12;<ETX>
<STX>H18;o170,450;c25;d3,- For Smooth or Interlocking Sheath Metal
Clad;k12;<ETX>
<STX>H19;o212,505;c25;d3,Cables .375" - .675" Dia. (UL only);k12;<ETX>
<STX>L20;o25,580;l1130;w8;<ETX>
<STX>U21;o40,610;c2;h9;w9;<ETX>
<STX>H22;o210,600;c25;d3,ACE CORP.;k24;<ETX>
<STX>H23;o210,670;c25;d3,ADDRESS 3010;k12;<ETX>
<STX>H24;o210,710;c25;d3,FICTION USA;k12;<ETX>
<STX>B25;o685,615;c0,0;d0,20;i1;h100;p@;<ETX>
<STX>I25;h2;w2;<ETX>
<STX>L26;o590,580;f3;l185;w8;<ETX>
<STX>W27;o015,000;w10;l1150;h775;<ETX>
<STX>R<ETX>
```

Data for Example

```
<STX><ESC>E5<CAN><ETX>
<STX>Lot 23455 262948<CR><FS>307 91747<FS><ESC>I2<ETX>
<STX><RS>5<ETB><ETX>
```

Use the <STX> and <ETX> characters to mark the beginning and end of the command strings. The other characters are explained in the following table. Most of the printer command lines explained below contain commands previously not discussed in this chapter. Refer to previous examples for clarification of the lines that are not explained, or see Chapter 7, "IPL Command Reference," for a further explanation of the command language.

Label Format Example Command Descriptions

Command	Description
`<ESC>C`	Selects Advanced mode.
`<ESC>P`	Selects Program mode.
`E5;F5;`	Erases anything previously stored as format five and accesses the location for format five.
`H0;`	Defines field 0 as a human-readable field.
`o35,40;`	Sets the origin of field 0 at coordinates (35,40).
`c25;`	Sets the font for field 0 to font 25.z
`d3,Cat.;`	Sets the data for field 0 to have the constant value: Cat.
`k12;`	Sets the point size to 12.
`L6;`	Defines field 6 as a line field.
`o740,10;`	Sets the origin for field 6 at (740,10).
`f3;`	Rotates field 6 by 270 degrees counterclockwise around the field origin.
`l130;`	Sets the length of the line in field 6 to 130 dots.
`w8;`	Sets the width of field 6 to 8 dots.
`H8;`	Defines field 8 as a human-readable field.

Label Format Example Command Descriptions (continued)

Command	Description
o30,165;	Sets the origin of field 8 at (30,165).
c25;	Defines the font for field 8 as font 25.
f3;	Rotates field 8 by 270 degrees counterclockwise around the origin.
r1;	Rotates the characters in field 8 by 90 degrees counterclockwise.
d3,Size;	Defines the constant data for field 8.
k12;	Sets the point size to 12.
H10;	Defines field 10 as a human-readable field.
o150,165;	Sets the origin for field 10 at (150,165).
f3;	Rotates field 10 by 270 degrees counterclockwise around the origin.
r1;	Rotates the characters in field 10 by 90 degrees counterclockwise.
c25;	Sets the font for field 10 to font 25.
d3,3/4;	Defines constant data for field 10.
k12;	Sets the point size to 12.
H13;	Defines field 13 as a human-readable field.
o60,560;	Sets the origin of field 13 at (60,560).
f1;	Rotates field 13 by 90 degrees around the origin.
c25;	Determines that field 13 prints in font 25.
d0,20;	Specifies that data for field 13 will be entered during Print mode and that the data will be a maximum of 20 characters long.
k10;	Sets the point size to 10.
U21;	Defines field 21 as a graphic field.
o40,610;	Sets the origin of field 21 at (40,610).
c2;	Determines that field 21 prints in font two.
h9;	Sets the height to nine times the original size.
w9;	Sets the width to 9 dots.
B25;	Defines field 25 as a bar code field.
o685,615;	Sets the origin of field 25 at (685,615).
c0,0;	Sets the bar code font to Code 39 with no check digit.
d0,20;	Determines that the data for field 25 is entered during Print mode and its maximum length is 20 characters.
i1;	Determines that an interpretation of the bar code prints with start and stop characters included.
h100;	Determines that the bar code height is 100 dots.
p@;	Clears all prefixes from the bar code field.
I25	Edits the interpretive field for bar code field 25.
h2	Sets the height of the interpretive field to twice its original height.
w2	Sets the width of the interpretive field to 2 dots.
W27;	Defines field 27 as a box field.
o015,000;	Sets the origin of field 27 at 15,0.
w10;	Defines the line width of the box as 10 dots.
l1150;	Defines the length of the box as 1150.
h775;	Sets the height of the box to 775.
R	Sets the printer in Print mode.

Label Format Example Command Descriptions (continued)

Command	Description
<ESC>E5	Accesses format 5 from the printer memory.
<CAN>	Clears all host-entered data for the current format and sets the field pointer to the lowest numbered data-entry field.
Lot 23455 262948<CR>	This is the data intended for the first data-entry field. <CR> instructs the printer to go to the next data-entry field.
<FS>	Specifies that the following data is to be incremented.
307 91747	This is the data intended for the next data-entry field (specified as data to be incremented).
<FS>	Specifies that the preceding data is to be incremented.
<ESC>I2	The data surrounded by <FS> commands is to be incremented by a value of 2 after each label is printed.
<RS>5	Sets the number of labels to print when the print command is executed.
<ETB>	Tells the printer to print the label.

Label Format - RFID Example

The format on this page is a bar code label that contains an RFID tag.

Label With RFID Tag

Format for RFID Example

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E4;F4;<ETX>
<STX>H0;o102,51;f0;c25;h20;w20;d0,30;<ETX>
<STX>L1;o102,102;f0;l575;w5;<ETX>
<STX>B2;o203,153;c0,0;h100;w2;i1;d0,10;<ETX>
<STX>I2;h1;w1;c20;<ETX>
<STX>Q3;a2,2,0,23;d3,MY FIRST RFID TAG WRITE;<ETX>
<STX>R;<ETX>
```

Data for RFID Example

```
<STX><ESC>E4<ETX>
<STX><CAN><ETX>
<STX>MY FIRST RFID TAG WRITE<CR><ETX>
<STX>SAMPLE<ETX>
<STX><ESC>J2,2,0,23<ETX>
<STX><ETB><ETX>
```

Use the <STX> and <ETX> characters to mark the beginning and end of the command strings. The other characters are explained in the following table. Most of the printer command lines explained below contain commands previously not discussed in this chapter. Refer to previous examples for clarification of the lines that are not explained, or see Chapter 7, "IPL Command Reference," for a further explanation of the command language.

Label Format – RFID Example Command Descriptions

Command	Description
<ESC>C	Selects Advanced mode.
<ESC>P	Selects Program mode.
E4;F4;	Erases anything previously stored as format four and accesses the location for format four.
H0;	Defines field 0 as a human-readable field.
o102,51;	Sets the origin of field 0 at coordinates (102,51).
f0;	Does not rotate field 0.
c25;	Sets the font to font 25.
h20;	Sets the height to 20 times original size.
w20;	Sets the width to 20 times original size.
d0,30;	Defines the variable data to be up to 30 characters.
L1;	Defines field 1 as a line field.
o102,102;	Sets the origin of field 1 at coordinates (102,102).
f0;	Rotates field 1 by 90 degrees counterclockwise around the origin.
l575;	Defines the length of the line as 575.
w5;	Sets the width of the line to 5 dots.
B2;	Defines field 2 as a bar code field.
o203,153;	Sets the origin of field 2 at coordinates (203,153).
c0,0;	Sets the bar code font to Code 39 with no check digit.
h100;	Sets the height to 100 dots.
w2;	Sets the width to 2 dots.
i1;	Determines that an interpretation of the bar code prints with start and stop characters included.
d0,10;	Defines the variable data to be up to 10 characters.
I2;	Defines field 2 to include an interpretive field with the bar code field.
h1;	Sets the height to original size.
w1;	Sets the width to original size.
c20;	Sets the font to font 20.
Q3;	Defines field 3 to be an RFID field.
a2,2,0,23	Sets the format to ASCII, writes to the Data segment, starts on byte 0 and writes up to 23 bytes.
d3,MY FIRST RFID TAG WRITE	Defines constant data for field 3 to be "MY FIRST RFID TAG WRITE."
R	Sets the printer in Print mode
<ESC>E4	Accesses format 4 from the printer memory.
<CAN>	Clears all host-entered data for the current format and sets the field pointer to the lowest numbered data-entry field.

Label Format – RFID Example Command Descriptions (continued)

Command	Description
MY FIRST RFID TAG WRITE<CR>	This is the data intended for the first data-entry field (human-readable field 0). <CR> instructs the printer to go to the next data-entry field.
SAMPLE	This is the data intended for the second data-entry field (bar code field 2).
<ESC>J2,2,0,23	Reads the data from the RFID tag. The data is in ASCII format on the Data segment, starting on byte 0 and having a length of 23 bytes.
<ETB>	Tells the printer to print the label.

4 Troubleshooting

This chapter describes the problems that may occur as a result of using IPL commands incorrectly. If you do not find your problem listed here, see the troubleshooting information in your printer user's manual.

Troubleshooting Checklist

Even though Intermec designed your printer to operate under harsh conditions, you may still encounter error messages. You can easily fix most of the errors you encounter and consequently not delay operation of the printer for very long.

If you receive an error message or encounter a functional problem with the printer, you should perform these steps:

To troubleshoot your printer

1 Send a <BEL> command to the printer and see if the printer sends an error message to the host in response.

2 If there is an error message, find it in the section called **"Interpreting Error Codes and Solving Problems" on page 44**. Follow the instructions in the table to correct the problem.

   Or:

   If the printer does not send an error message to the host, try to locate the symptom in the "Printer Operation Problems" and "Print Quality Problems" sections of the printer user's manual. Follow the instructions in the manual to correct the problem.

3 Clean the printer components and check all connections. See your user's manual for instructions.

4 If the problem persists, contact Intermec Product Support (1-800-755-5505) in North America. If you are an international customer, contact your local Intermec representative.

How the Printer Handles Error Conditions

This section describes how the printer handles error conditions that may occur while you use IPL commands.

Syntax Errors

The printer responds to syntax errors in the messages it receives from the host by attempting to execute the commands. It does not ignore a command with a syntax error; instead, the printer produces output, even if it is wrong. This output helps determine what went wrong and what should be done to correct the problem.

Parameter Errors

Certain commands require optional parameters. If you do not supply these parameters, the printer substitutes default values. If a parameter is above its maximum range limit, the printer uses the maximum value. If it falls below the minimum range, the printer uses the minimum value. See Chapter 7, "IPL Command Reference," for the range and default value for each command.

Image Overrun Errors

Image overrun occurs when a label is too complex to image for a given print speed. An overrun will cause the printer to abort the label being printed. This error is most common on labels over 12.7 cm (5 in) long.

The printer automatically attempts to correct for this error condition by resetting to the lowest print speed and to the highest number of image bands, then repeats printing the label. The printer remains at this setting until you reset it. If an image overrun still occurs, printing for that batch of labels stops and the printer executes any following commands.

Note: Installing optional memory expansion may decrease image overrun errors.

Invalid Numeric Character Errors

If you include non-numeric characters within a numeric data string in a command, the printer ignores them and continues to process the rest of the valid numeric characters. If a non-numeric character begins the numeric data string, however, the printer uses a default value for the affected command.

Here are two examples of valid numeric character strings and one example of an invalid string:

12a   valid
1a2   valid
a12   invalid

Insufficient Storage Memory Errors

Before storing new formats, graphics, or user-defined fonts in the static RAM or flash, the printer ensures that it has sufficient memory to store them. If there is insufficient memory, the printer ignores the last editing session. The printer preserves the existing data in the storage memory.

Interpreting Error Codes and Solving Problems

Most of the problems you may encounter cause the printer to send an error code to the host. To correct the error, find the error code in the following table and complete the instructions in the solution column.

Error Codes and Possible Solutions

Error Code	Description of Problem	Solution
00	No error.	No action is necessary.
02	Invalid number of bar code characters (UPC/EAN).	Verify the number of bar code characters used. For more information, see the "Bar Code, Select Type" command on page 126.
06	Invalid supplemental character count (UPC/EAN).	Make sure that the supplemental data consists of either two or five characters.
07	More than one supplemental delimiter (UPC/EAN).	Make sure that you have only one supplemental delimiter (".") between the bar code data and the supplemental data.
11	Invalid bar code data.	Verify data in the label format.
12	Data count exceeded.	Data count should not exceed what is specified for the field.
13	Entering data in non-data entry field.	Check the field for accuracy.
21	Quantity or batch count out of range.	Quantity of labels or number of batches should be between 1 and 9999.
22	Field increment/decrement out of range.	Quantity should be between 1 and 9999.
23	Intercharacter/message delay out of range.	Delay should be between 0 and 9999.
24	Missing preamble/postamble data.	Change the configuration command to no preamble/postamble or include preamble/postamble data.
25	Invalid format transmission syntax.	Check the Format, Transmit command syntax. The correct syntax is <ESC>xn with n ranging from 0 to 19 on most printers. On some printers, such as the 3440, n ranges from 0 to 99. For more information, see the "Format, Transmit" command on page 95.
26	Invalid page transmission syntax.	Check the Page, Transmit command syntax. The correct syntax is <ESC>yn with n ranging from 0 to 9.
27	Invalid font transmission syntax.	Check the Font, Transmit command syntax. The correct syntax is <ESC>vn. Values for n vary depending on your printer model. For more information, see the "Font, Transmit" command on page 93.
28	Invalid UDC transmission syntax.	Check the User-Defined Characters, Transmit command syntax on page 117. The correct syntax is <ESC>un with n ranging from 0 to 99.
32	Non-immediate command or data received after buffer full.	Allow the printer to empty the buffer contents before sending commands or data.
33	Invalid field delimiters.	Check for all pairs of field delimiters and make sure both are numeric, or both are alphanumeric.
34	Invalid escape command.	Correct the escape command syntax.
35	Invalid data shift command.	Correct the shift command syntax.
36	Invalid or undefined format number.	Verify that the format numbers are between 0 and 19.
37	Insufficient room in RAM to print format.	Reduce the number of data fields in the format or add more DRAM.

Error Codes and Possible Solutions (continued)

Error Code	Description of Problem	Solution
38	Invalid or undefined field number.	Verify the field number in the label format.
41	Syntax error for program commands.	Check the program command for proper syntax.
42	Insufficient room in RAM to store format.	Empty the buffer contents. If the format still does not fit, delete some fields or other data from the format. You may have to remove or reduce the UDCs, formats, or fonts if necessary. **Note:** Entering <ESC>m tells the host how much memory is installed and how much is available.
43	Too many fields in label format.	You can use up to 200 fields in a format and each field can use up to 250 characters. Reduce field size or delete some fields.
46	Undefined statement.	Check the statement syntax.
52	Invalid UDC/UDF bitmap cell height/width or intercharacter space.	Verify that the UDC/UDF bitmap cell height/width or intercharacter space is within the specified values for *n*. For more information, see: • the **"Bitmap Cell Height for Graphic or UDF, Define" command on page 127.** • the **"User-Defined Character Field, Create or Edit" command on page 155.** • the **"Intercharacter Space for UDF, Define" command on page 145.**
53	Insufficient room in RAM to store UDC or UDF.	Remove or reduce formats, fonts, or UDCs.
54	Invalid UDC command syntax.	Correct the UDC command syntax.
57	Invalid parameter.	Correct the syntax.
60	No RFID support.	The printer is unable to access the RFID module. Contact your local Intermec representative.
61	No RFID tag found.	The RFID module has determined that the printer does not have RFID media loaded. Load RFID media. Verify that the TAGADJUST value aligns the tag over the antenna. For help, see the **"RFID Parameters, Set" command on page 121.**
62	Access outside of the RFID tag memory.	The defined RFID tag field specifies a position outside of the tag's memory or the tag read/write operation was not successful (bad tag). Verify that the field specifies a position within the tag's memory. For help, see the **"RFID Tag Field Setup" command on page 150.**
63	RFID number conversion error.	You have entered an invalid hex or numerical (NUM) format in the data string. Enter a valid value.
64	RFID inactive (off).	You have a printer with an RFID module and you have defined RFID commands, but you have turned RFID mode off. Turn RFID mode on. For help, see the **"RFID Parameters, Set" command on page 121.**
65	RFID tag type does not support the selected option.	An application has sent a command with an argument that is not supported by the printer's tag type. Verify that the application commands match the printer's tag type.

5 Advanced Printer Programming

This chapter discusses topics for advanced IPL programmers, such as using printer memory efficiently, increasing throughput, and using Emulation mode.

Using the Printer Memory Efficiently

To receive the best performance from your printer, you must understand how to use the printer RAM efficiently. In general, if you use a significant amount of available memory for storage, you reduce the amount of memory used for imaging, which decreases printer performance.

How Is the Printer Storage Memory Used?

Although the printer contains enough static RAM or flash to store several different label formats, downloaded fonts, graphics, and data, you should be careful of how you use your printer memory.

Printers use either static RAM or flash memory for storing tables, pages, formats, fonts, and user-defined characters (UDCs). Any storage memory that you are not using for storage is available for imaging. Some printers allow you to use PrintSet to adjust the amount of storage memory available for storage purposes. If you require additional storage memory, you can purchase a memory expansion option.

Making the Most of Your Storage Memory

There are limits to the number of formats, fonts, graphics, or pages that you can store in the printer. You can define up to 16 fonts, but there may not be enough room depending on the amount of memory being used for other purposes. The more formats, graphics, and fonts you store, the less memory is available.

When you encounter a memory usage problem, use PrintSet to see how much memory is available. You must upload the memory information from the printer first. Refer to the PrintSet online help for more information.

You can increase your available memory by following one of these suggestions:

- In some printers, you can adjust the amount of RAM allocated for storage purposes. For help, see the PrintSet software or the **"Amount of Storage, Define" on page 104**.

- Increase the amount of available memory by using the Memory Reset portion of the Test and Service menu. You can use the Memory Reset command to erase all or part of the information that you have downloaded to the printer. For help, see your user's manual.

- Delete any unneeded user-defined fonts, graphics, pages, or formats. For help, see the PrintSet software or the specific commands in Chapter 7, "IPL Command Reference."

- Purchase additional memory. Please contact your Intermec representative for information on purchasing additional memory for your printer model.

Increasing Throughput

Note: This section does not apply to the EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, or PX6i.

To print labels as quickly as possible, you must adjust the print speed in conjunction with the number of image bands (one image band equals 2.54 cm (1 in) of label). The print speed and image band settings determine the rate at which the printer processes the images of your labels, which affects the throughput of the entire printing process.

When the printer receives the command to select a format, <ESC>E, it immediately begins imaging the label; as a result, the imaging process is better able to keep up with the print speed and throughput improves. If the number of image bands is too low, however, the imaging process is unable to keep up with the print speed, and the printer stops printing and restarts at the lowest print speed with the maximum number of image bands. If the image band command is set too high, the printer spends more time than necessary imaging, and label production is slowed.

What Is an Image Band?

An image band is a section of memory where a picture of a label format is drawn. This drawing process is known as imaging. Once the picture is imaged, the printer loads the picture from the image bands to the printhead for printing. Each image band is equal to 2.54 cm (1 in) of length of the label format. The number of image bands you use may be less than the length of the label being printed. The number of image bands (in inches) does not have to equal the length of the label since the printer recycles the image bands. Once the contents of an image band have been printed, it may be reused to image the next section of the label.

Keep in mind that the more complex the label, the longer it will take to image each section, thus requiring a slower print speed. To use a higher print speed, use more image bands to allow more of the imaging process to complete before printing begins.

It is possible to reduce the amount of time necessary to download and image a graphic by using Direct Graphics mode. In Direct Graphics mode, the printer images a graphic directly into the image bands without storing it in the printer. For help, see Appendix E, "Using Direct Graphics Mode."

How the Image Bands Command Works

The Number of Image Bands, Select command controls the amount of memory allotted to the imaging process. When you increase the image band adjustment to a higher number, you are adding more buffers to the imaging memory. As a result, more of the label format is imaged before printing begins.

The minimum number of required image bands is dependent upon the print speed and the complexity of the label. Labels that contain numerous fields with different rotations, graphics, or combinations of any number of these formatting options may require a higher number of image bands.

To set the number of image bands, use PrintSet or the Number of Image Bands, Set (<SI>I) IPL command. For help, see the PrintSet online help or the "Number of Image Bands, Set" on page 115.

Optimizing Print Speed and Image Band Setting

The minimum number of image bands available is two. The maximum number of image bands varies between printer models. Use PrintSet to check for the maximum number of image bands available, or see the **"Number of Image Bands, Set" on page 115**.

To optimize the number of image bands for your print speed

1 Set the image band setting at the lowest number (2).

2 Print a label at the desired speed.

If the label prints, the image band setting is optimal. You do not need to perform any more adjustments.

If the number of image bands is too low, the printer aborts the label before printing is completed and attempts to reprint the label at the slowest speed (2 ips) with the highest number of image bands. Continue with Step 3.

3 Return to the original print speed and increase the original number of image bands one at a time.

Continue to increase the number of image bands until the printer prints a label correctly.

If the printer still aborts and reprints at the highest image band setting, you may be trying to optimize at a print speed that is too high for your label format. Try optimizing the number of image bands at a lower print speed, or add expansion RAM.

To print very complex labels at high speeds, you must allocate enough image bands to completely image the label before printing. By allocating one band for each 2.54 cm (1 in) of label length, you can print at any speed; however, you may notice considerable delays before each label is printed.

Image Band Example

This example shows how the printer prints a label format using image bands. The label is 12.7 cm (5 in) long and is divided into five image bands. The printer is configured for three image bands, which means that three bands will be imaged before printing begins.

IPL.012
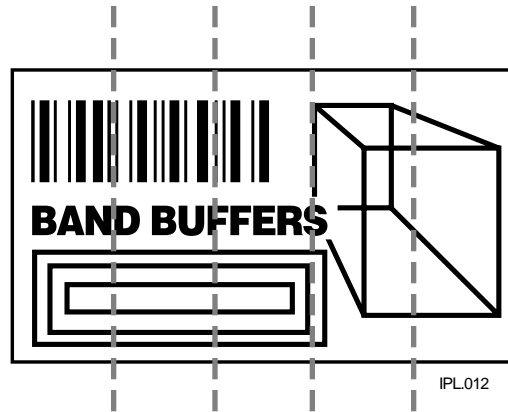
The dashed lines represent the divisions between the five image bands, and the arrow (↑) represents the portion of the image band that is being printed at that time.

IPL.013
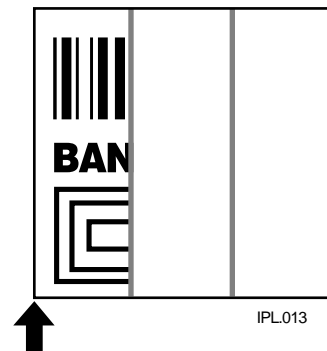
First Image Band: *This diagram shows the first 2.54 cm (1 in) of the label imaged into the first image band. The other two image bands are still empty. Printing is not started.*

IPL.014
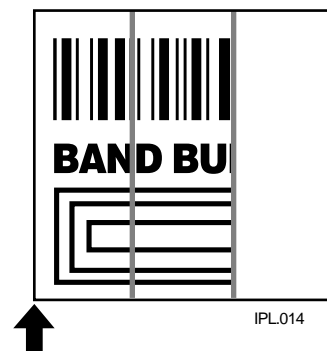
Second Image Band: *This diagram shows the second 2.54 cm (1 in) section of the label imaged into the second image band. Printing still is not started.*

IPL.015
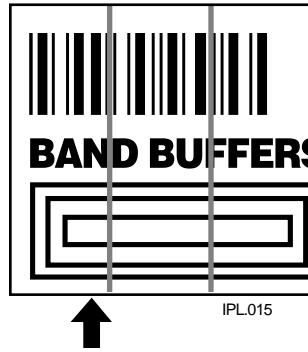
Third Image Band: *This diagram shows the third 2.54 cm (1 in) section of the label imaged into the third image band. Printing begins from the first image band, as indicated by the arrow. At this point, all three available image bands have been filled. The first band will be reused after it has been completely printed.*

IPL.016
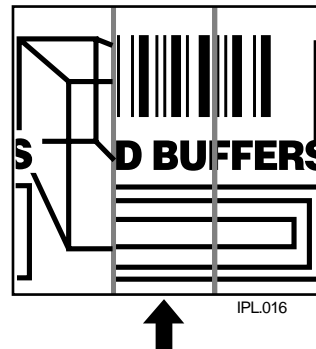
Fourth Image Band: *When the first image band is emptied (printed), the fourth band is imaged into it. Printing continues from the second image band. As before, this band must be emptied before the final band can be imaged into it.*

IPL.017
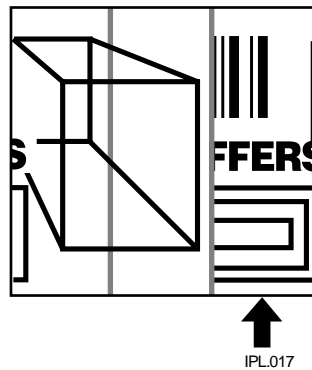
Fifth Image Band: *The final section of the label is imaged into the second image band. Printing continues from the third band. At this point, the label has been completely imaged, but not printed.*

Imaging of a second label could begin in the third image band while the first label is still printing. The second label could begin printing immediately after the first with no delay, which suggests that the only print delay encountered would be during the time when the first bands of the first label were imaged.

As labels become more complex, the influence that print speed and the number of buffers has on throughput is limited by imaging speed. You will encounter new considerations, such as delay between printing and perceived printer performance. Unfortunately, no formula exists to calculate an ideal configuration; instead, you will have to find it through trial and error.

Reimaging Modified Fields

You can now choose to reimage only the fields in a label format that you modify instead of reimaging the entire label format. If you are updating data in only a few simple fields, it might be faster to use the modified field reimaging command; however, you need to take into account the type of fields you will be reimaging. If you choose to reimage a field that takes longer to erase and reimage than it takes an entire label format to erase and reimage, you will not be increasing throughput. Erasing a field requires reimaging it with zeros and erasing a label requires only clearing the RAM. When you use it correctly, this command parameter can greatly increase the throughput of your printer.

To use the modified field reimaging command

1 Make sure that you select enough image bands to allow the printer to retain the entire label image.

One image band is equal to 2.54 cm (1 in) of label length.

2 Select the fields to reimage by using the following command:

`<ESC>E`*n*`,`*m*

See **"Format, Select" on page 94** for more information about reimaging modified fields.

Optimizing Image Bands for Batch Printing

If you frequently print batches of identical labels (using the <US> command) or print a quantity of identical labels, you may want to optimize the number of image bands for batch printing. Optimizing the number of image bands for batch printing is especially helpful if you experience delays between the printing of each label.

To optimize the number of image bands for batch printing, you must select enough image memory to allow the printer to retain the entire label image. To optimize batch printing, select the number of image bands (1 band = 2.54 cm (1 in)) to equal the label size. For example, if the printed image stops at a distance of 10.16 cm (4 in) from the beginning of the label, you must select four image bands to prevent reimaging if the label is 12.7 cm (5 in) long.

The 3400C, 3400e, 3440, 4420, 4440, 7421, and PC41 printers automatically select the optimal number of image bands. If you increase the number of image bands on these printers, you may decrease performance.

Using Emulation Mode

Note: The 4630 and 4830 printers do not support Emulation mode.

Emulation mode lets you print bar code labels that were designed on an 86XX printer in multiples of 10 or 15 mil. ("Emulation mode" is also called "86XX Emulation mode" in some printer manuals.)

Here is a summary of the features in Emulation mode:

- Pages are not available.

- Character size is specified by height and width magnification only.

- International characters are preceded by <SUB> or selectable by language.

- The bitmaps for user-defined characters (UDC) and user-defined fonts (UDF) are one bit per byte (instead of six bits per byte).

- Print resolution is in 10 mil dots.

- RFID commands are not available.

Two IPL commands place the printer in Emulation mode:

- Emulation or Advanced Mode on Power-Up.

- Emulation Mode, Enter.

The following table lists all the IPL commands that work when the printer is in Emulation mode.

IPL Commands and Emulation Mode

IPL Command Name	Syntax	Page
12 Volt Supply Value, Transmit	U	157
Abort Print Job	<EM>	82
Advanced Mode, Select	<ESC>C	86
Alphanumeric Field Separator	<GS>	86

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page
Auto-Transmit 1, Enable	<ESC>j	105
Auto-Transmit 2, Enable	<ESC>d	105
Auto-Transmit 3, Enable	<ESC>e	105
Auto-Transmit 1, 2, and 3, Disable	<ESC>k	106
Bar Code, Select Type	c	126
Bar Code Field, Create or Edit	B	127
Batch Count, Set	<US>	87
Bitmap Cell Height for Graphic or UDF, Define	y	127
Bitmap Cell Width for Graphic or UDF, Define	x	128
Bitmap User-Defined Font, Clear or Define	T	129
Border Around Human-Readable Text, Define	b	129
Box Field, Create or Edit	W	130
Character Bitmap Origin Offset, Define	X	131
Character Rotation or Bar Code Ratio, Define	r	131
Clear All Data	<CAN>	87
Clear Data From Current Field	<DEL>	87
Code 39 Prefix Character, Define	p	133
Command Tables, Load	C	133
Command Terminator	;	158
Command Terminator 1	<NUL>	88
Command Terminator 2	<LF>	88
Communication Port Configuration, Set	<SI>P	106
Configuration Parameters, Transmit	<ESC>p	88
Control Panel Access Permission, Set	<SI>A	107
Current Edit Session, Save	N	134
Cut	<SO>	88
Cutter, Enable or Disable	<SI>c	107
Dark Adjust	K	158
Dark Adjust, Set	<SI>d	108
Data Shift - International Characters	<SUB>	88
Data Source for Format in a Page, Define	e	134
Direct Graphics Mode, Select	<ESC>g	90
Emulation Mode, Enter	<ESC>c	90
Emulation or Advanced Mode on Power-Up	<SI>C	108
End-of-Print Skip Distance, Set	<SI>D	109
Error Code, Request	<BEL>	82
Factory Defaults, Reset	D	158
Field, Delete	D	134
Field, Select	<ESC>F	91
Field Data, Define Source	d	134
Field Decrement, Set	<ESC>D	92
Field Direction, Define	f	136

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page
Field Increment, Set	<ESC>I	92
Field Origin, Define	o	136
First Data Entry Field, Select	<ACK>	92
Font, Transmit	<ESC>v	93
Font Character Width, Define	Z	137
Font Type, Select	c	137
Form Feed	<FF>	94
Format, Create or Edit	A or F	139
Format, Erase	E	140
Format, Select	<ESC>E	94
Format, Transmit	<ESC>x	95
Format Direction in a Page, Define	q	140
Format Offset Within a Page, Define	O	141
Format Position From Page, Delete	m	141
Format Position in a Page, Assign	M	141
Formats, Print	f	158
Graphic, Select	c	142
Graphic or UDC, Define	u	142
Hardware Configuration Label, Print	h	158
Height Magnification of Bar, Box, or UDC, Define	h	143
Human-Readable Field, Create or Edit	H	144
IBM Language Translation, Enable or Disable	<SI>I	110
Increment and Decrement, Disable	<ESC>N	96
Intercharacter Delay, Set	<SYN>	111
Intercharacter Space for UDF, Define	z	145
Interpretive Field, Edit	I	145
Interpretive Field, Enable or Disable	I	145
Label and Gap Length, Transmit	<ESC> L	82
Label Rest Point, Adjust	<SI>f	111
Label Retract, Enable or Disable	<SI>R	111
Label Retract Distance, Set	<SI>r	112
Label Stock Type, Select	<SI>T	112
Label Taken Sensor Value, Transmit	T	159
Length of Line or Box Field, Define	l	146
Line Field, Create or Edit	L	146
Maximum Label Length, Set	<SI>L	113
Media Fault Recovery Mode, Set	<SI>e	113
Media Sensitivity, Select	<SI>g	114
Memory Usage, Transmit	<ESC>m	96
Message Delay, Set	<ESC><SYN>	115
Next Data Entry Field, Select	<CR>	97
Number of Image Bands, Set	<SI>I	115

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page
Numeric Field Separator	\<FS\>	97
Options Selected, Transmit	\<ESC\>O	98
Outline Font, Clear or Create	J	146
Outline Font, Download	j	147
Page, Create or Edit	S	148
Page, Delete	s	149
Page, Select	\<ESC\>G	99
Page, Transmit	\<ESC\>y	99
Pages, Print	p	159
Pin 11/20 Protocol, Set	\<SI\>p	116
Pitch Label, Print	C	159
Pitch Size, Set	g	149
Point Size, Set	k	149
Postamble, Set	\<EOT\>	117
Preamble, Set	\<SOH\>	117
Print	\<ETB\>	99
Print Quality Label, Print	Q	159
Print Speed, Set	\<SI\>S	117
Printer Language, Select	\<SI\>l	118
Printhead Loading Mode, Select	\<SI\>h	120
Printhead Parameters, Transmit	\<ESC\>H	100
Printhead Temperature Sensor Value, Transmit	P	159
Program Mode, Enter	\<ESC\>P	100
Program Mode, Exit	R	150
Program Number, Transmit	\<ESC\>M	100
Quantity Count, Set	\<RS\>	100
Reflective Sensor Value, Transmit	M	160
Remaining Quantity and Batch Count, Transmit	\<ESC\>Q	82
Reset	\<DLE\>	83
Self-Strip, Enable or Disable	\<SI\>t	123
Slash Zero, Enable or Disable	\<SI\>z	124
Software Configuration Label, Print	s	160
Start and Stop Codes (Code 39), Print	\<ESC\>\<SP\>	102
Status Dump	\<VT\>	83
Status Enquiry	\<ENQ\>	84
Takeup Motor Torque, Increase	\<SI\>b	124
Test and Service Mode, Enter	\<ESC\>T	102
Test and Service Mode, Exit	R	160
Top of Form, Set	\<SI\>F	125
Transmissive Sensor Value, Transmit	G	160
User-Defined Character (UDC) and Graphics, Print	g	160
User-Defined Character, Clear or Create	G	155

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page
User-Defined Character Field, Create or Edit	U	155
User-Defined Characters, Transmit	<ESC>u	102
User-Defined Font Character, Create	t	156
User-Defined Fonts, Print	t	160
User-Defined Tables, Transmit	<ESC>Z	103
Warm Boot	<BS>	103
Width of Line, Box, Bar, or Character, Define	w	156

6 Finding IPL Commands in This Manual

This chapter contains tables that show the page numbers in Chapter 7 where each IPL command is described. The tables are organized in various ways to help you find the command you are looking for.

Table	Page	How the Table is Organized
Commands Listed by Name	**60**	Alphabetized by the command name
Commands Listed by Syntax	**64**	Alphabetized by the command syntax
Commands Listed by Task	**68**	Divided into groups, further divided into the tasks you will perform, and finally alphabetized by the command name.

Commands Listed by Name

This table lists the IPL commands, syntax, and page numbers in alphabetical order by command name.

Commands Listed by Name

IPL Command	Syntax	Page
12 Volt Supply Value, Transmit	U	157
Abort Print Job	\<EM>	82
Advanced Mode, Select	\<ESC>C	86
Alphanumeric Field Separator	\<GS>	86
Ambient Temperature, Transmit	A	158
Amount of Storage, Define	\<SI>N	104
Audible Alarm, Enable or Disable	\<SI>a	105
Auto-Transmit 1, Enable	\<ESC>j	105
Auto-Transmit 2, Enable	\<ESC>d	105
Auto-Transmit 3, Enable	\<ESC>e	105
Auto-Transmit 1, 2, and 3, Disable	\<ESC>k	106
Bar Code, Select Type	c	126
Bar Code Field, Create or Edit	B	127
Batch Count, Set	\<US>	87
Bitmap Cell Height for Graphic or UDF, Define	y	127
Bitmap Cell Width for Graphic or UDF, Define	x	128
Bitmap User-Defined Font, Clear or Define	T	129
Border Around Human-Readable Text, Define	b	129
Box Field, Create or Edit	W	130
Character Bitmap Origin Offset, Define	X	131
Character Rotation or Bar Code Ratio, Define	r	131
Clear All Data	\<CAN>	87
Clear Data From Current Field	\<DEL>	87
Code 39 Prefix Character, Define	p	133
Command Tables, Load	C	133
Command Terminator	;	158
Command Terminator 1	\<NUL>	88
Command Terminator 2	\<LF>	88
Communication Port Configuration, Set	\<SI>P	106
Configuration Parameters, Transmit	\<ESC>p	88
Control Panel Access Permission, Set	\<SI>A	107
Current Edit Session, Save	N	134
Cut	\<SO>	88
Cutter, Enable or Disable	\<SI>c	107
Dark Adjust	K	158
Dark Adjust, Set	\<SI>d	108
Data Shift - International Characters	\<SUB>	88
Data Source for Format in a Page, Define	e	134

Commands Listed by Name (continued)

IPL Command	Syntax	Page
Direct Graphics Mode, Select	<ESC>g	90
Direct Graphics Emulation Mode, Enable or Disable	<SI>o	108
Emulation Mode, Enter	<ESC>c	90
Emulation or Advanced Mode on Power-Up	<SI>C	108
End-of-Print Skip Distance, Set	<SI>D	109
Error Code, Request	<BEL>	82
Factory Defaults, Reset	D	158
Field, Delete	D	134
Field, Select	<ESC>F	91
Field Data, Define Source	d	134
Field Decrement, Set	<ESC>D	92
Field Direction, Define	f	136
Field Increment, Set	<ESC>I	92
Field Origin, Define	o	136
First Data Entry Field, Select	<ACK>	92
Font, Transmit	<ESC>v	93
Font Character Width, Define	Z	137
Font Type, Select	c	137
Form Feed	<FF>	94
Format, Create or Edit	A or F	139
Format, Erase	E	140
Format, Select	<ESC>E	94
Format, Transmit	<ESC>x	95
Format Direction in a Page, Define	q	140
Format Offset Within a Page, Define	O	141
Format Position From Page, Delete	m	141
Format Position in a Page, Assign	M	141
Formats, Print	f	158
Graphic, Select	c	142
Graphic or UDC, Define	u	142
Hardware Configuration Label, Print	h	158
Height Magnification of Bar, Box, or UDC, Define	h	143
Human-Readable Field, Create or Edit	H	144
IBM Language Translation, Enable or Disable	<SI>i	110
Increment and Decrement, Disable	<ESC>N	96
Intercharacter Delay, Set	<SYN>	111
Intercharacter Space for UDF, Define	z	145
Interlabel Ribbon Save, Enable or Disable	<SI>s	111
Interpretive Field, Edit	I	145
Interpretive Field, Enable or Disable	i	145
Label and Gap Length, Transmit	<ESC> L	82
Label Path Open Sensor Value, Transmit	L	158

Commands Listed by Name (continued)

IPL Command	Syntax	Page
Label Rest Point, Adjust	<SI>f	111
Label Retract, Enable or Disable	<SI>R	111
Label Retract Distance, Set	<SI>r	112
Label Stock Type, Select	<SI>T	112
Label Taken Sensor Value, Transmit	T	159
Label Width, Set	<SI>W	112
Length of Line or Box Field, Define	l	146
Line Field, Create or Edit	L	146
Maximum Label Length, Set	<SI>L	113
Media Fault Recovery Mode, Set	<SI>e	113
Media Sensitivity, Select	<SI>g	114
Memory Usage, Transmit	<ESC>m	96
Message Delay, Set	<ESC><SYN>	115
Next Data Entry Field, Select	<CR>	97
Number of Image Bands, Set	<SI>I	115
Numeric Field Separator	<FS>	97
Online or Offline on Power-Up	<SI>O	116
Options Selected, Transmit	<ESC>O	98
Outline Font, Clear or Create	J	146
Outline Font, Download	j	147
Page, Create or Edit	S	148
Page, Delete	s	149
Page, Select	<ESC>G	99
Page, Transmit	<ESC>y	99
Pages, Print	p	159
Pin 11/20 Protocol, Set	<SI>p	116
Pitch Label, Print	C	159
Pitch Size, Set	g	149
Point Size, Set	k	149
Postamble, Set	<EOT>	117
Preamble, Set	<SOH>	117
Print	<ETB>	99
Print Line Dot Count Limit, Set	v	150
Print Quality Label, Print	Q	159
Print Speed, Set	<SI>S	117
Printer Language, Select	<SI>l	118
Printhead Loading Mode, Select	<SI>h	120
Printhead Parameters, Transmit	<ESC>H	100
Printhead Pressure, Set	<SI>H	121
Printhead Resistance Test, Begin	B	159
Printhead Resistance Values, Transmit	S	159
Printhead Temperature Sensor Value, Transmit	P	159

Commands Listed by Name (continued)

IPL Command	Syntax	Page
Printhead Test Parameters, Set	<SI>U	121
Printhead Volt Supply Value, Transmit	V	160
Program Mode, Enter	<ESC>P	100
Program Mode, Exit	R	150
Program Number, Transmit	<ESC>M	100
Quantity Count, Set	<RS>	100
Reflective Sensor Value, Transmit	M	160
Remaining Quantity and Batch Count, Transmit	<ESC>Q	82
Reset	<DLE>	83
RFID Parameters, Set	<SI>J	121
RFID Tag, Read	<ESC>J	101
RFID Tag Field Setup	a	150
RFID Tag Protect	n	155
RFID Tag Void Text, Set	<SI>K	122
RFID Tag Write Field, Create or Edit	Q	155
Ribbon Save Zones, Set	<SI>Z	123
Self-Strip, Enable or Disable	<SI>t	123
Slash Zero, Enable or Disable	<SI>z	124
Software Configuration Label, Print	s	160
Start and Stop Codes (Code 39), Print	<ESC><SP>	102
Status Dump	<VT>	83
Status Enquiry	<ENQ>	84
Takeup Motor Torque, Increase	<SI>b	124
Test and Service Mode, Enter	<ESC>T	102
Test and Service Mode, Exit	R	160
Top of Form, Set	<SI>F	125
Transmissive Sensor Value, Transmit	G	160
User-Defined Characters (UDC) and Graphics, Print	g	160
User-Defined Character, Clear or Create	G	155
User-Defined Character Field, Create or Edit	U	155
User-Defined Characters, Transmit	<ESC>u	102
User-Defined Font Character, Create	t	156
User-Defined Fonts, Print	t	160
User-Defined Tables, Transmit	<ESC>Z	103
Warm Boot	<BS>	103
Width of Line, Box, Bar, or Character, Define	w	156

Commands Listed by Syntax

This table lists the IPL commands and their page numbers in alphabetical order by command syntax.

Commands Listed by Syntax

Syntax	IPL Command	Page
;	Command Terminator	158
<ACK>	First Data Entry Field, Select	92
<BEL>	Error Code, Request	82
<BS>	Warm Boot	103
<CAN>	Clear All Data	87
<CR>	Next Data Entry Field, Select	97
<DEL>	Clear Data From Current Field	87
<DLE>	Reset	83
<EM>	Abort Print Job	82
<ENQ>	Status Enquiry	84
<EOT>	Postamble, Set	117
<ESC><SP>	Start and Stop Codes (Code 39), Print	102
<ESC><SYN>	Message Delay, Set	115
<ESC>c	Emulation Mode, Enter	90
<ESC>C	Advanced Mode, Select	86
<ESC>d	Auto-Transmit 2, Enable	105
<ESC>D	Field Decrement, Set	92
<ESC>e	Auto-Transmit 3, Enable	105
<ESC>E	Format, Select	94
<ESC>F	Field, Select	91
<ESC>g	Direct Graphics Mode, Select	90
<ESC>G	Page, Select	99
<ESC>H	Printhead Parameters, Transmit	100
<ESC>I	Field Increment, Set	92
<ESC>j	Auto-Transmit 1, Enable	105
<ESC>J	RFID Tag, Read	101
<ESC>k	Auto-Transmit 1, 2, and 3, Disable	106
<ESC>L	Label and Gap Length, Transmit	82
<ESC>m	Memory Usage, Transmit	96
<ESC>M	Program Number, Transmit	100
<ESC>N	Increment and Decrement, Disable	96
<ESC>O	Options Selected, Transmit	98
<ESC>p	Configuration Parameters, Transmit	88
<ESC>P	Program Mode, Enter	100
<ESC>Q	Remaining Quantity and Batch Count, Transmit	82
<ESC>T	Test and Service Mode, Enter	102
<ESC>u	User-Defined Characters, Transmit	102
<ESC>v	Font, Transmit	93

Commands Listed by Syntax (continued)

Syntax	IPL Command	Page
<ESC>x	Format, Transmit	**95**
<ESC>y	Page, Transmit	**99**
<ESC>Z	User-Defined Tables, Transmit	**103**
<ETB>	Print	**99**
<FF>	Form Feed	**94**
<FS>	Numeric Field Separator	**97**
<GS>	Alphanumeric Field Separator	**86**
<LF>	Command Terminator 2	**88**
<NUL>	Command Terminator 1	**88**
<RS>	Quantity Count, Set	**100**
<SI>a	Audible Alarm, Enable or Disable	**105**
<SI>A	Control Panel Access Permission, Set	**107**
<SI>b	Takeup Motor Torque, Increase	**124**
<SI>c	Cutter, Enable or Disable	**107**
<SI>C	Emulation or Advanced Mode on Power-Up	**108**
<SI>d	Dark Adjust, Set	**108**
<SI>D	End-of-Print Skip Distance, Set	**109**
<SI>e	Media Fault Recovery Mode, Set	**113**
<SI>f	Label Rest Point, Adjust	**111**
<SI>F	Top of Form, Set	**125**
<SI>g	Media Sensitivity, Select	**114**
<SI>h	Printhead Loading Mode, Select	**120**
<SI>H	Printhead Pressure, Set	**121**
<SI>i	IBM Language Translation, Enable or Disable	**110**
<SI>I	Number of Image Bands, Set	**115**
<SI>J	RFID Parameters, Set	**121**
<SI>K	RFID Tag Void Text, Set	**122**
<SI>l	Printer Language, Select	**118**
<SI>L	Maximum Label Length, Set	**113**
<SI>N	Amount of Storage, Define	**104**
<SI>o	Direct Graphics Emulation Mode, Enable or Disable	**108**
<SI>O	Online or Offline on Power-Up	**116**
<SI>p	Pin 11/20 Protocol, Set	**116**
<SI>P	Communication Port Configuration, Set	**106**
<SI>r	Label Retract Distance, Set	**112**
<SI>R	Label Retract, Enable or Disable	**111**
<SI>s	Interlabel Ribbon Save, Enable or Disable	**111**
<SI>S	Print Speed, Set	**117**
<SI>t	Self-Strip, Enable or Disable	**123**
<SI>T	Label Stock Type, Select	**112**

Commands Listed by Syntax (continued)

Syntax	IPL Command	Page
<SI>U	Printhead Test Parameters, Set	121
<SI>W	Label Width, Set	112
<SI>z	Slash Zero, Enable or Disable	124
<SI>Z	Ribbon Save Zones, Set	123
<SO>	Cut	88
<SOH>	Preamble, Set	117
<SUB>	Data Shift - International Characters	88
<SYN>	Intercharacter Delay, Set	111
<US>	Batch Count, Set	87
<VT>	Status Dump	83
a	RFID Tag Field Setup	150
A	Ambient Temperature, Transmit	158
A or F	Format, Create or Edit	139
b	Border Around Human-Readable Text, Define	129
B	Bar Code Field, Create or Edit	127
B	Printhead Resistance Test, Begin	159
c	Bar Code, Select Type	126
c	Font Type, Select	137
c	Graphic, Select	142
C	Command Tables, Load	133
C	Pitch Label, Print	159
d	Field Data, Define Source	134
D	Factory Defaults, Reset	158
D	Field, Delete	134
e	Data Source for Format in a Page, Define	134
E	Format, Erase	140
f	Field Direction, Define	136
f	Formats, Print	158
g	Pitch Size, Set	149
g	User-Defined Characters and Graphics, Print	160
G	Transmissive Sensor Value, Transmit	160
G	User-Defined Character, Clear or Create	155
h	Hardware Configuration Label, Print	158
h	Height Magnification of Bar, Box, or UDC, Define	143
H	Human-Readable Field, Create or Edit	144
i	Interpretive Field, Enable or Disable	145
I	Interpretive Field, Edit	145
j	Outline Font, Download	147
J	Outline Font, Clear or Create	146
k	Point Size, Set	149
K	Dark Adjust	158
l	Length of Line or Box Field, Define	146

Commands Listed by Syntax (continued)

Syntax	IPL Command	Page
L	Label Path Open Sensor Value, Transmit	158
L	Line Field, Create or Edit	146
m	Format Position From Page, Delete	141
M	Format Position in a Page, Assign	141
M	Reflective Sensor Value, Transmit	160
N	Current Edit Session, Save	134
n	RFID Tag Protect	155
o	Field Origin, Define	136
O	Format Offset Within a Page, Define	141
p	Code 39 Prefix Character, Define	133
p	Pages, Print	159
P	Printhead Temperature Sensor Value, Transmit	159
q	Format Direction in a Page, Define	140
Q	Print Quality Label, Print	159
Q	RFID Tag Write Field, Create or Edit	155
r	Character Rotation or Bar Code Ratio, Define	131
R	Program Mode, Exit	150
R	Test and Service Mode, Exit	160
S	Page, Create or Edit	148
s	Page, Delete	149
s	Software Configuration Label, Print	160
S	Printhead Resistance Values, Transmit	159
t	User-Defined Font Character, Create	156
t	User-Defined Fonts, Print	160
T	Bitmap User-Defined Font, Clear or Define	129
T	Label Taken Sensor Value, Transmit	159
u	Graphic or UDC, Define	142
U	12 Volt Supply Value, Transmit	157
U	User-Defined Character Field, Create or Edit	155
v	Print Line Dot Count Limit, Set	150
V	Printhead Volt Supply Value, Transmit	160
w	Width of Line, Box, Bar, or Character, Define	156
W	Box Field, Create or Edit	130
x	Bitmap Cell Width for Graphic or UDF, Define	128
X	Character Bitmap Origin Offset, Define	131
y	Bitmap Cell Height for Graphic or UDF, Define	127
z	Intercharacter Space for UDF, Define	145
Z	Font Character Width, Define	137

Commands Listed by Task

This section focuses on the tasks that you perform with IPL commands, such as editing bar code fields on a label. Each table presents a task and lists the IPL commands that you must use to perform that task. For example, to edit bar code fields while the printer is in Program mode, you must use all the commands shown in the second table in this section.

Note: This section does not list all the IPL commands, only the commands that are necessary to perform specific tasks. For a complete list of commands, see the table of contents, "Commands Listed by Name" starting on page or "Commands Listed by Syntax" on page .

Some command names in this section have been modified slightly to indicate exactly how you will use the command to perform the task.

Immediate Commands

System Commands

Syntax	Command	Page
<BEL>	Error Code, Request	82
<DLE>	Reset	83
<EM>	Abort Print Job	82
<ENQ>	Status Enquiry	84
<VT>	Status Dump	83
<ESC>L	Label and Gap Length, Transmit	82
<ESC>Q	Remaining Quantity and Batch Count, Transmit	82

Program Mode Commands

Bar Code Field Editing Commands

Syntax	Command	Page
c	Bar Code, Select Type	126
d	Field Data, Define Source	134
f	Field Direction, Define	136
h	Height Magnification of Bar, Box, or UDC, Define	143
I	Interpretive Field, Enable or Disable	145
o	Field Origin, Define	136
p	Code 39 Prefix Character, Define	133
r	Character Rotation or Bar Code Ratio, Define	131
w	Width of Line, Box, Bar, or Character, Define	156

Bitmap User-Defined Font Editing Commands

Syntax	Command	Page
t	User-Defined Font Character, Create	156
u	Graphic or UDC, Define	142
X	Character Bitmap Origin Offset, Define	131
x	Bitmap Cell Width for Graphic or UDF, Define	128
y	Bitmap Cell Height for Graphic or UDF, Define	127
Z	Font Character Width, Define	137
z	Intercharacter Space for UDF, Define	145

Box Field Editing Commands

Syntax	Command	Page
f	Field Direction, Define	136
h	Height Magnification of Bar, Box, or UDC, Define	143
l	Length of Line or Box Field, Define	146
o	Field Origin, Define	136
w	Width of Line, Box, Bar, or Character, Define	156

Format Editing Commands

Syntax	Command	Page
B	Bar Code Field, Create or Edit	127
D	Field, Delete	134
H	Human-Readable Field, Create or Edit	144
I	Interpretive Field, Edit	145
L	Line Field, Create or Edit	146
Q	RFID Tag Write Field, Create or Edit	155
U	User-Defined Character Field, Create or Edit	155
W	Box Field, Create or Edit	130

Human-Readable Field Editing Commands

Syntax	Command	Page
b	Border Around Human-Readable Text, Define	129
c	Font Type, Select	137
d	Field Data, Define Source	134
f	Field Direction, Define	136
g	Pitch Size, Set	149
h	Height Magnification of Bar, Box, or UDC, Define	143
k	Point Size, Set	149
o	Field Origin, Define	136
r	Character Rotation or Bar Code Ratio, Define	131
w	Width of Line, Box, Bar, or Character, Define	156

Interpretive Field Editing Commands

Syntax	Command	Page
b	Border Around Human-Readable Text, Define	129
c	Font Type, Select	137
f	Field Direction, Define	136
g	Pitch Size, Set	149
h	Height Magnification of Bar, Box, or UDC, Define	143
k	Point Size, Set	149
o	Field Origin, Define	136
r	Character Rotation or Bar Code Ratio, Define	131
w	Width of Line, Box, Bar, or Character, Define	156

Line Field Editing Commands

Syntax	Command	Page
F	Field Direction, Define	136
l	Length of Line or Box Field, Define	146
o	Field Origin, Define	136
w	Width of Line, Box, Bar or Character, Define	156

Page Editing Commands

Syntax	Command	Page
e	Data Source for Format in a Page, Define	134
M	Format Position in a Page, Assign	141
m	Format Position From Page, Delete	141
O	Format Offset Within a Page, Define	141
q	Format Direction in a Page, Define	140

Programming Commands

Syntax	Command	Page
A	Format, Create or Edit	139
E	Format, Erase	140
F	Format, Create or Edit	139
G	User-Defined Character, Clear or Create	155
J	Outline Font, Clear or Create	146
N	Current Edit Session, Save	134
R	Program Mode, Exit	150
S	Page, Create or Edit	148
s	Page, Delete	149
T	Bitmap User-Defined Font, Clear or Define	129

RFID Tag Editing Commands

Syntax	Command	Page
a	RFID Tag Field Setup	150
d	Field Data, Define Source	134
n	RFID Tag Protect	155

UDC Field Editing Commands

Syntax	Command	Page
c	Graphic, Select	142
f	Field Direction, Define	136
h	Height Magnification of Bar, Box, or UDC, Define	143
o	Field Origin, Define	136
w	Width of Line, Box, Bar, or Character, Define	156

UDC Editing Commands

Syntax	Command	Page
u	Graphic or UDC, Define	142
x	Bitmap Cell Width for Graphic or UDF, Define	128
y	Bitmap Cell Height for Graphic or UDF, Define	127
j	Outline Font, Download	147
J	Outline Font, Clear or Create	146

Print Mode Commands

Configuration Commands

Syntax	Command	Page
<SI>a	Audible Alarm, Enable or Disable	105
<SI>A	Control Panel Access Permission, Set	107
<SI>b	Takeup Motor Torque, Increase	124
<SI>c	Cutter, Enable or Disable	107
<SI>C	Emulation or Advanced Mode on Power-Up	108
<SI>d	Dark Adjust, Set	108
<SI>D	End-of-Print Skip Distance, Set	109
<SI>e	Media Fault Recovery Mode, Set	113
<SI>f	Label Rest Point, Adjust	111
<SI>F	Top of Form, Set	125
<SI>g	Media Sensitivity, Select	114
<SI>h	Printhead Loading Mode, Select	120
<SI>H	Printhead Pressure, Set	121
<SI>i	IBM Language Translation, Enable or Disable	110
<SI>I	Number of Image Bands, Set	115
<SI>l	Printer Language, Select	118
<SI>J	RFID Parameters, Set	121
<SI>K	RFID Tag Void Text, Set	122
<SI>L	Maximum Label Length, Set	113
<SI>N	Amount of Storage, Define	104
<SI>o	Direct Graphics Emulation Mode, Enable or Disable	108
<SI>O	Online or Offline on Power-Up	116
<SI>p	Pin 11/20 Protocol, Set	116
<SI>r	Label Retract Distance, Set	112
<SI>R	Label Retract, Enable or Disable	111
<SI>s	Interlabel Ribbon Save, Enable or Disable	111
<SI>S	Print Speed, Set	117
<SI>t	Self-Strip, Enable or Disable	123
<SI>T	Label Stock Type, Select	112
<SI>U	Printhead Test Parameters, Set	121
<SI>W	Label Width, Set	112
<SI>z	Slash Zero, Enable or Disable	124
<SI>Z	Ribbon Save Zones, Set	123

Print Commands

Syntax	Command	Page
<ACK>	First Data Entry Field, Select	92
<BS>	Warm Boot	103
<CAN>	Clear All Data	87
<CR>	Next Data Entry Field, Select	97
<DEL>	Clear Data From Current Field	87
<ESC>c	Emulation Mode, Select	90
<ESC>C	Advanced Mode, Select	86
<ESC>D	Field Decrement, Set	92
<ESC>E	Format, Select	94
<ESC>F	Field, Select	91
<ESC>g	Direct Graphics Mode, Select	90
<ESC>G	Page, Select	99
<ESC>H	Printhead Parameters, Transmit	100
<ESC>I	Field Increment, Set	92
<ESC>J	RFID Tag, Read	101
<ESC>m	Memory Usage, Transmit	96
<ESC>M	Program Number, Transmit	100
<ESC>N	Increment and Decrement, Disable	96
<ESC>O	Options Selected, Transmit	98
<ESC>p	Configuration Parameters, Transmit	88
<ESC>P	Program Mode, Enter	100
<ESC><SP>	Start and Stop Codes (Code 39), Print	102
<ESC>T	Test and Service Mode, Enter	102
<ESC>u	User-Defined Characters, Transmit	102
<ESC>v	Font, Transmit	93
<ESC>x	Format, Transmit	95
<ESC>y	Page, Transmit	99
<ESC>Z	User-Defined Tables, Transmit	103
<ETB>	Print	99
<FF>	Form Feed	94
<FS>	Numeric Field Separator	97
<GS>	Alphanumeric Field Separator	86
<LF>	Command Terminator 2	88
<NUL>	Command Terminator 1	88
<RS>	Quantity Count, Set	100
<SO>	Cut	88
<SUB>	Data Shift - International Characters	88
<US>	Batch Count, Set	87

Protocol Modification Commands

Syntax	Command	Page
<EOT>	Postamble, Set	117
<ESC>d	Auto-Transmit 2, Enable	105
<ESC>e	Auto-Transmit 3, Enable	105
<ESC>j	Auto-Transmit 1, Enable	105
<ESC>k	Auto-Transmit 1, 2, and 3, Disable	106
<SI>p	Pin 11/20 Protocol, Set	116
<SI>P	Communication Port Configuration, Set	106
<ESC><SYN>	Message Delay, Set	115
<SOH>	Preamble, Set	117
<SYN>	Intercharacter Delay, Set	111

Test and Service Commands

Syntax	Command	Page
;	Command Terminator	158
A	Ambient Temperature, Transmit	158
B	Printhead Resistance Test, Begin	159
C	Pitch Label, Print	159
D	Factory Defaults, Reset	158
f	Formats, Print	158
g	User-Defined Characters (UDC) and Graphics, Print	160
G	Transmissive Sensor Value, Transmit	160
h	Hardware Configuration Label, Print	158
K	Dark Adjust	158
L	Label Path Open Sensor Value, Transmit	158
M	Reflective Sensor Value, Transmit	160
p	Pages, Print	159
P	Printhead Temperature Sensor Value, Transmit	159
Q	Print Quality Label, Print	159
R	Test and Service Mode, Exit	160
s	Software Configuration Label, Print	160
S	Printhead Resistance Values, Transmit	159
t	User-Defined Fonts, Print	160
T	Label Taken Sensor Value, Transmit	159
U	12 Volt Supply Value, Transmit	157
V	Printhead Volt Supply Value, Transmit	160

7 IPL Command Reference

This chapter describes all of the IPL commands. The commands are grouped by type (Immediate, Print, Configuration, Program, and Test and Service) and alphabetized within each type.

The commands listed in this chapter are used for all Intermec printers. Each command explains syntax, defaults, ranges of values for the variables, and special notes for specific printers.

Convention	Description
< >	Angle brackets < > enclose mnemonic representations of ASCII control characters. For example, <ETX> represents the ASCII "End of Text" control character.
data	Italic text represents variable data, which you must replace with a real value. For example, *n* signifies a variable for which you must designate a constant value.
[*data*]	Italic text within brackets represents optional data.
Ctrl	Bold text represents a key on your keypad. For example, **Ctrl** represents the Ctrl key.
Ctrl-Z	When two keys are joined with a dash, press them simultaneously. For example, if you see the command **Ctrl-Z**, press the two keys at the same time.
E3;F3	Type all characters that appear in the Courier font by pressing an individual key on the keypad.

Which Commands Does Your Printer Support?

The next table shows which commands are supported by each printer. A •
indicates that the printer supports the command, and a blank space
indicates that the printer ignores the command.

Commands Supported By Each Printer

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44XX	4X30	7421	PC41	EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i
12 Volt Supply Value, Transmit	157							•					
Abort Print Job	82	•	•	•	•	•	•	•	•	•	•	•	•
Advanced Mode, Select	86	•	•	•	•	•	•	•	•		•	•	•
Alphanumeric Field Separator	86	•	•	•	•	•	•	•	•	•	•	•	•
Ambient Temperature, Transmit	158							•					
Amount of Storage, Define	104	•	•			•	•				•	•	
Audible Alarm, Enable or Disable	105							•					• (i only)
Auto-Transmit 1, Enable	105	•	•	•	•	•	•	•	•	•	•	•	•
Auto-Transmit 2, Enable	105	•	•	•	•	•	•	•	•	•	•	•	•
Auto-Transmit 3, Enable	105	•	•	•	•	•	•	•	•	•	•	•	•
Auto-Transmit 1, 2, and 3, Disable	106	•	•	•	•	•	•	•	•	•	•	•	•
Bar Code, Select Type	126	•	•	•	•	•	•	•	•	•	•	•	•
Bar Code Field, Create or Edit	127	•	•	•	•	•	•	•	•	•	•	•	•
Batch Count, Set	87	•	•	•	•	•	•	•	•	•	•	•	•
Bitmap Cell Height for Graphic or UDF, Define	127	•	•	•	•	•	•	•	•	•	•	•	•
Bitmap Cell Width for Graphic or UDF, Define	128	•	•	•	•	•	•	•	•	•	•	•	•
Bitmap User-Defined Font, Clear or Define	129	•	•	•	•	•	•	•	•	•	•	•	•
Border Around Human-Readable Text, Define	129	•	•	•	•	•	•	•	•	•	•	•	•
Box Field, Create or Edit	130	•	•	•	•	•	•	•	•	•	•	•	•
Character Bitmap Origin Offset, Define	131	•	•	•	•	•	•	•	•	•	•	•	•
Character Rotation or Bar Code Ratio, Define	131	•	•	•	•	•	•	•	•	•	•	•	•
Clear All Data	87	•	•	•	•	•	•	•	•	•	•	•	•

Commands Supported By Each Printer (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44XX	4X30	7421	PC41	EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i
Clear Data From Current Field	87	•	•	•	•	•	•	•	•	•	•	•	•
Code 39 Prefix Character, Define	133	•	•	•	•	•	•	•	•	•	•	•	•
Command Tables, Load	133	•	•	•	•	•	•	•	•	•	•	•	
Command Terminator	158	•	•	•	•	•	•	•	•	•	•	•	•
Command Terminator 1	88	•	•	•	•	•	•	•	•	•	•	•	•
Command Terminator 2	88	•	•	•	•	•	•	•	•	•	•	•	•
Communication Port Configuration, Set	106										•	•	•
Configuration Parameters, Transmit	88	•	•	•	•	•	•	•	•	•	•	•	•
Control Panel Access Permission, Set	107						•			•			• (i only)
Current Edit Session, Save	134	•	•	•	•	•	•	•	•	•	•	•	•
Cut	88		• (C, D)	•			•	•	•	•	•	•	•
Cutter, Enable or Disable	107		•	•			•	•	•	•	•	•	•
Dark Adjust	158				•								
Dark Adjust, Set	108	•	•	•	•	•	•	•	•	•	•	•	•
Data Shift – International Characters	88	•	•	•	•	•	•	•	•	•	•	•	•
Data Source for Format in a Page, Define	134	•	•	•	•	•	•	•	•	•	•	•	•
Direct Graphics Mode, Select	90		• (C, D)	•	•				•		•	•	•
Direct Graphics Emulation Mode, Enable or Disable	108											•	
Emulation Mode, Enter	90	•	•	•	•	•	•	•	•		•	•	•
Emulation or Advanced Mode on Power-Up	108	•	•	•	•	•	•	•	•		•	•	•
End-of-Print Skip Distance, Set	109	•	•	•	•	•	•	•	•	•	•	•	•
Error Code, Request	82	•	•	•	•	•	•	•	•	•	•	•	•
Factory Defaults, Reset	158	•	•	•	•	•	•	•	•	•	•	•	•
Field, Delete	134	•	•	•	•	•	•	•	•	•	•	•	•
Field, Select	91	•	•	•	•	•	•	•	•	•	•	•	•
Field Data, Define Source	134	•	•	•	•	•	•	•	•	•	•	•	•
Field Decrement, Set	92	•	•	•	•	•	•	•	•	•	•	•	•
Field Direction, Define	136	•	•	•	•	•	•	•	•	•	•	•	•
Field Increment, Set	92	•	•	•	•	•	•	•	•	•	•	•	•
Field Origin, Define	136	•	•	•	•	•	•	•	•	•	•	•	•

Commands Supported By Each Printer (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	4XX0	7430	PC41	EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i
First Data Entry Field, Select	92	•	•	•	•	•	•	•	•	•	•	•
Font, Transmit	93	•	•	•	•	•	•	•	•	•	•	•
Font Character Width, Define	137	•	•	•	•	•	•	•	•	•	•	•
Font Type, Select	137	•	•	•	•	•	•	•	•	•	•	•
Form Feed	94	•	•	•	•	•	•	•	•	•	•	•
Format, Create or Edit	139	•	•	•	•	•	•	•	•	•	•	•
Format Direction in a Page, Define	140	•	•	•	•	•	•	•	•	•	•	•
Format, Erase	140	•	•	•	•	•	•	•	•	•	•	•
Format, Select	94	•	•	•	•	•	•	•	•	•	•	•
Format, Transmit	95	•	•	•	•	•	•	•	•	•	•	•
Format Offset Within a Page, Define	141	•	•	•	•	•	•	•	•	•	•	•
Format Position From Page, Delete	141	•	•	•	•	•	•	•	•	•	•	•
Format Position in a Page, Assign	141	•	•	•	•	•	•	•	•	•	•	•
Formats, Print	158		• (C, D)	•	•			•		•	•	•
Graphic, Select	142	•	•	•	•	•	•	•	•	•	•	•
Graphic or UDC, Define	142	•	•	•	•	•	•	•	•	•	•	•
Hardware Configuration Label, Print	158		• (C, D)	•	•			•		•	•	•
Height Magnification of Bar, Box, or UDC, Define	143	•	•	•	•	•	•	•	•	•	•	•
Human-Readable Field, Create or Edit	144	•	•	•	•	•	•	•	•	•	•	•
IBM Language Translation, Enable or Disable	110	•	•	•	•	•	•	•	•	•	•	•
Increment and Decrement, Disable	96	•	•	•	•	•	•	•	•	•	•	•
Intercharacter Delay, Set	111	•	•	•	•	•	•	•	•	•	•	
Intercharacter Space for UDF, Define	145	•	•	•	•	•	•	•	•	•	•	•
Interlabel Ribbon Save, Enable or Disable	111							•				
Interpretive Field, Edit	145	•	•	•	•	•	•	•	•	•	•	•
Interpretive Field, Enable or Disable	145	•	•	•	•	•	•	•	•	•	•	•
Label and Gap Length, Transmit	82	•	•	•	•	•	•	•	•	•	•	•
Label Path Open Sensor Value, Transmit	158	•		•	•			•	•	•	•	•

Commands Supported By Each Printer (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	4400	4XX0	7430	PC41	EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i
Label Rest Point, Adjust	111	•	•	•	•	•	•	•	•	•	•	•	•
Label Retract, Enable or Disable	111	•	•	•	•	•	•	•	•	•	•	•	•
Label Retract Distance, Set	112	•	•	•	•	•	•	•	•	•	•	•	•
Label Stock Type, Select	112	•	•	•	•	•	•	•	•	•	•	•	•
Label Taken Sensor Value, Transmit	159	•	•	• (400 dpi only)	•	•	•	•	•	•	•	•	•
Label Width, Set	112							•	•		•	•	
Length of Line or Box Field, Define	146	•	•	•	•	•	•	•	•	•	•	•	•
Line Field, Create or Edit	146	•	•	•	•	•	•	•	•	•	•	•	•
Maximum Label Length, Set	113	•	•	•	•	•	•	•	•	•	•	•	•
Media Fault Recovery Mode, Set	113			•						•	•	•	•
Media Sensitivity, Select	114	•	•	•	•	•	•	•	•	•	•	•	•
Memory Usage, Transmit	96	•	•		•	•	•	•		•	•	•	•
Message Delay, Set	115	•	•	•	•	•	•	•	•	•	•	•	
Next Data Entry Field, Select	97	•	•	•	•	•	•	•	•	•	•	•	•
Number of Image Bands, Set	115	•	•	•	•	•	•	•	•		•	•	
Numeric Field Separator	97	•	•	•	•	•	•	•	•	•	•	•	•
Online or Offline on Power-Up	116							•		•			
Options Selected, Transmit	98	•	•	•	•	•	•	•	•	•	•	•	•
Outline Font, Clear or Create	146	•	•	•	•	•	•	•	•	•	•	•	•
Outline Font, Download	147	•	•	•	•	•	•	•	•	•	•	•	•
Page, Create or Edit	148	•	•	•	•	•	•	•	•	•	•	•	•
Page, Delete	149	•	•	•	•	•	•	•	•	•	•	•	•
Page, Select	99	•	•	•	•	•	•	•	•	•	•	•	•
Page, Transmit	99	•	•	•	•	•	•	•	•	•	•	•	•
Pages, Print	159			• (C, D)	•	•				•	•	•	•
Pin 11/20 Protocol, Set	116			•						•	•	•	
Pitch Label, Print	159	•	•	•	•		•	•	•	•	•	•	•
Pitch Size, Set	149	•	•	•	•	•	•	•	•	•	•	•	
Point Size, Set	149	•	•	•	•	•	•	•	•	•	•	•	•
Postamble, Set	117	•	•	•	•	•	•	•	•	•	•	•	•
Preamble, Set	117	•	•	•	•	•	•	•	•	•	•	•	•
Print	99	•	•	•	•	•	•	•	•	•	•	•	•
Print Line Dot Count Limit, Set	150												
Print Quality Label, Print	159	•	•	•	•	•	•	•	•	•	•	•	•

Commands Supported By Each Printer (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44X0	4XX0	7430	PC41	EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i
Print Speed, Set	117	•	•	•	•	•	•	•	•	•	•	•	•
Printer Language, Select	118	•	•	•	•	•	•	•	•	•	•	•	•
Printhead Loading Mode, Select	120		• (C, D)	•	•	•			•		•	•	•
Printhead Parameters, Transmit	100	•	•	•	•	•	•	•	•	•	•	•	•
Printhead Pressure, Set	121								•				
Printhead Resistance Test, Begin	159								•				
Printhead Resistance Values, Transmit	159								•				
Printhead Temperature Sensor Value, Transmit	220	•	•	•	•	•	•	•	•	•	•	•	•
Printhead Test Parameters, Set	121								•				
Printhead Volt Supply Value, Transmit	160								•				
Program Mode, Enter	100	•	•	•	•	•	•	•	•	•	•	•	•
Program Mode, Exit	150	•	•	•	•	•	•	•	•	•	•	•	•
Program Number, Transmit	100	•	•	•	•	•	•	•	•	•	•	•	•
Quantity Count, Set	100	•	•	•	•	•	•	•	•	•	•	•	•
Reflective Sensor Value, Transmit	160	•	•	•	•	•	•	•	•	•	•	•	•
Remaining Quantity and Batch Count, Transmit	82	•	•	•	•	•	•	•	•	•	•	•	•
Reset	83	•	•	•	•	•	•	•	•	•	•	•	•
RFID Parameters, Set	121												• (PM4i)
RFID Tag, Read	101												• (PM4i)
RFID Tag Field Setup	150												• (PM4i)
RFID Tag Protect	155												• (PM4i)
RFID Tag Void Text, Set	122												• (PM4i)
RFID Tag Write Field, Create or Edit	155												• (PM4i)
Ribbon Save Zones, Set	123						•						
Self-Strip, Enable or Disable	123	•	•	•	•	•	•	•	•	•	•	•	•
Slash Zero, Enable or Disable				•						• (e)			•
Software Configuration Label, Print	160		• (C, D)	•	•					•	•	•	•
Start and Stop Codes (Code 39), Print	102	•	•	•	•	•	•	•	•	•	•	•	•
Status Dump	83	•	•	•	•	•	•	•	•	•	•	•	•
Status Enquiry	84	•	•	•	•	•	•	•	•	•	•	•	•

Commands Supported By Each Printer (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44XX	4X30	7421	PC41	EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i
Takeup Motor Torque, Increase	124								•				
Test and Service Mode, Enter	102	•	•	•	•	•	•	•	•	•	•	•	•
Test and Service Mode, Exit	160	•	•	•	•	•	•	•	•	•	•	•	•
Top of Form, Set	125	•	•	•	•	•	•	•	•	•	•	•	•
Transmissive Sensor Value, Transmit	160	•	•	•	•	•	•	•	•	•	•	•	•
User-Defined Characters (UDC) and Graphics, Print	160		• (C, D)	•	•				•		•	•	•
User-Defined Character, Clear or Create	155	•	•	•	•	•	•	•	•	•	•	•	•
User-Defined Character Field, Create or Edit	155	•	•	•	•	•	•	•	•	•	•	•	•
User-Defined Characters, Transmit	102	•	•	•	•	•	•	•	•	•	•	•	•
User-Defined Font Character, Create	156	•	•	•	•	•	•	•	•	•	•	•	•
User-Defined Fonts, Print	160		• (C, D)	•	•				•				•
User-Defined Tables, Transmit	103	•	•	•	•	•	•	•	•	•	•	•	
Warm Boot	103	•	•	•	•	•	•	•	•	•	•	•	•
Width of Line, Box, Bar, or Character, Define	156	•	•	•	•	•	•	•	•	•	•	•	•

Immediate Commands

You can use Immediate commands to query the printer about the status of the printer and any print jobs, to abort print jobs, to request error conditions, and to reset the printer.

Unlike other commands that the printer stores in the data buffer and executes in the order received, the printer executes immediate commands when it receives them, regardless of printer mode.

For help downloading Immediate commands to the printer, see **"Sending IPL Commands to the Printer" on page 5.**

Abort Print Job

Purpose: Stops batch printing.

Syntax: `<EM>`

Notes: The printer stops the current batch print job. The batch quantity count is reset to the original setting. The printer continues to execute other commands remaining in the buffer.

Error Code, Request

Purpose: Solicits error codes from the printer.

Syntax: `<BEL>`

Notes: The printer sends back the most recent error code as an ASCII number. The error code represents a command syntax error or a printer RAM usage error.

If no errors have occurred since the printer was turned on, the printer sends a zero. It also resets the error code to 00.

See Chapter 4, "Troubleshooting," for a list of error codes.

Label and Gap Length, Transmit

Purpose: Transmits the label and gap length as measured by the number of 5 mil increments.

Syntax: `<ESC>L`

Notes: Label length refers to the length of the label currently being processed. If the label is longer than the distance between the label sensor and the printhead, the printer transmits the length of the previous label.

If you select continuous stock, the printer transmits the length defined by the Maximum Label Length, Set command (<SI>L).

Remaining Quantity and Batch Count, Transmit

Purpose: Uploads the remaining quantity and batch counts for the current print job.

Syntax: `<ESC>Q`

Reset

Purpose: Executes a printer power-up reset immediately.

Syntax: `<DLE>`

Notes: The printer erases all data and commands in the input buffer upon reset. In the following example, the first DLE is a transparency character. It instructs the printer to use the <DLE> as a reset command.

`<STX><DLE><DLE><ETX>`

Status Dump

Purpose: Causes the printer to upload all current printer status.

Syntax: `<VT>`

Notes: The next table lists status messsages that are not uploaded by each printer.

Printer	Status Messages Not Uploaded
3240	<BS> Takeup reel full <SO> Printhead test fail
3400	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
3400e	<BS> Takeup reel full <SO> Printhead test fail Only the 400 dpi version uploads <US> label path open.
3440	<BS> Takeup reel full <SO> Printhead test fail
3600	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
4100	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
4400	<BS> Takeup reel full
44X0	<BS> Takeup reel full <SO> Printhead test fail
4X30	<SO> Printhead test fail
7421, PC41	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	<BS> Takeup reel full <SO> Printhead test fail

Status Dump (Continued)

The printer uploads the status in the following order of priority for Intermec Standard Protocol. See Appendix D for codes for other protocols.

<GS>	Buffer already full	<BS>	Takeup reel full
<SO>	Printhead test fail	<SI>	Printhead hot
<US>	Label path open	<FS>	Label at strip pin
<US>	Ribbon fault	<ACK>	RFID tag write okay
<EM>	No label stock	<DC1>	Skipping
<DC3>	Buffer now full	<DC1>	Printing
<EOT>	RFID tag write error	<DC1>	Ready
<VT>	RFID Tag read error		

Status Enquiry

Purpose: Transmits the current printer status to the host.

Syntax: <ENQ>

Notes: The next table lists status messages that are not uploaded by each printer.

Printer	Status Messages Not Uploaded
3240	<BS> Takeup reel full <SO> Printhead test fail
3400	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
3400e	<BS> Takeup reel full <SO> Printhead test fail Only the 400 dpi version uploads <US> Label path open.
3440	<BS> Takeup reel full <SO> Printhead test fail
3600	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
4100	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
4400	<BS> Takeup reel full
44X0	<BS> Takeup reel full <SO> Printhead test fail
4X30	<SO> Printhead test fail
7421, PC41	<US> Label path open <BS> Takeup reel full <SO> Printhead test fail
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	<BS> Takeup reel full <SO> Printhead test fail

Status Enquiry (Continued)

Notes: The printer uploads the status in the following order of priority for Intermec Standard Protocol. See Appendix D for codes for other protocols.

<GS>	Buffer already full	<BS>	Takeup reel full
<SO>	Printhead test fail	<SI>	Printhead hot
<US>	Label path open	<FS>	Label at strip pin
<US>	Ribbon fault	<ACK>	RFID tag write okay
<EM>	No label stock	<DC1>	Skipping
<DC3>	Buffer now full	<DC1>	Printing
<EOT>	RFID tag write error	<DC1>	Ready
<VT>	RFID Tag read error		

Print Commands

You can use print commands to pass data to formats and print labels. When using print commands with printers with RFID modules, these commands pass data to formats and print labels. Print mode is used for uploading information from an RFID tag, for example, reading tag information.

When you enter data into a format for printing, the printer uses a field pointer to designate the field in the format where the data should print. If you choose a new format, the field pointer automatically points to the lowest numbered data entry field and continues to point to that field until you select a different field or format. If you select a field by using the <CR> or <ESC>F command, new data entered into the field overwrites any data already existing in the field.

Print commands are effective when the printer is in Print mode. You can switch to Print mode with this command:

```
<STX>R<ETX>
```

For help downloading print commands to the printer, see **"Sending IPL Commands to the Printer" on page 5.**

Note: You must precede each string of commands with the start of message character <STX> and follow it with the end of message character <ETX>. The next command in the message terminates all Print mode commands. The command separator (<NUL> or <LF>) is optional between commands, but is necessary to separate commands from data. For example, to separate the <ESC>F command from data, type:

```
<ESC>F4<NUL>data
```

Advanced Mode, Select

Purpose: Instructs the printer to operate in Advanced mode. Advanced mode is the default mode; the alternative operating mode is Emulation mode.

Syntax: `<ESC>C`*n*

where *n* specifies the dot size.

Advanced Mode, Select - Values Listed By Printer

Printer	Default	Values for n	Notes
3240	n = 1	0 = 5.0 mil (0.005 inch) dot size 1 = 2.5 mil (0.0025 inch) dot size	
3400e	200 dpi: Not available 400 dpi: n = 1	0 = 5.0 mil (0.005 inch) dot size 1 = 2.5 mil (0.0025 inch) dot size	The n parameter is not available on the 3400e with the 200 dpi option.
3440	n = 1	0 = 5.0 mil (0.005 inch) dot size 1 = 2.5 mil (0.0025 inch) dot size	
44X0	4420: Not available 4440: n = 1	0 = 5.0 mil (0.005 inch) dot size 1 = 2.5 mil (0.0025 inch) dot size	The n parameter is not available on the 4420.

Notes: The field pointer designates the first field in format 0. Page 0 is the default page.

You will lose all previously host-entered data when you switch operating modes.

Alphanumeric Field Separator

Purpose: Increments or decrements alphanumeric characters within a field-separated region. You must enclose the data between two sets of <GS> commands:

`<GS>`*data*`<GS>`

Syntax: `<GS>`

Alphanumeric characters are 0 to 9 and A to Z. The order of the characters is 0, 1, 2...8, 9, A, B, C...Y, Z, 0, 1...9, A, B....

Notes: You may have more than one region in a field as long as they do not overlap. Each region independently increments or decrements according to the increment or decrement value specified for the field. The length of data does not change. Rather, the values increment or decrement as in an odometer. For example, 9 increments to 0, and Z increments to A.

This command marks the region of characters to increment or decrement, but it does not actually increment or decrement. The printer ignores any non-alphanumeric characters within this region.

Alphanumeric Field Separator (Continued)

The following example illustrates the Alphanumeric Field Separator command:

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1;<ETX>
<STX>H1;o175,10;f3;c2;h2;w2;b10;<ETX>
<STX>H2;o75,10;f3;c2;h2;w2;b10;<ETX>
<STX>H3;o200,10;f3;c7;h2;w2<ETX>
<STX>H4;o100,10;f3;c7;h2;w2<ETX>
<STX>R<ETX>
<STX><ESC>E1<CAN><ETX>
<STX><CR><ESC>I1<GS>A<GS><ETX>
<STX><CR><ESC>D1<GS>C<GS><ETX>
<STX><CR>Increment Field<ETX>
<STX><CR>Decrement Field<ETX>
<STX><RS>3<ETB><ETX>
```

Batch Count, Set

Purpose: Sets the number of labels to be printed in the next batch.

Syntax: <US>*n*

where *n* is the number of labels. For all printers, the range for *n* is 1 to 1999. Default is 1.

Notes: This command causes the printer to make *n* copies of the same label. The total number of labels printed per print command is equal to the quantity in each batch multiplied by the number of batches.

The printer generates an error code (21) if *n* is out of range.

See your printer user's manual for help optimizing image bands for batch printing.

Clear All Data

Purpose: Clears all host-entered data from the current page or format.

Syntax: <CAN>

Notes: If you select a format, the pointer indicates the first data entry field in the format after you clear the data. If you select a page, the pointer designates the first data entry field in the first format.

Clear Data From Current Field

Purpose: Deletes data from the current field.

Syntax: <DEL>

Notes: The field pointer continues to designate the current field even after you clear the data.

Command Terminator 1

Purpose: Terminates the current command.

Syntax: `<NUL>`

Command Terminator 2

Purpose: Terminates the current command.

Syntax: `<LF>`

Configuration Parameters, Transmit

Purpose: Uploads the current configuration commands from the printer.

Syntax: `<ESC>p`

Notes: The printer transmits only the configuration parameters that you can set from the host.

Use this command to view, edit, or copy the current configuration command settings.

See your printer user's manual for a list of the configuration parameters that the printer uploads to the host.

Cut

Purpose: Advances the label out to the cutter and cuts the label stock.

Syntax: `<SO>`

Notes: This command is executed only if the cutter is installed but not enabled. Use this command only after you have printed a batch of labels.

Data Shift – International Characters

Purpose: Allows you to enter selected command characters as data.

Syntax: `<SUB>` or `<DLE>`

Notes: In Emulation mode, this command shifts the next character (if not a control character) into the upper character bank (setting the eighth bit to 1) to print international characters.

This command lets you enter selected command characters as data instead of commands in both Advanced and Emulation mode. For example, use this command to enter a <GS> or <CR> as data in a bar code or text field.

Data Shift - International Characters (Continued)

Use <SUB> to send the following command characters as data:

<ACK>	<DC4>	<FF>	<NUL>	<SYN>
<BEL>	<EM>	<FS>	<RS>	<US>
<BS>	<ENQ>	<GS>	<SI>	<VT>
<CAN>	<EOT>	<HT>	<SO>	
<CR>	<ESC>	<LF>	<SOH>	
<DC2>	<ETB>	<NAK>	<SUB>	

Use <DLE> to send these command characters as data:

<DC1>	<DC3>	<STX>	<ETX>

To send <DLE> as data, preface it with the command <SUB><DLE>.

This example illustrates using the Data Shift command to print control or command characters in a data field.

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1;<ETX>
<STX>H0;o750,10;f3;c0;h3;w2;b10;d0,50<ETX>
<STX>B1;o300,10;f3;c0;h200;w1;i1;r2<ETX>
<STX>B2;o600,10;f3;c0;h200;w1;i1;r2<ETX>
<STX>I1;o75,10;f3;c0;h3;w3<ETX>
<STX>I2;o375,10;f3;c0;h3;w3<ETX>
<STX>R<ETX>
<STX><ESC>E1<ETX>
<STX><CAN><ETX>
<STX>Example for printing control codes<CR><ETX>
<STX><SUB><NUL><SUB><SOH><DLE><STX><DLE><ETX><SUB><EOT>
<SUB><ENQ><SUB><ACK><SUB><BEL><SUB><BS><SUB><HT><SUB><LF>
<SUB><VT><SUB><FF><SUB><CR><SUB><SO><SUB><SI>
<SUB><DLE><DLE>
<SUB><DC1><SUB><DC2><ETX>
<STX><CR><ETX>
<STX><SUB><DC3><SUB><DC4><SUB><NAK><SUB><SYN><SUB><ETB>
<SUB><CAN><SUB><EM><SUB><SUB><SUB>
<ESC><SUB><FS><SUB><GS><SUB><RS><SUB><US><ETX>
<STX><US>1<ETX>
<STX><RS>1<ETX>
<STX><ETB><ETX>
```

Direct Graphics Mode, Select

Purpose: Allows you to download graphic images directly into image memory without storing them in nonvolatile RAM.

Syntax: `<ESC>gm`

where *m* specifies the format of the data to follow.

Direct Graphics Mode, Select - Values Listed by Printer

Printer	Values for m	Notes
3400C 3400e	0 = 8 bits per byte (default) 1 = 8 bits per byte that have been nibblized	When the printer is in Direct Graphics mode, the printer treats all Immediate commands as Direct Graphics commands.
3440	0 = 8 bits per byte (default) 1 = 8 bits per byte that have been nibblized	
44X0	0 = 8 bits per byte (default) 1 = 8 bits per byte that have been nibblized	
7421, PC41	0 = 8 bits per byte (default) 1 = 8 bits per byte that have been nibblized	
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	0 = 8 bits per byte (default) 1 = 8 bits per byte that have been nibblized	When the printer is in Direct Graphics mode, the printer treats all Immediate commands as Direct Graphics commands.

Notes: For more information on direct graphics, see Appendix E, "Using Direct Graphics Mode."

Emulation Mode, Enter

Purpose: Instructs the printer to enter Emulation mode (default is Advanced Mode).

Syntax: `<ESC>cn`

where *n* specifies the dot size. For all printers, valid values for *n* are:

0   10 mil (0.010 inch) dot size
1   15 mil (0.015 inch) dot size for bar codes only (other fields are 10 mil)

For all printers, the default value for *n* is 0.

Notes: Emulation mode lets you print bar code labels that were designed on an 86XX printer in multiples of 10 or 15 mil.

The field pointer designates the first field in format 0.

You disable the page select command and lose all previously host-entered data.

Field, Select

Purpose: Selects a data field for entering or working with data.

Syntax: `<ESC>F`*n* `or <ESC>F"`*name*`"`

where *n* is the number of the field. For all printers, the range for *n* is 0 to 199. Default is 0.

Notes: The parameter for this command can either be the field number or the field name, but not both. If neither is present, the printer defaults to 0.

If you use the field number, the printer enters all following data into field *n*. If you use the field *name*, the printer enters all following data into all fields with the specified name in the current format or page. You must bracket the field *name* with quotation marks (" ").

The printer generates an error code (38) if you enter an invalid field number.

The following example illustrates employing the Field, Select command to enter data into a field identified by a number:

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1;<ETX>
<STX>H0;o450,50;c0;f3;h3;w2;b10;d0,35<ETX>
<STX>H1;o300,50;c0;h2;w2;f3<ETX>
<STX>B2;o250,50;c0,3;f3;h200;w2;i1;<ETX>
<STX>R<ETX>
<STX><ESC>E1<CAN><ETX>
<STX><ESC>F0<DEL>Example printing by field number<ETX>
<STX><ESC>F1<DEL>This is a test<ETX>
<STX><ESC>F2<DEL>Test<ETX>
<STX><US>1<ETX>
<STX><RS>1<ETX>
<STX><ETB><ETX>The following example illustrates employing
the Field, Select command to enter data into a field
identified by a name:
```

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1;<ETX>
<STX>H0,Example;o450,50;c0;f3;h3;w2;b10;d0,35<ETX>
<STX>H1,Text;o300,50;c0;h2;w2;f3<ETX>
<STX>B2,Barcode;o250,50;c0,3;f3;h200;w2;i1;<ETX>
<STX>R<ETX>
<STX><ESC>E1<CAN><ETX>
<STX><ESC>F"Example"<DEL>Example printing by field
name<ETX>
<STX><ESC>F"Text"<DEL>This is a test<ETX>
<STX><ESC>F"Barcode"<DEL>Test<ETX>
<STX><US>1<ETX>
<STX><RS>1<ETX>
<STX><ETB><ETX>
```

Field Decrement, Set

Purpose: Sets the field decrement value for the selected field.

Syntax: `<ESC>Dn`

where *n* is the field decrement value. For all printers, the range for *n* is 0 to 1999. Default is 1.

Notes: In the section of data separated by <FS> or <GS>, the printer decrements the values in data entry fields by n after it prints each batch.

The printer generates an error code (22) if the decrement value is out of range.

Field Increment, Set

Purpose: Sets the increment value for the selected field.

Syntax: `<ESC>In`

where *n* is the increment value. For all printers, the range for *n* is 1 to 1999. Default is 1.

Notes: In the section of data separated by <FS> or <GS>, the printer increments the values in data entry fields by *n* after it prints each batch. You must use this command when you are defining a format in Programming mode. This example shows how to use the field increment command:

```
<STX><ESC>E5<CAN><ETX>
<STX>Lot 23455 262948<CR><FS>307 91747<FS><ESC>I2<ETX>
<STX><RS>5<ETB><ETX>
```

The printer generates an error code (22) if the increment value is out of range.

First Data Entry Field, Select

Purpose: Sets the field pointer to the lowest numbered data entry field that can accept Print mode data.

Syntax: `<ACK>`

Notes: This command ensures that data prints in the field with the lowest number if you do not want to specify a data field by its field number.

Font, Transmit

Purpose: Uploads a font from the printer in the form of commands and data the printer receives to create the font.

Syntax: `<ESC>v`*n*

where *n* is the font ID number.

Font, Transmit - Values Listed by Printer

Printer	Default	Values for n
3240	None	0 to 28, 30 to 41, and 50 to 56 with the Kanji option
3400A	None	0 to 24
3400B, 3400C 3400D	None	0 to 25, 30 to 41, and 50 to 56 with the Kanji option
3400e	None	0 to 28, 30 to 41 and 50 to 56 with the Kanji option
3440	None	0 to 28, 30 to 41, and 50 to 56 with the Kanji option
3600	None	0 to 25, 30 to 41, and 50 to 56 with the Kanji option
4100	None	0 to 24
4400	None	0 to 25
44X0	None	0 to 28, 30 to 41, and 50 to 56 with the Kanji option
4X30	None	0 to 28, 30 to 41
7421, PC41	None	0 to 28, 30 to 41
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	None	0 to 28, 30 to 41

Notes: The font names are listed in the **"Font Type, Select" command on page 137.**

If you send <ESC>v to the printer without specifying a value for *n*, the printer (except for the 3400A, 3400B, 3600, and 4400) uploads the entire user-defined fonts directory. The directory appears in this format:

`IDnumber, name, type, storagesize<CR><LF>`

where:

IDnumber   is the font number that was specified by *n* in the command that created the user-defined font.

name   is the optional font name that may have been specified by *,name* in the command that created the user-defined font.

type   is 200 for Bitmap fonts, 300 for Speedo outline fonts, or 301 for TrueType fonts.

storagesize   is 0 for resident fonts.

Always transmit fonts in Advanced mode.

The target printer remains in Advanced mode. The printer generates an error code (27) if you enter an invalid number.

Form Feed

Purpose: Feeds a label out to the next print point.

Syntax: <FF>

Notes: If you use self-strip, the printer feeds out one blank label to the strip pin, skipping an entire label. If you use batch operation with die-cut label stock, the label moves to the tear bar.

If you use continuous label stock, the label stock moves the same amount as the end-of-print skip distance.

Format, Select

Purpose: Selects a format for data entry or printing.

(RFID) If you have fixed data, this command writes to the RFID tag.

Syntax: <ESC>E*n*[,*m*]

where:

n   is the numeric format ID.

m   specifies whether to reimage the entire label or just the changed fields.

Format, Select - Values Listed by Printer

Printer	Default	Values for n	Values for m	Notes
3240	n = 0	0 to 99	0 = reimage entire label. 1 = reimage only changed fields.	
3400A 3400B	n = 0	0 to 19	0 = reimage entire label. 1 = reimage only changed fields.	
3400C 3400D	n = 0	*, 0 to 19	Not available	Use * for the label format to temporarily store the format in RAM.
3400e	n = 0	*, 0 to 99	Not available	Use * for the label format to temporarily store the format in RAM.
3440	n = 0	*, 0 to 99	Not available	Use * for the label format to temporarily store the format in RAM.
3600	n = 0	0 to 19	0 = reimage entire label. 1 = reimage only changed fields.	
4400	n = 0	0 to 19	0 = reimage entire label. 1 = reimage only changed fields.	
44X0	n = 0	*, 0 to 99	Not available	Use * for the label format to temporarily store the format in RAM.
4X30	n = 0	0 to 19	Not available	Use * for the label format to temporarily store the format in RAM.
7421, PC41	n = 0	*, 0 to 99	Not available	Use * for the label format to temporarily store the format in RAM.

Format, Select - Values Listed by Printer (continued)

Printer	Default	Values for n	Values for m	Notes
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	*, 0 to 99	Not available	Use * for the label format to temporarily store the format in RAM.

Notes: If you select a page other than 0, *n* is an alphabetic format position within the page with a range from a to z.

After you select the format, the field pointer points to the lowest numbered data entry field.

The printer must be able to completely image a label, within the available number of image bands, for the reimaging command to work and retain the image. The printer starts imaging the label as soon as it receives the command to select a format.

The printer clears all host entered/variable data from this format.

The printer generates an error code (36) if you enter an invalid format number.

Format, Transmit

Purpose: Uploads a format from the printer in the form of commands and data the printer uses to create the format.

Syntax: `<ESC>x`*n*

where *n* is the format ID number.

Format, Transmit - Values Listed by Printer

Printer	Default	Values for n
3240	None	0 to 19
3400A, 3400B	None	0 to 19
3400C, 3400D, 3400e	None	0 to 99
3440	None	0 to 99
3600	None	0 to 19
4100	None	0 to 19
4400	None	0 to 19
44X0	None	0 to 99
4X30	None	0 to 19
7421, PC41	None	0 to 99
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	None	0 to 99

Format, Transmit (Continued)

Notes: If you send <ESC>x to the printer without specifying a value for *n*, the printer (except for the 3400A, 3400B, 3600, and 4400) uploads the entire format directory. The directory appears in this format:

[*IDnumber*] [*name*] [*type*] [*storagesize*]<CR><LF>

where:

IDnumber   is the format number specified in the command that created the format.

name   is the optional format name specified by *name* in the command that created the format.

type   is 0 for formats.

storagesize   is the number of bytes needed to store the format.

The target printer remains in Advanced mode. The printer generates an error code (25) if you enter an invalid number.

Increment and Decrement, Disable

Purpose: Resets any increment or decrement flags for the current field.

Syntax: <ESC>N

Memory Usage, Transmit

Purpose: Uploads information on the amount of memory installed or allocated and the amount of memory not being used.

Syntax: <ESC>m*n*

where *n* specifies the type of the memory.

Memory Usage, Transmit - Values Listed by Printer

Printer	Default	Values for n
3400e	n = 0	0 = Transmits the amounts of memory not being used.
		1 = Transmits the amount of installed SRAM, DRAM, or Flash RAM.
3440	n = 0	0 = Transmits the amounts of memory not being used.
		1 = Transmits the amount of installed SRAM, DRAM, or Flash RAM.
44X0	n = 0	0 = Transmits the amounts of memory not being used.
		1 = Transmits the amount of installed SRAM, DRAM, or Flash RAM.
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	0 = Transmits the amounts of memory not being used.
		1 = Transmits the amount of installed SRAM, DRAM, or Flash RAM.

Memory Usage, Transmit (Continued)

Notes: The printer uploads the amount of total storage memory available for formats, fonts, and UDCs. The amount of available RAM not being used follows the amount of total RAM. The printer separates the numbers by a comma: 32,10.

This command was called Storage Area Usage, Transmit in older versions of the 3240, 3400, and 3600 printer manuals. This command is called Static RAM Usage, Transmit in the 4400 printer manual.

Next Data Entry Field, Select

Purpose: Moves the field pointer to the next data entry field.

Syntax: `<CR>`

Notes: If you have not selected a page and the pointer is designating the last field, the field pointer moves back to the first data entry field in the format. If you selected a multiformat page and the field pointer is pointing to the last field in a format, it moves to the first field in the next format.

Numeric Field Separator

Purpose: Specifies which numeric data within a field to increment or decrement. You must enclose the data between two sets of <FS> commands:

`<FS>data<FS>`

Syntax: `<FS>`

Notes: You can have more than one region per field as long as they do not overlap. The printer independently increments or decrements each region according to the increment or decrement value specified for the field. The length of data does not change. Rather, the values increment or decrement as in an odometer: 9 increments to 0. The printer ignores any non-numeric characters within the region.

The following example illustrates the Numeric Field Separator command:

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1;<ETX>
<STX>H1;o175,10;f3;c2;h2;w2;b10;<ETX>
<STX>H2;o75,10;f3;c2;h2;w2;b10;<ETX>
<STX>H3;o200,10;f3;c7;h2;w2<ETX>
<STX>H4;o100,10;f3;c7;h2;w2<ETX>
<STX>R<ETX>
<STX><ESC>E1<CAN><ETX>
<STX><CR><ESC>I1<FS>1<FS><ETX>
<STX><CR><ESC>D1<FS>10<FS><ETX>
<STX><CR>Increment Field<ETX>
<STX><CR>Decrement Field<ETX>
<STX><RS>3<ETB><ETX>
```

Options Selected, Transmit

Purpose: Uploads the list of selected options.

Syntax: `<ESC>O`

Options Selected, Transmit - Values Returned by Printer

Printer	Values Returned by Printer
3240	0 = No options selected 4 = Self-strip
3400A 3400B	0 = No options selected 4 = Self-strip
3400C 3400D	0 = No options selected 1 = Cutter 4 = Self-strip
3400e	0 = No options selected 1 = Cutter 4 = Self-strip
3440	0 = No options selected 4 = Self-strip
3600	0 = No options selected 4 = Self-strip
4100	0 = No options selected 1 = Cutter 4 = Self-strip 5 = Ribbon save
4400	0 = No options selected 1 = Cutter 2 = Batch takeup 3 = Self-strip and applicator 4 = Self-strip
44X0	0 = No options selected 1 = Cutter 2 = Batch takeup (if you have the option installed) 4 = Self-strip
4X30	0 = No options selected 1 = Cutter 2 = Batch takeup 3 = Self-strip and applicator 4 = Self-strip
7421, PC41	0 = No options selected 1 = Cutter
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	0 = No options selected 1 = Cutter 4 = Self-strip
EasyCoder PM4i (RFID)	0 = No options selected 1 = Cutter 4 = Self-strip 6 = RFID

Page, Select

Purpose: Selects a page for data entry or printing.

(RFID) If you have fixed data, this command writes to the RFID tag.

Syntax: `<ESC>G`*n*

where *n* is the page ID number. For all printers, the range for *n* is 0 to 9. Default is 0.

Notes: After you select the page, the field pointer points to the lowest numbered data entry field of the lowest position format.

The printer clears all host-entered data from this page.

The printer generates an error code (36) if you enter an invalid page number.

Page, Transmit

Purpose: Uploads a page from the printer in the form of commands used to create a format. It also uploads all formats in a page.

Syntax: `<ESC>y`*n*

where *n* is the page ID number. For all printers, the range for *n* is 1 to 9.

Notes: If you send <ESC>y to the printer without specifying a value for *n*, the printer uploads the entire page directory. The directory appears in this format:

`[`*IDnumber*`] [`*name*`] [`*type*`] [`*storagesize*`]<CR><LF>`

where:

IDnumber is the page number specified in the command that created the page.

name is the optional page name specified by *name* in the command that created the format.

type is 1 for pages.

storagesize is always 0 for a page.

The target printer remains in Advanced mode. The printer generates an error code (26) if you enter an invalid number.

Print

Purpose: Prints the current page or format with previously entered data.

(For the PM4i with the RFID option only) Writes data to the RFID tag.

Syntax: `<ETB>`

Printhead Parameters, Transmit

Purpose: Transmits the number and size of dots in the printhead back to the host.

Syntax: `<ESC>H`

Notes: Here is an example of what you can expect to see: 896,5.0.

Program Mode, Enter

Purpose: Causes the printer to enter Program mode for the purpose of creating or editing pages, formats, fonts, or graphics.

Syntax: `<ESC>P`

Notes: When this command is executed, you lose all previously entered data.

Program Number, Transmit

Purpose: Transmits both the program number and the version number.

Syntax: `<ESC>M`*n*

where *n* returns the program and version numbers. Valid values for *n* are:

0   returns program # and version # (default)
1   returns program #, version #, and model # (supported by 3400e and 44x0 only)

Here is an example of what you might see: 059877,1.4.

For the 3400e, `<ESC>M1` returns program #, version #, and 3400E2 or E4 (200 dpi/400 dpi)

Notes: This command uploads the program and software version number to the host as an ASCII alphanumeric character string.

Quantity Count, Set

Purpose: Sets the quantity of label batches to be printed by the next print command.

Syntax: `<RS>`*n*

where *n* is the number of batches. For all printers, the range for *n* is 1 to 9999. Default is 1.

Here is an example of how to use this command:

`<STX><RS>5<ETB><ETX>`

Notes: The printer generates an error code (21) if the quantity is out of range.

Data increments or decrements between batches of labels.

RFID Tag, Read

Purpose: Tells the printer to read the data from the RFID tag. This command is supported only by the PM4i with the RFID option.

Syntax: `<ESC>Jn,m,p,q`

where:

n   specifies the data format as described in the next table.

Value for n	Data Format
0	NUM
1 (default)	HEX
2	ASCII
3	SSCC-96
4	SSCC-64
5	SGTIN-96
6	SGTIN-64
7	EPC-URN
8	EPC-HEX96
9	EPC-HEX64
10	SGLN-96
11	SGLN-64
12	GRAI-96
13	GRAI-64
14	GIAI-96
15	GIAI-64
16	GID-96
17	USDOD-96
18	USDOD-64

m   specifies a tag segment from which data is read. Valid values for *m*:

1   ID (default)
2   Data
3   All

p   specifies the first byte of the declared segment (,*m*) from which the data is read (start of read). Value for *p* varies by RFID tag type (default is 0). The first byte of the segment is always 0, regardless of the segment's physical location on the tag.

q   specifies how many bytes of data that are read (length of read). Value for *q* varies by RFID tag type (default is 8). The length of field data may differ, depending on the segment and tag air interface ISO standard.

Notes: If the tag read fails, an error status of <SOH> is set. If auto-transmit level 3 is enabled, an <SOH> status response is returned to the host.

Start and Stop Codes (Code 39), Print

Purpose: Instructs the current Code 39 field to print only the start and stop characters.

Syntax: `<ESC><SP>`

where <SP> is the space character.

Notes: The printer clears all previous data from the current field.

Storage Area Usage, Transmit

See the **"Memory Usage, Transmit" command on page 96.**

Test and Service Mode, Enter

Purpose: Enters Test and Service mode.

Syntax: `<ESC>T`

Notes: The printer completes all print jobs before executing this command. When the printer enters Test and Service mode, it erases any host-entered data that was sent prior to the command.

User-Defined Characters, Transmit

Purpose: Uploads a graphic (user-defined character) from the printer in the form of commands and data the printer receives to create the graphic.

Syntax: `<ESC>u`*n*

where *n* is the graphic ID number. For all printers, the range for *n* is 0 to 99.

Notes: If you send <ESC>u to the printer without specifying a value for *n*, the printer (except for the 3400A, 3400B, 3600, and 4400) uploads the entire graphics directory. The directory appears in this format:

`[IDnumber] [name] [type] [storagesize]<CR><LF>`

where:

IDnumber is the graphic number that was specified by n in the command that created the graphic.

name is the optional graphic name that may have been specified by ,name in the command that created the graphic.

type is 100 for a graphic.

storagesize is the number of bytes needed to store the graphic.

If the printer is in Advanced mode, each data byte represents six bits of the graphic bitmap. If the printer is in Emulation mode, each data byte represents one bit of the graphic image.

The printer generates an error code (28) if you enter an invalid number.

User-Defined Tables, Transmit

Purpose: Causes the printer to upload the user-defined command and protocol tables that the printer receives to download a new command set.

This command is not supported by the EasyCoder 7421, F4, PC41, PD41, PF4i, PF6i, PM4i, PX4i, or PX6i printers.

Syntax: `<ESC>Zt`

where *t* identifies the table. For all supported printers, valid values for *t* are:

0   Print mode commands
1   Escape print commands
2   Shift print commands
3   Status response
4   Protocol characters

Notes: You can find tables listing the default values in Appendix D, "User-Defined Interface Tables."

The printer generates an error code (12) if you enter an invalid number.

Use this command to substitute protocol and command characters.

Warm Boot

Purpose: Resets the printer with a warm boot.

Syntax: `<BS>`

Notes: Unlike the <DLE> command, this command does not take effect immediately. The printer executes all previous commands before the warm boot takes effect.

You will lose any data that is sent after this command and before the printer finishes rebooting. Use this command when configuration changes require a printer reset.

Configuration Commands

Use configuration commands to set parameters for configuration features and to enable or disable options. When using configuration commands with printers with RFID modules, these commands affect how the RFID tag interacts with the printer.

Configuration commands are effective when the printer is in Print mode. You can switch to Print mode with this command:

<STX>R<ETX>

For help downloading configuration commands to the printer, see **"Sending IPL Commands to the Printer" on page 5.**

Note: You must precede each string of commands with the start of message character <STX> and follow it with the end of message character <ETX>. The printer terminates a configuration command when it receives the next command in the message.

After reconfiguring your printer, you must cycle power or reset the printer for the commands to become effective unless specified otherwise; however, when configuring the 3400e, 4420, and 4440 printers, do not cycle power using the hardware power switch. You must send the Reset command (<BS> character) after issuing the new configuration command or commands.

Amount of Storage, Define

Purpose: Specifies the amount of RAM you have allocated for storage.

Syntax: <SI>N*n*

where *n* is the amount of RAM in kilobytes.

Amount of Storage, Define - Values Listed by Printer

Printer	Without Expanded RAM		With Expanded RAM	
	Default	Values for n	Default	Values for n
3240	n = 60	10K to 120K	n = 200	10K to 504K
3400A	n = 20	10K to 32K	n = 120	10K to 128K
3400B 3400C 3400D	n = 60	10K to 120K	n = 200	10K to 504K
3600	n = 60	10K to 120K	n = 200	10K to 504K
4100	n = 20	10K to 32K	n = 120	10K to 128K

Notes: The printer buffers this command until you execute it. When you execute this command, it erases all previously stored format, fonts, or UDCs but does not change the printer configuration. Use this command with printers that share image generation and format/UDC/fonts storage area.

Audible Alarm, Enable or Disable

Purpose: Turns the audible alarm feature on or off.

This command is supported by the 4400 and the EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, and PX6i printers.

Syntax: `<SI>a`*n*

where *n* enables or disables the alarm. For all supported printers, valid values for *n* are:

0   Turns the alarm off (default).
1   Turns the alarm on.

Auto-Transmit 1, Enable

Purpose: Enables auto-transmit level 1.

Syntax: `<ESC>j`

Notes: The printer uploads the status in the following order of priority for Intermec Standard Protocol. See Appendix D, "User-Defined Interface Tables," for codes for other protocols.

<DC1>   Fault cleared.
             (<DC2> transmitted when Flow Control Protocol selected.)
<FS>   Label at strip pin
<BS>   Takeup reel full
<EM>   No label stock
<US>   Ribbon fault
<US>   Label path open

Auto-Transmit 2, Enable

Purpose: Enables auto-transmit level 2.

Syntax: `<ESC>d`

Notes: At level 2, the printer automatically transmits the status response code indicating room in input buffer (<DC1> for Standard Protocol and <DC2> for Flow Control Protocol). Without auto-transmit enabled, the host must use the <ENQ> or <VT> command to determine the status.

Auto-Transmit 3, Enable

Purpose: Enables auto-transmit level 3.

(RFID) The statuses are set after the RFID tag is read from or written to. They are erased when the label is printed.

Syntax: `<ESC>e`

Auto-Transmit 3, Enable (Continued)

Notes: The printer transmits a status response when this condition occurs:

<ACK>	RFID tag write successful
<EOT>	RFID tag write error
<HT>	Imager overrun
<RS>	Insufficient RAM for printing or storage
<SOH>	Printing is complete and the buffer is empty
<VT>	RFID tag read error

Auto-Transmit 1, 2, and 3, Disable

Purpose: Disables the auto-transmit status responses.

Syntax: `<ESC>k`

Communication Port Configuration, Set

Purpose: Sets the serial and parallel port configuration.

Syntax: `<SI>P[n1][,n2][,n3][,n4][,n5][,n6]`

where:

n1	sets the baud rate.
n2	sets the parity.
n3	sets the data bits.
n4	sets the protocol.
n5	sets the Multi-Drop address (if you are using Multi-Drop).
n6	sets the parallel port mode.

Communication Port Configuration, Set - Values Listed by Printer

Printer	Defaults	Values for n1	Values for n2	Values for n3	Values for n4	Values for n5	Values for n6
7421, PC41	n1 = 3 n2 = 0 n3 = 1 n4 = 0 n5 = A n6 = 0	0 = 1,200 1 = 2,400 2 = 4,800 3 = 9,600 4 = 19,200	0 = None 1 = Even 2 = Odd	0 = 7 bits 1 = 8 bits	0 = XON/ XOFF 1 = XON/ XOFF with status 2 = Intermec Standard 3 = Polling Mode D	A - Z, 0 - 5	0 = Centronic Mode 1 = 1284 Nibble Mode
EasyCoder F4	n1 = 3 n2 = 0 n3 = 1 n4 = 0	0 = 1,200 1 = 2,400 2 = 4,800 3 = 9,600 4 = 19,200 5 = 38,400 6 = 57,600 7 = 115,200	0 = None 1 = Even 2 = Odd	0 = 7 bits 1 = 8 bits	0 = XON/ XOFF 2 = Intermec Standard	Not available	Not available

Communication Port Configuration, Set - Values Listed by Printer (continued)

Printer	Defaults	Values for n1	Values for n2	Values for n3	Values for n4	Values for n5	Values for n6
EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n1 = 3 n2 = 0 n3 = 1 n4 = 0	0 = 1,200 1 = 2,400 2 = 4,800 3 = 9,600 4 = 19,200 5 = 38,400 6 = 57,600 7 = 115,200	0 = None 1 = Even 2 = Odd	0 = 7 bits 1 = 8 bits	0 = XON/ XOFF 1 = XON/ XOFF with status 2 = Intermec Standard	Not available	Not available

Control Panel Access Permission, Set

Purpose: Sets a security level to restrict access to certain menus.

Syntax: `<SI>An`

where *n* specifies the menus that can be accessed.

Control Panel Access Permission, Set - Values Listed by Printer

Printer	Default	Values for n
4400	n = 0	0 = Allows access to all menus (operator, configuration, installation, and test and service) 1 = Allows access to operator and configuration menus only 2 = Allows access to the operator menu only 3 = Denies access to all menus
4X30	n = 0	0 = Allows access to all menus (operator, configuration, installation, and test and service) 1 = Allows access to operator and configuration menus only 2 = Allows access to the operator menu only 3 = Denies access to all menus
EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n=0	0 = Allows access to all Setup menus 1 = Denies access to all Setup menus

Cutter, Enable or Disable

Purpose: Turns the cutter feature on or off if the cutter option is installed. Reset the printer after sending this command.

This command is not supported by the 3400A, 3400B, or 3600 printers, or by the EasyCoder F4 with IPL firmware earlier than v1.4.

Syntax: `<SI>cn`

where *n* enables or disables the cutter. For all supported printers, valid values for *n* are:

0   Disables the cutter (default).
1   Enables the cutter.

Dark Adjust, Set

Purpose: Sets the dark adjust command. This command controls the print darkness on the labels.

Syntax: `<SI>d`*n*

where *n* specifies the darkness setting. For all printers, the range for *n* is -10 (darkest) to +10 (lightest) in increments of 1. Default is 0.

Direct Graphics Emulation Mode, Enable or Disable

Purpose: Prints direct graphics with the same origin offset as a specific legacy printer. This command is supported only by the PC41.

Syntax: `<SI>o`*n*

where *n* enables or disables the emulation mode. Valid values for *n* are:

0   Emulate 7421 printer.
1   Direct graphics origin is the same as the format's origin.

Emulation or Advanced Mode on Power-Up

Purpose: Selects Emulation or Advanced printer operating mode on power-up.

Syntax: `<SI>C`*n*

where *n* specifies the mode and mil.

Emulation or Advanced Mode on Power-Up - Values Listed by Printer

Printer	Default	Values for n	Notes
3240	n = 3	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil) 3 = Advanced mode (2.5 mil)	
3400	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil)	
3400e	200 dpi: n = 1 400 dpi: n = 3	200 dpi: 0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil) 400 dpi: 0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil) 3 = Advanced mode (2.5 mil)	You can only use the Advanced mode 2.5 mil option on the 3400e with the 400 dpi option.
3440	n = 3	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil) 3 = Advanced mode (2.5 mil)	

Emulation or Advanced Mode on Power-Up -
Values Listed by Printer (continued)

Printer	Default	Values for n	Notes
3600	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil)	
4100	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil)	
4400	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil)	
4420	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil)	
4440	n = 3	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil) 3 = Advanced mode (2.5 mil)	
7421, PC41	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil)	
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 1	0 = Emulation mode (10 mil) 1 = Advanced mode (5 mil) 2 = Emulation mode (15 mil)	

Notes: Emulation mode lets you print labels that were designed on an 86XX printer in multiples of 10 or 15 mil. Advanced mode lets you print bar code labels in multiples of 2.5 or 5 mil.

End-of-Print Skip Distance, Set

Purpose: Sets the end-of-print skip distance. This distance is a value in 5 mil increments that the label advances after printing or when you pause printing. This command is ineffective in self-strip applications.

Syntax: `<SI>D[n]`

where *n* is the distance in 5 mil increments (3.3 mil increments on 4X30 printers).

End-of-Print Skip Distance, Set - Values Listed by Printer

Printer	Default		Values for n
3240	n = 0	Label Stock mode	0 to 9999 in 5 mil increments
	n = 118	Continuous Stock mode	
3400	n = 0	Label Stock mode	0 to 9999 in 5 mil increments
	n = 118	Continuous Stock mode	

End-of-Print Skip Distance, Set - Values Listed by Printer (continued)

Printer	Default		Values for n
3400e	n = 0 n = 123	Label Stock Mode Continuous Stock mode	0 to 9999 in 5 mil increments
3440	n = 0 n = 123	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
3600	n = 0 n = 118	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
4100	n = 0 n = 118	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
4400	n = 0 n = 141	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
44X0	n = 0 n = 132	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
4X30	n = 0 n = 94	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
7421	n = 0 n = 160	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
PC41	n = 0 n = 136	Label Stock mode Continuous Stock mode	0 to 9999 in 5 mil increments
EasyCoder F4, PF2i, PF4i	n = 0 n = 103	Label Stock mode Continuous Stock mode	
EasyCoder PD41	n = 0 n = 93	Label Stock mode Continuous Stock mode	
EasyCoder PM4i, PX4i, PX6i	n = 0 n = 100	Label Stock mode Continuous Stock mode	

Notes: To advance the label out to the tear bar in label stock mode, set n to the Continuous Stock mode value.

If you enter a value for *n,* it applies to both Continuous mode and Label Stock mode, regardless of the mode in which you enter the value.

If you do not specify a value for *n*, the <SI>D command returns the printer to the default.

IBM Language Translation, Enable or Disable

Purpose: Turns the IBM language translation feature on or off.

Syntax: `<SI>i`*n*

where *n* enables or disables IBM translation. For all printers, valid values for *n* are as follows:

0   Disables IBM translation.
1   Enables IBM translation.

Notes: This feature allows IBM compatible characters to replace standard ASCII characters based on the current printer language (see your printer user's manual for international character sets). This command overrides the language translation based on the current printer emulation.

Intercharacter Delay, Set

Purpose: Sets the intercharacter delay. The intercharacter delay is the time delay between characters in a message the printer transmits.

This command is not supported by the EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, or PX6i printers.

Syntax: `<SYN>`*n*

where *n* is the intercharacter delay in milliseconds. For all supported printers, the range for *n* is 0 to 9999. Default is 0.

Interlabel Ribbon Save, Enable or Disable

Purpose: Enables or disables the interlabel ribbon save feature on the 4100 printer. The printer ignores this command if the ribbon save option is not installed.

Syntax: `<SI>s`*n*

where *n* enables or disables the feature. Valid values for *n* are:

0   Disables interlabel ribbon save.
1   Enables interlabel ribbon save.

Label Rest Point, Adjust

Purpose: Adjusts the point at which labels stop for removal. Use this command for self-strip and cutter applications.

Syntax: `<SI>f`*n*

where *n* specifies the label stop point. For all printers, the range for *n* is -30 (farthest back) to +30 (farthest forward) in 5 mil increments. Default is 0.

Notes: You can also set this command by using the control panel or Test and Service DIP switches. For help, see your printer user's manual.

Label Retract, Enable or Disable

Purpose: Turns the label retract option on or off.

Syntax: `<SI>R`*n*

where *n* enables or disables the label retract option. Valid values for *n* are:

0   Disables label retract.
1   Enables label retract (default)
2   (3400e, 44x0 only) Enables delayed retract.

Notes: If you select die-cut label stock, the printer determines the retract distance automatically.

If you select continuous label stock, the printer uses the retract distance set by the Label Retract Distance, Set command (see **page 112**).

If you select delayed retract, the printer waits until it receives the next print command to retract.

Label Retract Distance, Set

Purpose: Sets the label retract distance.

Syntax: `<SI>rn`

where *n* specifies the label retract distance in 5 mil increments. For all printers, the range for *n* is 0 to 399.

For the 4400, the default value for *n* is 284 (or 216 for the 6.5 mil printhead). For all other printers, the default value for *n* is 0.

Notes: This command works with continuous label stock only. The label retracts to this distance at the start of a print.

Label Stock Type, Select

Purpose: Selects the type of label stock.

Syntax: `<SI>Tn`

where *n* specifies the type of stock. For all printers, valid values for n are as follows:

0   Continuous label stock (no breaks).
1   Label stock with gaps between labels (default).
2   Label stock with marks between labels (on back of label stock).

Notes: To make this command effective, reset the printer or turn the power off and on again after issuing the command.

Label Width, Set

Purpose: Sets the label width to *n* in dot increments.

Syntax: `<SI>Wn`

where *n* is a number between the minimum and maximum number of dots for your printer. Calculations for all printers (except the 4440 printer) use a 5 mil dot.

Label Width, Set - Values Listed by Printer

Printer	Default	Values for n	Notes
4400	n = 896	50 to 896	This command is effective upon execution.
4400 with 6.5 mil printhead	n = 672	50 to 672	This command is effective upon execution.
44X0	4420: n = 896 4440: n = 1792	4420: 50 to 896 4440: 100 to 1792	This command is effective upon execution. For the 4440 printer, n must be calculated using 2.5 mil dot.
7421, PC41	n = 832	50 to 832	This command is effective upon execution.

Label Width, Set (Continued)

Notes: (44X0 only) When you print narrower labels, set this command to reduce torque. You may need to experiment with this command until your labels print properly. In high humidity environments, you may also want to use the Takeup Motor Torque, Increase command.

Maximum Label Length, Set

Purpose: Defines the maximum label length.

Syntax: `<SI>L`*n*

where *n* specifies the maximum label length in 5 mil increments.

Maximum Label Length, Set - Values Listed by Printer

Printer	Default	Values for n
3240	n = 1000	100 to 4800
3400	n = 1000	100 to 4800
3440	n = 1000	100 to 4800
3600	n = 1000	100 to 4800
4100	n = 1000	100 to 4800
4400	n = 1000	200 to 4800
44X0	n = 1000	100 to 4800
4X30	n = 1000	200 to 4800
7421, PC41	n = 1000	100 to 4800
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 1200	100 to 4800

Notes: The printer uses this number for detecting media faults. It does not use this number to limit the image size of a format on the label.

Media Fault Recovery Mode, Set

Purpose: Sets the media fault recovery mode. This command is not supported by the 3240, 3400, 3440, 3600, 4100, or 4x30 printers.

Syntax: `<SI>e`*n*

where *n* sets the recovery mode. For all supported printers, valid values for *n* are:

0   Reprints interrupted label.
1   Does not reprint interrupted label.

Media Sensitivity, Select

Purpose: Selects the media sensitivity of the printer.

Syntax: `<SI>g`*n*`[,`*m*`]`

where:

n specifies direct thermal (DT) media or thermal transfer (TTR) media.

m specifies the sensitivity.

Media Sensitivity, Select - Values Listed by Printer

Printer	Default	Values for n	Values for ,m	Notes
3240	n = 0	0 = Direct thermal 1 = Thermal transfer	420 = Direct thermal 567 = Thermal transfer	You can only set n by using the DIP switches.
3400A 3400B	n = 0	0 = Direct thermal 1 = Thermal transfer	420 = Direct thermal 567 = Thermal transfer	You can only set n by using the DIP switches.
3400C 3400D	n = 0	0 = Direct thermal 1 = Thermal transfer	470 = Direct thermal 567 = Thermal transfer	You can only set n by using the DIP switches.
3400e	n = 0	0 = Direct thermal 1 = Thermal transfer	470 = Direct thermal (2-5 ips) 720 = Direct thermal (6-8 ips) 567 = Thermal transfer	You can only set n by using the DIP switches.
3440	n = 0	0 = Direct thermal 1 = Thermal transfer	470 = Direct thermal 567 = Thermal transfer	You can only set n by using the DIP switches.
3600	n = 0	0 = Direct thermal 1 = Thermal transfer	420 = Direct thermal 567 = Thermal transfer	You can only set n by using the DIP switches.
4100	n = 0	0 = Direct thermal 1 = Thermal transfer	420 = Direct thermal 567 = Thermal transfer	You can only set n by using the Transfer On switch on the front of the 4100 printer.
4400	n = 0	0 = Direct thermal 1 = Thermal transfer	420 = Direct thermal 567 = Thermal transfer	This command is effective after you cycle printer power.
44X0	n = 0	0 = Direct thermal 1 = Thermal transfer	470 = Direct thermal (2-5 ips) 720 = Direct thermal (6-8 ips) 567 = Thermal transfer	You can only set n by using the DIP switches.
4X30	n = 0	0 = Direct thermal 1 = Thermal transfer	Not available	The ,m parameter is not available for the 4630 and 4830 printers.
7421, PC41	n = 0	0 = Direct thermal 1 = Thermal transfer	180 = Direct thermal 567 = Thermal transfer	
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	0 = Direct thermal 1 = Thermal transfer	420 = Direct thermal 567 = Thermal transfer	

Notes: For help setting *m*, see your printer user's manual.

This command was called TTR/Direct Thermal Media Grade, Select in the 4630 and 4830 printers user's manual.

Message Delay, Set

Purpose: Sets the message delay to *n* milliseconds.

This command is not supported by the EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, or PX6i printers.

Syntax: `<ESC><SYN>n`

where *n* is the number of milliseconds to delay the start of a printer transmission. For all supported printers, the range for *n* is 0 to 9999. Default is 0.

Number of Image Bands, Set

Purpose: Selects the number of image bands.

This command is not supported by the EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, or PX6i printers.

Syntax: `<SI>In`

where *n* is the number of image bands. For supported printers, this command is effective upon execution.

Number of Image Bands, Set - Values Listed by Printer

Printer	Default	Values for n
3240	n = 3	2 to 5 if the printer has 128K of static RAM.
		2 to 7 if the printer has expanded RAM.
3400	n = 3	2 to 6 if the printer has 32K of static RAM.
		2 to 12 if the printer has expanded RAM
3400e	n = 3	200 dpi: 2 to 20 with the standard 1 MB of DRAM.
		400 dpi: 2 to 9 with the standard 1 MB of DRAM. 2 to 20 if the printer has expanded memory.
3440	n = 3	2 to 9 if the printer has 1 MB of DRAM.
		2 to 20 if the printer has expanded memory.
3600	n = 3	2 to 13 if the printer has 128K of static RAM.
		2 to 25 if the printer has expanded RAM.
4100	n = 3	2 to 6 if the printer has 32K of static RAM.
		2 to 12 if the printer has expanded RAM.
4400	n = 3	2 to 10 if the printer has 512K of RAM.
44X0	n = 3	4420: 2 to 20 with the standard 1 MB of DRAM.
		4440: 2 to 9 with the standard 1 MB of DRAM. 2 to 20 if the printer has expanded memory.
7421, PC41	n = 3	2 to 12 if the printer has 512K of DRAM.

Online or Offline on Power-Up

Purpose: Selects the printer to be online or offline when it is turned on.

This command is supported only by the 4400 and 4x30 printers.

Syntax: `<SI>On`

where *n* specifies online or offline. Valid values for *n* are:

0   Printer is online at power up (default).
1   Printer is offline at power up.

Pin 11/20 Protocol, Set

Purpose: Sets the protocol for pin 11/20.

Syntax: `<SI>pn[,m]`

where:

n   sets the protocol for pin 20 (DTR).

m   sets the protocol for pin 11 (PS).

Pin 11/20 Protocol, Set - Values Listed by Printer

Printer	Default	Values for n and m	Notes
3400e 44X0	n = 0 m = 0	0 = The pin follows the software protocol 1 = Always ready (high) 2 = Flow control 3 = Ready/Busy	
7421, PC41	n = 0 m = 0	0 = The pin follows the software protocol 1 = Always ready (high) 2 = Flow control 3 = Ready/Busy	The 7421 and PC41 use pins 6 and 9 instead of pins 20 and 11.

Notes: By default, the pin uses flow control if the serial port is set for XON/XOFF. The pin uses ready/busy if the port is set to Intermec Standard protocol.

When you set a pin to always ready (high), the pin is held high as long as the printer receives power.

When a pin is set to flow control, the pin is high when there is room in the data buffer. The pin is held low when the data buffer is full.

When a pin is set to ready/busy, the pin is high when the printer status is ready. The pin is held low when the printer is in one of these conditions:

- Offline
- Buffer full
- No label stock
- Ribbon fault
- Label at strip pin
- Printhead hot

Postamble, Set

Purpose: Sets the postamble character.

Syntax: `<EOT>n`

where *n* specifies the postamble character. For all printers, *n* can be any ASCII character. Default is <NUL> (printer does not send a postamble character).

Preamble, Set

Purpose: Sets the preamble character.

Syntax: `<SOH>n`

where *n* specifies the preamble character. For all printers, *n* can be any ASCII character. Default is <NUL> (printer does not send a preamble character).

Print Speed, Set

Purpose: Sets the print speed.

Syntax: `<SI>Sn`

where *n* specifies the print speed.

Print Speed, Set - Values Listed by Printer

Printer	Default	Values for n
3240	n = 30	20, 30, or 40 (corresponding to 2, 3, or 4 ips)
3400A 3400B	n = 30	20, 30, 40, or 50
3400C 3400D	n = 30	20, 30, 40, 50, or 60
3400e	n = 30	200 dpi: 20, 30, 40, 50, 60, 70, 80 (no self-strip) 20, 30, 40, 50, 60 (with self-strip) 400 dpi: 20, 30, 40, 50, 60, 70, 80 (no self-strip) 20, 30, 40, 50 (with self-strip)
3440	n = 30	20, 30, 40, or 50
3600	n = 30	20, 30, 40, or 50
4100	n = 30	20, 30, 40, or 50
4400	n = 35	5 mil printhead: A number from 25 to 100 in multiples of 5. 6.5 mil printhead: A number from 25 to 85 in multiples of 5.
44X0	n = 30	20, 30, 40, 50, 60, 70, 80, or 100 (no self-strip) 20, 30, 40, 50, 60, 70, or 80 (self-strip)
4X30	n = 35	20 to 80 in multiples of 5
7421	n = 20	20
PC41	n = 30	20, 30, 40

Print Speed, Set - Values Listed by Printer (continued)

Printer	Default	Values for n
EasyCoder F4, PF2i, PF4i, PM4i, PX4i, PX6i	n = 50	40, 50, 60, 70, 80
EasyCoder PD41	300 dpi: n = 30	300 dpi: 20, 30, 40
	203 dpi: n = 50	203 dpi: 20, 30, 40, 50, 60

Printer Language, Select

Purpose: Selects the printer language.

Syntax: `<SI>ln`

where *n* specifies the language as follows:

Printer Language, Select - Values for n

n	Language	n	Language
0	U.S.A.	13	Code Page 1252, Latin 1, Western Europe
1	United Kingdom	14	Code Page 1253, Greek
2	Germany	15	Code Page 1254, Turkish
3	Denmark	16	Code Page 1255, Hebrew
4	France	17	Code Page 1256, Arabic
5	Sweden	18	Code Page 1257, Baltic Rim
6	Italy	19	Code Page 1258, Vietnamese
7	Spain	20	Code Page 874, Thai
8	8-Bit ASCII	30	Code Page 932, Shift JIS, Japanese
9	Switzerland	31	Code Page 936, GB 2312-80, Simplified Chinese
10	Code Page 850	32	Code Page 949, KSC5601, Korean Hangeul
11	Code Page 1250, Central Europe	33	Code Page 950, Big 5, Traditional Chinese
12	Code Page 1251, Cyrillic, Russian	40	UTF-8

The next table specifies valid values for *n* for each printer.

Printer Language, Select - Values Listed by Printer

Printer	Default	Values for n
3240	n = 0	0 – 10
3400A 3400B	n = 0	0 – 9
3400C 3400D	n = 0	0 – 10
3400e	n = 0	0 – 20, 30 – 33
3440	n = 0	0 – 20, 30 – 33
3600	n = 0	0 – 9
4100	n = 0	0 – 9
4400	n = 0	0 – 9

Printer Language, Select - Values Listed by Printer (continued)

Printer	Default	Values for n
44X0	n = 0	0 – 20, 30 – 33
4X30	n = 0	0 – 10
7421, PC41	n = 0	0 – 10
EasyCoder F4	n = 0	0 – 20
EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	0 – 20, 40

Notes: You can only select one printer language per print job. Bitmap user-defined fonts (including bitmap TrueType) do not use code pages. If your label format requires several language fonts, you can:

- bitmap the TrueType fonts. For help, see **"Creating Bitmap Fonts From TrueType Fonts" on page 15.**

- create your own bitmap fonts. For help, see **"Creating User-Defined Bitmap Fonts" on page 181.**

Resident fonts (those that were installed at the factory) use language selections 0 through 10. The default setting will probably provide all the special characters you will need, but you may want to look through the page tables in Appendix B, "Character Sets," to determine if one of the other languages (0 through 10) would be more suitable. Code pages 11 through 33 do not work with resident fonts.

If you are using a TrueType font (not bitmap), you must match the code page to your language needs. Do not use languages 0 through 10 with scalable TrueType fonts.

If you are using a downloaded scalable (that is, not bitmap) Japanese, Chinese, or Korean TrueType font, you must first locate the correct code page and download it to your printer. (All others are already stored in your printer.) Select the corresponding code page using the Printer Language, Select command. See Chapter 2 for more information about downloading fonts and code pages. See Appendix B for tables of the character sets.

UTF-8 data is encoded using sequences of 1 to 4 bytes. The table below summarizes the different byte sequences of UTF-8 data that is transformed to a character number. The UTF-8 byte sequence (x, y, and z bits) in this table represents a character number in the range of the left column.

UTF-8 Data Transformation

Character Number Range	UTF-8 Byte Sequence
0000 – 007F, xxxxxxx	0xxxxxxx
0080 – 07FF, yyyyyxxxxxx	110yyyyy 10xxxxxx
0800 – FFFF, zzzzyyyyyyxxxxxx	1110zzzz 10yyyyyy 10xxxxxx
10000 – 10FFFF, TBD	TBD

Printer Language, Select (Continued)

The character number is calculated by getting the lower-order bits from the last byte of the sequence and proceeding to the left until there are no x, y, and z bits left. For example, the UTF-8 byte sequence to print a Greek "e" is OxCE OxB5.

Note: Font 61 has the most international characters of all of the resident fonts.

Printhead Loading Mode, Select

Purpose: Selects the printhead loading mode that affects how the whole image prints on the label. Mirror Printing mode reverses the order in which data loads into the printhead. Inverse Printing mode causes all pixels that are white to invert to black and vice versa.

Syntax: `<SI>h`*n*`[,`*m*`]`

Printhead Loading Mode, Select - Values Listed by Printer

Printer	Defaults	Values for n	Values for m
3400C 3400D 3400e	n = 0 m = 0	0 = Normal printing 1 = Mirror Printing mode	0 = Normal printing 1 = Inverse Printing mode
3440	n = 0 m = 0	0 = Normal printing 1 = Mirror Printing mode	0 = Normal printing 1 = Inverse Printing mode
44X0	n = 0 m = 0	0 = Normal printing 1 = Mirror Printing mode	0 = Normal printing 1 = Inverse Printing mode
7421 PC41	n = 0 m = 0	0 = Normal printing 1 = Mirror Printing mode	0 = Normal printing 1 = Inverse Printing mode
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0 m = 0	0 = Normal printing 1 = Mirror Printing mode	0 = Normal printing 1 = Inverse Printing mode

Note: The printhead is not under warranty if you use Inverse Printing mode for batch printing. Intermec does not recommend using Inverse Printing mode for batch printing. For best results with Inverse Printing mode, use a maximum print density of 35 percent.

Printhead Pressure, Set

Purpose: Compensates for variations in the thickness of label stock.

This command is supported only by the 4400.

Syntax: `<SI>Hn`

Printers: where n sets the printhead pressure. Valid values for *n* are:

0   Low printhead pressure
1   High printhead pressure

Notes: If your labels are slipping, or you notice that the pressure is too light, try changing the pressure to the other setting.

Printhead Test Parameters, Set

Purpose: Sets the printhead test parameters.

This command is supported only by the 4400.

Syntax: `<SI>Un[,m][,p][,q]`

where:

n   determines whether printing continues if the printhead test sends a warning. Valid values for *n* are:

0   Printing continues when warning occurs.
1   Printing stops when warning occurs.

m   is the positive threshold of the percentage of the allowable deviation in resistance. The range for *m* is 10 to 45. Default is 45.

p   is the negative threshold of the percentage of the allowable deviation in resistance. The range for *p* is 10 to 45. Default is 45.

q   specifies how often (in terms of the number of labels printed) to automatically run the printhead resistance test. The range for *q* is 0 to 9999. Default is 0 (test is disabled).

Notes: This command is effective upon execution.

RFID Parameters, Set

Purpose: Sets the RFID mode (on or off) and sets the TAGADJUST value and number of label retries. These parameters are also visible in the Setup menu on the printer console. This command is supported only by the PM4i with the RFID option.

Syntax: `<SI>Jn[,m][,p]`

where:

n   enables or disables RFID mode. Valid values for *n* are:

0   RFID mode is disabled and commands are ignored.
1   RFID mode is enabled (default)

RFID Parameters, Set (Continued)

m specifies the distance (in dots) a label must be moved from the default start of print point to align the RFID tag over the antenna and enable successful read and write operations to the tag's memory.

  Range for *m* is either a negative distance (in dots) from the thermal printhead to the tear-off bar, or a positive distance up to the maximum label length. For more information, see the Notes.

p specifies the number of labels to retry if accessing a tag fails. Range for *p* is from 0 to 10. Default is 1. For more information, see the Notes.

Notes: A negative *m* value means the tag is originally positioned in front of the antenna, and a positive *m* value means the label is originally positioned behind the antenna.

  If you change the start of print point, you may also need to change the TAGADJUST value. The move distance = TAGADJUST – STOPADJUST. STOPADJUST is any adjustment such as end-of-print skip distance that is done at the end of a label.

  For example, if TAGADJUST = 0 and End of Print (EOP) skip = 100, the label retracts 100 to access the tag. If TAGADJUST = 100 and the EOP skip = 100, the label does not move.

  When using thermal transfer media, *m* should not be greater than the maximum rewind spring allowance, since it will affect the print quality of the label.

  If a read or write operation to the tag's memory fails, "VOID" or some other text is printed on the label and the next label is tried. This procedure is repeated until the read or write operation succeeds or until the specified number of labels to retry is reached.

  If *p* = 0, the printer does not print any "VOID" labels and the labels do not advance.

  If *p* = 1, a maximum of 1 "VOID" label prints and so on.

  When using a cutter, the retract distance cannot be greater than the distance from the cutter to the thermal printhead.

RFID Tag Void Text, Set

Purpose: Defines the text that is printed on labels that have bad RFID tags. This text cannot be changed from the control panel.

  This command is supported only by the PM4i with the RFID option.

Syntax: `<SI>K`*n*

  where *n* is the text that is printed. The range for *n* is 0 to 16 ASCII characters. Default is VOID. If *n* is blank, this command is disabled.

Notes: Text prints using font 26, with 1.27 cm (0.5 in) tall characters printed in the down direction.

RFID Tag Void Text, Set (Continued)

When the RFID module cannot communicate with the tag on the label, this text will be printed at the start of the label or at the maximum retract distance from the tag.

Ribbon Save Zones, Set

Purpose: Defines the start and stop points of a ribbon save zone within the label. This command does not enable interlabel ribbon save. This command is supported only by the 4100 with the ribbon save option installed.

Syntax: `<SI>Zn[,m]`

where *n* and *m* are the zone start and zone stop distances, in dot increments, from the detected front of the label. The difference between *n* and *m* depends on the speed (number of ips) at which you are printing. Also, *m* must be bigger than *n* by at least 100, or the command will be ignored.

Notes: Setting a ribbon save zone enables ribbon save. Entering no ribbon save zones clears all ribbon save zones within this label. If only one parameter is entered, the command is ignored. The maximum number of zones possible on one label is 10. This command is buffered up and becomes effective upon execution.

Self-Strip, Enable or Disable

Purpose: Turns the self-strip (label taken sensor) option on or off. This command is not supported by the 4100, but you can enable self-strip using the DIP switches.

Syntax: `<SI>tn [,m] [,o]`

Printers: where:

n　Enables or disables the option. Valid values for n are:

　0　Self-strip is disabled (default).
　1　Self-strip is enabled.
　2　(PX4i, PX6i only) Self-strip is enabled and a VOID label rewinds with the liner. If you choose this option, you also need to specify *,m* and *o*.
　3　(PX4i, PX6i only) Self-strip is enabled and the internal rewind stepper motor starts. If you choose this option, you also need to specify *,m*.

,m　(PX4i, PX6i only) If *n* = 2, *,m* enables or disables rewinding. In this case, valid values for *,m* are:

　0　Disables rewinding (default).
　1　Enables rewinding.

Self-Strip, Enable or Disable (Continued)

If *n* = 3, then *,m* sets the number of dots the rewind motor starts before or after paper feeding begins. A positive value starts the motor before paper feeding and a negative value starts the motor after paper feeding. To turn the motor off, set *,m* to -1.

,o   (PX4i, PX6i only) Sets the number of dots that the internal rewind stepper motor starts after the paper starts feeding. Default is 100. Maximum value is the media length.

Serial Port Configuration, Set

See the

Slash Zero, Enable or Disable

Purpose: Determines if the regular zero is replaced with a slashed zero.

This command is supported by the 3400e, 44x0e, and EasyCoder PD41, PF4i, PM4i, PX4i, and PX6i printers.

Syntax: `<SI>zn`

where *n* enables or disables the slashed zero character. For all supported printers, valid values for *n* are:

0   Disables the slashed zero (default)
1   Enables the slashed zero.

Notes: This command only works if the Printer Language, Select command <SI>1 is set to 0 (USA). Also, it does not apply to OCR fonts 23 and 24.

Takeup Motor Torque, Increase

Purpose: Increases the takeup motor torque from 0 to 50% above the default value. For printers with firmware version 2.5, this command varies the torque from 75% below to 50% above the default value.

This command is supported only by the 44x0.

Syntax: `<SI>bn`

where *n* is the percentage above or below the default value to set the takeup motor torque.

• For printers with firmware earlier than version 2.5, the range for *n* is 0 to 50.

• For printers with firmware version 2.5 and later, the range for *n* is -75 to 50.

Notes: In high humidity environments, you may want to use this command with the Label Width, Set command.

Top of Form, Set

Purpose: Sets the top of form (left margin or start print point) to n, which is the distance in 5 mil increments from the label origin to its leading edge.

Syntax: `<SI>Fn`

where *n* sets the top of form. For all printers, the range for *n* is -10 to 4000 in 5 mil increments. Default is 20.

Notes: Negative values for *n* decrease the margin and print closer to the label edge.

Program Mode Commands

You can use program mode commands to design label formats and to download user-defined fonts and graphics. When using program mode commands with printers with RFID modules, these commands handle the interaction with the chip in the RFID tag. For example, you can use a command that specifies where in the tag's memory, data is written.

When creating or editing formats, the printer uses a field pointer to designate the field you are going to modify when the printer is in Program mode. To download commands in Program mode, you must specify the field you want to change. If you do not select a field, the pointer continues to point to the last selected field until you select a different format or field. New formats contain a default human-readable field numbered H0. New pages do not contain a default format.

Program mode commands are effective when the printer is in Program mode. You can switch the printer to Program mode with this command:

`<STX><ESC>P<ETX>`

For help downloading program mode commands to the printer, see **"Sending IPL Commands to the Printer" on page 5.**

Note: You must precede each string of commands with the start of message character <STX> and follow it with the end of message character <ETX>. The semicolon (;) is the command terminator. All commands in Program mode must end with this terminator except the last command in a message. The printer ignores parentheses [( )] and <LF> characters.

Bar Code, Select Type

Purpose: Selects a symbology for a bar code field.

Syntax: `cn[,m1][,m2][,m3]`

where:

n   is the symbology as described in the next table:

Bar Code, Select Type - Values for n

n	Symbology	n	Symbology	n	Symbology
0	Code 39	8	HIBC Code 39	17	Data Matrix
1	Code 93	9	Code 16K	18	QR Code
2	Interleaved 2 of 5	10	Code 49	19	MicroPDF417
3	Code 2 of 5	11	POSTNET	20	RSS
4	Codabar	12	PDF417	21	EAN.UCC Composite
5	Code 11	14	MaxiCode	22	Planet (EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, PX6i only)
6	Code 128	15	JIS-ITF	23	Aztec
7	UPC/EAN	16	HIBC Code 128		

The next table shows valid *n* values for each printer.

Bar Code, Select Type - Values Listed by Printer

Printer	Default	Values for n
3240	n = 0	0 - 12, 14 - 19
3400A	n = 0	0 - 11
3400B	n = 0	0 - 12, 14 - 17
3400C, 3400D	n = 0	0 - 12, 14 - 19
3440	n = 0	0 - 12, 14 - 19
3600	n = 0	0 - 12, 14 - 17
4100	n = 0	Standard memory: 0 - 11 Expanded memory: 0 - 12, 14
4400	n = 0	0 - 11
44X0, 3400e	n = 0	0 - 12, 14 - 20
4X30	n = 0	0 - 12, 14, 16, 17
7421, PC41	n = 0	0 - 12, 14 - 19
EasyCoder F4	n = 0	0 - 12, 14 - 19
EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	0 - 12, 14 - 22

m1, *m2*, *m3*   are modifiers for the symbology specified by *n*. For more information on valid *m* values, see the information for the symbology in Appendix F, "Symbology Modifiers."

Bar Code Field, Create or Edit

Purpose: Edits or creates a bar code field.

Syntax: B*n*[,*name*]

where:

n is the field number of the field. For all printers, the range for *n* is 0 to 199. Default is 0.

name (optional) is a name for the field of up to eight ASCII characters. The name cannot start with a numeric character.

Notes: When you create a bar code field, you automatically create an interpretive field if you have enabled the Interpretive parameter. The printer generates an error code (38) if the field number is out of range.

Bar Code Field Default Parameters

Parameter	Syntax	Default
Field origin	o	0,0
Field direction	f	0 degrees
Bar code type	c	Code 39
Check digits		Disabled
Prefix		None
Data length		20
Ratio	r	3 to 1
Interpretive	i	Disabled
Height magnification	h	50
Width magnification	w	1

Bitmap Cell Height for Graphic or UDF, Define

Purpose: Defines the height of a graphic or user-defined font.

Syntax: y*n*

where *n* is the number of rows for a bitmap font or a graphic, or the height of the base character in number of dots for an outline font.

Bitmap Cell Height for Graphic or UDF, Define - Values Listed by Printer

Printer	Default		Values for n
3240	n = 1	bitmap fonts	1 - 999
	n = 10	outline fonts	
	n = 50	graphics	
3400	n = 1	bitmap fonts	1 - 799
	n = 10	outline fonts	
	n = 50	graphics	

Bitmap Cell Height for Graphic or UDF, Define - Values Listed by Printer (continued)

Printer	Default		Values for n
3400e	n = 1	bitmap fonts	200 dpi: 1 - 799
	n = 10	outline fonts	400 dpi: 1 - 1599
	n = 50	graphics	
3440	n = 1	bitmap fonts	1 - 1599
	n = 10	outline fonts	
	n = 50	graphics	
3600	n = 1	bitmap fonts	1 - 599
	n = 10	outline fonts	
	n = 50	graphics	
4100	n = 1	bitmap fonts	1 - 599
			1 - 799 (with expanded memory)
4400	n = 1	bitmap fonts	1 - 599
	n = 10	outline fonts	
	n = 50	graphics	
44X0	n = 1	bitmap fonts	4420: 1 - 799
	n = 10	outline fonts	4440: 1 - 1599
	n = 50	graphics	
4X30	n = 1	bitmap fonts	1 - 599
	n = 10	outline fonts	
	n = 50	graphics	
7421, PC41	n = 1	bitmap fonts	1 - 799
	n = 10	outline fonts	
	n = 50	graphics	
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 1	bitmap fonts	1 - 799
	n = 10	outline fonts	
	n = 50	graphics	

Notes: The printer generates an error code (52) for an invalid height.

Bitmap Cell Width for Graphic or UDF, Define

Purpose: Defines the maximum width for a graphic or any character in a font. Each character has a width within this amount, which should be at least as wide as the widest character in the font.

Syntax: xn

where n is the number of columns for the UDC, bitmap, or user-defined font, or the width of the base character in number of dots for an outline font.

Printer	Default	Values for n
3240	n = 1 (graphics/bitmap fonts)	1 - 999
	n = 10 (outline fonts)	With expanded memory: 1 - 1999

Printer	Default	Values for n
3400	n = 1 (graphics/bitmap fonts)	1 – 799
	n = 10 (outline fonts)	
3400e	n = 1 (graphics/bitmap fonts)	200 dpi: 1 - 799
	n = 10 (outline fonts)	400 dpi: 1 - 1599
3440	n = 1 (graphics/bitmap fonts)	1 – 1599
	n = 10 (outline fonts)	
3600	n = 1 (graphics/bitmap fonts)	1 – 599
	n = 10 (outline fonts)	
4100	n = 1 (graphics/bitmap fonts)	1 - 599
		With expanded memory: 1 - 799
44X0	n = 1 (graphics/bitmap fonts)	4420: 1 - 799
	n = 10 (outline fonts)	4440: 1 - 1599
4400	n = 1 (graphics/bitmap fonts)	1 – 599
	n = 10 (outline fonts)	
4X30	n = 1 (graphics/bitmap fonts)	1 – 599
	n = 10 (outline fonts)	
7421, PC41	n = 1 (graphics/bitmap fonts)	1 - 799
	n = 10 (outline fonts)	
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 1 (graphics/bitmap fonts)	1 - 799
	n = 10 (outline fonts)	

Notes: The printer generates an error code (52) for an invalid width.

Bitmap User-Defined Font, Clear or Define

Purpose: Clears or creates a user-defined bitmap font set.

Syntax: T*n*[,*name*]

where:

n   is the font ID number of the field. For all printers, the range for *n* is 3 to 6 and 8 to 19.

name   (optional) is a name for the field of up to eight ASCII characters. The name cannot start with a numeric character.

Notes: If you have already defined font set *n*, the printer erases all previous characters in the font. You can recreate an existing font, but you cannot edit it. To change any characters, you must transmit the entire font set.

Border Around Human-Readable Text, Define

Purpose: Defines a border around a human-readable field.

Syntax: b*n*

Border Around Human-Readable Text, Define - Values Listed by Printer

Printer	Default		Values for n
3240	n = 0	no borders (black letters)	0 - 199
3400A, 3400B	n = 0	no borders (black letters)	0 - 199
3400C, 3400D	n = 0	no borders (black letters)	0 - 999
3400e	n = 0	no borders (black letters)	0 - 999
3440	n = 0	no borders (black letters)	0 - 999
3600	n = 0	no borders (black letters)	0 - 199
4100	n = 0	no borders (black letters)	0 - 199
4400	n = 0	no borders (black letters)	0 - 199
44X0	n = 0	no borders (black letters)	0 - 999
4X30	n = 0	no borders (black letters)	0 - 199
7421, PC41	n = 0	no borders (black letters)	0 -999
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	no borders (black letters)	0 - 999

Notes: When $n > 0$, the field prints white letters with an n dot size border around the field.

Box Field, Create or Edit

Purpose: Accesses or creates a box field.

Syntax: `Wn[,name]`

Printers: where:

n is the field number of the field. For all printers, the range for n is 3 to 6 and 8 to 19.

name (optional) is a name for the field of up to eight ASCII characters. The name cannot start with a numeric character.

Notes: The next table describes the box field parameters.

Box Field Parameter Descriptions

Parameter	Syntax	Default
Field origin	o	0,0
Field direction	f	0 degrees
Box length	l	100
Box height	h	100
Box width	w	1

Character Bitmap Origin Offset, Define

Purpose: Defines the offset, to the right, of all characters in a bitmap font. If you define each character's width in columns, with the first column numbered 0, then the origin of each character is at the column with the same number as n. For example, $n = 2$ shifts the character origins over two columns to the right.

Syntax: Xn

where n is the number of columns to offset the origin to the right.

Character Bitmap Origin Offset, Define - Values Listed by Printer

Printer	Default	Values for n
3240	n = 0	0 - 599
3400A 3400B	n = 0	0 - 599
3400C 3400D 3400e	n = 0	0 - 800
3440	n = 0	0 - 800
3600	n = 0	0 - 599
4100	n = 0	0 - 599
4400	n = 0	0 - 599
44X0	n = 0	0 - 800
4X30	n = 0	0 - 599
7421, PC41	n = 0	0 - 800
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	n = 0	0 - 800

Character Rotation or Bar Code Ratio, Define

Purpose: Defines the character rotation (either no rotation or 90° counterclockwise) for human-readable fields, or the ratio of wide elements to narrow elements for a bar code field.

Syntax: rn

where n defines the rotation, or the bar code ratio.

For all printers, valid values for *n* are as follows for character rotation in a human-readable field:

0   Horizontal (default)
1   90° counterclockwise

The next table lists valid values for *n* for setting the bar code ratio. For all printers, this default value for *n* is 1.

Bar Code Ratio, Define - Values Listed by Printer

Printer	Bar code ratio values for n	
3240	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
	Note: If the bar code width is odd and you select r0, the printer substitutes r1.	
	The narrow elements of this code are always at least three dots. Select a width of w = 1 to have the shortest symbol.	
3400A	n = 0	2.5 to 1
3400B	n = 1	3.0 to 1
	n = 2	2.0 to 1
3400C	n = 0	2.5 to 1
3400D	n = 1	3.0 to 1
3400e	n = 2	2.0 to 1
	n = 3	2.3 to 1
	Note: n = 3 applies to Code 39 for a ratio of 7 dots to 3 dots.	
3440	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
	n = 3	2.3 to 1
3600	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
4100	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
4400	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
44X0	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
	n = 3	2.3 to 1
4X30	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
7421, PC41	n = 0	2.5 to 1
	n = 1	3.0 to 1
	n = 2	2.0 to 1
	n = 3	2.3 to 1

Bar Code Ratio, Define - Values Listed by Printer (continued)

Printer		Bar code ratio values for n
EasyCoder F4, PD41,	n = 0	2.5 to 1
PF2i, PF4i, PM4i,	n = 1	3.0 to 1
PX4i, PX6i	n = 2	2.0 to 1
	n = 3	2.3 to 1

Code 39 Prefix Character, Define

Purpose: Defines the prefix for a Code 39 field (only valid for Code 39 fields).

Syntax: `p[n1][n2][n3][n4];`

where *n* is the prefix for the Code 39 field. For all printers, valid values for *n* are A to Z (uppercase only) and 0 to 9.

Notes: Enter the prefix after you select Code 39. For example, enter c0,3;pABC4; rather than pABC4;c0,3;.

When you enter the @ character as n1, it clears all prefixes. Prefix characters do not appear in the interpretive field.

Command Tables, Load

Purpose: Downloads a command table, with *t* as the command table identifier. This command table identifier is followed by the nibblized command entries (c1-cn) to be loaded into the table. The printer expects two hex digits for every entry in the table.

This command is not supported by the EasyCoder 7421, F4, PC41, PD41, PF2i, PF4i, PM4i, PX4i, and PX6i printers.

Syntax: `C[t], [command 1], [command 2], ..., [command n]`

where *t* is the command table identifier. For all supported printers, valid values for *t* are:

0   Print mode commands
1   Escape print commands
2   Shift print commands
3   Status response
4   Protocol characters

Notes: Data must be nibblized ASCII characters ranging from 0 to 9 and A to F.

New commands become effective after you reset the printer or turn the power off and back on. For help, see Appendix D, "User-Defined Interface Tables."

To change an entry in the table, you must send the entire table to the printer as a string of ASCII characters in hexadecimal form. Any entry that you do not redefine retains its old value. To modify only a few commands, send the <ESC>Z command, capture the output, modify it, and send it back to the printer.

Current Edit Session, Save

Purpose: Saves the current page, format, UDC, or UDF being edited. The printer remains in Program mode.

Syntax: N

Notes: The printer automatically saves the current page, format, or UDC when you call a new one or when you exit Program mode.

Data Source for Format in a Page, Define

Purpose: Defines a data source for a format assigned to a page position. This command is not supported by the 4x30.

Syntax: en[,$m1$][,$m2$]

where:

n defines the data source. Valid values for n are:

   0   Format receives its data during Print mode (default).
   1   Format is slave of another format on this page.

$m1$ is the position of the master format within the page. Default is a.

$m2$ is the data offset to apply to the slave format. You can only offset data that is delimited by numeric field separator <FS> or alphanumeric field separator <GS>. Default is 0.

Notes: The format ID must be the same for both the master and slave formats.

For the 4x30, this command was called Format Page Position, Define Data Source. All values are the same.

Field, Delete

Purpose: Deletes field n from the format.

Syntax: Dn

where n is the field number to delete. For all printers, the range for n is 0 to 199. Default is 0.

Notes: You cannot delete the last field in a format. If you delete the current field, the field pointer points to the next field. If you delete a master field, you also delete all slave fields of that master field.

Field Data, Define Source

Purpose: Defines a data source for the current field and how many characters are in the field.

Syntax: dn[,$m1$][,$m2$]

where:

n defines the data source for the current field. For all printers, valid values for *n* are:

0   Data entered in Print mode (default)
1   Data entered in Print mode
2   Data comes from field ,m1
     (Not supported by PM4i with RFID option)
3   Fixed data

m1 is the number of characters in the current field. Set *m1* if you choose *n* = 0 or *n* = 1. For all printers, default for m1 is:

20   Bar code fields
30   Human-readable fields
64   RFID fields (PM4i with RFID option only)

Ranges for *m1* are as follows:

Field Data, Define Source - m1 Ranges Listed by Printer

Printer	Range for m1
3240	0 - 3550
3400	0 - 3550
3440	0 - 3550 (incl. 2D fields)
3600	0 - 3550
4100	0 - 250
4400	0 - 250
44X0	0 - 250
4X30	0 - 3550
7421, PC41	0 - 3550
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	0 - 3550
EasyCoder PM4i (RFID)	0 - 3550

m2 is an optional positive integer numeric field offset. For all printers, the range for *m2* is 0 to 9999. Default is 0.

The syntax for this command is illustrated in these examples.

```
d0[,m1]
d1[,m1];
```

Enter optional data in Print mode. *m1* is the maximum amount of data that you can enter into this field. The default for *m1* is 20 characters for bar code fields, 30 characters for human-readable fields, and 64 characters for RFID fields.

For variable RFID fields, make sure to allow for field separator commands. Also, fields in hex format need at least twice as many characters as defined in the RFID tap setup command. For example, to write 4 hex bytes to a tag, you need to allow at least 8 characters in the variable data field.

```
d2,m1[,m2];
```

Copy data into this field from field *m1*. You must define the field before you can use it. *m2* is an optional positive integer numeric field offset that can range from 0 to 9999, with 0 as the default. You can only offset data delimited by numeric field separator <FS> or alphanumeric field separator <GS>. A bar code field cannot copy data from a human-readable field, but a human-readable field can copy data from a bar code field. You can use up to 19 slave fields in each format.

```
d3,m1;
```

Fixed data *m1* is stored as part of the format, and you use it every time you print the current field. You cannot change entered data with print commands.

Many formats divide data into separate fields and then rearrange these fields to fit the RFID tag or composite bar codes. Use the <HT> character to divide the fields to enable you to enter the entire source data with one command.

The following example shows how to separate the fields with <HT>:

<STX>Q3;a3,1;d3,0<HT>4011661<HT>0030000001;<ETX>
<STX><ESC>J3,1<ETX>

Field Direction, Define

Purpose: Defines the field rotation.

Syntax: f*n*

where *n* defines the rotation. For all printers, valid values for *n* are:

0   Horizontal
1   Rotated 90° counterclockwise from horizontal
2   Rotated 180° counterclockwise from horizontal
3   Rotated 270° counterclockwise from horizontal

Field Origin, Define

Purpose: Defines the origin for a field. The field origin is the upper left corner of the field. Horizontal n and vertical m locations represent the number of dots from the label's origin. The origin (0,0) is the upper left square on the label.

Syntax: o*n,m*

where:

n   is the horizontal distance (in dots) from the label's origin. For all printers, the range for *n* is 0 to 19999. Default is 0.

m   is the vertical distance (in dots) from the label's origin. For all printers, the range for *m* is 0 to 19999. Default is 0.

Font Character Width, Define

Purpose: Defines the amount of space from the origin of one letter to the origin of the next. If n is too small, characters may overlap. Use this command for bitmap characters only.

Syntax: `zn`

where *n* defines the font character width. For all printers, the default value is the character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*). The next table lists ranges for *n* by printer.

Font Character Width, Define - Ranges for n Listed by Printer

Printer	Values for n
3240	1 - 999
	With expanded memory: 1 - 1999
3400	1 - 799
3400e	200 dpi: 1 - 799
	400 dpi: 1 - 1599
3440	1 - 1599
3600	1 - 599
4100	1 - 599
	With expanded memory: 1 - 799
4400	1 - 599
4420	1 - 799
4440	1 - 1599
4X30	1 - 599
7421, PC41	1 - 799
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	1 - 799

Notes: All printers ignore the intercharacter space command (z*n*) if you use it with this command.

Font Type, Select

Purpose: Selects a font type for human-readable fields.

Syntax: `cn[,m][,o]`

where:

n   is the font ID number. Values for *n* are described in the next table. Default is 0.

Font Type, Select - Values for n

n	Font Name	n	Font Name
0	7 x 9 Standard (86XX font)	38	24 point monospace standard
1	7 x 11 OCR (86XX font)	39	24 point monospace bold

Font Type, Select - Values for n (continued)

n	Font Name	n	Font Name
2	10 x 14 Standard (86XX font)	40	30 point monospace bold
3 - 6	User-defined fonts	41	36 point monospace bold
7	5 x 7 Standard (86XX font)	50	Kanji outline font
8 - 19	User-defined fonts	51	Kanji monospace outline font
20	8 point monospace	52	Katakana 12 x 16 bitmap
21	12 point monospace	53	Katakana 16 x 24 bitmap
22	20 point monospace	54	Katakana 24 x 36 bitmap
23	OCR A	55	Kanji 16 x 16 bitmap
24	OCR B size 2	56	Kanji 24 x 24 bitmap
25	Swiss Mono 721 standard outline font	61	Swiss 721
26	Swiss Mono 721 bold outline font	62	Swiss 721 bold
28	Dutch Roman 801 proportional outline font	63	Swiss 721 bold condensed
30	6 point monospace bold	64	Prestige bold
31	8 point monospace bold	65	Zurich extra condensed
32	10 point monospace standard	66	Dutch 801 bold
33	10 point monospace bold	67	Century Schoolbook
34	12 point monospace bold	68	Futura light
35	16 point monospace standard	69	Letter Gothic
36	16 point monospace bold	70	DingDings
37	20 point monospace bold		

m (optional) is the intercharacter gap (the space between characters). For all printers, the range for m is -199 to 199. If you do not specify m, the printer uses the default value of the selected font.

o (optional) is the language for the field. If you do not specify the language, the printer uses the default setting of the <SI>l command on the PM/PF/PX printers.

Printers: The next table lists values for n supported by each printer.

Font Type, Select - Values for n Listed by Printer

Printer	Valid values for n
3240	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option
3400A	0 to 24
3400B	0 to 25, 30 to 41, 50 to 56 with the Kanji option
3400C 3400D	0 to 25, 26, 28, 30 to 71 50 to 56 with the Kanji option
3400e	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option

Font Type, Select - Values for n Listed by Printer (continued)

Printer	Valid values for n
3440	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option
3600	0 to 25, 30 to 41 50 to 56 with the Kanji option
4100	0 to 24
4400	0 to 25
44X0	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option
4X30	0 to 26, 28, 30 to 41
7421, PC41	0 to 26, 28, 30 to 41
EasyCoder F4	0 to 26, 28, 30 to 41
EasyCoder PD41, PF2i, PF4i, PM4i, PX4i, PX6i	0 to 26, 28, 30 to 41, 61 to 70

For more information about fonts, see the **"Printer Language, Select"**
command on page 118. For more information about designing and using
fonts, see Chapter 2, "Downloading Fonts to the Printer," and Appendix C,
"Creating User-Defined Bitmap Graphics and Fonts."

Format, Create or Edit

Purpose: Edits or creates a format.

Syntax: A*n*[,*name*] or F*n*[,*name*]

where:

n   is the format ID number. See the next table for the range for *n* listed
         by printer. For certain printers, if you use an asterisk (*) for the label
         format the printer does not store the label in permanent memory.
         When you turn the printer off, it loses the format.

name (optional) is a name for the field of up to eight ASCII characters.
         The name cannot start with a numeric character. See the next table
         to learn which printers support *name*.

Format, Create or Edit - Values Listed by Printer

Printer	Values for n	Supports *name*?
3240	1 - 99	Yes
3400A 3400B	1 - 19	Yes
3400C 3400D	*, 1 - 19	No
3400e	*, 1 - 99	No
3440	*, 1 - 99	No

Format, Create or Edit - Values Listed by Printer (continued)

Printer	Values for n	Supports *name*?
3600	1 - 19	Yes
4100	1 - 19	Yes
4400	1 - 19	Yes
44X0	*, 1 - 99	No
4X30	1 - 19	Yes
7421, PC41	*, 1 - 99	No
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	*, 1 - 99	No

Notes: The printer generates an error code (36) if the format number is out of range.

Format Direction in a Page, Define

Purpose: Defines the format directions within a page.

Syntax: q*n*

where *n* defines the format direction. For all printers, valid values for *n* are:

0   Horizontal
1   Rotated 90° counterclockwise from normal
2   Rotated 180° counterclockwise from normal
3   Rotated 270° counterclockwise from normal

Format, Erase

Purpose: Erases format ID number *n*.

Syntax: E*n*

where *n* is the format ID number to erase. The next table lists ranges for *n*.

Format, Erase - Values Listed by Printer

Printer	Values for n
3240	1 - 99
3400	1 - 19
3400e	1 - 99
3440	1 - 99
3600	1 - 19
4100	1 - 19
4400	1 - 19
44X0	1 - 99
4X30	1 - 19
7421, PC41	1 - 99
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	1 - 99

Notes: You cannot erase format 0.

Format Offset Within a Page, Define

Purpose: Defines the format offsets within a page and creates new origins for fields within a format by adding the format offsets to the original field offsets. m and n represent increments of dot sizes.

Syntax: O*n*,*m*

where:

n   is an increment of dot sizes. For all printers, the range for *n* is 0 to 19999. Default is 0.

m   is an increment of dot sizes. For all printers, the range for *m* is 0 to 19999. Default is 0.

Format Page Position, Define Data Source

Format Position From Page, Delete

Purpose: Deletes the format position *p* from a page.

Syntax: m*p*

where *p* is the page position. For all printers, the range for *p* is a to z. Default is a.

Format Position in a Page, Assign

Purpose: Assigns a specified format to a specific page position.

Syntax: M*p*,*n*

where:

n   is the numeric format ID. The range for *n* varies by printer as shown in the next table.

Format Position in a Page, Assign - Values for n Listed by Printer

Printer	Values for n
3240	0 - 19
3400	0 - 19
3400e	0 - 99
3440	0 - 99
3600	0 - 19
4100	0 - 19
4400	0 - 19
44X0	0 - 99
43X0	0 - 19
7421, PC41	0 - 99

Format Position in a Page, Assign - Values for n Listed by Printer

Printer	Values for n
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	0 - 99

    p   is the page position. For all printers, the range for *p* is a to z. Default is a.

Notes: A format may be in multiple positions.

    The printer generates an error code (36) if the format ID is out of range.

Graphic, Select

Purpose: Selects a graphic for graphic fields.

Syntax: `cn`

    where *n* is the graphic field to select. For all printers, the range for *n* is 0 to 99. Default is 0.

Notes: This command applies to a graphic field only.

Graphic or UDC, Define

Purpose: Maps one column of bitmap for a graphic or a font character. n is the column to be mapped.

Syntax: `un,m...m`

    where:

    n   is the column to be mapped. The range for *n* varies by printer as described in the next table:

Graphic or UDC, Define - Range for n Listed by Printer

Printer	Values for n	Notes
3240	1 - 999 With expanded memory: 1 - 1999	
3400	1 - 799	
3400e	200 dpi: 1 - 799 400 dpi: 1 - 1599	
3440	1 - 1599	
3600	1 - 599	
4100	1 - 599 With expanded memory: 1 - 799	
4400	1 - 599	
44X0	4420: 1 - 799 4440: 1 - 1599	
4X30	1 - 599	These printers do not support Emulation mode.

Graphic or UDC, Define - Range for n Listed by Printer

Printer	Values for n	Notes
7421, PC41	1 - 799	
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	1 - 799	

m...m   (Emulation mode only) is a string of 1s and 0s that make up the column and specify whether or not to print in that row element of the column (m = 1 prints, m = 0 does not). Any unmapped columns or row elements default to 0. In Advanced mode, each data byte *m* represents 6 bits of the bitmap.

Height Magnification of Bar, Box, or UDC, Define

Purpose: Defines box, bar code, or UDC height magnification. For bar code and box fields, define the height *n* in number of dots.

Syntax: h*n*

where *n* is the magnification in number of dots. For all printers, defaults for *n* are as follows:

Bar codes   50
Box fields   100
Graphics   1
POSTNET fields   2
Human-readable fields   2

The range for *n* varies by printer as described in the next table.

Height Magnification of Bar, Box, or UDC, Define - Values Listed by Printer

Printer	Bar codes	Box fields	Graphics	POSTNET and HR fields
3240	1 - 1999	1 - 9999	1 - 250	1 - 400
3400A 3400B	1 - 1999	1 - 9999	1 - 250	1 - 400
3400C 3400D	1 - 9999	1 - 9999	1 - 999	1 - 999
3400e	1 - 9999	1 - 9999	1 - 999	1 - 999
3440	1 - 9999	1 - 9999	1 - 999	1 - 999
3600	1 - 1999	1 - 9999	1 - 250	1 - 400
4100	1 - 9999	1 - 9999	1 - 250	1 - 250
4400	1 - 9999	1 - 9999	1 - 250	1 - 250
44X0	1 - 9999	1 - 9999	1 - 999	1 - 999
4X30	1 - 9999	1 - 9999	1 - 250	1 - 250
7421 PC41	1 - 9999	1 - 9999	1 - 999	1 - 999

***Height Magnification of Bar, Box, or UDC, Define -
Values Listed by Printer (continued)***

Printer	Bar codes	Box fields	Graphics	POSTNET and HR fields
EasyCoder F4, PD41, PF2i,PF4i, PM4i, PX4i, PX6i	1 - 9999	1 - 9999	1 - 999	1 - 999

Notes: For human-readable fields, graphics, and the POSTNET symbology, n represents the vertical magnification of the character bitmap.

If you set n to a number that is too large, the printer uses the highest value it can support.

In Advanced Mode, a dot is 5 mil for a 200 dpi printer and 2.5 mil for a 400 dpi printer. For the 4X30 and 300 dpi (PD/PM/PX-series) printers, a dot is 3.3 mil.

Human-Readable Field, Create or Edit

Purpose: Edits or creates a human-readable field.

Syntax: `Hn[,name]`

where:

n is the field number of the field. For all printers, the range for n is 0 to 199. Default is 0.

name (optional) is a name for the field of up to eight ASCII characters (not counting the following semicolon). You cannot start the name with a number.

Notes: The parameters for the default field are listed in the next table.

Human-Readable Default Parameters

Parameter	Syntax	Default
Field origin	o	0,0
Field direction	f	0 degrees
Character rotation	r	0 degrees
Font	c	7 x 9 standard
Height magnification	h	2
Width magnification	w	2
Pitch	g	Disabled
Point	k	Disabled
Border	b	Disabled
Data origin	d	Print mode
Data length		30

Intercharacter Space for UDF, Define

Purpose: Defines the amount of space added to the default intercharacter gap length for a bitmap font. The number of dots you select for *n* define the intercharacter gap length.

Syntax: `zn`

where *n* is the amount of space to add in dots. For all printers, the range for *n* is 0 to 199. Default is 2.

Notes: The printer ignores this command if you use it with the font character width command (Zn).

The printer generates an error code (52) for invalid lengths.

The unit for *n* is in number of dots per pixels. In Advanced Mode, a dot is 5 mil for a 200 dpi printer and 2.5 mil for a 400 dpi printer. For the 4X30 printers, a dot is 3.3 mil.

Interpretive Field, Edit

Purpose: Edits an interpretive field.

Syntax: `In`

where *n* is the field ID number of the bar code field to be interpreted. For all printers, the range for *n* is 0 to 199. Default is 0.

Notes: You cannot create interpretive fields with this command; you can only create or delete them when enabling the interpretive of the corresponding bar code field. The parameters for the default field are as follows:

Interpretive Field Default Parameters

Parameter	Syntax	Default
Field origin	o	2 dots below bar code, left justified
Field direction	f	0 degrees
Character rotation	r	0 degrees
Font	c	7 x 9 standard
Height magnification	h	2
Width magnification	w	2
Pitch	g	Disabled
Point	k	Disabled
Border	b	Disabled
Data origin	d	Print mode
Data length		30

Each interpretive field is counted as an individual field in the maximum number of 200 fields (0 – 199).

Interpretive Field, Enable or Disable

Purpose: Determines if the interpretive field of the current bar code field prints.

Syntax: `in`

where *n* enables or disables printing. For all printers, valid values for *n* are:

0   Disable printing.
1   Enable with start and stop characters.
2   Enable without start or stop characters.

Notes: When you enable the interpretive field, the human-readable information in the default font (font 0, 7 x 9 standard) prints 2 dots below the bar code field and is left justified.

Use the I command to edit an interpretive field.

Length of Line or Box Field, Define

Purpose: Defines the length of a line or box in number of dots.

Syntax: `ln`

where *n* is the length in dots. For all printers, the range for *n* is 1 to 1999. Default is 100.

Notes: In Advanced Mode, a dot is 5 mil for a 200 dpi printer and 2.5 mil for a 400 dpi printer. For the 4X30 printers, a dot is 3.3 mil.

Line Field, Create or Edit

Purpose: Accesses or creates a line field.

Syntax: `Ln[,name]`

where:

n   is the field number of the field. For all printers, the range for *n* is 0 to 199. Default is 0.

name   (optional) is a name for the field of up to eight ASCII characters (not counting the following semicolon).

Notes: The parameters for the default field are listed in the next table.

Line Field Default Parameters

Parameter	Syntax	Default
Field origin	o	0,0
Field direction	f	0 degrees
Line length	l	100
Line width	w	1

Outline Font, Clear or Create

Purpose: Clears or creates an outline font or graphic.

The 4100 printer does not support this command unless additional RAM is installed.

Syntax: `Jn[,name][,type][,size]`

where:

n   is the font or graphic ID. See the next table for ranges for *n* listed by printer.

name   is a string of up to eight ASCII characters (not counting the semicolon) that provides a name for the font or graphic.

type   is the type of the font. See the next table for values for *type* listed by printer.

size   defines the size of a TrueType font and is only needed for double-byte fonts that exceed 512K bytes.

Outline Font, Clear or Create - Values Listed by Printer

Printer	Values for n	Values for type
3240	3 to 6, 8 to 19	0 = Speedo font
3400A 3400B	3 to 6, 8 to 19	0 = Speedo font
3400C	3 to 6, 8 to 19	0 = Speedo font (default) 2 = Double-byte bitmap font
3400e	3 to 6, 8 to 19	0 = Speedo font (default) 1 = TrueType font 2 = Double-byte bitmap font
3440	3 to 6, 8 to 19	0 = Speedo font (default) 1 = TrueType font 2 = Double-byte bitmap font
3600	3 to 6, 8 to 19	0 = Speedo font
4100	Not available	Not available
4400	3 to 6, 8 to 19	0 = Speedo font
44X0	3 to 6, 8 to 19	0 = Speedo font (default) 1 = TrueType font 2 = Double-byte bitmap font
4X30	3 to 6, 8 to 19	0 = Speedo font (default)
7421, PC41	3 to 6, 8 to 19	0 = Speedo font (default) 2 = Double-byte bitmap font
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	3 to 6, 8 to 19	1 = TrueType font

Notes: If you have already defined font set *n*, the printer erases all previous characters in the font.

Outline Font, Download

Purpose: Downloads outline font descriptions.

Syntax: `jnn....nn`

where *n* is the information that describes all characters within the font.

You must send the font information to the printer as a string of ASCII characters in hexadecimal form. The printer expects two hex digit bytes for every 8-bit byte of information. Data must be ASCII characters, ranging from 0 to 9 and A to F. All characters are loaded at once, not individually as with bitmap fonts. The description for the whole font can be thousands of characters long; however, the maximum message length is only 255. Therefore, the font description may have to be split between successive j commands.

Notes: The printer stores the incoming font description in the font you select with the J command.

See Chapter 2 for more information about downloading fonts.

Page, Create or Edit

Purpose: Edits or creates a page.

Syntax: Sn

where *n* is the numeric page ID. For all printers, the range for *n* is 1 to 9.

Notes: You cannot edit the default page (page 0).

The printer generates an error code (26) if a page number is out of range.

The following example illustrates the Page, Create or Edit command:

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1;<ETX>
<STX>H0;o1000,100;f3;b10;c0;h3;w2;d0,35<ETX>
<STX>H1;o300,250;c0;f3;h3;w3;<ETX>
<STX>B2;o250,100;c0;f3;h200;w2;i1;<ETX>
<STX>W3;o25,50;l300;h600;w5;<ETX>
<STX>R<ETX>
<STX><ESC>P<ETX>
<STX>E2;F2;<ETX>
<STX>H0;o800,250;c0;f3;h3;w3;<ETX>
<STX>B1;o750,100;c0;f3;h200;w2;i1;<ETX>
<STX>W2;o525,50;l300;h600;w5;<ETX>
<STX>R<ETX>
<STX><ESC>P<ETX>
<STX>S1;Ma,1;O0,0;Mb,2;O0,0<ETX>
<STX>R<ETX>
<STX><ESC>G1<CAN><ETX>
<STX><ESC>Ea<ETX>
<STX>Example using the page command<CR><ETX>
<STX>Format 1<CR><ETX>
<STX>Format1<STX>
<STX><ESC>Eb<ETX>
<STX>Format 2<CR><ETX>
<STX>Format2<STX>
<STX><US>1<ETX>
<STX><RS>1<ETX>
<STX><ETB><ETX>
<STX><ESC>G0<ETX>
```

Page, Delete

Purpose: Deletes a page.

Syntax: `sn`

where *n* is the numeric page ID. For all printers, the range for *n* is 1 to 9.

Notes: You cannot delete the default page (page 0).

Pitch Size, Set

Purpose: Sets the pitch size that defines the size of the characters in human-readable fields. Use this command to scale outline fonts smoothly.

This command is not supported by the EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, and PX6i printers.

Syntax: `gn`

where *n* is the pitch size. For supported printers, the range for *n* is 1 to 50. Default is 12.

Notes: You can only use this command in Advanced mode. When you use the pitch size command, you disable the height and width magnification and point.

Point Size, Set

Purpose: Sets the point size that defines the size of the characters in human-readable fields. You can only use this command in Advanced mode.

Syntax: `kn`

where *n* sets the point size. For all printers, default is 12. The next table shows ranges for *n* listed by printer.

Printers:

Point Size, Set - Values Listed by Printer

Printer	Values for n	Notes
3240	4 - 180	This command works most effectively on fonts c25, c26, and c27.
3400	4 - 288	This command works most effectively on outline fonts.
3400e	200 dpi: 3 - 288 400 dpi: 3 - 255	This command works most effectively on outline fonts.
3440	3 - 255	This command works most effectively on fonts c25, c26, and c27.
3600	4 - 288	This command works most effectively on font c25.
4100	4 - 212	This command works most effectively on fonts c20, c21, and c22.
4400	4 - 212	This command works most effectively on fonts c20, c21, c22, and c25.
44X0	4420: 3 - 288 4440: 3 - 255	This command works most effectively on outline fonts.

Point Size, Set - Values Listed by Printer

Printer	Values for n	Notes
4X30	4 - 212	This command works most effectively on fonts c20, c21, c22, and c25.
7421, PC41	3 - 288	This command works most effectively on outline fonts.
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	4 - 288	This command works most effectively on outline fonts.

Notes: A point size equals 1/72 inch. A higher point size means larger characters.

Print Line Dot Count Limit, Set

Syntax: v*n*

Notes: This is a null command and the printer ignores it.

Program Mode, Exit

Purpose: Instructs the printer to exit Program mode and enter Print mode. It saves any format or page currently being edited.

Syntax: R

RFID Tag Field Setup

Purpose: Defines an RFID tag field for the write command. This command is supported only by the PM4i with the RFID option.

Syntax: a*n*,*m*,*p*,*q*

where:

n   specifies the format number of a tag format for the source data. Valid values for *n* are 0 to 18. Default is 1.

m   specifies a tag segment from which data is read or to which data is written. Valid values for *m* are:

    1   ID (default)
    2   Data
    3   All
    10   RESERVED (EPCglobal Gen2 tags only)
    11   EPC (EPCglobal Gen2 tags only)
    12   TID (EPCglobal Gen2 tags only)
    13   USER (EPCglobal Gen2 tags only)

p   specifies the first byte of the declared segment (*m*) on the aligned tag to which data is written. Values for *p* vary by RFID tag type. The first byte of a segment is always 0, regardless of the segment's physical location on the tag. Default is 0.

> *q* specifies how many bytes on the tag are reserved for the data to be written, starting at the position stated by the start of field data command. Values for *q* vary by RFID tag type. The length of field data may differ, depending on the segment and tag air interface ISO standard. Default is 8.

Notes: This command specifies how data is stored on the tag. Use the next table to match the format number with the format name.

Tag Format Field Parameters

Format Number	Format Name	Format Number	Format Name
0	NUM	10	SGLN-96
1	HEX	11	SGLN-64
2	ASCII	12	GRAI-96
3	SSCC-96	13	GRAI-64
4	SSCC-64	14	GIAI-96
5	SGTIN-96	15	GIAI-64
6	SGTIN-64	16	GID-96
7	EPC-URN	17	USDOD-96
8	EPC-HEX96	18	USDOD-64
9	EPC-HEX64		

The next table provides examples of how choosing the NUM, HEX, or ASCII formats affects how data is stored on the tag. The Data column shows the original field data. Depending on the format (NUM, HEX, ASCII) you choose, the appropriate column shows you the data (in hex) that is stored on the tag.

Tag Format, Example of NUM, HEX, ASCII

Data	NUM	HEX	ASCII
ABCD	Not applicable since the data is not numeric.	AB,CD	41,42,43,44
1234	00,00,04,D2 Hex equivalent of the number 1234.	12,34	31,32,33,34
ABC	Not applicable since the data is not numeric.	Not applicable since the data does not contain an even number of digits (pairs)	42,42,43
RFID	Not applicable since the data is not numeric.	Not applicable since the data is not in hex.	52,46,49,44
257	00,00,01,01	Not applicable since the data does not contain an even number of digits (pairs)	32,35,37

Tag Format Details and Descriptions

Tag Format	Details	Description
SSCC-96	**Filter Value:** Numeric, 0-7	SSCC is intended for assignment to individual objects and does not require any additional fields to serve as an EPC pure identity. Size of segment is 12 bytes.
	Company Prefix: Numeric, 6-12 digits	Company Prefix + Serial Reference = 17 digits
	Serial Reference: Numeric, 11-5 digits	Example for a fixed data field: `"d3,filter<HT>company prefix<HT>serial reference;"`
SSCC-64	**Filter Value:** Numeric, 0-7	Same description as SSCC-96 except that the size of segment is 8 bytes.
	Company Prefix: Numeric, 0-16 383	Example for a fixed data field: `"d3,filter<HT>company prefix index<HT>serial reference;"`
	Serial Reference: Numeric, 0-99 999 999 999	
SGTIN-96	**Filter Value:** Numeric, 0-7	A GTIN by itself does not fit the definition of an EPC pure identity, because it does not uniquely identify a single physical object. Instead, a GTIN identifies a particular class of object, such as a particular kind of product. To create a unique identifier for individual objects, the GTIN is augmented with a serial number, which the managing entity is responsible for assigning uniquely to individual object classes. The combination of GTIN and a unique serial number is called a Serialized GTIN (SGTIN). Size of segment is 12 bytes.
	Company Prefix: Numeric, 6-12 digits	
	Item Reference: Numeric, 7-1 digits	
	Serial Number: Numeric, 0-274 877 906 943	Company prefix + item reference = 13 digits
		Example for a fixed data field: `"d3,filter<HT>company prefix<HT>item reference<HT>serial number;"`
SGTIN-64	**Filter Value:** Numeric, 0-7	Same description as SGTIN-96 except that the tag holds 8 bytes.
	Company Prefix: Numeric, 0-16 383	Example for a fixed data field: `"d3,filter<HT>company prefix index<HT>item reference<HT>serial number;"`
	Item Reference: Numeric, 0-1 048 575	
	Serial Number: Numeric, 0-33 554 431	
EPC-URN	URN string For EPCglobal tag formats, the pure identity URI representation is as follows: `urn:epc:tag:epc-format: parameter 1.parameter 2.parameter 3`	A standardized format for writing data to a tag. URI forms are provided for pure identities, which contain just the EPC fields that serve to distinguish one object from another. These URIs take the form of Uniform Resource Names (URNs), with a different URN namespace allocated for each pure identity type.
		Example for fixed data field: `"d3,urn:epc:tag:sscc-96:0.12345678.987654321;"`
EPC-HEX96	Hex string (0-9, a-f, A-F)	Hex representation of the complete memory area on a 12 byte tag.
		Example for fixed data field: `"d3,0102030405060708090A0B0C;"`
EPC-HEX64	Hex string (0-9, a-f, A-F)	Hex representation of the complete memory area of the tag holds 8 bytes of data.

Tag Format Details and Descriptions (continued)

Tag Format	Details	Description
SGLN-96	**Filter Value:** Numeric, 0-7 **Company Prefix:** Numeric, 6-12 digits **Location Reference:** Numeric, 6-0 digits **Serial Number:** Numeric, 0-2 199 023 255 551	A SGLN can represent either a discrete, unique physical location such as a dock door or a warehouse slot, an aggregate physical location such as an entire warehouse, or a logical entity such as an organization that performs a business function such as placing an order. The serial number, that makes it a SGLN, should not be used until specified by the EAN.UCC general specifications. The tag holds 12 bytes of data. Company prefix + location reference = 12 digits Example for a fixed data field: `"d3,filter<HT>company prefix index<HT> location reference<HT>serial number;"`
SGLN-64	**Filter Value:** Numeric, 0- 7 **Company Prefix Index:** Numeric, 0-16 383 **Location Reference:** Numeric, 0-999 999 **Serial Number:** Numeric, 0-524 287	Same description as SGLN-96 except that the tag holds 8 bytes of data. Example for a fixed data field: `"d3,filter<HT>company prefix index<HT> location reference<HT>serial number;"`
GRAI-96	**Filter Value:** Numeric, 0-7 **Company Prefix:** Numeric, 6-12 digits **Asset Type:** Numeric, 6-0 digits **Serial Number:** Numeric, 0-274 877 906 943	GRAI is intended for assignment to individual objects and therefore does not require any additional fields to serve as an EPC pure identity. Holds 12 bytes of data. Company prefix + asset type = 12 digits Example for a fixed data field: `"d3,filter<HT>company prefix<HT>asset type<HT>serial number;"`
GRAI-64	**Filter Value:** Numeric, 0-7 **Company Prefix Index:** Numeric, 0-16 383 **Asset Type:** Numeric, 0-999 999 **Serial Number:** Numeric, 0-524 287	Same description as GRAI-96 except that the tag holds 8 bytes of data. Example for a fixed data field: `"d3,filter<HT>company prefix index<HT>asset type<HT>serial number;"`
GIAI-96	**Filter Value:** Numeric, 0-7 **Company Prefix:** Numeric, 6-12 digits **Individual Asset Reference:** Numeric, 18-12 digits	Intended for assignment to individual objects and therefore does not require any additional fields to serve as an EPC pure identity. The tag can store 12 bytes of data. Company prefix + Individual asset reference = 24 digits Example for a fixed data field: `"d3,filter<HT>company prefix<HT>individual asset reference;"`
GIAI-64	**Filter Value:** Numeric, 0-7 **Company Prefix Index:** Numeric, 0-16 383 **Individual Asset Reference:** Numeric, 0-549 755 813 887	Same description as GIAI-96 except that the tag holds 8 bytes of data. Example for a fixed data field: `"d3,filter<HT>company prefix index<HT> individual asset reference;"`

Tag Format Details and Descriptions (continued)

Tag Format	Details	Description
GID-96	**General Manager Number:** Numeric, 0-268 435 455 **Object Class:** Numeric, 0-16 777 215 **Serial Number:** Numeric, 0-68 719 476 735	Independent of any known, existing specifications or identity schemes, 12 byte General Identifier. Example for a fixed data field: "d3,general manager number\<HT>object class\<HT>serial number;"
USDOD-96	**Filter Value:** Numeric, 0-15 **Government Managed Identifier:** Always 5 characters. 8 bit ASCII, 0-9, SPACE and A-Z except I and O allowed **Serial Number:** Numeric, 0-68 719 476 735	The Department of Defense has constructed a tag format with header, filter, government managed identifier (supplier), and serial number. The tag can store 12 bytes of data. Example of a fixed data field: "d3,filter\<HT>government managed identifier \<HT>serial number;"
USDOD-64	**Filter Value:** Numeric, 0-3 **Government Managed Identifier:** Always 5 characters, 0-9, SPACE and A-Z except I and O allowed **Serial Number:** Numeric, 0-16 777 215	Same description as USDOD-96 except that the tag holds 8 bytes of data Example of a fixed data field: "d3,filter\<HT>government managed identifier \<HT>serial number;"

RFID Tag Protect

Purpose: Marks whether or not the data that is defined by the RFID field is permanently protected. If the data is protected, another RFID device cannot overwrite it. This command is supported only by the PM4i with the RFID option.

Syntax: n*n*

where *n* enables or disables write protection. Valid values for *n* are:

0   No write protection.
1   Field is write protected.

RFID Tag Write Field, Create or Edit

Purpose: Edits or creates a field that allows for setting up data to write to an RFID tag. Note that if a program mode command parameter is left out, the default value applies. Temporary format settings are lost at reboot.

This command is supported only by the PM4i with the RFID option.

Syntax: Q*n*

where *n* is the field ID number. Valid values for *n* are 0 to 199. Default is 0.

Notes: The parameters for the default field are listed in the next table.

RFID Tag Write Field Default Parameters

Parameter	Syntax	Default
RFID tag field setup	a	1,1,0,8
Field data, define source (write operations only)	d	0,30,0
RFID tag protect	n	0

If the tag write fails, an error status of <EOT> is set. If the write succeeds, a status of <ACK> is set. If auto-transmit level 3 is enabled, an <EOT> status response is returned to the host upon error and an <ACK> upon success.

User-Defined Character, Clear or Create

Purpose: Clears or creates a graphic bitmap.

Syntax: G*n*[,*name*]

where:

n   is the graphic ID.

name   is a name for the UDC of up to eight ASCII characters (not counting the semicolon). The name cannot start with a number.

Notes: If you have already defined graphic *n*, the printer erases it and redefines it.

User-Defined Character Field, Create or Edit

Purpose: Edits or creates a graphic field.

Syntax: U*n*[,*name*]

where:

n   is the field ID. Valid values for *n* are 0 to 199. Default is 0.

name   is a name for the UDC of up to eight ASCII characters (not counting the semicolon). The name cannot start with a number.

Notes: The parameters for the default field are listed in the next table.

Parameters for the Default Field

Parameter	Syntax	Default
Field origin	o	0,0
Field direction	f	0 degrees
Character rotation	r	0 degrees
Height magnification	h	1
Width magnification	w	1

User-Defined Font Character, Create

Purpose: Specifies which font character you will define next.

Syntax: t*n*

where *n* is the decimal representation of the character to define. For all printers, the range for *n* is 0 to 255. The printer erases existing characters.

Width of Line, Box, Bar, or Character, Define

Purpose: Defines the width magnification of a line, box, bar code, or character. You define the width of line, box, or bar code fields by the number of dots that you specify for *n*. For human-readable fields, graphics and the POSTNET symbology, *n* is the magnification of the character width.

Syntax: w*n*

where *n* defines the width magnification in number of dots. For all printers, default values for *n* are:

Line width	1
Box width	1
Bar code field	1
Graphics	1
Human-readable fields	2
POSTNET	2

See the next table for ranges for *n* listed by printer.

Width of Line, Box, Bar, or Character, Define - Values Listed By Printer

Printer	Line and box fields	Bar code fields	Graphics	POSTNET and HR fields
3240	1 - 9999	1 - 99	1 - 400	1 - 250

Width of Line, Box, Bar, or Character, Define - Values Listed By Printer (continued)

Printer	Line and box fields	Bar code fields	Graphics	POSTNET and HR fields
3400A 3400B	1 - 9999	1 - 99	1 - 400	1 - 250
3400C 3400D	1 - 9999	1 - 99	1 - 999	1 - 999
3400e	1 - 9999	1 - 99	1 - 999	1 - 999
3440	1 - 9999	1 - 99	1 - 999	1 - 999
3600	1 - 9999	1 - 99	1 - 400	1 - 250
4100	1 - 9999	1 - 9999	1 - 250	1 - 250
4400	1 - 9999	1 - 9999	1 - 250	1 - 250
44X0	1 - 9999	1 - 99	1 - 999	1 - 999
4X30	1 - 9999	1 - 9999	1 - 250	1 - 250
7421, PC41	1 - 9999	1 - 99	1 - 999	1 - 999
EasyCoder F4, PD41, PF2i, PF4i, PM4i, PX4i, PX6i	1 - 9999	1 - 99	1 - 999	1 - 999

Notes: In Advanced Mode, a dot is 5 mil for a 200 dpi printer and 2.5 mil for a 400 dpi printer. For the 4x30 and 300 dpi (PD/PM/PX-series) printers, a dot is 3.3 mil.

Test and Service Commands

You can use Test and Service commands to query the printer for hardware diagnostic information. Test and Service commands are effective when the printer is in Test and Service mode. You can switch the printer to Test and Service mode with this command:

```
<ESC>T
```

For help downloading Test and Service commands to the printer, see

Note: All commands in Test and Service mode end with the command terminator (;), except the last command in a message.

12 Volt Supply Value, Transmit

Purpose: Transmit the 12 volt supply A/D output back to the host. The range of the value is 00 to 255.

This command is supported only by the 4400.

Syntax: U

Ambient Temperature, Transmit

Purpose: Transmits the ambient temperature sensor A/D output back to the host. The value ranges from 00 to 255.

This command is supported only by the 4400.

Syntax: A

Command Terminator

Purpose: All commands in Test and Service mode must end with the command terminator except for the last command in a message.

Syntax: ;

Dark Adjust

Purpose: This command changes the darkness of the print on your labels. It is for fine-tuning only.

This command is supported only by the 3440.

Syntax: K

Factory Defaults, Reset

Purpose: Sets the printer configuration to the factory defaults. When you exit Test and Service mode after sending this command, the printer performs a warm boot (it resets).

Syntax: D

Use this example to reset the factory defaults:

`<STX><ESC>T;D;R;<ETX>`

Formats, Print

Purpose: Prints all stored formats.

Syntax: f

Hardware Configuration Label, Print

Purpose: Prints a label that provides information about the printer's hardware configuration.

Syntax: h

Label Path Open Sensor Value, Transmit

Purpose: Transmits the paper path open switch value back to the host. A value of 0 indicates the paper path is open, and a value of 1 indicates it is closed. On the EasyCoder F4 and PD/PF/PM/PX-series printers, a value of 1 indicates the paper path is open, and a value of 0 indicates it is closed.

This command is not supported by the 3400A, 3400B, and 3600 printers.

Syntax: L

Label Taken Sensor Value, Transmit

Purpose: Transmits the label taken sensor A/D output back to the host. The value can range from 00 to 255. On the EasyCoder F4 and PD/PF/PM/PX-series printers, a value of 0 indicates the label is removed, and a value of 1 indicates the label is at the strip pin.

Syntax: T

Pages, Print

Purpose: Prints the pages stored on the printer.

Syntax: p

Pitch Label, Print

Purpose: Prints the pitch label.

Syntax: C

Print Quality Label, Print

Purpose: Prints the print quality program and model number label.

Syntax: Q

Printhead Resistance Test, Begin

Purpose: Starts the printhead resistance test. The printer will respond with the ASCII character string "pass" or "fail." This command is supported only by the 4400.

Syntax: B

Printhead Resistance Values, Transmit

Purpose: Sends the average, maximum, and minimum printhead dot resistance value to the host. Each value is a numeric data string, separated by comma. This command is supported only by the 4400.

Syntax: S

Printhead Temperature Sensor Value, Transmit

Purpose: This command transmits the printhead thermistor A/D output back to the host. The range of the value is 00 to 255.

Syntax: P

Printhead Volt Supply Value, Transmit

Purpose: Transmits the printhead volt supply A/D output back to the host. The range of the value is 00 to 255. This command is supported only by the 4400.

Syntax: V

Reflective Sensor Value, Transmit

Purpose: Transmits the label mark reflective sensor A/D output back to the host. The value ranges from 00 to 255.

The EasyCoder F4 and PD/PF/PM/PX-series printers will not respond if the paper is moving. For these printers, the values are 0 (label) or 1 (mark).

Syntax: M

Software Configuration Label, Print

Purpose: Prints a label providing software configuration information.

Syntax: s

Test and Service Mode, Exit

Purpose: Causes the printer to exit Test and Service mode.

Syntax: R

Transmissive Sensor Value, Transmit

Purpose: Transmits the label gap transmissive sensor A/D output back to the host. The value ranges from 00 to 255.

The EasyCoder F4 and PD/PF/PM/PX-series printers will not respond if the paper is moving. For these printers, values are 0 (gap) or 1 (label).

Syntax: G

User-Defined Characters (UDC) and Graphics, Print

Purpose: Prints the user-defined characters and graphics stored on the printer.

Syntax: g

User-Defined Fonts, Print

Purpose: Prints the user-defined fonts stored on the printer.

Syntax: t

A Full ASCII Table

This appendix contains the full ASCII chart. For each ASCII character, it also provides its binary, hexadecimal, and Code 39 equivalent. This appendix also contains an ASCII control character chart and provides an explanation for each control character.

Full ASCII Table

Binary[0]	Hex[1]	Decimal	Code 39	ASCII[2]	Binary[0]	Hex[1]	Decimal	Code 39	ASCII[2]
00000000	00	00	%U	NUL	00100011	23	35	/C	#
00000001	01	01	$A	SOH	00100100	24	36	/D	$
00000010	02	02	$B	STX	00100101	25	37	/E	%
00000011	03	03	$C	ETX	00100110	26	38	/F	&
00000100	04	04	$D	EOT	00100111	27	39	/G	'
00000101	05	05	$E	ENQ	00101000	28	40	/H	(
00000110	06	06	$F	ACK	00101001	29	41	/I	)
00000111	07	07	$G	BEL	00101010	2A	42	/J	*
00001000	08	08	$H	BS	00101011	2B	43	/K	+
00001001	09	09	$I	HT	00101100	2C	44	/L	,
00001010	0A	10	$J	LF	00101101	2D	45	/M	-
00001011	0B	11	$K	VT	00101110	2E	46	/N	.
00001100	0C	12	$L	FF	00101111	2F	47	/O	/
00001101	0D	13	$M	CR	00110000	30	48	/P4	0
00001110	0E	14	$N	SO	00110001	31	49	/Q	1
00001111	0F	15	$O	SI	00110010	32	50	/R	2
00010000	10	16	$P	DLE	00110011	33	51	/S	3
00010001	11	17	$Q	DC1	00110100	34	52	/T	4
00010010	12	18	$R	DC2	00110101	35	53	/U	5
00010011	13	19	$S	DC3	00110110	36	54	/V	6
00010100	14	20	$T	DC4	00110111	37	55	/W	7
00010101	15	21	$U	NAK	00111000	38	56	/X	8
00010110	16	22	$V	SYN	00111001	39	57	/Y	9
00010111	17	23	$W	ETB	00111010	3A	58	/Z	:
00011000	18	24	$X	CAN	00111011	3B	59	%F	;
00011001	19	25	$Y	EM	00111100	3C	60	%G	<
00011010	1A	26	$Z	SUB	00111101	3D	61	%H	=
00011011	1B	27	%A	ESC	00111110	3E	62	%I	>
00011100	1C	28	%B	FS	00111111	3F	63	%J	?
00011101	1D	29	%C	GS	01000000	40	64	%V	@
00011110	1E	30	%D	RS	01000001	41	65	A	A
00011111	1F	31	%E	US	01000010	42	66	B	B
00100000	20	32	SP	SP[3]	01000011	43	67	C	C
00100001	21	33	/A	!	01000100	44	68	D	D
00100010	22	34	/B	"	01000101	45	69	E	E

Full ASCII Table (continued)

Binary[0]	Hex[1]	Decimal	Code 39	ASCII[2]	Binary[0]	Hex[1]	Decimal	Code 39	ASCII[2]
01000110	46	70	F	F	01100011	63	99	+C	c
01000111	47	71	G	G	01100100	64	100	+D	d
01001000	48	72	H	H	01100101	65	101	+E	e
01001001	49	73	I	I	01100110	66	102	+F	f
01001010	4A	74	J	J	01100111	67	103	+G	g
01001011	4B	75	K	K	01101000	68	104	+H	h
01001100	4C	76	L	L	01101001	69	105	+I	i
01001101	4D	77	M	M	01101010	6A	106	+J	j
01001110	4E	78	N	N	01101011	6B	107	+K	k
01001111	4F	79	O	O	01101100	6C	108	+L	l
01010000	50	80	P	P	01101101	6D	109	+M	m
01010001	51	81	Q	Q	01101110	6E	110	+N	n
01010010	52	82	R	R	01101111	6F	111	+O	o
01010011	53	83	S	S	01110000	70	112	+P	p
01010100	54	84	T	T	01110001	71	113	+Q	q
01010101	55	85	U	U	01110010	72	114	+R	r
01010110	56	86	V	V	01110011	73	115	+S	s
01010111	57	87	W	W	01110100	74	116	+T	t
01011000	58	88	X	X	01110101	75	117	+U	u
01011001	59	89	Y	Y	01110110	76	118	+V	v
01011010	5A	90	Z	Z	01110111	77	119	+W	w
01011011	5B	91	%K	[	01111000	78	120	+X	x
01011100	5C	92	%L	\	01111001	79	121	+Y	y
01011101	5D	93	%M	]	01111010	7A	122	+Z	z
01011110	5E	94	%N	^	01111011	7B	123	%P	{
01011111	5F	95	%O	_	01111100	7C	124	%Q	|
01100000	60	96	%W	`	01111101	7D	125	%R	}
01100001	61	97	+A	a	01111110	7E	126	%S	~
01100010	62	98	+B	b	01111111	7F	127	%T[5]	n[6]

Notes:
0   Bit positions are 76543210.
1   Hexadecimal value
2   ASCII character
3   SP is the SPACE character.
4   The Code 39 characters /P through /Y may be interchanged with the numbers 0 through 9.
5   May be interchanged with %X or %Y or %Z.
6   n is the DELETE character.
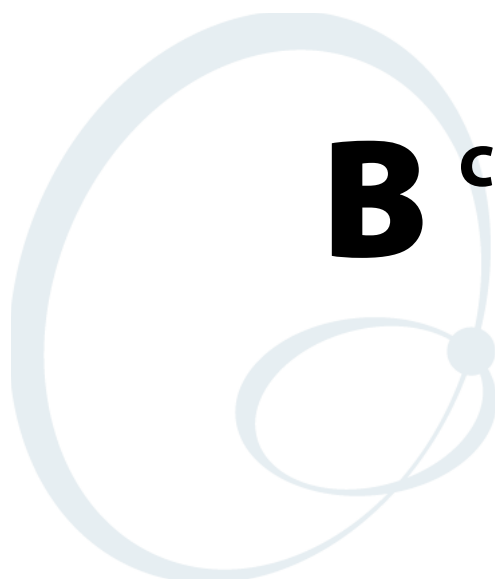
Full ASCII Control Characters Table

Control Character	Definition	Control Character	Definition
NUL	Null, or all zeroes	DC1	Device Control 1 (XON)
SOH	Start of Heading	DC2	Device Control 2
STX	Start of Text	DC3	Device Control 3 (XOFF)
ETX	End of Text	DC4	Device Control
EOT	End of Transmission	NAK	Negative Acknowledge
ENQ	Enquiry	SYN	Synchronous Idle
ACK	Acknowledgment	ETB	End Transmission Block
BEL	Bell	CAN	Cancel
BS	Backspace	EM	End of Medium
HT	Horizontal Tab	SUB	Substitute
LF	Line Feed	ESC	Escape
VT	Vertical Tab	FS	File Separator
FF	Form Feed	GS	Group Separator
CR	Carriage Return	RS	Record Separator
SO	Shift Out	US	Unit Separator
SI	Shift In	SP	Space
DLE	Data Link Escape	DEL	Delete

B Character Sets

This appendix contains the extended character set substitution tables available on your printer.

International Character Sets

The following tables show which hex codes to download for international characters not available in the U.S. character set. To use the tables, find the hex code for the U.S. character that corresponds with the character in your language.

Advanced Character Table

If you are running your printer in Advanced mode, use this table to find the right hex codes for the international character sets.

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S. ASCII	#	$	@	[	\	]	^	`	{	¦	}	˜
U.K. ASCII	£	$	@	[	\	]	^	`	{	¦	}	-
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	-
Sweden/Finland	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Spain	£	$	§	¡	Ñ	¿	^	`	°	ñ	ç	˜
Switzerland	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	£	$	§	°	ç	é	^	ù	à	ò	è	ì

8636/46 Character Table

This table shows the hex codes for the character sets that print if your printer is running under 86XX emulation mode.

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S. ASCII	#	$	@	[	\	]	^	`	{	¦	}	˜
U.K. ASCII	£	$	@	[	\	]	^	`	{	¦	}	˜
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	˜
Sweden/Finland	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Spain	P$_t$	$	@	¡	Ñ	¿	^	`	¨	ñ	ç	˜
Switzerland	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	#	$	§	°	ç	é	^	ù	à	ò	è	ì

IBM Translation Character Table

This table shows the hex codes for the international character sets that print if your printer is running with Translation enabled.

	21	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S. ASCII	¦	#	$	@	¢	\	!	ÿ	`	{	¦	}	˜
U.K. ASCII	¦	#	£	@	$	\	!	ÿ	`	{	¦	}	-
Germany	!	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	!	£	$	à	°	ç	§	^	`	é	ù	è	¨
Norway/Denmark	!	Æ	Å	Ø	#	\	¤	^	`	æ	ø	å	ü
Sweden/Finland	!	Ä	Å	Ö	§	É	¤	^	é	ä	ö	å	ü
Spain	¦	Ñ	P_t	@	[	\	]	ÿ	`	{	ń	}	¨
Switzerland	!	#	$	à	°	ç	é	^	ù	ä	ö	ü	è
Italy	!	£	$	§	°	ç	é	^	ù	à	ò	è	ì

Code Page 850 Character Table

This table shows the character set that prints if your printer has Code Page 850 selected as the printer language.

Note: Some Intermec printers do not support Code Page 850. For more information, see the **"Printer Language, Select" command on page 118.**

00	☺ 01	☻ 02	♥ 03	♦ 04	♣ 05	♠ 06	● 07	◘ 08	○ 09	◙ 0A	♂ 0B	♀ 0C	♪ 0D	♫ 0E	☼ 0F
► 10	◄ 11	↕ 12	‼ 13	¶ 14	§ 15	▬ 16	↨ 17	↑ 18	↓ 19	→ 1A	← 1B	∟ 1C	↔ 1D	▲ 1E	▼ 1F
20	! 21	" 22	# 23	$ 24	% 25	& 26	' 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
0 30	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 40	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 50	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	- 5F
` 60	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 70	q 71	r 72	s 73	t 74	u 75	v D6	w 77	x 78	y 79	z 7A	{ 7B	¦ 7C	} 7D	~ 7E	⌂ 7F
Ç 80	ü 81	é 82	â 83	ä 84	à 85	å E6	ç 87	ê 88	ë 89	è 8A	ï 8B	î 8C	ì 8D	Ä 8E	Å 8F
É 90	æ 91	Æ 92	ô 93	ö 94	ò 95	û F6	ù 97	ÿ 98	Ö 99	Ü 9A	ø 9B	£ 9C	Ø 9D	× 9E	ƒ 9F
á A0	í A1	ó A2	ú A3	ñ A4	Ñ A5	ª A6	º A7	¿ A8	® A9	¬ AA	½ AB	¼ AC	¡ AD	« AE	» AF
░ B0	▒ B1	▓ B2	│ B3	┤ B4	Á B5	Â B6	À B7	© B8	╣ B9	║ BA	╗ BB	╝ BC	¢ BD	¥ BE	┐ BF
└ C0	┴ C1	┬ C2	├ C3	─ C4	┼ C5	ã C6	Ã C7	╚ C8	╔ C9	╩ CA	╦ CB	╠ CC	═ CD	╬ CE	CF
´ D0	Ð D1	Ê D2	Ë D3	È D4	€ D5	Í D6	Î D7	Ï D8	┘ D9	┌ DA	█ DB	▄ DC	¦ DD	Ì DE	▀ DF
Ó E0	ß E1	Ô E2	Ò E3	õ E4	Õ E5	µ E6	þ E7	þ E8	Ú E9	Û EA	Ù EB	ý EC	Ý ED	¯ EE	´ EF
- F0	± F1	= F2	¾ F3	¶ F4	§ F5	÷ F6	¸ F7	° F8	¨ F9	· FA	¹ FB	³ FC	² FD	■ FE	FF

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Extended Character Sets

Each internal font in the printer has a different character set associated with it as shown in the following tables. The hex codes accompany each character. *You must set the serial port communication to 8 data bits to use the extended character sets.*

Characters in Fonts

c0   7x9 Standard
c1   7x11 OCR
c2   10x14 Standard
c7   5x7 Standard

NL 00	SH 01	SX 02	EX 03	ET 04	EQ 05	AK 06	BL 07	BS 08	HT 09	LF 0A	UT 0B	FF 0C	CR 0D	SO 0E	SI 0F
DL 10	D1 11	D2 12	D3 13	D4 14	NK 15	SN 16	EB 17	CN 18	EM 19	SB 1A	EC 1B	FS 1C	GS 1D	RS 1E	US 1F
20	! 21	'' 22	# 23	$ 24	% 25	& 26	' 27	(28	) 29	* 2A	+ 2B	, 2C	– 2D	. 2E	/ 2F
0 30	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 40	A 41	B 42	C 43	D 44	E 45	F 46	G 47	H 48	I 49	J 4A	K 4B	L 4C	M 4D	N 4E	O 4F
P 50	Q 51	R 52	S 53	T 54	U 55	V 56	W 57	X 58	Y 59	Z 5A	[5B	\ 5C	] 5D	^ 5E	_ 5F
' 60	a 61	b 62	c 63	d 64	e 65	f 66	g 67	h 68	i 69	j 6A	k 6B	l 6C	m 6D	n 6E	o 6F
p 70	q 71	r 72	s 73	t 74	u 75	v 76	w 77	x 78	y 79	z 7A	{ 7B	| 7C	} 7D	~ 7E	▓ 7F
R̦ 80	à 81	■ 82	□ 83	△ 84	△ 85	86	87	88	89	8A	8B	8C	8D	8E	8F
90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
A0	¡ A1	A2	£ A3	¤ A4	¥ A5	A6	Ș A7	¨ A8	A9	AA	AB	AC	AD	AE	AF
⊖ B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	¿ BF
C0	C1	C2	C3	Ä C4	Å C5	Æ C6	C7	C8	É C9	CA	CB	CC	CD	CE	CF
D0	Ñ D1	D2	D3	D4	D5	Ö D6	D7	Ø D8	D9	DA	DB	Ü DC	DD	DE	ß DF
à E0	E1	E2	E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	EA	ë EB	ï EC	ED	EE	EF
F0	ñ F1	ò F2	F3	F4	F5	ö F6	F7	ø F8	ù F9	FA	FB	ü FC	FD	FE	FF

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Characters in Fonts

c20   8 point

c21   12 point

c22   20 ;p

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
2Ø	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
3Ø	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
4Ø	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
5Ø	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
6Ø	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
7Ø	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
€															
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
	¡	¢	£	¤	¥	|	§	¨	©	a	«	¬	-	®	‾
AØ	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
°	±	2	3	´	µ	¶	·	¸	1	0	»	¼	½	¾	¿
BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF
À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
CØ	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
DØ	D1	D2	D3	D4	D5	D6	D7	D8	D8	DA	DB	DC	DD	DE	DF
à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
EØ	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ
FØ	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

Characters in Font

c23   OCR A

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Characters in Font

c24   OCR B Size 2

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
								‾							
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
	!	"	#	$	%	&	'	(	)	*	+	,	—	.	/
2Ø	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
3Ø	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
4Ø	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
5Ø	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
6Ø	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
p	q	r	s	t	u	v	w	x	y	z	{			}	~	■
7Ø	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
			£	¤	¥	¦	§	¨							
AØ	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
				´				,							
BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF
				Ä	Å	Æ									
CØ	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
	Ñ					Ö		Ø				Ü			ß
DØ	D1	D2	D3	D4	D5	D6	D7	D8	D8	DA	DB	DC	DD	DE	DF
				ä	å	æ									
EØ	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
	ñ					ö		ø				ü			
FØ	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

IPL025.eps

Characters in Fonts

c25   8 point
c26   12 point
c28   20 point

ØØ	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	ØA	ØB	ØC	ØD	ØE	ØE
1Ø	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
2Ø	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
3Ø	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
4Ø	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
5Ø	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
6Ø	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
7Ø	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
€		‚	ƒ	„	…	†	‡	^	‰	Š	‹	Œ		Ž	
8Ø	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
	'	'	"	"	•	–	—	~	TM	š	›	œ		ž	Ÿ
9Ø	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬		®	¯
AØ	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
BØ	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF
À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
CØ	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
Ð	Ñ	Ò	Ó	Ô	Õ	Ö	?	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
DØ	D1	D2	D3	D4	D5	D6	D7	D8	D8	DA	DB	DC	DD	DE	DF
à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
EØ	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ
FØ	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

IPL026.eps

C Creating User-Defined Bitmap Graphics and Fonts

This appendix explains how to create user-defined bitmap fonts and graphics.

Creating User-Defined Bitmap Graphics

You can create user-defined graphics (user-defined characters, or UDCs) in two ways: one bit per byte or six bits per byte. To use the UDC in a format, you must first define a graphic field using the IPL command U*n*[,*name*]. For more information, see the **"User-Defined Character Field, Create or Edit" command on page 155.**

Creating One Bit Per Byte User-Defined Graphics

One bit per byte is the standard graphic format used for downloading to an Intermec 8636/8646 printer. You can download a one bit per byte graphic to the printer when it is in 86XX Emulation mode. A one bit per byte bitmap image is an arrangement of ones and zeros that looks similar to the following example.

Example of One Bit Per Byte Bitmap Image

Bitmap Pattern	Row
000000010000000	Row 0
000000111000000	Row 1
000001011100000	Row 2
000010011110000	Row 3
000100011111000	Row 4
001000011111100	Row 5
010000011111110	Row 6
100000011111111	Row 7
010000010000010	Row 8
001000010000100	Row 9
000100010001000	Row 10
000010010010000	Row 11
000001010100000	Row 12
000000111000000	Row 13
000000010000000	Row 14

If you look closely at the bitmap pattern above, you can see that it is the outline of a diamond with a line down the middle and the upper right corner blacked in.

To create your own graphic

1 Draw your design on a piece of graph paper:.

IPL.027
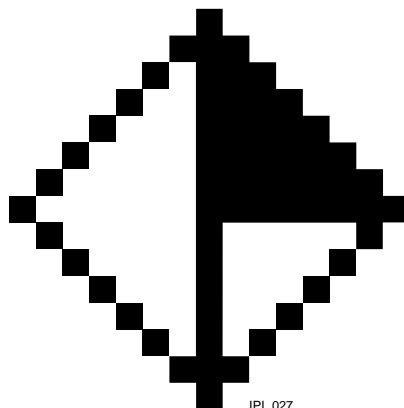
2 Convert each of the squares to either a one or a zero (the zeros are blanks and the ones are dots), and type it into a text file column by column. When you send the file to the printer, a character in the file represents either a dot or a blank when the image prints.

UØ ————————————————————————→ U14

```
O O O O O O O I O O O O O O O
O O O O O O I I I O O O O O O
O O O O O I O I I I O O O O O
O O O O I O O I I I I O O O O
O O O I O O O I I I I I O O O
O O I O O O O I I I I I I O O
O I O O O O O I I I I I I I O
I O O O O O O I I I I I I I I
O I O O O O O I O O O O O I O
O O I O O O O I O O O O I O O
O O O I O O O I O O O I O O O
O O O O I O O I O O I O O O O
O O O O O I O I O I O O O O O
O O O O O O I I I O O O O O O
O O O O O O O I O O O O O O O
```

IPL.028

3 Read the pattern of ones and zeros down each column starting at the top left corner. The first column on the left becomes the data for the u0 command line, the second column becomes the data for the u1 command line, and so on. Type this into a text file:

```
UØ,    O O O O O O O | O O O O O O O
U1,    O O O O O O | | | O O O O O O
U2,    O O O O O | O | O | O O O O O
U3,    O O O O | O O | O O | O O O O
U4,    O O O | O O O | O O O | O O O
U5,    O O | O O O O | O O O O | O O
U6,    O | O O O O O | O O O O O | O
U7,    | | | | | | | | O O O O O O |
U8,    O | | | | | | | O O O O O | O
U9,    O O | | | | | | O O O O | O O
U10,   O O O | | | | | O O O | O O O
U11,   O O O O | | | | O O | O O O O
U12,   O O O O O | | | O | O O O O O
U13,   O O O O O O | | | O O O O O O
U14,   O O O O O O O | O O O O O O O
```

IPL.029

4 Ensure that the printer is in 86XX Emulation mode, and then add the protocol characters and define the bitmap as a user-defined graphic. The following example gives the graphic the number 3, the name "diamond," the dimensions 15 rows by 15 columns, and adds the ASCII characters necessary for the printer to understand the graphic.

Example of Defining a Bitmap as a User-Defined Graphic

Command Line	Description
`<STX><ESC>c<ETX>`	Selects 86XX mode
`<STX><ESC>P<ETX>`	Enter Program mode
`<STX>G3,diamond;x15;y15;<ETX>`	Create UDC bitmap 3 (diamond)
`<STX>u0,000000010000000;<ETX>`	Define column 0
`<STX>u1,000000101000000;<ETX>`	Define column 1
`<STX>u2,000001000100000;<ETX>`	Define column 2
`<STX>u3,000010000010000;<ETX>`	Define column 3
`<STX>u4,000100000001000;<ETX>`	Define column 4
`<STX>u5,001000000000100;<ETX>`	Define column 5
`<STX>u6,010000000000010;<ETX>`	Define column 6
`<STX>u7,111111111111111;<ETX>`	Define column 7
`<STX>u8,011111110000010;<ETX>`	Define column 8
`<STX>u9,001111110000100;<ETX>`	Define column 9
`<STX>u10,000111110001000;<ETX>`	Define column 10
`<STX>u11,000011110010000;<ETX>`	Define column 11
`<STX>u12,000001110100000;<ETX>`	Define column 12
`<STX>u13,000000111000000;<ETX>`	Define column 13
`<STX>u14,000000010000000;<ETX>`	Define column 14
`<STX>R;<ETX>`	Save and exit to Print mode

Creating Six Bits Per Byte User-Defined Graphics

The six bits per byte format is more compact than one bit per byte. When you use six bits per byte, you can download large graphics more quickly. The printer must be in Advanced mode (2.5 mil or 5.0 mil) to use the six bits per byte format. The only difference between 2.5 mil and 5.0 mil mode is the size of the image when it prints.

The arrangement of the bits is very important in this format. Eight bits (0 through 7) compose every byte, but the printer only uses bits 0 through 5 to map the image.

You must always set bit 6 (the seventh bit) to 1 so you can download data to the printer. 7-bit hosts reserve bit 7 (the eighth bit) for parity and compatibility, so the range of characters for any given UDC is 40 hex (@) to 127 hex (■ delete character).

You can download graphics like the previous one bit per byte (diamond) bitmap example in a six bits per byte format by following the procedure below. Please refer to "Creating Six Bits Per Byte User-Defined Fonts" on page 182 for an illustrated example of creating a six bits per byte format.

To download a six bits per byte graphic

1 Draw the graphic on graph paper.

2 Change the graph paper drawing into a pattern of ones (square is filled in) and zeros (square is empty).

3 Starting from the top row, divide each vertical column into groups of six digits. (If the bottom group has less than six digits, add zeros to this group until it also has six.) The six digits in each group are the six bits that you download in a byte of data. The top digit of each group is bit 0, the bottom digit is bit 5.

4 Add a 1 in the bit 6 position, and then add a 0 in the bit 7 position so that each group now has eight digits. (Eight digits complete the byte.)

5 Starting with the first group of 8 bits in the first column, reverse the order of each group so that bit 0 is now last and bit 7 is first. Work from the top of each column to the bottom. Each eight-digit group is now a binary representation of an ASCII character.

6 Translate each eight-digit group into an ASCII character according to the full ASCII table in Appendix A.

7 Make sure the printer is in Advanced mode and not in 86XX Emulation mode. For help, see the 86XX command or the "Emulation or Advanced Mode on Power-Up" command on page 108.

8 Download the graphic so that each column is represented by a command string.

Here is the same format for the diamond shape graphic shown earlier, but this time it is in six bits per byte format with ASCII characters.

Example of Six Bits Per Byte Graphic Image

Command	Definition
`<STX><ESC>C<ETX>`	Selects Advanced mode
`<STX><ESC>P<ETX>`	Enter Program mode
`<STX>G2,diamond;x15;y15;<ETX>`	Create UDC bitmap 2 (diamond), 15 rows by 15 columns
`<STX>u0,@B@;<ETX>`	Define column 0
`<STX>u1,@E@;<ETX>`	Define column 1
`` <STX>u2,`H@;<ETX> ``	Define column 2
`<STX>u3,PP@;<ETX>`	Define column 3
`` <STX>u4,H`@;<ETX> ``	Define column 4
`<STX>u5,D@A;<ETX>`	Define column 5
`<STX>u6,B@B;<ETX>`	Define column 6
`<STX>u7,<DEL><DEL>G;<ETX>`	Define column 7
`<STX>u8,~CB;<ETX>`	Define column 8
`<STX>u9,|CA;<ETX>`	Define column 9
`<STX>u10,xc@;<ETX>`	Define column 10
`<STX>u11,pS@;<ETX>`	Define column 11
`` <STX>u12,`K@;<ETX> ``	Define column 12
`<STX>u13,@G@;<ETX>`	Define column 13
`<STX>u14,@B@;<ETX>`	Define column 14
`<STX>R;<ETX>`	Save and exit to Print mode

After downloading the graphic to the printer, download the following format to see how the graphic prints. A label similar to the one following the format is printed.

Example - Downloading Format for Six Bits Per Byte Graphic

Command	Definition
`<STX><ESC>C<ETX>`	Selects Advanced mode
`<STX><ESC>P<ETX>`	Enter Program mode
`<STX>E4;F4<STX>`	Create format 4
`<STX>U1;o1050,650;c2;w20;h20;<ETX>`	Create graphic field 1, origin of 1050,650, use graphic 2, and magnify it by a factor of 20
`<STX>R;<ETX>`	Save and exit to Print mode
`<STX><ESC>E4<ETX>`	Select format 4
`<STX><ETB><ETX>`	Print
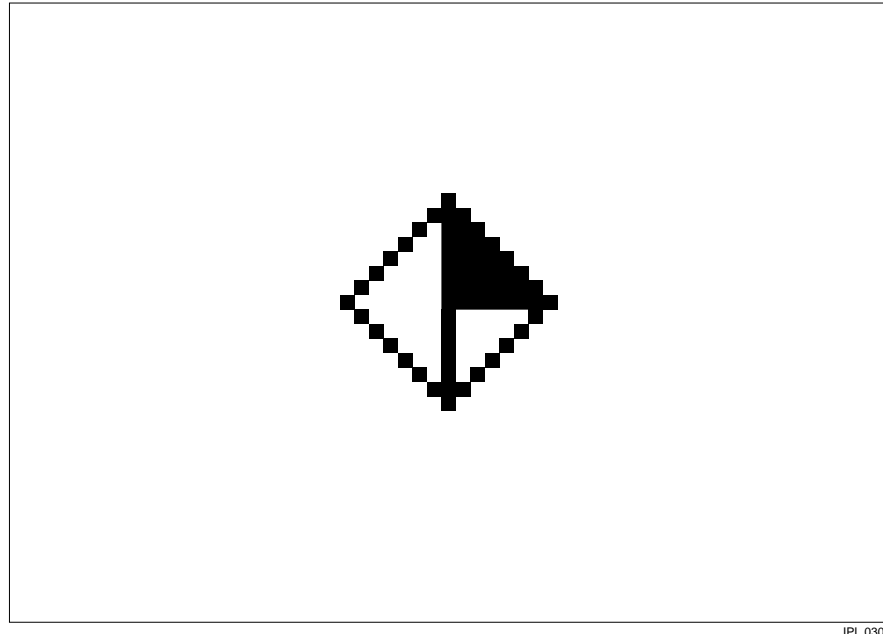
IPL.030

Six Bits Per Byte Graphic: *After downloading the graphic image and the format for the graphic, this graphic is what your printer prints.*

Creating User-Defined Bitmap Fonts

There are two ways to create user-defined fonts: one bit per byte format (86XX Emulation mode) or six bits per byte format (Advanced mode).

Creating One Bit Per Byte User-Defined Fonts

In 86XX Emulation mode, the printer receives downloaded fonts in the same manner as the 8636/8646 printers. You create characters column by column, from the top of the column downward. In 86XX Emulation mode, each byte of data represents one bit in the bitmap. The following example lists the commands and data required to define a font with the two characters "$" (t36) and "i" (t105). See "Creating One Bit Per Byte User-Defined Graphics" on page 176 for more information.

Example of User-Defined Font, One Bit Per Byte

Commands	Definition
`<STX><ESC>c<ETX>`	Selects 86XX Emulation mode
`<STX><ESC>P<ETX>`	Enter Program mode
`<STX>T11,FONT11<ETX>`	Create bitmap font 11
`<STX>x10;y14;<ETX>`	Define cell width and height
`<STX>t36;Z12;<ETX>`	Create character 36 ($), character width is 12
`<STX>u0,00111110001100;<ETX>`	Define column 0

Example of User-Defined Font, One Bit Per Byte (continued)

Commands	Definition
`<STX>u1,01111111001110;<ETX>`	Define column 1
`<STX>u2,01100011000110;<ETX>`	Define column 2
`<STX>u3,01100011000110;<ETX>`	Define column 3
`<STX>u4,11111111111111;<ETX>`	Define column 4
`<STX>u5,11111111111111;<ETX>`	Define column 5
`<STX>u6,01100011000110;<ETX>`	Define column 6
`<STX>u7,01100011000110;<ETX>`	Define column 7
`<STX>u8,01110011111110;<ETX>`	Define column 8
`<STX>u9,00110001111100;<ETX>`	Define column 9
`<STX>t105;Z4;<ETX>`	Create character 105 (i), character width is 4
`<STX>u4,00110011111111;<ETX>`	Define column 4
`<STX>u5,00110011111111;<ETX>`	Define column 5
`<STX>R;<ETX>`	Save and exit to Print mode

Creating Six Bits Per Byte User-Defined Fonts

You can also create bitmaps in Advanced mode. In Advanced mode, each data byte represents six bits in the bitmap. See the following example to create a six bits per byte format like the previous one bit per byte ("$" and "i") bitmap font examples.

To download a six bits per byte format

1 Draw the character on graph paper.
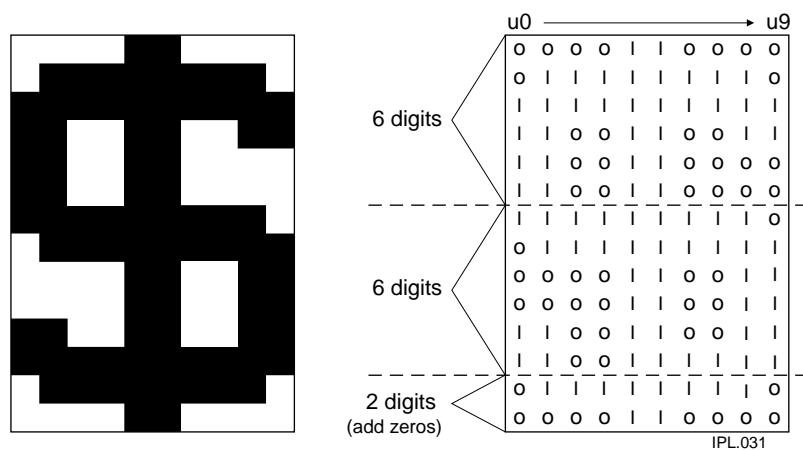
2 Change the graph paper drawing into a pattern of ones and zeros.

3 Starting with the first column, divide each vertical column into groups of six digits. (If the bottom group has less than six digits, add zeros to this group until it also has six.) The six digits in each group are the six bits that you download in a byte of data. The top digit of each group is bit 0, and the bottom digit is bit 5.

```
        u0  u1  u2  u3  u4  u5  u6  u7  u8  u9
bit Ø    o   o   o   o   l   l   o   o   o   o
         o   l   l   l   l   l   l   l   l   o
         l   l   l   l   l   l   l   l   l   l
         l   l   o   o   l   l   o   o   l   l
         l   l   o   o   l   l   o   o   o   o
bit 5    l   l   o   o   l   l   o   o   o   o
bit 6    l   l   l   l   l   l   l   l   l   l
bit 7    o   o   o   o   o   o   o   o   o   o

bit Ø    l   l   l   l   l   l   l   l   l   o
         o   l   l   l   l   l   l   l   l   l
         o   o   o   o   l   l   o   o   l   l
         o   o   o   o   l   l   o   o   l   l
         l   l   o   o   l   l   o   o   l   l
bit 5    l   l   l   l   l   l   l   l   l   l
bit 6    l   l   l   l   l   l   l   l   l   l
bit 7    o   o   o   o   o   o   o   o   o   o

bit Ø    o   l   l   l   l   l   l   l   l   o
         o   o   o   o   l   l   o   o   o   o
         o   o   o   o   o   o   o   o   o   o
         o   o   o   o   o   o   o   o   o   o
         o   o   o   o   o   o   o   o   o   o
bit 5    o   o   o   o   o   o   o   o   o   o
bit 6    l   l   l   l   l   l   l   l   l   l
bit 7    o   o   o   o   o   o   o   o   o   o
```

IPL.032

Byte Mapping: *This illustration shows how to map a character in the six bits per byte format.*

4 Add a 1 in the bit 6 position, and then add a 0 in the bit 7 position so that each group now has eight digits. Eight digits complete the byte.

5 Starting with the first group of eight bits in the first column (u0), reverse the order of each group so that bit 0 is now last and bit 7 is first. Work from the top of each column to the bottom. Each eight-digit group is now a binary representation of an ASCII character.

Note: In this illustration, each row now represents a column.

```
        bit              bit  bit              bit   bit              bit
        7                Ø    7                Ø     7                Ø
    uØ  o l l l l l o o   o l l l o o o l   o l o o o o o o
    u1  o l l l l l l o   o l l l o o l l   o l o o o o o l
    u2  o l o o o l l o   o l l o o o l l   o l o o o o o l
    u3  o l o o o l l o   o l l o o o l l   o l o o o o o l
    u4  o l l l l l l l   o l l l l l l l   o l o o o o l l
    u5  o l l l l l l l   o l l l l l l l   o l o o o o l l
    u6  o l o o o l l o   o l l o o o l l   o l o o o o o l
    u7  o l o o o l l o   o l l o o o l l   o l o o o o o l
    u8  o l o o l l l o   o l l l l l l l   o l o o o o o l
    u9  o l o o l l o o   o l l l l l l o   o l o o o o o o
```

IPL.033

6 Translate each eight-digit group into an ASCII character according to the full ASCII table in Appendix A.

u0 = |q@
u1 = ~sA
u2 = FcA
u3 = FcA
u4 = <DEL><DEL>C
u5 = <DEL><DEL>C
u6 = FcA
u7 = FcA
u8 = N<DEL>A
u9 = L~@

7 Make sure the printer is in Advanced mode and not in 86XX Emulation mode.

8 Download the font so that you represent each column with a command string.

Here are the previously defined characters shown in a six bits per byte format with ASCII characters.

Example of User-Defined Font, Six Bits Per Byte

Commands	Definitions
`<STX><ESC>C<ETX>`	Selects Advanced mode
`<ESC>P;<ETX>`	Enters Program mode
`<STX>T11,FONT11<ETX>`	Create bitmap font 11
`<STX>x10;y14;<ETX>`	Define cell width (10) and cell height (14)
`<STX>t36;Z12;<ETX>`	Create ASCII character 36 ($), define character width as 12
`<STX>u0,|q@;<ETX>`	Defines column 0
`<STX>u1,~sA;<ETX>`	Defines column 1

Example of User-Defined Font, Six Bits Per Byte (continued)

Commands	Definitions
<STX>u2,FcA;<ETX>	Defines column 2
<STX>u3,FcA;<ETX>	Defines column 3
<STX>u4,<DEL><DEL>C;<ETX>	Defines column 4
<STX>u5,<DEL><DEL>C;<ETX>	Defines column 5
<STX>u6,FcA;<ETX>	Defines column 6
<STX>u7,FcA;<ETX>	Defines column 7
<STX>u8,N<DEL>A;<ETX>	Defines column 8
<STX>u9,L~@;<ETX>	Defines column 9
<STX>t105;Z4;<ETX>	Creates ASCII character 105 (i), define character width as 4
<STX>u0,L<DEL>C;<ETX>	Defines column 0
<STX>u1,L<DEL>C;<ETX>	Defines column 1
<STX>R;<ETX>	Saves and exits to Print mode

D User-Defined Interface Tables

This appendix contains the user-defined interface tables, which you may need when programming with IPL. These tables show commands in the order that you must download them when you replace the User-Defined Command/Protocol characters. A table is shown for each type of command specified by a value for "t".

Print Commands (t = 0)

This list shows the Print Mode commands in the order you must download them when you are replacing the command codes.

Print Commands (t = 0)

Default Print Command	Hex Value	Print Command Description
NUL	00	Command Terminator 1
SOH	01	Set Preamble
EOT	04	Set Postamble
ENQ	05	Status Inquiry
ACK	06	Select First Data Entry Field
BEL	07	Transmit Error Code
BS	08	Warm Boot
LF	0A	Command Terminator 2
VT	0B	Status Dump
FF	0C	Form Feed
CR	0D	Select Next Data Entry Field
SO	0E	Label Cut Command
SI	0F	Go to Shift Command Table
DLE	10	Reset
SYN	16	Set Intercharacter Delay
ETB	17	Print
CAN	18	Clear All Data
EM	19	Abort Print Job
SUB	1A	Data Shift
ESC	1B	Go to Escape Command Table
FS	1C	Numeric Field Separator
GS	1D	Alphanumeric Field Separator
RS	1E	Set Quantity Count
US	1F	Set Batch Count
DEL	7F	Clear Data From Current Field

Escape Print Commands (t = 1)

This table lists the <ESC> commands in the order you must download them.

Escape Print Commands (t=1)

Default Escape Command	Hex Value	Escape Command Description
SYN	16	Set Message Delay
(space)	20	Enter Start/Stop Character
C	43	Select Advanced Mode
D	44	Set Field Decrement
E	45	Select Format
F	46	Select Field
G	47	Select Page
H	48	Transmit Printhead Parameters
I	49	Set Field Increment
L	4C	Transmit Label and Gap Length
M	4D	Transmit Software Version Number
N	4E	Disable Increment/Decrement
O	4F	Transmit Options Selected
P	50	Enter Program Mode
Q	51	Transmit Quantity and Batch Count
T	54	Enter Test and Service Mode
Z	5A	Transmit User-Defined Command Tables
c	63	Select 86XX Emulation Mode
d	64	Enable Auto-Transmit 2
e	65	Enable Auto-Transmit 3
g	67	Select Direct Graphics Mode
j	6A	Enable Auto-Transmit 1
k	6B	Disable Auto-Transmit 1, 2, and 3
m	6D	Transmit Static RAM Usage
p	70	Transmit Configuration Parameters
u	75	Transmit User-Defined Characters
v	76	Transmit Font
x	78	Transmit Format
y	79	Transmit Page

Shift Print Commands (t = 2)

This list shows the Shift commands in the order you must download them. You must precede these commands with the "Go to Shift Command Table" command (default value SI) listed in the Print Commands (*t* = 0) table on page 188.

Shift Print Commands (t = 2)

Default Shift Command	Hex Value	Shift Command Description
A	41	Control Panel Access
C	43	86XX or Advanced Mode on Power-Up
D	44	Set End-of-Print Skip Distance
F	46	Set Top of Form
H	48	Set Printhead Pressure
I	49	Set Number of Image Bands
L	4C	Set Maximum Label Length
N	4E	Define Amount of Storage
O	4F	Online or Offline on Power-Up
R	52	Enable or Disable Label Retract
S	53	Set Print Speed
T	54	Select Label Stock Type
U	55	Set Printhead Test Parameters
W	57	Set Label Width
Z	5A	Set Ribbon Save Zone
a	61	Audible Alarm
b	62	Increase Takeup Motor Torque
c	63	Enable or Disable Cutter
d	64	Set Dark Adjust
f	66	Adjust Label Rest Point
g	67	Select TTR or Direct Thermal
h	68	Select Printhead Loading Mode
i	69	IBM Language Translation
l	6C	Select Printer Language
p	70	Set Pin 11/20 Protocol
r	72	Set Label Retract Distance
t	74	Enable or Disable Self-Strip

Status Responses and Auto-Transmit Commands (t = 3)

This list contains the status responses and auto-transmit commands in the order you must download them.

Status Responses and Auto-Transmit Commands (t = 3)

Status Command	Hex Value	Status Description
GS	1D	Buffer Already Full
SO	0E	Printhead Test Fail
US	1F	Label Path Open
US	1F	Ribbon Fault
EM	19	No Label Stock
DC3	13	Buffer Now Full
EOT	04	RFID Tag Write Error
VT	01	RFID Tag Read Error
BS	08	Takeup Reel Full
SI*	0F	Printhead Hot
FS	1C	Label at Strip Pin
ACK	06	RFID Tag Write Ok
DC1**	11	Skipping
DC1**	11	Printing
DC1**	11	Ready
DC1 Auto-Transmit 1**	11	Clear
FS Auto-Transmit 1	1C	Label at Strip Pin
BS Auto-Transmit 1	08	Takeup Reel Full
EM Auto-Transmit 1	19	No Label Stock
US Auto-Transmit 1	1F	Ribbon Fault
DC1 Auto-Transmit 2	11	Room in Buffer
HT Auto-Transmit 3	09	Imager Overrun
SOH Auto-Transmit 3	01	Print Job Complete and Buffer Empty
RS Auto-Transmit 3	1E	Insufficient RAM

*Some older Intermec printers may not support this entry.

**The status responses in the above table are for standard protocol. In XON/XOFF protocol, most of the status responses are the same; however, instead of DC1, the status response is DC2, and instead of DC2, the status response is DC4.

See your printer user's manual for more information about protocols and status responses.

Protocol Commands (t = 4)

This list contains the protocol codes in the order you must download them.

Protocol Commands (t = 4)

Command Characters	Hex Value	Command Description
GS	1D	SELECT IN
FS	1C	POLL IN
EOT	04	RES IN
ENQ	05	REQ IN
STX	02	SOM IN
ETX	03	EOM IN
ACK	06	AFF IN
NAK	15	NEG IN
DLE	10	DLE IN
DC1	11	XON IN
DC3	13	XOFF IN
GS	1D	SELECT OUT
FS	1C	POLL OUT
EOT	04	RES OUT
ENQ	05	REQ OUT
STX	02	SOM OUT
ETX	03	EOM OUT
ACK	06	AFF OUT
NAK	15	NEG OUT
DLE	10	DLE OUT
DC1	11	XON OUT
DC3	13	XOFF OUT
ENQ	05	Proto-Cmd 1
VT	0B	Proto-Cmd 2
20 (ms) (Range: 0 - 255)	14	Timeout on EOM ACK

Communications Protocol Characters

This table shows the characters available for different protocols. Refer to the protocol you are using for your system.

Communications Protocol Characters

Protocol Characters	Standard	XON/XOFF	Polling Mode D	Multi-Drop
Select In			GS	GS
Poll In			FS	FS
Reset In			EOT	EOT
Request for Acknowledgment In			ENQ	ENQ
Start of Message In	STX	STX	STX	STX
End of Message In	ETX	ETX	ETX	ETX
Acknowledgment In			ACK	ACK
Negative Acknowledgment In			NAK	NAK
Data Line Escape In	DLE	DLE	DLE	DLE
XON In		DC1		
XOFF In		DC3		
Select Out				GS
Poll Out				FS
Reset Out			EOT	EOT
Request for Acknowledgment Out			ENQ	ENQ
Start of Message Out			STX	STX
End of Message Out			ETX	ETX
Acknowledgment Out			ACK	ACK
Negative Acknowledgment Out	NAK		NAK	NAK
Data Line Escape Out	DLE	DLE	DLE	DLE
XON Out		DC1		
XOFF Out		DC3		
Status Enquiry In	ENQ	ENQ		
Status Dump In	VT	VT		
Timeout on EOM ACK			DC4	DC4

E Using Direct Graphics Mode

This appendix explains how to use Direct Graphics mode, which can significantly reduce the amount of time needed to download and image a graphic.

What Is Direct Graphics Mode?

You can significantly reduce the amount of time necessary to download and image a graphic by using Direct Graphics mode. Direct Graphics mode allows the printer to receive a compressed bitmap graphic and image it directly into the image bands without storing it in the printer.

Before you download the graphic, you must compress it into run-length encoded (RLE) data. The data compression greatly reduces the amount of data to download and the rasterized graphic requires minimal processing to image it into the image bands. You no longer need to store the graphic in Program mode and then set up a format in Print mode.

When you download a direct graphic to the printer, the printer stores the graphic in the image bands until you:

* clear the label data.

* set up another format.

* enter Program mode or Test and Service mode.

When printing a label with direct graphics, you must have enough dynamic RAM installed in your printer to contain the entire label. Because Intermec printers normally reuse image bands, you can print long labels with standard RAM; however, when you download direct graphics, the printer retains no information regarding the existence of the graphic in its image bands. Therefore, the printer cannot reuse those image bands when you download a direct graphic.

With standard dynamic RAM, you should be able to print almost any label up to 2.4 cm (6 in) long. You may need to install expanded dynamic RAM for longer labels.

What Is Run-Length Encoding?

Run-length encoding (RLE) is a method of compressing bitmap graphics. RLE compresses graphics that have repeated runs of white or black dots in a column, reducing the amount of time required to download the graphics to a printer.

RLE sends a series of commands that define each bitmap column of a graphic and takes advantage of a series of repeated dots within a column by encoding them as transition commands. Instead of sending the entire column of bitmap data, it sends commands telling the printer how many series of black and white dots to image.

If columns are identical, a command can instruct the printer to repeat the last column. RLE is ideal for bar code graphics or designs with simple patterns.

In cases where patterns do not exist, you can send uncompressed bitmap data to the printer. You can mix raw bitmap data and RLE commands to ensure the most efficient way to download a graphic.

The RLE file may contain five types of data, each of which is one byte long:

Data Types in RLE Files

Type	Description	Byte Format, Range, and Data Represented
Immediate commands	• Recognized and executed as regular IPL commands or protocol commands • Removed from compressed data	Byte format (7-0): 000xxxxx Range: 0-31 Data represented: N/A
Compression encodation commands	• Used as part of the compressed graphics file to change or set data modes, repeat lines, change the origin for the next lines of data, or end the compress graphics file and return to IPL command printing	Byte format (7-0): 001xxxxx Range: 32 - 63 Data represented: N/A
Low order data	• 7 bits long and may be combined with high order data. 8th bit is always set to 1. • Can represent up to 7 bits of data (0-127) • Must be preceded by a command byte so the printer knows how to interpret them	Byte format (7-0): 1xxxxxx Range: 128 - 255 Data represented: 0 - 127
High order data	• 6 bits long and always combined with low order data. 7th bit is always set to 1 and 8th bit is always set to 0. • When combined with low order data, can represent up to 13 bits of data (0-8191) • Must be preceded by a command byte so the printer knows how to interpret them • Printer ignores high order data followed by a command or more high order data	Byte format (7-0): 01xxxxx Range: 64 - 127 Data represented: 0 - 63
Bitmap data	• Composed of uncompressed bytes (7 data bits per byte) that represent columns of your graphic. 8th bit is always set to 1.	Byte format (7-0): 1xxxxxx Range: 128 - 255 Data represented: Raw data

How Do I Send a Direct Graphic to the Printer?

Once you have compressed the graphic, use the following commands to send the RLE file to the printer.

Direct Graphics Mode, Enter

Purpose: Instructs the printer to receive RLE compressed graphics data in nibblized format.

Default: $m = 0$

Syntax: `<ESC>g`*m*

where *m* specifies the format of the data to follow.

m = 0 8 bits per byte.
m = 1 7 bits per byte of nibblized data.

When you select $m = 0$, the printer parses subsequent data streams as RLE commands. The printer still recognizes immediate IPL commands. Non-immediate commands are not parsed. The printer resumes normal IPL parsing when it receives an end of bitmap RLE command.

When you select *m* = 1, the printer receives the RLE compressed graphics data in nibblized format. The printer converts each pair of bytes from ASCII to their numerical equivalent and combines them to form the original byte. For example:

ASCII	Numerical	Original byte
1,B	0x1,0xB	0x1B

Change Origin

Purpose: Tells the printer the X and Y coordinates of the next RLE data column.

Default: 0,0

Syntax: `0x21[x,y]`

where *x* and *y* are the coordinates of the next data column. Values for *x* and *y* range from 0 to 8191.

The change origin command tells the printer where to place the graphic on the label. If you do not send the command, the printer uses the default setting of 0,0.

You can use the command to place different sections of the RLE graphic in different parts of the label.

Notes: It is not necessary to use this command for every column. Column-to-column transitions are automatic following the end of line command.

The default origin of any direct graphic (0,0) is in the lower left corner instead of in the upper left corner. The upper left corner is the label format origin.

End of Bitmap

Purpose: Marks the end of RLE encoded data.

Syntax: `0x28`

Notes: The printer parses subsequent characters as IPL commands.

On the final column of the RLE encoded data, an end of line command does not need to precede the end of bitmap command.

End of Line

Purpose: Causes the printer to assign subsequent bitmap data to the next column.

Syntax: `0x22`

Notes: The printer images the next data stream in the next column position, incrementing the X position. This command causes an action similar in function to a carriage return.

Raw Bitmap Data Follows

Purpose: Indicates raw bitmap data bytes follow.

Syntax: `0x27[data]`

Notes: The printer only uses the first 7 bits of the data byte. If you set a bit to 1, it prints black. The most significant bit prints farthest to the left. Data order runs from right to left, so the first dot in a column is the least significant bit of the first data byte.

Repeat Last Line

Purpose: Causes the printer to copy the previously defined column n number of times.

Syntax: `0x24n`

Values for *n* range from 0 - 8191.

Notes: The printer automatically increments the X origin of each column. This command is only valid when preceded by a column of encoded, raw data or an end of line command.

Transition Black

Purpose: Transition data follows. The first transition is black.

Syntax: `0x25[data,data,...data]`

where *data* specifies the number of black or white dots. Values for *data* can range from 0 - 8191.

Notes: Each transition data specifies the number of dots to draw (either black or white). Each data alternates black and white dot counts.

Transition White

Purpose: Transition data follows. The first transition is white.

Syntax: `0x26[data,data,...data]`

where *data* specifies the number of black or white dots. Values for *data* can range from 0 - 8191.

Notes: Each transition data specifies the number of dots to draw (either black or white). Each data alternates black and white dot counts.

Using Direct Graphics Commands

This example consists of two parts: a graphic and a line. The origin of the direct graphic is defined the same as the origin of a normal graphic. In this example, the coordinates for the origin of the complex graphic are X0,Y450; however, once you enter Direct Graphics mode, your printer loads the information in the reverse Y direction. Each column of the graphic loads from the bottom to the top. Y coordinates now start at 0 from the bottom left corner and increase in size as the data loads. So, the printer starts loading data for the complex graphic at X0,Y450 and loads up to X0,Y425. Likewise, the data for the line starts loading at X19,Y450 and loads up to X19,Y0.
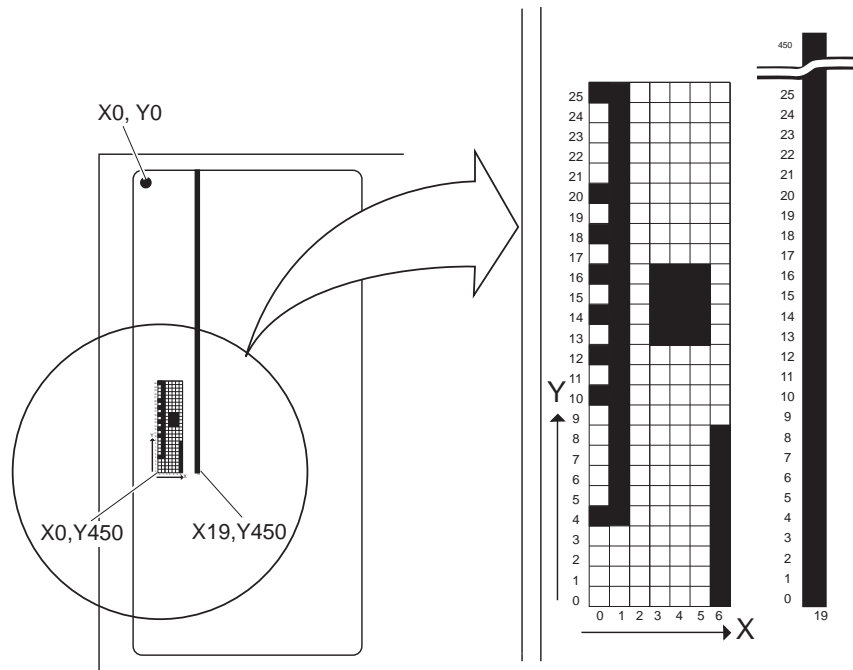
3440A.001

Direct Graphics Commands: *This example shows how the printer loads information in Direct Graphics mode.*

Here is a hex data file for the example above:

1B	67	30	21	80	43	C2	27	90	A8	D5
90	22	26	84	96	22	22	26	8C	84	22
24	82	25	88	22	21	93	43	C2	25	43
C2	28									

The next table explains the hex data file in the example.

Hex Data Commands in Example

Data	Command	Description
1B 67 30	<ESC>g0	Enter Direct Graphics mode
21 80 43 C2	0x21	Change origin
	80	80 - 80 (LO) = 0x00 -> X0
	43 C2	43 - 40 (HI) = 0x03 C2 - 80 (LO) = 0x42 (0x03 * 0x80) + 0x42 = 1C2 -> Y450
27 90 A8 D5 90 22	0x27	Raw bitmap data follows, starts at Y0
	90	90 - 80 (LO) = 0x10 -> 1 dot at Y4
	A8	A8 - 80 (LO) = 0x28 -> 2 dots at Y10 and Y12
	D5	D5 - 80 (LO) = 0x45 -> 3 dots at Y14, Y17, and Y20
	90	90 - 80 (LO) = 0x10 -> 1 dot at Y25
	0x22	End of line
26 84 96 22	0x26	Transition white
	84	84 - 80 (LO) = 4 white
	96	96 - 80 (LO) = 22 black
	0x22	End of line
22	0x22	End of line
26 8C 84 22	0x26	Transition white
	8D	8D - 80 (LO) = 13 white
	84	84 - 80 (LO) = 4 black
	0x22	End of line
24 82	0x24	Repeat last line
	82	82 - 80 (LO) = 2 times
25 88 22	0x25	Transition black
	88	89 - 80 (LO) = 9 black
	0x22	End of line
21 93 43 C2	0x21	Change origin
	93	93 - 80 (LO) = 0x13 -> X19
	43 C2	43 - 40 (HI) = 0x03 C2 - 80 (LO) = 0x42 (0x03 * 0x80) + 0x42 = 1C2 -> Y450
25 43 C2	0x25	Transition black
	43 C2	43 - 40 (HI) = 0x03 C2 - 80 (LO) = 0x42 (0x03 * 0x80) + 0x42 = 1C2 -> Y450
28	0x28	End of bitmap

F Symbology Modifiers

This appendix describes the symbology modifiers you use with the Bar Code, Select Type command. For more information, see the **"Bar Code, Select Type" command on page 126.**

Using Symbology Modifiers

When you choose a symbology for a bar code field using the Bar Code, Select Type command, you can set options for the symbology. This appendix explains the different options for each symbology and how the options affect printing.

Code 39 Modifiers

To select Code 39 using the Bar Code, Select Type command, the syntax is:

`c0[,m]`

The default for *m* is 0.

Values for m

m	Description
0	Selects 8646 compatible Code 39. No check digit.
1	Selects 8646 compatible Code 39. Printer enters check digit.
2	Selects 8646 compatible Code 39. Host enters check digit and printer verifies.
3	Selects full ASCII Code 39. No check digit.
4	Selects full ASCII Code 39. Printer enters check digit.
5	Selects full ASCII Code 39. Host enters check digit and printer verifies.
6	Selects 43 character Code 39. No check digit.
7	Selects 43 character Code 39. Printer enters check digit.
8	Selects 43 character Code 39. Host enters check digit and printer verifies.

Intermec printers support three different types of Code 39:

- 43 character Code 39

- Full ASCII Code 39

- 8646 compatible Code 39 (except the EasyCoder F4, PD41, PF2i, PF4i and PM4i). The 8646 compatible version only differs from the full ASCII version by four characters. The "$", "%", "/", and "+" are encoded as single characters instead of as "/D", "/E", "/O", and "/K." The 8646 compatible version allows the printer to be backward compatible with 86XX printers.

When you enter <ESC><SPACE> as data, the printer prints the start and stop characters.

Code 93 Modifiers

To select Code 93 using the Bar Code, Select Type command, the syntax is:

`c1`

There are no modifiers for Code 93.

Interleaved 2 of 5 Modifiers

To select Interleaved 2 of 5 using the Bar Code, Select Type command, the syntax is:

c2 [, *m*]

The default for *m* is 0. The printer adds a zero to character strings that are odd in length.

Values for m

m	Description
0	No check digit.
1	Printer enters check digit.
2	Host enters check digit.

Code 2 of 5 Modifiers

To select Code 2 of 5 using the Bar Code, Select Type command, the syntax is:

c3 [, *m*]

The default for *m* is 0.

Values for m

m	Description
0	3-bar start/stop code.
1	2-bar start/stop code.

Codabar Modifiers

To select Codabar using the Bar Code, Select Type command, the syntax is:

c4 [, *m*]

The default for *m* is 0.

Values for m

m	Description
0	Host enters start/stop codes and printer verifies.
1,*x*,*y*	Printer enters start code *x* and stop code *y*. The values for *x* and *y* can range from A to D and from a to d.

Valid start/stop characters range from A to D and from a to d. You can define them as part of the bar code field, or you can download them as part of the print data. Start/stop characters sent down with printer data override the characters defined by the bar code field.

Code 11 Modifiers

To select Code 11 using the Bar Code, Select Type command, the syntax is:

`c5[,m]`

The default for *m* is 0.

Values for m

m	Description
0	Printer enters 2 check digits.
1	Printer enters 1 check digit.
2	Host enters 2 check digits and printer verifies.
3	Host enters 1 check digit and printer verifies.

Code 128 Modifiers

To select Code 128 using the Bar Code, Select Type command, the syntax is:

`c6[,m1][,m2][,m3]`

The default for *m1*, *m2*, and *m3* is 0.

Values for m1 and m2

m1,m2	Description
0,0	Keep parentheses and spaces.
0,1	Ignore parentheses and spaces in the bar code but keep them in the interpretive field.
1,0	Selects UCC-128 Serial Shipping Container Code.
1,1	Selects UCC-128 Serial Shipping Container Code and keep parentheses and spaces in interpretive field.

In Emulation mode, you can print the Function 1 character by entering <SUB> 1. In Advanced mode, you can print the Function 1 character by entering <SUB><SUB> 1. You can print the characters for Function 2, 3, and 4 in the same way.

UCC-128 serial shipping container code automatically starts in subset C with a <FNC1>. It is a fixed length version of Code 128 requiring you to enter 19 numeric characters. The printer forces the first two characters to zero.

Values for m3

m3	Description
0	Default and recommended settings. Automatically selects character subset.
1	Starts in subset A.
2	Starts in subset B.
3	Starts in subset C.

Note: Intermec recommends that you set *m3* to 0 unless you are familiar with Code 128 subsets. The printer will automatically determine the correct start subset and perform any necessary switching between subsets.

m3 is valid only in the EasyCoder PD/PF/PM/PX-series printers when *m1* = 0. If you set *m3* to a number other than 0, only characters within the chosen subset are valid. If you enter characters from another subset, the printer generates an error code 11 (invalid bar code data) and the bar code will not print.

To switch to another character subset within the bar code (if m3 = 1, 2, or 3)

• Enter:

```
<SUB><SUB>n
```

where *n* is A, B, or C depending on if you want to switch to subset A, B, or C.

Or,

where *n* is S and the current subset is A or B. The next one character is shifted from the current subset into the other subset (A or B). Then, the following characters will return to the current subset. If you set *n* equal to S and the current subset is C, this command is ignored.

UPC/EAN Modifiers

To select UPC/EAN using the Bar Code, Select Type command, the syntax is:

```
c7[,m1][,m2]
```

The default for *m1* and *m2* is 0.

Values for m1

m1	Description
0	Printer enters check digit. Flag 1 enabled.
1	Printer enters check digit. Flag 1 disabled.
2	Host enters check digit and printer verifies Flag 1 enabled.
3	Host enters check digit and printer verifies. Flag 1 disabled.

Values for m2

m2	Description	m2	Description
0	variable length	5	UPC Version D1
1	EAN 8	6	UPC Version D2
2	EAN 13	7	UPC Version D3
3	UPC Version A	8	UPC Version D4
4	UPC Version E	9	UPC Version D5

The variable length option selects the UPC/EAN version by the number of characters in the data field. The number of data characters and check characters allowed for each version are:

EAN 8   07 data + 1 check character
EAN 13   12 data + 1 check character

EAN 8	07 data + 1 check character
UPC version A	11 data + 1 check character
UPC version E	06 data + 1 check character
UPC version D1	13 data + 1 check character
UPC version D2	18 data + 2 check characters
UPC version D3	22 data + 2 check characters
UPC version D4	25 data + 3 check characters
UPC version D5	29 data + 3 check characters

Use a "." to delimit the bar code data from the supplemental data. Data to the right of the "." is supplemental data; data to the left is bar code data. You can add the two- or five-digit supplemental to any version of the UPC/ EAN code.

The flag 1 option only applies to EAN 8, EAN 13, and UPC version A. For EAN 13, enabling the flag 1 option prints the first character of the bar code interpretive. For EAN 8 and UPC version A, enabling the flag 1 option moves the first and last character of the bar code interpretive outside of the guard bars.

UPC versions D1 - D5 are not supported in the 3400C, 3400D, 3400e, 4420, 4440, or the EasyCoder F4 and PD/PF/PM/PX-series printers.

HIBC Code 39 Modifiers

To select HIBC Code 39 using the Bar Code, Select Type command, the syntax is:

```
c8[,m1][,m2]
```

The default for *m1* is 0.

Values for m1 Conforming to the Supplier Standard

m1	Description
0	Primary format.
1	Alternate primary format.
2[,m2]	Secondary format. The linkage character comes from m2, which is the field identifier.

Values for m1 Conforming to the Provider Standard

m1	Description
3	Single format.
4	First data format.
5[,m2]	Second data format. The linkage character comes from m2, which is the field identifier.
6	Multiple data format.

Code 16K Modifiers

To select Code 16K using the Bar Code, Select Type command, the syntax is:

```
c9
```

There are no modifiers for Code 16K.

In Emulation mode, use a <SUB> 1 to represent the function 1 character. To represent the function 1 character in Advanced mode, enter <SUB><SUB> 1. Represent the characters for functions 2, 3, and 4 in the same way.

To produce a square symbol, specify a height magnification of 1 in Advanced mode. To specify a square symbol, use a height magnification of 250 in Emulation mode.

Code 49 Modifiers

To select Code 49 using the Bar Code, Select Type command, the syntax is:

```
c10
```

There are no modifiers for Code 49.

Use a <SUB> 1 to represent the function 1 character in Emulation mode. In Advanced mode, you can represent the function 1 character by entering <SUB><SUB> 1. You can represent the characters for functions 2, 3, and 4 in the same way.

To produce a square symbol, specify a height magnification of 1 in Advanced mode. To specify a square symbol, use a height magnification of 250 in Emulation mode.

The printer supports only the alphanumeric (0) and numeric (2) modes.

POSTNET Modifiers

To select POSTNET using the Bar Code, Select Type command, the syntax is:

```
c11
```

There are no modifiers for POSTNET.

POSTNET uses the height ("h") and width ("w") commands in the same way as a font. Other symbologies use "h" to specify the bar height and "w" to specify the narrow bar width. POSTNET uses "h" and "w" to magnify the base character cell. Each character cell is 13 dots high by 22 dots wide. The default width and height magnification for POSTNET is 2 x 2, resulting in a symbology sized according to the POSTNET specification.

PDF417 Modifiers

PDF417 is a stacked 2D symbology that provides the ability to scan across rows of code. Each row consists of start/stop characters, row identifiers, and symbol characters, which consist of four bars and four spaces each and contain the actual data. This symbology uses error correction symbol characters appended at the end to recover loss of data.

To select PDF417 using the Bar Code, Select Type command, the syntax is:

```
c12[[,m1][,m2][,m3]];
```

where:

m1   is the number of columns of data characters. Range for *m1* is 0 to 30. Default is 0. For more information, see the next section, "Using *m1* to Select the Number of Columns."

m2   sets the level of error correction. Range for *m2* is 0 to 9. Default is 9. For more information, see "Using *m2* to Set an Error Correction Level."

m3   sets the truncate flag. Valid values for *m3* are:

   0   Disables truncation.
   1   Enables truncation.

   For more information, see **"Using m3 to Set the Truncate Flag" on page 211.**

Using *m1* to Select the Number of Columns
m1 is the number of columns of data characters. The range for *m1* is 0 to 30 and the default is 0. If you select zero, the printer provides the number of columns needed to create a symbol that is as close to a square as possible.

Note: When you select zero, the printer selects a height magnification that is three times the width magnification. The specifications of PDF417 recommend these magnification values for creating a symbol that you can scan easily.

Using *m2* to Select an Error Correction Level
m2 determines the level of error correction. Each level provides a certain number of detection characters, which can detect and recover a specific number of faulty characters. The range for *m2* is 0 to 9. The default is 9 and allows the printer to automatically select the appropriate level.

The level of error correction that works best for your data depends on the amount of characters in your symbols. If you decide to select your own error correction level, you will need to estimate the number of characters since they are formed by compressing the raw data you send to the printer. In general, 1.8 alphanumeric characters generate one symbol character. If you are using numeric data, 2.9 digits generate one data symbol character.

Intermec recommends that you leave the error correction level at the default setting of 9. This setting lets the printer select a level, between level 2 and level 5, that provides the most efficient error correction of your data. The printer bases the level selection on the number of symbol characters your data generates.

The following table shows the *m2* values (error correction levels), the recommended data amount that you should use for each value, and the number of error correction characters that it generates.

Values for m2

m2	Recommended Amount of Data	Error Detection Characters
0	*	2 (error detected, no recovery)
1	*	4
2	1 - 40	8
3	41 - 160	16
4	161 - 320	32
5	321 - 863	64
6	†	128
7	†	256
8	†	512
9	‡	

* You should only use m2 = 0 or 1 if your labels do not have enough space for more error correction characters. Usually, these values are not recommended.

† The printer reserves m2 = 6, 7, or 8 for special applications where the symbol is subject to damage and requires a higher level of error correction.

‡ m2 = 9 lets the printer set ,m2 to the recommended value for each symbol based on the number of characters. An m2 value of 9 is the default setting.

Using m3 to Set the Truncate Flag

m3 is a truncate flag that indicates whether to print the symbol in truncated form. If truncated, the symbols print without right row indicators and with only a one-module wide stop character. The values for *m3* are 0 to disable truncating and 1 to enable truncating. The default is 0. To minimize errors and maintain the best reading performance, Intermec recommends that you leave *m3* equal to 0.

This table shows the approximate data capacity (maximum number of characters allowed) for the three character sets.

Data Capacity per Character Set

Character Set	Data Capacity
Full ASCII	1108
Alphanumeric	1850
Numeric	2725

Note: 2D symbols encode data by compressing it in different amounts. Therefore, use these values as guidelines. The exact data capacity varies with the actual data being encoded.

MaxiCode Modifiers

MaxiCode is a fixed-size 2D symbology where the printer ignores height and width magnification. This symbology is made up of offset rows of hexagonal elements, each of which is 35 mils wide by 40 mils high, arranged around a bull's-eye finder pattern. Each hexagon represents one bit of information and is either black or white depending on the state of the encoded data bit. United Parcel Service (UPS) developed MaxiCode for the specific purpose of encoding information about a parcel.

To select MaxiCode using the Bar Code, Select Type command, the syntax is:

```
c14[,m1]
```

The next table lists the possible values for *m1*. The default value autodiscriminates between Modes 2, 3, and 4.

Values for m1

m1	Description
2	Structured Carrier Message for numeric postal codes up to 9 digits
3	Structured Carrier Message for alphanumeric postal codes up to 6 characters
4	Standard Symbol
5	Full Enhanced Error Correction (EEC)
6	Reader Programming

Note: If you have developed previous applications using Mode 0, your printer will still support your application; however, Intermec recommends using Mode 2 or 3 for new applications.

When you select MaxiCode, you must format your data to conform to the five fields described in the next table.

Note: The header only applies to Structured Carrier Message (Modes 2 and 3). The Structured Carrier Message header is optional.

MaxiCode Fields

Field	Description of Field	Number of Characters	Default
1	Header (optional)	Nine	None
2	Postal code	Six or nine	None
3	Country code	Three	840 (U.S.)
4	Service class	Three	999
5	Secondary Message	84	None

$$\underbrace{[)>^R{}_S}_{1}\ \underbrace{01^G{}_S}_{}\ \underbrace{97982039280^G{}_S}_{2}\ \underbrace{840^G{}_S}_{3}\ \underbrace{001^G{}_S}_{4}\ \underbrace{\text{Up to 84 Character Message}^E{}_T}_{5}$$

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Notes: The NULL character is not supported. If the NULL character appears in the user data, you will lose it along with any following data.

All control characters (<RS>, <GS>, <EOT>, etc.) must be preceded by a <SUB> character, as illustrated in the following examples.

This example illustrates the command for MaxiCode Mode 2:

```
<STX><ESC>C<ETX>
<STX><ESC>P<ETX>
<STX>E1;F1<ETX>
<STX>H0;o10,10<ETX>
<STX>B1;o100,300;f1;c14,2;h6;w6;d0,100<ETX>
<STX>R<ETX>
<STX><ESC>E1<CAN><ETX>
<STX>MaxiCode Sample Mode 2<CR><ETX>
<STX>[)><SUB><RS>01<SUB><GS>01982039280<SUB><GS>840<SUB>
<GS>001<SUB><GS>1Z94924221455215<SUB><RS>Intermec 6001
36th Ave West Everett, WA 98203<SUB><EOT><ETX>
<STX><ETB><ETX>
```

This example illustrates the command for MaxiCode Mode 3:

```
<STX><ESC>P<ETX>
<STX>E1;F1<ETX>
<STX>H0;o10,10<ETX>
<STX>B1;o100,300;f1;c14,3;h6;w6;d0,100<ETX>
<STX>R<ETX>
<STX><ESC>E1<CAN><ETX>
<STX>MaxiCode Sample Mode 3<CR><ETX>
<STX>[)><SUB><RS>01<SUB><GS>96T51654<SUB><GS>484<SUB>
<GS>066<SUB><GS>1Z00000256<SUB><RS><SUB><EOT><ETX>
<STX><ETB><ETX>
```

JIS-ITF Modifiers

The JIS-ITF bar code is the Japanese Industry Standard for Interleaved 2 of 5. JIS-ITF bar codes are in a box of solid black that measures 4.75 mm (0.19 in) and always include an interpretive field [21 x 14O CR-B (JIS x 9001)] centered beneath the bar code field.

Valid narrow bar width magnifications are 5, 8, and 10 dots. Due to printhead dot size limitations, the printer cannot achieve a true 2.5 to 1 ratio when using a narrow bar width of 5 dots. The printer uses a wide bar width of 12 dots for a true 2.4 to 1 ratio instead.

JIS-ITF bar code fields consist of these three categories: standard, condensed, and enlarged. If you are not using the command to define the source of the field data, the printer automatically chooses a category. If your bar code field contains 14 characters, the printer uses standard JIS-ITF. If your field contains 6, the printer uses the condensed version, and if your field contains 16, the printer uses the enlarged version.

To select JIS-ITF using the Bar Code, Select Type command, the syntax is:

`c15[,`*m*`]`

The default for *m* is 0.

Values for m

m	Description
0	Selects 5 dot narrow bar width magnification.
1	Selects 8 dot narrow bar width magnification.
2	Selects 10 dot narrow bar width magnification.

Defining the Data Source for JIS-ITF Fields

To define the data source for JIS-ITF fields, use the Field Data, Define Source command. For JIS-ITF, the syntax is:

`d[`*n*`] [,`*m*`]`

The default for *n,m* is 0,14. Valid values for *n* and *m* are described in the next table.

Values for m and n

Syntax	n =	Description
d0[,*m*]	0	This field receives data from a host. The *m* is the data length, which can be set to 6 (condensed), 14 (standard), and 16 (extended).
d2[,*m*]	2	This field acts as a slave field and receives its data from another field (master slave). The *m* is the master slave field ID.
d3[,*m*]	3	The printer defines the data during Program mode (fixed). The *m* determines the JIS-ITF type. If the data length is not exactly 6, 14, or 16, the printer uses the next highest JIS-ITF type with zero padding in front.

HIBC Code 128 Modifiers

To select HIBC Code 128 using the Bar Code, Select Type command, the syntax is:

`c16[,`*m1*`][,`*m2*`]`

The default for *m1* is 0.

Values for m1 Conforming to the Supplier Standard

m1	Description
0	Primary format.
1	Alternate primary format.
2,*m2*	Secondary format. The linkage character comes from *m2*, which is the field identifier.

Values for m1 Conforming to the Provider Standard

m1	Description
3	Single format.
4	First data format.
5,*m2*	Second data format. The linkage character comes from *m2*, which is the field identifier.
6	Multiple data format.

Data Matrix Symbology Versions ECC-100 and ECC-200 Modifiers

Data Matrix is a 2D matrix symbology made up of square modules arranged within a perimeter finder pattern. The finder pattern is a perimeter to the data region and is one module wide. Two adjacent sides are solid dark lines. These lines are used to define physical size, orientation, and symbol distortion. Intermec supports these two versions of Data Matrix: ECC-100 and ECC-200. Use ECC-200 for new applications.

To select Data Matrix using the Bar Code, Select Type command, the syntax is:

```
c17[,m1][,m2][,m3,m4[,m5,m6]]
```

Data Matrix Default Parameters

Parameter	Default	Description
m1	200	ECC-200
m2	0	Square
m3	0	Position of current symbol in group
m4	,m3	Total number of symbols in group
m5	1	File identifier
m6	1	File identifier

m1 is a three-digit number that selects the Data Matrix version. Possible values are:

100   Specifies ECC-100
200   Specifies ECC-200 (default)

Note: The EasyCoder F4 and PD/PF/PM/PX-series printers only support *m1* = 200.

m2 is a one-digit value that indicates whether your symbol will be square or rectangular. The amount of data you enter determines the size of the symbol. Possible values are:

0   Square
1   Rectangular

Use *m3*, *m4*, *m5*, and *m6* when you define Structured Append symbols within ECC-200.

Structured Append Parameter Values for Data Matrix

Parameter	Description	Possible Values
m3	The position of the current symbol in the group	0 - 16
m4	The total number of symbols in the group	0 - 16
m5	File identifier	1 - 254
m6	File identifier	1 - 254

For example, setting *m3*, *m4*, *m5*, and *m6* to 2, 5, 1, 43 indicates that the current symbol definition is the second in a group of 5 with the file identifier of 1, 43.

If you do not set *m3* or you set it to 0, you disable Structured Append mode. If you do not set *m5*, *m6*, the settings default to 1, 1.

Notes: This table lists how many numeric, alpha, or 8-bit characters you can place in a Data Matrix bar code for each version.

Character Capacity for Data Matrix Versions

Type of Character	ECC-100	ECC-200
All numeric	88	3116
All alpha	59	2335
All 8-bit	38	1556

QR Code Modifiers

QR Code is a matrix 2D symbology that encodes data into patterns consisting of black and white dots or modules. A three position detection pattern enables omni-directional reading and ultra high-speed reading. QR Code can handle a wide range of data, including numerical, alphabetical, Kanji, Hiragana, Katakana, graphics, and control codes. A built-in error correction function enables the QR Code to repair errors in the code.

To select QR Code using the Bar Code, Select Type command, the syntax is:

```
c18[,m1][,m2][,m3]
```

Values for m1, m2, m3

Parameter	Default	Description	Possible Values
m1	2	QR model	1 = Model 1 2 = Model 2
m2	M	Error correction level	L = 7% correction M = 15% correction Q = 25% correction H = 30% correction
m3	8	Mask number	0-7 = Mask type 8 = Auto-selection of mask by printer

Notes: You can only create QR symbols up to 3550 characters.

MicroPDF417 Modifiers

MicroPDF417 is a 2D symbology, derived from PDF417. You use MicroPDF417 for applications needing improved area efficiency but without the requirement for PDF417's maximum data capacity. MicroPDF417 replaces PDF417's 17-module-wide start/stop patterns and left/right row indicators with a unique set of 10-module-wide Row Address Patterns, which were designed both to reduce overall symbol width and to enable linear scanning at row heights as low as 2X. MicroPDF417, unlike PDF417, may only be printed in certain defined combinations of number of data columns (m1) and number of data rows (m2), up to a maximum of 4 data columns by 44 data rows.

To select MicroPDF417 using the Bar Code, Select Type command, the syntax is:

```
c19[,m1][,m2]
```

Values for m1 and m2

Parameter	Default	Description
m1	0	Sets the number of data columns in the printed symbol. The default setting (0) allows the printer to determine the most efficient size for given data. Possible values are 0 through 4.
m2	0	Sets the number of data rows in the printed symbol. The default setting (0) allows the printer to determine the most efficient size for given data. Possible values depend on the setting for m1.

MicroPDF417 uses the following symbol sizes (data columns x data rows), each with a distinct error correction capacity:

1x11	2x8	3x6	4x4
1x14	2x11	3x8	4x6
1x17	2x14	3x10	4x8
1x20	2x17	3x12	4x10
1x24	2x20	3x15	4x12
1x28	2x23	3x20	4x15
	2x26	3x26	4x20
		3x32	4x26
		3x38	4x32
		3x44	4x38
			4x44

RSS Modifiers

The Reduced Space Symbology (RSS) family contains seven different linear bar codes that can be used individually (c20) or as Composite Components for the EAN.UCC Composite symbology (c21).

To select RSS using the Bar Code, Select Type command, the syntax is:

```
c20[,m1][,m2][,m3]
```

RSS Bar Code Descriptions

RSS Bar Code	Description
RSS-14	Numeric only linear symbology used to encode the Global Trade Item Numbers (GTINs) for scanning in the supply chain.
	RSS-14 is smaller than EAN-13 or UPC-A and may include up to 13 digits. The check digit is not included in the data.
RSS-14 Truncated	Reduced height symbology designed to fit on small, narrow items. This bar code may include up to 13 digits. The check digit is not included in the data.
RSS-14 Stacked	A variation that is stacked in two rows, and is suitable for applications with limited width available. This bar code may include up to 13 digits. The check digit is not included in the data.
RSS-14 Stacked Omnidirectional	Full height version symbology with omni directional scanning capability so it can be scanned at retail point-of-sale. This bar code may include up to 13 digits. The check digit is not included in the data.
RSS-14 Limited	Numeric only linear symbology used to encode the Global Trade Item Numbers (GTINs) for scanning in the supply chain. This bar code may include up to 13 digits. The check digit is not included in the data.
RSS-14 Expanded	Encodes a maximum of 74 numeric or 41 alphanumeric characters from a subset of ISO 646 consisting of the uppercase and lowercase letters, digits, 20 selected punctuation characters and the FNC1 character. See **"ISO 646 Subset Characters" on page 219.**
RSS-14 Expanded Stacked	RSS-14 Expanded symbology that is stacked in 2 to 11 rows.

Values for m1, m2, m3

Parameter	Default	Description	Possible Values
m1	2	Select RSS version	0 = RSS-14 1 = RSS-14 Truncated 2 = RSS-14 Stacked 3 = RSS-14 Stacked Omnidirectional 4 = RSS Limited 5 = RSS Expanded 6 = RSS Expanded Stacked
m2	1	Height of the separator pattern row	,m1 = 2, 3, and 6 only Minimum is 1X the defined bar magnification of the barcode (w[n] command). If too low of a value for m2 is entered, the height will be changed to the smallest legal value for the selected magnification.
m3	2	Number of segments per row	,m1 = 6 only Even numbers in the range of 2 to 22

The height of the bar codes or the height of each row in the stacked bar codes is determined by the bar height magnification command (h[n]). For RSS-14 Stacked, the lower row is set using the value specified in the bar height magnification command and the upper row height is calculated from this value. If the bar height magnification command is not sent, the bar code will default to the proper height specified for the selected width:

- For *m1* = 0 h[n] = 33*w[n]

- For *m1* = 1 h[n] = 13*w[n]

- For *m1* = 2 h[n] = 7*w[n]

- For *m1* = 3 h[n] = 33*w[n]

- For *m1* = 4 h[n] = 10*w[n]

- For *m1* = 5 h[n] = 33*w[n]

- For *m1* = 6 h[n] = 34*w[n]

If the amount of data sent to the bar code exceeds the defined limit, an Error Code 11 is generated and the bar code does not print.

ISO 646 Subset Characters

Character	Description	Character	Description
0-9		+	Plus sign
FNC1		,	Comma
A to Z		-	Minus or hyphen
a to z		.	Period or full stop
!	Exclamation mark	/	Slash or solidus
"	Quotation mark	:	Colon
%	Percent sign	;	Semicolon
&	Ampersand	<	Less-than sign

ISO 646 Subset Characters

Character	Description	Character	Description
'	Apostrophe	=	Equals sign
(	Left parenthesis	>	Greater-than sign
)	Right parenthesis	?	Question mark
*	Asterisk	_	Underline or underscore
	space		

EAN.UCC Composite Modifiers

The EAN.UCC Composite symbology consists of an EAN.UCC linear component associated with an adjacent 2D Composite Component.

The linear component encodes the primary identification so that it is readable by all scanning technologies and so that 2D imagers can use the linear component as a finder pattern for the adjacent 2D Composite Component. The linear components include these bar codes:

*   UCC/EAN-128

*   UPC-A

*   EAN-8

*   EAN-13

*   RSS family of bar codes

The 2D Composite Component encodes supplementary data, such as batch number or expiration date. There are three types of 2D Composite Components that are all based on the PDF417 symbology:

*   CC-A is a structural variant of MicroPDF417.

*   CC-B is a MicroPDF417 symbol.

*   CC-C is a PDF417 symbol.

The data for the linear and 2D components is separated by the <HT> command with the data for the linear component sent first. For example, to print a Composite bar code with the linear component encoding 112233445566 and the 2D component encoding aabbccddeeff, the data is sent to the printer as 112233445566<HT>aabbccddeeff.

For all possible combinations of linear and 2D Composite components, see the next section.

Combinations of Linear and 2D Composite Components and Capacity

Linear Component		2D Composite Component (Max Data Length)		
Bar Code Type	**Data Length**	**CC-A**	**CC-B**	**CC-C**
UCC/EAN-128	1-48 digits	56 digits 31 char	338 digits 196 char	2361 digits
EAN-13	13 digits	56 digits 31 char	338 digits 196 char	Not available
EAN-8	8 digits	47 digits 26 char	219 digits 127 char	Not available
UPC-A	12 digits	56 digits 31 char	338 digits 196 char	Not available
UPC-E	8 digits	47 digits 26 char	96 digits 55 char	Not available
RSS-14 RSS-14 Truncated	1-13 digits	56 digits 31 char	338 digits 196 char	Not available
RSS-14 Stacked RSS-14 Stacked Omnidirectional	1-13 digits	47 digits 26 char	96 digits 55 char	Not available
RSS Limited	1-13 digits	47 digits 26 char	219 digits 127 char	Not available
RSS-14 Expanded RSS-14 Expanded Stacked	1-74 digits* 1-41 char*	56 digits 31 char	338 digits 196 char	Not available

Notes: Data lengths with an asterisk (*) indicate that the actual maximum amount of data depends on data content.

UCC/EAN-128 uses the same code set as Code 128, except it does not allow function codes FNC2 through FNC4. FNC1 can be sent to the printer as the data string <SUB><SUB>1.

2D Composite Components encode characters from the ISO 646 code set. See **"ISO 646 Subset Characters" on page 219.**

To select EAN.UCC using the Bar Code, Select Type command, the syntax is:

`c21[,m1][,m2][,m3][,m4][,m5][,m6]`

The next table lists valid values for *m1* through *m6*.

Values for m1, m2, m3, m4, m5, m6

Parameter	Default	Description	Possible Values
m1	0	Select version	0 = UCC/EAN-128 with CC-C 1 = UCC/EAN-128 with CC-A or CC-B 2 = EAN-13 with CC-A or CC-B 3 = EAN-8 with CC-A or CC-B 4 = UPC-A with CC-A or CC-B 5 = UPC-E with CC-A or CC-B 6 = RSS-14 with CC-A or CC-B 7 = RSS-14 Truncated with CC-A or CC-B 8 = RSS-14 Stacked with CC-A or CC-B 9 = RSS-14 Stacked Omnidirectional with CC-A or CC-B 10 = RSS Limited with CC-A or CC-B 11 = RSS Expanded with CC-A or CC-B 12 = RSS Expanded Stacked with CC-A or CC-B **Note:** The printer determines whether CC-A or CC-B will be used based on the amount of data sent to the 2D Composite Component.
m2	1	Height of the separator pattern row	m1 = 0, and 6-12 only: Range is between 1X and 2X the defined bar magnification of the bar code (w[n] command). If too low of a value for m2 is entered, the height is changed to the smallest legal value for the selected magnification. If too high a value is entered, an Error Code 11 "Invalid bar code data". Example: If w[n] is set to 3 the separator height can be 3 to 6.
m3	0 (m1 = 0) 4 (m1 = 12)	Number of segments or columns per row	m1 = 0: m3 = 0 selects the largest number of columns for the 2D bar code to fit within the 1D bar code including its quiet zones. Values for m3 are from 1 to 30. m1 = 12: the number of segments per row.
m4	1	Display space, "(" and ")" characters	m4 = 0: the bar code does not include any of the "space", "(" and ")" characters in the data, but these characters are displayed in the human readable interpretive field. m4 = 1: the bar code and the human readable interpretive field includes exactly the same data.
m5	0	Height of each row in the 2D bar code	m5 = 0: the height is 3X the magnification (default)
m6	0	Print the linear barcode interpretive field	m6 = 0: do not print the human readable interpretive field for the linear bar code m6 = 1: print the human readable interpretive field for the linear bar code The human readable interpretive field for the 2D Composite Component is displayed if the i[n] is set to 1.

Planet Modifiers

Planet is a linear bar code similar to the POSTNET bar code. Planet bar codes print at a fixed size so any height and width commands are ignored.

To select Planet using the Bar Code, Select Type command, the syntax is:

```
c22
```

Aztec Modifiers

To select Aztec using the Bar Code, Select Type command, the syntax is:

`c23[,m1][,m2][,m3][,m4]`

The next table lists valid values for *m1* through *m4*.

Values for m1, m2, m3, m4

Parameter	Default	Values	
m1	0	0:	23%+3 codewords. Dynamic symbol size with fixed error correction.
		1 - 99:	Static error correction level in percent. Dynamic symbol size.
		101- 104:	Compact Format symbol, 1-4 layers (+100). Error correction level depends on spare bits in chosen symbol size. Static symbol size.
		201 - 232:	Full range symbol. 1 - 32 layers (+200). Error correction level depends on spare bits in chosen symbol size. Static symbol size.
		300:	Simple Aztec "rune."
m2	0	0:	Menu symbol off.
		1:	Menu symbol on.
m3	1	1:	Symbol append off. ID field used if present.
		2 - 26:	Append # symbols. ID field used if present.
m4	0	0:	ECI off.
		1:	ECI on.

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