Reference Manual

IPL Programming

Intermec Technologies Corporation
6001 36th Avenue West
Everett, WA 98203-9280

U.S. service and technical support: 1-800-755-5505
U.S. media supplies ordering information: 1-800-227-9947

Canadian service and technical support: 1-800-668-7043
Canadian media supplies ordering information: 1-800-268-6936

Outside U.S.A. and Canada: Contact your local Intermec service supplier.

Manual Change Record

Revision	Date	Changes
002	11/ 1999	Revised Commands: *Serial Port Configuration, Set* was renamed *Communication Port Configuration, Set* and moved to a new location within Configuration Commands (Chapter 7). New Commands: *Media Fault Recovery Mode, Set* added to Configuration Commands (Chapter 7). *MicroPDF417* added to *Bar Code Type, Select* command in the Program Mode Commands. New Test and Service Commands (Chapter 7): *Formats, Print* *Hardware Configuration Label, Print* *Pages, Print* *Software Configuration Label, Print* *User-Defined Character (UDC) and Graphics, Print* *User-Defined Fonts, Print* Miscellaneous corrections throughout the manual: Front Matter - Corrected list of manuals and part numbers Chapter 1 - Added information to "Sending IPL Commands to the Printer" section. Chapter 2 - Expanded PrintSet information, added information about international character sets and code pages. Chapter 3 - No changes. Chapter 4 - No changes. Chapter 5 - Added new commands and revised page number references to reflect changes in Chapter 7. Chapter 6 - Added new commands and revised page number references to reflect changes in Chapter 7. Chapter 7 - Added new commands and revised page number references to reflect new and revised commands. Added information to these Immediate commands: Reset Status Dump Status Enquiry Added information to these Print commands: Alphanumeric Field Separator Data Shift - International Characters Emulation Mode, Enter Font, Transmit

		Format, Select Memory Usage, Transmit Numeric Field Separator Added information to these Configuration commands: Emulation or Advanced Mode on Power-Up Pin 11/20 Protocol, Set Printer Language, Select Printhead Loading Mode, Select Top of Form, Set Media Sensitivity, Select Self-Strip, Enable or Disable Added information to these Program Mode commands: Bar Code, Select Type Bitmap Cell Height for Graphics or UDF, Define Bitmap Cell Width for Graphic or UDF, Define Border Around Human-Readable Text, Define Character Bitmap Origin Offset, Define Field Data, Define Source Field Origin, Define Font Character Width, Define Font Type, Select Graphic or UDC, Define Height Magnification of Bar, Box, or UDC, Define Human-Readable Field, Create or Edit Intercharacter Space for UDF, Define Interpretive Field, Enable or Disable Length of Line or Box Field, Define Width of Line, Box, Bar, or Character, Define Added information to this Test and Service command: Label Path Open Sensor Value, Transmit Appendixes A, B, C, and E - No change Appendix D - Additional information added to Status Responses and Auto-Transmit Commands (t=3) section.
003	10/00	Revised throughout to include EasyCoder F4 printer information.
004	04/01	Revised to include 3400e series printer information.
005	12/01	Revised to include 44X0 printer information.

Contents

5 Advanced Printer Programming

6 How to Find IPL Commands in This Manual

7 IPL Command Reference

D

User-Defined Interface Tables

E

Using Direct Graphics Mode

I

Index

Before You Begin

This section introduces you to standard warranty provisions, document formatting conventions, and sources of additional product information. A documentation roadmap is also provided to guide you in finding the appropriate information.

Warranty Information

To receive a copy of the standard warranty provision for this product, contact your local Intermec support services organization. In the U.S. call 1-800-755-5505, and in Canada call 1-800-668-7043. If you live outside of the U.S. or Canada, you can find your local Intermec support services organization on the Intermec Web site at www.intermec.com.

Terms and Conventions

Listed below are special terms and conventions used throughout the manual.

Terms

"Printer" can refer to the 3240, 3400, 3440, 3600, 4100, 4400, 4420, 4440, 4630, 4830, 7421, or EasyCoder F4 bar code printer.

"Media" is the label stock on which the printer prints labels.

"Host" refers to a personal computer or other computer that communicates with the printer.

A "symbol" or "bar code symbol" consists of alphanumeric characters encoded in a bar code format.

"IPL" stands for the Intermec Printer Language.

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

Conventions

Downloaded commands appear in the order that you enter them into the printer with the following conventions:

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.

Other Intermec Manuals

You may need additional information when working with printers in a data collection system. Please visit our Web site at www.intermec.com to download many of our current manuals in PDF format. 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.

What Is IPL?

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

- design formats (templates) for bar code labels.
- download bar code label formats to the printer.
- modify a bar code label format that is stored in the printer.
- download data to fill in a bar code label format and print the label.
- enable or disable printer features and options.
- query the printer for hardware diagnostic data and the 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 Type	Printer Operating Mode	Uses for This Type of IPL Command
Immediate	Any operating mode	Query the printer on the status of print jobs, abort print jobs, and reset the printer.
Print	Print mode	Download data to the printer and print bar code labels.
Configuration	Print mode	Enable or disable printer features and options.
Program	Program mode	Design label formats.
Test and Service	Test and Service mode	Query the printer for hardware diagnostic information.

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 "Switching Between Print Mode and Program Mode" later in this chapter, or refer to your printer user's manual for help changing the mode of your printer.

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 the "Format, Create or Edit" command in Chapter 7.

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.

Here is an 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).

Here is an 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**. The following 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;d
0,16;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, or to download configuration commands to the printer.

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.

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	Refer to
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

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, and EasyCoder F4 printers support the use of scaleable TrueType fonts. Bitmap fonts can be used on any Intermec printer, including those TrueType fonts you have converted to bitmap using PrintSet. The EasyCoder F4 does 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 (scaleable) 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 4 inches (10.16 centimeters).]
- 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, and EasyCoder F4 printers) and Speedo (not supported on the EasyCoder F4). 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.

Use this table to decide which fonts best suit your needs:

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 Version 2.0 or Higher to Download Fonts

The easiest way to download fonts to the printer is with the PrintSet printer configuration application. This application is on the disk that shipped with your printer. You can also download PrintSet 2.0 from the Intermec Web site at www.intermec.com. You can use PrintSet to select fonts and directly download them to your printer.

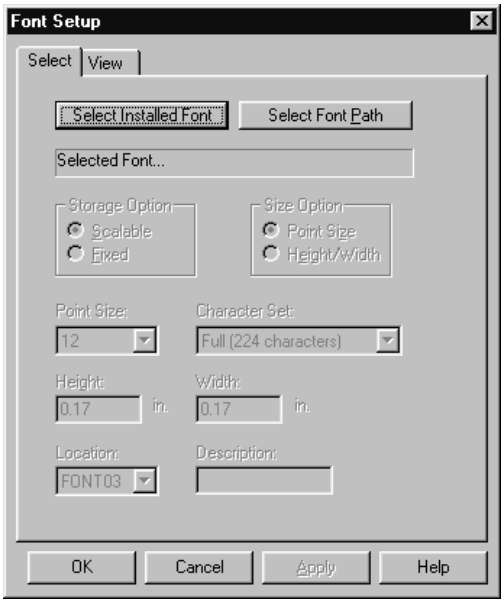
Bitmap fonts can be memory intensive, so you may decide not to download the entire font to the printer. You can use PrintSet to define a subset of the font (only the numbers, for example). Then you can download the subset, saving storage space on the printer. The printer requires that bitmap fonts be 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.

To select a font with PrintSet

1. Start PrintSet on your PC.
2. Enter PrintSet and make sure that the communications settings are correct.
3. From the PrintSet main menu, select Fonts from the Configuration menu or click the Font Setup button on the toolbar.

The Font Setup dialog box appears:



4. To select a font by font name, click the Select Installed Font button. From the list of installed fonts, select your TrueType font name.

   To select a font by pathname, click the Select Font Path button. Select a drive and a path. From the File name list box, select a TrueType font file.

5. Under Storage Option:
   - Click the Fixed option button if you are downloading a bitmap font.
   - Click the Scaleable option button if you are downloading an outline font. (This option is disabled if your printer does not support TrueType.)

6. Select the size option, point size, and character set as needed (for bitmap fonts only).

7. From the Location list box, choose the font number you wish to assign to the font. Intermec printers identify each font by its font number.

   You may select additional fonts to add to local memory. Each font must have a unique location number.

8. Click Apply.

9. Select the View tab. The Fonts to send box displays the selected fonts and the designated printer locations.

10. Click OK to exit the Font Setup dialog box.

Now that you have defined your font, you need to either install it in your printer or save it to a file. Follow one of these procedures to complete the process.

To install fonts in your printer

- From the PrintSet main menu, select Send to printer from the DataXfer menu or click the Send Config to Printer button on the toolbar.

Note: If you download an incompatible TrueType font, the font type will be 999. If you select the incompatible font for a text field, the printer will print the default font 0.

To save a font to a file and copy it to your printer

1. From the PrintSet main menu, select Save as from the File menu or click the Save As button on the toolbar. The Save As dialog box appears.
2. In the file manager dialog box, enter a file name and assign a path. The file must use a .PCF extension. For example, you could name your file NEWFONT.PCF.
3. Click the Save button.

   When you save the font to file, the Intermec Printer Language (IPL) commands necessary to install the font are automatically written to the file.
4. Use Windows HyperTerminal to download the .PCF file to your printer.

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 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 higher under Windows 95/98, or Windows NT. Earlier versions of PrintSet will run under Windows 3.11.

PrintSet 2.1 or higher 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" later in this chapter. 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 this table to determine the approximate size of some Asian TrueType fonts. The approximate size is shown in dots per inch (dpi).

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
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 resell TrueType fonts that work with Intermec printers:

Precision Type
47 Mall Drive
Commack, NY 11725
phone 1-800-248-3668
fax 516-543-5721
email info@precisiontype.com

Galapagos Design Group
256 Great Road
Suite 15
Littleton, MA 01360-1916
phone 978-952-6200
fax 978-952-6260
email info@galapagosdesign.com

These companies also provide TrueType fonts compatible with Intermec printers:

Dynalab Inc.
2055 Gateway Place
Suite 400
San Jose, CA 95110
phone 408-490-4224
fax 408-490-2233
Web address www.dynalab.com

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399
phone 206-882-8080
Web address www.microsoft.com

Note: Dynalab Inc. 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.

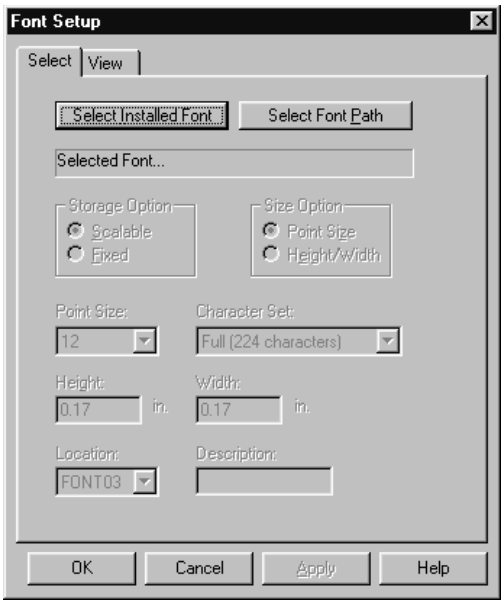
The advantage of bitmap fonts is that they may require less RAM and the printer can image them faster. When you download bitmap characters to the printer, you must select the size of the characters. Make sure that you select the size you want to use in your formats. If you magnify the character size 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 does not support bitmapped Chinese, Japanese, or Korean fonts.

To create bitmap fonts from TrueType fonts

1. Start PrintSet on your PC.
2. Enter PrintSet and make sure that the communications settings are correct.
3. From the PrintSet main menu, select Fonts from the Configuration menu or click the Font Setup button on the toolbar.

   The Font Setup dialog box appears:



4. To select a font by font name, click Select Installed Font. Select the TrueType font name from the list of installed fonts.

   To select a font by pathname, click Select Font Path. Select a drive and a path. Select the TrueType front file from the File name list box.
5. In the Storage Option box, click Fixed.
6. In the Size Option box, click either Point Size or Height/Width.
7. If you select Point Size, select the size of the bitmap characters in the Point Size list box. One point equals 1/72 of an inch.

   If you select Height/Width, enter the height and width (in inches or centimeters) of the bitmap characters in the Height and Width boxes.

Note: If you enter 0 for the width, you preserve the aspect ratio of the font.

8. In the Character Set Selection box, you may restrict the number of bitmap characters that you want created. Restricting the number of characters will create a smaller font that requires less memory and takes less time to install.

   If you are creating a Chinese, Japanese, or Korean font, you must select the language you are using. You can choose from these selections:

   - Japanese (Shift JIS)
   - Traditional Chinese (BIG 5)
   - Simplified Chinese (GB 2312)
   - Korean (KSC 5601)
9. From the Location list box, choose the font number you wish to assign to the font. Intermec printers identify fonts by their font number.
10. Select the View tab. The selected font and the designated printer location appear in the fonts to send box.

You may select additional fonts to add to local memory. Each font must have a unique location number.

Selecting the Printer Language

When you install a TrueType font, you must select the correct printer language. To choose the correct language, use the Intermec printer language (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. See the "Printer Language, Select" command in Chapter 7 for a list of code pages. You can download code pages from Intermec's Web site at www.intermec.com, and then choose Software Downloads from the Support menu. The files were compressed using Microsoft's 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. From the Start menu, select Programs and open HyperTerminal. (HyperTerminal is often located inside the Accessories folder.) The Connection Description screen appears.
   b. In the Connection Description window, enter a name for this connection (such as Printer) and select an icon (optional). Click OK. The Phone Number screen appears.
   c. In the Connect Using drop down menu, select the appropriate port. Click OK. The Port Settings screen appears.
   d. Enter data, matching the PC's settings to the printer settings. Click OK. The HyperTerminal main menu appears.
   e. Click Transfer and select Send File.
   f. In the Send File screen, locate your file, and 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" in Appendix C.

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. (See the Outline Font, Download command in Chapter 7.) 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.

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>j000100000011010000040060 4c545348efe24cd00000;<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 at power down.

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

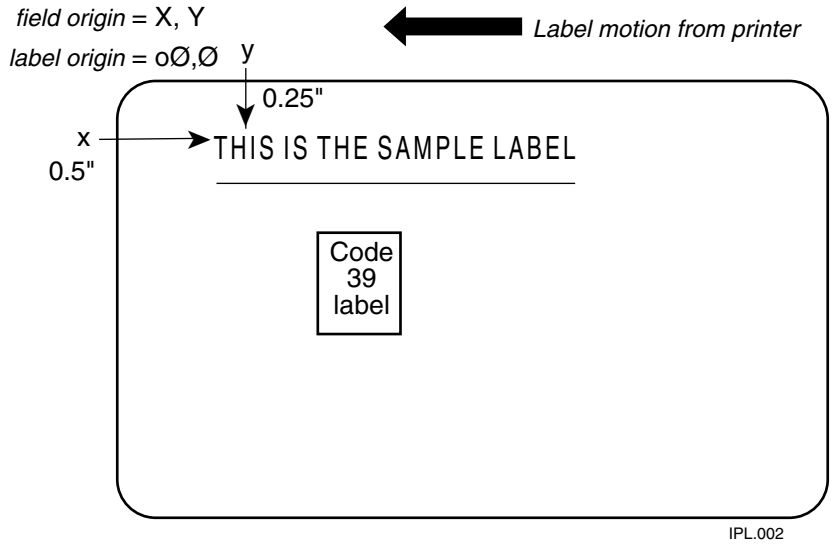
   In this example, you will design a simple label that includes a human-readable field, a line field, and a bar code field.

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 and 7421 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.



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

   25.4 millimeters (1 in) = 203 dots
   1 millimeter = 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.

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

See "Commands Listed by Task" in Chapter 6 for a list of the parameters you can define for each type of field. For example, you need to define these 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 this example:

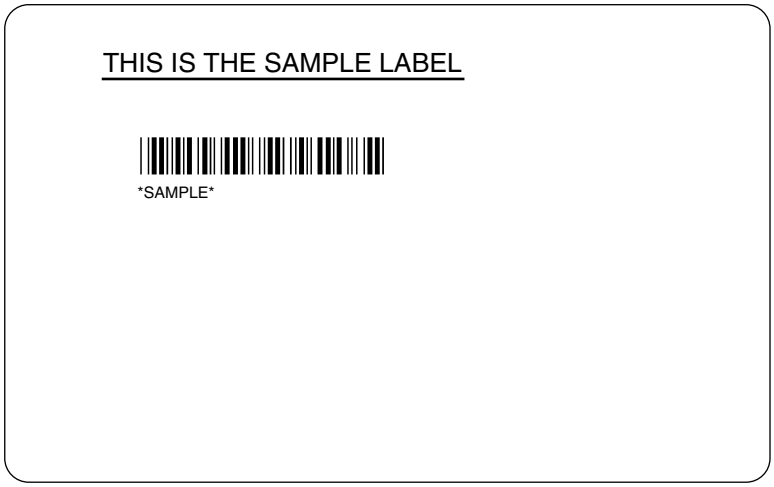
Note: The difference between the lowercase letter “l” and the numeral “1” is not very noticeable in the Courier font. Make sure that you enter the correct command.

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.

This format prints the label shown on the next page.

Sample Label Printed from the Tutorial



IPL004.eps

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 the symbologies listed below. See Chapter 7, "IPL Command Reference," for a complete list of commands to select the appropriate bar code symbology. "Commands Listed by Task" in Chapter 6 lists the command options available for editing bar code fields.

These symbologies are available:

Codabar	Data Matrix
Code 2 of 5	HIBC
Code 11	Interleaved 2 of 5
Code 16K	Maxicode
Code 39	MicroPDF417
Code 49	QR Code
Code 93	PDF417
Code 128	POSTNET
Code One	UPC/EAN

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>
```

Lines and Boxes Label

IPL006.eps

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” in Appendix C. 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. 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, "How to Find 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. The defaults for the H0 field are:

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>
```

This table describes each command in the string:

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 in Chapter 7, “IPL Command Reference.” 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.

Use the following format as an example. Assume that you have downloaded the following format to the printer:

Commands	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:

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	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.

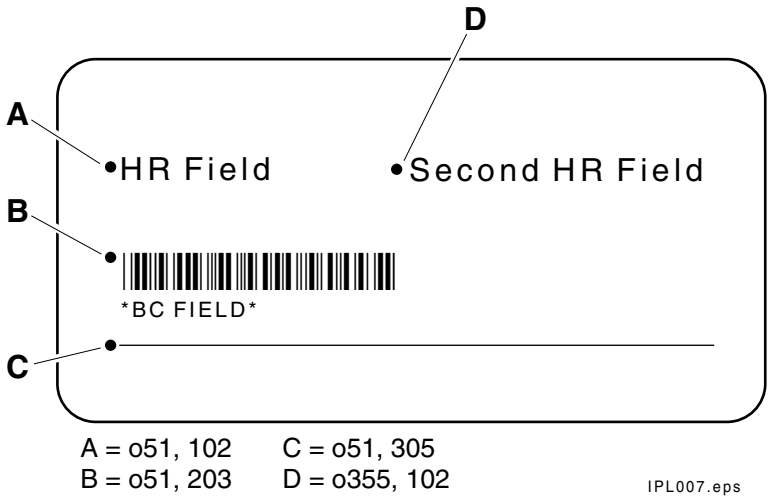
The field origin is the upper left corner of an unrotated field. To define the coordinates of the field origin, use the origin command (oX,Y) where o is the command that specifies origin, X is the distance from the left side of the label, and Y is the distance from the top of the label.

Note: On the 4400 and 7421 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 millimeter. The 4X30 printers have 300 dots per inch or 12 dots per millimeter.

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.

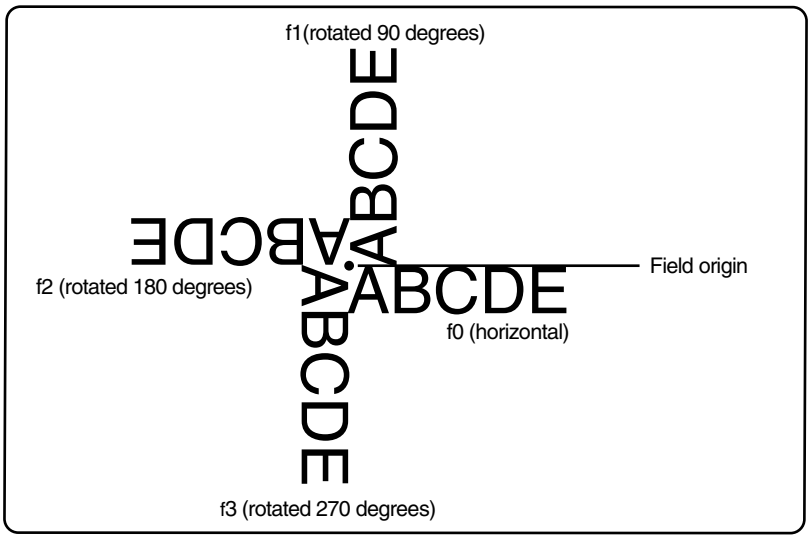


Note: If you are operating your printer in Emulation mode, the dot sizes are doubled (101 dots per inch or 4 dots per millimeter), so the origin for 1 inch from the top of the label and 0.5 inch from the left side is o25,51.

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 f*n* 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.



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):

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

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

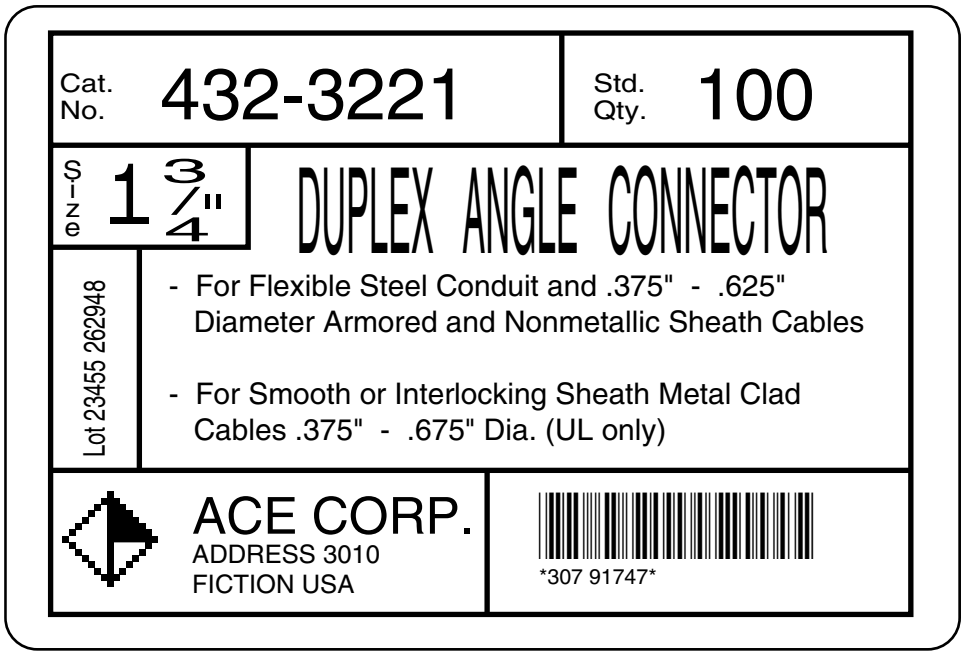
A page is a collection of one or more formats that you combine to print at the same time. This feature is helpful when you need to print several different labels for an application at once. For example, you may need to attach one type of label to a product and a different type of label to its container. 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 format example on page 3-20 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).

Complex Label Format



IPL011.eps

Graphic for Example

Download the six bits per byte diamond graphic explained in “Creating Six Bits Per Byte User-Defined Graphics” in Appendix C.

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 <ETX> and <STX> 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

Example 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.
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.
l1300;	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.
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.

Label Format Example Command Descriptions (continued)

Example Command	Description
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.

Label Format Example Command Descriptions (continued)

Example Command	Description
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.
<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. It is being 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.

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," later in this chapter. 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 Technical 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 5 inches 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 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 in the Bar Code, Select Type command.
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>x*n* 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 in Chapter 7.
26	Invalid page transmission syntax.	Check the Page, Transmit command syntax. The correct syntax is <ESC>y*n* with *n* ranging from 0 to 9.
27	Invalid font transmission syntax.	Check the Font, Transmit command syntax. The correct syntax is <ESC>v*n*. Values for *n* vary depending on your printer model. For more information, see the Font, Transmit command in Chapter 7.

Interpreting Error Codes and Solving Problems (continued)

Error Code	Description of Problem	Solution
28	Invalid UDC transmission syntax.	Check the User-Defined Characters, Transmit command syntax. The correct syntax is <ESC>u*n* 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.
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/Width for Graphic or UDF, Define or the Intercharacter Space for UDF, Define command in Chapter 7.
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.

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 command in Chapter 7.
- 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.

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 1 inch 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 1 inch 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 (<SI>I) command in Chapter 7.

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 (<SI>I) command in Chapter 7.

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.

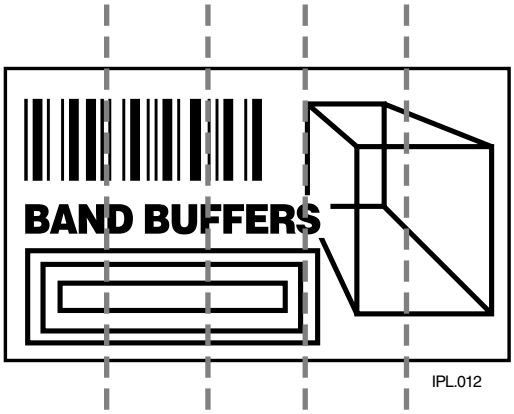
If the printer still aborts and reprints at the highest image band setting, you may be trying to optimize at a print speed that is too high for your label format. Try optimizing the number of image bands at a lower print speed, or add expansion RAM.

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 inch of label length, you can print at any speed; however, you may notice considerable delays before each label is printed.

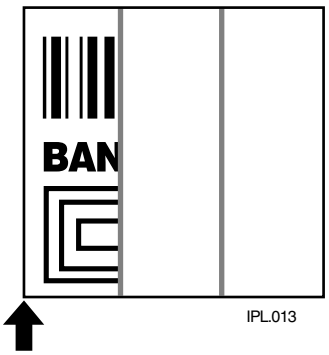
Image Band Example

This example shows how the printer prints a label format using image bands. The label is 5 inches 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.

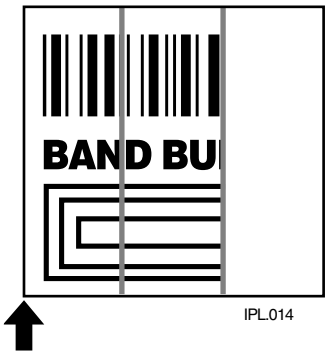
The dashed lines represent the divisions between the five image bands, and the arrow (↑) represents the portion of the image band that is being printed at that time.



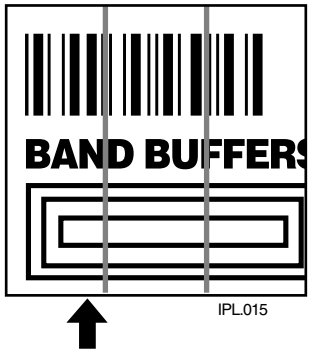
The diagram below shows the first inch of the label imaged into the first image band. The other two image bands are still empty. Printing has not started.



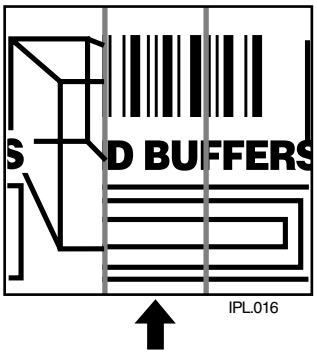
The second inch of label is imaged into the second image band. Printing still has not started.



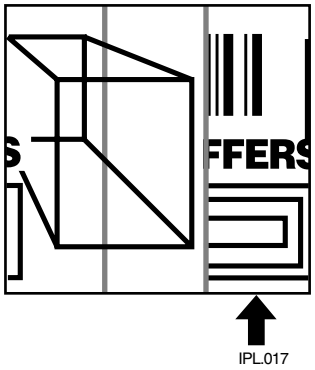
The third inch of the label is imaged into the third image band. Printing begins from the first image band, as indicated by the arrow. At this point, all three available image bands have been filled. The first band will be reused after it has been completely printed.



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.



The final inch 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 1 inch of label length.

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

   `<ESC>En,m`

See the Format, Select command in Chapter 7 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 = 1 inch) to equal the label size. For example, if the printed image stops at a distance of four inches from the beginning of the label, you must select four image bands to prevent reimaging if the label is 5 inches long.

The 3400C, 3400e, 3440, 4420, 4440, and 7421 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.

Two IPL commands place the printer in Emulation mode:

- Emulation or Advanced Mode on Power-Up.
- Emulation Mode, Enter.

This table lists all the IPL commands and specifies if the command works when the printer is in Emulation mode.

IPL Command Name	Syntax	Page	Works in Emulation Mode?
12 Volt Supply Value, Transmit	U	7-127	Yes
Abort Print Job	<EM>	7-10	Yes
Advanced Mode, Select	<ESC>C	7-15	Yes
Alphanumeric Field Separator	<GS>	7-16	Yes
Ambient Temperature, Transmit	A	7-127	N/A
Amount of Storage, Define	<SI>N	7-39	N/A
Audible Alarm, Enable or Disable	<SI>a	7-40	N/A
Auto-Transmit 1, Enable	<ESC>j	7-40	Yes
Auto-Transmit 2, Enable	<ESC>d	7-40	Yes

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page	Works in Emulation Mode?
Auto-Transmit 3, Enable	<ESC>e	7-41	Yes
Auto-Transmit 1, 2, and 3, Disable	<ESC>k	7-41	Yes
Bar Code, Select Type	c	7-65	Yes
Bar Code Field, Create or Edit	B	7-85	Yes
Batch Count, Set	<US>	7-17	Yes
Bitmap Cell Height for Graphic or UDF, Define	y	7-86	Yes
Bitmap Cell Width for Graphic or UDF, Define	x	7-88	Yes
Bitmap User-Defined Font, Clear or Define	T	7-90	Yes
Border Around Human-Readable Text, Define	b	7-90	Yes
Box Field, Create or Edit	W	7-91	Yes
Character Bitmap Origin Offset, Define	X	7-92	Yes
Character Rotation or Bar Code Ratio, Define	r	7-93	Yes
Clear All Data	<CAN>	7-17	Yes
Clear Data From Current Field	<DEL>	7-17	Yes
Code 39 Prefix Character, Define	p	7-96	Yes
Command Tables, Load	C	7-96	Yes
Command Terminator	;	7-127	Yes
Command Terminator 1	<NUL>	7-17	Yes
Command Terminator 2	<LF>	7-18	Yes
Communication Port Configuration, Set	<SI>P	7-42	Yes
Configuration Parameters, Transmit	<ESC>p	7-18	Yes
Control Panel Access Permission, Set	<SI>A	7-43	Yes
Current Edit Session, Save	N	7-97	Yes
Cut	<SO>	7-18	Yes
Cutter, Enable or Disable	<SI>c	7-44	Yes
Dark Adjust	K	7-128	Yes
Dark Adjust, Set	<SI>d	7-44	Yes
Data Shift - International Characters	<SUB>	7-19	Yes
Data Source for Format in a Page, Define	e	7-97	No
Direct Graphics Mode, Select	<ESC>g	7-20	No

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page	Works in Emulation Mode?
Emulation Mode, Enter	<ESC>c	7-21	Yes
Emulation or Advanced Mode on Power-Up	<SI>C	7-45	Yes
End-of-Print Skip Distance, Set	<SI>D	7-46	Yes
Error Code, Request	<BEL>	7-10	Yes
Factory Defaults, Reset	D	7-128	Yes
Field, Delete	D	7-98	Yes
Field, Select	<ESC>F	7-22	Yes
Field Data, Define Source	d	7-98	Yes
Field Decrement, Set	<ESC>D	7-23	Yes
Field Direction, Define	f	7-100	Yes
Field Increment, Set	<ESC>I	7-24	Yes
Field Origin, Define	o	7-100	Yes
First Data Entry Field, Select	<ACK>	7-24	Yes
Font, Transmit	<ESC>v	7-25	Yes
Font Character Width, Define	Z	7-101	Yes
Font Type, Select	c	7-103	Yes
Form Feed	<FF>	7-26	Yes
Format, Create or Edit	A or F	7-105	Yes
Format, Erase	E	7-107	Yes
Format, Select	<ESC>E	7-26	Yes
Format, Transmit	<ESC>x	7-28	Yes
Format Direction in a Page, Define	q	7-106	No
Format Offset Within a Page, Define	O	7-107	No
Format Position From Page, Delete	m	7-108	No
Format Position in a Page, Assign	M	7-108	No
Formats, Print	f	7-128	Yes
Graphic, Select	c	7-109	Yes
Graphic or UDC, Define	u	7-109	Yes
Hardware Configuration Label, Print	h	7-128	Yes
Height Magnification of Bar, Box, or UDC, Define	h	7-110	Yes

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page	Works in Emulation Mode?
Human-Readable Field, Create or Edit	H	7-113	Yes
IBM Language Translation, Enable or Disable	<SI>i	7-47	Yes
Increment and Decrement, Disable	<ESC>N	7-29	Yes
Intercharacter Delay, Set	<SYN>	7-47	Yes
Intercharacter Space for UDF, Define	z	7-114	Yes
Interlabel Ribbon Save, Enable or Disable	<SI>s	7-48	N/A
Interpretive Field, Edit	I	7-115	Yes
Interpretive Field, Enable or Disable	i	7-115	Yes
Label and Gap Length, Transmit	<ESC> L	7-11	Yes
Label Path Open Sensor Value, Transmit	L	7-129	N/A
Label Rest Point, Adjust	<SI>f	7-48	Yes
Label Retract, Enable or Disable	<SI>R	7-49	Yes
Label Retract Distance, Set	<SI>r	7-49	Yes
Label Stock Type, Select	<SI>T	7-50	Yes
Label Taken Sensor Value, Transmit	T	7-129	Yes
Label Width, Set	<SI>W	7-50	N/A
Length of Line or Box Field, Define	l	7-116	Yes
Line Field, Create or Edit	L	7-116	Yes
Maximum Label Length, Set	<SI>L	7-51	Yes
Media Fault Recovery Mode, Set	<SI>e	7-52	Yes
Media Sensitivity, Select	<SI>g	7-52	Yes
Memory Usage, Transmit	<ESC>m	7-30	Yes
Message Delay, Set	<ESC><SYN>	7-54	Yes
Next Data Entry Field, Select	<CR>	7-31	Yes
Number of Image Bands, Set	<SI>I	7-54	Yes
Numeric Field Separator	<FS>	7-31	Yes
Online or Offline on Power-Up	<SI>O	7-55	N/A
Options Selected, Transmit	<ESC>O	7-32	Yes
Outline Font, Clear or Create	J	7-117	No
Outline Font, Download	j	7-118	No

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page	Works in Emulation Mode?
Page, Create or Edit	S	7-119	No
Page, Delete	s	7-120	No
Page, Select	<ESC>G	7-33	No
Page, Transmit	<ESC>y	7-33	No
Pages, Print	p	7-129	Yes
Pin 11/20 Protocol, Set	<SI>p	7-56	No
Pitch Label, Print	C	7-129	Yes
Pitch Size, Set	g	7-120	No
Point Size, Set	k	7-121	No
Postamble, Set	<EOT>	7-57	Yes
Preamble, Set	<SOH>	7-57	Yes
Print	<ETB>	7-34	Yes
Print Line Dot Count Limit, Set	v	7-122	N/A
Print Quality Label, Print	Q	7-129	Yes
Print Speed, Set	<SI>S	7-58	Yes
Printer Language, Select	<SI>l	7-59	Yes
Printhead Loading Mode, Select	<SI>h	7-61	No
Printhead Parameters, Transmit	<ESC>H	7-34	Yes
Printhead Pressure, Set	<SI>H	7-62	N/A
Printhead Resistance Test, Begin	B	7-130	N/A
Printhead Resistance Values, Transmit	S	7-130	N/A
Printhead Temperature Sensor Value, Transmit	P	7-130	Yes
Printhead Test Parameters, Set	<SI>U	7-62	N/A
Printhead Volt Supply Value, Transmit	V	7-130	N/A
Program Mode, Enter	<ESC>P	7-34	Yes
Program Mode, Exit	R	7-122	Yes
Program Number, Transmit	<ESC>M	7-35	Yes
Program Number and Model, Transmit	<ESC>M	7-35	Yes
Quantity Count, Set	<RS>	7-35	Yes
Reflective Sensor Value, Transmit	M	7-130	No
Remaining Quantity and Batch Count, Transmit	<ESC>Q	7-11	Yes

IPL Commands and Emulation Mode (continued)

IPL Command Name	Syntax	Page	Works in Emulation Mode?
Reset	<DLE>	7-11	Yes
Ribbon Save Zones, Set	<SI>Z	7-63	N/A
Self-Strip, Enable or Disable	<SI>t	7-63	Yes
Software Configuration Label, Print	s	7-130	Yes
Start and Stop Codes (Code 39), Print	<ESC><SP>	7-35	Yes
Status Dump	<VT>	7-12	Yes
Status Enquiry	<ENQ>	7-13	Yes
Takeup Motor Torque, Increase	<SI>b	7-64	No
Test and Service Mode, Enter	<ESC>T	7-36	Yes
Test and Service Mode, Exit	R	7-130	Yes
Top of Form, Set	<SI>F	7-65	Yes
Transmissive Sensor Value, Transmit	G	7-131	Yes
User-Defined Character (UDC) and Graphics, Print	g	7-131	Yes
User-Defined Character, Clear or Create	G	7-122	Yes
User-Defined Character Field, Create or Edit	U	7-123	Yes
User-Defined Characters, Transmit	<ESC>u	7-36	Yes
User-Defined Font Character, Create	t	7-124	Yes
User-Defined Fonts, Print	t	7-131	Yes
User-Defined Tables, Transmit	<ESC>Z	7-37	Yes
Warm Boot	<BS>	7-37	Yes
Width of Line, Box, Bar, or Character, Define	w	7-125	Yes

6

How to Find 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.

Overview

To find a command, you can refer to any of these tables which give the page number on which the command is described:

Table	Page	How the Table is Organized
"Commands Listed by Name"	6-4	Alphabetized by the command name
"Commands Listed by Syntax"	6-9	Alphabetized by the command syntax
"Commands Listed by Task"	6-14	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 in alphabetical order by name.

Commands Listed by Name (continued)

IPL Command	Syntax	Page
Command Terminator 2	<LF>	7-18
Communication Port Configuration, Set	<SI>P	7-42
Configuration Parameters, Transmit	<ESC>p	7-18
Control Panel Access Permission, Set	<SI>A	7-43
Current Edit Session, Save	N	7-97
Cut	<SO>	7-18
Cutter, Enable or Disable	<SI>c	7-44
Dark Adjust	K	7-128
Dark Adjust, Set	<SI>d	7-44
Data Shift - International Characters	<SUB>	7-19
Data Source for Format in a Page, Define	e	7-97
Direct Graphics Mode, Select	<ESC>g	7-20
Emulation Mode, Enter	<ESC>c	7-21
Emulation or Advanced Mode on Power-Up	<SI>C	7-45
End-of-Print Skip Distance, Set	<SI>D	7-46
Error Code, Request	<BEL>	7-10
Factory Defaults, Reset	D	7-128
Field, Delete	D	7-98
Field, Select	<ESC>F	7-22
Field Data, Define Source	d	7-98
Field Decrement, Set	<ESC>D	7-23
Field Direction, Define	f	7-100
Field Increment, Set	<ESC>I	7-24
Field Origin, Define	o	7-100
First Data Entry Field, Select	<ACK>	7-24
Font, Transmit	<ESC>v	7-25
Font Character Width, Define	Z	7-101
Font Type, Select	c	7-103
Form Feed	<FF>	7-26
Format, Create or Edit	A or F	7-105
Format Direction in a Page, Define	q	7-106

Commands Listed by Name (continued)

Commands Listed by Name (continued)

Commands Listed by Name (continued)

Commands Listed by Syntax

This table lists the IPL commands in alphabetical order by command syntax.

Syntax	Command	Page
;	Command Terminator	7-127
<ACK>	First Data Entry Field, Select	7-24
<BEL>	Error Code, Request	7-10
<BS>	Warm Boot	7-37
<CAN>	Clear All Data	7-17
<CR>	Next Data Entry Field, Select	7-31
<DEL>	Clear Data From Current Field	7-17
<DLE>	Reset	7-11
<EM>	Abort Print Job	7-10
<ENQ>	Status Enquiry	7-13
<EOT>	Postamble, Set	7-57
<ESC>L	Label and Gap Length, Transmit	7-11
<ESC><SP>	Start and Stop Codes (Code 39), Print	7-35
<ESC><SYN>	Message Delay, Set	7-54
<ESC>C	Advanced Mode, Select	7-15
<ESC>c	Emulation Mode, Enter	7-21
<ESC>d	Auto-Transmit 2, Enable	7-40
<ESC>D	Field Decrement, Set	7-23
<ESC>e	Auto-Transmit 3, Enable	7-41
<ESC>E	Format, Select	7-26
<ESC>F	Field, Select	7-22
<ESC>G	Page, Select	7-33
<ESC>g	Direct Graphics Mode, Select	7-20
<ESC>H	Printhead Parameters, Transmit	7-34
<ESC>I	Field Increment, Set	7-24
<ESC>j	Auto-Transmit 1, Enable	7-40
<ESC>k	Auto-Transmit 1, 2, and 3, Disable	7-41
<ESC>m	Memory Usage, Transmit	7-30

Commands Listed by Syntax (continued)

Syntax	Command	Page
<ESC>M <ESC>M1	Program Number, Transmit	7-35
<ESC>N	Increment and Decrement, Disable	7-29
<ESC>O	Options Selected, Transmit	7-32
<ESC>p	Configuration Parameters, Transmit	7-18
<ESC>P	Program Mode, Enter	7-34
<ESC>Q	Remaining Quantity and Batch Count, Transmit	7-11
<ESC>T	Test and Service Mode, Enter	7-36
<ESC>u	User-Defined Characters, Transmit	7-36
<ESC>v	Font, Transmit	7-25
<ESC>x	Format, Transmit	7-28
<ESC>y	Page, Transmit	7-33
<ESC>Z	User-Defined Tables, Transmit	7-37
<ETB>	Print	7-34
<FF>	Form Feed	7-26
<FS>	Numeric Field Separator	7-31
<GS>	Alphanumeric Field Separator	7-16
<LF>	Command Terminator 2	7-18
<NUL>	Command Terminator 1	7-17
<RS>	Quantity Count, Set	7-35
<SI>a	Audible Alarm, Enable or Disable	7-40
<SI>A	Control Panel Access Permission, Set	7-43
<SI>b	Takeup Motor Torque, Increase	7-64
<SI>c	Cutter, Enable or Disable	7-44
<SI>C	Emulation or Advanced Mode on Power-Up	7-45
<SI>d	Dark Adjust, Set	7-44
<SI>D	End-of-Print Skip Distance, Set	7-46
<SI>e	Media Fault Recovery Mode, Set	7-52
<SI>f	Label Rest Point, Adjust	7-48
<SI>F	Top of Form, Set	7-65
<SI>g	Media Sensitivity, Select	7-52
<SI>h	Printhead Loading Mode, Select	7-61

Commands Listed by Syntax (continued)

Syntax	Command	Page
<SI>H	Printhead Pressure, Set	7-62
<SI>i	IBM Language Translation, Enable or Disable	7-47
<SI>I	Number of Image Bands, Set	7-54
<SI>l	Printer Language, Select	7-59
<SI>L	Maximum Label Length, Set	7-51
<SI>N	Amount of Storage, Define	7-39
<SI>O	Online or Offline on Power-Up	7-55
<SI>p	Pin 11/20 Protocol, Set	7-56
<SI>P	Communication Port Configuration, Set	7-42
<SI>r	Label Retract Distance, Set	7-49
<SI>R	Label Retract, Enable or Disable	7-49
<SI>s	Interlabel Ribbon Save, Enable or Disable	7-48
<SI>S	Print Speed, Set	7-58
<SI>t	Self-Strip, Enable or Disable	7-63
<SI>T	Label Stock Type, Select	7-50
<SI>U	Printhead Test Parameters, Set	7-62
<SI>W	Label Width, Set	7-50
<SI>Z	Ribbon Save Zones, Set	7-63
<SO>	Cut	7-18
<SOH>	Preamble, Set	7-57
<SUB>	Data Shift - International Characters	7-19
<SYN>	Intercharacter Delay, Set	7-47
<US>	Batch Count, Set	7-17
<VT>	Status Dump	7-12
A	Ambient Temperature, Transmit	7-127
A or F	Format, Create or Edit	7-105
b	Border Around Human-Readable Text, Define	7-90
B	Bar Code Field, Create or Edit	7-85
B	Printhead Resistance Test, Begin	7-130
c	Bar Code, Select Type	7-65
c	Font Type, Select	7-103

Commands Listed by Syntax (continued)

Syntax	Command	Page
c	Graphic, Select	7-109
C	Command Tables, Load	7-96
C	Pitch Label, Print	7-129
d	Field Data, Define Source	7-98
D	Factory Defaults, Reset	7-128
D	Field, Delete	7-98
e	Data Source for Format in a Page, Define	7-97
E	Format, Erase	7-107
f	Field Direction, Define	7-100
f	Formats, Print	7-128
g	Pitch Size, Set	7-120
g	UDC / Graphics, Print	7-131
G	Transmissive Sensor Value, Transmit	7-131
G	User-Defined Character, Clear or Create	7-122
h	Hardware Configuration Label, Print	7-128
h	Height Magnification of Bar, Box, or UDC, Define	7-110
H	Human-Readable Field, Create or Edit	7-113
i	Interpretive Field, Enable or Disable	7-115
I	Interpretive Field, Edit	7-115
j	Outline Font, Download	7-118
J	Outline Font, Clear or Create	7-117
k	Point Size, Set	7-121
K	Dark Adjust	7-128
l	Length of Line or Box Field, Define	7-116
L	Label Path Open Sensor Value, Transmit	7-129
L	Line Field, Create or Edit	7-116
m	Format Position From Page, Delete	7-108
M	Format Position in a Page, Assign	7-108
M	Reflective Sensor Value, Transmit	7-130
N	Current Edit Session, Save	7-97
o	Field Origin, Define	7-100

Commands Listed by Syntax (continued)

Syntax	Command	Page
O	Format Offset Within a Page, Define	7-107
p	Code 39 Prefix Character, Define	7-96
p	Pages, Print	7-129
P	Printhead Temperature Sensor Value, Transmit	7-130
q	Format Direction in a Page, Define	7-106
Q	Print Quality Label, Print	7-129
r	Character Rotation or Bar Code Ratio, Define	7-93
R	Program Mode, Exit	7-122
R	Test and Service Mode, Exit	7-130
S	Page, Create or Edit	7-119
s	Page, Delete	7-120
S	Printhead Resistance Values, Transmit	7-130
s	Software Configuration Label, Print	7-130
t	User-Defined Font Character, Create	7-124
T	Bitmap User-Defined Font, Clear or Define	7-90
T	Label Taken Sensor Value, Transmit	7-129
t	User-Defined Fonts, Print	7-131
u	Graphic or UDC, Define	7-109
U	12 Volt Supply Value, Transmit	7-127
U	User-Defined Character Field, Create or Edit	7-123
v	Print Line Dot Count Limit, Set	7-122
V	Printhead Volt Supply Value, Transmit	7-130
w	Width of Line, Box, Bar, or Character, Define	7-125
W	Box Field, Create or Edit	7-91
x	Bitmap Cell Width for Graphic or UDF, Define	7-88
X	Character Bitmap Origin Offset, Define	7-92
y	Bitmap Cell Height for Graphic or UDF, Define	7-86
z	Intercharacter Space for UDF, Define	7-114
Z	Font Character Width, Define	7-101

Commands Listed by Task

This section focuses on the tasks that you will 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," or "Commands Listed by Syntax."

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	7-10
<DLE>	Reset	7-11
<EM>	Abort Print Job	7-10
<ENQ>	Status Enquiry	7-13
<VT>	Status Dump	7-12
<ESC>L	Label and Gap Length, Transmit	7-11
<ESC>Q	Remaining Quantity and Batch Count, Transmit	7-11

Program Mode Commands

Bar Code Field Editing Commands

Syntax	Command	Page
c	Bar Code, Select Type	7-65
d	Field Data, Define Source	7-98
f	Field Direction, Define	7-100
h	Height Magnification of Bar, Box, or UDC, Define	7-110
i	Interpretive Field, Enable or Disable	7-115
o	Field Origin, Define	7-100
p	Code 39 Prefix Character, Define	7-96
r	Character Rotation or Bar Code Ratio, Define	7-93
w	Width of Line, Box, Bar, or Character, Define	7-125

Bitmap User-Defined Font Editing Commands

Syntax	Command	Page
t	User-Defined Font Character, Create	7-124
u	Graphic or UDC, Define	7-109
X	Character Bitmap Origin Offset, Define	7-92
x	Bitmap Cell Width for Graphic or UDF, Define	7-88
y	Bitmap Cell Height for Graphic or UDF, Define	7-86
Z	Font Character Width, Define	7-101
z	Intercharacter Space for UDF, Define	7-114

Box Field Editing Commands

Syntax	Command	Page
f	Field Direction, Define	7-100
h	Height Magnification of Bar, Box, or UDC, Define	7-110
l	Length of Line or Box Field, Define	7-116
o	Field Origin, Define	7-100
w	Width of Line, Box, Bar, or Character, Define	7-125

Program Mode Commands (continued)

Format Editing Commands

Syntax	Command	Page
B	Bar Code Field, Create or Edit	7-85
D	Field, Delete	7-98
H	Human-Readable Field, Create or Edit	7-113
I	Interpretive Field, Edit	7-115
L	Line Field, Create or Edit	7-116
U	User-Defined Character Field, Create or Edit	7-123
W	Box Field, Create or Edit	7-91

Human-Readable Field Editing Commands

Syntax	Command	Page
b	Border Around Human-Readable Text, Define	7-90
c	Font Type, Select	7-103
d	Field Data, Define Source	7-98
f	Field Direction, Define	7-100
g	Pitch Size, Set	7-120
h	Height Magnification of Bar, Box, or UDC, Define	7-110
k	Point Size, Set	7-121
o	Field Origin, Define	7-100
r	Character Rotation or Bar Code Ratio, Define	7-93
w	Width of Line, Box, Bar, or Character, Define	7-125

Program Mode Commands (continued)

Interpretive Field Editing Commands

Syntax	*Command*	*Page*
b	Border Around Human-Readable Text, Define	7-90
c	Font Type, Select	7-103
f	Field Direction, Define	7-100
g	Pitch Size, Set	7-120
h	Height Magnification of Bar, Box, or UDC, Define	7-110
k	Point Size, Set	7-121
o	Field Origin, Define	7-100
r	Character Rotation or Bar Code Ratio, Define	7-93
w	Width of Line, Box, Bar, or Character, Define	7-125

Line Field Editing Commands

Syntax	*Command*	*Page*
f	Field Direction, Define	7-100
l	Length of Line or Box Field, Define	7-116
o	Field Origin, Define	7-100
w	Width of Line, Box, Bar or Character, Define	7-125

Page Editing Commands

Syntax	*Command*	*Page*
e	Data Source for Format in a Page, Define	7-97
M	Format Position in a Page, Assign	7-108
m	Format Position From Page, Delete	7-108
O	Format Offset Within a Page, Define	7-107
q	Format Direction in a Page, Define	7-106

Program Mode Commands (continued)

Programming Commands

Syntax	Command	Page
A	Format, Create or Edit	7-105
E	Format, Erase	7-107
F	Format, Create or Edit	7-105
G	User-Defined Character, Clear or Create	7-122
N	Current Edit Session, Save	7-97
R	Program Mode, Exit	7-122
S	Page, Create or Edit	7-119
s	Page, Delete	7-120
T	Bitmap User-Defined Font, Clear or Define	7-90
J	Outline Font, Clear or Create	7-117

UDC Field Editing Commands

Syntax	Command	Page
c	Graphic, Select	7-109
f	Field Direction, Define	7-100
h	Height Magnification of Bar, Box, or UDC, Define	7-110
o	Field Origin, Define	7-100
w	Width of Line, Box, Bar, or Character, Define	7-125

UDC Editing Commands

Syntax	Command	Page
u	Graphic or UDC, Define	7-109
x	Bitmap Cell Width for Graphic or UDF, Define	7-88
Y	Bitmap Cell Height for Graphic or UDF, Define	7-86
j	Outline Font, Download	7-118
J	Outline Font, Clear or Create	7-117

Print Mode Commands

Configuration Commands

Syntax	Command	Page
<SI>a	Audible Alarm, Enable or Disable	7-40
<SI>A	Control Panel Access Permission, Set	7-43
<SI>b	Takeup Motor Torque, Increase	7-64
<SI>c	Cutter, Enable or Disable	7-44
<SI>C	Emulation or Advanced Mode on Power-Up	7-45
<SI>D	End-of-Print Skip Distance, Set	7-46
<SI>d	Dark Adjust, Set	7-44
<SI>e	Media Fault Recovery Mode, Set	7-52
<SI>F	Top of Form, Set	7-65
<SI>f	Label Rest Point, Adjust	7-48
<SI>g	Media Sensitivity, Select	7-52
<SI>h	Printhead Loading Mode, Select	7-61
<SI>H	Printhead Pressure, Set	7-62
<SI>I	Number of Image Bands, Set	7-54
<SI>i	IBM Language Translation, Enable or Disable	7-47
<SI>L	Maximum Label Length, Set	7-51
<SI>l	Printer Language, Select	7-59
<SI>N	Amount of Storage, Define	7-39
<SI>O	Online or Offline on Power-Up	7-55
<SI>p	Pin 11/20 Protocol, Set	7-56
<SI>R	Label Retract, Enable or Disable	7-49
<SI>r	Label Retract Distance, Set	7-49
<SI>S	Print Speed, Set	7-58
<SI>s	Interlabel Ribbon Save, Enable or Disable	7-48
<SI>T	Label Stock Type, Select	7-50
<SI>t	Self-Strip, Enable or Disable	7-63
<SI>U	Printhead Test Parameters, Set	7-62
<SI>W	Label Width, Set	7-50
<SI>Z	Ribbon Save Zones, Set	7-63

Print Mode Commands (continued)

Print Commands

Syntax	Command	Page
<ACK>	First Data Entry Field, Select	7-24
<BS>	Warm Boot	7-37
<CAN>	Clear All Data	7-17
<CR>	Next Data Entry Field, Select	7-31
<DEL>	Clear Data From Current Field	7-17
<ESC>C	Advanced Mode, Select	7-15
<ESC>c	Emulation Mode, Select	7-21
<ESC>D	Field Decrement, Set	7-23
<ESC>E	Format, Select	7-26
<ESC>F	Field, Select	7-22
<ESC>g	Direct Graphics Mode, Select	7-20
<ESC>G	Page, Select	7-33
<ESC>H	Printhead Parameters, Transmit	7-34
<ESC>I	Field Increment, Set	7-24
<ESC>m	Memory Usage, Transmit	7-30
<ESC>M <ESC>M1	Program Number, Transmit	7-35
<ESC>N	Increment and Decrement, Disable	7-29
<ESC>O	Options Selected, Transmit	7-32
<ESC>p	Configuration Parameters, Transmit	7-18
<ESC>P	Program Mode, Enter	7-34
<ESC><SP>	Start and Stop Codes (Code 39), Print	7-35
<ESC><T>	Test and Service Mode, Enter	7-36
<ESC>u	User-Defined Characters, Transmit	7-36
<ESC>v	Font, Transmit	7-25
<ESC>x	Format, Transmit	7-28
<ESC>y	Page, Transmit	7-33
<ESC>Z	User-Defined Tables, Transmit	7-37
<ETB>	Print	7-34

Print Mode Commands (continued)

Print Commands

Syntax	Command	Page
<FF>	Form Feed	7-26
<FS>	Numeric Field Separator	7-31
<GS>	Alphanumeric Field Separator	7-16
<LF>	Command Terminator 2	7-18
<NUL>	Command Terminator 1	7-17
<RS>	Quantity Count, Set	7-35
<SO>	Cut	7-18
<SUB>	Data Shift - International Characters	7-19
<US>	Batch Count, Set	7-17

Protocol Modification Commands

Syntax	Command	Page
<EOT>	Postamble, Set	7-57
<ESC>d	Auto-Transmit 2, Enable	7-40
<ESC>e	Auto-Transmit 3, Enable	7-41
<ESC>j	Auto-Transmit 1, Enable	7-40
<ESC>k	Auto-Transmit 1, 2, and 3, Disable	7-41
<SI>p	Pin 11/20 Protocol, Set	7-56
<SI>P	Communication Port Configuration, Set	7-42
<ESC><SYN>	Message Delay, Set	7-54
<SOH>	Preamble, Set	7-57
<SYN>	Intercharacter Delay, Set	7-47

Test and Service Commands

Test and Service Commands

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. For help finding a command in this chapter, see Chapter 6 or the following table.

These commands are used for all Intermec printers. Defaults, ranges of values for the variables, and special notes for specific printers are presented in a chart under the Printers heading.

Which Commands Does Your Printer Support?

Use this table to easily identify whether your printer supports or ignores a specific IPL command. A • indicates that the printer supports the command, and a blank space indicates that the printer ignores the command.

IPL Command	Page	3240	3400	340e	3440	3600	4100	4400	44X0	4X30	7421	Easy Coder F4
12 Volt Supply Value, Transmit	7-127							•				
Abort Print Job	7-10	•	•	•	•	•	•	•	•	•	•	•
Advanced Mode, Select	7-15	•	•	•	•	•	•	•	•		•	•
Alphanumeric Field Separator	7-16	•	•	•	•	•	•	•	•	•	•	•
Ambient Temperature, Transmit	7-127							•				
Amount of Storage, Define	7-39	•	•			•	•				•	
Audible Alarm, Enable or Disable	7-40							•				
Auto-Transmit 1, Enable	7-40	•	•	•	•	•	•	•	•	•	•	•
Auto-Transmit 2, Enable	7-40	•	•	•	•	•	•	•	•	•	•	•
Auto-Transmit 3, Enable	7-41	•	•	•	•	•	•	•	•	•	•	•
Auto-Transmit 1, 2, and 3, Disable	7-41	•	•	•	•	•	•	•	•	•	•	•
Bar Code, Select Type	7-65	•	•	•	•	•	•	•	•	•	•	•
Bar Code Field, Create or Edit	7-85	•	•	•	•	•	•	•	•	•	•	•
Batch Count, Set	7-17	•	•	•	•	•	•	•	•	•	•	•
Bitmap Cell Height for Graphic or UDF, Define	7-86	•	•	•	•	•	•	•	•	•	•	•
Bitmap Cell Width for Graphic or UDF, Define	7-88	•	•	•	•	•	•	•	•	•	•	•
Bitmap User-Defined Font, Clear or Define	7-90	•	•	•	•	•	•	•	•	•	•	•

Summary of IPL Commands (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44X0	4X30	7421	Easy Coder F4
Border Around Human-Readable Text, Define	7-90	•	•	•	•	•	•	•	•	•	•	•
Box Field, Create or Edit	7-91	•	•	•	•	•	•	•	•	•	•	•
Character Bitmap Origin Offset, Define	7-92	•	•	•	•	•	•	•	•	•	•	•
Character Rotation or Bar Code Ratio, Define	7-93	•	•	•	•	•	•	•	•	•	•	•
Clear All Data	7-17	•	•	•	•	•	•	•	•	•	•	•
Clear Data From Current Field	7-17	•	•	•	•	•	•	•	•	•	•	•
Code 39 Prefix Character, Define	7-96	•	•	•	•	•	•	•	•	•	•	•
Command Tables, Load	7-96	•	•	•	•	•	•	•	•	•	•	
Command Terminator	7-127	•	•	•	•	•	•	•	•	•	•	•
Command Terminator 1	7-17	•	•	•	•	•	•	•	•	•	•	•
Command Terminator 2	7-18	•	•	•	•	•	•	•	•	•	•	•
Communication Port Configuration, Set	7-42										•	•
Configuration Parameters, Transmit	7-18	•	•	•	•	•	•	•	•	•	•	•
Control Panel Access Permission, Set	7-43							•		•		
Current Edit Session, Save	7-97	•	•	•	•	•	•	•	•	•	•	•
Cut	7-18		• (C, D)	•			•	•	•	•	•	
Cutter, Enable or Disable	7-44		•	•			•	•	•	•	•	
Dark Adjust	7-128				•							
Dark Adjust, Set	7-44	•	•	•	•	•	•	•	•	•	•	•
Data Shift - International Characters	7-19	•	•	•	•	•	•	•	•	•	•	•
Data Source for Format in a Page, Define	7-97	•	•	•	•	•	•	•	•	•	•	•
Direct Graphics Mode, Select	7-20		• (C, D)	•	•				•		•	•

Summary of IPL Commands (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44X0	4X30	7421	Easy Coder F4
Emulation Mode, Enter	7-21	•	•	•	•	•	•	•	•		•	•
Emulation or Advanced Mode on Power-Up	7-45	•	•	•	•	•	•	•	•		•	•
End-of-Print Skip Distance, Set	7-46	•	•	•	•	•	•	•	•	•	•	•
Error Code, Request	7-10	•	•	•	•	•	•	•	•	•	•	•
Factory Defaults, Reset	7-128	•	•	•	•	•	•	•	•	•	•	•
Field, Delete	7-98	•	•	•	•	•	•	•	•	•	•	•
Field, Select	7-22	•	•	•	•	•	•	•	•	•	•	•
Field Data, Define Source	7-98	•	•	•	•	•	•	•	•	•	•	•
Field Decrement, Set	7-23	•	•	•	•	•	•	•	•	•	•	•
Field Direction, Define	7-100	•	•	•	•	•	•	•	•	•	•	•
Field Increment, Set	7-24	•	•	•	•	•	•	•	•	•	•	•
Field Origin, Define	7-100	•	•	•	•	•	•	•	•	•	•	•
First Data Entry Field, Select	7-24	•	•	•	•	•	•	•	•	•	•	•
Font, Transmit	7-25	•	•	•	•	•	•	•	•	•	•	•
Font Character Width, Define	7-101	•	•	•	•	•	•	•	•	•	•	•
Font Type, Select	7-103	•	•	•	•	•	•	•	•	•	•	•
Form Feed	7-26	•	•	•	•	•	•	•	•	•	•	•
Format, Create or Edit	7-105	•	•	•	•	•	•	•	•	•	•	•
Format, Erase	7-107	•	•	•	•	•	•	•	•	•	•	•
Format, Select	7-26	•	•	•	•	•	•	•	•	•	•	•
Format, Transmit	7-28	•	•	•	•	•	•	•	•	•	•	•
Format Direction in a Page, Define	7-106	•	•	•	•	•	•	•	•	•	•	•
Format Offset Within a Page, Define	7-107	•	•	•	•	•	•	•	•	•	•	•
Format Position From Page, Delete	7-108	•	•	•	•	•	•	•	•	•	•	•
Format Position in a Page, Assign	7-108	•	•	•	•	•	•	•	•	•	•	•
Formats, Print	7-128		• (C, D)	•	•				•		•	•

Summary of IPL Commands (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44X0	44X30	7421	Easy Coder F4
Graphic, Select	7-109	•	•	•	•	•	•	•	•	•	•	•
Graphic or UDC, Define	7-109	•	•	•	•	•	•	•	•	•	•	•
Hardware Configuration Label, Print	7-128		• (C, D)	•	•				•		•	•
Height Magnification of Bar, Box, or UDC, Define	7-110	•	•	•	•	•	•	•	•	•	•	•
Human-Readable Field, Create or Edit	7-113	•	•	•	•	•	•	•	•	•	•	•
IBM Language Translation, Enable or Disable	7-47	•	•	•	•	•	•	•	•	•	•	•
Increment and Decrement, Disable	7-29	•	•	•	•	•	•	•	•	•	•	•
Intercharacter Delay, Set	7-47	•	•	•	•	•	•	•	•	•	•	
Intercharacter Space for UDF, Define	7-114	•	•	•	•	•	•	•	•	•	•	•
Interlabel Ribbon Save, Enable or Disable	7-48						•					
Interpretive Field, Edit	7-115	•	•	•	•	•	•	•	•	•	•	•
Interpretive Field, Enable or Disable	7-115	•	•	•	•	•	•	•	•	•	•	•
Label and Gap Length, Transmit	7-11	•	•	•	•	•	•	•	•	•	•	•
Label Path Open Sensor Value, Transmit	7-129	•		•	•			•	•	•	•	•
Label Rest Point, Adjust	7-48	•	•	•	•	•	•	•	•	•	•	•
Label Retract, Enable or Disable	7-49	•	•	•	•	•	•	•	•	•	•	•
Label Retract Distance, Set	7-49	•	•	•	•	•	•	•	•	•	•	•
Label Stock Type, Select	7-50	•	•	•	•	•	•	•	•	•	•	•
Label Taken Sensor Value, Transmit	7-129	•	•	• (400 dpi only)	•	•	•	•	•	•	•	•
Label Width, Set	7-50							•	•		•	
Length of Line or Box Field, Define	7-116	•	•	•	•	•	•	•	•	•	•	•
Line Field, Create or Edit	7-116	•	•	•	•	•	•	•	•	•	•	•

Summary of IPL Commands (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44XX30	4X30	7421	Easy Coder F4
Maximum Label Length, Set	7-51	•	•	•	•	•	•	•	•	•	•	•
Media Fault Recovery Mode, Set	7-52			•					•		•	•
Media Sensitivity, Select	7-52	•	•	•	•	•	•	•	•	•	•	•
Memory Usage, Transmit	7-30	•	•		•	•	•	•		•	•	•
Message Delay, Set	7-54	•	•	•	•	•	•	•	•	•	•	
Next Data Entry Field, Select	7-31	•	•	•	•	•	•	•	•	•	•	•
Number of Image Bands, Set	7-54	•	•	•	•	•	•	•	•		•	
Numeric Field Separator	7-31	•	•	•	•	•	•	•	•	•	•	•
Online or Offline on Power-Up	7-55							•		•		
Options Selected, Transmit	7-32	•	•	•	•	•	•	•	•	•	•	•
Outline Font, Clear or Create	7-117	•	•	•	•	•	•	•	•	•	•	•
Outline Font, Download	7-118	•	•	•	•	•	•	•	•	•	•	•
Page, Create or Edit	7-119	•	•	•	•	•	•	•	•	•	•	•
Page, Delete	7-120	•	•	•	•	•	•	•	•	•	•	•
Page, Select	7-33	•	•	•	•	•	•	•	•	•	•	•
Page, Transmit	7-33	•	•	•	•	•	•	•	•	•	•	•
Pages, Print	7-129		• (C, D)	•	•				•		•	•
Pin 11/20 Protocol, Set	7-56			•					•		•	
Pitch Label, Print	7-129	•	•	•	•			•	•	•	•	•
Pitch Size, Set	7-120	•	•	•	•	•	•	•	•	•	•	
Point Size, Set	7-121	•	•	•	•	•	•	•	•	•	•	•
Postamble, Set	7-57	•	•	•	•	•	•	•	•	•	•	•
Preamble, Set	7-57	•	•	•	•	•	•	•	•	•	•	•
Print	7-34	•	•	•	•	•	•	•	•	•	•	•
Print Line Dot Count Limit, Set	7-122											
Print Quality Label, Print	7-129	•	•	•	•	•	•	•	•	•	•	•
Print Speed, Set	7-58	•	•	•	•	•	•	•	•	•	•	•

Summary of IPL Commands (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44X0	4X30	7421	Easy Coder F4
Printer Language, Select	7-59	•	•	•	•	•	•	•	•	•	•	•
Printhead Loading Mode, Select	7-61		• (C, D)	•	•	•			•		•	•
Printhead Parameters, Transmit	7-34	•	•	•	•	•	•	•	•	•	•	•
Printhead Pressure, Set	7-62							•				
Printhead Resistance Test, Begin	7-130							•				
Printhead Resistance Values, Transmit	7-130							•				
Printhead Temperature Sensor Value, Transmit	7-130	•	•	•	•	•	•	•	•	•	•	•
Printhead Test Parameters, Set	7-62							•				
Printhead Volt Supply Value, Transmit	7-130							•				
Program Mode, Enter	7-34	•	•	•	•	•	•	•	•	•	•	•
Program Mode, Exit	7-122	•	•	•	•	•	•	•	•	•	•	•
Program Number, Transmit	7-35	•	•	•	•	•	•	•	•	•	•	•
Quantity Count, Set	7-35	•	•	•	•	•	•	•	•	•	•	•
Reflective Sensor Value, Transmit	7-130	•	•	•	•	•	•	•	•	•	•	•
Remaining Quantity and Batch Count, Transmit	7-11	•	•	•	•	•	•	•	•	•	•	•
Reset	7-11	•	•	•	•	•	•	•	•	•	•	•
Ribbon Save Zones, Set	7-63						•					
Self-Strip, Enable or Disable	7-63	•	•	•	•	•	•	•	•	•	•	•
Software Configuration Label, Print	7-130		• (C, D)	•	•				•		•	•
Start and Stop Codes (Code 39), Print	7-35	•	•	•	•	•	•	•	•	•	•	•
Status Dump	7-12	•	•	•	•	•	•	•	•	•	•	•
Status Enquiry	7-13	•	•	•	•	•	•	•	•	•	•	•
Takeup Motor Torque, Increase	7-64								•			

Summary of IPL Commands (continued)

IPL Command	Page	3240	3400	3400e	3440	3600	4100	4400	44XX30	4X30	7421	Easy Coder F4
Test and Service Mode, Enter	7-36	•	•	•	•	•	•	•	•	•	•	•
Test and Service Mode, Exit	7-130	•	•	•	•	•	•	•	•	•	•	•
Top of Form, Set	7-65	•	•	•	•	•	•	•	•	•	•	•
Transmissive Sensor Value, Transmit	7-131	•	•	•	•	•	•	•	•	•	•	•
User-Defined Characters (UDC) and Graphics, Print	7-131		• (C, D)	•	•				•		•	•
User-Defined Character, Clear or Create	7-122	•	•	•	•	•	•	•	•	•	•	•
User-Defined Character Field, Create or Edit	7-123	•	•	•	•	•	•	•	•	•	•	•
User-Defined Characters, Transmit	7-36	•	•	•	•	•	•	•	•	•	•	•
User-Defined Font Character, Create	7-124	•	•	•	•	•	•	•	•	•	•	•
User-Defined Fonts, Print	7-131		• (C, D)	•	•				•			•
User-Defined Tables, Transmit	7-37	•	•	•	•	•	•	•	•	•	•	
Warm Boot	7-37	•	•	•	•	•	•	•	•	•	•	•
Width of Line, Box, Bar, or Character, Define	7-125	•	•	•	•	•	•	•	•	•	•	•

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" in Chapter 1.

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 powering on the printer, 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>`

Printers:

Printer	Notes
3240	The 3240 printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail.
3400	The 3400 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
3400e	The 3400e printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail. Only the 400 dpi version uploads <US> label path open.
3440	The 3440 printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail.
3600	The 3600 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
4100	The 4100 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
4400	The 4400 printer does not upload <BS> Takeup reel full.
44X0	The 4420 and 4440 printers do not upload either <BS> Takeup reel full or <SO> Printhead test fail.
4X30	The 4630 and 4830 printers do not upload <SO> Printhead test fail.
7421	The 7421 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
EasyCoder F4	The EasyCoder F4 printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail.

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	<DC1>	Skipping
<EM>	No label stock	<DC1>	Printing
<DC3>	Buffer now full	<DC1>	Ready

Status Enquiry

Purpose: Transmits the current printer status to the host.

Syntax: <ENQ>

Printers:

Printer	Notes
3240	The 3240 printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail.
3400	The 3400 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
3400e	The 3400e printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail. Only the 400 dpi version uploads <US> Label path open.
3440	The 3440 printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail.
3600	The 3600 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
4100	The 4100 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
4400	The 4400 printer does not upload <BS> Takeup reel full.
44X0	The 4420 and 4440 printers do not upload either <BS> Takeup reel full or <SO> Printhead test fail.
4X30	The 4630 and 4830 printers do not upload <SO> Printhead test fail.
7421	The 7421 printer does not upload <US> Label path open, <BS> Takeup reel full, or <SO> Printhead test fail.
EasyCoder F4	The EasyCoder F4 printer does not upload either <BS> Takeup reel full or <SO> Printhead test fail.

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	<DC1>	Skipping
<EM>	No label stock	<DC1>	Printing
<DC3>	Buffer now full	<DC1>	Ready

Print Commands

You can use Print commands to pass data to formats and print labels.

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" in Chapter 1.

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>Cn`

where *n* specifies the dot size.

Printers:

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: N/A 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: N/A 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.

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.

Printers:

Printer	Default	Values for n	Notes
All	n = 1	1 to 9999	All printers support this command the same way.

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 command characters as data.

Syntax: <SUB>

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 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.

The following 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.

Printers:

Printer	Default	Values for m	Notes
3400C, 3400e	m = 0	0 - 8 bits per byte 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	m = 0	0 - 8 bits per byte 1 - 8 bits per byte that have been nibblized	
44X0	m = 0	0 - 8 bits per byte 1 - 8 bits per byte that have been nibblized	
7421	m = 0	0 - 8 bits per byte 1 - 8 bits per byte that have been nibblized	
EasyCoder F4	m = 0	0 - 8 bits per byte 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 operate in Emulation mode. The alternative operating mode (and default) is Advanced Mode.

Syntax: `<ESC>cn`

where *n* specifies the dot size.

Printers:

Printer	Default	Values for n
All	n = 0	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)

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>Fn or <ESC>F"name"`

where *n* is the number of the field.

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 to 199	All printers support this command the same way.

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>
```

Field, Select (continued)

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>D*n*

where *n* is the field decrement value.

Printers:

Printer	Default	Values for n	Notes
All	n = 1	1 to 9999	All printers support this command the same way.

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.

Printers:

Printer	Default	Values for n	Notes
All	n = 1	1 to 9999	All printers support this command the same way.

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>vn`

where *n* is the font ID number.

Printers:

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	None	0 to 28, 30 to 41
EasyCoder F4	None	0 to 28, 30 to 41

Notes: You can set *n* to a number from 0 to 56, depending on the fonts your printer supports. The font names are listed on page 7-103 in the Font Type, Select command description.

Font, Transmit (continued)

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

IDnumber, name, type, storage size<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.
storage size	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.

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

where *n* is the numeric format ID and *,m* specifies to reimage only changed fields.

Format, Select (continued)

Printers:

Printer	Default	Values for n	Values for ,m	Notes
3240	n = 0	0 to 99	0 - the printer reimages the entire label. 1 - the printer only reimages the changed fields.	
3400A 3400B	n = 0	0 to 19	0 - the printer reimages the entire label. 1 - the printer only reimages the changed fields.	
3400C 3400D	n = 0	*, 0 to 19	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.
3400e	n = 0	*, 0 to 99	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.
3440	n = 0	*, 0 to 99	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.
3600	n = 0	0 to 19	0 - the printer reimages the entire label. 1 - the printer only reimages the changed fields.	
44X0	n = 0	*, 0 to 99	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.
4X30	n = 0	0 to 19	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.
7421	n = 0	*, 0 to 99	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.
EasyCoder F4	n = 0	*, 0 to 99	Not available	If you use an asterisk (*) for the label format, the printer temporarily stores the label format in RAM.

Format, Select (continued)

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>xn`

where *n* is the format ID number.

Printers:

Printer	Default	Values for n
3240	None	0 to 19
3400	None	0 to 19
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	None	0 to 99
EasyCoder F4	None	0 to 99

Format, Transmit (continued)

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

IDnumber, name, type, storage size<CR><LF>

where:

IDnumber	is the format number that was specified by *n* in the command that created the format.
name	is the optional format name that may have been specified by ,*name* in the command that created the format.
type	is 0 for formats.
storage size	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.

Printers:

Printer	Default	Values for n
3400e	n = 0	0 - The printer transmits the amounts of memory that are available and free. 1 - The printer transmits the amount of installed SRAM, DRAM, or Flash RAM.
3440	n = 0	0 - The printer transmits the amounts of memory that are available and free. 1 - The printer transmits the amount of installed SRAM, DRAM, or Flash RAM.
44X0	n = 0	0 - The printer transmits the amounts of memory that are available and free. 1 - The printer transmits the amount of installed SRAM, DRAM, or Flash RAM.

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`

Printers:

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	0 - No options selected 1 - Cutter
EasyCoder F4	0 - No options selected 4 - Self-strip

Page, Select

Purpose: Selects a page for data entry or printing.

Syntax: <ESC>G*n*

where *n* is the page ID number.

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 to 9	All printers support this command the same way.

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.

Printers:

Printer	Default	Values for n	Notes
All	None	1 to 9	All printers support this command the same way.

Page, Transmit (continued)

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

IDnumber, name, type, storage size<CR><LF>

where:

IDnumber	is the page number that was specified by *n* in the command that created the page.
name	is the optional page name that may have been specified by *,name* in the command that created the page.
type	is 1 for pages.
storage size	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.

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 executes, you lose all previously entered data.

Program Number, Transmit

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

Syntax: <ESC>Mn

n = 0 returns program # and version #

n = 1 returns program #, version #, and model #

The default for n is 0.

<ESC>M1 is supported by 4420, 4440, and 3400e only.

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

3400e: <ESC>M1 returns program #, version # 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.

Printers:

Printer	Default	Values for n	Notes
All	n = 1	1 to 9999	All printers support this command the same way.

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.

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>

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

Storage Area Usage, Transmit

See Memory Usage, Transmit.

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.

Printers:

Printer	Default	Values for n	Notes
All	None	0 to 99	All printers support this command the same way.

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

IDnumber, name, type, storage size<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.

storage size is the number of bytes 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.

Syntax: `<ESC>Zt`

where *t* identifies the table.

Printers:

Printer	Values for t	Notes
All except the EasyCoder F4 and 7421	0 - Print mode commands 1 - Escape print commands 2 - Shift print commands 3 - Status response 4 - Protocol characters	All printers support this command the same way.

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.

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" in Chapter 1.

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.

Note: 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>Nn`

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

Printers:

Printer	Default	Values for n
3240	n = 60 without expanded RAM n = 200 with expanded RAM	10K to 120K without expanded RAM. 10K to 504K with expanded RAM.
3400A	n = 20 without expanded RAM n = 120 with expanded RAM	10K to 32K without expanded RAM. 10K to 128K with expanded RAM.
3400B 3400C 3400D	n = 60 without expanded RAM n = 200 with expanded RAM	10K to 120K without expanded RAM. 10K to 504K with expanded RAM.
3600	n = 60 without expanded RAM n = 200 with expanded RAM	10K to 120K without expanded RAM. 10K to 504K with expanded RAM.
4100	n = 20 without expanded RAM n = 120 with expanded RAM	10K to 32K without expanded RAM. 10K to 128K with expanded RAM.
7421	n = 60 without expanded RAM n = 200 with expanded RAM	10K to 120K without expanded RAM.

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.

Syntax: `<SI>a`*n*

Printers:

Printer	Default	Values for n
4400	n = 0	0 - Disables the audible alarm. 1 - Enables the audible alarm

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.

Syntax: `<ESC>e`

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

<HT>	Imager overrun
<SOH>	Printing is complete and the buffer is empty
<RS>	Insufficient RAM for printing or storage

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, and *n5* sets the Multi-Drop address (if you are using Multi-Drop).

n6 sets the parallel port mode.

Printers:

Printer	Defaults	n1 Values	n2 Values	n3 Values	n4 Values	n5 Values	n6 Values
7421	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 = Intermec XON/XOFF 2 = Intermec Standard 3 = Polling Mode D	A - Z, 0 - 5	0 = Centronic Mode 1 = 1284 Nibble Mode
EasyCoder F4	None	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	N/A	N/A

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.

Printers:

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 the 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 the operator and configuration menus only 2 - Allows access to the operator menu only 3 - Denies access to all menus

Cutter, Enable or Disable

Purpose: Turns the cutter feature on or off if the cutter option is installed.

Syntax: `<SI>cn`

where *n* enables or disables the cutter.

Printers:

Printer	Default	Values for n
3400C 3400D	n = 0	0 - Disables the cutter 1 - Enables the cutter
3400e	n = 0	0 - Disables the cutter 1 - Enables the cutter
4100	n = 0	0 - Disables the cutter 1 - Enables the cutter
4400	n = 0	0 - Disables the cutter 1 - Enables the cutter
44X0	n = 0	0 - Disables the cutter 1 - Enables the cutter
4X30	n = 0	0 - Disables the cutter 1 - Enables the cutter
7421	n = 0	0 - Disables the cutter 1 - Enables the cutter

Dark Adjust, Set

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

Syntax: `<SI>dn`

where *n* specifies the darkness setting.

Printers:

Printer	Default	Values for n	Notes
All	n = 0	-10 to +10 (in increments of 1)	This command changes the configuration setting.

Notes: The darkest setting is +10 (darkest) and the lightest setting is -10 (lightest).

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.

Printers:

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 use Advanced mode 2.5 mil option **only** 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)	
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)	
44X0	4420: n = 1 4440: n = 3	4420: 0 - Emulation mode (10 mil) 1 - Advanced mode (5 mil) 2 - Emulation mode (15 mil) 4440: 0 - Emulation mode (10 mil) 1 - Advanced mode (5 mil) 2 - Emulation mode (15 mil) 3 - Advanced mode (2.5 mil)	You can use Advanced mode 2.5 mil option **only** on the 4440.
7421	n = 1	0 - Emulation mode (10 mil) 1 - Advanced mode (5 mil) 2 - Emulation mode (15 mil)	
EasyCoder F4	n = 1	0 - Emulation mode (10 mil) 1 - Advanced mode (5 mil) 2 - Emulation mode (15 mil)	

Emulation or Advanced Mode on Power-Up (continued)

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.

Syntax: `<SI>D[n]`

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

Printers:

Printer	Default	Values for n
3240	n = 0 Label Stock mode n = 118 Continuous Stock mode	0 to 9999 in 5 mil increments
3400	n = 0 Label Stock mode n = 118 Continuous Stock mode	0 to 9999 in 5 mil increments
3400e	n = 0 Label Stock Mode n = 123 Continuous Stock mode	0 to 9999 in 5 mil increments
3440	n = 0 Label Stock mode n = 123 Continuous Stock mode	0 to 9999 in 5 mil increments
3600	n = 0 Label Stock mode n = 118 Continuous Stock mode	0 to 9999 in 5 mil increments
4100	n = 0 Label Stock mode n = 118 Continuous Stock mode	0 to 9999 in 5 mil increments
4400	n = 0 Label Stock mode n = 141 Continuous Stock mode	0 to 9999 in 5 mil increments
44X0	n = 0 Label Stock Mode n = 132 Continuous Stock mode	0 to 9999 in 5 mil increments
4X30	n = 0 Label Stock mode n = 94 Continuous Stock mode	0 to 9999 in 5 mil increments
7421	n = 0 Label Stock mode n = 160 Continuous Stock mode	0 to 9999 in 5 mil increments
EasyCoder F4	n = 0 Label Stock mode n = 103 Continuous Stock mode	

End-of-Print Skip Distance, Set (continued)

Notes: To advance the label out to the tear bar in label stock mode, set *n* to 108.

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.

This command is ineffective in self-strip applications.

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.

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 - Disable IBM translation 1 - Enable IBM translation	All printers support this command the same way.

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.

Syntax: `<SYN>`*n*

where *n* is the intercharacter delay in milliseconds.

Printers:

Printer	Default	Values for n	Notes
All except the EasyCoder F4	n = 0	0 to 9999	All printers support this command the same way.

Interlabel Ribbon Save, Enable or Disable

Syntax: <SI>s*n*

Printers:

Printer	Default	Values for n	Notes
4100	n = 0	0 - Disable interlabel ribbon save 1 - Enable interlabel ribbon save	If you do not have the ribbon save option installed, the printer ignores this command.

Label Rest Point, Adjust

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

Syntax: <SI>f*n*

where *n* specifies the label stop point.

Printers:

Printer	Default	Values for n
3240	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
3400	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
3400e	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
3440	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
3600	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
4100	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
4400	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
44X0	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
4X30	n = 0	-20 (farthest back) to +20 (farthest forward)
7421	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments
EasyCoder F4	n = 0	-30 (farthest back) to +30 (farthest forward) in 5 mil increments

Notes: You can also set this command by using the 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>Rn`

where *n* enables or disables the label retract option.

Printers:

Printer	Default	Values for n	Notes
All	n = 1	0 - Disables label retract 1 - Enables label retract	All printers support this command the same way.

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 Set Label Retract Distance (Label Retract Distance, Set) command. See also Select Label Stock Type (Label Stock Type, Select) command.

Label Retract Distance, Set

Purpose: Sets the label retract distance.

Syntax: `<SI>rn`

where *n* specifies the label retract distance in 5 mil increments.

Printers:

Printer	Default	Values for n	Notes
4400	n = 284 n = 216 (6.5 mil printhead)	0 to 399	
All other printers	n = 0	0 to 399	All other printers support this command the same way.

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.

Printers:

Printer	Default	Values for n	Notes
All	n = 1	0 - Continuous label stock (no breaks between labels) 1 - Label stock with gaps between labels 2 - Label stock with marks between labels (on back of label stock)	All printers support this command the same way.

Notes: To make this command effective, reset the printer or cycle the power 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. The 4440 printer uses a 2.5 mil dot.

Printers:

Printer	Default	Values for n	Notes
4400	n = 896 n = 672 (6.5 mil printhead)	50 to 896 or 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	n = 832	50 to 832	This command is effective upon execution.

Maximum Label Length, Set

Purpose: Defines the maximum label length.

Syntax: `<SI>Ln`

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

Printers:

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	n = 1000	100 to 4800
EasyCoder F4	n = 1000	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.

Syntax: <SI>e*n*

Printers:

Printer	Default	Values for n
3400e	n = 0	0 = reprints interrupted label 1 = do not reprint interrupted label
4420	n = 0	0 = reprints interrupted label 1 = do not reprint interrupted label
4440	n = 0	0 = reprints interrupted label 1 = do not reprint interrupted label
7421	n = 0	0 = reprints interrupted label 1 = do not reprint interrupted label
EasyCoder F4	n = 0	0 = reprints interrupted label 1 = do 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) stock or thermal transfer (TTR) stock, and ,*m* specifies the sensitivity.

Printers:

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.

Media Sensitivity, Select (continued)

Printer	Default	Values for n	Values for ,m	Notes
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 to 5 ips) 720 - Direct thermal (6 to 8 ips) 567 -Thermal transfer (2 to 8 ips)	You can only set n by using the DIP switches.
4X30	n = 0	0 - Direct thermal 1 - Thermal transfer	N/A	The ,m parameter is not available for the 4630 and 4830 printers.
7421	n = 0	0 - Direct thermal 1 - Thermal transfer	180 - Direct thermal 567 -Thermal transfer	
EasyCoder F4	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.

Syntax: `<ESC><SYN>n`

where *n* is the number of milliseconds to delay the start of a printer transmission.

Printers:

Printer	Default	Values for n	Notes
All except EasyCoder F4	n = 0	0 - 9999	All printers support this command the same way.

Number of Image Bands, Set

Purpose: Selects the number of image bands.

Syntax: `<SI>In`

where *n* is the number of image bands.

Printers:

Printer	Default	Values for n	Notes
3240	n = 3	2 to 5 if the printer has 128K of static RAM. 2 to 7 if the printer has expanded RAM.	This command is effective upon execution.
3400	n = 3	2 to 6 if the printer has 32K of static RAM. 2 to 12 if the printer has expanded RAM	This command is effective upon execution.
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.	This command is effective upon execution.
3440	n = 3	2 to 9 if the printer has 1 MB of DRAM. 2 to 20 if the printer has expanded memory.	This command is effective upon execution.
3600	n = 3	2 to 13 if the printer has 128K of static RAM. 2 to 25 if the printer has expanded RAM.	This command is effective upon execution.

Number of Image Bands, Set (continued)

Printer	Default	Values for n	Notes
4100	n = 3	2 to 6 if the printer has 32K of static RAM. 2 to 12 if the printer has expanded RAM.	This command is effective upon execution.
4400	n = 3	2 to 10 if the printer has 512K of RAM.	This command is effective upon execution.
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.	This command is effective upon execution.
7421	n = 3	2 to 20 if the printer has 512K of DRAM.	This command is effective upon execution.

Online or Offline on Power-Up

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

Syntax: `<SI>On`

where *n* specifies online or offline.

Printers:

Printer	Default	Values for n
4400	n = 0	0 - Printer is online on power up 1 - Printer is offline on power up
4X30	n = 0	0 - Printer is online on power up 1 - Printer is offline on 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) and ,*m* sets the protocol for pin 11 (PS).

Printers:

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	n = 0 m = 0	0 - The pin follows the software protocol 1 - Always ready (high) 2 - Flow control 3 - Ready/Busy	The 7421 uses pins 6 and 9 instead of pins 20 and 11.

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

Printers:

Printer	Default	Values for n	Notes
All	n = <NUL>	Any ASCII character	When n = <NUL>, the printer does not send a postamble character. All printers support this command the same way.

Preamble, Set

Purpose: Sets the preamble character.

Syntax: <SOH>*n*

where *n* specifies the preamble character.

Printers:

Printer	Default	Values for n	Notes
All	n = <NUL>	Any ASCII character	When n = <NUL>, the printer does not send a preamble character. All printers support this command the same way.

Print Speed, Set

Purpose: Sets the print speed.

Syntax: `<SI>Sn`

where *n* specifies the print speed.

Printers:

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		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
EasyCoder F4	n = 50	40, 50, 60, 70, 80

Printer Language, Select

Purpose: Selects the printer language.

Syntax: `<SI>l`*n*

where *n* specifies the language. Possible values for *n* include:

0 - USA

1 - United Kingdom

2 - Germany

3 - Denmark

4 - France

5 - Sweden

6 - Italy

7 - Spain

8 - 8-Bit ASCII

9 - Switzerland

10 - Code Page 850

11 - Code Page 1250, Central Europe

12 - Code Page 1251, Cyrillic, Russian

13 - Code Page 1252, Latin 1, Western Europe

14 - Code Page 1253, Greek

15 - Code Page 1254, Turkish

16 - Code Page 1255, Hebrew

17 - Code Page 1256, Arabic

18 - Code Page 1257, Baltic Rim

19 - Code Page 1258, Vietnamese

20 - Code Page 874, Thai

30 - Code Page 932, Shift JIS, Japanese

31 - Code Page 936, GB 2312-80, Simplified Chinese

32 - Code Page 949, KSC5601, Korean Hangeul

33 - Code Page 950, Big 5, Traditional Chinese

Printer Language, Select (continued)

Printers:

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
44X0	n = 0	0 - 20, 30 - 33
4X30	n = 0	0 - 10
7421	n = 0	0 - 10
EasyCoder F4	n = 0	0 - 20

Notes: You can only select one printer language per print job.

Bitmap user-defined fonts (includes bitmap TrueType) do not use code pages. Therefore, if your label format requires several language fonts, bitmap the TrueType fonts (Chapter 2) or create your own bitmap fonts (Appendix C).

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 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 scaleable TrueType fonts.

If you are using a downloaded scaleable (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.

See Chapter 2 for more information about downloading fonts and code pages. See Appendix B for tables of the various character sets.

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>hn[,m]`

Printers:

Printer	Defaults	Values for n	Values for ,m
3400C 3400D 3400e	n = 0 ,m = 0	0 - Selects normal printing 1 - Selects Mirror Printing mode	0 - Selects normal printing 1 - Selects Inverse Printing mode
3440	n = 0 ,m = 0	0 - Selects normal printing 1 - Selects Mirror Printing mode	0 - Selects normal printing 1 - Selects Inverse Printing mode
44X0	n = 0 ,m = 0	0 - Selects normal printing 1 - Selects Mirror Printing mode	0 - Selects normal printing 1 - Selects Inverse Printing mode
7421	n = 0 ,m = 0	0 - Selects normal printing 1 - Selects Mirror Printing mode	0 - Selects normal printing 1 - Selects Inverse Printing mode
EasyCoder F4	n = 0 ,m = 0	0 - Selects normal printing 1 - Selects Mirror Printing mode	0 - Selects normal printing 1 - Selects 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.

Syntax: <SI>H*n*

Printers:

Printer	Default	Values for n	Notes
4400	n = 0	0 - Low printhead pressure 1 - High printhead pressure	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.

Syntax: <SI>U*n*[,*m*] [,*p*] [,*q*]

where:

n determines whether printing continues if the printhead test sends a warning.

,*m* is the positive threshold of the percentage of the allowable deviation in resistance.

,*p* is the negative threshold of the percentage of the allowable deviation in resistance.

,*q* specifies how often (in terms of the number of labels printed) to automatically run the printhead resistance test.

Printers:

Printer	Defaults	Values for n ,m ,p and ,q	Notes
4400	n = 0 m = 45 p = 45 q = 0	n - 0 Printing continues when warning occurs n - 1 Printing stops when warning occurs ,m A number from 45 to 10 ,p A number from 45 to 10 q A number from 0 to 9999. Setting q = 0 disables the test.	This command is effective upon execution.

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.

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

n and *,m* are the zone start and zone stop distances, in dot increments, from the detected front of the label.

The difference between *m* and *n* 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.

Printers:

Printer	Notes
4100	The ribbon save option must be installed or the printer will ignore this command. 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.

Syntax: `<SI>tn`

Printers:

Printer	Default	Values for n
3240	n = 0	0 - disabled 1 - enabled
3400	n = 0	0 - disabled 1 - enabled
3440	n = 0	0 - disabled 1 - enabled
3600	n = 0	0 - disabled 1 - enabled

Self-Strip, Enable or Disable (continued)

Printer	Default	Values for n	Notes
4100	N/A	N/A	The 4100 printer ignores this command; however, you can enable self-strip by using the DIP switches.
4400	n = 0	0 - disabled 1 - enabled	You must install the self-strip option from the control panel before you can enable or disable the label taken sensor.
44X0	n = 0	0 - disabled 1 - enabled	
4X30	n = 0	0 - disabled 1 - enabled	
7421	n = 0	0 - disabled 1 - enabled	
EasyCoder F4	n = 0	0 - disabled 1 - enabled	

Serial Port Configuration, Set

See Communication Port Configuration, Set.

Takeup Motor Torque, Increase

Purpose: Increases the takeup motor torque from 0 to 50% above the default value.

Syntax: `<SI>b`*n*

Printers:

Printer	Default	Values for n
44X0	n = 0	0 to 50%

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>F*n*

Printers:

Printer	Default	Values for n	Notes
All	n = 20	-10 to 4000 (in 5 mil increments)	The negative values for *n* let you decrease the margin and print closer to the edge of the label.

Program Mode Commands

You can use Program mode commands to design label formats and to download user-defined fonts and graphics.

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" in Chapter 1.

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: c*n*[,*m1*][,*m2*][,*m3*]

Bar Code, Select Type (continued)

Printers:

Printer	Default	Values for n	Notes
3240	n = 0	0 - Code 39 1 - Code 93 2 - Interleaved 2 of 5 3 - Code 2 of 5 4 - Codabar 5 - Code 11 6 - Code 128 7 - UPC/EAN Codes 8 - HIBC Code 39 9 - Code 16K 10 - Code 49 11 - POSTNET 12 - PDF417 13 - Code One 14 - Maxicode 15 - JIS-ITF 16 - HIBC Code 128 17 - Data Matrix 18 - QR Code 19 - MicroPDF417	Modifiers (,m) apply only to bar code symbologies. Values for ,m vary depending on the symbology you select, as discussed on the following pages.
3400A	n = 0	0 - 11	You cannot select 12 to 19.
3400B	n = 0	0 - 17	You cannot select 18 or 19.
3400C 3400D 3400e	n = 0	0 - 19	
3440	n = 0	0 - 19	
3600	n = 0	0 - 17	You cannot select 18 or 19.
4100	n = 0	0 - 11 Standard memory 1 - 14 Expanded memory	Standard: You cannot select 12 -19. Expanded: You cannot select 15 - 19.
4400	n = 0	0 - 11	You cannot select 12 to 19.
44X0	n = 0	0 - 19	
4X30	n = 0	0 - 12, 14, 16, 17	You cannot select 13, 15, 18, or 19.
7421	n = 0	0 - 19	
EasyCoder F4	n = 0	0 - 12, 14 - 19	

The following pages contain detailed descriptions of the different symbologies and the parameters that you can set for each.

Bar Code, Select Type (continued)

Code 39

c0[,m] Selects Code 39. The default for ,*m* is 0.

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 printer)

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.

You can set c0[,*m*] to these values:

`c0,0` Selects 8646 compatible Code 39. No check digit.

`c0,1` Selects 8646 compatible Code 39. Printer enters check digit.

`c0,2` Selects 8646 compatible Code 39. Host enters check digit and printer verifies.

`c0,3` Selects full ASCII Code 39. No check digit.

`c0,4` Selects full ASCII Code 39. Printer enters check digit.

`c0,5` Selects full ASCII Code 39. Host enters check digit and printer verifies.

`c0,6` Selects 43 character Code 39. No check digit.

`c0,7` Selects 43 character Code 39. Printer enters check digit.

`c0,8` Selects 43 character Code 39. Host enters check digit and printer verifies.

Code 93

c1 Selects Code 93.

Interleaved 2 of 5

c2[,m] Selects Interleaved 2 of 5. Default for ,*m* is 0. The printer adds a zero to character strings that are odd in length. You can set c2[,*m*] to these values:

`c2,0` Selects Interleaved 2 of 5. No check digit.

`c2,1` Selects Interleaved 2 of 5. Printer enters check digit.

`c2,2` Selects Interleaved 2 of 5. Host enters check digit.

Bar Code, Select Type (continued)

Code 2 of 5

c3[,m] Selects Code 2 of 5. Default for ,*m* is 0. You can set c3[,*m*] to these values:

`c3,0` Selects Code 2 of 5. 3-bar start/stop code.

`c3,1` Selects Code 2 of 5. 2-bar start/stop code.

Codabar

c4[,m] Selects Codabar. Default for ,*m* is 0.

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.

You can set c4[,*m*] to these values:

`c4,0` Selects Codabar. Host enters start/stop codes and printer verifies.

`c4,1,x,y` Selects Codabar. 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.

Code 11

c5[,m] Selects Code 11. The default for ,*m* is 0. You can set c5[,*m*] to these values:

`c5,0` Selects Code 11. Printer enters 2 check digits.

`c5,1` Selects Code 11. Printer enters 1 check digit.

`c5,2` Selects Code 11. Host enters 2 check digits and printer verifies.

`c5,3` Selects Code 11. Host enters 1 check digit and printer verifies.

Code 128

c6[,m1][,m2] Selects Code 128.

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. The default for ,*m1* = 0. The default for ,*m2* = 0.

Bar Code, Select Type (continued)

You can set c6[,*m1*][,*m2*] to these values:

`c6,0,0`	Selects Code 128, keep parentheses and spaces.
`c6,0,1`	Selects Code 128, ignore parentheses and spaces in the bar code but keep them in the interpretive field.
`c6,1,0`	Selects UCC-128 Serial Shipping Container Code.
`c6,1,1`	Selects UCC-128 Serial Shipping Container Code and keep parentheses and spaces in interpretive field.

UPC/EAN

`c7[,m1][,m2]` Selects UPC/EAN Codes. Default for ,*m1* is 0. Default for ,*m2* is 0.

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	7 data + 1 check character
EAN 13	12 data + 1 check character
UPC version A	11 data + 1 check character
UPC version E	6 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.

You can set c7[,*m1*][,*m2*] to these values:

`c7,0[,m2]`	Selects UPC/EAN Codes. Printer enters check digit. Flag 1 enabled.
`c7,1[,m2]`	Selects UPC/EAN Codes. Printer enters check digit. Flag 1 disabled.
`c7,2[,m2]`	Selects UPC/EAN Codes. Host enters check digit and printer verifies Flag 1 enabled.
`c7,3[,m2]`	Selects UPC/EAN Codes. Host enters check digit and printer verifies. Flag 1 disabled.

Bar Code, Select Type (continued)

Use ,*m2* to select the UPC/EAN codes listed below. Default is 0.

0	variable length
1	EAN 8
2	EAN 13
3	UPC Version A
4	UPC Version E
5	UPC Version D1
6	UPC Version D2
7	UPC Version D3
8	UPC Version D4
9	UPC Version D5

UPC Versions D1 - D5 are not supported in the 3400 C/D, 3400e, 4420, 4440, or EasyCoder F4 printers.

HIBC Code 39

c8[,*m1*][,*m2*] Selects HIBC Code 39. Default for ,*m1* is 0.

You can set c8[,*m1*][,*m2*] to these values to conform to the Supplier Standard:

c8,0	Selects HIBC Code 39. Primary format.
c8,1	Selects HIBC Code 39. Alternate primary format.
c8,2[,*m2*]	Selects HIBC Code 39. Secondary format. The linkage character comes from ,*m2,* which is the field identifier.

You can set c8[,*m1*][,*m2*] to these values to conform to the Provider Standard:

c8,3	Single format.
c8,4	First data format.
c8,5[,*m2*]	Selects HIBC Code 39. Second data format. The linkage character comes from ,*m2*, which is the field identifier.
c8,6	Selects HIBC Code 39. Multiple data format.

Code 16K

c9 Selects 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.

Bar Code, Select Type (continued)

Code 49

c10 Selects 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

c11 Selects 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

c12[[,*m1*][,*m2*][,*m3*]];

Selects PDF417.

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.

This table lists the defaults:

Parameter	Default	Description
,m1	0	The printer selects the number of columns needed to create a symbol that is as close to square as possible.
,m2	9	The printer automatically selects the error correction level based on the amount of data.
,m3	0	Truncating disabled.

Bar Code, Select Type (continued)

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.

Bar Code, Select Type (continued)

This 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.

,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* values of 0 and 1 if your labels do not have enough space for more error correction characters. These values are generally not recommended.

† The printer reserves *,m2* values of 6, 7, and 8 for special applications where the symbol is subject to damage and requires a higher level of error correction.

‡ An *,m2* value of 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.

Character Set	Data Capacity
Full ASCII	1108
Alphanumeric	1850
Numeric	2725

Bar Code, Select Type (continued)

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.

Code One

```
c13[,[,m1][,m2,m3]]
```

Selects Code One. There are 15 versions of Code One. Each version has a different maximum data length.

Code One is a 2D matrix symbology that stores a checkerboard pattern of data directly in a matrix. This feature makes Code One especially useful for applications such as small parts labels, which do not provide sufficient space for linear bar codes. Code One automatically generates error correction symbol characters that it adds to the matrix. In addition to data storage and error correction symbols, each Code One symbol contains a set of horizontal lines in the center, called a finder pattern, that helps the readers quickly locate and identify each symbol. Code One symbols also contain vertical reference bars to help the readers locate the relative positions of each data bit.

Code One symbols accommodate varying amounts of data using a different method than other codes. Other codes adjust their size to fit the data exactly. Code One symbols are divided into versions of specific sizes. Each version can accommodate an amount of data from one bit to the maximum amount that will fit into that version. If more data is present than the version can accommodate, the printer will not print the label.

Code One symbols cannot be read with a laser scanner. They are read by a digital imager that captures the entire symbol at once instead of scanning each component individually. The imager decodes the components of each Code One symbol after it captures the image, permitting faster data collection.

This table lists the defaults:

Parameter	Default	Description
,m1	0	Code One version, variable
,m2	1	First position in the group
,m3	1	Total number of symbols in the group is one symbol

Bar Code, Select Type (continued)

Using ,m1 to Select a Code One Version

,m1 is the version of Code One you are printing. Code One selections with all the *,m1* variables are shown below. The default for *,m1* is 0.

`c13,0[,m2,m3]`	Code One, variable length (Autoselects from Code One version A to Code One version H)
`c13,1[,m2,m3]`	Code One version A
`c13,2[,m2,m3]`	Code One version B
`c13,3[,m2,m3]`	Code One version C
`c13,4[,m2,m3]`	Code One version D
`c13,5[,m2,m3]`	Code One version E
`c13,6[,m2,m3]`	Code One version F
`c13,7[,m2,m3]`	Code One version G
`c13,8[,m2,m3]`	Code One version H
`c13,9[,m2,m3]`	Code One version S10
`c13,10[,m2,m3]`	Code One version S20
`c13,11[,m2,m3]`	Code One version S30
`c13,12[,m2,m3]`	Code One version T16
`c13,13[,m2,m3]`	Code One version T32
`c13,14[,m2,m3]`	Code One version T48

It is important that you select the correct version of Code One for the data you are encoding. If you try to encode data in the wrong version, your symbol may not print.

If your data lengths vary greatly for different labels, or if you are not sure which symbology to select, you can select variable Code One version (*,m1* = 0). This version lets the printer choose the correct version of Code One (from version A to Version H) based on the data length. If you know your data lengths are consistent, or if the printer always chooses the same version, you should manually select the Code One version to save printer memory.

Bar Code, Select Type (continued)

You may notice that part of your Code One symbols do not contain data. This situation occurs because each version of Code One has a fixed size, and the version that is large enough to accommodate all of your data may be larger than you need. This situation does not mean that you should use a version of a smaller size, because if it is too small to accommodate your data, the symbol will not print.

This table shows the data lengths that each Code One version accommodates.

Note: The data lengths in this table approximate the maximum amount of data for each version of Code One. The printer compresses the data before it encodes it, which shortens the length of the amount you send. This condition should not affect printing, but if you select the variable length, the printer may select a Code One version that is smaller than the one listed next to your data length.

,m1 Value	Code One Type	Full ASCII	Alphanumeric	Numeric
0	variable*			
1	A	10	13	22
2	B	19	27	44
3	C	44	64	104
4	D	91	135	217
5	E	182	271	435
6	F	370	553	886
7	G	732	1096	1755
8	H	1480	2218	3550
9	S10	✧	✧	6
10	S20	✧	✧	12
11	S30	✧	✧	18
12	T16	10	13	22
13	T32	24	34	55
14	T48	38	55	90

* The printer selects the correct Code One type based on the data length.

✧ Encodes only numeric data.

Bar Code, Select Type (continued)

Note: For full ASCII and alphanumeric columns, the maximum number of characters is actually less than those listed for each version of Code One. That number varies depending upon the number of character type changes (lowercase to uppercase, numeric to alphanumeric, and so on). The more shifts between these different types, the less data you can encode.

Using ,m2 *and* ,m3 *to Group Symbols*

,m2 and *,m3* define symbols that are part of a group. *,m2* is the position of the current symbol in the group, and *,m3* is the total number of symbols in the group. For example, setting *,m2,m3* to ,2,5 indicates that the current symbol definition is the second in a group of five. Both *,m2* and *,m3* range from 1 to 15, with a default of 1.

Note: If you are using groups of symbols with the ,m2 and ,m3 variables, make sure ,m2 (the position in the group) is never greater than ,m3 (the total number of symbols in the group).

The printer does not check to ensure that you define all positions of a group. For example, if you set *,m3* to 5, and you define only three positions, the printer prints the three. When you scan these symbols, the scanner waits for all five symbols and will not be able to transmit the data.

Defining Height and Width for Code One

Code One modules must be square; therefore, when you define a field for Code One, you only need to enter one value for both the height and width magnification. If you enter more than one value, the printer uses the last value for both height and width and ignores all previously entered magnification values. If you do not enter a value, the printer uses a default value of 3 for both height and width magnification.

Using Groups of Code One Symbols

Use groups of Code One symbols to encode data so that you can scan separate symbols more efficiently. When you scan a group of symbols, the scanner accumulates the data from all members of the group and transmits the data as if it came from a single symbol.

Bar Code, Select Type (continued)

Maxicode

c14[,*m1*] Selects Maxicode.

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.

This table lists the possible values for *,m1*. The default value autodiscriminates between Modes 2, 3, and 4.

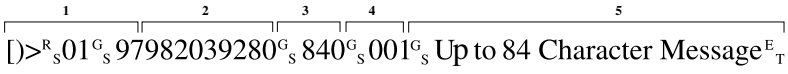
Note: If you have developed previous applications using Mode 0, your printer will still support your application; however, we recommend using Mode 2 or 3 for new applications.

Mode (,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

When you select Maxicode, you must format your data to conform to these five fields.

Note: The header only applies to Structured Carrier Message (Modes 2 and 3). The Structured Carrier Message header is optional.

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



IPL.018

Bar Code, Select Type (continued)

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>
```

Bar Code, Select Type (continued)

JIS-ITF

c15[,*m*] Selects JIS-ITF bar code. Default for ,*m* is 0.

You can set c15[,*m*] to these values:

`c15,0` Selects 5 dot narrow bar width magnification.

`c15,1` Selects 8 dot narrow bar width magnification.

`c15,2` Selects 10 dot narrow bar width magnification.

The next command defines a data source for the current field and how many characters are in the field.

d[*n*][,*m*] Selects the category for the JIS-ITF bar code. The default for *n,m* is 0,14.

You can set d[*n*][,*m*] to these values:

`d0[,m]` 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]` 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]` 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.

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 0.19 inch (4.75 mm) 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.

Bar Code, Select Type (continued)

HIBC Code 128

c16[,*m1*][,*m2*] Selects HIBC Code 128. Default for ,*m1* is 0.

You can set c16[,*m1*][,*m2*] to these values to conform to the Supplier Standard:

c16,0	Selects HIBC Code 128. Primary format.
c16,1	Selects HIBC Code 128. Alternate primary format.
c16,2,*m2*	Selects HIBC Code 128. Secondary format. The linkage character comes from ,*m2*, which is the field identifier.

You can set c16[,*m1*][,*m2*] to these values to conform to the Provider Standard:

c16,3	Single format.
c16,4	First data format.
c16,5,*m2*	Selects HIBC Code 128. Second data format. The linkage character comes from ,*m2*, which is the field identifier.
c16,6	Selects HIBC Code 128. Multiple data format.

Data Matrix Symbology Versions ECC-100 and ECC-200

c17[,*m1*][,*m2*][,*m3*,*m4*[,*m5*,*m6*]]

Selects Data Matrix.

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.

This table lists the defaults:

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

Bar Code, Select Type (continued)

,m1 is a three-digit number that selects the Data Matrix version. Possible values are:

,m1 = 100 ECC-100
,m1 = 200 ECC-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.

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,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* or *,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.

Type of Character	ECC-100	ECC-200
All numeric	88	3116
All alpha	59	2335
All 8-bit	38	1556

Bar Code, Select Type (continued)

QR Code

c18[,*m1*][,*m2*][,m3]

Selects QR Code.

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.

This table lists the defaults:

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

c19[,*m1*][,*m2*] Selects MicroPDF417.

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.

Bar Code, Select Type (continued)

This table lists the defaults:

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

Bar Code Field, Create or Edit

Purpose: Edits or creates a bar code field.

Syntax: `Bn[,name]`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 - 199	The ,name parameter is optional. The field can be up to eight ASCII characters, but 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 parameters for the default field are:

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

The printer generates an error code (38) if the field number is out of range.

Bitmap Cell Height for Graphic or UDF, Define

Purpose: Defines the height of a graphic or user-defined font.

Syntax: `yn`

Printers:

Printer	Default	Values for n	Notes
3240	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 999	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
3400	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 799	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
3400e	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	200 dpi: 1 - 799 400 dpi: 1 - 1599	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
3440	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 1599	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.

Bitmap Cell Height for Graphic or UDF, Define (continued)

Printer	Default	Values for n	Notes
3600	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 599	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
4100	n = 1 bitmap fonts or graphics	1 - 599 With expanded memory: 1 - 799	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
4400	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 599	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
44X0	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	4420: 1 - 799 4440: 1 - 1599	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
4X30	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 599	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.

Bitmap Cell Height for Graphic or UDF, Define (continued)

Printer	Default	Values for n	Notes
7421	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 799	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. The printer generates an error code (52) for an invalid height.
EasyCoder F4	n = 1 bitmap fonts n = 10 outline fonts n = 50 graphics	1 - 799	n is the number of rows for a graphic or font (bitmap). For outline fonts, n represents the height of the base character in number of dots. 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. *n* is the number of columns for the UDC, bitmap, or user-defined font. For outline fonts, *n* represents the width of the base character in number of dots.

Syntax: `xn`

Printers:

Printer	Default	Values for n	Notes
3240	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 999 With expanded memory: 1 - 1999	The printer generates an error code (52) for an invalid width.
3400	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 799	The printer generates an error code (52) for an invalid width.

Bitmap Cell Width for Graphic or UDF, Define (continued)

Printer	Default	Values for n	Notes
3400e	n = 1 bitmap fonts or graphics n = 10 outline fonts	200 dpi: 1 - 799 400 dpi: 1 - 1599	The printer generates an error code (52) for an invalid width.
3440	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 1599	The printer generates an error code (52) for an invalid width.
3600	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 599	The printer generates an error code (52) for an invalid width.
4100	n = 1 bitmap fonts or graphics	1 - 599 With expanded memory: 1 - 799	The printer generates an error code (52) for an invalid width.
4400	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 599	The printer generates an error code (52) for an invalid width.
44X0	n = 1 bitmap fonts or graphics n = 10 outline fonts	4420: 1 - 799 4440: 1 - 1599	The printer generates an error code (52) for an invalid width.
4X30	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 599	The printer generates an error code (52) for an invalid width.
7421	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 799	The printer generates an error code (52) for an invalid width.
EasyCoder F4	n = 1 bitmap fonts or graphics n = 10 outline fonts	1 - 799	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. The font ID number is *n*.

Syntax: `Tn[,name]`

Printers:

Printer	Default	Values for n	Notes
All	N/A	3 to 6 and 8 to 19	The ,name parameter is an optional field. The field can be up to eight ASCII characters.

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: `bn`

Printers:

Printer	Default	Values for n	Notes
3240	n = 0 no borders (black letters)	0 - 199	When n is greater than 0, field prints white letters with n dot size border around the field.
3400A 3400B	n = 0 no borders (black letters)	0 - 199	When n is greater than 0, field prints white letters with n dot size border around the field.
3400C 3400D	n = 0 no borders (black letters)	0 - 999	When n is greater than 0, field prints white letters with n dot size border around the field.
3400e	n = 0 no borders (black letters)	0 - 999	When n is greater than 0, field prints white letters with n dot size border around the field.
3440	n = 0 no borders (black letters)	0 - 999	When n is greater than 0, field prints white letters with n dot size border around the field.
3600	n = 0 no borders (black letters)	0 - 199	When n is greater than 0, field prints white letters with n dot size border around the field.

Border Around Human-Readable Text, Define (continued)

Printer	Default	Values for n	Notes
4100	n = 0 no borders (black letters)	0 - 199	When n is greater than 0, field prints white letters with n dot size border around the field.
4400	n = 0 no borders (black letters)	0 - 199	When n is greater than 0, field prints white letters with n dot size border around the field.
44X0	n = 0 no borders (black letters)	0 - 999	When n is greater than 0, field prints white letters with n dot size border around the field.
4X30	n = 0 no borders (black letters)	0 - 199	When n is greater than 0, field prints white letters with n dot size border around the field.
7421	n = 0 no borders (black letters)	0 -999	When n is greater than 0, field prints white letters with n dot size border around the field.
EasyCoder F4	n = 0 no borders (black letters)	0 - 999	When n is greater than 0, field prints white letters with n dot size border around the field.

Box Field, Create or Edit

Purpose: Accesses or creates a box field.

Syntax: `Wn[,name]`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 - 199	The ,name parameter is optional. The field can be up to eight ASCII characters, but cannot start with a numeric character.

Box Field, Create or Edit (continued)

Notes: Parameters for the default field:

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 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`

Printers:

Printer	Default	Values for n	Notes
3240	n = 0	0 - 599	Use this command only with bitmap fonts.
3400A 3400B	n = 0	0 - 599	Use this command only with bitmap fonts.
3400C 3400D 3400e	n = 0	0 - 800	Use this command only with bitmap fonts.
3440	n = 0	0 - 800	Use this command only with bitmap fonts.
3600	n = 0	0 - 599	Use this command only with bitmap fonts.
4100	n = 0	0 - 599	Use this command only with bitmap fonts.
4400	n = 0	0 - 599	Use this command only with bitmap fonts.
44X0	n = 0	0 - 800	Use this command only with bitmap fonts.
4X30	n = 0	0 - 599	Use this command only with bitmap fonts.
7421	n = 0	0 - 800	Use this command only with bitmap fonts.
EasyCoder F4	n = 0	0 - 800	Use this command only with bitmap fonts.

Character Rotation or Bar Code Ratio, Define

Purpose: Defines the character rotation for human-readable fields, or the bar code ratio for a bar code field.

Syntax: `rn`

Printers:

Printer	Default	Values for n	Notes
3240	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1	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 3 dots, therefore select a width of w = 1 to have the shortest symbol.
3400A 3400B	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1	
3400C 3400D 3400e	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1 n = 3 2.3 to 1	n = 3 applies to Code 39 for a ratio of 7 dots to 3 dots.

Character Rotation or Bar Code Ratio, Define (continued)

Printer	Default	Values for n	Notes
3440	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: 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 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1	
4100	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1	
4400	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1	

Character Rotation or Bar Code Ratio, Define (continued)

Printer	Default	Values for n	Notes
44X0	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: 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 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1	
7421	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 n = 2 2.0 to 1 n = 3 2.3 to 1	
EasyCoder F4	n = 0 character rotation n = 1 bar code ratio	Human-readable fields: n = 0 horizontal n = 1 90° counterclockwise Bar code fields, ratios of wide element to narrow element: n = 0 2.5 to 1 n = 1 3.0 to 1 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. The prefix is only valid for Code 39 fields.

Syntax: `p[n1][n2][n3][n4];`

Printers:

Printer	Default	Values for n	Notes
All	No prefix	A to Z (uppercase only) and 0 to 9	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.

Syntax: `C[t], [command 1], [command 2], ..., [command n]`

t is the command table identifier.

Printers:

Printer	Default	Values for t	Notes
All except the EasyCoder F4 and 7421	N/A	0 - Print mode commands 1 - Escape print commands 2 - Shift print commands 3 - Status response 4 - Protocol characters	Data must be nibblized ASCII characters ranging from 0 to 9 and A to F.

Notes: New commands become effective after you repower or reset the printer. 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.

Syntax: `en[,m1][,m2]`

Printers:

Printer	Default	Values for n	Notes
All	n = 0 m1 = a m2 = 0	0 - format receives its data during Print mode 1 - format is a slave of another format within this page.	The format ID must be the same for both the master and slave formats.
4X30	Same as all other printers	Same as all other printers	This command was called Format Page Position, Define Data Source.

m1 is the position of the master format within the page.

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>.

Field, Delete

Purpose: Deletes field *n* from the format.

Syntax: `Dn`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 -199.	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]`

Printers:

Printer	Default	Values for n	Values for m1 (d0 or d1)
3240	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550
3400	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550
3440	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550 (incl. 2D fields)
3600	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550

Field Data, Define Source (continued)

Printer	Default	Values for n	Values for m1 (d0 or d1)
4100	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 250
4400	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 250
44X0	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550
4X30	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550
7421	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550
EasyCoder F4	0,20,0 Bar code fields 0,30,0 Human-readable fields	0 - Data entered in Print mode 1 - Data entered in Print mode 2 - Data comes from field ,m1 3 - Fixed data	0 - 3550

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, and 30 characters for human-readable fields.

Field Data, Define Source (continued)

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.

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.

Field Direction, Define

Purpose: Defines the field rotation.

Syntax: `fn`

Printers:

Printer	Default	Values for n
All	n = 0	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: `on,m`

Printers:

Printer	Default	Values for n and m
All	n = 0 ,m = 0	n = 0 to 19999 ,m = 0 to 19999

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.

Syntax: `Zn`

Printers:

Printer	Default	Values for n	Notes
3240	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 999 With expanded memory: 1 - 1999	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
3400	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 799	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
3400e 200 dpi	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 799	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
3400e 400 dpi	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 1599	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
3440	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 1599	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
3600	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 599	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
4100	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 599 With expanded memory: 1 - 799	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.

Font Character Width, Define (continued)

Printer	Default	Values for n	Notes
4400	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 599	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
4420	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 799	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
4440	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 1599	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
4X30	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 599	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
7421	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 799	For bitmap characters only. The printer ignores the intercharacter space command (z*n*) if you use it with this command.
EasyCoder F4	Character's bitmap width, minus the font character offset (X*n*) plus the intercharacter space (z*n*)	1 - 799	For bitmap characters only. The printer ignores 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]`

where:

n is the font ID number.

,*m* is the intercharacter gap (the space between characters). If you do not specify ,*m*, the printer uses the default value of the selected font.

Printers:

Printer	Default	Values for n	Values for m
3240	n = 0	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option	-199 to 199
3400A	n = 0	0 to 24	-199 to 199
3400B 3400C 3400D	n = 0	0 to 25, 30 to 41, 50 to 56 with the Kanji option	-199 to 199
3400e	n = 0	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option	-199 to 199
3440	n = 0	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option	-199 to 199
3600	n = 0	0 to 25, 30 to 41 50 to 56 with the Kanji option	-199 to 199
4100	n = 0	0 to 24	-199 to 199
4400	n = 0	0 to 25	-199 to 199
44X0	n = 0	0 to 26, 28, 30 to 41 50 to 56 with the Kanji option	-199 to 199
4X30	n = 0	0 to 26, 28, 30 to 41	-199 to 199
7421	n = 0	0 to 26, 28, 30 to 41	-199 to 199
EasyCoder F4	n = 0	0 to 26, 28, 30 to 41	-199 to 199

Notes: You can set *n* to a number from 0 to 56 for human-readable fields, depending on the fonts your printer supports. Refer to the table on the following page for the values for *n* and the font name associated with it.

Font Type, Select (continued)

n	Font Name
0	7 x 9 Standard (86XX font)
1	7 x 11 OCR (86XX font)
2	10 x 14 Standard (86XX font)
3 - 6	User-defined fonts
7	5 x 7 Standard (86XX font)
8 - 19	User-defined fonts
20	8 point monospace
21	12 point monospace
22	20 point monospace
23	OCR A
24	OCR B size 2
25	Swiss Mono 721 standard outline font
26	Swiss Mono 721 bold outline font
28	Dutch Roman 801 proportional outline font
30	6 point monospace bold
31	8 point monospace bold
32	10 point monospace standard
33	10 point monospace bold
34	12 point monospace bold
35	16 point monospace standard
36	16 point monospace bold
37	20 point monospace bold
38	24 point monospace standard
39	24 point monospace bold
40	30 point monospace bold
41	36 point monospace bold
50	Kanji outline font
51	Kanji monospace outline font
52	Katakana 12 x 16 bitmap
53	Katakana 16 x 24 bitmap
54	Katakana 24 x 36 bitmap
55	Kanji 16 x 16 bitmap
56	Kanji 24 x 24 bitmap

For more information about fonts, see the “Printer Language, Select” command in this chapter. For more information about designing and using fonts, see Chapter 2 and Appendix C.

Format, Create or Edit

Purpose: Edits or creates a format.

Syntax: `An[,name]` or `Fn[,name]`

Printers:

Printer	Default	Values for n	Notes
3240	N/A	1 - 99	n is the format ID number. The ,name parameter is an optional field. The field can be up to eight ASCII characters, but cannot start with a numeric character.
3400A 3400B	N/A	1 - 19	n is the format ID number. The ,name parameter is an optional field. The field can be up to eight ASCII characters, but cannot start with a numeric character.
3400C 3400D	N/A	*, 1 - 19	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
3400e	N/A	*, 1 - 99	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
3440	N/A	*, 1 - 99	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
3600	N/A	1 - 19	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
4100	N/A	1 - 19	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
4400	N/A	1 - 19	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
44X0	N/A	*, 1 - 99	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.

Format, Create or Edit (continued)

Printer	Default	Values for n	Notes
4X30	N/A	1 - 19	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
7421	N/A	*, 1 - 99	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.
EasyCoder F4	N/A	*, 1 - 99	If you use an asterisk (*) for the label format, the printer does not store the label format in permanent memory. When you turn the printer off, the printer loses the label format.

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`*

Printers:

Printer	Default	Values for n
All	n = 0	0 - Horizontal 1 - Rotated 90° counterclockwise from horizontal 2 - Rotated 180° counterclockwise from horizontal 3 - Rotated 270° counterclockwise from horizontal

Format, Erase

Purpose: Erases format ID number *n*.

Syntax: `En`

Printers:

Printer	Default	Values for n	Notes
3240	N/A	1 - 99	You cannot erase format 0.
3400	N/A	1 - 19	You cannot erase format 0.
3400e	N/A	1 - 99	You cannot erase format 0.
3440	N/A	1 - 99	You cannot erase format 0.
3600	N/A	1 - 19	You cannot erase format 0.
4100	N/A	1 - 19	You cannot erase format 0.
4400	N/A	1 - 19	You cannot erase format 0.
44X0	N/A	1 - 99	You cannot erase format 0.
4X30	N/A	1 - 19	You cannot erase format 0.
7421	N/A	1 - 99	You cannot erase format 0.
EasyCoder F4	N/A	1 - 99	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: `On,m`

Printers:

Printer	Default	Values for n	Values for ,m
All	n = 0 ,m = 0	0 - 19999	0 - 19999

Format Page Position, Define Data Source

See Data Source for Format in a Page, Define.

Format Position From Page, Delete

Purpose: Deletes the format position *p* from a page. *p* is the page position.

Syntax: `mp`

Printers:

Printer	Default	Values for p
All	p = a	a to z

Format Position in a Page, Assign

Purpose: Assigns the format *n* to page position *p*. *n* is the numeric format ID, and *p* is the page position.

Syntax: `Mp,n`

Printers:

Printer	Default	Values for p	Values for ,n
3240	p = a	a to z	0 - 19
3400	p = a	a to z	0 - 19
3400e	p = a	a to z	0 - 99
3440	p = a	a to z	0 - 99
3600	p = a	a to z	0 - 19
4100	p = a	a to z	0 - 19
4400	p = a	a to z	0 - 19
44X0	p = a	a to z	0 - 99
43X0	p = a	a to z	0 - 19
7421	p = a	a to z	0 - 99
EasyCoder F4	p = a	a to z	0 - 99

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: c*n*

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 - 99	This 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`

Printers:

Printer	Default	Values for n	Notes
3240	N/A	1 - 999 With expanded memory: 1 - 1999	
3400	N/A	1 - 799	
3400e	N/A	200 dpi: 1 - 799 400 dpi: 1 - 1599	
3440	N/A	1 - 1599	
3600	N/A	1 - 599	
4100	N/A	1 - 599 With expanded memory: 1 - 799	
4400	N/A	1 - 599	
44X0	N/A	4420: 1 - 799 4440: 1 - 1599	
4X30	N/A	1 - 599	These printers do not support Emulation mode.
7421	N/A	1 - 799	
EasyCoder F4	N/A	1 - 799	

In Emulation mode, *m...m* 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 *m* = 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: `hn`

Printers:

Printer	Default	Values for n *Human-readable fields and graphics*	Values for n *Bar codes and box fields*
3240	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 250 (graphics) 1 - 400 (human readable fields)	1 - 1999 (bar codes) 1 - 9999 (box fields)
3400A 3400B	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 250 (graphics) 1 - 400 (human readable fields)	1 - 1999 (bar codes) 1 - 9999 (box fields)
3400C 3400D	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 999	1 - 9999
3400e	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 999	1 - 9999

Height Magnification of Bar, Box, or UDC, Define (continued)

Printer	Default	Values for n *Human-readable fields and graphics*	Values for n *Bar codes and box fields*
3440	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 999	1 - 9999
3600	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 250 (graphics) 1 - 400 (human readable fields)	1 - 1999 (bar codes) 1 - 9999 (box fields)
4100	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 250	1 - 9999
4400	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 250	1 - 9999
44X0	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 999	1 - 9999

Height Magnification of Bar, Box, or UDC, Define (continued)

Printer	Default	Values for n *Human-readable fields and graphics*	Values for n *Bar codes and box fields*
4X30	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 250	1 - 9999
7421	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 999	1 - 9999
EasyCoder F4	n = 50 Bar code height n = 100 Box height n = 2 POSTNET and human-readable fields n = 1 Graphics	1 - 999	1 - 9999

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 printers, a dot is 3.3 mil.

Human-Readable Field, Create or Edit

Purpose: Edits or creates a human-readable field.

Syntax: `Hn[,name]`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 - 199	The ,name parameter is an optional field. You can use eight ASCII characters (not counting the semicolon) and cannot start with a number.

Notes: If *n* does not exist, the printer creates a default human-readable field. The parameters for the default field are:

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		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`

Printers:

Printer	Default	Values for n	Notes
3240	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
3400	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
3440	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
3600	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
4100	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
4400	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
44X0	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
4X30	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
7421	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).
EasyCoder F4	n = 2	0 - 199	The printer ignores this command if you use it with the font character width command (Z*n*).

Notes: 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`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 - 199	n is the field ID number of the bar code field to be interpreted.

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.

You must count each interpretive field as an individual field. Although interpretive fields are identified with a bar code field, IPL assigns a number to each interpretive field. The interpretive field numbers start at 199 and get smaller. For example, if you create two bar code fields with the interpretive fields enabled, you would create interpretive fields 199 and 198.

Interpretive Field, Enable or Disable

Purpose: Determines if the interpretive field of the current bar code field prints.

Syntax: `in`

Printers:

Printer	Default	Values for n
All	n = 0	0 = Disable 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 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. You define the length of a line or box field in the number of dots.

Syntax: `ln`

Printers:

Printer	Default	Values for n
All	n = 100	1 to 9999

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]`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 to 199	The ,name parameter is an optional field. The field can be up to eight ASCII characters.

Notes: Parameters for the default field:

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.

Syntax: `Jn[,name][,type][,size]`

where:

n is the font or graphic ID.

,name is an optional 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.

,size defines the size of a TrueType font and is only needed for double-byte fonts that exceed 512K bytes.

Printers:

Printer	Values for n	Values for ,type	Notes
3240	3 to 6 and 8 to 19	0 = Speedo font	
3400A 3400B	3 to 6 and 8 to 19	0 = Speedo font	
3400C	3 to 6 and 8 to 19	0 = Speedo font (default) 2 = Double-byte bitmap font	
3400e	3 to 6 and 8 to 19	0 = Speedo font (default) 1 = TrueType font 2 = Double-byte bitmap font	
3440	3 to 6 and 8 to 19	0 = Speedo font (default) 1 = TrueType font 2 = Double-byte bitmap font	
3600	3 to 6 and 8 to 19	0 = Speedo font	
4100	N/A	N/A	This command is only available on the 4100 with the addition of expanded RAM.
4400	3 to 6 and 8 to 19	0 = Speedo font	
44X0	3 to 6 and 8 to 19	0 = Speedo font (default) 1 = TrueType font 2 = Double-byte bitmap font	

Outline Font, Clear or Create (continued)

Printer	Values for n	Values for ,type	Notes
4X30	3 to 6 and 8 to 19	0 = Speedo font (default)	
7421	3 to 6 and 8 to 19	0 = Speedo font (default) 2 = Double-byte bitmap font	
EasyCoder F4	3 to 6 and 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.

Printers:

Printer	Default	Values for n	Notes
All	N/A	1 to 9	You cannot edit the default page (page 0).

Notes: 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.

Printers:

Printer	Default	Values for n	Notes
All	N/A	1 to 9	You cannot edit the default page (page 0).

Pitch Size, Set

Purpose: Sets the pitch size that defines the size of the characters in human-readable fields. 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.

Syntax: `gn`

Printers:

Printer	Default	Values for n	Notes
All except the EasyCoder F4	n = 12	1 to 50	You can use this command for both bitmap and outline fonts. Pitch is characters per line. The higher the pitch, the smaller the characters.

Notes: Use the pitch size command to scale outline fonts smoothly.

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`

Printers:

Printer	Default	Values for n	Notes
3240	n = 12	4 - 180	This command works most effectively on fonts c25, c26, and c27.
3400	n = 12	4 - 288	This command works most effectively on outline fonts.
3400e	n = 12	200 dpi: 3 - 288 400 dpi: 3 - 255	This command works most effectively on outline fonts.
3440	n = 12	3 - 255	This command works most effectively on fonts c25, c26, and c27.
3600	n = 12	4 - 288	This command works most effectively on font c25.
4100	n = 12	4 - 212	This command works most effectively on fonts c20, c21, and c22.
4400	n = 12	4 - 212	This command works most effectively on fonts c20, c21, c22, and c25.
44X0	n = 12	4420: 3 - 288 4440: 3 - 255	This command works most effectively on outline fonts.
4X30	n = 12	4 - 212	This command works most effectively on fonts c20, c21, c22, and c25.
7421	n = 12	3 - 288	This command works most effectively on outline fonts.
EasyCoder F4	n = 12	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: `vn`

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`

User-Defined Character, Clear or Create

Purpose: Clears or creates a graphic bitmap.

Syntax: `Gn[,name]`

Printers:

Printer	Default	Values for n	Notes
All	N/A	0 to 99	The ,name parameter is an optional field. The field can be up to eight ASCII characters (not counting the semicolon) and 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: `Un[,name]`

Printers:

Printer	Default	Values for n	Notes
All	n = 0	0 to 199	The ,name parameter is an optional field. The field can be up to eight ASCII characters (not counting the semicolon) and cannot start with a number.

Notes: Parameters for the default field are:

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: `tn`

Printers:

Printer	Default	Values for n	Notes
3240	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
3400	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
3440	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
3600	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
4100	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
4400	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
44X0	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
4X30	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
7421	N/A	0 - 255	n is the decimal representation of the ASCII character. The printer erases existing characters.
EasyCoder F4	N/A	0 - 255	n is the decimal representation of the ASCII character. 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: `wn`

Printers:

Printer	Default	Values for n *Line and box fields*	Values for n *Bar code fields*	Values for n *Human-readable (HR) fields, graphics, and POSTNET*
3240	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 250 (HR fields) 1 - 400 (graphics)
3400A 3400B	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 250 (HR fields) 1 - 400 (graphics)
3400C 3400D	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 999
3400e	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 999
3440	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 999
3600	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 250 (HR fields) 1 - 400 (graphics)

Width of Line, Box, Bar, or Character, Define (continued)

Printer	Default	Values for n *Line and box fields*	Values for n *Bar code fields*	Values for n *Human-readable (HR) fields, graphics, and POSTNET*
4100	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 9999	1 - 250
4400	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 9999	1 - 250
44X0	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 999
4X30	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 9999	1 - 250
7421	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	1 - 999
EasyCoder F4	n = 1 Line, box, bar code fields and graphics n = 2 Human-readable fields and POSTNET	1 - 9999	1 - 99	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 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 "Sending IPL Commands to the Printer" in Chapter 1.

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.

Syntax: `U`

Printer: 4400

Ambient Temperature, Transmit

Purpose: Transmits the ambient temperature sensor A/D output back to the host. The value ranges from 00 to 255.

Syntax: `A`

Printer: 4400

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.

Syntax: `K`

Printers: 3440

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 printer, a value of 1 indicates the paper path is open, and a value of 0 indicates it is closed.

Syntax: `L`

Printers:

Printer	Notes
3400A 3400B	This printer ignores this command.
3600	This printer ignores this command.

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, a value of 1 indicates the label is removed, and a value of 0 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: Causes the printer to print the pitch label.

Syntax: `C`

Print Quality Label, Print

Purpose: Causes the printer to print out the print quality program and model number label.

Syntax: `Q`

Printhead Resistance Test, Begin

Purpose: Causes the printer to begin the printhead resistance test. The printer will respond with the ASCII character string “pass” or “fail.”

Syntax: `B`

Printhead Resistance Values, Transmit

Purpose: Transmits the average, maximum, and minimum printhead dot resistance value back to the host. Each value is a numeric data string separated by a comma.

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.

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 will not respond if the paper is moving. Values for the EasyCoder F4 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 will not respond if the paper is moving. Values for the EasyCoder F4 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 and describes each ASCII control character.

Full ASCII Table

This table lists the ASCII characters and their binary, hexadecimal, and Code 39 equivalents.

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	00100000	20	32	SP	SP[3]
00000001	01	01	$A	SOH	00100001	21	33	/A	!
00000010	02	02	$B	STX	00100010	22	34	/B	"
00000011	03	03	$C	ETX	00100011	23	35	/C	#
00000100	04	04	$D	EOT	00100100	24	36	/D	$
00000101	05	05	$E	ENQ	00100101	25	37	/E	%
00000110	06	06	$F	ACK	00100110	26	38	/F	&
00000111	07	07	$G	BEL	00100111	27	39	/G	'
00001000	08	08	$H	BS	00101000	28	40	/H	(
00001001	09	09	$I	HT	00101001	29	41	/I	)
00001010	0A	10	$J	LF	00101010	2A	42	/J	*
00001011	0B	11	$K	VT	00101011	2B	43	/K	+
00001100	0C	12	$L	FF	00101100	2C	44	/L	,
00001101	0D	13	$M	CR	00101101	2D	45	/M	-
00001110	0E	14	$N	SO	00101110	2E	46	/N	.
00001111	0F	15	$O	SI	00101111	2F	47	/O	/
00010000	10	16	$P	DLE	00110000	30	48	/P[4]	0
00010001	11	17	$Q	DC1	00110001	31	49	/Q	1
00010010	12	18	$R	DC2	00110010	32	50	/R	2
00010011	13	19	$S	DC3	00110011	33	51	/S	3
00010100	14	20	$T	DC4	00110100	34	52	/T	4
00010101	15	21	$U	NAK	00110101	35	53	/U	5
00010110	16	22	$V	SYN	00110110	36	54	/V	6
00010111	17	23	$W	ETB	00110111	37	55	/W	7
00011000	18	24	$X	CAN	00111000	38	56	/X	8
00011001	19	25	$Y	EM	00111001	39	57	/Y	9
00011010	1A	26	$Z	SUB	00111010	3A	58	/Z	:
00011011	1B	27	%A	ESC	00111011	3B	59	%F	;
00011100	1C	28	%B	FS	00111100	3C	60	%G	<
00011101	1D	29	%C	GS	00111101	3D	61	%H	=
00011110	1E	30	%D	RS	00111110	3E	62	%I	>
00011111	1F	31	%E	US	00111111	3F	63	%J	?

Full ASCII Table (continued)

Binary[0]	Hex[1]	Decimal	Code 39	ASCII[2]
01000000	40	64	%V	@
01000001	41	65	A	A
01000010	42	66	B	B
01000011	43	67	C	C
01000100	44	68	D	D
01000101	45	69	E	E
01000110	46	70	F	F
01000111	47	71	G	G
01001000	48	72	H	H
01001001	49	73	I	I
01001010	4A	74	J	J
01001011	4B	75	K	K
01001100	4C	76	L	L
01001101	4D	77	M	M
01001110	4E	78	N	N
01001111	4F	79	O	O
01010000	50	80	P	P
01010001	51	81	Q	Q
01010010	52	82	R	R
01010011	53	83	S	S
01010100	54	84	T	T
01010101	55	85	U	U
01010110	56	86	V	V
01010111	57	87	W	W
01011000	58	88	X	X
01011001	59	89	Y	Y
01011010	5A	90	Z	Z
01011011	5B	91	%K	[
01011100	5C	92	%L	\
01011101	5D	93	%M	]
01011110	5E	94	%N	^
01011111	5F	95	%O	_
01100000	60	96	%W	`
01100001	61	97	+A	a
01100010	62	98	+B	b
01100011	63	99	+C	c
01100100	64	100	+D	d
01100101	65	101	+E	e
01100110	66	102	+F	f
01100111	67	103	+G	g
01101000	68	104	+H	h
01101001	69	105	+I	i
01101010	6A	106	+J	j
01101011	6B	107	+K	k
01101100	6C	108	+L	l
01101101	6D	109	+M	m
01101110	6E	110	+N	n
01101111	6F	111	+O	o
01110000	70	112	+P	p
01110001	71	113	+Q	q
01110010	72	114	+R	r
01110011	73	115	+S	s
01110100	74	116	+T	t
01110101	75	117	+U	u
01110110	76	118	+V	v
01110111	77	119	+W	w
01111000	78	120	+X	x
01111001	79	121	+Y	y
01111010	7A	122	+Z	z
01111011	7B	123	%P	{
01111100	7C	124	%Q	|
01111101	7D	125	%R	}
01111110	7E	126	%S	~
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

This table describes the ASCII control characters.

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	5E	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	Pt	$	@	¡	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	¦	#	$	@	¢	\	!	¬	`	{	¦	}	~
U.K. ASCII	¦	#	£	@	$	\	!	¬	`	{	¦	}	¯
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	Pt	@	[	\	]	¬	`	{	ñ	}	¨
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 in Chapter 7.

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	X 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
ð D0	Ð D1	Ê D2	Ë D3	È D4	ı 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	p 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

IPL.019

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 ØØ	SH Ø1	SX Ø2	EX Ø3	ET Ø4	EQ Ø5	AK Ø6	BL Ø7	BS Ø8	HT Ø9	LF ØA	VT ØB	FF ØC	CR ØD	SO ØE	SI ØF
DL 1Ø	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
2Ø	! 21	" 22	# 23	$ 24	% 25	& 26	' 27	(28	) 29	* 2A	+ 2B	, 2C	- 2D	. 2E	/ 2F
Ø 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	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 5Ø	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
` 6Ø	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 7Ø	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
Ŗ 8Ø	ȧ 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
CØ	C1	C2	C3	Ä C4	Å C5	Æ C6	C7	C8	É C9	CA	CB	CC	CD	CE	CF
DØ	Ñ D1	D2	D3	D4	D5	Ö D6	D7	Ø D8	D9	DA	DB	Ü DC	DD	DE	ß DF
à EØ	E1	E2	E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	EA	ë EB	ì EC	ED	EE	EF
FØ	ñ F1	ò F2	F3	F4	F5	ö F6	F7	ø F8	ù F9	FA	FB	ü FC	FD	FE	FF

IPL020.eps

Characters in Fonts ***c20 8 point***
c21 12 point
c22 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 3Ø	1 31	2 32	3 33	4 34	5 35	6 36	7 37	8 38	9 39	: 3A	; 3B	< 3C	= 3D	> 3E	? 3F
@ 4Ø	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 5Ø	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
` 6Ø	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 7Ø	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
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	Û A4	¥ A5	| A6	§ A7	¨ A8	© A9	a AA	« AB	¬ AC	- AD	® AE	¯ AF
BØ	± B1	2 B2	3 B3	´ B4	µ B5	¶ B6	· B7	¸ B8	1 B9	0 BA	» BB	1/4 BC	1/2 BD	3/4 BE	¿ BF
À CØ	Á C1	Â C2	Ã C3	Ä C4	Å C5	Æ C6	Ç C7	È C8	É C9	Ê CA	Ë CB	Ì CC	Í CD	Î CE	Ï CF
Ð DØ	Ñ D1	Ò D2	Ó D3	Ô D4	Õ D5	Ö D6	× D7	Ø D8	Ù D8	Ú DA	Û DB	Ü DC	Ý DD	Þ DE	ß DF
à EØ	á E1	â E2	ã E3	ä E4	å E5	æ E6	ç E7	è E8	é E9	ê EA	ë EB	ì EC	í ED	î EE	ï EF
ð FØ	ñ F1	ò F2	ó F3	ô F4	õ F5	ö F6	÷ F7	ø F8	ù F9	ú FA	û FB	ü FC	ý FD	þ FE	ÿ FF

IPL022.eps

Characters in Font c23 OCR A

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
3Ø	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
4Ø	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
5Ø	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
6Ø	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
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
CØ	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
DØ	D1	D2	D3	D4	D5	D6	D7	D8	D8	DA	DB	DC	DD	DE	DF
EØ	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
FØ	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

IPL024.eps

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
3Ø	0 31	1 32	2 33	3 34	4 35	5 36	6 37	7 38	8 39	9 3A	: 3B	; 3C	< 3D	= 3E	> 3F
4Ø	@ 41	A 42	B 43	C 44	D 45	E 46	F 47	G 48	H 49	I 4A	J 4B	K 4C	L 4D	M 4E	N 4F
5Ø	O 51	P 52	Q 53	R 54	S 55	T 56	U 57	V 58	W 59	X 5A	Y 5B	Z 5C	[5D	\ 5E	] 5F
6Ø	^ 61	_ 62	` 63	a 64	b 65	c 66	d 67	e 68	f 69	g 6A	h 6B	i 6C	j 6D	k 6E	l 6F
7Ø	m 71	n 72	o 73	p 74	q 75	r 76	s 77	t 78	u 79	v 7A	w 7B	x 7C	y 7D	z 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
CØ	C1	C2	C3	Ä C4	Å C5	Æ C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
DØ	Ñ D1	D2	D3	D4	D5	Ö D6	D7	Ø D8	D8	DA	DB	Ü DC	DD	DE	ß DF
EØ	E1	E2	E3	ä E4	å E5	æ E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
FØ	ñ F1	F2	F3	F4	F5	ö F6	F7	ø F8	F9	FA	FB	ü FC	FD	FE	FF

IPL025.eps

C

Creating User-Defined Bitmap Fonts and Graphics

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 help using the U*n*[,*name*] (User-Defined Character Field, Create or Edit) command, see Chapter 7, "IPL Command Reference."

Creating One Bit Per Byte User-Defined Graphics

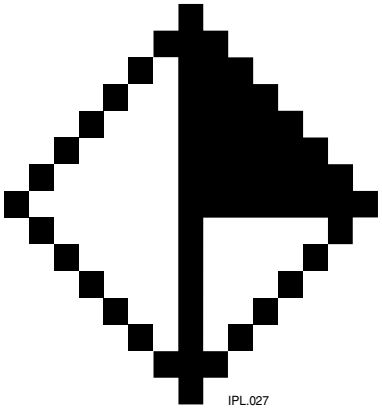
One bit per byte is the standard graphic format used for downloading to an Intermec 8636/8646 printer. You can download a one bit per byte graphic to the printer when it is in 86XX Emulation mode. A one bit per byte bitmap image is an arrangement of ones and zeros that looks similar to the following example.

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.

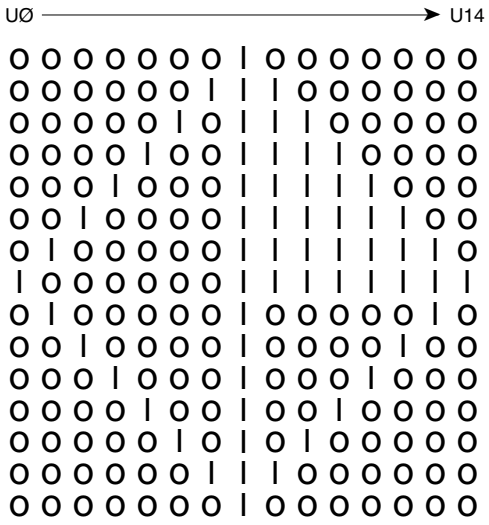
To create your own graphic

1. Draw your design on a piece of graph paper:



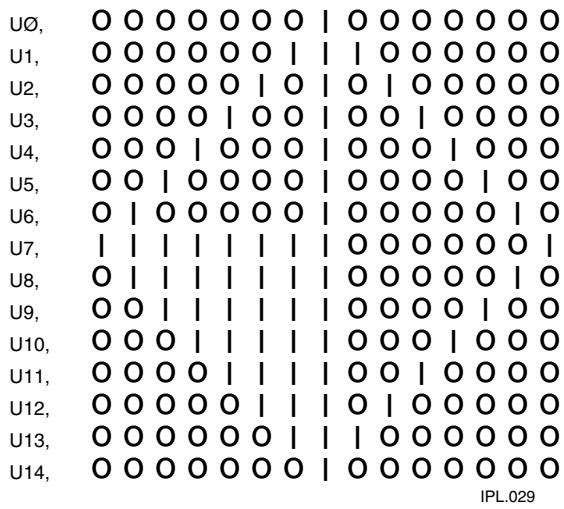
IPL.027

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.



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:



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.

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" later in this appendix 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.

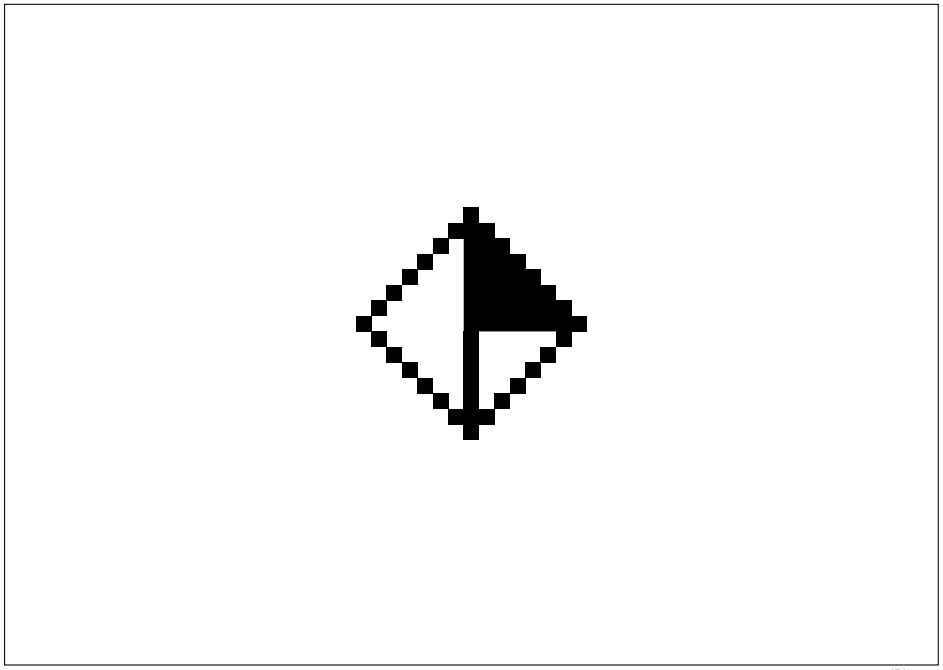
7. Make sure the printer is in Advanced mode and not in 86XX Emulation mode. For help, see the 86XX or Advanced Mode on Power-up command in Chapter 7, "IPL Command Reference."
8. Download the graphic so that each column is represented by a command string.

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.

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 prints:

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

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" earlier in this appendix for more information.

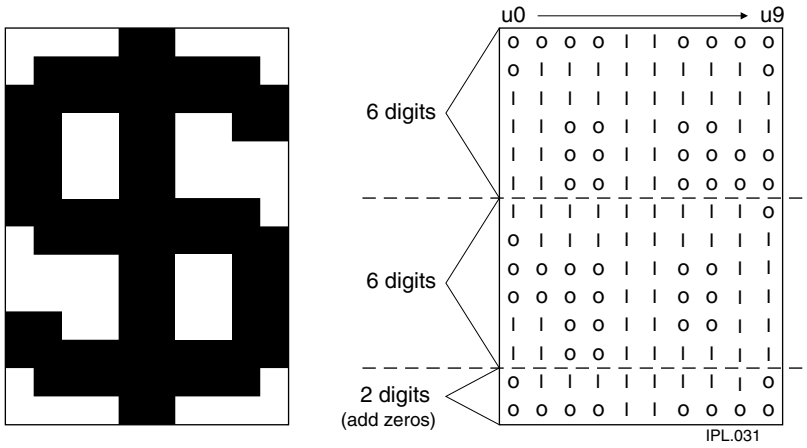
Commands	Definition
<STX><ESC>c<ETX>	Selects 86XX Emulation mode
<STX><ESC>P<ETX>	Enter Program mode
<STX>T11,FONT11<ETX>	Create bitmap font 11
<STX>x10;y14;<ETX>	Define cell width and height
<STX>t36;Z12;<ETX>	Create character 36 ($), character width is 12
<STX>u0,00111110001100;<ETX>	Define column 0
<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

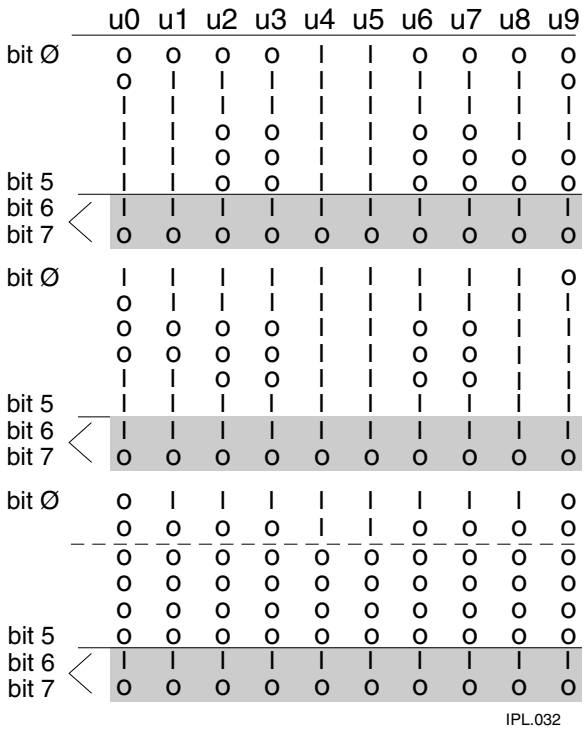
You can also create bitmaps in Advanced mode. In Advanced mode, each data byte represents six bits in the bitmap. See the following example to create a six bits per byte format like the previous one bit per byte ("$" and "i") bitmap font examples.

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.

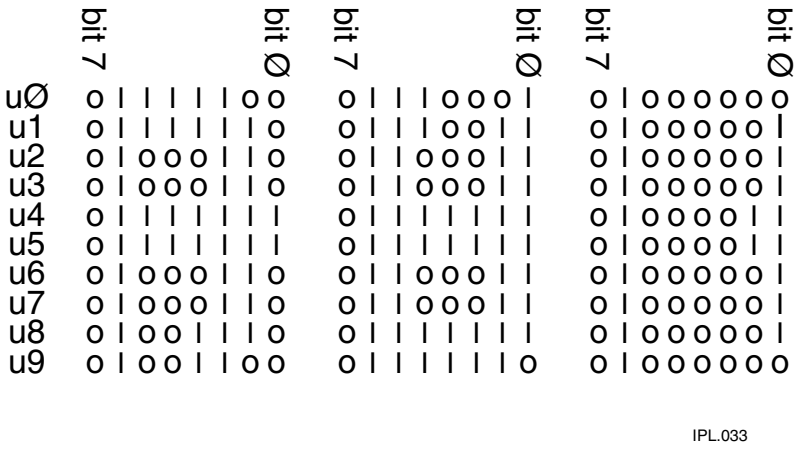


3. Starting with the first column, divide each vertical column into groups of six digits. (If the bottom group has less than six digits, add zeros to this group until it also has six.) The six digits in each group are the six bits that you download in a byte of data. The top digit of each group is bit 0, and the bottom digit is bit 5.



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.



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.

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
<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.

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.

Default Escape Command	Hex Value	Escape Command Description
SYN	16	Set Message Delay
(space)	60	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 table of Print Commands (t = 0).

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 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
BS	08	Takeup Reel Full
SI*	0F	Printhead Hot
FS	1C	Label at Strip Pin
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.

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.

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		(14 Hex)	20 (DEC) (14 Hex)	20 (DEC)

E

Using Direct Graphics Mode

This appendix explains how to use Direct Graphics mode.

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 6 inches 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:

Immediate commands Immediate commands are recognized and executed as regular IPL commands or protocol commands. Immediate commands are removed from the compressed data.

Compression encodation commands Compression encodation commands are used as a part of the compressed graphics file to change or set data modes, repeat lines, change the origin where the next line or lines of data will print, and to end the compressed graphics file and return to IPL command parsing.

Low order data Low order data is 7 bits long and may be combined with high order data. A single low order data byte can represent up to 7 bits of data (0-127). Combined with a high order byte, the combined data can represent 13 bits of data (0 - 8191) at most. Because data bytes cannot exist by themselves, they must be preceded by a command byte so that the printer knows how to interpret them. Any data may be represented by either combined data or low order data. The 8th bit is always set to 1.

High order data High order data is 6 bits long and is always combined with low order data. The combined data can represent 13 bits of data (0 - 8191) at most. Because data bytes cannot exist by themselves, they must be preceded by a command byte so that the printer knows how to interpret them. Any data may be represented by either combined data or low order data. The printer will ignore high order data followed by a command or more high order data. You must set the 7th bit to 1 and the 8th bit to 0.

Bitmap data Bitmap data is composed of uncompressed bytes that represent columns of your graphic. The uncompressed bytes contain 7 data bits per byte. The 8th bit is always set to 1.

Use this table to understand how the printer uses these five types of data:

Type of Data	Byte Format (7 - 0)	Range	Data it Represents
Immediate commands	0 0 0 x x x x x	0 - 31	N/A
Compression encodation commands	0 0 1 x x x x x	32 - 63	N/A
Low order data	1 x x x x x x x	128 - 255	0 - 127
High order data	0 1 x x x x x x	64 - 127	0 - 63
Bitmap data	1 x x x x x x x	128 - 255	Raw data

How Do I Send a Direct Graphic to the Printer?

Once you have compressed the graphic, you need to use several IPL commands to send the RLE file to the printer. These are the commands accompanied by their descriptions:

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.

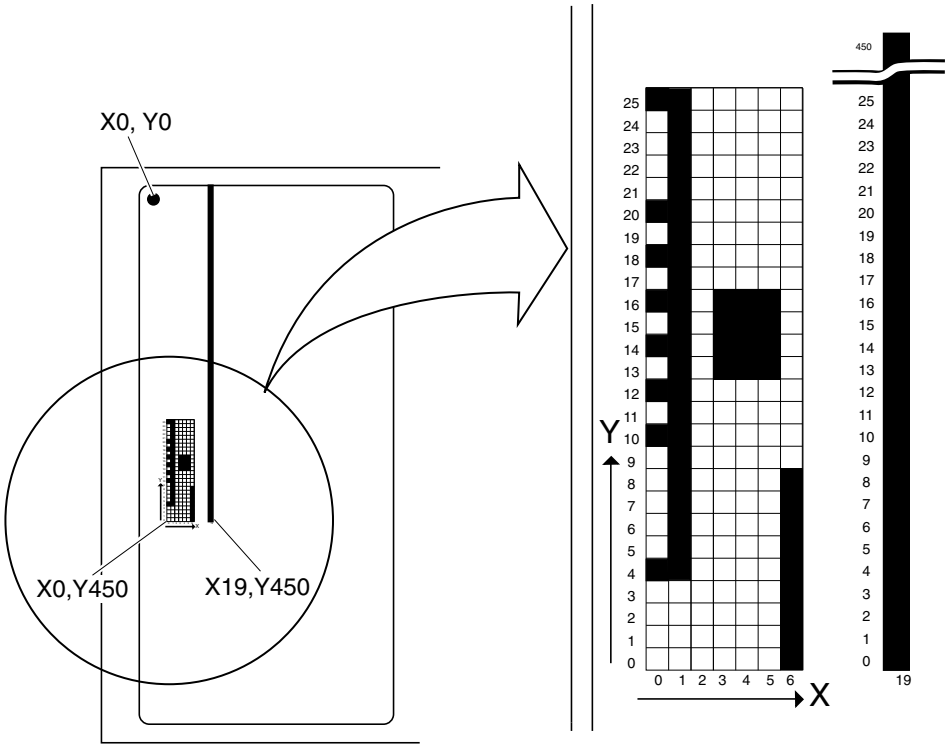
Syntax: `0x26[data,data,...data]`

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 complicated 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 complicated 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

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									

This table explains the hex data file in the 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

I

Index

Numbers

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

U

W

Intermec

Corporate Headquarters
6001 36th Avenue West
Everett, Washington 98203
tel 425.348.2600
fax 425.355.9551
www.intermec.com

IPL Programming Reference Manual

066396-005