

Packet Reference Manual

Monarch®
Pathfinder® Ultra®
Platinum
Printer

{F,1,A,R,E,600,400,"6037FMT" }
T,1,15,V,190,100,1,1,2,2,B,L,0,0 }
C,220,135,0,1,1,1,B,L,0,0,"Ship From:" }
B,2,12,F,250,130,1,2,75,5,L,0 }

{B,1,N,1 }
1,"Dayton, Ohio" }
2,"12345678901" }



Ship From:
Dayton, Ohio



Ship From:
Dayton, Ohio



Ship From:
Dayton, Ohio

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GETTING STARTED

Before you read this manual, review the printer information in the *Operator's Handbook*.

About This Manual

This manual is for the developer who is creating and designing custom formats for the Monarch® Pathfinder® Ultra® Platinum 6039™ printer. The printer operates on a Microsoft® Windows-based CE platform.

You must develop an application that uses the packets you create. Refer to the *Programmer's Manual* for information about developing an application.

This chapter creates a sample Monarch® Printer Control Language II (MPCLII) packet.

Standard Features

The following features are standard on the printer:

Feature	6039
DPI	203
Max. Print Image	1.89" x 3.65"
Print Speed	Up to 4" per second
LCD	Touch screen display
Number of Keys	16
Application Memory (Windows CE)	32 MB RAM 64 MB Flash
Printer Memory	4 MB RAM 4 MB Flash
Prints 2D Bar Codes	Yes
On-Demand Sensor	Yes

Creating an MPCLII Format Packet

A *format* defines which fields appear and where the fields are printed on the label. The printer requires this information in a special form. This section describes how to create a sample MPCLII format packet.

Make sure supplies are loaded, you have a fully charged battery, the printer is connected to a host and ready to receive data, and you have software in the printer. Refer your *Operator's Handbook* for more information.

1. Type the following format header in any text editor:

```
{F,25,A,R,M,508,508,"FMT-25" }
```

2. Type the following constant text field:

```
C,325,80,0,1,2,1,W,C,0,0,"MONARCH MARKING",1 }
```

3. Type the following bar code field:

```
B,1,12,F,185,115,1,2,120,5,L,0 }
```

4. Type the following text field:

```
T,2,18,V,105,70,1,1,1,1,B,C,0,0,1 }
```

For detailed information about the format header, text, constant text, and bar code fields, see Chapter 2, "Defining Fields." For information about batch packets, see Chapter 6, "Printing."

You have created a format packet for your MPCLII printer. Now, a batch packet must be created before you can print the format.

5. Type the following batch header, after the text field line:

```
{B,25,N,1 |
```

6. Type the following bar code data:

```
1, "12345678901" |
```

7. Type the following text field data:

```
2, "DAYTON, OHIO" | }
```

8. Save your file as SAMPLE.FMT.

9. For your application to use the format, use the Ultra.Net library functions in the *Programmer Manual*.



Using MPCLII Conventions

Here are some guidelines to follow when using MPCLII.

MPCLII Punctuation

Use the following symbols when creating MPCLII packets:

{	start of header
}	end of header
	field separator (use hex 7C for this character. Depending on the code page selected, this character may appear differently.)
,	parameter separator
"ABC"	Quotation marks enclose character strings. Empty quotes ("") identify null strings or unused fields.
'comment'	Grave accents enclose comments. Any data enclosed in grave accents is ignored. Do not embed comments within a quoted string. Grave accents are also used to reject mainframe data.

These MPCL characters are the default.

Standard Syntax Guidelines

When creating MPCLII packets:

- ◆ Begin each packet with a **start of header** ({}).
- ◆ End each packet with an **end of header** ({}).
- ◆ Define no more than **200** fields in a format. Each | indicates one field. However, options are not counted as fields.
- ◆ The field number (**0 - 999**) must be unique. We recommend starting at 1, instead of 0.
- ◆ Do not use a field number more than once per format.
- ◆ Define all fields in the order you want to image/print them.

- ◆ Separate all parameters with a **Parameter Separator** (,).
- ◆ End each field with a **Field Separator** (|).
- ◆ Enter all information in CAPITAL letters, except words or phrases within quotation marks.
- ◆ Include all parameters for a field unless documented as optional.
- ◆ Define non-printable text fields before the field to which they apply.
- ◆ Define options immediately after the field to which they apply.
- ◆ Multiple options can be used with most fields. Options can be used in any combination except as noted with each definition.
- ◆ Keep in mind that proportionally spaced fonts need wider fields than monospaced fonts. For variable field data, use a letter "W" to determine the maximum field size.
- ◆ Do not place a new line (return) or any other non-printing character in a character string. However, a carriage return or line break after each | makes your formats easier to read.
T,1,20,V,30,30,1,1,1,1,B,C,0,0,0 |
T,2,10,V,50,30,1,1,1,1,B,C,0,0,0 |
- ◆ Spaces are ignored, except within character strings.

Starting with a Design

Before you create a format packet, you must design your label. There are several steps to designing a custom label:

1. Decide which fields should appear on your label. See "Determining Format Contents" for more information.
2. Determine your label size. Labels are available from us in a wide variety of sizes. Your application and the amount of data you need to print determines the supply size. Contact your sales representative for more information.
3. Draw a rough sketch of your label. You may want to draw several variations to see what works best. See "Drawing Rough Sketches" for more information.

4. Identify the field types that appear on your label. See "Considering Field Types" for more information.
5. Decide which fonts you want to use. See "Considering Fonts" for more information.
6. Fill out your Format Worksheet. See "Using the Format Worksheet" for more information.

At this point, you are ready to use your design.

7. Create a format packet, based on how you filled out your worksheet. See Chapter 2, "Defining Fields," for more information.
8. For your application to use the format, use the Ultra.Net library functions in the *Programmer Manual*.
9. Execute your application.

Determining Format Contents

Before you lay out your format, you need to make a few decisions. For example:

- ◆ How large is your supply?
- ◆ Which fonts do you want to use?
- ◆ Do you want to include a bar code?
- ◆ Do you want to include graphics?

Determining the Print Area

The print area varies, depending on the size of your supply. Below are the maximum and minimum print areas. Notice that the top edge of the supply exits the printer first. There is a non-print zone on the edges and top (0.235") and bottom (.115") of the supply. For exact print area measurements of your supply, see the supply layout grids in Appendix D.

Unit of Measure	Maximum Supply Size	Maximum Print Area	Minimum Supply Size	Minimum Print Area
English (1/100")	205 x 400	189 x 365	50 x 37.5	50 x 37.5
Metric (1/10mm)	521 x 1016	480 x 927	127 x 95	95 x 95
Dots (1/203 dots)	416 x 812	384 x 741	102 x 76	76 x 76

An image up to 11.65 inches (296 mm or 2365 dots) can be created by increasing the image buffer. See Chapter 5, "Configuring the Printer," for more information.

Use the following formulas to convert inches to dots and metric:

Dots = inches x 203

Metric (1/10mm) = inches x 254

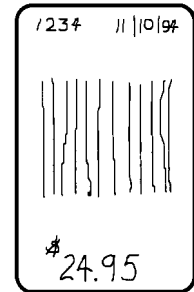
English (1/100 inch) = 100 x (dots/203)

Dots = Metric (1/10 mm) x .797

Drawing Rough Sketches

After you decide what information you want to print, sketch how you want the information to appear on the label. Note any areas that are preprinted on the label, such as a logo.

As soon as you know what information to include on the label, and you have a rough sketch, you can use a supply layout grid to help you layout and size your label. If you do not want to use a grid, go to "Considering Field Types" to choose what information you want on your label.



Using Supply Layout Grids

A supply layout grid contains measurement markers. These markers help you accurately position information on your label.

Decide whether you want to design formats using English, Metric, or Dot measurements. Choose from the following grids:

◆ English

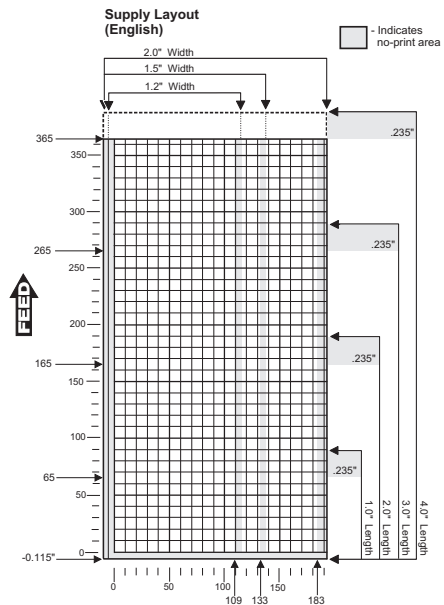
The English grid is measured in 1/100 inches.

◆ Metric

The Metric grid is measured in 1/10 millimeters (mm).

◆ Graphic

The printer uses dots to print images on a label. The printhead has 203 dots per inch (DPI).



If you want to use the supply layout grids, a copy of each is in Appendix D, "Format Design Tools."

Considering Field Types

After you select a supply size, the next step in designing a format is to decide what information you want to print on the label. For example, you may want to print your company name, price of an item, and a bar code that combines information from other places. Everything you want to print falls into one of the following categories.

Field Type	Description	Examples
Text	Contains letters, numbers, or symbols you want to print.	item number, item description, department number, price, date
Bar Code	Used for printing bar codes that can be scanned.	item or serial numbers, zip codes, information you don't want to have visible to customers
Constant Text	Prints fixed characters that print without changing.	company name, company address
Line or Box	Highlights or separates items.	line marking out the regular price, border around the supply
Graphic	Contains a bitmap image or a compliance label overlay.	logos

All of the above field types except graphics are discussed in Chapter 2. See Chapter 4, "Creating Graphics" for information on including graphics in your format.

Considering Fonts

When working with fonts, you have three considerations:

- ◆ font appearance
- ◆ font size (bitmapped)
- ◆ font spacing (monospaced or proportional)

See Appendix B, "Fonts," for samples of each font.

Using the Format Worksheet

The Format Worksheet is divided into sections that list the field types. Each section has boxes to fill in with parameters that define your format. A format worksheet is included in Appendix D, "Format Design Tools."

Filling in the Format Worksheet

Decide what type of field to use on your label.

1. Make a copy of the Format Worksheet.
2. Define the Format Header.
3. Define options as you require them. See Chapter 3, "Defining Field Options" for more information.

DEFINING FIELDS

2

This chapter provides a reference for defining

- ◆ the format header
- ◆ text and constant text
- ◆ bar code fields
- ◆ line and box fields.

Defining the Format Header

A Format Header begins a format file.

Syntax {F, format#, action, device, measure, length, width, "name" }

F1. F Format Header.

F2. format# Unique number from **0** - **999** to identify the format.

F3. action Action. Enter **A** to add the format to the printer.

F4. device Format storage device. Options:
R RAM (default) When you turn off the printer, items saved in RAM are lost.
F Flash Memory. When you turn off the printer, items saved in Flash memory are saved.

F5. measure Unit of measure. Options:
E English, measured in 1/100 inches
M Metric, measured in 1/10 mm
G Graphic, measured in dots

F6. length Supply length, top to bottom, in selected units.

English **50 - 400**
Metric **127 - 1016**
Dots **102 812**

NOTE: An image up to 11.65 inches (296 mm or 2365 dots) can be created by increasing the image buffer. See Chapter 5, "Configuring the Printer," for more information.

F7. width Supply width, from left to right, in selected units.

English **50 - 205**
Metric **127 - 480**
Dots **102 - 416**

F8. "name" Format name (optional), **0** - **8** characters, enclose within quotation marks.

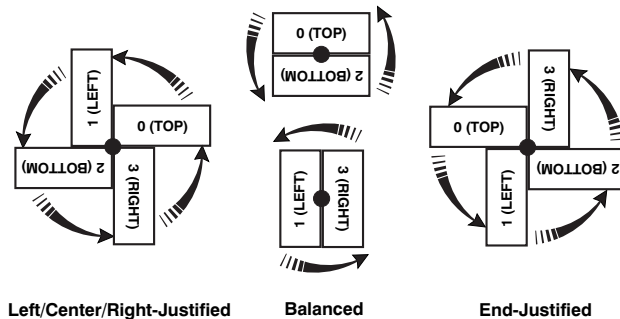
Example {F, 1, A, R, E, 300, 100, "TEXTILES" }

Format 1 ("TEXTILES") uses a three inch long by one inch wide label.

Defining Text Fields

Create a separate definition for each text field. If text falls on two lines, each line of text requires a separate definition.

Syntax	T,field#,# of char,fix/var,row,column, gap,font,hgt mag,wid mag,color,alignment, char rot,field rot,sym set
T1. T	Text Field.
T2. field#	Unique number from 0 - 999 to identify this field.
T3. # of char	Maximum number of printed characters (0 - 2710) in the field.
T4. fix/var	Fixed or variable length field. Options: F Fixed length V Variable length
T5. row	For monospaced fonts, distance from bottom of print area to the pivot point. The pivot point varies depending on how text is justified.



For proportionally spaced fonts, distance from bottom of print area to baseline of characters in field.

English	37 - 365
Metric	95 - 927
Dot	76 741



NOTE: If you reallocated memory for an 11.65-inch image, the row maximum is 1164 (English), 295 (metric), or 2364 (dots).

T6. column

Distance from the left edge of the print area to the pivot point to find the column location.

English **37 - 189**
Metric **95 - 480**
Dots **76 - 383**



T7. gap

Number of dots between characters (203 dots per inch).
Range: **0 - 99**.

NOTE: For monospaced fonts, the additional spacing is added to the existing inter-character gap. This is also true for proportionally spaced fonts, but remember that the inter-character gap varies with character combinations.

Any number other than **0** or the default number affects your field width. Default spacing:

Reduced and Letter Gothic Bold 6 pt. **1 dot**
HR2 and Letter Gothic Bold 9 pt. **2 dots**
Standard, Bold, OCRA-like, and HR1 **3 dots**
All other fonts **varies with each letter**
HR1 and HR2 are only used with the UPC bar code family and must be numeric.

T8. font

Style of font. Options:

1	Standard	5	HR1
2	Reduced	6	HR2
3	Bold	10	CG Triumvirate Bold 9 pt
4	OCRA-like	11	CG Triumvirate 6 pt
50	EFF Swiss Bold (scalable)		

CG Trium Bold	CG Trium Bold Cond
---------------	--------------------

1000	6.5 pt	1006	6.5 pt
1001	8 pt	1007	8 pt
1002	10 pt	1008	10 pt
1003	12 pt	1009	12 pt
1004	18 pt	1010	18 pt
1005	22 pt	1011	22 pt

Letter Gothic Bold

1012	6 pt	1013	9 pt
-------------	------	-------------	------

Or a valid downloaded font selector number. Fonts 5 and 6 are for numeric data only.

NOTE: Point sizes greater than 12 include only the following special characters:

0123456789#\$\$%&(),./@DFKLMPS\kpröç£¥.

All other point sizes use the whole symbol set. This information may not apply to optional fonts.

T9. hgt mag Height magnifier, **1 - 7** (times- for bitmapped fonts). With TrueType/Scalable fonts, use **4 - 250**, for the font's point size.

T10. wid mag Width magnifier, **1 - 7** (times). With TrueType/Scalable fonts, use **4 - 250**, for the font's point size. Proportionally spaced fonts do not have a set width. To estimate the size of your field, use the letter "W" for the widest field or an "L" for an average width field. Find your selected font and the desired width in Appendix B, "Fonts."

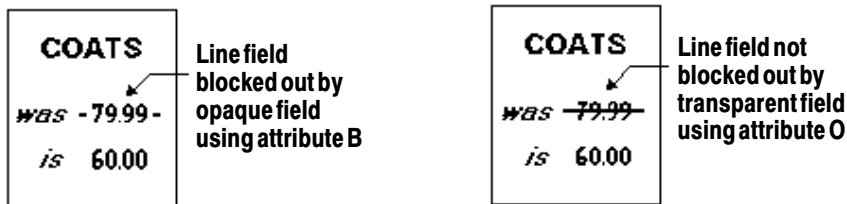
T11. color Options for standard printer fonts:
B Opaque, Normal, Black, Normal
D/R/W Opaque, Normal, White, Normal
O Transparent, Normal, Black, Normal

Options for scalable fonts:
A/N Opaque, Normal, Black, Bold
B/O Opaque, Normal, Black, Normal
E/S Opaque, Italics, Black, Bold
F/T Opaque, Italics, Black, Normal

NOTE: Solid black print should not exceed 30% on a given square inch of the label, or the printhead life may be decreased.

There are two types of field color overlay attributes:

Transparent The overlay field (text or constant text) does not block out (or "erase") existing fields.
Opaque The overlay field blocks out (or "erases") existing fields.



Field placement in the packet is an important consideration when using field color attributes. If a line field is defined before the overlay (text or constant text) field, the line field is blocked out by the overlay field, depending on the overlay field's color attribute. If a line field is defined after the overlay field, the line field is not blocked out by the overlay field, regardless of the overlay field's color attribute.

T12. alignment

Options:

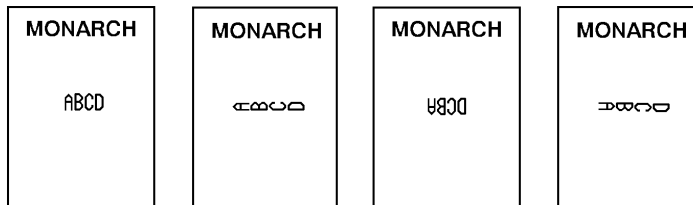
- L** Align on left side of field.
- C** Center text within field (monospaced fonts only)
- R** Align on right side of field (monospaced fonts only)
- B** Align at midpoint of field
- E** Align at endpoint of the field

Use **L**, **B**, or **E** for any font.

T13. char rot

Character rotation. The field or supply does not rotate, only the characters do. Options:

- 0** Top of character points to top of field
- 1** Top of character points to left of field
- 2** Top of character points to bottom of field
- 3** Top of character points to right of field



T14. field rot

Field rotation. Field rotation rotates the whole field, not just the characters. Rotation is affected by the pivot point, which varies depending on how text is justified. Lower left corner of field is the pivot point. Options:

- 0** Top of field points to top of supply
- 1** Top of field points to left of supply
- 2** Top of field points to bottom of supply
- 3** Top of field points to right of supply

T15. sym set Symbol set. Use **0** for the Internal Symbol Set. For scalable fonts, use:

1	ANSI Symbol Set
100	Macintosh
101	Wingdings
437	DOS Code Page 437 (Domestic)
850	DOS Code Page 850 (International)
852	DOS Code Page 852 (Latin 2)
855	DOS Code Page 855 (Russian)
857	DOS Code Page 857 (IBM Turkish)
860	DOS Code Page 860 (MS-DOS Portuguese)
1250	Code Page 1250 (Latin 2)
1251	Code Page 1251 (Cyrillic)
1252	Code Page 1252 (Latin 1)
1253	Code Page 1253 (Greek)
1254	Code Page 1254 (Turkish)
1255	Code Page 1255 (Hebrew)
1256	Code Page 1256 (Arabic)
1257	Code Page 1257 (Baltic)
1258	Code Page 1258 (Vietnam)

See Appendix C, "Symbol Sets/ Code Pages" for more information.

Example `T,2,10,V,250,80,0,1,1,1,B,C,0,0,0,1`

Defines a text field (field #2) with a variable length of up to 10 characters. The field begins at row 250, column 80. There is no additional gap between characters, and the Standard font is used without any additional magnification. The printing is black on white and centered. No field or character rotation is used. The internal symbol set is used.

Defining Bar Code Fields

Each bar code field requires a separate definition.

The two-dimensional bar codes (PDF417, Maxicode, Code 16K, Data Matrix, and Quick Response) apply to the Pathfinder Ultra Gold 6037 printer only.

Syntax B,field#, # of char,fix/var,row,column,
 font,density,height,text,alignment,
 field rot !

B1. B Bar Code Field.

B2. field# Unique number from **0 - 999** to identify this field.

B3. # of char Maximum number of characters. If the bar code uses a check digit, allow an extra character for the check digit. The actual maximum number of characters is limited by the size of the label and bar code density. Range: **0 - 2710**.

For Quick Response bar codes, this number includes header information. The maximum depends on the type of characters entered for the batch data and differs for the two models of the bar code.

Data Type	Model 1	Model 2
Numeric Data	1167	2710
Alphanumeric data	707	2710
8-byte data	486	2710
Kanji data	299	1817

NOTE: The maximum number of characters depends on the selected level of error correction. As you increase the error correction level, the maximum number of characters decreases.

B4. fix/var Fixed (F) or variable (V) length field.

Bar Code	Number of Characters	Fixed or Variable
UPCA	12	F
UPCA+2	14	F
UPCA+5	17	F
UPCA+Price CD	12	F
UPCE	7	F
UPCE+2	9	F
UPCE+5	12	F
EAN8	8	F
EAN8+2	10	F
EAN8+5	13	F
EAN13	13	F
EAN13+2	15	F
EAN13+5	18	F
EAN13+Price CD	13	F
POSTNET	9 or 11	F
Interleaved 2 of 5 or Interleaved I 2 of 5 with Barrier Bar	0 - 2710	F or V
Code 39 (w/ or w/o CD) or MOD43	0 - 2710	F or V
Codabar	0 - 2710	F or V
Code 128	0 - 2710	F or V
Code 93	0 - 2710	V
MSI	0 - 14	F or V
PDF 417	0 - 2710	F or V
Maxicode	15 - 99	F or V
Code 16K	0 - 2710	V
Data Matrix	0 - 2710	F or V
Quick Response	1167 - 2710 (numeric) 707 - 2710 (alphanumeric)	V

B5. row

Distance from bottom of the print area to the pivot point of the field. The pivot point varies, depending on how the field is justified. Pivot points:

Remember to include text or numbers that may appear with the bar code for the row measurement.



Left/Center/Right-Justified Fields



Balanced Fields

End-Justified Fields

English	37 - 365
Metric	95 - 927
Dot	76 - 741

B6. column

Distance from the lower left edge of the print area to the pivot point.



English	37 - 189
Metric	95 - 480
Dots	76 - 383

NOTE: Allow a minimum of **1/10** inch between the scan edge of bar code and label edges or other data.



B7. font

Bar code. Options:

1	UPCA	16	EAN13 +2
2	UPCE	17	EAN13 +5
3	Interleaved 2 of 5	21	LAC
4	Code 39 (no check digit)	22	POSTNET
5	Codabar	23	Code 93
6	EAN8	31	Code 16K
7	EAN13	32	PDF 417
8	Code 128	33	Maxicode
9	MSI	35	Data Matrix
10	UPCA +2	36	Quick Response
11	UPCA +5	40	Code 39 (MOD 43 check digit)
12	UPCE +2	41	UPCA & Price CD
13	UPCE +5	44	EAN13 & Price CD
14	EAN8 +2	50	Interleaved 2of5 w/ Barrier Bar
15	EAN8 +5		

B8. density

Bar code density. Use the following table for other bar codes.

NOTE: If the field contains an 11-digit UPC bar code, the printer automatically zero-suppresses it into a 6-digit UPCE bar code.

Bar Code Type	Density Selector	Density (% or cpi)	Narrow Element (dots/mils)	Narrow to Wide Ratio	Data Length	Appearance Codes Available	Char Set
UPCA +2/+5 Price CD	2 4	76% 114%	2/9.9 3/14.8	1.0:1	11 or 12 14/17	1, 5, 6, 7 or 8	0 to 9
UPCE +2/+5	2 4	76% 114%	2/9.9 3/14.8	1.0:1	6 or 7 9/12	1, 5, 6, 7 or 8	0 to 9
EAN8 +2/+5	2 4	76% 114%	2/9.9 3/14.8	1.0:1	7 or 8 10/13	1, 5, 6, 7 or 8	0 to 9
EAN13+2/+5 Price CD	2 4	76% 114%	2/9.9 3/14.8	1.0:1	12 or 13 15/18	1, 5, 6, 7 or 8	0 to 9
Interleaved 2 of 5 or I2of5 with Barrier Bar	1 2 3 4 5 6 7 8 9 10 11 12 13	1.1 2.1 3.2 4.2 5.6 6.3 7.5 8.8 9.6 11.2 11.0 12.7 14.5	21/103.4 12/59.1 7/34.5 6/29.6 4/19.7 4/19.7 3/14.8 3/14.8 3/14.8 2/9.9 2/9.9 2/9.9 2/9.9 1:2.0	1:3.0 1:2.5 1:3.0 1:2.5 1:3.0 1:2.5 1:3.0 1:2.3 1:2.0 1:3.0 1:3.0 1:2.5 1:2.0	0 to 2710	8	0 to 9
(Code 39 or MOD43 (Extended Code 39))	1 2 3 4 6 7 11 12 20	1.4 1.7 3.5 4.2 6.3 7.0 3.9 12.7 3.0	10/49.3 8/39.4 4/19.7 3/14.8 2/9.9 2/9.9 4/19.7 1/4.9 5/24.6	1:2.5 1:2.5 1:2.5 1:3.0 1:3.0 1:2.5 1:2.0 1:3.0 1:2.2	0 to 2710	8	SPACE \$%*+-./ 0 to 9 A to Z
Codabar (NW7)	2 3 4 5 7 8 9	2.1 3.0 4.6 5.1 8.4 9.2 10.1	8/39.4 6/29.6 4/19.7 4/19.7 2/9.9 2/9.9 2/9.9	1:3.0 1:2.5 1:2.5 1:2.0 1:3.0 1:2.5 1:2.0	0 to 26	8	\$+-./ 0 to 9 a to d
Code 128 or Code 16K	20 4 6 8	3.5/7.0 4.4/8.7 5.8/11.7 8.7/11.5	5/24.6 4/19.7 3/14.8 2/9.9	N/A	0 to 2710	8	00H to 7FH

NOTE: For I 2of5 bar codes, pad field data to the left with a zero when an odd number of characters are used. Codabar uses "A" as the start and stop characters if not included with the data. All bar codes with system check digits are automatically calculated and added to the bar code data.

2-12 Defining Fields

Bar Code Type	Density Selector	Density (% or cpi)	Narrow Element (dots/mils)	Narrow to Wide Ratio	Data Length	Appearance Codes Available	Char Set
CODE 93	3 4 5 7 10	3.7 4.5 5.6 7.5 11.2	6/29.6 5/24.6 4/19.7 3/14.8 2/9.9	N/A	0 to 2710	8	00H to 7FH
MSI	4 5 7	4.2 5.6 7.2	4/19.7 3/14.8 2/9.9	1:2.0 1:2.0 1:2.5	0 to 14	8	0 to 9
POSTNET	0 (fixed at 4.3 cpi)	24/118.2	10/49.3	4/19.7 (5 dot gap)	0,5,6,9 or 11	8	0 to 9
MaxiCode	7	N/A	N/A	N/A	99	8	00H to FFH

Bar Code Type	Density Selector	Element Width (dot/mils)	Row Height (dots/mils)	Aspect Ratio	Data Length	Appearance Codes Available	Char Set
PDF417	1 2 3 4 5 6 7 8 9	2/9.8 2/9.8 2/9.8 3/14.8 3/14.8 3/14.8 4/19.7 4/19.7 4/19.7	2/9.8 4/19.7 6/29.6 3/14.8 6/29.6 9/44.3 4/19.7 8/39.4 12/59.1	1:1 1:2 1:3 1:1 1:2 1:3 1:1 1:2 1:3	0 to 2709	8	00H to FFH

Bar Code Type	Density Selector	Data Length
Quick Response Models 1 and 2	0	Model 1: 0 - 1167 Numeric 0 - 707 Alphanumeric 0 - 486 (8-bit) 0 - 299 (Kanji) Model 2: 0 - 2710 Numeric; Alphanumeric and 8-bit; 0 - 1817 Kanji

NOTE: Values in bold indicate the default.

Bar Code	Size Row x Col.	Density Selector	Data Length Num. Alphanum.	App Code	Char Set
Data Matrix Square symbols	10 x 10 12 x 12 14 x 14 16 x 16 18 x 18 20 x 20 22 x 22 24 x 24 26 x 26 32 x 32 36 x 36 40 x 40 44 x 44 48 x 48 52 x 52 64 x 64 72 x 72 80 x 80 88 x 88 96 x 96 104 x 104 120 x 120 132 x 132 144 x 144	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	6 x 3 10 x 6 16 x 10 24 x 16 36 x 25 44 x 31 60 x 43 72 x 52 88 x 64 124 x 91 172 x 127 228 x 169 288 x 214 348 x 259 408 x 304 560 x 418 736 x 550 912 x 682 1152 x 862 1392 x 1042 1632 x 1222 2100 x 1573 2608 x 1954 2710 x 2335	8	00H to FFH

Bar Code	Size Row x Col.	Density Selector	Data Length Num. Alphanum.	App Code	Char Set
Data Matrix Rectangular symbols	8 x 18 8 x 32 12 x 26 12 x 36 16 x 36 16 x 48	25 26 27 28 29 30	10 x 6 20 x 13 32 x 22 44 x 31 64 x 46 98 x 72	8	00H to FFH

B9. height

Bar code height, in 1/100 inches, 1/10 mm, or dots.

Minimum values:

English **1**
Metric **2**
Dots **1**

For Quick Response bar codes, the value you enter is the symbol's maximum height. Small bar codes may not be scannable.

- B10. text* Appearance of text with bar code. For UPC and EAN, use **1** or **5 - 8**. For all others, use **8**. Options:
- 1** No check digit or number system or Quick Response Model 1
 - 2** Quick Response Model 2
 - 5** Number system at bottom, no check digit
 - 6** Check digit at bottom, no number system
 - 7** Check digit and number system at bottom
 - 8** No text, bar code only
- B11. alignment* Choose **L**, **R**, **C**, **B** or **E** to align the bar code data correctly in the field. For 12 of 5, Code 39 (Mod 43), Codabar, and MSI, you can use **L**, **R**, **C**, **B** or **E**. For all other bar codes, use **L**.
- B12. field rot* Field rotation. Field rotation rotates the whole field, not just the characters. Rotation is affected by the pivot point, which varies depending on how text is justified. Lower left corner of field is the pivot point. Options:
- 0** Top of field points to top of supply
 - 1** Top of field points to left of supply
 - 2** Top of field points to bottom of supply
 - 3** Top of field points to right of supply
- NOTE:** Serial bar codes printed at speeds greater than 1.5 IPS may not scan properly.

Example B,3,12,F,150,70,1,2,80,7,L,0 ;

Defines a bar code field (field #3) with 12 characters of fixed length starting at row 150, column 70. A UPCA bar code with a density of 2 and a height of 80 is used. The check digit and number system are shown at the bottom. The bar code is left aligned without any field rotation.

Defining Constant Text Fields

A constant text field is a set of fixed characters that prints on all labels. Define each constant text field separately. This field is not assigned a field number, but is counted as a field (keep this in mind, as the printer allows a maximum of **200** fields per format). The characters in this field cannot be changed by batch data. Field options do not apply to constant text fields.

Determine the height and the maximum width of the characters, using the tables in Appendix B, "Fonts." If you're using proportionally spaced fonts, use the average size of the characters. Mark the pivot point of your field. This will vary, depending on how your field is justified.

Syntax

```
C, row, column, gap, font, hgt mag,  
wid mag, color, alignment, char rot,  
field rot, "fixed char", sym set |
```

C1. C Constant Text Field.

C2. row For monospaced fonts, distance from bottom of print area to the pivot point. For proportionally spaced fonts, distance from bottom of print area to baseline of characters in the field. (Bottom exits the printer first.)

English	37 - 365
Metric	95 - 927
Dot	76 - 741

C3. column Distance from the lower left edge of the print area to the pivot point.

English	37 - 189
Metric	95 - 480
Dots	76 - 383

C4. gap Number of dots between characters (203 dots per inch). Range: **0 - 99**.

Any number other than **0** or the default number affects your field width. Default spacing:

Reduced and Letter Gothic Bold 6 pt.	1 dot
HR2 and Letter Gothic Bold 9 pt.	2 dots
Standard, Bold, OCRA-like, and HR1	3 dots
All other fonts	varies with each letter

C5. font

Style of font. Options:

1	Standard	5	HR1
2	Reduced	6	HR2
3	Bold	10	CG Triumvirate Bold 9 pt
4	OCRA-like	11	CG Triumvirate 6 pt
50	EFF Swiss Bold (scalable)		

CG Trium Bold CG Trium Bold Cond

1000	6.5 pt	1006	6.5 pt
1001	8 pt	1007	8 pt
1002	10 pt	1008	10 pt
1003	12 pt	1009	12 pt
1004	18 pt	1010	18 pt
1005	22 pt	1011	22 pt

Letter Gothic Bold

1012	6 pt	1013	9 pt
-------------	------	-------------	------

Or a valid downloaded font selector number. Fonts 5 and 6 are for numeric data only.

NOTE: Point sizes greater than 12 include only the following special characters:

0123456789#\$\$%&(),./@DFKLMPS\kpröç£¥.

All other point sizes use the whole symbol set. This information may not apply to optional fonts.

C6. hgt mag

Height magnifier, **1 - 7** (times). With TrueType/scalable fonts, use **4 - 250** for the font's point size.

C7. wid mag

Width magnifier, **1 - 7** (times). With TrueType/scalable fonts, use **4 - 250** for the font's point size.

C8. color

Options for standard printer fonts:

B	Opaque, Normal, Black, Normal
D/R/W	Opaque, Normal, White, Normal
O	Transparent, Normal, Black, Normal

Options for scalable fonts:

A/N	Opaque, Normal, Black, Bold
B/O	Opaque, Normal, Black, Normal
E/S	Opaque, Italics, Black, Bold
F/T	Opaque, Italics, Black, Normal

NOTE: Solid black print should not exceed 30% on a given square inch of the label, or the printhead life may be decreased.

There are two types of field color overlay attributes:

- | | |
|-------------|--|
| Transparent | The overlay field (text or constant text) does not block out (or "erase") existing fields. |
| Opaque | The overlay field blocks out (or "erases") existing fields. |

Field placement in the packet is an important consideration when using field color attributes. If a line field is defined before the overlay (text or constant text) field, the line field is blocked out by the overlay field, depending on the overlay field's color attribute. If a line field is defined after the overlay field, the line field is not blocked out by the overlay field, regardless of the overlay field's color attribute.

C9. alignment

Alignment of constant text in the field. Options:

- L** Align on left side of field.
- C** Center text within field (for monospaced fonts only)
- R** Align on right side of field (for monospaced fonts only)
- B** Align at midpoint of field
- E** Align at end of field.

Use **L**, **B**, or **E** for any font.

C10. char rot

Character rotation. Options:

- 0** Top of character points to top of field
- 1** Top of character points to left of field
- 2** Top of character points to bottom of field
- 3** Top of character points to right of field

C11. field rot

Field rotation. Lower left corner of field is the pivot point.

Options:

- 0** Top of overlay points to top of supply
- 1** Top of overlay points to left of supply
- 2** Top of overlay points to bottom of supply
- 3** Top of overlay points to right of supply

NOTE: Rotation is affected by the pivot point, which varies depending on how text is justified.

C12. "fixed char"

Fixed characters to appear in the field. Maximum **2710** characters. Enclose in quotation marks.

C13. sym set Symbol set. Use 0 for the Internal Symbol Set. For scalable fonts, use:

1	ANSI Symbol Set
100	Macintosh
101	Wingdings
437	DOS Code Page 437 (Domestic)
850	DOS Code Page 850 (International)
852	DOS Code Page 852 (Latin 2)
855	DOS Code Page 855 (Russian)
857	DOS Code Page 857 (IBM Turkish)
860	DOS Code Page 860 (MS-DOS Portuguese)
1250	Code Page 1250 (Latin 2)
1251	Code Page 1251 (Cyrillic)
1252	Code Page 1252 (Latin 1)
1253	Code Page 1253 (Greek)
1254	Code Page 1254 (Turkish)
1255	Code Page 1255 (Hebrew)
1256	Code Page 1256 (Arabic)
1257	Code Page 1257 (Baltic)
1258	Code Page 1258 (Vietnam)

See Appendix C, "Symbol Sets/ Code Pages" for more information.

Example `C,100,80,0,1,1,1,B,L,0,0,"MADE IN USA",0,1`

Defines a constant text field starting at row 100, column 80. It does not have any additional inter-character gap. The Standard font is used without any additional magnification. The printing is black on white and left justified. No field or character rotation is used. "MADE IN USA" is printed in this field. The internal symbol set is used.

Defining Line Fields

Use lines to form borders and mark out original prices. Define each line separately. This field is not assigned a field number, but is counted as a field (keep this in mind, as the printer allows a maximum of **200** fields per format). You can define any line length and a thickness up to 99 dots, as long as the solid black print does not exceed 30 percent of any given square inch of the label.

Line Types

You can create horizontal and vertical lines. There are two ways to define lines.

Segments You choose the starting point and ending point.

Vectors You choose the starting point, the angle, and the length of the line.

Syntax `L,type,row,column,angle/end row,length/
end col,thickness,"pattern" |`

L1. L Line Field.

L2. type Type of line. Only vertical and horizontal lines are supported. Options:

S Segment. You choose the starting point and ending point.

V Vector. You choose the starting point, angle, and length.

L3. row

Distance from bottom of print area to the starting point.

English **37 - 189**

Metric **95 - 480**

Dots **76 - 383**



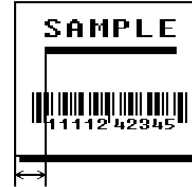
L4. column

Distance from left edge of the print area to line origin.

English **37 - 365**

Metric **95 - 927**

Dot **76 - 741**



*L5. angle
/end row*

If Using Segments:

Row location of ending point. Measure from bottom of print area. Ranges same as *row* above. On horizontal lines, this value must match item **L3**.

If Using Vectors:

Angle of line. Options: **0, 90, 180, or 270**.



*L6. length/
end col*

If Using Segments:

Column location of end point. Measure from left edge of print area. Ranges same as *column* above. On vertical lines, this value must match parameter **L4**.

If Using Vectors:

Length of the line in selected units.

Ranges for horizontal lines:

English **37 - 189**

Metric **95 - 480**

Dots **76 - 383**

Ranges for vertical lines:

English **37 - 365**



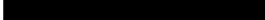

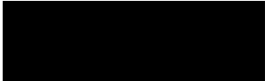
Metric **95 - 927**

Dot **76 - 741**



L7. thickness

Using the chart below for reference, write the line thickness (1 - 99) in box L7. Measured in dots.

Dots	Thickness
1	
10	
24	
48	
96	

NOTE: Line thickness fills upward on horizontal lines, or to the right on vertical lines.

L8. "pattern" Line pattern. Enter "".

Example L,S,110,70,110,350,10," " !

Defines a horizontal line field as a segment starting at row 110, column 70 and ending at row 110, column 350. The line thickness is 10 dots.

Defining Box Fields

Use boxes to form borders or highlight items of interest. Define each box field separately. This field is not assigned a field number, but is counted as a field (keep this in mind, as the printer allows a maximum of **200** fields per format). You can define any line length and a thickness up to 99 dots, as long as the solid black print does not exceed 30 percent of any given square inch of the label.

Syntax Q,row,column,end row,end col,thickness,
"pattern" !

Q1. Q Box (**Q**uadrilateral) Field.

Q2. row

Distance from bottom of print area to lower left corner of box.

English **37 - 365**

Metric **95 - 927**

Dot **76 - 741**



Q3. column

Distance from left edge of print area to lower left corner of box.

English **37 - 189**

Metric **95 - 480**

Dots **76 - 383**



Q4. end row

Distance from bottom of print area to upper right corner of box. Ranges same as *row*.




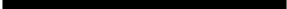
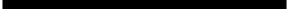


Q5. end col

Distance from left edge of print area to upper right corner of box. Ranges same as *column*.



Q6. thickness Using the chart below for reference, write the desired line thickness (**1 - 99**) in box **Q6**. Measure in dots.

Dots	Thickness
1	
10	
24	
48	
96	

NOTE: Line thickness fills upward on horizontal lines, or to the right on vertical lines.

Q7. "pattern" Line pattern. Enter `" "`.

Example `Q,240,80,270,130,3," " |`

Defines a box field starting at row 240, column 80. It ends at row 270, column 130. It has a thickness of 3 dots.

DEFINING FIELD OPTIONS

3

This chapter provides a reference for defining

- ◆ field options in formats
- ◆ check digit packets.

Applying Field Options

Field options further define text and bar code fields. The text, constant text, or bar code field must be previously defined *before* you can apply any field option to it. Define options immediately after the field to which they apply.

Combining Field Options

You can use more than one option with most fields. When you use multiple options for the same field, you must place the options in the order you want to apply them to your format.

Restrictions

Some options cannot be used together. See the following sections addressing individual options for specific combinations to avoid.

Example R,1,3,1,3,1,1 |

Syntax R,option#,parameter...parameter |

R1. R Indicates field option header.

R2. option# Option number:
 1 Define Fixed Characters
 4 Copy Data
 30 Pad Characters
 31 Calculate Check Digit
 42 Format as a Price Field
 50 Define Bar Code Densities
 51 Define Security and Truncation of PDF417 Bar Codes
 52 Define Width or Length of PDF417 Bar Codes
 60 Define Incrementing/Decrementing Fields
 61 Re-Image Fields

R3. parameter(s) Varies per option. See the following option descriptions.

Option 1 (Fixed Data)

Fixed data is information (a company name or store number) you want to print on all labels. You can define fixed characters for an entire field or for part of a field.

Syntax `R,1,"fixed char" |`

R1. R Option Header.

R2. 1 Option 1.

R3. fixed char Characters to insert. Enclose in quotation marks. If you are defining fixed characters for part of a field, place underscores(_) in non-fixed positions. Any spaces in the phrase are fixed characters. Range **0** to **2710**.

Underscore characters are stripped out and the data is compressed if no data is supplied by the batch and the field length is variable.

Example `R,1,"_ _ _%$_ _ _ _" |`

Uses fixed characters (%) in positions 4 and 5. The other positions are variable.

Example `R,1,"MONARCH" |`

"MONARCH" appears as a fixed field in this example.

To fill in the non-fixed portion of the field, see "Defining Batch Data Fields" in Chapter 6. As an alternative, you can apply Option 4 to copy data into the non-fixed character positions.

Option 4 (Copy Data)

You can create a field that uses data from another field. This is useful for creating merged fields or sub-fields. You can copy the information from multiple fields into one field by applying the copy procedure more than once. Copy data is the only option you can apply to a field more than once.

The maximum number of characters defined in box **T3** or **B3** must allow for the number of characters you will place in the field, including any price, check digit, or fixed characters inserted by the printer. The maximum number of characters in the field into which data is copied cannot exceed **2710** or the maximum number of characters permitted by the bar code.

When copying from more than one field, copy
into the destination field from left to right.

Syntax

```
R,4,src fld,src start,# to copy,dest  
start,copy code |
```

R1. R Field Option Header.

R2. 4 Option 4.

R3. src fld Field number from which data is copied. Range: **0** to **999**.

R4. src start Position number in the source field of the first character to be copied. Character positions are numbered **1** to **2710**, starting from the left.

R5. # to copy Number of characters to copy. Range: **1** to **2710**.

R6. dest start Position number where copied characters are to begin printing in the destination field. Range: **1** to **2710**.

R7. copy code Copy Method.

- 1** Copy field as is (including price symbols, pad characters, check digits, etc.).
- 2** Copy unformatted data (without price characters, pad characters, etc.).

Example R,4,3,1,3,1,1 !

Copies data from field #3, starting at the first position and copying three characters. In the destination field, the information is placed in position 1 and copied as formatted data.

Merging Fields

You can copy data to merge the contents of fields. Use the copy data option as many times as necessary to copy all the appropriate fields into the merged field.

In the following example, two text and two non-printable fields are shown. Data from these fields is merged to form field 5, and is then printed as a bar code.

Field	Data	Field Type
1	203	Non-printable
2	339	Non-printable
3	8	Text
4	BLUE	Text
5	2033398BLUE	Bar Code

To create this sequence:

1. Define fields 1, 2, 3, and 4.
2. Define field 5 as a bar code. Allow enough characters in the bar code field to hold all the copied characters.
3. Apply Option 4 to field 5 once for every source field.

Sub-Fields

You can copy a segment of data from one field into a new location, called a sub-field. For example, extract part of the data in a bar code and display it in text form in a sub-field. Then, use the copy data option.

Option 30 (Pad Data)

You can add characters to one side of a field to "pad" the field. Padding allows you to fill in the remaining spaces when the entered data does not fill an entire field.

If a variable length field is not completely filled with batch data, this option fills the remaining positions in the field with the character designated by Option 30.

Syntax R,30,L/R,"character" |

R1. R Option Header.

R2. 30 Option **30**.

R3. L/R Indicates type of padding

L Pad field on left side

R Pad field on right side

R4. "character" Pad character must be within the **0 - 255** decimal range and enclosed inside quotation marks.

NOTE: Do not use on fixed length fields.

Example R,30,L,"X" |

Pads data with an "X" on the left side of the field.

Sample Use for Padding

If you have a variable length bar code that you want to occupy a fixed amount of space on the supply, use pad characters. If the maximum number of characters in the bar code is 15, but the batch record only has 10 characters, the padding option fills the remainder of the field with pad characters.

Option 31 (Calculate Check Digit)

The printer generates a check digit if you apply Option 31 to the field. You cannot use this option if the field contains a UPC, EAN, or Code 39 (with the MOD43 check digit) bar code.

Syntax `R,31,gen/ver,check digit # |`

R1. R Option Header.

R2. 31 Option **31**.

R3. gen/ver Enter **G** to generate a check digit.

R4. check digit # Specifies a check digit scheme. Enter a number that identifies a check digit scheme that has been defined. For more information, see "Using Check Digits." Range: **1 - 10**.

Example `R,31,G,5 |`

Generates a check digit using the previously defined check digit scheme 5.

Option 42 (Price Field)

You can apply options that will insert monetary symbols automatically. Do not use this option with Option 31 (define a check digit) or Option 60 (increment or decrement a field). This option is not recommended for bar codes. When determining the maximum number of characters, add the maximum number of digits and the monetary symbols.

Syntax `R,42,appearance code |`

R1. R Option Header.

R2. 42 Option **42**.

R3. appearance code Enter **1** to print price field in standard notation, as defined by country setting.

Use the monetary formatting packet to select monetary notations and symbols by country setting. See "Defining the Monetary Formatting Packet" for more information. See Appendix C, "Symbol Sets/Code Pages," to make sure the monetary symbol you want to use is printable in the font selected for this field. For monetary symbols other than the dollar sign, use the internal symbol set.

Example R,42,1 |

Uses a price field that prints the monetary symbol and notations as defined in the monetary formatting packet.

Option 50 (Bar Code Density)

You can apply this option to bar code fields when you want to create custom densities. When you apply this option, it overrides the density value in the bar code field.

Do not use Option 50 with UPC or EAN bar codes. When using this option, set the density parameter in your bar code field to the default value. You can only use this option once for each bar code field. This option overrides the density selected in the bar code field.

Bar codes produced using Option 50 may not be scannable. The additional character gap, narrow space, and wide space parameters are valid **only** with Code 39 and Codabar. If these parameters are specified for any other bar codes, they will be ignored by the printer.

Syntax `R,50,narrow,wide,gap,nar_space,wide_space |`

R1. R Field Option Header.

R2. 50 Option **50**.

R3. narrow Dot width of the narrow element. Range: **1 - 99**.

R4. wide Dot width of the wide element. Range: **1 - 99**.

R5. gap Additional dot space between characters. Enter a value of **1 - 99**. (Code 39 and Codabar only.)

R6. nar_space Additional dot width of the narrow bar code space. (Code 39 and Codabar only). Range: **1 - 99**.

R7. wide_space Additional dot width of the wide bar code space. (Code 39 and Codabar only). Range: **1 - 99**.

Example `R,50,4,8,4,4,8 |`

Creates a custom bar code density with a narrow element of 4 dots, a wide element of 8 dots, a gap of 4 dots, 4 additional dot widths for the narrow bar code space, and 8 additional dot widths for the wide bar code space (if this is a Code 39 or Codabar bar code).

Option 51 (PDF417 Security/Truncation)

You can define a security level and choose whether or not to truncate a PDF417 bar code. Higher security levels add data to a bar code, improving scan reliability. Some damaged bar codes may still be scannable if the security level is high enough. You can use this option to create standard PDF417 bar codes or use the truncated option to create a narrower bar code. This option can appear only once per PDF417 field, in any order, following the bar code field.

As the security level is increased, so is the size of your PDF417 bar code. For each level increased, the bar code will double in size.

Syntax `R,51,security,stand/default !`

R1. R Option Header.

R2. 51 Indicates Option **51**.

R3. security Security level ranges from **0-8** (**0** is the default).

Higher security levels add data to a bar code, improving scan reliability. Some damaged bar codes may still be scannable if the security level is high enough.

R4. stand/def Truncation selector. Valid values:

S	(default) a standard PDF417 bar code
T	truncated

Example `R,51,2,S !`

Defines a security level of 2 for a standard PDF417 bar code.

Option 52 (PDF417 Width/Length)

This option defines the image width or length of a PDF417 bar code. If you define a fixed number of columns (width), the bar code expands in length. If you define a fixed number of rows (length), the bar code expands in width.

Column value does not include start/stop or left/right indicator columns.

If this option does not immediately follow the PDF417 bar code field, the default settings are used. You can only use this option once per PDF417 bar code field.

Syntax `R,52,row/column,dimension !`

R1. R Option Header.

R2. 52 Indicates Option **52**.

R3. row/column Indicates if you are defining the number of rows or columns.

R Row
C Column

If you specify rows, the bar code expands in columns, or vice versa.

R4. dimension The number of rows or columns defined for the bar code. The default is **4**. Valid values:

3-90 for rows
1-30 for columns

Example `R,52,C,10 !`

Defines the column width of 10, which expands the PDF417 bar code length by 10.

Option 60 (Incrementing/Decrementing Fields)

You may have an application, such as serial numbers, in which you need a numeric field to increment (increase in value) or decrement (decrease in value) on successive tickets within a single batch. Incrementing or decrementing can be applied to **numeric** data only. If you have a field that includes letters and digits, apply incrementing or decrementing to only the portion of the field that contains digits. Do not use with Option 42 (price field).

Syntax R,60,I/D,amount,l pos,r pos |

R1. R Option Header.

R2. 60 Option **60**.

R3. I/D **I** incrementing field
 D decrementing field

R4. amount Amount to increase or decrease. Range: **0 - 999**.

R5. l pos Leftmost position in inc/dec portion of field. If this value is not entered, the default value **1** is used. Range: **0 - 2710**.

R6. r pos Rightmost position in inc/dec portion of field. If this value is not used, the entire field length is used as the default. Range: **0 - 2710**.

Example R,60,I,5,1,6 |

Increments a field by 5 each time the field is printed. The field increments beginning with the first left position and ending with the sixth position.

Fixing the First Number in the Incrementing Sequence

There are two ways to enter the first number in the incrementing sequence. You can use batch data or use Option 1 to define the first number as a fixed character. The first number in the sequence must contain the same amount of digits as the highest number to be counted. For example, to count the numbers **1** to **999**, the first number in the sequence must be entered as **001**.

Option 61 (Re-image Field)

If you have a constant field that appears on top of a non-constant field, apply this option to the constant field. For example, you may create a tag for an item on sale. The tag shows both the old and the new prices, but has a line drawn through the old price.

The constant field can be a line, a box, a graphic, or constant text. This option redraws the constant field when the other field changes. If you do not use this option, the field may appear broken.

Syntax R, 61 |

Using Check Digits

Check digits are typically used to ensure that a text or bar code field scans correctly. If you apply Option 31, the printer calculates a check digit. A check digit scheme determines how the printer calculates a check digit. When you define a check digit scheme, you assign a number to identify it. This number is later entered in box **R4** when you apply Option 31 to a field. You can use check digits with text or bar code fields. Check digit calculations are performed on *numeric* data only.

Do not use check digits with price fields. Do not define a check digit scheme for UPC, EAN, Code 39 (with the MOD43 check digit), and Code 93 bar codes, because they have predefined check digits.

Syntax {A, selector, action, device, modulus, fld_length, D/P, "weights" | }

- | | |
|---------------------|---|
| A1. A | Check Digit Header. |
| A2. selector | Assign a number from 1 - 10 to this check digit formula. |
| A3. action | The action to perform. Enter A to add the check digit scheme. |
| A4. device | Format storage device. Options:
R RAM (default) When you turn off the printer, items saved in RAM are lost.
F Flash Memory. When you turn off the printer, items saved in Flash memory are saved. |

- A5. *modulus* Number from **2 - 11**. The modulus is used to divide the sum of products or the sum of digits.
- A6. *fld_length* The maximum number of characters the field will contain. Range: **0 - 2710**.
- A7. *D/P* Algorithm. The algorithm determines how the check digit is calculated. Options:
D sum of digits
P sum of products
- A8. *"weights"* String of digits used for calculation. A weight string is a group of two or more numbers that is applied to a field. The number of digits in this string should equal the number in *fld_length*. Enclose in quotation marks. Range: **0 - 2710**.

Example {A,1,A,R,10,5,P,"65432" | }

Adds check digit scheme number 1 to the printer's memory. The modulus is 10, the maximum number of characters in the field is 5. The check digit is calculated by using the Sum of Products and the string of digits used in the calculation is "65432."

Sum of Products Calculation

This is an example of how the printer uses Sum of Products to calculate a check digit for this data:

5 2 3 2 4 5 2 1 9

- Weights are applied to each digit, starting with the last digit in the weight string. They are applied right to left, beginning at the right-most position of the field. Remember, a weight string must contain at least two different numbers. This example has a weight string of **1,2,3,4**:

field:	5	2	3	2	4	5	2	1	9
weight string:	4	1	2	3	4	1	2	3	4

- Each digit in the field is multiplied by the weight assigned to it:

field:	5	2	3	2	4	5	2	1	9
weight string:	4	1	2	3	4	1	2	3	4
products:	20	2	6	6	16	5	4	3	36

- Next, the product of each digit is added together. This is the sum of the products.

$$20 + 2 + 6 + 6 + 16 + 5 + 4 + 3 + 36 = 98$$

- Divide the sum of the products by the modulus (**10** in this case), only to the whole number. The balance is called the remainder.

$$\begin{array}{r} 9 \\ 10 \overline{)98} \\ \underline{90} \\ 8 \end{array}$$

- Subtract the remainder from the modulus.

The result becomes the check digit. In this case, the check digit is **2**.

$$10 - 8 = 2$$

Sum of Digits Calculation

This is an example of how the printer uses Sum of Digits to calculate a check digit for this data:

5 2 3 2 4 5 2 1 9

- Weights are applied to each digit, starting with the last digit in the weight string. They are applied right to left, beginning at the right-most position of the field. Remember, a weight string must contain at least two different numbers. This example has a weight string of **1,2,3,4**:

field:	5	2	3	2	4	5	2	1	9
weight string:	4	1	2	3	4	1	2	3	4

- Each digit in the field is multiplied by the weight assigned to it:

field:	5	2	3	2	4	5	2	1	9
weight string:	4	1	2	3	4	1	2	3	4
products:	20	2	6	6	16	5	4	3	36

- Next, the digits of the products are added together. Two-digit products are treated as two separate digits.
This is the sum of the digits.

$$2 + 0 + 2 + 6 + 6 + 1 + 6 + 5 + 4 + 3 + 3 + 6 = 44$$

- Divide the sum of the digits by the modulus (**10** in this case), only to the whole number. The balance is called the remainder.

$$\begin{array}{r} 4 \\ 10 \overline{)44} \\ \underline{40} \\ 4 \end{array}$$

- Subtract the remainder from the modulus.

The result becomes the check digit. In this case, the check digit is **6**.

$$10 - 4 = 6$$

CREATING GRAPHICS

4

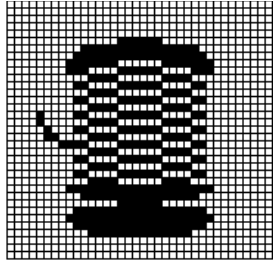
This chapter provides information on how to

- ◆ map out the graphic image using the hexadecimal (hex) or run length method.
- ◆ create a graphic packet using a graphic header, bitmap, duplicate, next-bitmap, text, constant text, line, and box fields.
- ◆ place a graphic image into a format.

You can use graphic packets to create bitmapped images. To include a graphic packet within your format, your format must contain a graphic field. See "Placing the Graphic in a Format" for more information.

Overview of Bitmapped Images

A printed image is formed through a series of dots. Each square on the grid below represents a dot on the printhead. The graphic image is created by blackening dots in a specific pattern. You can print varying shades of gray according to the concentration of dots on the image. When the dots are printed together, the end result is a graphic image.



Determining a Method

You can use one of two methods to map out your graphic image:

Hex Method

The dot sequences are segmented into binary numbers and then converted to hex numbers.

A graphic using gray-scaling, several slanted lines, or several vertical lines typically translates more efficiently with hex representation.

Run Length Encoding Method

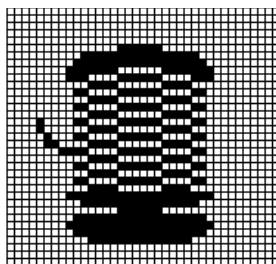
The dot sequences are segmented into black and white strings within a row. The total count of each white string is converted to a lower-case letter, corresponding to numeric value. The total count of each black string is converted to an uppercase letter, corresponding to numeric value. This method can reduce imaging time for graphics that contain repetitive rows of dots. A graphic with horizontal lines or very few white-to-black borders typically translates more efficiently with run length encoding.

The most efficient encoding method depends on how complicated your graphic image is and whether or not imaging time is a concern. You may want to experiment with both encoding methods to get optimal performance.

Designing Bitmapped Images

Once you determine the encoding method to use, you can begin mapping out your graphic image.

The image that you map must be an upside
down mirror image of the final result.



Special Considerations

Solid black print cannot exceed 25% of any given square inch of the supply. If the black print exceeds this limit, you may lose data or damage the printhead.

In the first label, the large "M" logo and thick black line exceed the allowed black to white print ratio. In the second label, the large "M" logo does not exceed the black to white print ratio.

2. Section off the grid in columns of eight. If any rows are not divisible by 8, add enough 0's to complete a column.

[illegible]

3. One row at a time, convert each group of eight binary digits to hex.

```
starting at position 49 ...
```

$$00111111 = 3F$$
$$11111111 = \text{FF}$$
$$11111111 = \text{FF}$$
$$11110000 = F0$$

4. Write the hex values for each row as a continuous string.

```
row 1, position 49 = 03FFFFFF000000
```

5. Repeat steps 3 through 4 for each row on the grid.

6. Insert the hex values in syntax format.

Using the Run Length Encoding Method

The following steps explain how to derive a run length character string from a bitmapped graphic.

For visual clarity, the following example shows "1" to indicate when a square is ON, and "0" to indicate when a square is OFF. You do not have to convert your dots when using the run length method.

1. Count the number of consecutive OFF or ON dots in a row. Write the number of consecutive dots in sequence for the first row on the grid. Write "ON" or "OFF" after each number to indicate ON or OFF dots.

2. Replace each number you have written with its corresponding code from the Dot to Run Length Encoding Chart provided in Appendix C, "Symbol Sets/Code Pages." Be sure to use CAPITAL letters for black dots and lower-case letters for white dots.

26 on (Z)
11 on (K), 26 off (z), 9 on (I)

.
.

If the number is greater than 26, write z, followed by the letter corresponding to the amount over 26. For example, to represent 45 off dots, write zs.

5 on (E), 45 off (zs), 6 on (F)

.
.

3. Write the letter codes in sequence, uninterrupted, for each row.

(row 1,position 50) Z
(row 2,position 39) KzI
(row 3,position 34) EzsF
(row 4,position 30) DpZoD

.
.

If the end of the line specifies OFF dots (lower-case letters), the ending lower-case letters can be omitted. For example, uZFu can be written as uZF.

4. Repeat steps 1 through 5 for each row on the grid.
5. Insert the code values in syntax format.

Determining How to Store the Image

Once you have mapped out your graphic image, determine how you want to store it. You have three options:

- ◆ RAM
- ◆ Temporary Storage
- ◆ Flash

Using RAM

You should use RAM when the graphic image is used by several formats, because you only have to send the graphic image once. This eliminates the need to send the graphic image repeatedly. See "Placing the Graphic in a Format," for more information about using the graphic packet in a format. Graphics smaller than approximately 1/2 inch by 1/2 inch can be stored in printer RAM and referenced by the graphic ID number.

Graphics are stored in the image buffer and remain there until another format is sent or the printer is turned off.

Using Temporary Storage

You should use temporary storage when the graphic image is used only in one format or your graphic image is very large. Graphic data in temporary storage is held in the image buffer until the graphic is printed. Then, it is cleared from memory when you send a new or updated batch. You can use the same graphic image multiple times on a format. Send the graphic image to the printer after the format to which it applies.

If a graphic is stored in temporary storage, do not place a graphic field in the format. This will cause an error. Instead, position the graphic image by using the row and column locations in the graphic packet header.

Image memory (temporary storage) will accept a graphic packet 2436 rows long with 384 dots per row.

Using Flash

You can use flash memory when the graphic image is used by several formats, because you only have to send the graphic image once. This eliminates the need to send the graphic image repeatedly. See "Placing the Graphic in a Format," for more information about using the graphic packet in a format.

Creating a Graphic Packet

Your graphic packet can contain

- ◆ bitmapped fields (for bitmapped images)
- ◆ constant text fields
- ◆ lines
- ◆ boxes.

Images using hex representation or run length encoding are bitmapped images. See "Designing Bitmapped Images" to design your bitmapped image.

Once you design your graphic image, you are ready to define a graphic packet. This packet generates the graphic image you use in a format.

Positioning the Graphic Image

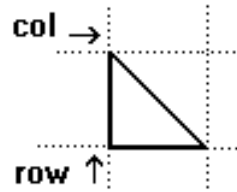
This section explains how to position the graphic image within a graphic packet header, a field of a graphic packet, or within a format.

Within the Graphic Packet Header

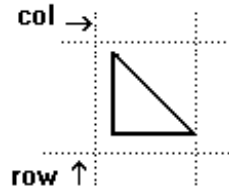
When you are using RAM, the row and column parameters in the graphic header are usually 0,0, because placement is controlled by the graphic field in your format.

When you are using temporary storage, these parameters control the placement of the graphic image on the supply.

The area enclosed within the dotted lines represents the graphic image starting at 0,0 (as defined in the graphic header).



If you want a fixed amount of white space around your graphic image, use something other than 0 for row and/or column.

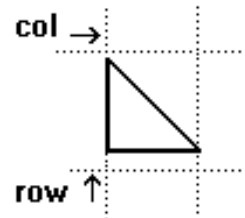


The area enclosed within the dotted lines represents the graphic image starting at 0,0 with a fixed amount of white space (10,10) around the graphic image.

Within the Field

In a bitmap, constant text, line, or box field, the row and column parameters control where an individual field or bitmapped row begins in relation to the coordinates defined in the graphic header.

The bottom of the triangle in this example represents the first field of the graphic packet starting at 10,0.

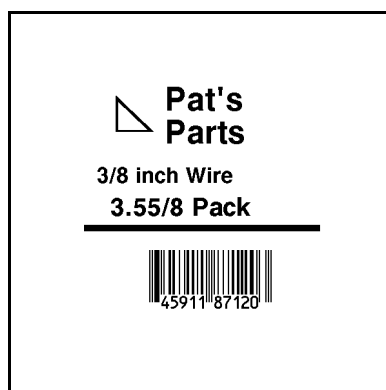


Within a Format

When you define the graphic field within your format, the row and column parameters represent where on the format to place the graphic image.

If you are placing a graphic (a logo, for example) within a certain area on your supply, enter the starting position (bottom left corner) of the graphic image.

This label shows the triangle "logo" beginning (the bottom left corner) at 155, 33 as defined in the graphic field.



Defining the Graphic Header

Every graphic packet must contain a graphic header. This is the first thing you enter. It identifies and provides important measurement and formatting information for the graphic. Bitmap, duplicate, next-bitmap, constant text, line, and box fields follow the graphic header, if they are used.

Syntax {G,graphID,action,device,units,row,col,
 mode,"name" }

G1. G Graphic Header.

G2. graphID Unique number from **0 - 999** to identify the graphic image.

G3. action The action to perform to the graphic. Options:
A Add the graphic.
C Clear the graphic from the printer.

<i>G4. device</i>	<p>Graphic storage device:</p> <p>R Volatile RAM (format must contain a graphic field) T Temporary Storage F Flash Memory</p> <p>NOTE: If you are using flash memory, send the graphic only once. Then, send only batches to reference it. If you re-send the graphic each time, it creates separate copies, and eventually fills up flash memory.</p>
<i>G5. units</i>	<p>Unit of measure. Options:</p> <p>E English, measured in 1/100 inches M Metric, measured in 1/10 mm G Graphic, measured in dots. For bitmapped graphics, G is the only valid option.</p>
<i>G6. row</i>	<p>Distance between the bottom of the graphic image area and the first bitmap line. This is usually 0, unless you want a fixed amount of white space around the graphic image. See "Positioning the Graphic Image," for more information.</p> <p>English 37 - 365 Metric 95 - 927 Dot 76 - 741</p>
<i>G7. column</i>	<p>Distance between the left edge of the graphic image area and the left edge of first bitmap line. This is usually 0, unless you want a fixed amount of white space around the graphic image. See "Positioning the Graphic Image," for more information.</p> <p>English 37 - 189 Metric 95 - 480 Dots 76 - 383</p>
<i>G8. mode</i>	Imaging mode. Enter 0 .
<i>G9. "name"</i>	Graphic name (optional), 0-8 characters, enclose within quotation marks.
<i>Example</i>	<code>{G,99,A,R,G,0,0,0,"99Wire" }</code>

Adds a graphic image identified by number 99 to volatile RAM. The graphic uses dot measurement. The image will be placed according to the row and column parameters in the graphic field. The imaging mode is 0 and the image is called 99Wire.

Creating Bitmap Fields

This defines one row of dots, starting at a specific row and column within the graphic image. Each unique row of dots requires a bitmap field. A bitmap field can later be repeated by using a duplicate field.

Syntax `B,row,column,algorithm,"data" |`

B1. B Bitmap Field.

B2. row Distance (in dots) from the graphic image's bottom margin to the bitmap line.

English	37 - 365
Metric	95 - 927
Dot	76 - 741

B3. column Distance (in dots) from the graphic image's left edge to the bitmap line.

English	37 - 189
Metric	95 - 480
Dots	76 - 383

B4. algorithm Coding method for bitmap data:

H	Hex Representation
R	Run Length Encoding

B5. data Character string made up of hex or run length encoding. Do not put spaces or any other character between the numbers. Range: **0 - 2710**.

Example `{B,39,56,H,"3FFFFFF0" |`

Defines a bitmapped graphic field. The image begins 39 dots from the bottom and 56 dots from the left edge of the graphic area. Hex representation is used.

Creating Next-Bitmap Fields

This field uses the previous field's row and column locations. It allows you to use the bitmap or duplicate field data without having to recalculate row and column locations. This field represents one row of dots on the image.

Syntax `N,adjdir,adjamt,algorithm,"data" |`

N1. *N* Next-Bitmap Field.

N2. *adjdir* Increments or decrements the row count. Inserts the duplicate line after or before the current row.

0 Increments (inserts after)
1 Decrements (inserts before)
For example:
 `B,50,35,R,"GsSsG" |`
 `N,0,R,"DpZoD" |`
 prints a next-bitmap field on row 51 at column 35.

N3. *adjamt* Amount of row adjustment in dot rows. Using **0** overwrites the same line. Range: **0 - 999**.

N4. *algorithm* Coding method for bitmap data:

H Hex Representation
R Run Length Encoding

N5. "*data*" Character string made up of hex or run length encoding. Do not put spaces or any other character between the hex numbers or run length code letters. Range: **0 - 2710**.

Example `B,39,56,H,"3FFFFFF0" |`
 `N,0,1,H,"000000E00000" |`

Defines a next-bitmap graphic field beginning on row 40. The row count increments by 1. Hex representation is used.

Creating Duplicate Fields

If a line of data is identical to a previous bitmap or next-bitmap field, the duplicate field allows you to repeat the dot sequence without retyping the data. A duplicate field represents one row of dots on the image.

Duplicate fields are useful when you have a
graphic with a lot of repetition.

Syntax `D, adjdir, adjamt, count |`

D1. D Duplicate Field.

D2. adjdir Increments or decrements the row count. Inserts the duplicate line after or before the current row.

0 Increments (inserts after)

1 Decrements (inserts before)

 For example:

`B,50,35,R,"GsSsG" |`

`D,0,20,2 |`

 inserts row 50 again at row 70 and row 90. Rows 70 and 90 do not have to be defined later.

D3. adjamt Amount of row adjustment in dot rows. Range: **0 - 999**. The above example adjusts the duplicate field to image on row 70 and 90 (adding 20 to the current row count).

D4. count Number of times to duplicate the line. Range: **0 - 999**.

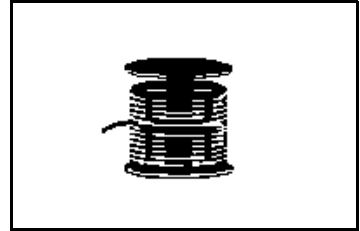
Example `B,117,24,H,"03FFFFFFFFFFFFFFFFFFFFFC" |`
 `D,0,1,2 |`

Defines a duplicate field that is imaged after the bitmap line. This field duplicates the preceding bitmap line twice (at row 118 and 119).

You can use constant text, line, or box fields in a graphic packet to create a compliance label overlay. See Chapter 2, "Defining Fields," for more information about these fields.

Sample Hex Graphic Packet

```
{G,99,A,R,G,0,0,0,"99WIRE"  
B,39,48,H,"3FFFFFF0" |  
B,40,32,H,"01FFC000000FF8" |  
B,41,32,H,"3E0000000000FC0" |  
B,42,24,H,"03C0003FFFFFF0000F" |  
B,43,24,H,"7C3FFFFFFFFFFFFFFE1F0" |  
B,44,16,H,"0183FFFFFFFFFFFFFFF06" |  
B,45,16,H,"018FFFFFFFFFFFFFFFEE" |  
B,46,16,H,"01FFFFFFFFFFFFFFFEE" |  
B,47,16,H,"01FFFFFF80001FFFFFFFFE" |  
B,48,16,H,"01FFFFFF0000000007FFFC" |  
B,49,24,H,"7F800007FFFF00003FF0" |  
B,50,24,H,"1FC00007FFFF00001FC0" |  
D,0,4,4 |  
B,51,24,H,"1C03FFFFFFFFFFFFFFE01C0" |  
D,0,4,4 |  
B,52,32,H,"3FFFFFFFFFFFFFFE1C0" |  
D,0,4,4 |  
B,53,24,H,"03FFF0000000007FFE" |  
D,0,4,4 |  
B,70,0,H,"0400001FC00007FFFF00001FC0" |  
B,71,0,H,"0600001C03FFFFFFFFFFFFFFE01C0" |  
B,72,0,H,"030000003FFFFFFFFFFFFFFE1C0" |  
B,73,0,H,"01000003FFF0000000007FFE" |  
B,74,8,H,"FC001C03FFFFFFFFFFFFFFE00C0" |  
B,75,8,H,"FE00003FFFFFFFFFFFFFFE0C0" |  
B,76,8,H,"1FF803FFF0000000007FFE" |  
B,77,8,H,"0FFFCFFC00000000000001C0" |  
B,78,16,H,"FFDF000FFFFFFFFF8003C0" |  
B,79,16,H,"7FFFC00007FFFF00001FC0" |  
B,80,24,H,"1C03FFFFFFFFFFFFFFE01C0" |  
D,0,4,4 |  
B,81,32,H,"3FFFFFFFFFFFFFFE1C0" |  
D,0,4,4 |  
B,82,24,H,"03FFF0000000007FFE" |  
D,0,4,3 |  
B,83,24,H,"1FC00007FFFF00001FC0" |  
D,0,4,3 |  
B,98,24,H,"03FFFFFFFFFFFFFFF0" |  
B,99,24,H,"07FFFFFFFFFFFFFFFC" |  
B,100,24,H,"1FF9FFFFFFFFFFFFFFF" |  
B,101,24,H,"3FFE0007FFFF8000FF80" |  
B,102,24,H,"391E0027FFFF803FFFC0" |  
B,103,24,H,"1C7FFFFFFFFFFFFFFFC0" |  
B,104,24,H,"1FC1FFFFFFFFFFFFFFF1FC0" |
```



```

B,105,24,H,"0FFDFFFFFFFFFFFFE0FF" ¦
B,106,24,H,"FFFFFFFFFFFFFFFFF8" ¦
B,107,32,H,"3FFFFFFFFFFFFFE0" ¦
B,108,32,H,"03FFFFFFFFFFFFF" ¦
B,109,48,H,"07FFFF80" ¦
D,0,1,2 ¦
B,111,48,H,"FFFFFFFF" ¦
B,112,32,H,"FFFF00000000FFE0" ¦
B,113,24,H,"078000FFFFFFFFF001F" ¦
B,114,24,H,"78FFFFFFFFFFFFFE060" ¦
B,115,16,H,"0187FFFFFFFFFFFFFC18" ¦
B,116,16,H,"027FFFFFFFFFFFFF2" ¦
B,117,16,H,"03FFFFFFFFFFFFFC" ¦
D,0,1,2 ¦
B,120,16,H,"01FFFFFFFFFFFFF8" ¦
B,121,24,H,"FEFFFFFFFFFFFFFE0" ¦
B,122,24,H,"07FFFFFFFFFFFFFC" ¦
B,123,32,H,"FFFFFFFFFFFFFC0" ¦
B,124,32,H,"01FFFFFFFFF8" ¦ }

```

Sample Run Length Graphic Packet

```

{G,99,A,R,G,0,0,0,"99WIRE" ¦
B,39,50,R,"Z" ¦
B,40,39,R,"KzI" ¦
B,41,34,R,"EzsF" ¦
B,42,30,R,"DpZoD" ¦
B,43,25,R,"EdZZEdE" ¦
B,44,23,R,"BeZZMeB" ¦
B,45,23,R,"BcZZW" ¦
B,46,23,R,"ZZZA" ¦
B,47,23,R,"ZDsZE" ¦
B,48,24,"TzkU" ¦
B,49,25,"HtRqJ" ¦
B,50,27,"GsSsG" ¦
D,0,4,4 ¦
B,51,27,"ChZWgC" ¦
D,0,4,4 ¦
B,52,34,R,"ZZEdC" ¦
D,0,4,4 ¦
B,53,30,R,"NzkN" ¦
D,0,4,4 ¦
B,70,5,R,"AuGsSsG" ¦
B,71,5,R,"BtChZWgC" ¦
B,72,6,R,"DxZZEdC" ¦
B,73,7,R,"CtNzkN" ¦

```



```

B,74,8,R,"FmChZWhC" |
B,75,8,R,"GsZZEdC" |
B,76,11,R,"JiNzkN" |
B,77,12,R,"NbJzzeC" |
B,78,16,R,"JaElZKmD" |
B,79,17,R,"QsSsG" |
B,80,27,R,"ChZWgC" |
D,0,4,4 |
B,81,34,R,"ZZEdC" |
D,0,4,4 |
B,82,30,R,"NzkN" |
D,0,4,4 |
B,83,27,R,"GsSsG" |
D,0,4,4 |
B,98,30,R,"ZZJ" |
B,99,29,R,"ZZM" |
B,100,27,R,"JbZZE" |
B,101,26,R,"MnToI" |
B,102,26,R,"CbHnTiP" |
B,103,27,R,"CcZZC" |
B,104,27,R,"GeZWcG" |
B,105,28,R,"JaZReH" |
B,106,32,R,"ZZI" |
B,107,34,R,"ZZE" |
B,108,38,R,"ZQ" |
B,109,53,R,"T" |
D,0,1,2 |
B,111,48,R,"ZF" |
B,112,33,R,"PzfK" |
B,113,29,R,"CpZBoE" |
B,114,25,R,"DcZZGfB" |
B,115,23,R,"BdZZMeB" |
B,116,22,R,"AbZZVbA" |
B,117,22,R,"ZZZB" |
D,0,1,2 |
B,120,23,R,"ZZZ" |
B,121,25,R,"ZZV" |
B,122,29,R,"ZZM" |
B,123,32,R,"ZZF" |
B,124,39,R,"ZT" | }

```

Placing the Graphic in a Format

To include a graphic within a format:

1. Design the graphic image as shown in "Designing Bitmapped Images."
2. If you are using RAM, place a graphic field in the format file to reference the graphic. See the following section, "Defining the Graphic Field," for more information.

If you are using temporary storage, you do not need a graphic field in your format to reference the graphic image.

3. Download all the necessary packets (check digit, format, etc.).
4. Send the graphic file to the printer, if you have not already done so. See "Creating a Graphic Packet" for more information.

Defining the Graphic Field

The graphic field in a format references the graphic image by the graphID in the graphic header. **This field is required only if the graphic will be stored in RAM.**

Syntax `G,graphID,row,col,mode,rotation !`

G1. G Graphic Field.

G2. graphID Unique number from **0 - 999** to identify the graphic image.

G3. row Distance between the bottom of the print area on the supply to the bottom of the graphic image. Measured in selected units.

English	37 - 365
Metric	95 - 927
Dot	76 - 741

The row specified in the constant text, bitmap, line, or box field is added to the row value above to determine the actual position in the format.

G4. column Distance between the left edge of the print area on the supply and the left edge of the graphic. Measured in selected units.

English **37 - 189**
Metric **95 - 480**
Dots **76 - 383**

The column specified in the constant text, bitmap, line, or box field is added to the col value above to determine the actual position in the format.

G5. mode Imaging mode. Enter **0**.

G6. rotation The orientation of the graphic on the supply. Enter **0**.

Example G,57,0,0,0,0 }

Defines a graphic field that is identified by the number 57. The image begins at 0,0. The imaging mode is 0 and there is no rotation.

Sample Bitmap Graphic Image

The following format shows the graphic packets (hex and run length) in a sample format.

```
{F,2,A,R,E,200,200,"FMT2" | }  
G,99,132,30,0,0 }  
Q,146,30,198,95,5," " }  
T,1,5,V,175,100,0,1004,1,1,B,L,0,0,0 }  
T,2,5,V,150,100,0,1004,1,1,B,L,0,0,0 }  
T,3,15,V,120,25,0,1003,1,1,B,L,0,0,0 }  
T,4,15,V,95,35,0,1003,1,1,B,L,0,0,0 }  
L,S,84,15,84,195,10," " }  
B,5,12,F,30,65,1,2,40,1,L,0 } }
```



CONFIGURING THE PRINTER

5

This chapter discusses how to

- ◆ upload the printer's configuration or font information.
- ◆ configure the printer using online configuration packets.
- ◆ use immediate commands to control the printer's operation at any time.

Using Online Configuration Packets

Use online configuration packets to change the printer's settings. You can send an individual configuration packet or a single packet containing all the configuration packets. Supply all parameters for each packet.

Make a copy of the online configuration worksheet in Appendix D, "Format Design Tools," and save the original. Packets A - M are listed on the worksheet.

When you turn off the printer, all the information in the online configuration packets is saved and used when the printer is turned back on. After you change printer configurations, you must resend the format, batch, or graphic to the printer before the changes take effect.

Some of these settings can be set offline or in
an application.

Always include an I, immediately after the left bracket { and before the packet identifier (A, B, C, etc.). The I parameter identifies the data stream as a configuration packet.

Include the I parameter with each packet if you are sending them individually. Include it only at the beginning of a data stream if you are sending multiple packets.

This is the syntax to use when you create online configuration packets:

Syntax

{	Start of Header
I,	Configuration Header
1 - 7 optional records	
A, parameter 1...parameter 5	System Setup
B, parameter 1...parameter 5	Supply Setup
C, parameter 1...parameter 5	Print Control
D, parameter 1...parameter 3	Monetary Formatting
E, parameter 1...parameter 9	Control Characters
F, parameter 1...parameter 5	Communication Settings
M, parameter 1...parameter 4	Memory Configuration
}	End of Header

Syntax for single packet

{	Start of Header
I,	Configuration Header
A, parameter 1...parameter 5	System Setup
}	End of Header

Syntax {I, O, U, N | }

Uploads the printer configuration from nonvolatile RAM and returns the following to the host.

```
A,0,0,0,1,0 |
B,0,0,1,0,0 |
C,0,0,0,0,0,0 |
D,1,0,2 |
E,"~123~044~034~124~125~126",",", "~013~010" |
F,3,1,0,0,1 |
G,0,65,65 |
M,R,R,160 |
M,T,R,20 |
M,I,R,320 |
M,D,N,1280 |
M,F,N,640 |
M,V,R,1280 |
```

The parameters for each packet (**A** - **M**) are displayed. Ignore the line beginning with **G**. In the first line that begins with **M**, 8725 is the total volatile memory available, 1345 is the memory used in volatile RAM. 2535 is the total non-volatile memory available, 615 is the memory used in non-volatile RAM. The remaining lines beginning with **M** list the buffer sizes in 1/10K for the Receive, Transmit, Image, Downloadable Fonts, Formats, and Scalable Fonts Buffers.

Configuration Syntax Guidelines

When creating a printer configuration packet:

- ◆ Follow the "Standard Syntax Guidelines" listed at the beginning of this manual.
- ◆ The first character after the Start of Header ({} is the Configuration Header (I).
- ◆ Include the first five ANSI codes, at a minimum, in the control characters packet.
- ◆ If you change any of the online configuration packets, resend the format packet to the printer, so the configuration changes take effect.

Defining the System Setup Packet

Use the system setup packet (A) to select the power up mode, display language, print separators between batches, print a "slashed zero," and select the symbol set.

Syntax {I, A, powup_mode, language, sep_on, slash_zero, symbol_set !}

A1. A System Setup Packet

A2. *powup_mode* Online Mode. Enter **0**.

A3. *language* Display Language. Enter **0** (for English).

A4. *sep_on* Batch Separators. Enter **0**.

A5. *slash_zero* Slash Zero. Options:
 0 Print a standard zero (default)
 1 Print a zero with a slash through it

A6. *symbol_set* Symbol Set. Use **0** for the Internal Symbol Set. For font 50 or TrueType® fonts, use:

- 1** ANSI
- 2** Code Page 437 (Latin U.S.)
- 3** Code Page 850 (Latin 1)
- 4** Code Page 1250 (Latin 2)
- 5** Code Page 1251 (Cyrillic)
- 6** Code Page 1252 (Latin 1)
- 7** Code Page 1253 (Greek)
- 8** Code Page 1254 (Turkish)
- 9** Code Page 1255 (Hebrew)
- 10** Code Page 1256 (Arabic)
- 11** Code Page 1257 (Baltic)
- 12** Code Page 1258 (Vietnamese)
- 13** DOS Code Page 852 (Latin 2)
- 14** DOS Code Page 855 (Russian)
- 15** DOS Code Page 857 (IBM Turkish)
- 16** DOS Code Page 860 (MS-DOS Portuguese)

NOTE: See Appendix C for more information.

Example {I, A, 0, 0, 0, 1, 0 ! }

Powers up the printer in the online mode, displays prompts in English, does not print a separator after each batch, prints zeros with slashes through them, and uses the internal symbol set.

Defining the Supply Setup Packet

Use the supply setup packet (B) to select supply type, ribbon, feed mode, supply position, and cut position.

Syntax {I, B, supply_type, ph_energy, feed_mode, supply_posn }

B1. B Supply Setup Packet

B2. supply_type Supply Type. Options:
 0 Black mark supply (default)
 2 Non-indexed supply

NOTE: You may need to adjust the print contrast (in the Print Control packet), based on the type of supply you are using.

B3. ph_energy **0** Standard Supplies
 1 Special (fax paper)
 2 High Energy (synthetic)

B4. feed_mode Feed Mode. Options:
 0 Continuous operation (default)
 1 On-demand mode

B5. supply_posn **-99 - 99** in 1/203 inch. 0 is the default. Do not change this setting. If you need to move the printing for a pre-printed area, change the print adjustment.

Example {I, B, 0, 2, 1, 0 }

Indicates black mark synthetic supply has been loaded, causes the printer to operate in on-demand mode, and does not adjust the supply position.

Defining the Print Control Packet

Use the print control packet (C) to set the contrast, print, and margin adjustment, print speed, and printhead width.

Syntax {I,C,contrast,print_adj,margin_adj,
 speed_adj,ph_width | }

C1. C Print Control Packet

C2. contrast **-28 - 40.** 0 is the default. You may need to adjust this value depending on the type of supplies you are using. For example, synthetic supplies require a higher print contrast, but receipt paper requires less contrast.

C3. print_adj **-99 - 99** in 1/203 inch. 0 is the default. Adjusts where data prints vertically on the supply. Increase the print position to move print up, decrease to move print down for a pre-printed area.

C4. margin_adj **-99 - 99** in 1/203 inch. **0** is the default. Adjusts where data prints horizontally on the supply. Increase the margin position to move print to the right, decrease to move print to the left.

C5. speed_adj Print Speed in inches per second (ips). Options:
0 The printer determines the print speed automatically.
 This is the default.
40 Formats not containing serial bar codes print at 4.0 ips.
 The printer does not print less than 3.0 ips when this is selected.

NOTE: Serial bar codes, lines, and graphics print at 2.0 ips.
 Synthetic supplies and special supplies print at 1.5 ips.

C6. ph_width Width of the printhead in dots. Use **0**.

Example {I,C,0,0,0,40,0 | }

Uses the default contrast, print adjustment, margin adjustment, prints at 4.0 ips when possible, and uses the default printhead width.

Defining the Monetary Formatting Packet

The monetary formatting packet (D) selects the monetary symbols to print for a price field. Use the monetary formatting packet to select primary and secondary monetary symbols, and designate the number of digits to appear at the right of a decimal.

Syntax {I,D,cur_sym,secondary,decimals | }

D1. D Monetary Formatting Packet

D2. cur_sym Currency Symbol. Options:

0	No symbol
1	USA (\$, Dollar- default)
2	UK (£, Pound)
3	Japan (¥, Yen)
4	Germany (₭, Deutsche Mark)
5	France (F, Franc)
6	Spain (P, Peseta)
7	Italy (L., Lira)
8	Sweden (Kr, Krona)
9	Finland (₯, Markka)
10	Austria (₧, Shilling)
11	India (Rs, Rupee)
12	Russian (₮, Ruble)
13	Korean (₩, Won)
14	Thai (฿, Baht)
15	Chinese (¥, Yuan)
16	Euro-Dollar (€)

NOTE: To use these symbols, select the internal symbol set.

D3. secondary Secondary Sign. Options:

0	No secondary sign (default)
1	Print secondary sign

NOTE: Secondary symbols only print if you designate at least one decimal place.

D4. decimals Number of digits to the right of the decimal. Options:

0	No digits
1	One digit
2	Two digits (default)
3	Three digits

Example {I,D,1,1,2 | }

Prints the dollar sign, uses a secondary symbol, and places two digits to the right of the decimal.

Defining the Control Characters Packet

Use the control characters packet (E) to enable and disable the immediate commands. **Do not change the MPCL control characters.**

Changes take effect with the first character following the end of header character } of the configuration packet. Each control character must be unique and cannot appear anywhere else in your packet, except within quotation marks. You can customize the trailer characters to work with your host.

Use the following syntax for the control characters packet. Notice all but the first parameter are within quotation marks.

Syntax {I,E,"ANSI_cd","string1","string2" | }

E1. E Control Characters Packet

E2. "ANSI_cd" ~123 Start of header { (left bracket)
 ~044 Parameter , (comma)
 separator
 ~034 Quoted strings " (quotes)
 ~124 Field separator | (pipe sign)
 ~125 End of header } (right bracket)
 ~126 Data escape ~~ (double tilde)
 character (optional)
def. ch. Immediate command character (optional).
 Up to any 3 characters in the 0 - 255 decimal
 range. The character must be defined before this
 command can be used. The caret (~094) is
 normally used.

NOTE: "ANSI_cd" includes seven separate parameters. The first five parameters are required. The other parameters are optional.

E3. "string 1" Terminator for status requests and ENQ requests. The default is "013". Sending "" disables this sequence.

E4. "string 2" Terminator for job requests and data uploads. The default is none. Sending "" disables this sequence.

You must send the control characters packet to enable the immediate commands. An immediate command will execute immediately, even if it is embedded within quotation marks, and all data following the command in the string will be ignored.

Example {I,E,"~123~063~034~124~125~126~094" | }

Enables immediate commands by defining the ^ (~094) symbol as the command identifier. The other MPCL control characters do not change.

Using Immediate Commands

Immediate commands affect printer operation as soon as the printer receives them, even if they are included within a packet or used inside quotation marks.

You can use immediate commands to change immediate command or status polling control characters, reset the printer, or cancel and repeat batches.

Enabling Immediate Commands

When the printer is first turned on, these commands are not available. To use these commands, you must first send the control characters packet and define the immediate command control character. The immediate command control character is saved in non-volatile RAM so it is not lost after you turn off the printer. Once the immediate command control character is defined, the immediate commands are enabled.

Sending Immediate Commands

Immediate commands consist of a three- or four-character sequence you can send in a packet or embed in your application. Each command must be sent separately.

Syntax control_character_immediate command

The printer can accept only one immediate command at a time. Sending a command before the previous one is completed can result in an error.

Example ^CB

Immediately cancels the batch currently printing unless an error exists in the printer. This example assumes that the defined immediate command control character is the caret (^).

Command	Parameter
^CA	Cancels all the batches in the queue unless an error exists on the printer.
^CB	Cancels only the current batch being printed unless an error exists.
^DD or ^DCd	Disables the MPCL data escape character (the tilde) and inhibits MPCL from acting on ANY data escape sequence from the host. Sets the MPCL data escape character to the ASCII value given by the d parameter. The value can be any ASCII character.
^EA	Aborts an error condition. This command is the same as the left ⏏ button to clear an error. May need to be sent multiple times. Use ^RB to reprint batch. CAUTION: This command causes the current batch to stop and the condition that caused the error to remain uncorrected.
^ER	Resets the error. This command is the same as pressing ⏏ to acknowledge an error. Normal operation will resume.
^FD	Feeds a label when printer is idle . Simulates the operation of pressing ⏏ and dispenses the next label if printer is in the on-demand mode (purchase optional). NOTE: Printer ignores this command if printing.
^ID or ^ICd	Disables the Immediate Command feature by turning off the Immediate Command escape character. Sets the Immediate Command escape character to the ASCII value given by the d parameter. The value can be any ASCII character. Use ^IE to enable immediate commands.
^MC	Returns the customer ID or RPQ version to the host. (00 - 99)
^MD	Returns the printhead dot density to the host. 00 = 203 dpi 01 = 300 dpi
^MF	Uploads the MIF file to the host.
^MI	Returns the customer ID or RPQ revision level to the host. (00 - 99)
^MM	Returns the model number to the host. 30 = 6039
^MP	Returns the prototype number to the host. (00 - 99)
^MR	Returns the revision number to the host. (00 - 99)
^MS	Returns the flash file system information (fonts).
^MV	Returns the version number to the host. (00 - 99)
^PR	Resets the printer. This command takes five seconds to complete and then the printer is ready to receive data. It has the same effect as turning off and then turning on the printer. NOTE: Command should be used only when the printer is not printing.
^RB	Repeats the last printed batch, printing the same number of labels as specified in the original batch. This command does not work if using batch separators. NOTE: Printer ignores this command if printing.
^RS	Resynchronizes supply when supply roll is changed. NOTE: Printer ignores this command if printing.

Command	Parameter
^SD or ^SCd	Disables the status polling feature by turning off the status polling control character. Sets the status polling control character to the ASCII value given by the d parameter. The value of d can be any ASCII character.
^TP	Prints a diagnostic label set. NOTE: Printer ignores this command if printing.

The table represents the defined immediate command control character as **^** and the defined status polling control character as **d**. You may define these characters to suit your needs.

To use the immediate command control character or the status polling character within your data, use the tilde sequence.

Defining the Communication Settings Packet

Use the communication settings packet (F) to set the baud rate, word length, stop bits, parity, and flow control for serial communications. **Do not change the communication settings.**

Syntax {I,F,baud,word_length,stop_bits,parity,flow_control | }

F1. F Communication Settings Packet

F2. baud Baud Rate. Enter **7** for 115200.

F3. word_length Word Length. Enter **1** for an 8-bit word length.

F4. stop_bits Stop Bits. Enter **0** for 1-stop bit.

F5. parity Parity. Enter **0** for None.

F6. flow_control Flow Control. Enter **3** for XON/XOFF.

Example {I,F,7,1,0,0,3 | }

Uses 115200 baud, an 8-bit word length, one stop bit, no parity, and XON/XOFF mode.

Defining the Memory Configuration Packet

Use the memory configuration packet (M) to customize the size of your printer's buffers, which gives you greater flexibility in your formats.

Memory must be allocated in 1/2K increments. The memory configuration packet does not accept decimals, so enter whole numbers. Multiply the amount to reallocate (in K) by 10. For example,

To reallocate (in K)	Enter this amount
1	10
1.5	15
2	20
2.5	25
153	1530
229.5	2295

Each buffer's allocated memory remains in effect until that buffer is reallocated. For this reason, you may want to reallocate all the buffers when reallocating any buffer. If you reallocate more memory than you have available, you will receive an error.

Syntax {I,M,buffer,device,buffer_size | }

M1. M Memory Configuration Packet

M2. buffer Buffer type:

D	Downloadable Fonts
F	Format
I	Image
R	Receive
T	Transmit
V	Scalable (vector) fonts

M3. device Storage type:

Use **R** (volatile RAM)

NOTE: You cannot reallocate flash memory.

M4. buffer size Buffer size in 1/10K ranges. Options:
5 - 40 Transmit (16 is the default)
20 - 160 Receive (64 is the default)
160 - 1142 Image (380 is the default)
160 - 1280 Format (320 is the default)
640 - 1280 Downloadable Fonts (640 is the default)
10 - 1280 Scalable Fonts (640 is the default)

NOTE: For the scalable font buffer, specify 10 if you do not use the buffer. When using the buffer, specify a minimum of 40.

The larger the number you specify for the image buffer, the longer your formats can be. As a rule of thumb, divide the value you select by 100, and round up to the next whole number. That number will be the length in inches.

Example {I,M,I,R,1530 | }

Stores the image buffer in volatile RAM and allocates 153K for it.

Checking Current Buffer Sizes

Send a configuration upload packet to check the sizes of your current buffers. See "Configuration Packet Header" for more information. After you check your current buffer sizes you can begin reallocating memory.

If you want to increase your image buffer and you will not be using scalable fonts, add that memory into your image buffer.

<i>Example</i>	{I,M,R,R,20	Receive buffer	2K
	M,T,R,10	Transmit buffer	1K
	M,D,N,80	Downloadable fonts	8K
	M,V,R,160	Scalable fonts buffer	16K
	M,I,N,3200 }	Image buffer	320K

Make sure memory is available before adding memory to a buffer. In the above example, if the image buffer (M,I,N,3200) was defined before the downloadable fonts and scalable fonts buffers (M,D,N,80 and M,V,R,160) were defined, an error would have occurred.

About Memory Buffers

<i>Transmit Buffer</i>	Used to send ENQ, job, and upload responses. This buffer must be allocated as volatile (R) RAM.
<i>Receive Buffer</i>	Used to save data received from the host before it is processed by the printer. Changing this buffer size affects the amount of data the printer can receive without using flow control. This buffer must be allocated as volatile (R) RAM.
<i>Image Buffer</i>	Used to image the current format. To use supply lengths greater than 4.0 inches, you must reconfigure memory. An image up to 11.65 inches can be created by increasing the image buffer. You may not be able to use scalable or downloadable fonts if you have allocated memory from these buffers into your image buffer. Use the formula below to calculate the required image buffer size.

$$10K \times Length$$

Length is the length of your label in inches.

Example

$10K \times 6 = 60K$
(Multiply by 10 and round up.)
 $60K \times 10 = 600$
Enter 600 for your Image buffer.

Format Buffer

Used to store formats, batch data, and graphics. Use the following formula to calculate the required format buffer size:

$$\text{Linecount} \times 50/1024$$

Linecount is the number of lines in your format packet including the format header and all the options.

The result of the above calculation is in kilobytes.

*Downloadable
Fonts Buffer*

Used to store downloaded soft TrueType fonts. To determine the size of your downloadable fonts, send a font packet. The file size, in bytes, is the minimum amount needed in this buffer. See "Using the Font Packet" for more information.

*Scalable (Vector)
Fonts Buffer*

Used to image the scalable or downloaded TrueType font characters. Increasing this buffer size allows more characters to be saved in cache memory, so the characters do not have to be re-built the next time they are printed. Use **0** if you are not using scalable/TrueType fonts. This buffer must be allocated as volatile (**R**) RAM. The printer does not print the fonts if there is not enough memory in this buffer to image them.

Buffer Worksheet

Make copies of this page to use as a buffer worksheet.

Buffer Allocation Considerations

Keep these items in mind when allocating memory.

- ◆ Do not allocate more memory than what is available.
- ◆ Free memory from one buffer *before* you add it to another buffer.
- ◆ Reallocate all the buffers if you need to reallocate any buffer.

	HEADER	BUFFER	DEVICE	BUFFER SIZE
DOWN LOADABLE FONTS BUFFER	M	D		
FORMAT BUFFER	M	F		
IMAGE BUFFER	M	I		
RECEIVE BUFFER	M	R	R	
TRANSMIT BUFFER	M	T	R	
SCALABLE FONTS BUFFER	M	V	R	

- ◆ Send all buffer (re)allocations in one packet. The printer evaluates each individual buffer allocation separately. If one buffer allocation is invalid, the entire packet is invalid. For example, if you send


```
{I,M,R,N,20 |
M,T,N,60 |
...}
```

 the printer ignores the entire packet, because the second line allocates 6K for the transmit buffer, and 4K is the maximum for that buffer. If you define a buffer size that exceeds the maximum value, an error occurs. However, no information is lost.
- ◆ Whenever the printer accepts a memory configuration packet, it takes effect immediately, causing a printer reset. Any information contained in the buffers is lost. Resend your formats, batches, graphics, or fonts to the printer.
- ◆ If you remap your image buffer, make sure the length and width specified in your format header are not too large for the current image buffer. In other words, if you remap for a 2 x 6 inch label, you cannot print a 2 x 8 inch label without receiving an error, until you change your format header or increase your image buffer.

Memory Considerations with Downloaded TrueType Fonts

- ◆ The size of the TrueType font file, in bytes, is the minimum amount of memory you must have available in the downloadable fonts buffer.
- ◆ The scalable (vector) fonts buffer is used to image the downloaded fonts (TrueType). If you are using several downloaded TrueType fonts, you may need 100K or more in this buffer. The printer does not print the fonts if there is not enough memory in the scalable (vector) fonts buffer.
- ◆ To use large point sizes (greater than 60 point), you must reconfigure memory and increase the size of the scalable (vector) fonts buffer.

Clearing Packets from Memory

You may want to remove packets from the printer to increase memory storage capacity or if the formats/fonts are no longer needed. In some cases, turning the printer off may clear the packets from memory. If not, send a format clear packet.

Syntax {header,packet#,action,device | }

- 1. header** Identifies the packet. Options:
- A** Check Digit Scheme
 - F** Format
 - G** Graphic
 - W** Font
- 2. packet#** Identification number of the packet to clear (**1 - 999**) or font number (**0 - 9999**). 0 is for all fonts.
- 3. action** Enter **C** to clear the packet.
- 4. device** Storage device. Options:
- N** Nonvolatile RAM
 - R** Volatile RAM
 - F** Flash Memory

Example {F,1,C,R | }

Clears Format #1 from volatile RAM.

Using the Font Packet

You can use a font packet to add or clear downloaded fonts from memory, upload your font buffer, font data, or the cell size information for a particular font. The font packet is useful when you are downloading fonts. If you are using downloaded fonts, the font number and the number of bytes each downloaded font uses is listed.

This packet *does not* list the number of bytes the standard printer fonts use.

Use the Monarch® MPCL Toolbox (available at www.paxar.com) to create the font header and data. Refer to the Toolbox's online help for more information.

Syntax	{W, font#, action, device, data_length, data_record }
W1. W	Writable Font Header.
W2. font#	The font identifier from 0 - 32000 . Use 0 to specify all fonts.
W3. action	Action. Options: A Adds the specified font. C Clears all or specified fonts, except ones in flash. H Uploads font size information. M Uploads font memory usage information.
W4. device	Device. Options: R Volatile RAM Z All devices (use for upload).
W5. data_length (optional)	The length of the font data. The range is 68 - 16384 .

If you are creating fonts, you need to have font data included with this packet.

W6. data_record (optional)	Multiple data records define the font. The first character is either an H (hex) or an R (run-length), referring to the algorithm. The rest of the record is up to 2710 characters of font data in double quotes. Separate the algorithm and the data with a comma, and end the record with <code> </code> .
-----------------------------------	---

Example {W,0,M,R ! }

Selects all fonts and checks the memory usage in RAM. The printer returns the following to the host:

```
{W,0,M,R !  
Number of bytes free, Number of bytes used ! }
```

Example {W,0,H,Z ! }

Selects all fonts and uploads the font size information for any downloaded fonts.

The printer returns the following to the host:

```
{W,0,H,Z !  
0,1,0,"Standard",0,0,0,21,33,21,33,5,1 !  
0,1,437,"Standard",0,0,0,21,33,21,33,5,1 !  
0,2,0,"Reduced",0,0,0,10,21,10,21,2,1 !  
0,2,437,"Reduced",0,0,0,10,21,10,21,2,1 !  
0,3,0,"Bold",0,0,0,36,51,36,51,5,1 !  
0,3,437,"Bold",0,0,0,36,51,36,51,5,1 !  
0,4,0,"OCRA",0,0,0,19,36,19,36,5,1 !  
0,4,437,"OCRA",0,0,0,19,36,19,36,5,1 !  
0,5,0,"HR1",0,0,0,18,30,18,30,3,1 !  
0,5,437,"HR1",0,0,0,18,30,18,30,3,1 !  
0,6,0,"HR2",0,0,0,26,24,26,24,2,1 !  
0,6,437,"HR2",0,0,0,26,24,26,24,2,1 !  
0,50,0,"Swiss Bold",1,1,92248  
0,50,437,"Swiss Bold",1,1,92248 }
```

Spacing Monospaced (0) or proportional (1).

Type Bitmapped (0) or scalable (1).

Baseline Bottom of the font.

Cell Width Horizontal number of dots to contain the widest character.

Cell Height Vertical number of dots to contain the tallest character.

Nominal Width	Average width for lower-case letters.
Nominal Height	Average height for lower-case letters.
Inter-Character Gap	Default spacing between characters in monospaced fonts.
Printhead Density	Displays whether a 203 (0) dpi or 300 (1) dpi printhead is used.

Uploading Format Header Information

You can upload format header information from the formats in memory to check the supply length and width for each format.

Syntax {header,format#,action,device | }

F1. header Format Header

F2. format# Format number from 0 - 999. 0 is for all formats in memory.

F3. action Action. Options:
 A Adds the specified format
 C Clears the specified format
 H Uploads format header information

F4. device Device. Options:
 R Volatile RAM
 Z All devices (use for upload)

Example {F,0,H,Z | }

Selects all formats in memory and returns the following:

Example {F,0,H,Z |
 Fmt_1,406,406 |
 Fmt_10,324,406 |
 Fmt_15,812,812 |
 Fmt_20,305,609 |
 Fmt_25,1218,406 | }

Displays the format number, supply length and supply width (in dots) for each format in memory.

Example { F, 1, H, Z | }

Selects format1 and returns the following to the host:

```
{ F, 1, H, Z |  
Fmt_1, 406, 406 | }
```

Displays the supply length and supply width (in dots) for format1.

PRINTING

6

This chapter describes how to define the batch header, batch control, and batch data files.

Defining the Batch Header

Batch data is the actual information printed on the supply. Batch data fills in the format's text, bar code, and non-printable text fields.

A batch packet contains the following three parts:

batch header	identifies the format and how many labels to print.
batch control	defines the print job.
batch data (optional)	defines the actual information printed on the label.

A batch header begins the file. It tells which format the batch uses and how many labels to print. To record batch data, make a copy of the worksheet in Appendix D, "Format Design Tools."

Syntax {B, format#, N/U, quantity }

B1. B Batch Header.

B2. format# Format number (**0-999**) to use.

B3. N/U Controls how image is generated.

N New (default). Erase image and re-image all fields using online data. Any missing fields will be blank.

U Update last image with one or more fields.
All other fields remain the same as the last
queued batch.

B4. quantity Quantity to print (**1-24**).

NOTE: Using **0** pre-images the field to reduce the imaging time for labels. See "Batch Quantity Zero Method" for more information.

Example {B, 1, N, 1 }

Defines a batch header that uses format #1 and reimages all fields using the online data. One label is printed with this batch.

Defining the Batch Control Field

The batch header must precede this field. The batch control field defines the print job and applies only to the batch that immediately follows.

Syntax `E, feed_mode, batch_sep, print_mult,
 multi_part |`

E1. E Batch Control Field.

E2. feed_mode Feed Mode. Options:

 0 Continuous Feed (default)
 1 On-Demand

E3. batch_sep Batch Separator. Use **0**.

E4. print_mult Number of tags (**1 - 24**) with the same image.

E5. multi_part Number of identical parts on one tag (**1 - 5**).

Example `E, 0, 0, 1, 1 |`

Defines a batch control field. Continuous feed mode is used and no separator prints between batches.

Defining Batch Data Fields

Batch data fields should be sent in field number order. Use continuation fields for large amounts of data. If you are using **N** (New) in the batch header, you must list all fields with your data in sequence. If you are using **U**, you need to list only those fields and data that changes from the last printed batch.

Syntax	<code>field#,"data string" C,"continuation" </code>
<i>field#</i>	Identifies the text, bar code, or non-printable text field in which to insert the following data. Range: 0 - 999 .
<i>"data string"</i>	Provides the actual information to appear in fields. Enclose in quotation marks. Length: 0 - 2710 characters.
<i>C</i>	Optional. Identifies information to be appended to the data string.
<i>"continuation"</i>	Optional. Provides the actual information to be added to the batch packet. Enclose in quotation marks. Use this option to break up longer fields. Length: 0 - 2710 characters.

Example	<code>1,"Size 12" 2,"" 3,"Blue" C,"and this would be appended." </code>
----------------	--

Defines a batch data field. "Size 12" prints in field #1, a blank line appears in field #2, "Blue and this would be appended" prints in field #3.

Using Special Characters in Batch Data

There are two ways to specify special characters in batch data:

- ◆ Place a tilde (~) before each character.
- ◆ Use a tilde with the decimal ASCII equivalent.

For example, you can use "" or ~034 to print the " character in your batch data; otherwise, the tilde characters are ignored. You can also use ~XXX where XXX is the decimal equivalent of an unprintable character.

Sample Batch Data with Special Characters

{B,1,N,1	Decimal Character	What Prints
1,"123~034456789"	~034 is "	123"456789
2,"~094983~'126LG4451"	~094 is ^ ~126 is ~	^983~'LG4451

Merged or Sub-Fields

If a field is completely filled by data copied from other fields, use quotation marks without spaces between them for *data string*.

Incrementing Fields

In incrementing fields, the first number in the sequence must contain the same number of digits as the highest number to be counted. For example, to increment the numbers in a field from 1 to 999, enter the starting number in the batch as 001.

Downloading Methods

You can download the format and batch data using one of three methods: sequential, batch, and batch quantity zero.

Sequential Method

Using the sequential method, you send all your format and batch data at one time. Use this method when your application does not require operator intervention to input data. All data is sent down at one time, and the printer then images each field. As soon as the last field is imaged, your labels begin to print.

Example {Format}
 {Batch Packet}

Batch Method

This is similar to the sequential method, but it is used when you want to send multiple batches. All data for the first batch is sent at one time, and the printer then images each field. As soon as the last field for the first batch is imaged, labels begin to print. This process is repeated for each subsequent batch.

Example {Format}
 {Batch Packet}
 {Batch Packet}

Batch Quantity Zero Method

You may use the batch quantity zero method when your application requires operator intervention to enter data. While the operator is entering data, the previous field is sent with a batch quantity of zero. The printer images the field, but does not print it. After the operator enters the data for the last field, the batch quantity can be specified. The last remaining field is imaged, and the label prints almost immediately.

To use the batch quantity zero method:

1. Send the format and a batch header in one file. The first time you send the batch header, use the parameter **N** (new batch), and the parameter **0** for (zero quantity). This ensures the label is properly positioned.

The printer images constant text, line, and box fields, but does not print them.

2. Input data for each field, and send it with a batch header using the parameter **U** (batch update) and a quantity of zero. When the printer receives the data, it immediately images the field, but does not print it.

At this time, the printer is imaging all associated fields, including fields that copy from other fields.

3. Repeat step 2 for each field except the last one.
4. For the last field, input data and send a batch header with the quantity of labels you want printed. When the printer receives input for the last field, it immediately prints the labels. See "Reducing Imaging Time" in Chapter 8 for an example using the batch quantity zero method.

Modifying Formats

The optional entry method is a quick way to modify your format fields, check digit fields and configuration packets.

Optional Entry Method

This method enables you to reset only the parameters you want to change. Commas act as placeholders for unchanged parameters. The optional entry method reduces file size and increases the speed at which files are sent to the printer.

TROUBLESHOOTING

7

This chapter explains how to

- ◆ print diagnostics labels
- ◆ reset the printer
- ◆ call Technical Support.

This chapter also provides explanations of your printer's errors. The errors are classified by type and are listed in order. If you have trouble loading supplies or performing maintenance, refer to your *Operator's Handbook*.

Follow the directions provided with the error description to correct the problem. If you cannot clear an error, turn off the printer, wait several seconds and then turn on the printer. Call Technical Support if you receive any error message not listed in this chapter.

Printing Diagnostics Labels

1. Select the printer icon from status bar on the display.
2. Select **Printer Diagnostics**.
3. Select **Printer** from the **Printer Diagnostics** menu.
4. Select **Diagnostic Labels** from the **Printer Tests** menu.
5. Select **Diag Label** from the **Diagnostic Labels** menu.

```
Monarch
MODEL:6039 S/M:Version 1.0
A,0,0,0,0,0; B,0,0,0,0,0;
C,3,0,0,0,0;
D,1,0,2;
E,{,,",,,},-,0d/0a;
F,4,1,0,0,3;
G,0,0,0;
H,D,R,640; M,F,R,320;
M,I,R,380; M,R,R,40;
M,T,R,10; M,V,R,640;
```

```
Monarch
MODEL:M6039 S/M:Version 1.0
TOTAL INCHES:      0000505
HI ENERGY INCHES: 0000000
VOLTAGE:           07.45
CONTRAST POT:      N/A
PH RESISTANCE:     (0384) 0319
BAD DOTS:          000
MEMORY:            1024KR/2048KN
OPTIONS:           --
SMID: N/A
```

Two diagnostic labels print. The diagnostic labels show the printer's configuration, as well as the model number and software version number. Refer to the *System Administrator's Guide* to print the checkerboard, grey scale, serial and parallel quality labels.

Reading Diagnostics Labels

The first diagnostic (test) label shows the model number, software version, and the printer's configuration by packet. See Chapter 5, "Configuring the Printer," for more information about the printer's configuration.

The second diagnostic (test) label shows the model number, software version, total number of inches printed, voltage, print contrast, printhead resistance, number of bad dots, and memory. In the example above:

- ◆ The printer has printed 505 inches of regular supplies
- ◆ The printer has printed no high-energy (synthetic) supplies
- ◆ No options are set
- ◆ CONTRAST POT does not apply.

If You Receive an Error Message

Any time you receive a message that is not described in this manual, or the recommended action does not solve the problem, call Technical Support.

Calling Technical Support

Technical support representatives are available Monday through Friday during regular business hours. Their number is listed on the back cover of this manual. Follow these steps before you call:

1. Make sure your PC and printer are properly connected.
2. Record any error messages that occurred.
3. Recreate the problem, if you can.
4. Check your port settings. Your problem may be corrected simply by changing the communication settings.
5. List any changes that have recently been made to the system. Try to record what you were doing when the problem occurred.
6. Reboot your computer. Refer to your computer documentation for specific instructions.
7. Print the Diagnostics labels. See "Printing Diagnostics Labels" for more information.

If these steps do not solve the problem, call Technical Support.

Have the following information ready before you call:

- ◆ computer brand name and type of software or terminal brand name and model
- ◆ Monarch printer model
- ◆ printer serial number
- ◆ support agreement, contract number, or invoice information
- ◆ customer number

Data Errors

A data error indicates that incorrect data was received from the host, causing the printer to ignore the entire print job. After checking the packet and correcting the problem, transmit the print job again.

The following is a list of data errors. These errors occur because data in the format, batch, check digit, font, or graphic packet is invalid.

Format Errors

Error Code	Description
001	Format ID number must be 1 - 999 .
002	Name must be 1 - 8 characters inside quotes or a printer-assigned name ("").
003	Action must be A (add) or C (clear).
004	Supply length is invalid (maximum is 4 "). See "Defining the Format Header" in Chapter 2 for valid lengths.
005	Supply width is invalid (maximum is 2 "). See "Defining the Format Header" in Chapter 2 for valid widths.
006	Storage device must be R (volatile RAM), T (temporary storage), or F (flash memory).
007	Unit of measure must be E (English), M (Metric), or G (Dots). See "Defining the Format Header" in Chapter 2 for more information.
010	Field ID number is outside the range 0 - 999 .
011	Field length exceeds 200 .
012	Row field position is greater than the maximum stock dimension. See "Defining Text Fields" in Chapter 2 for valid row lengths.

- 013 Column field position is greater than the maximum stock dimension. See "Defining Text Fields" in Chapter 2 for valid column widths.
- 014 Font style is invalid. Must be **1, 2, 3, 4, 5, 6, 10, 11, 50, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, or 1013**. See "Defining Text Fields" in Chapter 2 or Appendix B, "Fonts," for more information.
- 015 Character rotation must be **0** (0 degree), **1** (90 degree), **2** (180 degree), or **3** (270 degree). See "Defining Text Fields" in Chapter 2 for more information.
- 016 Field rotation must be **0** (0 degree), **1** (90 degree), **2** (180 degree), or **3** (270 degree). See "Defining Text Fields" in Chapter 2 for more information.
- 017 Field restriction must be **V** (variable) or **F** (fixed).
- 018 Invalid text code page selection. Must be **0** (Monarch internal), **1** (ANSI), **2** (DOS 437), **3** (DOS 850), **437** (DOS Page 437), **850** (DOS Page 850), **852** (Latin 2), **855** (Russian), **857** (Turkish), **860** (Portuguese), **1250** (Latin 2), **1251** (Cyrillic), **1252** (Latin 1), **1253** (Greek), **1254** (Turkish), **1255** (Hebrew), **1256** (Arabic), **1257** (Baltic), or **1258** (Vietnamese). See "Defining Text Fields" in Chapter 2 for more information.
- 020 Vertical magnification must be **1 - 7** or for TrueType/Scalable fonts, use **4 - 250** (the point size).
- 021 Horizontal magnification must be **1 - 7** or for TrueType/Scalable fonts, use **4 - 250** (the point size).
- 022 Color must be **B, D, O, R, or W**. See "Defining Text Fields" in Chapter 2 for more information.
- 023 Intercharacter gap must be **0 - 99** dots.

- 024 Field justification must be **B** (balanced), **C** (centered), **E** (end), **L** (left), or **R** (right). See "Defining Text Fields" in Chapter 2 for more information.
- 025 Data length is too long.
- 030 Bar code height must be at least **1** (English), **2** (Metric), **1** (Dots), or is not within the supply dimensions.
- 031 Human readable option must be
- 1** no CD or NS
 - 5** NS at bottom, no CD
 - 6** CD at bottom, no NS
 - 7** CD and NS at bottom
 - 8** no text
- 032 Bar code type is invalid. See "Defining Bar Code Fields" in Chapter 2 for valid options.
- 033 Bar code density is invalid. See "Defining Bar Code Fields" in Chapter 2 for the bar code density chart.
- 040 Line thickness must be **0** - **99** dots.
- 041 Line direction must be **0**, **90**, **180**, or **270**.
- 042 End row is invalid. Line segment or box end row is defined outside of printable area.
- 043 End column is invalid. Line segment or box end column is defined outside of printable area.
- 044 Dot pattern for line or box must be "".
- 045 Line length is defined beyond the maximum length. See "Defining Line Fields" in Chapter 2 for valid lengths.
- 046 Line type must be **S** (segment) or **V** (vector).
- 051 Imaging mode in the graphic header must be **0**.

Batch Errors

Error Code	Description
101	The format referenced by batch is not in memory.
102	Print quantity is outside the range 0 - 999 .
104	Batch mode must be N (new) or U (update).
105	Batch separator in a batch control field must be 0 (off).
106	Print multiple is outside the range 1 - 24 .
108	Multiple part supply is outside the range 1 - 5 .

Option Errors

Error Code	Description
200	Option number must be 1 , 2 , 4 , 30 , 31 , 50 , 51 , 52 , or 60 .
201	Copy length is outside the range 1 - 2710 .
202	Copy start position must be 1 - 255 .
203	Destination start position must be 1 - 255 .
204	Source field must be 0 - 999 .
205	Copy type must be 1 (copy after rules) or 2 (copy before rules).
206	Increment/Decrement selection must be I (increment) or D (decrement).
207	Incrementing start position must be 0 - 2710 .
208	Incrementing end position must be 0 - 2710 .

- 209 The incrementing amount must be **0 - 999**.
- 210 Security value for a PDF-417 bar code must be **0** to **8**.
Correct the value and resend the format to the printer.
- 211 Narrow element value is less than **1** or greater than **99**.
Correct the value and resend the format to the printer.
- 212 Wide element value is less than **1** or greater than **99**.
Correct the value and resend the format to the printer.
- 214 Truncation code must be **S** (standard) or **T** (truncated
bar code).
- 215 Aspect code must be **C** (columns) or **R** (rows).
- 216 Option definition must be **S** (set) or **T** (template).
- 217 Input device device must be **D** (Default), **H** (Host), **K**
(Keyboard), **N** (None), or **S** (Scanner).
- 218 Pad direction must be **L** (from left) or **R** (from right).
- 219 Pad character is outside the range **0 - 255**.
- 220 Check digit selection must be **G** to generate check digit.
- 221 Primary or secondary price format is outside the range
1 - 16.
- 222 Data type restriction is outside the range of **1 - 6**.
- 223 Option is not valid for the field.
- 224 Bar code intercharacter gap must be **0 - 99** dots. (This
is also known as the additional character gap when
using Option 50, Defining Bar Code Densities.)

Online Configuration Errors

Error Code	Description
251	Power up mode must be 0 (online).
252	Language selection must be 0 (English).
253	Batch separator code in a system setup packet must be 0 (off).
254	Slash zero selection must be 0 (standard zero) or 1 (slashed zero).
255	Supply type must be 0 (black mark) or 2 (non-indexed).
256	Ribbon selection must be 0 (direct) or 1 (transfer).
257	Feed mode must be 0 (continuous) or 1 (on-demand).
258	Supply position is outside the range.
259	Contrast adjustment must be 28 - 40 dots.
260	Print adjustment must be -99 - 99 dots.
261	Margin adjustment must be -99 - 99 dots.
262	Speed adjustment must be 0 .
263	Primary monetary symbol is invalid.
264	Secondary symbol selection must be 0 (none) or 1 (print secondary sign).
265	Monetary decimal places must be 0 - 3 .
266	Character string length in the control characters packet must be 5 (MPCL control characters) or 7 (ENQ/IMD command character).

- 267 Baud rate selection must be **7** (115200).
- 268 Word length selection must be **1** (8 bits).
- 269 Stop bits selection must be **0** (1 bits).
- 270 Parity selection must be **0** (none).
- 271 Flow control selection must be **3** (XON/XOFF).
- 272 Invalid code page selection. Must be **0** (Monarch internal), **1** (ASCII), **2** (DOS 437), **3** (DOS 850), **4** (1250- Latin 2), **5** (1251- Cyrillic), **6** (1252- Latin 1), **7** (1253- Greek), **8** (1254- Turkish), **9** (1255- Hebrew), **10** (1256- Arabic), **11** (1257- Baltic), **12** (1258- Vietnamese), **13** (852- Latin 2), **14** (855- Russian), **15** (857- IBM Turkish), **16** (860- DOS Portuguese), **17** (Wingdings), or **18** (Macintosh).
- 282 RS232 Trailer string is too long. Use a maximum of **3** characters.
- 283 ENQ Trailer string is too long. Use a maximum of **3** characters.
- 284 The buffer type must be **T** (Transmit), **R** (Receive), **I** (Image), **F** (Format), or **D** (Downloadable Fonts).
- 285 The storage device type in the memory configuration packet must be **R** (volatile RAM).
- 286 The buffer size is invalid.
- 287 The printhead width must be **0**.
- 288 Invalid battery voltage packet. Must be **0** or **1**.
- 289 Invalid printer address in communication settings packet. Use **0** or none.

Check Digit Errors

Error Code	Description
310	Check digit scheme number must be 1 - 10 .
311	Modulus must be 2 - 11 .
314	Check digit algorithm must be D (sum of digits) or P (sum of products).

Graphic Errors

Error Code	Description
325	Duplicating direction must be 0 (insert after) or 1 (insert before) in duplicate fields for graphics.
327	Amount of row adjustment must be 0 - 999 dots in duplicate fields for graphics.
328	Duplicate count must be 0 - 999 .
340	Bitmap line encoding must be H (hex) or R (run length).
350	Font selector must be 1 - 9999 .
351	Font data length must be 68 - 16384 .
352	Insufficient font memory is available for the downloaded font.
380	Job request is outside the range 0 to 4 .
400	The character immediately following { is invalid.
401	Internal software error. Call Technical Support.
402	Field separator not in expected location.

- 403 Field separator not found.
- 404 The number or string that is currently being processed is too long.
- 405 Too many fields exist in the format. You cannot have more than 200 fields in the format. Lines and box fields count as fields.

Communication Errors

Error Code	Description
409	The printer memory is full. Delete unnecessary formats or graphics from memory. If you are using a graphic file that is very large, consider using another mapping method (such as run length encoding) to reduce the required memory.
410	Parity on the printer does not match the parity on the host. Check the parity setting under SETUP options.
411	Framing error. The printer cannot communicate with the host. Make sure the host is turned on, communication cables are connected correctly, port settings are correct, and communications are active. Check the baud rate, word length, and stop bits to make sure they match those at the host. Do not toggle between Microsoft Windows and MS-DOS while using the COPY command, or you will receive a framing error. Exit Windows before using the COPY command. Re-transmit the data.
412	There is a problem with flow control between the printer and the host. Make sure the printer and the host flow control settings match (both are DTR or both are XON/XOFF). If the error persists, call Technical Support.

- 413 Online receive queue is full. Check your printer's XON/XOFF or DTR SETUP values to be sure there isn't a flow control problem.
- 414 The internal keyboard buffer is full or you need a new keypad. Call Technical Support.
- 415 The buffer size you defined exceeds the total available in your machine.
- 423 Internal software error. Call Technical Support.

Data Formatting Failures

Formatting errors indicate that a field will print incorrectly. After you have checked the data stream and corrected the data, retransmit the format and batch.

—————
For these errors, the batch still prints, but the
field, font, bar code, or density may be
incomplete, missing or contain
incorrect data.
—————

- 571 Invalid bar code length.
- 572 Invalid copy field, padded field, or incrementing field length.
- 573 Invalid price length.
- 574 No CD scheme or room for CD. The CD scheme in the batch does not fit the format or the field contains blanks.
- 575 The graphic included in your format could not be found.
- 601 An error occurred while the batch was imaging.
- 603 The batch was not found for imaging.

- 611 Font, bar code or density is invalid. The font, bar code or density in the batch does not fit the format.
- 612 The data in this line of the batch is either missing or does not match the format.
- 613 Reference point off tag.
- 614 Portion of field off tag. There may be an invalid character in the packet. Make sure you did not enter **O** for **Ø**.
- 615 Bar code width is greater than 16 inches, or number of keywords for PDF 417 exceeds 928.
- 616 Dot shifting failed. A bad dot falls on a bar code that cannot be shifted. Call Technical Support.
- 618 Magnification must be **1 - 7**.
- 621 An error occurred opening the TrueType font file. Select a different font to download. If the error message persists, call Technical Support.
- 622 Not enough memory to create the downloaded TrueType characters in the scalable (vector) fonts buffer. Reconfigure the printer's memory and increase the scalable (vector) fonts buffer. Resend the font, format, and batch packet after reconfiguring the memory. If the error message persists, call Technical Support.

Machine Faults

These errors occur when there is a problem with the printer.

- 703 The printer sensed a calibration of different-sized black marks. Make sure the correct supply is loaded.
- 704 Printer has not sensed a supply mark within the specified number of inches or is out of supplies. Check the supply tracking, supply marks, black mark sensor position, and supply roll for binding. Change supply.
- 706 The motor could not get up to speed within the allotted time. Call Technical Support.
- 707 The motor reached the desired speed, but was unable to maintain that speed. Call Technical Support.
- 708 The motor has stalled or is running too slow to measure the speed. Call Technical Support.
- 750 Printhead is overheated. Turn off the printer to let the printhead cool. If the error persists, call Technical Support.
- 751 Printer did not sense a black mark when expected. The supply may be jammed.

For these errors, Check the

- ◆ supply tracking
- ◆ supply marks
- ◆ black mark sensor position
- ◆ supply roll for binding.

If the error continues to appear, change the supply.

- 752 Printer sensed a mark in the wrong place.
- 753 Printer sensed a mark that is too long.

- 756 The printer is out of supplies. Load supplies.
- 757 Load supplies. The calibrated supply length differs by plus or minus .25 inches from the format.
- 758 Check supply. Either the supply is not seen, or the on-demand sensor is broken (purchase optional). Check for a label jam. Clear the supply path or reload supplies. This error may occur if you remove a label too quickly in on-demand mode. The printer does not recalibrate after this error.
- 762 Low battery. Recharge the battery.
- 763 Waiting to dispense label.
- 765 Printhead has less than 3 bad dots.
- 768 Printhead has more than 10 bad dots or is not connected. Make sure the printhead is connected.
- 790 The printer is busy. Turn off the printer. Wait two seconds and turn it back on. Resend the packets. If the problem continues, call Technical Support.
- 791 The printer has an error pending. Turn off the printer. Wait two seconds and turn it back on. Resend the packets. If the problem continues, call Technical Support.
- 792 Printer not initialized.
- 793 Printer job queue full.

Flash Memory Errors

These errors occur when there a problem occurs with the printer's flash memory.

- | | |
|-----|---|
| 800 | A directory in flash memory is full. |
| 801 | Flash memory is full. |
| 802 | A directory in flash memory cannot be found. |
| 803 | There is no directory in flash memory. |
| 810 | A file in flash memory is not open. |
| 811 | A file in flash memory is already open. |
| 812 | The file in flash memory is full. |
| 813 | You cannot access flash memory. |
| 820 | An error occurred in the flash program. |
| 821 | An error occurred while erasing flash memory. |
| 822 | There is a flash ID error. |

Hard Printer Failure Errors

These errors are hard printer failures. Call Technical Support if you receive these messages.

- 904 No memory for native layer.
- 907 Low RAM error.
- 909 RAM corrupted.
- 911 Version string mismatch.

SYSTEM ERROR	## can be:
VECTOR ##	2 Bus Error
	3 Address Error
	4 Illegal Instruction
	5 Zero Division
	6 CHK, CHK2 Instructions
	7 TRAP Instructions
	8 Privilege Violation
	9 Trace
	10 Line 1010 Emulator
	48 User-defined vectors (48-255)

This error is fatal. If you receive it, reset and/or reflash the printer. If the error persists, call us at the number listed on the back cover of this manual for instructions. If they determine you should send the printer back, use the original packaging (box and packing material) and include the documentation. Use the following address:

Paxar ERC
200 Monarch Lane
Door 39
Miamisburg, OH 45342

The warranty does not apply if you do not follow these instructions.

PRINTER OPTIMIZATION

8

This chapter provides information on how to improve your printer's performance by

- ◆ adjusting the print quality
- ◆ reducing the imaging time for printing
- ◆ providing general tips and hints for designing formats.

This printer uses "smart imaging" to image and print fields on supplies. Smart imaging remembers the exact boundaries and locations of each field and places a boundary box (white space) around each field. When a field changes that particular boundary box is cleared and the new field data is imaged. However, the new field data may require a larger boundary box than the previous field did. In some cases, neighboring fields that do not change may be covered with white space from the changing field's boundary box.

Adjusting the Print Quality

Many factors affect print quality: type of supplies, print contrast, and the type of printer's application. The type of supply should match the printer's application.

- ◆ Using premium supplies reduces smudged images, hard to read labels, and faded print. Supply type, print speed, and print contrast work together to improve the print quality of labels. Contact your Paxar Representative for more information.
- ◆ If the print quality is too light or too dark, adjust the print contrast. The correct contrast setting is important because it effects how well your bar codes scan and how long the printhead lasts.

Be sure to check the print quality of bar codes with a bar code verifier or scanner. If you do not have a verifier or scanner, check the bar code visually. A bar code that is **IN SPEC** will have complete bars and clear spaces. Small alphanumeric characters will look complete. A bar code that is **IN SPEC** may not look as good as one that is too dark, but it will have the highest scan rate.



For highest scan rates, make sure there is adequate white space before and after the bar code. A darker bar code does not mean it will scan better.

Reducing Imaging Time

Imaging time is the time it takes the printer to image the data for the first label after the printer receives the format and batch packet. There are several ways to reduce the imaging time: send formats and configurations once, use a batch quantity of zero, or update batch fields.

- ◆ If the formats use the same check digit scheme, you only need to send the check digit scheme once.
- ◆ Send formats once and use the batch update field to change information on the label. Using a batch update field reduces the imaging time, because only the fields that change are imaged. All other fields remain the same as the last queued batch.
- ◆ Use the batch quantity zero method when your application requires operator intervention to enter data. While the operator is entering data, the previous field is sent with a batch quantity of zero. The printer images the field, but does not print it. After the operator enters the data for the last field, the batch quantity can be specified. The last remaining field is imaged, and the label prints almost immediately.

To pre-image a label:

1. Send the format and a batch header in one file. The first time you send the batch header, use the parameter **N** (new batch), and the parameter **0** for (zero quantity).

Example {B,1,N,0 | }

The printer images constant text, line, box, and graphic fields, but does not print them.

2. Input data for each field, and send it with a batch header using the parameter **U** (update) and a quantity of zero. When the printer receives the data, it immediately images the field, but does not print it.

Example

```
{B,1,U,0 |  
1,"RODGER DIST CTR" | }  
{B,1,U,0 |  
2,"8292" | }
```

At this time, the printer is imaging all associated fields, including fields that copy from other fields.

3. Repeat step 2 for each field except the last one.

```
{B,1,U,0 |  
3,"BROADWAY" | }  
{B,1,U,0 |  
4,"555 WEST OAK AVE." | }
```

4. For the last field, input data and send it with the quantity of labels you want printed. When the printer receives input for the last field, it immediately prints the labels.

Example

```
{B,1,U,10 |  
5,"DAYTON, OHIO" | }
```

Increasing Throughput

Reducing the imaging time increases throughput. You can also increase the baud rate to increase the transmission time and increase throughput. Make sure the communication settings at the printer match those at the host.

General Format Tips and Hints

The following tips and hints are helpful to keep in mind when designing MPCLII formats.

With Formats

If you want to modify your format fields, check digit fields, and configuration commands, use the optional entry method. This method enables you to reset only the parameters you want to change. Commas act as placeholders for unchanged parameters. The optional entry method reduces file size and increases the speed at which files are sent to the printer.

With Packets

Leave parameters blank that you do not need to change when sending online configuration packets.

You can group fields with similar parameters. For example,

```
T,1,10,V,250,50,1,1,1,1,B,C,0,0 ¦  
T,2,15,,,75 ¦  
T,3,,,,,100 ¦
```

The first text field sets all the parameters for that field. The second text field's number of characters and column location changes from what was defined in the first field. In the third text field, only the column location is changed. This method can be used on bar code and constant text fields as well.

You should understand the basics of each
field before using this method.

After you modify any fields or parameters with the optional entry method, resend the format, batch, or configuration packet to the printer.

With Bar Codes

Be careful when rotating or placing a UPC/EAN bar code with human readable characters, because the bottom reference point is at the bottom of the bars, **not** at the bottom of the human readable characters.

With Fields

Data that remains the same for each label should be in a constant text field. Data that varies for each label should be in a text field.

Check for trailing spaces in text or constant text fields if you receive a "field off tag" error. An easy way to see trailing spaces is to print the field in the reverse font.

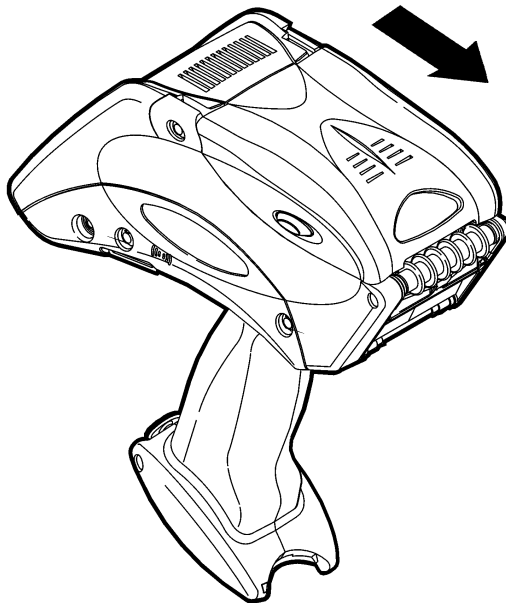
Make sure if you magnify a field, it does not go off the label or cover another field. Magnifying a field increases the distance between the printed character and the edge of the cell.

SAMPLES

A

This appendix contains sample formats. You can customize any of these formats to meet your needs.

The samples pictured are oriented as if you are looking down at the display, watching labels come out of the front of the printer, as shown below.



Sample Data Matrix Packets

Data Matrix (ECC-200) is a two-dimensional bar code which is made up of square modules arranged within a perimeter finder pattern. There are 24 square symbol sizes available ranging from 10 rows by 10 columns to 144 rows by 144 columns. There are six rectangular symbol sizes available ranging from 8 rows by 8 columns to 16 rows by 48 columns. The symbol size is data dependent. Data Matrix automatically pads data.

Do not overlay other fields when designing your Data Matrix symbol. You should also allow a 3 or 4 dot "quiet zone" (blank space around the bar code's perimeter) for scanning. See "Defining a Bar Code Field" for more information.

Square Data Matrix Packet

```
{F,36,A,R,E,200,200,"DTMTRX1" |  
B,1,50,V,50,50,35,0,100,8,L,0 | }
```

```
{B,36,N,1 |  
1,"1234567890ABCDEFGHIJKLMNQRST" | }
```



This example prints a one-inch wide by one-inch tall (**100**) square Data Matrix symbol using the default density (**0**) without any field rotation (**0**).

Rectangular Data Matrix Packet

```
{F,36,A,R,E,200,200,"DTMTRX2" |  
B,1,400,V,50,125,35,29,50,8,L,1 | }
```

```
{B,36,N,1 |  
1,"1234567890ABCDEFGHIJKLMNQRST" | }
```



This example prints a one-inch by a half-inch tall (**50**) rectangular 16 rows by 36 columns (**density 29**) Data Matrix symbol rotated 90 (**1**).

Sample Quick Response Packets

Quick Response (QR Code) is a two-dimensional bar code, which is made up of square modules arranged in an overall square pattern. A unique finder pattern is located at three corners of the symbol. Four levels of error correction are available, along with a wide range of symbol sizes.

- ◆ Model 1 is the original specification.
- ◆ Model 2 is an enhanced form that includes additional features.

The maximum number of characters depends on the type of characters entered for the batch data and differs for the two models of QR Code.

Data Type	Model1	Model2
Numeric data	1167	2710
Alphanumeric data	707	2710
8-Bit data	486	2710
Kanji data	299	1817

QR Code can accommodate Japanese *Kana* and *Kanji* characters and has a variety of applications, including marking spark plugs, radiators, printed circuit boards, and test tubes. Refer to the *AIM International Symbology Specification* for more details about data requirements.

Entering Batch Data for QR Code

QR Code requires certain parameters at the beginning of all batch data.

Syntax "error_cor mask# data_input, char"

error_cor Level of error correction. Some damaged bar codes may still be scannable if the error correction is high enough. Options:

H	Ultra high reliability level
Q	High reliability level
M	Standard level
L	High density level

NOTE: As you increase the error correction level, the maximum number of characters (in the field) decreases.

mask# Mask number. Undefined. Leave blank or use 0.

data_input Type of data input. Options:

A	Automatic
M	Manual

char Type of characters. Options:

A	Alphanumeric
B	Binary
K	Kanji
N	Numeric

NOTE: In binary mode, the number of characters must be represented by the 4-digit number in decimal.

Example 1, "HM,N0123456789012345" | }

Defines the following batch data for the QR Code: The error correction level is **H**, which provides very high reliability. Leave the mask number blank. The data input mode is **Manual**. The type of characters are **Numeric** and the data is **0123456789012345**.

QR Code Packet

```
{F,1,A,R,E,200,200,"QRCODE" |  
B,1,200,V,50,50,36,0,100,2,B,0 | }  
{B,1,N,1 |  
1,"HM,N0123456789012345" | }
```



Structured Append Mode

QR Code offers a mode called structured append (or concatenated) that allows you to collect data from multiple QR Code symbols and use that data elsewhere. For example, the components of a sub-assembly can have individual QR Codes and the QR Code for the entire assembly contains all the data from the individual codes. This mode also requires certain parameters at the beginning of all batch data.

Syntax	"mode_id code# #of_div parity, error_cor mask# data_input char"								
<i>mode_id</i>	Mode identifier. Use D to indicate the structured append (or concatenated) mode.								
<i>code#</i>	Code number of the individual symbol in the concatenated set. You must use a two-digit number in decimal.								
<i>#of_div</i>	Total number of symbols in this concatenated set. You must use a two-digit number in decimal.								
<i>parity</i>	Parity byte. You must use a two-digit number in hexadecimal. There is no standard parity byte.								
<i>error_cor</i>	<div>Level of error correction. Some damaged bar codes may still be scannable if the error correction is high enough. Options: <table><tr><td>H</td><td>Ultra high reliability level</td></tr><tr><td>Q</td><td>High reliability level</td></tr><tr><td>M</td><td>Standard level</td></tr><tr><td>L</td><td>High density level</td></tr></table></div> <div>NOTE: As you increase the error correction level, the maximum number of characters (in the field) decreases.</div>	H	Ultra high reliability level	Q	High reliability level	M	Standard level	L	High density level
H	Ultra high reliability level								
Q	High reliability level								
M	Standard level								
L	High density level								
<i>mask#</i>	Mask number. Undefined. Leave blank or use 0.								

data_input Type of data input. Options:
 A Automatic
 M Manual

char Type of characters. Options:
 A Alphanumeric
 B Binary
 K Kanji
 N Numeric

NOTE: In binary mode, the number of characters must be represented by the 4-digit number in decimal.

Example 1, "D0205E9,Q0A," |
 C, "B006qrcline," | }

Defines the structured append mode (**D**) for QR Code. This is symbol (**02**) of a concatenated set containing (**05**) symbols. The parity byte is **E9**. The error correction level is **Q**, which provides a high reliability. Use **0** for the mask number. The data input mode is **Automatic**. The type of characters are binary (**B**) and there will be six (**06**) data characters (**qrcline**).

Structured Append QR Code Packet

```
{F,2,A,R,E,200,200,"QRCLINE2" |  
B,1,200,V,50,50,36,0,100,2,B,0 | }  
{B,2,N,1 |  
1, "D0202E9,Q0A" |  
C, "0123456789ABCD+___âô~129~064~159~252~224~064" | }
```



Sample MaxiCode Packets

MaxiCode is a two-dimensional bar code developed by UPS (United Parcel Service, Inc.). Data must be defined in a specific way for UPS. Refer to the *Guide to Bar Coding with UPS* or the *AIM MaxiCode Specification* for more details about data requirements.

The printer supports modes 0, 1, 2, and 3. Contact us for information about additional MaxiCode modes.

Mode	Description
0	Obsolete
1	Obsolete
2	Structured Message
3	Structured Message
4	No Known Application
5	No Known Application
6	No Known Application

You can select which mode to use in the bar code field or allow the printer to auto-select the mode (0, 2, or 3) based on your data. See "Defining a Bar Code Field" for more information. MaxiCode automatically pads data with the "!" character.

MaxiCode does not support
the NULL character.

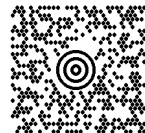
Modes 2 and 3 are defined by the way the postal code, class of service, and country code fields are arranged. (The postal code, class of service, and country code are required fields.) Begin with the message header, then the primary data (15 characters), followed by the secondary message (up to 78 characters). Or, begin with the primary data, then the message header, followed by the secondary data. If the postal code data characters are all numeric then the MaxiCode symbol is set to Mode 2. If the characters are alphanumeric, or only contain ASCII characters 65 to 90, then the MaxiCode symbol is set to Mode 3.

If you receive an error 612, check your MaxiCode data. You may have not correctly structured or left out one of the three required fields (postal code, class of service, and country code) or the "~029" character.

Mode 0 (Obsolete) Sample

```
{F,1,A,R,E,0200,0200,"MAXICODE" |  
B,1,93,V,020,20,33,7,0,8,L,0 | }  
{B,1,N,1 |  
1,"450660000" |  
  
C,"001" |  
C,"840" |  
C,"[]~030" |  
C,"01~02996" |  
C,"1Z12345678~029" |  
C,"UPSN~029" |  
C,"12345A~029" |  
C,"070~029" |  
C,"~029" |  
C,"1/1~029" |  
C,"15~029" |  
C,"Y~029" |  
C,"60 SADDLEBROOK CT.~029" |  
C,"DAYTON~029" |  
C,"OH~030" |  
C,"~004" | }
```

MaxiCode bar code (33)
Batch header
Postal code- zip code
(This field determines Mode)
Country code
Class of service
Message header
Transportation header
Tracking number
Origin carrier SCAC
UPS shipper number
Julian day of pickup
Shipment ID (empty)
Package count
Weight (lb.)
Address validation
Street address (empty)
City (empty)
State
EOT



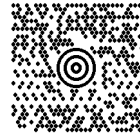
Mode 2 Sample

```
{F,1,A,R,E,200,200,"MAXI_M2" |  
B,1,93,V,020,020,33,7,0,8,L,0 | }  
{B,1,N,1 |  
1,"[>~030" |  
C,"01~02996" |  
C,"068100000~029" |
```

```
C,"840~029" |  
C,"001~029" |  
C,"1Z12345675~029" |  
C,"UPSN~029" |  
C,"12345E~029" |  
C,"089~029" |  
C,"~029" |  
C,"1/1~029" |  
C,"10~029" |  
C,"Y~029" |  
C,"~029" |  
C,"~029" |  
C,"CT~030" |  
C,"~004" | }
```

MaxiCode bar code (33)

Message header
Transportation header
Postal Code
(This field determines Mode)
Country code
Class of service
Tracking number
Origin carrier SCAC
UPS shipper number
Julian day of pickup
Shipment ID (empty)
Package count
Weight (lb.)
Address validation
Street address (empty)
City (empty)
State
EOT



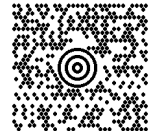
Mode 3 Sample

```
{F,1,A,R,E,200,200,"MAXI_M3" |  
B,1,93,V,020,020,33,7,0,8,L,0 | }  
{B,1,N,1 |  
1,"[>~030" |  
C,"01~02996" |  
C,"M5E1G45~029" |
```

```
C,"124~029" |  
C,"066~029" |  
C,"1Z12345679~029" |  
C,"UPSN~029" |  
C,"12345E~029" |  
C,"089~029" |  
C,"~029" |  
C,"1/1~029" |  
C,"10~029" |  
C,"Y~029" |  
C,"~029" |  
C,"TORONTO~029" |  
C,"ON~030" |  
C,"~004" | }
```

MaxiCode bar code (33)

Message header
Transportation header
Postal Code
(This field determines Mode)
Country code
Class of service
Tracking number
Origin carrier SCAC
UPS shipper number
Julian day of pickup
Shipment ID (empty)
Package count
Weight (lb.)
Address validation
Street address (empty)
City (empty)
State
EOT

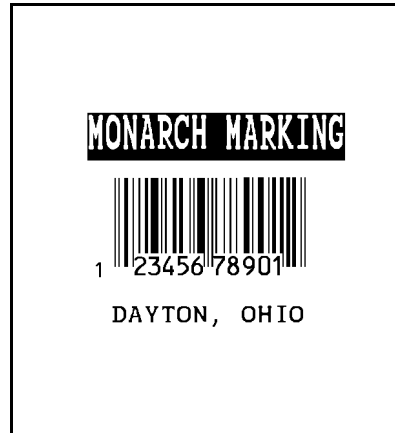


Sample UPCA Format Packet

```
{F,25,A,R,M,508,508,"Fmt 25" |  
C,250,80,0,1,2,1,W,C,0,0,"MONARCH MARKING", 1 |  
B,1,12,F,110,115,1,2,120,5,L,0 |  
T,2,18,V,30,30,1,1,1,1,B,C,0,0,1 | }
```

Sample Batch Packet

```
{B,25,N,1 |  
1,"12345678901" |  
2,"DAYTON, OHIO" | }
```

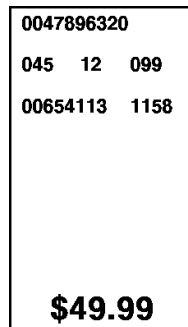


HangTag Example

```
{F,1,A,R,E,275,125,"1TAG01"|  
C,228,20,0,50,8,8,A,L,0,0,"0047896320",1|  
C,203,20,0,50,8,8,A,L,0,0,"045",1|  
C,203,55,0,50,8,8,A,L,0,0,"12",1|  
C,203,85,0,50,8,8,A,L,0,0,"099",1|  
C,178,20,0,50,8,8,A,L,0,0,"00654113",1|  
C,178,85,0,50,8,8,A,L,0,0,"1158",1|  
C,54,37,0,50,14,14,A,L,0,0,"$49.99",1|  
}
```

Sample Batch Packet

```
{B,1,N,1|E,0,0,1,1}
```



Tag Example

```
{F,1,A,R,E,200,150,"1LAB1520"|  
C,44,40,0,50,9,9,A,L,0,0,"PEANUTS",1|  
B,1,12,F,125,25,1,2,50,7,L,0|  
R,1,"028400067362"|  
C,20,34,0,50,8,8,A,L,0,0,"*SALT FREE*",1|  
C,84,45,0,50,14,14,A,L,0,0,"$1.19",1|  
}
```

Sample Batch Packet

```
{B,1,N,1|E,0,0,1,1}
```



Label Example

```
{F,1,A,R,E,300,150,"1LAB1530"|
C,100,90,0,50,10,10,A,L,0,1,"BATTERY PACK",1|
C,20,130,0,50,10,10,A,L,0,1,"1452-99311",1|
C,230,128,0,50,12,10,A,L,0,1,"$5.99",1|
B,1,9,F,75,55,4,7,40,8,L,1|
R,1,"031535512"|
T,2,9,V,125,67,0,50,8,8,A,L,0,1,1|
R,4,1,1,9,1,1|
}
```

Sample Batch Packet

```
{B,1,N,1|E,0,0,1,1|}
```

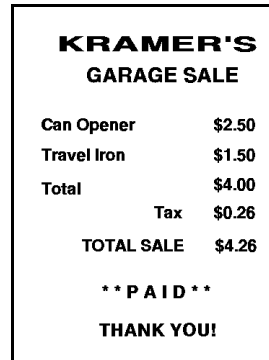


Receipt Format Example

```
{F,1,A,R,E,300,175,"1Garage"|
C,277,15,0,50,10,18,A,L,0,0,"KRAMER'S",1|
C,223,4,0,50,8,8,A,L,0,0,"Can Opener",1|
C,202,4,0,50,8,8,A,L,0,0,"Travel Iron",1|
C,179,4,0,50,8,8,A,L,0,0,"Total",1|
C,163,81,0,50,8,8,A,L,0,0,"Tax",1|
C,140,32,0,50,8,8,A,L,0,0,"TOTAL SALE",1|
C,86,47,0,50,9,9,A,L,0,0,"* * P A I D * *",1|
C,60,45,0,50,9,9,A,L,0,0,"THANK YOU!",1|
C,256,35,0,50,10,10,A,L,0,0,"GARAGE SALE",1|
C,223,122,0,50,8,8,A,L,0,0,"$2.50",1|
C,202,122,0,50,8,8,A,L,0,0,"$1.50",1|
C,182,122,0,50,8,8,A,L,0,0,"$4.00",1|
C,163,122,0,50,8,8,A,L,0,0,"$0.26",1|
C,140,123,0,50,8,8,A,L,0,0,"$4.26",1|
}
```

Sample Batch Packet

```
{B,1,N,1|E,0,0,1,1|}
```



Label Sample 2

```
{F,1,A,R,E,110,200,"1LAB2011"|  
C,92,70,0,50,7,7,A,L,0,0,"PRETZELS",1|  
B,1,12,F,45,50,1,2,40,7,L,0|  
R,1,"028400067362"|  
C,18,105,0,50,10,10,A,L,0,0,"$.79",1|  
}
```

Sample Batch Packet

```
{B,1,N,1|E,0,0,1,1|}
```

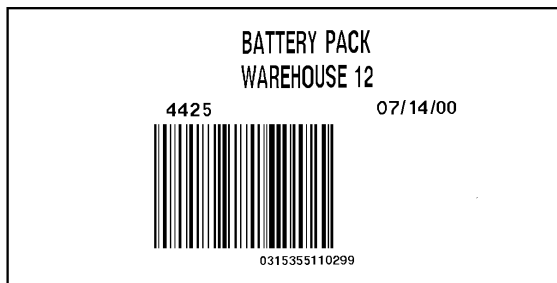


Label Sample 3

```
{F,1,A,R,E,400,200,"1LAB2040"|  
C,150,21,0,50,14,12,A,L,0,1,"BATTERY PACK",1|  
C,150,46,0,50,14,12,A,L,0,1,"WAREHOUSE 12",1|  
C,285,70,0,50,10,10,A,L,0,1,"07/14/00",1|  
C,110,70,0,50,10,10,A,L,0,1,"4425",1|  
B,1,13,F,95,165,8,6,90,8,L,1|  
R,5,N|  
R,1,"0315355110299"|  
T,2,13,V,214,176,0,50,7,9,A,L,0,1,1|  
R,4,1,1,13,1,1|  
}
```

Sample Batch Packet

```
{B,1,N,1|E,0,0,1,1|}
```



FONTS



This appendix shows examples of the fonts loaded in your printer's memory.

Number	Font Size and Appearance	Type of Spacing	# of Dots Between Characters
1	Standard	monospaced	3 (203 dpi)
2	Reduced	monospaced	1 (203 dpi)
3	Bold	monospaced	3 (203 dpi)
4	OCRA-like	monospaced	3 (203 dpi)
5	HR1 - for numeric data	monospaced	2 (203 dpi)
6	HR2 - for numeric data	monospaced	1 (203 dpi)
10	CG Triumvirate Bold	proportional	varies w/ each letter
11	CG Triumvirate 6 pt.	proportional	varies w/ each letter
50	EFF Swiss Bold	scalable	varies w/ each letter
1000	CG Triumvirate Bold 6.5 pt	proportional	varies w/each letter
1001	CG Triumvirate Bold 8 pt	proportional	varies w/each letter
1002	CG Triumvirate Bold 10 pt	proportional	varies w/each letter
1003	CG Triumvirate Bold 12 pt	proportional	varies w/each letter
1004	CG Triumvirate Bold 18 pt	proportional	varies w/each letter
1005	CG Triumvirate Bold 22 pt	proportional	varies w/each letter
1006	CG Tri. Bold Condensed 6.5 pt	proportional	varies w/each letter
1007	CG Tri. Bold Condensed 8 pt	proportional	varies w/each letter
1008	CG Tri. Bold Condensed 10 pt	proportional	varies w/each letter
1009	CG Tri. Bold Condensed 12 pt	proportional	varies w/each letter
1010	CG Tri. Bold Condensed 18 pt	proportional	varies w/each letter
1011	CG Tri. Bold Condensed 22 pt	proportional	varies w/each letter
1012	Letter Gothic Bold 6 pt	monospaced	1
1013	Letter Gothic Bold 9 pt	monospaced	2

These samples were printed using the Internal Symbol set.

Standard Font

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
nopqrstuvwxyz
0123456789:;<=>?
!"#\$%&'()*+,-./
[\]^_`{|}~Çüéåäää
çëëëïïïÅÄËæøöüü
ùÿöÜÇŔŦáíóúñÑ°;
¬¼½;«»Øøαβ@TM—
\$£¥℥FPLK℥RGRWB¥

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
nopqrstuvwxyz
0123456789:;<=>?
!"#\$%&'()*+,-./
[\]^_`{|}~Çüéåäää
çëëëïïïÅÄËæøöüü
ùÿöÜÇŔŦáíóúñÑ°;
¬¼½;«»Øøαβ@TM—
\$£¥℥FPLK℥RGRWB¥

Reduced Font

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789:;<=>?
!"#\$%&'()*+,-./
[\]^_`{|}~Çüéåäää
çëëëïïïÅÄËæøöüü
ùÿöÜÇŦáíóúñÑ°;
¬¼½;«»Øøαβ—
\$£¥℥FPLK℥RGRWB¥

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789:;<=>?
!"#\$%&'()*+,-./
[\]^_`{|}~Çüéåäää
çëëëïïïÅÄËæøöüü
ùÿöÜÇŦáíóúñÑ°;
¬¼½;«»Øøαβ—
\$£¥℥FPLK℥RGRWB¥

Bold Font

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
0123456789@½
!"#\$%&'()*+,-
[\]^_`{|}~Çüéåäää
çëëëïïïÅÄËæøöüü
ùÿöÜÇŦáíóúñÑ°;
¬¼½;«»Øøαβ@TM—
\$£¥℥FPLK℥RGRWB¥

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
0123456789@½
!"#\$%&'()*+,-
[\]^_`{|}~Çüéåäää
çëëëïïïÅÄËæøöüü
ùÿöÜÇŦáíóúñÑ°;
¬¼½;«»Øøαβ@TM—
\$£¥℥FPLK℥RGRWB¥

OCRA-like Font

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
0123456789@
"/+,-./<>RGRWB¥
\$£¥℥FPLK℥RGRWB¥

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
0123456789@
"/+,-./<>RGRWB¥
\$£¥℥FPLK℥RGRWB¥

These samples were printed using Code Page 437.

CG Triumvirate Bold Font

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789; < = > ?
! " # \$ % & ' () * + , - . / _ :
[\] ^ _ { | } ~ Ç Ü é à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ù
ÿ Ö Ü ç Þ ß à í ó ú ñ Ñ º ½ ¼ ⅓ ⅔ ⅕ ⅖ ⅗ ⅘ ⅙ ⅚ ⅛ ⅜ ⅝ ⅞ Ⅰ Ⅱ Ⅲ Ⅳ Ⅴ Ⅵ Ⅶ Ⅷ Ⅸ Ⅹ Ⅺ Ⅻ Ⅼ Ⅽ Ⅾ Ⅿ ⅰ ⅱ ⅲ ⅴ ⅵ ⅶ ⅷ ⅸ ⅹ ⅺ ⅻ ⅼ ⅽ ⅾ ⅿ

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789; < = > ?
! " # \$ % & ' () * + , - . / _ :
[\] ^ _ { | } ~ Ç Ü é à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ù
ÿ Ö Ü ç Þ ß à í ó ú ñ Ñ º ½ ¼ ⅓ ⅔ ⅕ ⅖ ⅗ ⅘ ⅙ ⅚ ⅛ ⅜ ⅝ ⅞ Ⅰ Ⅱ Ⅲ Ⅳ Ⅴ Ⅵ Ⅶ Ⅷ Ⅸ Ⅹ Ⅺ Ⅻ Ⅼ Ⅽ Ⅾ Ⅿ ⅰ ⅱ ⅲ ⅴ ⅵ ⅶ ⅷ ⅸ ⅹ ⅺ ⅻ ⅼ ⅽ ⅾ ⅿ

CG Triumvirate Font

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789; < = > ?
! " # \$ % & ' () * + , - . / _ :
[\] ^ _ { | } ~ Ç Ü é à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ù
ÿ Ö Ü ç Þ ß à í ó ú ñ Ñ º ½ ¼ ⅓ ⅔ ⅕ ⅖ ⅗ ⅘ ⅙ ⅚ ⅛ ⅜ ⅝ ⅞ Ⅰ Ⅱ Ⅲ Ⅳ Ⅴ Ⅵ Ⅶ Ⅷ Ⅸ Ⅹ Ⅺ Ⅻ Ⅼ Ⅽ Ⅾ Ⅿ ⅰ ⅱ ⅲ ⅴ ⅵ ⅶ ⅷ ⅸ ⅹ ⅺ ⅻ ⅼ ⅽ ⅾ ⅿ

ABCDEFGHIJKLM
NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789; < = > ?
! " # \$ % & ' () * + , - . / _ :
[\] ^ _ { | } ~ Ç Ü é à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ù
ÿ Ö Ü ç Þ ß à í ó ú ñ Ñ º ½ ¼ ⅓ ⅔ ⅕ ⅖ ⅗ ⅘ ⅙ ⅚ ⅛ ⅜ ⅝ ⅞ Ⅰ Ⅱ Ⅲ Ⅳ Ⅴ Ⅵ Ⅶ Ⅷ Ⅸ Ⅹ Ⅺ Ⅻ Ⅼ Ⅽ Ⅾ Ⅿ ⅰ ⅱ ⅲ ⅴ ⅵ ⅶ ⅷ ⅸ ⅹ ⅺ ⅻ ⅼ ⅽ ⅾ ⅿ

EFF Swiss Bold Font

ABCDEF GHIJKLM
NOPQRST UVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789;,<=>?
!"#\$%&'()*+,-./:
[\] ^ _ ` ~ 128üéääåä@
çëëëïïÄÅÊë/Éöóô
ûüÿÖÜ€ΣΨφψ&íóññÑ"º¿
Γ~½¼¡«»¶πσß

ABCDEF GHIJKLM
NOPQRST UVWXYZ
abcdefghijklm
nopqrstuvwxyz
0123456789;,<=>?
!"#\$%&'()*+,-./:
[\] ^ _ ` ~ 128üéääåä@
çëëëïïÄÅÊë/Éöóô
ûüÿÖÜ€ΣΨφψ&íóññÑ"º¿
Γ~½¼¡«»¶πσß

EFF Swiss Bold 9 pt

EFF Swiss Bold 15 pt

EFF Swiss Bold 20 pt




Bitmap Font Information

Our bitmap fonts are either monospaced (each character occupies the same amount of space) or proportional (each character is a different height and width). Use monospaced fonts for price fields and data you want to list in a column. With proportionally spaced fonts, you may be able to place more characters on a line. However, you may need to experiment with these fonts and adjust field measurements in your format. The bitmapped fonts (either monospaced or proportional) appear jagged when magnified.

Monospaced Font Magnification

Monospaced characters occupy the same amount of space within a magnification. Use monospaced fonts for price fields and data you want to list in a column. Decide how wide and tall you want the characters to appear on the labels. The following two tables show the width and height of each of the monospaced fonts after magnification.


This table includes the default (3 dots for Standard, 1 dot for Reduced, 3 dots for Bold) spacing.


Width Mag.		Standard		Reduced		Bold	
Units		Character Width	Sample	Character Width	Sample	Character Width	Sample
1x	1/100 in.	8.37		3.9		13.3	
	1/10 mm	21.26		9.9		33.78	
	Dots	17	A	8	A	27	A
7x	1/100 in.	49.75		24.63		84.24	
	1/10 mm	126.37		62.56		214	
	Dots	101		50		171	

To calculate other font widths, multiply the font dots (14 dots for Standard, 7 dots for Reduced, 24 dots for Bold) by the magnification and add the default spacing (3 dots for Standard, 1 dot for Reduced, 3 dots for Bold) between characters.

Example

14 (Standard font dots) x 5 (magnification) = 70 + 3 (default spacing between characters). There are 73 dots in the Standard font at 5x.

1x		7x
		
Standard	A	
1/100 in.	10.8	75.9
1/10 mm	27.4	192.8
dots	22	154

		
Reduced	A	
1/100 in.	6.9	48.28
1/10 mm	17.5	122.6
dots	14	98



1/100 in.	16.7	117.24
1/10 mm	42.4	297.8
dots	34	238

Proportional Font Magnification

Each character in a proportionally spaced font is a different height and width. You may be able to place more characters on a line using proportionally spaced fonts. You may want to experiment with these fonts and adjust field measurements in your format as needed. The following tables provide height and width magnification of sample characters.

CG Triumvirate Bold (8 pt.)

Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	1.56	5.73	10.94
	1/10 mm	3.97	14.55	27.78
	Dots	3	11	21
7x	1/100 in.	6.9	20.7	41.4
	1/10 mm	17.5	52.6	105.2
	Dots	14	42	84







To calculate other font widths, multiply the font dots (3 dots for Minimum, 13 dots for Average, 22 dots for Maximum) by the magnification.

Example


13 (Average font dots) x 5 (magnification) = 65 dots in an average letter of the CG Triumvirate Bold font at 5x.


CG Triumvirate Bold (6.5 pt.)

Font #1000

Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	1.56	4.69	9.90
	1/10 mm	3.97 	11.91 	25.14 
	Dots	3	9	19
7x	1/100 in.	10.94	32.81	69.27
	1/10 mm	27.78 	83.34 	175.95 
	Dots	21	63	133

Height Magnification






	1x	7x
1/100 in.	6.77	47.40
1/10 mm	17.20	120.39
dots	13	91

Width Mag.		Minimum	Average		Maximum
1x	1/100 in.	1.56	5.73		10.94
	1/10 mm	3.97	14.55		27.78
	Dots	3	11	L	21
7x	1/100 in.	6.9	20.7		41.4
	1/10 mm	17.5	52.6		105.2
	Dots	14	42		84

Height Magnification

	1x	w	7x	
1/100 in.	8.33		58.33	
1/10 mm	21.17		148.17	
dots	16		112	

CG Triumvirate Bold (10 pt.)

Font #1002

Width Mag.		Minimum		Average		Maximum	
1x	1/100 in.	1.56		6.77		13.02	
	1/10 mm	3.97	I	17.20	L	33.07	w
	Dots	3		13		25	
7x	1/100 in.	10.94		47.40		91.15	
	1/10 mm	27.78	■	120.39	■	231.51	⚡
	Dots	21		91		175	

Height Magnification

	1x	W	7x	⚡
1/100 in.	10.42		72.92	
1/10 mm	26.46		185.21	
dots	20		140	

CG Triumvirate Bold (12 pt.)

Font #1003


Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	2.60	8.85	16.15
	1/10 mm	6.61	22.49	41.01
	Dots	5	17	31
7x	1/100 in.	18.23	67.94	113.02
	1/10 mm	46.30	157.43	287.07
	Dots	35	119	217

Height Magnification

		W		W	
		1x		7x	
1/100 in.	12.50			87.50	
1/10 mm	31.75			222.25	
dots	24			168	


Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	7.81	12.50	22.92
	1/10 mm	19.84	31.75	58.21
	Dots	15	24	44
		1	8	%
7x	1/100 in.	54.69	87.50	160.42
	1/10 mm	138.91	222.25	407.46
	Dots	105	168	308

Height Magnification

		1x	8	7x	
1/100 in.		19.27		134.90	
1/10 mm		48.95		342.64	
dots		37		259	

Width Mag.		Minimum	Average		Maximum
1x	1/100 in.	9.38	15.63	27.08	
	1/10 mm	23.81	39.68	68.79	
	Dots	18	30	52	
7x	1/100 in.	65.63	109.38	189.58	
	1/10 mm	166.69	277.81	481.54	
	Dots	126	210	364	

Height Magnification

		1x	8	7x	
1/100 in.		23.44		164.05	
1/10 mm		59.53		416.72	
dots		54		315	

CG Triumvirate Bold Cond (6.5 pt.)

Font #1006

Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	1.04	3.65	6.25
	1/10 mm	2.65	9.26	15.88
	Dots	2	7	12
7x	1/100 in.	7.29	25.52	43.75
	1/10 mm	18.52	64.82	111.13
	Dots	14	49	84

Height Magnification

	1x	7x
1/100 in.	6.77	47.40
1/10 mm	17.20	120.39
dots	13	91

CG Triumvirate Bold Cond (8 pt.)

Font #1007







Width Mag.		Minimum	Average	Maximum	
1x	1/100 in.	1.56	4.69	8.85	
	1/10 mm	3.97	11.91	22.49	
	Dots	3 i	9 L	17 w	
7x	1/100 in.	10.94	32.81	67.94	
	1/10 mm	27.78	83.34	157.43	
	Dots	21 ■	63 ■	119	W

Height Magnification

	1x	w	7x	W
1/100 in.	8.85		61.98	
1/10 mm	22.49		157.43	
dots	17		119	


CG Triumvirate Bold Cond (10 pt.)







Font #1008

Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	2.08	5.73	11.98
	1/10 mm	5.29	14.55	30.43
	Dots	4 	11 	23 
7x	1/100 in.	14.58	40.10	83.85
	1/10 mm	37.04	101.86	212.99
	Dots	28 	77 	161 


Height Magnification

	1x	W	7x
1/100 in.	10.94		76.56
1/10 mm	27.78		194.47
dots	21		147



Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	2.60	7.29	14.58
	1/10 mm	6.61	18.52	38.04
	Dots	5 	14 	28 
7x	1/100 in.	18.23	51.04	96.88
	1/10 mm	46.30	129.65	246.06
	Dots	35 	98 	186 

Height Magnification

	1x	W	7x	
1/100 in.	13.02		91.15	
1/10 mm	33.07		231.51	
dots	25		175	


Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	7.81	10.94	21.88
	1/10 mm	19.84	27.78	55.56
	Dots	15	21	42
7x	1/100 in.	54.69	76.56	153.12
	1/10 mm	138.91	194.47	388.94
	Dots	105	147	294

Height Magnification

		1x	8	7x	0/0
1/100 in.		20.31		142.19	
1/10 mm		51.59		361.16	
dots		39		273	

Width Mag.		Minimum	Average	Maximum
1x	1/100 in.	9.38	13.02	26.56
	1/10 mm	23.81	33.07	67.47
	Dots	18	25	51
7x	1/100 in.	65.63	91.15	185.94
	1/10 mm	166.69	231.51	472.28
	Dots	126	175	357

Height Magnification

		1x	8	7x	
1/100 in.		24.48		171.35	
1/10 mm		62.18		435.24	
dots		47		329	

Scalable Font Information

The scalable font is smooth at any point size or magnification. There are no jagged edges as in the standard printer bitmapped fonts. Therefore, the field height and width varies with each letter.

When you define formats using scalable fonts, remember to set the character rotation to **0**, because it is not supported. However, field rotation is supported for text or constant text fields using the scalable font.

The height and width magnification are defined in point size. 72 points = one inch. One inch = cell size. The cell size is the built-in space around the individual characters of the scalable font. The minimum point size is 4 and the maximum point size is 250. If height and width magnification are not set to the same point size, the printed characters look tall and thin or short and thick, which allows for greater flexibility in the appearance of the font.

Scalable fonts perform better in constant text fields, because those fields are imaged only once per batch, not once per label as in text fields. **The scalable font does not print a slashed zero.** The transparent overlay allows closer field placement when using scalable fonts.

Soft Font Utility

The MONARCH® MPCL Toolbox Soft Font Utility is available on our Web site (www.paxar.com) and converts Truetype fonts to Hex or Run Length encoding. When downloading a TrueType font, you download the entire font. You cannot specify a subset (particular characters or point size) of the font. This allows you to print a variety of Code Pages with International (Turkish, Latin, Spanish, etc.) characters. TrueType fonts are designed to be regionally specific; therefore, all code pages may not be supported in a given font.

Using Font Numbers in Formats

Use the following font numbers in your format when designating new fonts.

1 - 49	Resident fonts (bitmapped only)
50 - 99	Resident fonts (scalable only)
100 - 499	Customer-generated RAM fonts (bitmapped)
500 - 999	Monarch's optional fonts (bitmapped and scalable)
1000 - 8999	Monarch's optional fonts (bitmapped)
9000 - 9999	Monarch's optional fonts (scalable only)

—————
If you use a font number that is not a
standard font for your printer, make sure the
font has been installed in the printer.
—————

Locating the Font Number in a Font Packet

If you are creating font packets, the font number is the second parameter in the packet. Software is available to create the font data and packet. Call Technical Support for more information.

<i>Example</i>	{W,200,A,N,68	FontNumber
	font data	
	font data }	

Use this number in **T8** or in **C5**. See "Defining Text Fields" or "Defining Constant Text Fields" in Chapter 2 for more information.

Example

```
T,1,10,V,30,10,0,200,1,1,B,L,0,0,0 |
C,50,30,0,200,1,1,B,L,0,0,"MONARCH",0 |
```

Font Number

Font Number

Defines a text and constant text field using the downloaded (#200) font.

SYMBOL SETS/CODE PAGES



This appendix provides a listing of the symbol sets and code pages the printer supports.

Supported Symbol Sets and Code Pages

The printer supports the following symbol sets and code pages:

- ◆ Internal Symbol Set
- ◆ ASCII Symbol Set
- ◆ DOS Code Page 437
- ◆ DOS Code Page 850

Fonts 1004, 1005, 1010, and 1011 are limited to the following special characters: 0123456789#\$%&(),./@DFKLMPS\kprö£¥.

Selecting a Symbol Set or Code Page

The printer defaults to the internal symbol set.

Selecting the Internal Symbol Set

The CG Triumvirate fonts support only the ASCII and DOS Code Page Symbol Sets.

Selecting the 437 or 850 Code Page

These code pages provide extended and international characters and use proportionally spaced fonts.

Using Code 128 Function Codes

This table lists the characters for Bar Code 128 function codes. These functions are used with scanners.

Code	Function Code
~201	F1
~202	F2
~203	F3
~204	F4

ASCII Symbol Set

To determine the character code, add the column number and row number for the character. For example, to produce the ~ character, you would press **Alt 126** (column 14 + row 112).

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
16	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
32		!	"	#	\$	%	&	'	()	*	+	,	-	.	/
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	⌘

■ designates non-printing characters.

Entering Extended Characters

When using extended characters in your batch data file, type a tilde in front of the three-digit code. For example, if you want to include the character Å in a text field using the Internal Symbol Set, type:

1, "~142" |

Using International Character Sets/Code Pages

Code pages 100, 101, 852-860, and 1250-1258 may only be used with downloaded TrueType fonts. TrueType fonts are designed to be regionally specific; therefore, all code pages may not be supported in a given font. Font 50 does not support Code Pages 101 (Wingdings), 1255 (Hebrew), 1256 (Arabic), or 1258 (Vietnamese). For example, to print Hebrew characters, you need to find a font (such as Arial) that supports Hebrew characters; convert, and then download the font to your printer. Make sure the correct Code Page for Hebrew characters is selected. The character sets (100 and greater) were printed using Arial or a similar downloaded TrueType font. To determine the character code, add the column number and row number for the character. For example, to produce the ÿ character, you would press **Alt 255** (column 15 + row 240).

The Euro-dollar symbol at position ~192 is only available in the Standard, Reduced, and Bold fonts.

Additional code pages (932, 936, and 950) are available when using downloaded Asian double-byte fonts. Each of these Asian code pages contain thousands of characters, which are not represented in this manual.

Internal Symbol Set

240																	TM
224	α	β															
208	Ø		ø														
192	€	—															
176	\$	£	¥	₤	₡	₧	₪	₹	₱	₱	₱	₱	₱	₱	₱		
160	á	í	ó	ú	ñ	Ñ	ª	º	¿	¬	½	¼	;	«	»		
144	É	æ	Æ	ô	ö	ò	û	ÿ	Ö	Ü	Ç	£	¥	₤	₡		
128	Ç	ü	é	â	ä	à	ã	ç	ê	ë	è	ï	î	ì	Ä		
112	p	q	r	s	t	u	v	w	x	y	z	{	!	}	~		
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n		
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^		
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N		
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>		
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/		
16																	
0																	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

ANSI Symbol Set

240	ð	ñ	ò	ó	ô	õ	÷	ø	ù	ú	û	ü	ý	þ	ÿ
224	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î
208	Ð	Ñ	Ò	Ó	Ô	Õ	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
192	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î
176	°	±	²	³	´	μ	¶	·	¸	¹	º	»	¼	½	¾
160	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	­	®	¯
144	‘	’													
128															
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	O	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32		!	"	#	\$	%	&	'	()	*	+	,	-	.
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
															15

Bold Character Set

240															
224															
208															
192	€														
176	\$	£	¥	¤	F	P	L	¢	®	§	®	½	¢	W	¥
160															
144															
128															
112															
96															
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	O	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32		!	"	#	\$	%	&	'	()	*	+	,	-	.
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
															15

OCRA Character Set

[illegible]

Code Page 100 (Macintosh)

	Ò	Ú	Û	Ù	ı	^	~	-	˘	˙	˚	˛	˜	˝	ˆ	˜	
240	‡	·	,	„	%	‰	Â	Ê	Á	Ë	È	Í	Î	Ĩ	Ì	Ó	Ô
224	—	—	“	”	,	’	÷	◇	Ÿ	Ỳ	/	€	<	>	fi	fl	
208	¿	i	¬	√	f	≈	Δ	«	»	…	À	Ã	Ö	Æ	œ		
192	∞	±	≤	≥	¥	μ	ə	Σ	Π	n	ƒ	ª	º	Ω	æ	ø	
176	†	°	¢	£	§	•	¶	β	®	©	™	’	¨	≠	Æ	Ø	
160	ê	ë	í	ì	î	ï	ñ	ó	ò	ô	ö	õ	ú	ù	û	ü	
144	Ä	Å	Ç	É	Ñ	Ö	Ü	á	à	â	ä	ã	å	ç	é	è	
128	p	q	r	s	t	u	v	w	x	y	z	{		}	~		
112	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
96	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_	
80	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
64	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?	
48	!	"	#	\$	%	&	'	()	*	+	,	-	.	/		
32																	
16																	
0																	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

Code Page 101 (Wingdings)

240	⇐	↑	↓	↔	↕	↖	↗	↘	↙	□	□	×	✓	☒	☑	☐
224	→	↑	↓	↖	↗	↘	↙	↘	↗	↖	↙	↘	↗	↖	↙	↘
208	☞	☛	☞	☛	☛	☛	☛	☛	☛	☛	☛	☛	☛	☛	☛	☛
192	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚	⌚
176	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕
160	•	○	○	●	◎	◎	○	▪	□	▲	★	★	★	★	★	★
144	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳
128	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯
112	□	□	□	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
96	Ⅱ	Ⅲ	Ⅳ	Ⅴ	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	Ⅺ	Ⅻ	Ⅼ	Ⅽ	Ⅾ	Ⅿ	ⅰ
80	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
64	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
48	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
32	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
16																
0																

Code Page 437 (Latin U.S.)

240	≡	±	≥	≤			÷	≈	°	.	.	√	n	2	■	
224	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
208	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥
192	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥
176	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥
160	á	í	ó	ú	ñ	Ñ	ª	º	¿	¬	½	¼	¡	«	»	
144	É	æ	Æ	ô	ö	ò	û	ü	ÿ	Ö	Ü	ø	£	¥	Ps	f
128	Ç	ü	é	â	ä	à	ç	ê	ë	è	ï	î	ï	Ä	Å	
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																

Code Page 850 (Latin 1)

240	-	±	=	¾	¶	§	÷	,	°	¨	.	¹	³	²	■
224	Ó	ß	Ô	ò	Õ	µ	þ	Þ	Ú	Û	Ü	ý	Ý	-	´
208	ð	Ð	Ê	Ë	È	Í	Î	Ï			■	■			■
192															
176															
160	á	í	ó	ú	ñ	Ñ	ª	º	¿						
144	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	×
128	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ï	Ä
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
															15

Code Page 852 (Latin 2)

240	-	ˆ	˜	˘	˙	˚	˛	˜	˜	˜	˜	˜	˜	˜	˜
224	Ó	ß	Ô	Ó	ñ	ñ	Š	š	Ř	Ú	ř	Ů	ý	Ý	ť
208	đ	Ð	Ď	Ě	ď	Ň	í	î	ě			■	■		
192															
176															
160	á	í	ó	ú	Ā	ā	Ž	ž	Ę	ę					
144	É	Í	Í	ô	ö	Ĺ	ĺ	Š	š	Ö	Ü	Ť	ť	Ł	×
128	Ç	ü	é	â	ä	û	ć	ç	ł	ë	Ő	ő	î	Ž	Ć
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
															15

Code Page 855 (Russian)

240	-	ы	Ы	з	З	ш	Ш	э	Э	щ	Щ	ч	Ч	§	■
224	Я	р	Р	с	С	т	Т	у	У	ж	Ж	в	В	ь	№
208	л	Л	м	М	н	Н	о	О	п	┘	┐	■	■	П	я
192	└	┴	┤	├	─	┬	к	К	┌	┐	≡	≡	≡	≡	α
176	▒	▒	▒	▒		┘	х	Х	и	И				й	Й
160	а	А	б	Б	ц	Ц	д	Д	е	Е	ф	Ф	г	Г	«
144	ь	Ь	ъ	Ъ	ћ	Ћ	ќ	Ќ	џ	Џ	ю	Ю	ъ	Ъ	
128	ђ	Ђ	ѓ	Ѓ	ё	Ё	є	Є	ѕ	Ѕ	і	І	ї	Ї	Ј
112	р	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Code Page 857 (IBM Turkish)

240	-	±	¼	¶	§	÷	,	°	ˆ	.	1	3	2	■	
224	Ó	ß	Ô	Ò	õ	Ö	μ	×	Ú	Û	Ü	ı	ÿ	—	˘
208	°	à	Ê	Ë	È	Í	Î	İ	┘	┐	■	■	ı	ı	■
192	└	┴	┤	├	─	┬	ă	Ă	┌	┐	≡	≡	≡	≡	α
176	▒	▒	▒	▒		┘	Á	Â	À	©				φ	¥
160	á	í	ó	ú	ñ	Ñ	Ğ	ğ	¿	®	¬	½	¼	ı	«
144	É	æ	Æ	ô	ö	ò	û	ü	İ	Ö	Ü	ø	£	Ø	§
128	Ç	ü	é	â	ä	à	â	ç	ê	ë	è	ï	î	ı	Ä
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Code Page 860 (MS-DOS Portuguese)

240	≡	±	≥	≤	∫	∫	÷	≈	°	.	.	√	n	²	■	
224	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
208	⌌	⌍	⌎	⌏	⌐	⌑	⌒	⌓	⌔	⌕	⌖	⌗	⌘	⌙	⌚	⌛
192	⌜	⌝	⌞	⌟	⌠	⌡	⌢	⌣	⌤	⌥	⌦	⌧	⌨	〈	〉	⌫
176	⌬	⌭	⌮	⌯	⌰	⌱	⌲	⌳	⌴	⌵	⌶	⌷	⌸	⌹	⌺	⌻
160	á	í	ó	ú	ñ	Ñ	ª	º	¿	Ò	¬	½	¼	¡	«	»
144	É	À	È	ô	õ	ò	Ú	ù	ì	Ö	Ü	£	£	Ù	Ps	Ó
128	Ç	ü	é	â	ã	à	Á	ç	ê	Ê	è	Í	Ô	ì	Ã	Â
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code Page 1250 (Latin 2)

240	đ	ń	ň	ó	ô	õ	ö	÷	ř	ů	ú	ů	ý	ť	.	
224	í	á	â	ă	ä	í	ć	ç	č	é	ę	ë	ě	í	î	đ
208	Đ	Á	Â	Ă	Ä	Í	Ć	Ç	Č	É	Ę	Ë	Ě	Í	Î	Đ
192	Ŕ	Á	Â	Ă	Ä	Í	Ć	Ç	Č	É	Ę	Ë	Ě	Í	Î	Đ
176	°	±	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
160	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
144	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
128	€	,	„	...	†	‡	‰	Š	<	Š	Ť	Ž	Ž	Ž	Ž	Ž
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code Page 1251 (Cyrillic)

240	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я
224	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
208	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
192	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
176	°	±	І	і	Ҁ	μ	¶	·	ё	№	є	»	ј	Ѕ	ѕ	ї
160	Ў	ў	Ј	ѣ	Ґ	ґ	§	Є	©	€	«	¬	-	®	İ	
144	ђ	`	'	"	"	•	—		™	љ	>	њ	ќ	ћ	џ	
128	Ђ	Ѓ	Ѕ	Ї	Ї	„	...	†	‡	€	‰	Љ	<	Њ	Ќ	Џ
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code Page 1252 (Latin 1)

240	đ	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ
224	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
208	Đ	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ÿ
192	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
176	°	±	²	³	´	μ	¶	·	¸	¹	º	»	¼	½	¾	¿
160	ı	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	-	®	¯	
144	`	'	"	"	•	—		~	™	š	>	œ	ž	ÿ		
128	€		‚	ƒ	„	...	†	‡	^	‰	Š	<	Œ	Ž		
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code Page 1253 (Greek)

240	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	ϊ	ϋ	ό	ύ	ώ
224	ϐ	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ ο
208	Π	Ρ		Σ	Τ	Υ	Φ	Χ	Ψ	Ω	Ϊ	Ϋ	ά	έ	ή ι
192	ΐ	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ Ο
176	ο	±	²	³	´	μ	¶	·	Έ	Ή	Ί	»	Ό	½	Υ Ώ
160	ˆ	Ά	£	⌘	¥	!	§	¨	©		«	¬	-	®	—
144	`	'	”	”	•	—	—	™			>				
128	€		,	ƒ	„	...	†	‡	‰						<
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^ _
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	> ?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 15

Code Page 1254 (Turkish)

240	ğ	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ı	ş Ÿ
224	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î ï
208	Ğ	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	İ	Ş ß
192	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î Ï
176	ο	±	²	³	´	μ	¶	·	¸	¹	º	»	¼	½	¾ ¿
160	ı	¢	£	⌘	¥	!	§	¨	©	ª	«	¬	-	®	—
144	`	'	”	”	•	—	—	~	™	š	>	œ			ÿ
128	€		,	ƒ	„	...	†	‡	^	‰	Š	<	Œ		
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^ _
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	> ?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14 15

Code Page 1255 (Hebrew)

240	נ	ס	ע	ף	פ	ץ	צ	ק	ש	ר	ת	ן	מ	ם	ל
224	א	ב	ג	ד	ה	ו	ז	ח	ט	י	ך	כ	ל	ם	ן
208		.	:	וּ	וֵ	וִ	"	'	"						
192	.	"	׳	״	.	װ	ױ	ײ	״	׳	״	׳	״	׳	״
176	°	±	²	³	'	μ	¶	·	¸	¹	÷	»	¼	½	¾
160	ı	¢	£	¤	¥	¦	§	¨	©	×	«	¬	-	®	¯
144	\	'	"	"	•	—	—	~	™		>				
128	€		,	f	"	...	†	‡	^	%	‰	<			
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Code Page 1256 (Arabic)

240	=	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ
224	à	ا	â	م	ن	و	ه	ç	é	é	ê	ë	ی	آ	İ
208	ك	ق	ف	-	غ	ع	ط	ط	×	ض	ص	ش	س	ز	ذ
192	د	خ	ح	ج	ث	ت	ة	ب	ا	ئ	إ	ؤ	أ	آ	ء
176	°	±	²	³	'	μ	¶	·	¸	¹	÷	»	¼	½	¾
160	ı	¢	£	¤	¥	¦	§	¨	©	×	«	¬	-	®	¯
144	گ	\	'	"	"	•	—	—	ک	™	>	œ		ı	ı
128	€	پ	,	f	"	...	†	‡	^	%	‰	<	£	ج	ز
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
16															
0															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Code Page 1257 (Baltic)

240	š	ń	ņ	ó	ō	õ	ö	÷	ų	ţ	ś	ū	ü	ž	ž	·
224	ą	į	ā	ć	ä	ā	ē	ē	č	é	ž	è	ğ	ķ	ī	ļ
208	Š	Ń	Ņ	Ó	Ō	Õ	Ö	×	Ų	Ț	Ś	Ū	Ü	Ž	Ž	β
192	Ą	Į	Ā	Ć	Ä	Ā	Ē	Ē	Č	É	Ž	È	Ğ	Ķ	Ī	Ļ
176	°	±	²	³	´	µ	¶	·	ø	¹	²	»	¼	½	¾	æ
160		¢	£	¤	¥	¦	§	¨	©	ª	«	¬	-	®	¯	Æ
144	`	'	"	"	•	—	—	™	>							˘
128	€		,	„	...	†	‡	‰	<							˙
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Code Page 1258 (Vietnamese)

240	đ	ñ	.	ó	ô	ơ	ö	÷	ø	ù	ú	û	ư	đ	ÿ	
224	à	á	â	ă	ä	ã	æ	ç	è	é	ê	ë	í	î	ï	
208	Đ	Ñ	.	Ó	Ô	Ơ	Ö	×	Ø	Ù	Ú	Û	Ư	~	β	
192	À	Á	Â	Ă	Ä	Ã	Æ	Ç	È	É	Ê	Ë	Ì	Î	Ï	
176	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
160		¢	£	¤	¥	¦	§	¨	©	ª	«	¬	-	®	¯	˘
144	`	'	"	"	•	—	—	™	>	æ						ÿ
128	€		,	„	...	†	‡	‰	<	œ						
112	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
96	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
80	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
64	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
48	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
32	!	"	#	\$	%	&	'	()	*	+	,	-	.	/	
16																
0																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Dot to Run Length Encoding Chart

ON (Black) Dots

# of Dots	Code	# of Dots	Code
1	A	14	N
2	B	15	O
3	C	16	P
4	D	17	Q
5	E	18	R
6	F	19	S
7	G	20	T
8	H	21	U
9	I	22	V
10	J	23	W
11	K	24	X
12	L	25	Y
13	M	26	Z

OFF (White Dots)

# of Dots	Code	# of Dots	Code
1	a	14	n
2	b	15	o
3	c	16	p
4	d	17	q
5	e	18	r
6	f	19	s
7	g	20	t
8	h	21	u
9	i	22	v
10	j	23	w
11	k	24	x
12	l	25	y
13	m	26	z

FORMAT DESIGN TOOLS



Use copies of these worksheets and grids to create formats, batch data, and check digit schemes. You may want to keep copies of the completed forms for your records:

- ◆ Batch Worksheet
- ◆ Check Digit Worksheet
- ◆ Supply Layout Grids (English, Metric, Dots)
- ◆ Format Worksheet

B	B1 HEADER	B2 FORMAT #	B3 NEW / UPDATE	B4 QUANTITY
---	-----------	-------------	-----------------	-------------

FIELD #	DATA
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

9	HEADER
	CONTRAST
	PRINT ADJUST
	MARGIN ADJUST
	SPEED ADJUST
	PRINTHD WIDTH

E	E1 HEADER
	E2 FEED-MODE
	E3 BATCH-SEP
	E4 PRINT-MULT
	E5 MULTI-PART
	E6 CUT-TYPE
	E7 CUT-MULT

[illegible]

Check Digit Worksheet

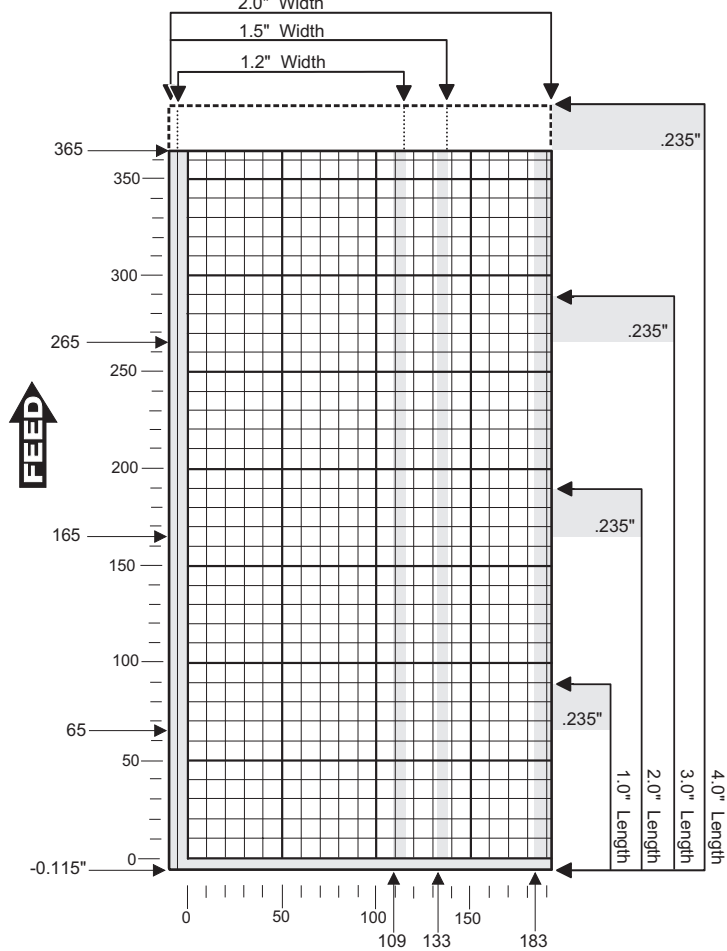
A	A1 HEADER	A2 SELECTOR #	A3 ACTION	A4 DEVICE	A5 MODULUS	A6 LENGTH	A7 ALGORITHM	WEIGHTS A8
R								

A	A1 HEADER	A2 SELECTOR #	A3 ACTION	A4 DEVICE	A5 MODULUS	A6 LENGTH	A7 ALGORITHM	WEIGHTS A8
R								

A	A1 HEADER	A2 SELECTOR #	A3 ACTION	A4 DEVICE	A5 MODULUS	A6 LENGTH	A7 ALGORITHM	WEIGHTS A8
R								

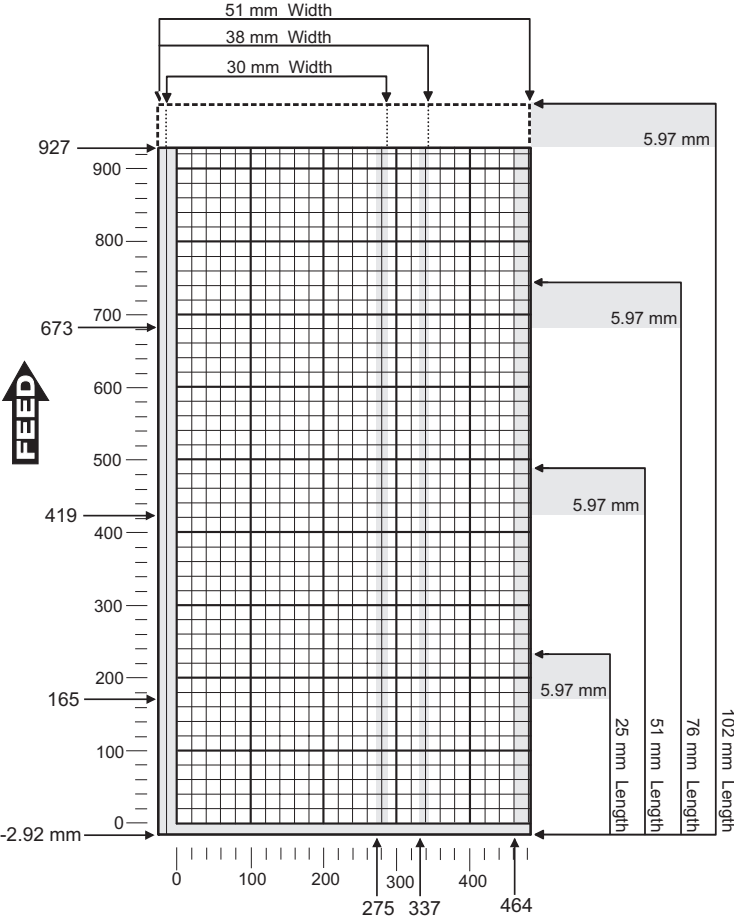
Supply Layout (English)

□ - Indicates
no-print area



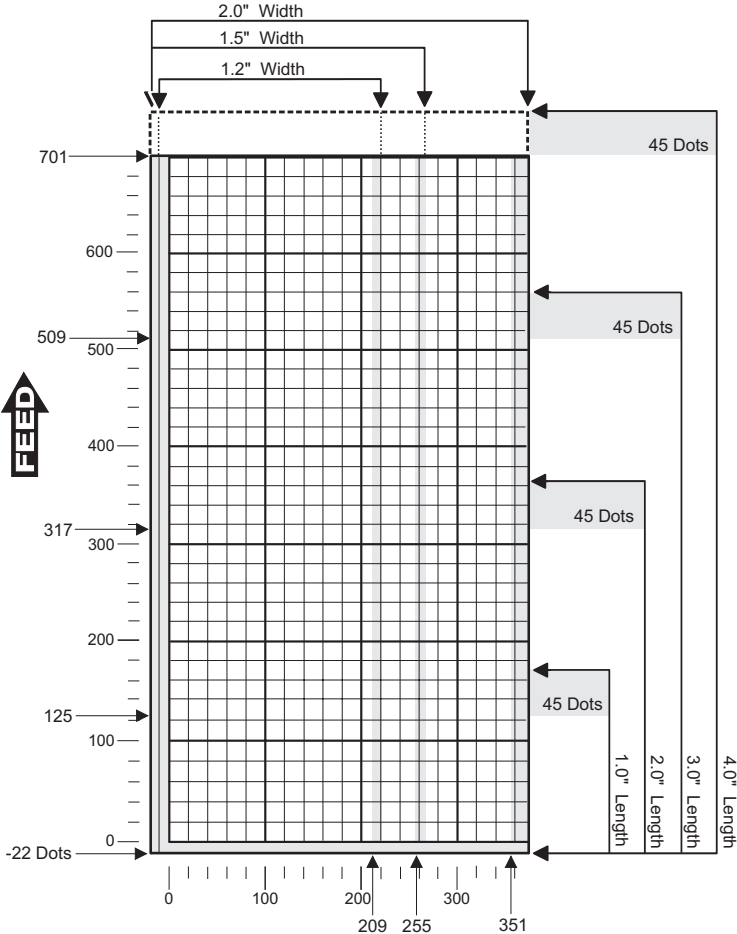
Supply Layout
(Metric)

█ - Indicates
no-print area



Supply Layout
(Graphic)

█ - Indicates
no-print area



CONSTANT
TEXT
FIELDS

	L1 HEADER
	L2 TYPE
	L3 ROW
	L4 COLUMN
	L5 ANGLE/ END ROW
	L6 LENGTH/ END COL.
	L7 THICKNESS
	L8 PATTERN

NON -
PRINTABLE
TEXT FIELDS

	D1 HEADER	OPTION #1 Fixed Characters	
	D2 FIELD #		
	D3 # OF CHAR.		
	R1 HEADER		
	R2 CODE #		
		R3 FIXED CHAR. ("IN QUOTES")	

BAR CODE
FIELDS

	B1 HEADER
	B2 FIELD #
	B3 # OF CHAR
	B4 FIX/VAR
	B5 ROW
	B6 COLUMN
	B7 FONT
	B8 DENSITY
	B9 HEIGHT
	B10 TEXT
	B11 ALIGNMENT
	B12 FIELD ROT.

LINES

	F1 HEADER
	F2 FORMAT #
	F3 ACTION
	F4 DEVICE
	F5 MEASURE
	F6 LENGTH
	F7 WIDTH
	R8 NAME. ("IN QUOTES")

FORMAT
HEADER

GRAPHICS
FIELDS

	G1 HEADER
	G2 GRAPH ID
	G3 ROW
	G4 COLUMN
	G5 MODE
	G6 ROTATION

BOXES

	Q1 HEADER
	Q2 ROW
	Q3 COLUMN
	Q4 END ROW
	Q5 END COLUMN
	Q6 THICKNESS
	Q7 PATTERN

TEXT
FIELDS

	T1 HEADER	
	T2 FIELD #	
	T3 # OF CHAR.	
	T4 FIX/VAR	
	T5 ROW	
	T6 COLUMN	
	T7 GAP	
	T8 FONT	
	T9 HGT. MAG.	
	T10 WID. MAG.	
	T11 COLOR	
	T12 ALIGNMENT	
	T13 CHAR. ROT.	
	T14 FIELD ROT.	
	T15 SYM. SET	
	R1 HEADER	
	R2 CODE #	
	R3 FIXED CHAR. ("IN QUOTES")	
	R1 HEADER	
	R2 CODE #	
	R3 SRC FIELD	
	R4 SRC START	
	R5 # TO COPY	
	R6 DEST. START	
	R7 COPY CODE	
	R1 HEADER	
	R2 CODE #	
	R3 INPUT (↵)	

GLOSSARY

Batch Data 2,"Monarch"	Defines the actual information (as fields within { }) printed on the label.
Batch Control E,0,1,4,2	Defines the print job (as a field).
Batch Header {B,1,N,1}	First line of a batch, immediately following ({}). Identifies the format and batch quantity.
Batch Packet {B,1,N,1 2,"Monarch" }	Contains a batch header and the batch data. Enclosed within { }.
Bitmapped Fonts	Reside in the printer's memory. If you change the point size, you have changed the font. Magnifying these fonts causes some jaggedness to occur.
Buffer	Storage area in the printer's memory that holds specific data (images, formats, etc).
Field	Can be text, bar codes, lines, boxes, constant, or non-printable text. It is the result of a field definition.
Field Definition	Any string of parameters that pertain to one field. A field definition begins with a field identifier (such as T , B , D , C , etc.). T,1,10,V,250,50,0,1,1,1,B,C,0
Field Parameters	Parameters that apply to a field and are separated by commas. (In the above example, B is a field element for black print on a white background.)
Flash Memory	Contains information that is SAVED on power-down.
Format	Layout or design for your printed label.

Format Header First line of a format, immediately following the start of packet ({). A format header must begin with **F**, followed by various header elements.

```
{F,1,A,R,E,600,400,"Fmt-1" }
```

Monospaced Fonts All characters have the same width and are easy to center justify. (Standard, bold, and reduced are monospaced.)

Option Any line within a format that applies special formatting to a field. This line always begins with **R** and must immediately follow the field it applies to.
R,4,6,1,3,1

Packet Any string of characters within ({ }).
{**B,1,N,1** |
2,"Monarch" | }

Pre-image A way to optimize the printer, because it images the fields while data is collected. After the last field is imaged, the label prints almost immediately.

Proportionally Spaced Fonts All characters have different widths and are difficult to center justify (CG Triumvirate fonts).

Soft (Downloaded) Fonts Reside in the printer's RAM. They can be erased or overwritten.

Volatile RAM Contains information that is LOST on power-down.

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