# ZPL II Programming

## Guide

For Firmware Version x.14 and Later

Zebra

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**Part Number: 13979L-008 Rev. A**

# Contents

# Functional Contents

# About This Document

This section provides you with contact information, document structure and organization, and additional reference documents.

## Contents

# Who Should Use This Document

This Guide is for programmers who are familiar working with programming languages.

# How This Document Is Organized

The Guide is set up as follows:

| Section | Description |
|---|---|
| *Introduction* | Provides a high-level overview about this guide and Zebra Programming Language (ZPL). |
| *ZPL Commands* | Provides an alphabetical, detailed description of each ZPL command. |
| *ZPL RFID Commands* | Provides an alphabetical, detailed description of each ZPL RFID command, and some examples of how to use them. |
| *ZPL Wireless Commands* | Provides new and modified ZPL commands for the wireless print server. |
| *ZBI Commands* | Provides and explanation of the Zebra Basic Interpreter, its commands, descriptions, formats, and parameters. Examples are shown and comments provided for you as well. |
| *SGD Printer Setting Commands* | Provides a high-level overview of printer setting Set / Get / Do (SGD) commands. |
| *SGD Wired Commands* | Provides a high-level overview of the wired Set / Get / Do (SGD) commands. |
| *SGD Wireless Commands* | Provides a high-level overview of the wireless Set / Get / Do (SGD) commands. |

| Section | Description |
|---|---|
| Appendixes | The appendixes include:<br>*Zebra Code Pages*<br>*ASCII*<br>*Fonts and Bar Codes*<br>*Mod 10 and Mod 43 Check Digits*<br>*ZB64 Encoding and Compression*<br>*Field Interactions*<br>*Real Time Clock*<br>*ZBI Character Set*<br>*SGD Command Support*<br>*Features* |
| *Glossary* | Glossary of terms. |

# Contacts

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http://www.zebra.com

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# Document Conventions

The following conventions are used throughout this document to convey certain information.

**Alternate Color** (online only) Cross-references contain hot links to other sections in this guide. If you are viewing this guide online in .pdf format, you can click the cross-reference (blue text) to jump directly to its location.

**LCD Display Examples** Text from a printer's Liquid Crystal Display (LCD) appears in `Bubbledot ICG` font.

**Command Line Examples** Command line examples appear in `Courier New` font. For example, type `ZTools` to get to the Post-Install scripts in the `bin` directory.

**Files and Directories** File names and directories appear in `Courier New` font. For example, the `Zebra<version number>.tar` file and the `/root` directory.

### Icons Used

.16↑ Identifies features that are available in printers with firmware version V60.16.x, V53.16.x, or later.

.15↑ Identifies features that are available in printers with firmware version V60.15.x, V50.15.x, or later.

.14↑ Identifies features that are available in printers with firmware version v60.14, v50.14, or later.

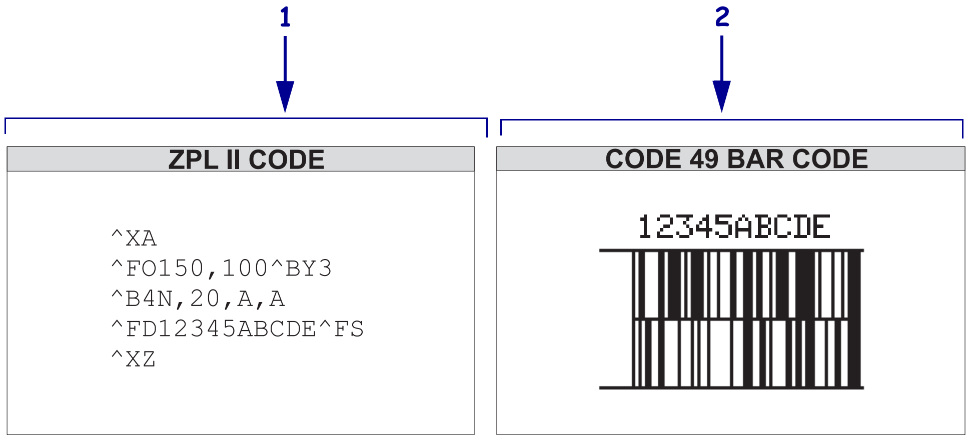
! **Important •** Advises you of information that is essential to complete a task.

**Note •** Indicates neutral or positive information that emphasizes or supplements important points of the main text.

→ **Example •** Provides an example, often a scenario, to better clarify a section of text.

**Illustration Callouts** Callouts are used when an illustration contains information that needs to be labeled and described. A table that contains the labels and descriptions follows the graphic. Figure 1 provides an example.

**Figure 1 • Sample Figure with Callouts**



```
^XA
^FO150,100^BY3
^B4N,20,A,A
^FD12345ABCDE^FS
^XZ
```

| | |
|---|---|
| **1** | ZPL Code |
| **2** | Generated Label |

# 1 Introduction

This guide is the unabridged, alphabetical reference of programming commands supported in the firmware. This includes all ZPL commands and SGD commands.

**Important •** These are important points to note when using ZPL and SGD commands:

- ZPL and SGD commands should be sent to the printer as separate files.
- Certain settings can be controlled by both ZPL and SGD. Configuration changes made in ZPL can affect configuration changes made in SGD.

**Firmware** You can get the printer's firmware version by printing out a configuration label. For instructions to do so, see your printer's user guide.

**Note •** For firmware upgrades go to: www.zebra.com.

If you are using a previous version of Zebra printer firmware, some of the commands are the same and function as they did before— but equally as many are new and are not recognized by firmware earlier than X.10.

Many word processors or a text editor is capable of creating ASCII files can be used to recreate most examples in this guide. However, for other encodings such as Unicode, a text editor such as Microsoft Notepad is needed.

If there are any terms used in this guide that you need clarification on, please see the *Glossary* on page 851.

**Notes •** ___________________________________________________________

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___________________________________________________________

# 2

# ZPL Commands

This section contains the complete alphabetical listing of ZPL II commands.

**Description** This heading provides an explanation of how the command is used, what it is capable of, and any defining characteristics it has.

**Format** Format explains how the command is syntactically arranged and what parameters it contains.

**For Example** The `^B8` command prints a EAN-8 bar code. The format of the `^B8` command is: `^B8o,h,f,g`. It is arranged with the caret symbol (`^`), the command code (`B8`), and the parameters and are replaced with supported values.

**Parameters** If a command has values that can be defined to make its function more specific, these are outlined as parameters. Parameters typically have *Accepted Values* and *Default Values*.

Still using the `^B8` example, the `h` parameter is defined as:

`h =` bar code height (in dots)

*Accepted Values:* `1 to 32000`

*Default Value:* value set by `^BY`

If the command has no parameters – for example `~JA` (Cancel All) – the parameter heading is removed, indicating that the format of the command (`~JA`) is acceptable ZPL II code.

**Example •** When the command is best clarified in context, an example of the ZPL II code is provided. Text indicating exact code entered is printed in an easily recognizable Courier font. An example of code using the ^B8 command looks like this:

```
^XA
^FO50,50
^B8N,100,Y,N
^FD1234567^FS
^XZ
```

Notice that the ^B8 parameter letters have been replaced with real values that apply to the command. In this example N,100,Y,N have been entered.

**Comment** This section is reserved for notes that are of value to a programmer, warnings of potential command interactions, or command-specific information that should be taken into consideration.

**Example •** An example comment is: **This command works only when the printer is idle,** or **This command is ignored if a value exceeds the parameter limits**.

Comments are also included next to parameters if they apply directly to a particular setting.

# Basic ZPL Exercises and Examples

The purpose of these exercises is to introduce basic ZPL commands to novice ZPL users.

### Make sure this checklist is complete:

❑ Load the printer with labels that are big enough to give you ample space to work with.

❑ Print a configuration label (CANCEL test).

❑ Look at the configuration label and make sure that the `LEFT POSITION` is set to `000` and `LABEL TOP` is set to `000`.

❑ Determine the printer's resolution. It is listed on the configuration label. 8/MM `=` 200 dpi, `12/MM = `300 dpi and `24/MM = `600 dpi.

### Tips

These are some tips when using ZPL:

- Use the DOS text editor to write ZPL files.
- Save the file as a `.txt` file and copy it to the printer from DOS command line.

## Before you begin

Some things that are important to understand before you begin are:

- 200 dpi means the resolution of the printhead is 200 dots per inch. If you program the printer to draw a line 100 dots long that equals a half inch. 100 dots on a 300 dpi printer prints a line 1/3 inch long.
- The home position that all your coordinates are referencing is at the left-hand trailing edge of the label as the label comes out of the printer. (There are some exceptions to this.)

## Exercises

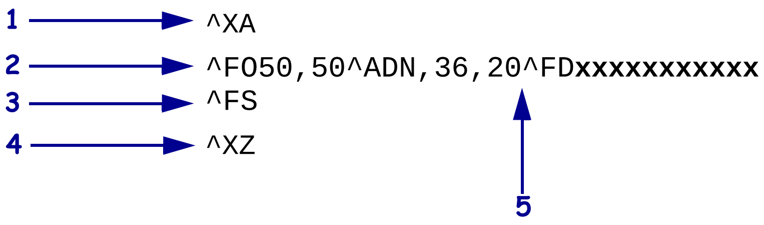
The exercises start simple and gradually progress to give you an opportunity to try a variety of commonly used ZPL commands. Not all commands are covered, but this should be a good core of commands to learn. Some commands may not be supported due to the firmware version in your printer.

### Exercise 1 • This exercise shows you how to specify a location for an entered name.

1. Print your name on the label.
2. Start by printing just your name on the label. Use this format as a model:

**Important •** Your name goes where you see `xxxxxxxxxxx` in the second line of code.

3. Send this format to the printer:



```
^XA
^FO50,50^ADN,36,20^FDxxxxxxxxxxx
^FS
^XZ
```

| | |
|---|---|
| 1 | Every format starts with the `^XA` command |
| 2 | `^FO` (field origin) command |
| 3 | `^FS` (field separator) command |
| 4 | Every format ends with the `^XZ` command |
| 5 | `^FD` (field data) command |

4. When the label prints correctly, alter the first number after the `^FOx.` See how that change affects the print position. Alter the second number after the `^FO50,x` and see how that the print position.

### Font instruction

`^ADN`

1. Alter the numbers after the `^ADN,x,x` command.
   - 18,10 is the smallest size you can make the **D** font.
   - The first number is the height of the font in dots. The second number is the width in dots.
   - You can use direct multiples up to ten times that size as a maximum.

**Example •** 180,100 is the largest you can make the **D** font.

   - 25,18 would not be a valid size. The printer rounds to the next recognizable size.

2. Check the font matrices tables for other fonts to try. See *Fonts and Bar Codes* on page 773.

3. Try the zero scalable font `^A0N,x,x`.

   This font is scalable, and you can choose any height and width.

## Rotation commands

1. Change `^ADN` to `^ADR`, and then `^ADI`, and then `^ADB`.

   See how the print position changes.

2. Add more fields.

3. Add two more fields to print directly under your name using the `^ADN,36,20` font and size:

   Your street address

   Your city, state, zip

4. You must add two more lines of code that start off with:

```
^XA
^FO50,50^ADN,36,20^FDxxxxxxxxxxx^FS
^FO    (fill in the rest)
^FO    (fill in the rest)
^XZ
```

Make sure all these fields print in the same font and size and left side of fields has same vertical alignment.

Your name
1200 W Main Street
Anytown, Il 60061

## Special Effects commands

The Graphic Box or `^GB` command or is used in some of the speical effects commands.

### Reverse Printing a Field

1. Write the following format and send to the printer:

```
^XA
^PR1
^FO100,100
^GB70,70,70,,3^FS
^FO200,100
^GB70,70,70,,3^FS
^FO300,100
^GB70,70,70,,3^FS
^FO400,100
^GB70,70,70,,3^FS
^FO107,110^CF0,70,93
^FR^FDREVERSE^FS
^XZ
```

2. To see the effects, remove:

```
^FR^FDREVERSE^FS
```

3. To see the effects, try removing one of the `^GB` lines of code.

### Label Reverse Print

1. Write the following format and send to the printer:

```
^XA^LRY
^FO100,50
^GB195,203,195^FS
^FO180,110^CFG
^FDLABEL^FS
^FO130,170
^FDREVERSE^FS
^XZ
```

2. To see the effects, remove:

```
^GB195,203,195^FS
```

## Mirror Image of Label

1. Write the following format and send to the printer:

```
^XA^PMY
^FO100,100
^CFG
^FDMIRROR^FS
^FO100,160
^FDIMAGE^FS
^XZ
```

2. To see the effects, in the first line of code change `^PMY` to `^PMN`.

## Print Orientation

1. Write the following format and send to the printer:

```
^XA^CFD
^POI
^LH330,10
^FO50,50
^FDZEBRA TECHNOLOGIES^FS
^FO50,75
^FDVernon Hills, IL^FS
^XZ
```

2. To see the effects, in the second line of code change `^POI` to `^PON`.

## Exercise 2 • Boxes and lines

1. Use the address format from Exercise 1.

2. Add this new line to your existing format:

```
^FO50,200^GB200,200,2^FS
```

This prints a box one wide by one inch long and the thickness of the line is 2 dots.

3. Reposition and resize the square so that it goes around the name and address uniformly.

4. Print a line by adding:

```
^FO50,300^GB400,0,4,^FS
```

This prints a horizontal line two inches wide by 4 dots thick.

5. Print a vertical line using this code:

```
^F0100,50^GBO,400,4^FS
```

### Exercise 3 • Bar codes — ^B3 code 39 bar code

1. Write the following format and send to the printer:

```
^XA
^FO50,50^B3N,N,100,Y,N^FD123456^FS
^XZ
```

2. Try changing each of the parameters in the `^B3` string so you can see the effects.

```
^B3o,e,h,f,g
^BY
```

**Important** • For valid parameter choices, see *^B3* on page 53.

3. Insert the `^BY` command just before the `^B3` to see how the narrow bar width can be altered.

```
^FO50,50^BY2^B3..etc ^BYx, acceptable values for x are 1
through 10
```

4. Alter the ratio of the narrow to wide bar.

```
^FO50,50^BY2,3^B3..etc ^BY2,x acceptable values for x are
2.1 through 3 in .1 increments
```

5. Print out a `^B3` bar code with the interpretation line on top of the bar code and the bar code rotated 90 degrees.

6. Add a `^PQ` just before the `^XZ` to print several labels.

```
^PQ4
^XZ
```

`^PR` Print rate (in inches per second)

7. Add a `^PR` command after the `^XA` at the beginning of the format to change the print rate (print speed).

```
^XA
^PR4 then try ^PR6 ^PRx acceptable values for x are 2 through
12 (check printer specs)
```

See how the print speed affects the print quality of the bar code. You may need to increase the printer darkness setting at higher print speeds.

### Exercise 4 • ^SN — Serial Number command

1. Send this format to the printer:

```
^XA
^FO100,100^ADN,36,20^SN001,1,Y^FS
^PQ3
^XZ
```

To vary the `^SNv,n,z` to exercise increment/decrement and leading zeros functions, consult this guide.

If your serial number contains alpha and numeric characters, you can increment or decrement a specific segment of the data even if it is in the middle, as this sample sequence shows:

`ABCD1000EFGH, ABCD1001EFGH, ABCD1002EFGH`

2. Send this file to the printer and to see how it increments the serial number. The `^SF` command can also work with alpha characters.

```
^XA
^FO100,100^ADN,36,20^FDABCD1000EFGH^SF%%%%dddd%%%%,10000^FS
^PQ15
^XZ
```

Notice how the field data character position aligns with the `^SF` data string:

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ^ | F | D | A | B | C | D | 1 | 0 | 0 | 0 | E | F | G | H |
| ^ | S | F | % | % | % | % | d | d | d | d | % | % | % | % |
| | | | | | | | | | | 1 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | 2 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | 3 | 0 | 0 | 0 | 0 |

And on through…

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | 0 | 1 | 4 | 0 | 0 | 0 | 0 |

The last label prints **ABCD1014EFGH**.

The % is placed in positions that you do not want to increment or decrement, `d = ` decimal, `10000 = ` increment value.

For more details on `^SF`, see *^SF* on page 315.

### Exercise 5 • Saving a template to memory. ^IS and image save and image load.

**Note** • This exercise helps you troubleshoot your code against the errors you see on your labels.

1. Send this format to the printer:

```
^XA
^FO20,30^GB750,1100,4^FS
^FO20,30^GB750,200,4^FS
^FO20,30^GB750,400,4^FS
^FO20,30^GB750,700,4^FS
^FO20,226^GB325,204,4^FS
^FO30,40^ADN,36,20^FDShip to:^FS
^FO30,260^ADN,18,10^FDPart number #^FS
^FO360,260^ADN,18,10^FDDescription:^FS
^FO30,750^ADN,36,20^FDFrom:^FS
^ISR:SAMPLE.GRF^FS
^XZ
```

2. Send this format:

```
^XA
^ILR:SAMPLE.GRF^FS
^FO150,125^ADN,36,20^FDAcme Printing^FS
^FO60,330^ADN,36,20^FD14042^FS
^FO400,330^ADN,36,20^FDScrew^FS
^FO70,480^BY4^B3N,,200^FD12345678^FS
^FO150,800^ADN,36,20^FDMacks Fabricating^FS
^XZ
```

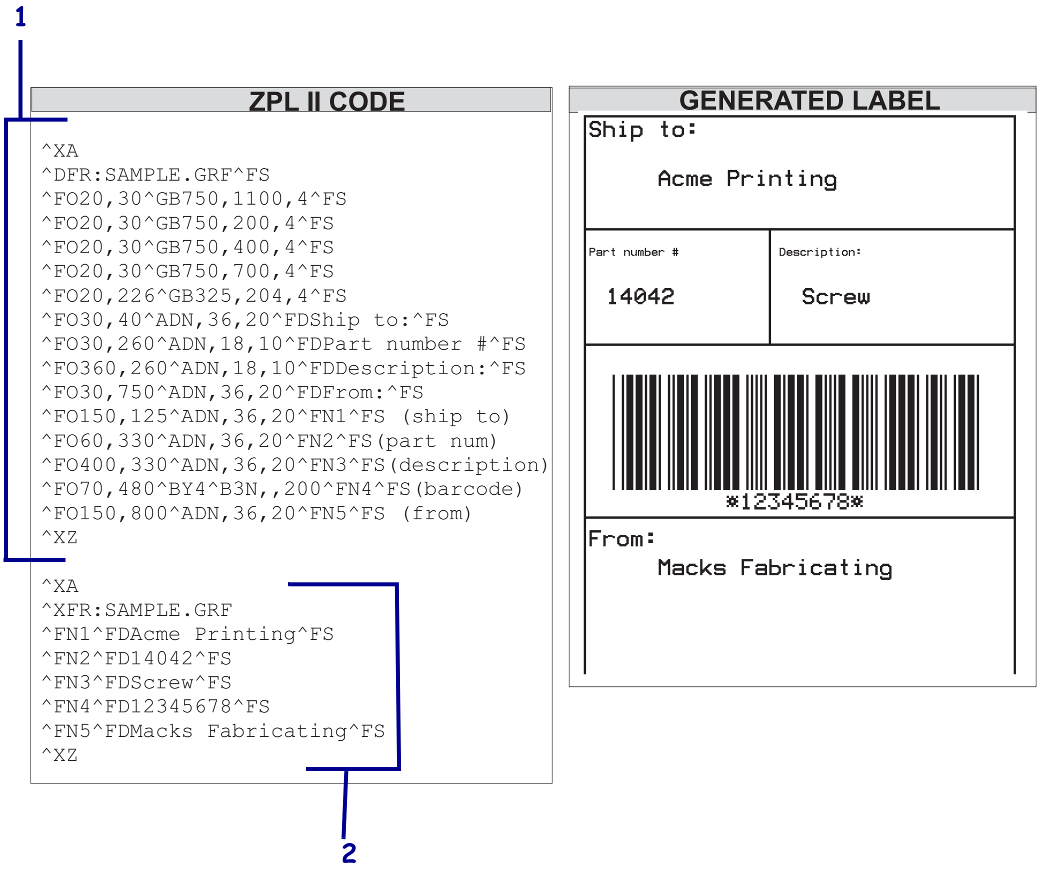
In this way the template only needs to be sent one time to the printer’s memory. Subsequent formats can be sent recalling the template and merging variable data into the template. In this exercise, the file was saved in the printers `R:` memory, which is volatile.

### Exercise 6 • ^DF and ^XF — Download format and recall format

Similar concept to ^IS and ^IL command. ^IS and ^IL processes faster in the printer than ^DF and ^XF.

This is how the ^DF and ^XF format structure produces a label similar to the ^IS/^IL sample you just tried.

**Figure 2 • Download and Recall Format**



```
^XA
^DFR:SAMPLE.GRF^FS
^FO20,30^GB750,1100,4^FS
^FO20,30^GB750,200,4^FS
^FO20,30^GB750,400,4^FS
^FO20,30^GB750,700,4^FS
^FO20,226^GB325,204,4^FS
^FO30,40^ADN,36,20^FDShip to:^FS
^FO30,260^ADN,18,10^FDPart number #^FS
^FO360,260^ADN,18,10^FDDescription:^FS
^FO30,750^ADN,36,20^FDFrom:^FS
^FO150,125^ADN,36,20^FN1^FS (ship to)
^FO60,330^ADN,36,20^FN2^FS(part num)
^FO400,330^ADN,36,20^FN3^FS(description)
^FO70,480^BY4^B3N,,200^FN4^FS(barcode)
^FO150,800^ADN,36,20^FN5^FS (from)
^XZ

^XA
^XFR:SAMPLE.GRF
^FN1^FDAcme Printing^FS
^FN2^FD14042^FS
^FN3^FDScrew^FS
^FN4^FD12345678^FS
^FN5^FDMacks Fabricating^FS
^XZ
```

| | |
|---|---|
| **1** | Download format code |
| **2** | Recall format call that generates the generated label in Figure 2. |

## Exercise 7 • Asian and Unicode Encodings

.14↑ This exercise works in printers with firmware version v60.14, v50.14, or later.

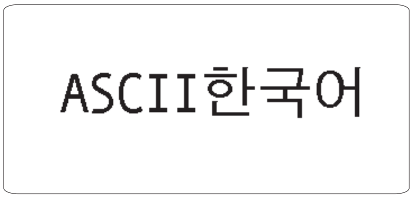
In each of the following examples, the format is saved in the corresponding encoding before being sent down to the printer and the ZPL script was made in Microsoft Notepad, a basic text editor. The characters were inserted from the character map in Windows or typed from the keyboard.

**Example** • This is an example of using an Asian encoding, such as UHANGUL, with ASCII text. Using the `CI26` command tells the printer to recognize any byte less than `7F` as ASCII text and every byte above as the first byte of UHANGUAL encoding:

**ZPL II CODE**

```
^XA^CW1,B:ANMDK.TTF
^SEB:UHANGUL.DAT^CI26
^FO100,100^A1,50,50^FDASCII 한국어 ^FS
^XZ
```

**GENERATED LABEL**

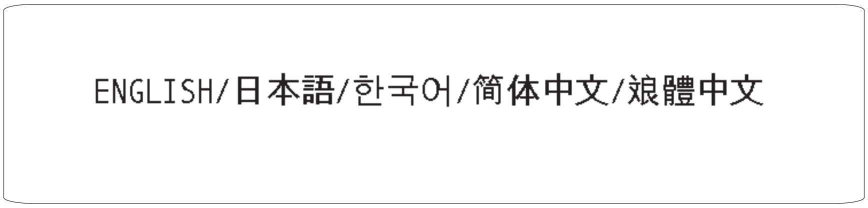

ASCII한국어

**Example** • This is an example of using the Unicode encoding, UTF-8:

**ZPL II CODE**

```
^XA^CW1,ANMDJ.TTF^CI28
^FO100,50^A1,30,30^FDENGLISH/日本語/한국어/简体中文/浪體中文^FS
^XZ
```

**GENERATED LABEL**


ENGLISH/日本語/한국어/简体中文/浪體中文

# ^A

## Scalable/Bitmapped Font

**Description** The ^A command specifies the font to use in a text field. ^A designates the font for the current ^FD statement or field. The font specified by ^A is used only once for that ^FD entry. If a value for ^A is not specified again, the default ^CF font is used for the next ^FD entry.

**Format** `^Afo,h,w`

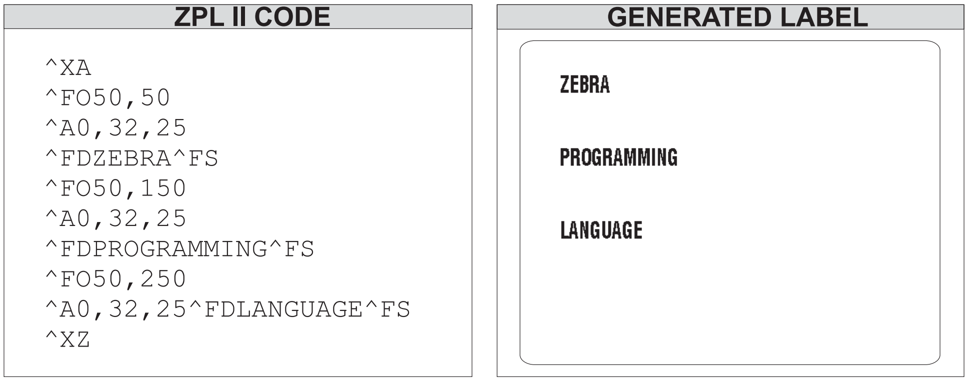
**Important •** Parameter **f** is required. If **f** is omitted it defaults to the last value of the ^CF command.

This table identifies the parameters for this format:

| Command | Details |
|---|---|
| f = font name | *Accepted Values:* A through Z, and 0 to 9<br>Any font in the printer (downloaded, EPROM, stored fonts, fonts A through Z and 0 to 9). |
| o = field orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* the last accepted ^FW value or the ^FW default |
| h = Character Height (in dots) | **Scalable**<br>*Accepted Values:* 10 to 32000<br>*Default Value:* last accepted ^CF<br>**Bitmapped**<br>*Accepted Values:* multiples of height from 1 to 10 times the standard height, in increments of 1<br>*Default Value:* last accepted ^CF |
| w = width (in dots) | **Scalable**<br>*Accepted Values:* 10 to 32000<br>*Default Value:* last accepted ^CF<br>**Bitmapped**<br>*Accepted Values:* multiples of width from 1 to 10 times the standard width, in increments of 1<br>*Default Value:* last accepted ^CF |

## Scalable Font Command

**Example •** This is an example of a scalable font command:



ZPL II CODE

```
^XA
^FO50,50
^A0,32,25
^FDZEBRA^FS
^FO50,150
^A0,32,25
^FDPROGRAMMING^FS
^FO50,250
^A0,32,25^FDLANGUAGE^FS
^XZ
```

GENERATED LABEL

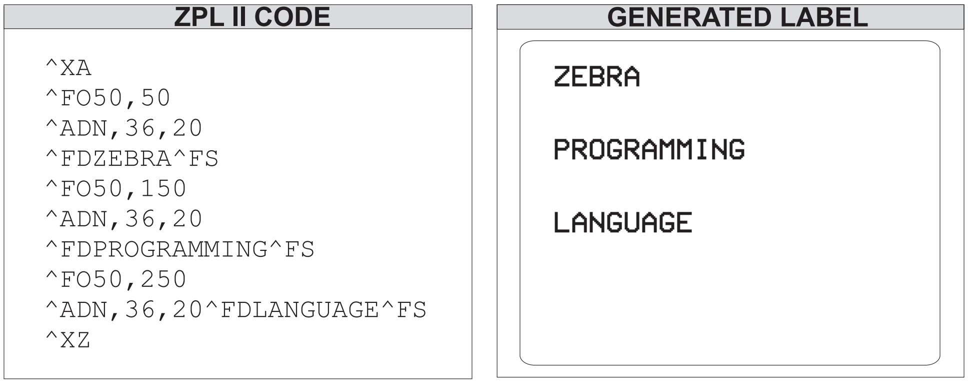
ZEBRA

PROGRAMMING

LANGUAGE

## Bitmap Font Command

**Example •** This is an example of a bitmap font command:



ZPL II CODE

```
^XA
^FO50,50
^ADN,36,20
^FDZEBRA^FS
^FO50,150
^ADN,36,20
^FDPROGRAMMING^FS
^FO50,250
^ADN,36,20^FDLANGUAGE^FS
^XZ
```

GENERATED LABEL

ZEBRA

PROGRAMMING

LANGUAGE

For reference, see *Standard Printer Fonts* on page 774**,** *Zebra Code Page 850* on page 766, *Fonts and Bar Codes* on page 773, and *ASCII* on page 771.

**Comments** Fonts are built using a matrix that defines standard height-to-width ratios. If you specify only the height or width value, the standard matrix for that font automatically determines the other value. If the value is not given or a 0 (zero) is entered, the height or width is determined by the standard font matrix.

.14↑ This command interacts with the justification parameters of `^FO` and `^FT` and with the field direction parameter of `^FP`. For output and examples, see *Field Interactions* on page 799.

# ^A@

## Use Font Name to Call Font

**Description** The ^A@ command uses the complete name of a font, rather than the character designation used in ^A. Once a value for ^A@ is defined, it represents that font until a new font name is specified by ^A@.

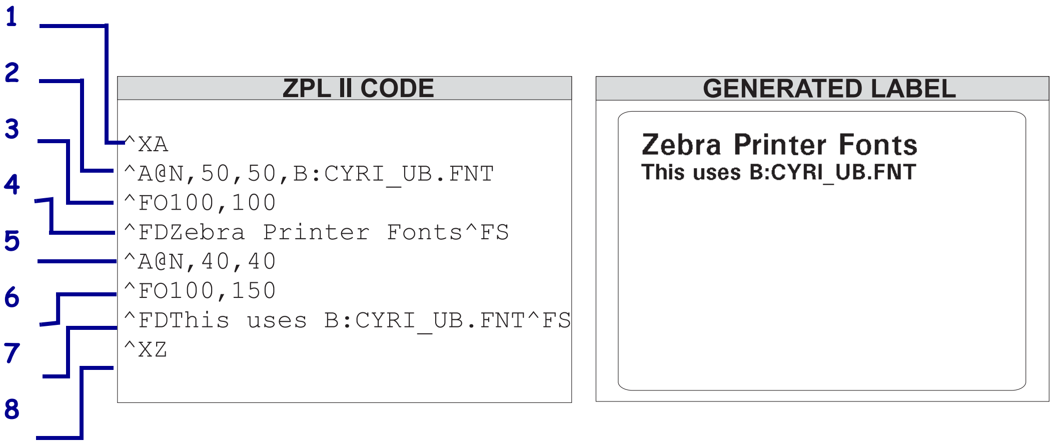
**Format** `^A@o,h,w,d:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = field orientation | *Accepted Values:*<br>N = normal<br>R = rotates 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* N or the last ^FW value |
| h = character height (in dots) | *Default Value:* specifies magnification by **w** (character width) or the last accepted ^CF value. Uses the base height if none is specified.<br>**Scalable** The value is the height in dots of the entire character block. Magnification factors are unnecessary, because characters are scaled.<br>**Bitmapped** The value is rounded to the nearest integer multiple of the font's base height, then divided by the font's base height to give a magnification nearest limit. |
| w = width (in dots) | *Default Value:* specifies magnification by **h** (height) or the last accepted ^CF value. Specifies the base width is used if none is specified.<br>**Scalable** The value is the width in dots of the entire character block. Magnification factors are unnecessary, because characters are scaled.<br>**Bitmapped** The value rounds to the nearest integer multiple of the font's base width, then divided by the font's base width to give a magnification nearest limit. |
| d = drive location of font | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |

| Parameters | Details |
|---|---|
| `o` = font name | *Accepted Values:* any valid font<br>*Default Value:* if an invalid or no name is entered, the default set by `^CF` is used. If no font has been specified in `^CF`, font A is used.<br>The font named carries over on all subsequent `^A@` commands without a font name. |
| `x` = extension<br>.14↑<br>`.TTE` is only supported in firmware version V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>`.FNT` = font<br>`.TTF` = TrueType Font<br>`.TTE` = TrueType Extension |

**Example •** This example is followed by a table that identifies the called out lines of code:



```
^XA
^A@N,50,50,B:CYRI_UB.FNT
^FO100,100
^FDZebra Printer Fonts^FS
^A@N,40,40
^FO100,150
^FDThis uses B:CYRI_UB.FNT^FS
^XZ
```

| | |
|---|---|
| **1** | Starts the label format. |
| **2** | Searches non-volatile printer memory (`B:`) for `CYRI_UB.FNT`. When the font is found, the `^A@` command sets the print orientation to normal and the character size to 50 dots by 50 dots. |
| **3** | Sets the field origin at 100,100. |
| **4** | Prints the field data, *Zebra Printer Fonts* on the label. |
| **5** | Calls the font again and character size is decreased to 40 dots by 40 dots. |
| **6** | Sets the new field origin at 100,150. |
| **7** | Prints the field data, *This uses the B:CYRI_UB.FNT* on the label. |
| **8** | Ends the label format. |

For reference, see *Zebra Code Page 850* on page 766, *Fonts and Bar Codes* on page 773, and *ASCII* on page 771.

# ^B0

## Aztec Bar Code Parameters

**Description** The `^B0` command creates a two-dimensional matrix symbology made up of square modules arranged around a bulls-eye pattern at the center.

**Note •** The Aztec bar code works with firmware version v60.13.0.11A and v50.13.2 or later.

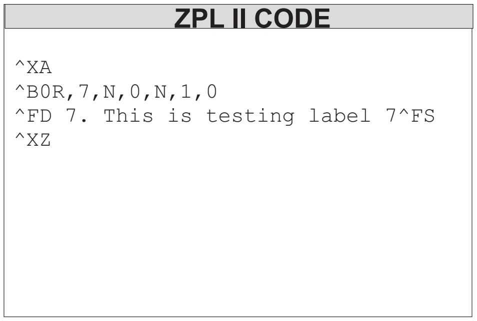
**Format** `^B0a,b,c,d,e,f,g`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `b` = magnification factor | *Accepted Values:* `1` to `10`<br>*Default Value:*<br>`1` on `150` dpi printers<br>`2` on `200` dpi printers<br>`3` on `300` dpi printers<br>`6` on `600` dpi printers |
| `c` = extended channel interpretation code indicator | *Accepted Values:*<br>`Y` = if data contains ECICs<br>`N` = if data does not contain ECICs<br>*Default Value:* `N` |
| `d` = error control and symbol size/type indicator | *Accepted Values:*<br>`0` = default error correction level<br>`01` to `99` = error correction percentage (minimum)<br>`101` to `104` = 1 to 4-layer compact symbol<br>`201` to `232` = 1 to 32-layer full-range symbol<br>`300` = a simple Aztec “Rune”<br>*Default Value:* `0` |
| `e` = menu symbol indicator | *Accepted Values:*<br>`Y` = if this symbol is to be a menu (bar code reader initialization) symbol<br>`N` = if it is not a menu symbol<br>*Default Value:* `N` |

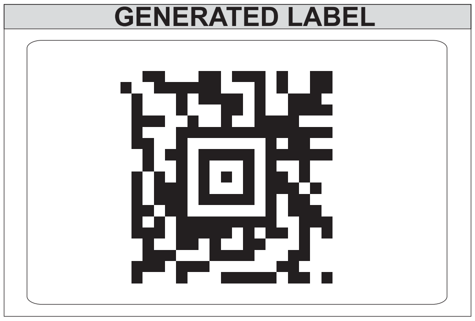
| Parameters | Details |
|---|---|
| `f` = number of symbols for structured append | *Accepted Values:* `1` through `26`<br>*`Default Value:`* `1` |
| `g` = *optional* ID field for structured append | The ID field is a text string with 24-character maximum<br>*Default Value:* no ID |

**Example •** This is an example of the `^B0` command:



ZPL II CODE

```
^XA
^B0R,7,N,0,N,1,0
^FD 7. This is testing label 7^FS
^XZ
```



GENERATED LABEL

# ^B1

## Code 11 Bar Code

**Description** The ^B1 command produces the Code 11 bar code, also known as USD-8 code. In a Code 11 bar code, each character is composed of three bars and two spaces, and the character set includes 10 digits and the hyphen (-).

- ^B1 supports print ratios of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

**Format** `^B1o,e,h,f,g`

**Important •** If additional information about the Code 11 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

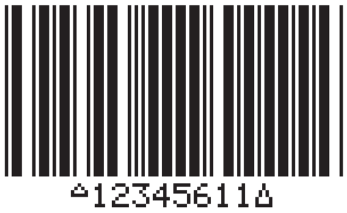
| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value: current* ^FW *value* |
| e = check digit | *Accepted Values:*<br>Y = 1 digit<br>N = 2 digits<br>*Default Value:* N |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>Y = yes<br>N = no<br>*Default Value:* Y |
| g = print interpretation line above code | *Accepted Values:*<br>Y = yes<br>N = no<br>*Default Value:* N |

**Example •** This is an example of the Code 11 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^B1N,N,150,Y,N
^FD123456^FS
^XZ
```

**CODE 11 BAR CODE**



**CODE 11 BAR CODE CHARACTERS**

0 1 2 3 4 5 6 7 8 9 -

**Internal Start/Stop Character:**△

*When used as a stop character:*

△ is used with 1 check digit
△ is used with 2 check digits

# ^B2

## Interleaved 2 of 5 Bar Code

**Description** The `^B2` command produces the Interleaved 2 of 5 bar code, a high-density, self-checking, continuous, numeric symbology.

Each data character for the Interleaved 2 of 5 bar code is composed of five elements: five bars or five spaces. Of the five elements, two are wide and three are narrow. The bar code is formed by interleaving characters formed with all spaces into characters formed with all bars.

- `^B2` supports print ratios of 2.0:1 to 3.0:1.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.

**Format** `^B2o,h,f,g,e,j`

**Important •** If additional information about the Interleaved 2 of 5 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

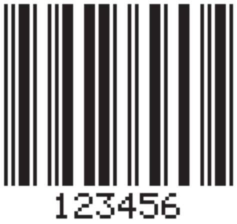
| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*Default Value:* `Y` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*Default Value:* `N` |
| `e` = calculate and print Mod 10 check digit | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*Default Value:* `N` |

**Example** • This is an example of an Interleaved 2 of 5 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^B2N,150,Y,N,N
^FD123456^FS
^XZ
```

**INTERLEAVED 2 OF 5 BAR CODE**



| INTERLEAVED 2 OF 5 BAR CODE CHARACTERS |
|---|
| 0 1 2 3 4 5 6 7 8 9 |
| **Start/Stop (internal)** |

**Comments** The total number of digits in an Interleaved 2 of 5 bar code must be even. The printer automatically adds a leading 0 (zero) if an odd number of digits is received.

The Interleaved 2 of 5 bar code uses the Mod 10 check-digit scheme for error checking. For more information on Mod 10 check digits, see *Mod 10 Check Digit* on page 790.

# ^B3

## Code 39 Bar Code

**Description** The Code 39 bar code is the standard for many industries, including the U.S. Department of Defense. It is one of three symbologies identified in the American National Standards Institute (ANSI) standard MH10.8M-1983. Code 39 is also known as USD-3 Code and 3 of 9 Code.

Each character in a Code 39 bar code is composed of nine elements: five bars, four spaces, and an inter-character gap. Three of the nine elements are wide; the six remaining elements are narrow.

- `^B3` supports print ratios of 2.0:1 to 3.0:1.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.
- Code 39 automatically generates the start and stop character (*).
- Asterisk (*) for start and stop character prints in the interpretation line, if the interpretation line is turned on.
- Code 39 is capable of encoding the full 128-character ASCII set.

**Format** `^B3o,e,h,f,g`

**Important •** If additional information about the Code 39 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `e` = Mod-43 check digit | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*`Default Value:`* `N` |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |

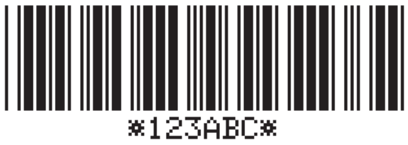
| Parameters | Details |
|---|---|
| `f` = print interpretation line | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>`Default Value: Y` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*Default Value:* `N` |

**Example •** This is an example of a Code 39 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^B3N,N,100,Y,N
^FD123ABC^FS
^XZ
```

**CODE 39 BAR CODE**



**CODE 39 BAR CODE CHARACTERS**

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
- . $ / + % Space

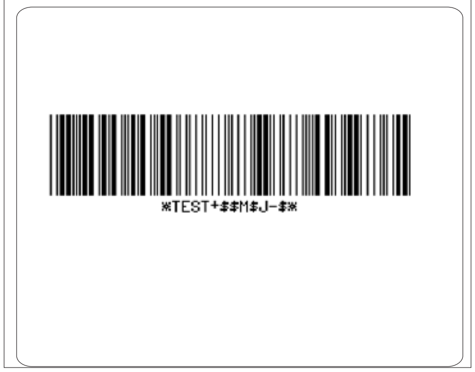
**Comments** Extended ASCII is a function of the scanner, not of the bar code. Your scanner must have extended ASCII enabled for this feature to work. To enable extended ASCII in the Code 39, you must first encode +$ in your `^FD` statement. To disable extended ASCII, you must encode -$ in your `^FD` statement.

**Example •** This example encodes a carriage return with line feed into a Code 39 bar code:

**ZPL II CODE**

```
^XA
^FO20,20
^B3N,N,100,Y
^FDTEST+$$M$J-$^FS
^XZ
```

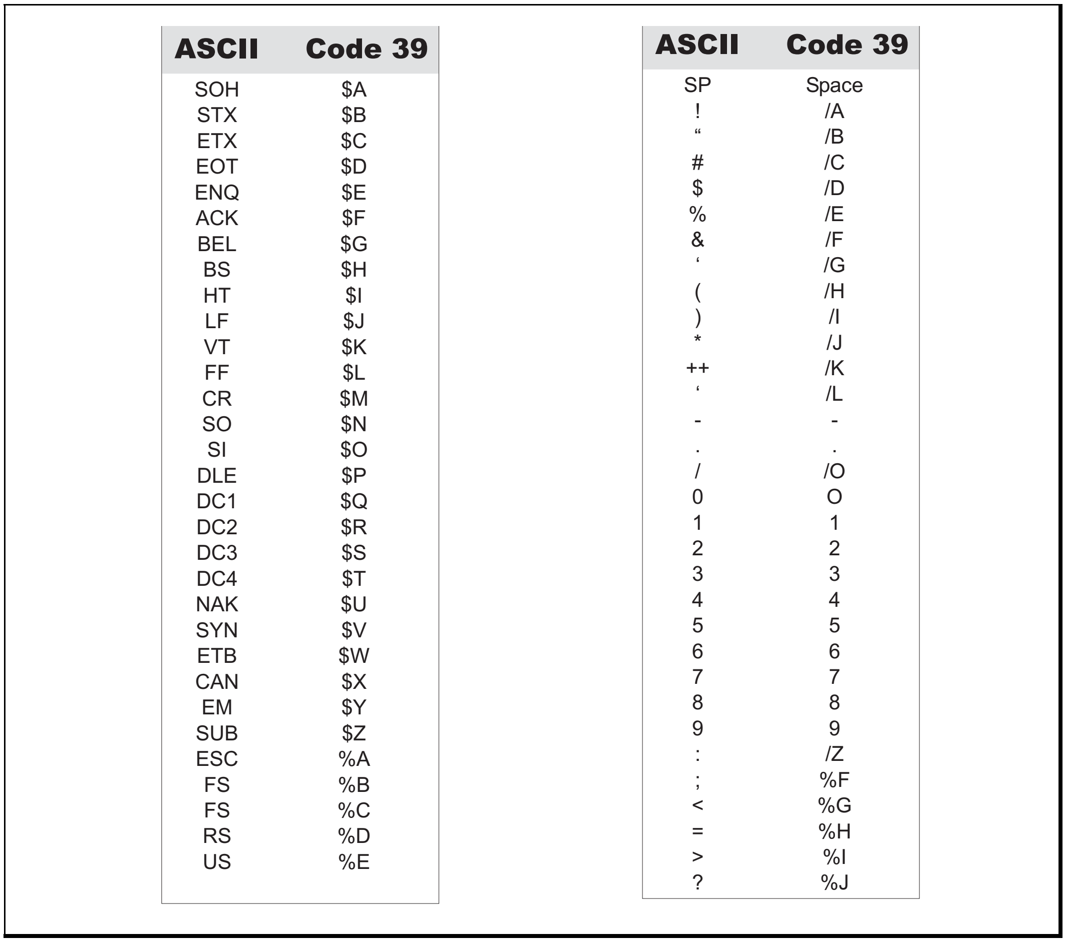
**GENERATED LABELS**



## Full ASCII Mode for Code 39

Code 39 can generate the full 128-character ASCII set using paired characters as shown in these tables:

**Table 1 • Code 39 Full ASCII Mode**



| ASCII | Code 39 |
|---|---|
| SOH | $A |
| STX | $B |
| ETX | $C |
| EOT | $D |
| ENQ | $E |
| ACK | $F |
| BEL | $G |
| BS | $H |
| HT | $I |
| LF | $J |
| VT | $K |
| FF | $L |
| CR | $M |
| SO | $N |
| SI | $O |
| DLE | $P |
| DC1 | $Q |
| DC2 | $R |
| DC3 | $S |
| DC4 | $T |
| NAK | $U |
| SYN | $V |
| ETB | $W |
| CAN | $X |
| EM | $Y |
| SUB | $Z |
| ESC | %A |
| FS | %B |
| FS | %C |
| RS | %D |
| US | %E |

| ASCII | Code 39 |
|---|---|
| SP | Space |
| ! | /A |
| “ | /B |
| # | /C |
| $ | /D |
| % | /E |
| & | /F |
| ‘ | /G |
| ( | /H |
| ) | /I |
| * | /J |
| ++ | /K |
| ‘ | /L |
| - | - |
| . | . |
| / | /O |
| 0 | O |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| : | /Z |
| ; | %F |
| < | %G |
| = | %H |
| > | %I |
| ? | %J |

Table 2 • Code 39 Full ASCII Mode

| ASCII | Code 39 | ASCII | Code 39 |
|---|---|---|---|
| @ | %V | ‘ | %W |
| A | A | a | +A |
| B | B | b | +B |
| C | C | c | +C |
| D | D | d | +D |
| E | E | e | +E |
| F | F | f | +F |
| G | G | g | +G |
| H | H | h | +H |
| I | I | I | +I |
| J | J | j | +J |
| K | K | k | +K |
| L | L | l | +L |
| M | M | m | +M |
| N | N | n | +N |
| O | O | o | +O |
| P | P | p | +P |
| Q | Q | q | +Q |
| R | R | r | +R |
| S | S | s | +S |
| T | T | t | +T |
| U | U | u | +U |
| V | V | v | +V |
| W | W | w | +W |
| X | X | x | +X |
| Y | Y | y | +Y |
| Z | Z | z | +Z |
| [ | %K | { | %P |
| \ | %L | \| | %Q |
| ] | %M | } | %R |
| ^ | %N | ~ | %S |
| _ | %O | DEL | %T, %X |

# ^B4

## Code 49 Bar Code

**Description** The ^B4 command creates a multi-row, continuous, variable-length symbology capable of encoding the full 128-character ASCII set. It is ideally suited for applications requiring large amounts of data in a small space.

The code consists of two to eight rows. A row consists of a leading quiet zone, four symbol characters encoding eight code characters, a stop pattern, and a trailing quiet zone. A separator bar with a height of one module separates each row. Each symbol character encodes two characters from a set of Code 49 characters.

- ^B4 has a fixed print ratio.
- Rows can be scanned in any order.

**Format** ^B4o,h,f,m

! **Important** • For additional information about the Code 49 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = height multiplier of individual rows | *Accepted Values:* 1 to height of label<br>*Default Value:* value set by ^BY<br>This number multiplied by the module equals the height of the individual rows in dots. 1 is not a recommended value. |

| Parameters | Details |
|---|---|
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no line printed<br>`A` = print interpretation line above code<br>`B` = print interpretation line below code<br>*Default Value:* `N`<br>When the field data exceeds two rows, expect the interpretation line to extend beyond the right edge of the bar code symbol. |
| `m` = starting mode | *Accepted Values:*<br>`0` = Regular Alphanumeric Mode<br>`1` = Multiple Read Alphanumeric<br>`2` = Regular Numeric Mode<br>`3` = Group Alphanumeric Mode<br>`4` = Regular Alphanumeric Shift 1<br>`5` = Regular Alphanumeric Shift 2<br>`A` = Automatic Mode. The printer determines the starting mode by analyzing the field data.<br>*Default Value:* `A` |

**Example •** This is an example of a Code 49 bar code:

**ZPL II CODE**

```
^XA
^FO150,100^BY3
^B4N,20,A,A
^FD12345ABCDE^FS
^XZ
```

**CODE 49 BAR CODE**

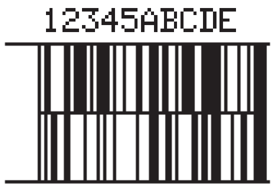
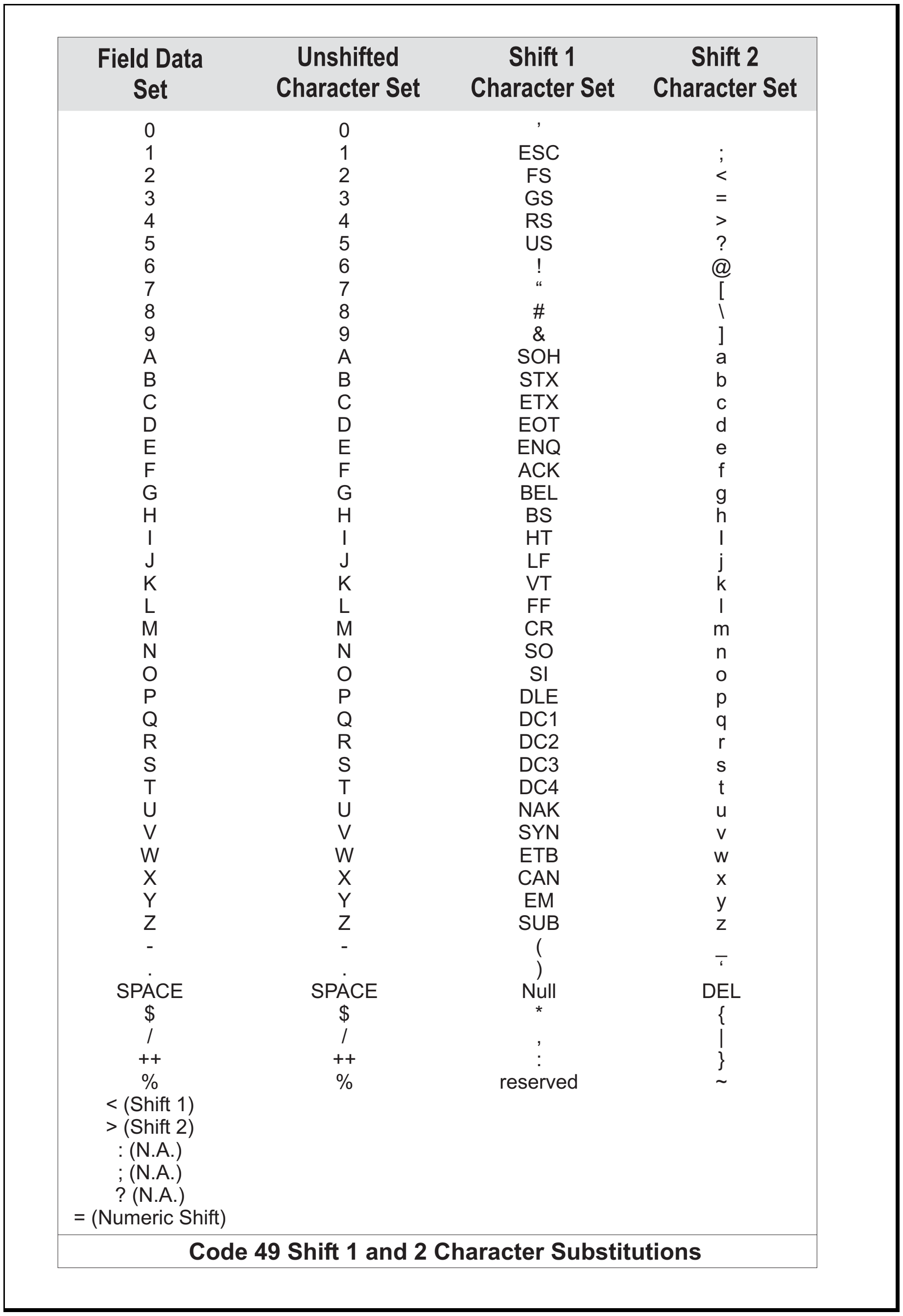


Table 3 • Code 49



| Field Data Set | Unshifted Character Set | Shift 1 Character Set | Shift 2 Character Set |
|---|---|---|---|
| 0 | 0 | ’ | |
| 1 | 1 | ESC | ; |
| 2 | 2 | FS | < |
| 3 | 3 | GS | = |
| 4 | 4 | RS | > |
| 5 | 5 | US | ? |
| 6 | 6 | ! | @ |
| 7 | 7 | “ | [ |
| 8 | 8 | # | \ |
| 9 | 9 | & | ] |
| A | A | SOH | a |
| B | B | STX | b |
| C | C | ETX | c |
| D | D | EOT | d |
| E | E | ENQ | e |
| F | F | ACK | f |
| G | G | BEL | g |
| H | H | BS | h |
| I | I | HT | I |
| J | J | LF | j |
| K | K | VT | k |
| L | L | FF | l |
| M | M | CR | m |
| N | N | SO | n |
| O | O | SI | o |
| P | P | DLE | p |
| Q | Q | DC1 | q |
| R | R | DC2 | r |
| S | S | DC3 | s |
| T | T | DC4 | t |
| U | U | NAK | u |
| V | V | SYN | v |
| W | W | ETB | w |
| X | X | CAN | x |
| Y | Y | EM | y |
| Z | Z | SUB | z |
| - | - | ( | _ |
| . | . | ) | ‘ |
| SPACE | SPACE | Null | DEL |
| $ | $ | * | { |
| / | / | , | \| |
| ++ | ++ | : | } |
| % | % | reserved | ~ |
| < (Shift 1) | | | |
| > (Shift 2) | | | |
| : (N.A.) | | | |
| ; (N.A.) | | | |
| ? (N.A.) | | | |
| = (Numeric Shift) | | | |

Code 49 Shift 1 and 2 Character Substitutions

## Code 49 Field Data Character Set

The `^FD` data sent to the printer when using starting modes 0 to 5 is based on the Code 49 Internal Character Set. This is shown in the first column of the Code 49 table on the previous page. These characters are Code 49 control characters:

```
: ; < = > ?
```

Valid field data must be supplied when using modes 0 to 5. Shifted characters are sent as a two-character sequence of a shift character followed by a character in the unshifted character set.

**Example •** To encode a lowercase **a**, send **a >** (Shift 2) followed by an uppercase **A**. If interpretation line printing is selected, a lowercase *a* prints in the interpretation line. This reflects what the output from the scanner reads. Code 49 uses uppercase alphanumeric characters only.

If an invalid sequence is detected, the Code 49 formatter stops interpreting field data and prints a symbol with the data up to the invalid sequence. These are examples of invalid sequences:

- Terminating numeric mode with any characters other than 0 to 9 or a Numeric Space.
- Starting in Mode 4 (Regular Alphanumeric Shift 1) and the first field data character is not in the Shift 1 set.
- Starting in Mode 5 (Regular Alphanumeric Shift 2) and the first field data character is not in the Shift 2 set.
- Sending Shift 1 followed by a character not in the Shift 1 set.
- Sending Shift 2 followed by a character not in the Shift 2 set.
- Sending two Shift 1 or Shift 2 control characters.

## Advantages of Using the Code 49 Automatic Mode

Using the default (Automatic Mode) completely eliminates the need for selecting the starting mode or manually performing character shifts. The Automatic Mode analyzes the incoming ASCII string, determines the proper mode, performs all character shifts, and compacts the data for maximum efficiency.

Numeric Mode is selected or shifted only when five or more continuous digits are found. Numeric packaging provides no space advantage for numeric strings consisting of fewer than eight characters.

# ^B5

## Planet Code bar code

**Description** The `^B5` command is supported in all printers as a resident bar code.

**Note •** Accepted bar code characters are 0 - 9.

**Format** `^B5o,h,f,g`

This table identifies the parameters for this format:

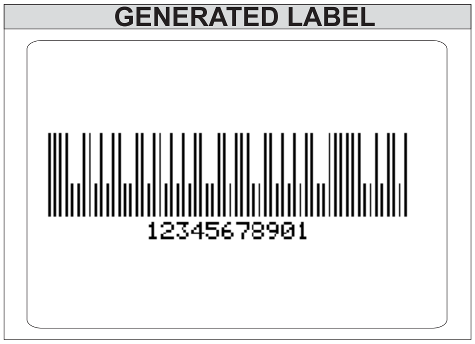
| Parameters | Details |
|---|---|
| `o` = orientation code | *Accepted Values:*<br>`N` = normal<br>`R` = rotated<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `9999`<br>*Default Value:* value set by `^BY` |
| `f` = interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |
| `g` = determines if the interpretation line is printed above the bar code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example •** This is an example of a Planet Code bar code:

ZPL II CODE

```
^XA
^FO150,100^BY3
^B5N,100,Y,N
^FD12345678901^FS
^XZ
```

GENERATED LABEL



# ^B7

## PDF417 Bar Code

**Description** The `^B7` command produces the PDF417 bar code, a two-dimensional, multirow, continuous, stacked symbology. PDF417 is capable of encoding over 1,000 characters per bar code. It is ideally suited for applications requiring large amounts of information at the time the bar code is read.

The bar code consists of three to 90 stacked rows. Each row consists of start and stop patterns and symbol characters called *code-words*. A code-word consists of four bars and four spaces. A three code-word minimum is required per row.

The PDF417 bar code is also capable of using the structured append option (`^FM`), which allows you to extend the field data limitations by printing multiple bar codes. For more information on using structured append, see *^FM* on page 181.

- PDF417 has a fixed print ratio.
- Field data (`^FD)` is limited to 3K of character data.

**Format** `^B7o,h,s,c,r,t`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height for individual rows (in dots) | *Accepted Values:* `1` to height of label<br>*Default Value:* value set by `^BY`<br>This number multiplied by the module equals the height of the individual rows in dots. If this number is not specified, the overall bar code height, divided by the number of rows, equals the height of the individual rows in dots, where the overall bar code height is defined by the `^BY` command. 1 is not a recommended value. |
| `s` = security level | *Accepted Values:* `1` to `8` (error detection and correction)<br>*Default Value:* `0` (error detection only)<br>This determines the number of error detection and correction code-words to be generated for the symbol. The default level provides only error detection without correction. Increasing the security level adds increasing levels of error correction and increases the symbol size. |

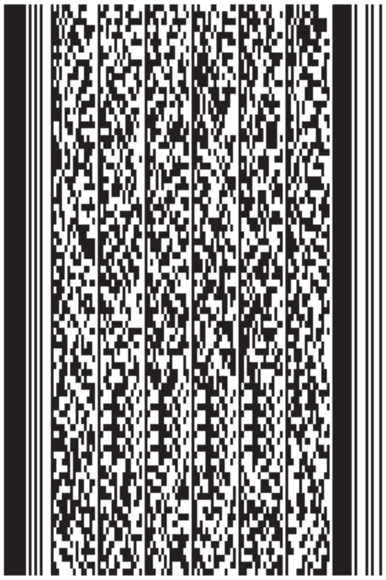
| Parameters | Details |
|---|---|
| `c` = number of data columns to encode | *Accepted Values:* `1` to `30`<br>*Default Value:* `1:2` (row-to-column aspect ratio)<br>You can specify the number of code-word columns giving control over the width of the symbol. |
| `r` = number of rows to encode | *Accepted Values:* `3` to `90`<br>*Default Value:* `1:2` (row-to-column aspect ratio)<br>You can specify the number of symbol rows giving control over the height of the symbol. For example, with no row or column values entered, 72 code-words would be encoded into a symbol of six columns and 12 rows. Depending on code-words, the aspect ratio is not always exact. |
| `t` = truncate right row indicators and stop pattern | *Accepted Values:*<br>`N` = no truncation<br>`Y` = perform truncation<br>*Default Value:* `N` |

**Example •** This is an example of a PDF417 bar code:

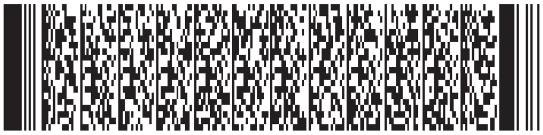
**ZPL II CODE**

```
^XA
^BY2,3
^FO10,10^B7N,5,5,,83,N
^FDZebra Technologies
Corporation strives to be
the expert supplier of
innovative solutions to
speciality demand labeling
and ticketing problems of
business and government.
We will attract and retain
the best people who will
understand our customer's
needs and provide them with
systems, hardware, software,
consumables and service
offering the best value,
high quality, and reliable
performance, all delivered
in a timely manner.
^FS^XZ
```

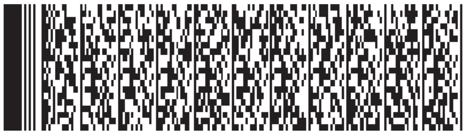
**PDF417 BAR CODE**



**Example •** This is an example of a PDF417 without and with truncation selected:



PDF417 without Truncation being selected



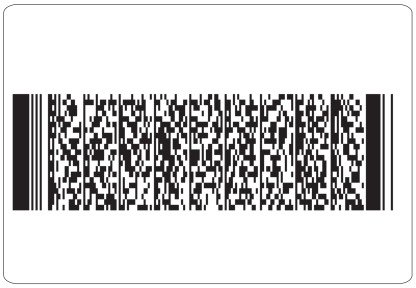
PDF417 with Truncation being selected

**Example •** This example shows the ^B7 command used with field hex (^FH) characters:

**ZPL II CODE**

```
^XA
^FO50,50^BY3,3.0^B7N,8,5,7,21,N
^FH_^FD[)>_1E06_1DP12345678_1DQ160
_1D1JUN123456789A2B4C6D8E_1D20LA6-987
_1D21L54321 ZES_1D15KG1155
_1DBSC151208_1D7Q10GT_1E_04^FS
^XZ
```

**GENERATED LABEL**



**Comments** Noted in this bulleted list:

- If both columns and rows are specified, their product must be less than 928.
- No symbol is printed if the product of columns and rows is greater than 928.
- No symbol is printed if total code-words are greater than the product of columns and rows.
- Serialization is not allowed with this bar code.
- The truncation feature can be used in situations where label damage is not likely. The right row indicators and stop pattern is reduced to a single module bar width. The difference between a non truncated and a truncated bar code is shown in the previous examples.

## Special Considerations for ^BY When Using PDF417

When used with ^B7, the parameters for the ^BY command are:

**w = module width (in dots)**

*Accepted Values:* 2 to 10

*Default Value:* 2

**r = ratio**

*Fixed Value:* 3 (ratio has no effect on PDF417)

**h = height of bars (in dots)**

*Accepted Values:* 1 to 32000

*Default Value:* 10

PDF417 uses this only when row height is not specified in the ^B7 h parameter.

## Special Considerations for ^FD When Using PDF417

The character set sent to the printer with the ^FD command includes the full ASCII set, except for those characters with special meaning to the printer.

See *Zebra Code Page 850* on page 766, *^CC ~CC* on page 139, and *^CT ~CT* on page 149.

- CR and LF are also valid characters for all ^FD statements. This scheme is used:

  \& = carriage return/line feed

  \\ = backslash (\)

- ^CI13 must be selected to print a backslash (\).

# ^B8

## EAN-8 Bar Code

**Description** The ^B8 command is the shortened version of the EAN-13 bar code. EAN is an acronym for European Article Numbering. Each character in the EAN-8 bar code is composed of four elements: two bars and two spaces.

- ^B8 supports a fixed ratio.
- Field data (^FD) is limited to exactly seven characters. ZPL II automatically pads or truncates on the left with zeros to achieve the required number of characters.
- When using JAN-8 (Japanese Article Numbering), a specialized application of EAN-8, the first two non-zero digits sent to the printer are always 49.

**Format** `^B8o,h,f,g`

**Important •** If additional information about the EAN-8 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

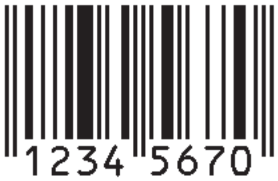
| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |

**Example** • This is an example of an EAN-8 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^B8N,100,Y,N
^FD1234567^FS
^XZ
```

**EAN-8 BAR CODE**



| EAN-8 BAR CODE CHARACTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

# ^B9

## UPC-E Bar Code

**Description** The `^B9` command produces a variation of the UPC symbology used for number system 0. It is a shortened version of the UPC-A bar code, where zeros are suppressed, resulting in codes that require less printing space. The 6 dot/mm, 12 dot/mm, and 24 dot/mm printheads produce the UPC and EAN symbologies at 100 percent of their size. However, an 8 dot/mm printhead produces the UPC and EAN symbologies at a magnification factor of 77 percent.

Each character in a UPC-E bar code is composed of four elements: two bars and two spaces. The `^BY` command must be used to specify the width of the narrow bar.

- `^B9` supports a fixed ratio.
- Field data (`^FD`) is limited to exactly 10 characters, requiring a five-digit manufacturer's code and five-digit product code.
- When using the zero-suppressed versions of UPC, you must enter the full 10-character sequence. ZPL II calculates and prints the shortened version.

**Format** `^B9,h,f,g,e`

**Important** • If additional information about the UPC-E bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `Y` |

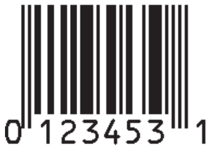
| Parameters | Details |
|---|---|
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |
| e = print check digit | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |

**Example** • This is an example of a UPC-E bar code:

**ZPL II CODE**

```
^XA
^FO150,100^BY3
^B9N,100,Y,N,Y
^FD1230000045^FS
^XZ
```

**UPC-E BAR CODE**



| UPC-E BAR CODE CHARACTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

## Rules for Proper Product Code Numbers

- If the last three digits in the manufacturer’s number are 000, 100, or 200, valid product code numbers are 00000 to 00999.
- If the last three digits in the manufacturer’s number are 300, 400, 500, 600, 700, 800, or 900, valid product code numbers are 00000 to 00099.
- If the last two digits in the manufacturer’s number are 10, 20, 30, 40, 50, 60, 70, 80, or 90, valid product code numbers are 00000 to 00009.
- If the manufacturer’s number does not end in zero (0), valid product code numbers are 00005 to 00009.

# ^BA

## Code 93 Bar Code

**Description** The ^BA command creates a variable length, continuous symbology. The Code 93 bar code is used in many of the same applications as Code 39. It uses the full 128-character ASCII set. ZPL II, however, does not support ASCII control codes or escape sequences. It uses the substitute characters shown below.

| Control Code | ZPL II Substitute |
|---|---|
| Ctrl $ | & |
| Ctrl % | ‘ |
| Ctrl / | ( |
| Ctrl + | ) |

Each character in the Code 93 bar code is composed of six elements: three bars and three spaces. Although invoked differently, the human-readable interpretation line prints as though the control code has been used.

- ^BA supports a fixed print ratio.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

**Format** `^BAo,h,f,g,e`

**Important •** If additional information about the Code 93 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |

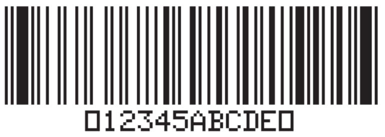
| Parameters | Details |
|---|---|
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |
| e = print check digit | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |

**Example •** This is an example of a Code 93 bar code:

ZPL II CODE

```
^XA
^FO100,75^BY3
^BAN,100,Y,N,N
^FD12345ABCDE^FS
^XZ
```

CODE 93 BAR CODE



CODE 93 BAR CODE CHARACTERS

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
- . $ / + % & ' ( )
SPACE

□ *Denotes an internal start/stop character that must precede and follow every bar code message.*

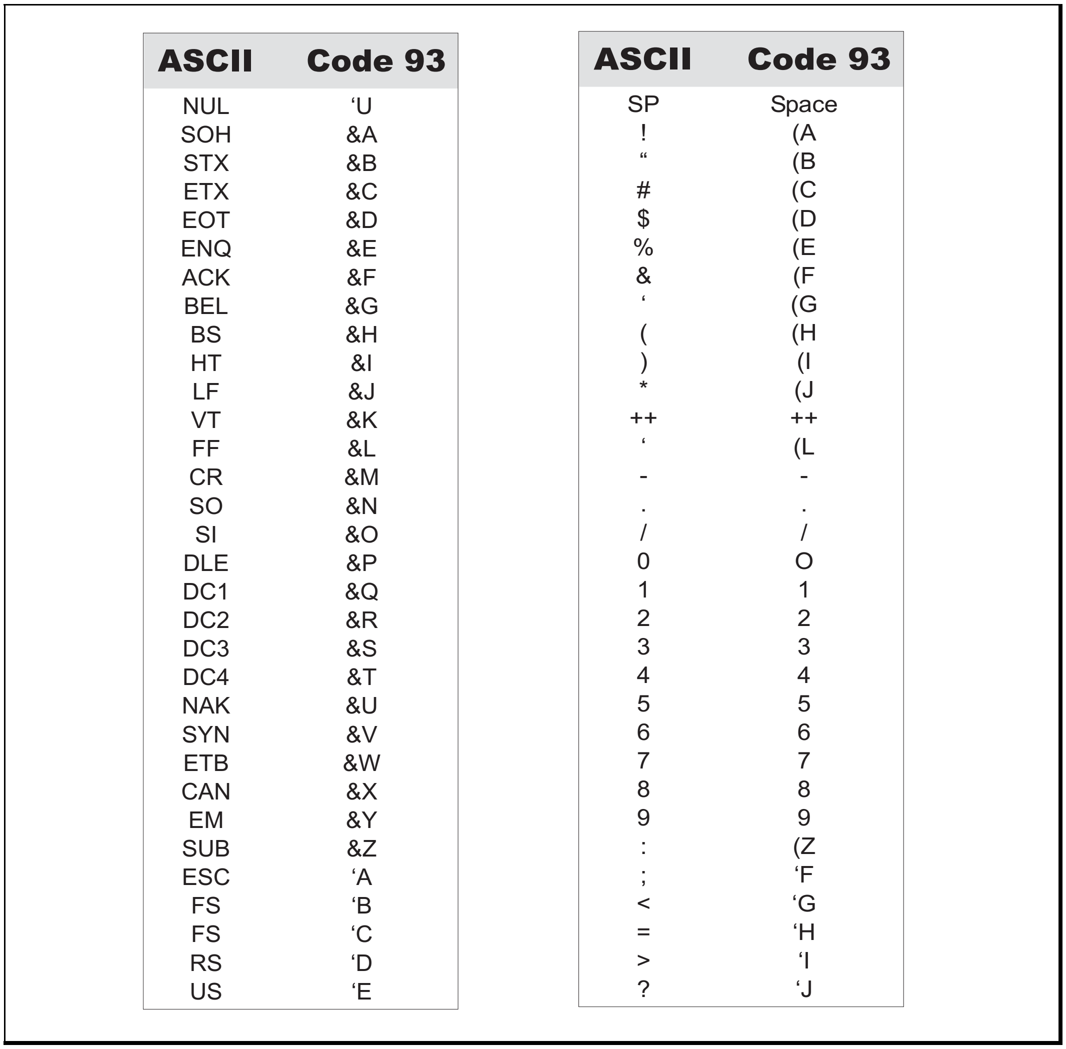
**Comments** All control codes are used in pairs.

Code 93 is also capable of encoding the full 128-character ASCII set. For more details, see *Table 4 on page 72*.

## Full ASCII Mode for Code 93

Code 93 can generate the full 128-character ASCII set using paired characters as shown in *Table 4 on page 72*.

### Table 4 • Code 93 Full ASCII Mode



| ASCII | Code 93 | ASCII | Code 93 |
|---|---|---|---|
| NUL | ‘U | SP | Space |
| SOH | &A | ! | (A |
| STX | &B | “ | (B |
| ETX | &C | # | (C |
| EOT | &D | $ | (D |
| ENQ | &E | % | (E |
| ACK | &F | & | (F |
| BEL | &G | ‘ | (G |
| BS | &H | ( | (H |
| HT | &I | ) | (I |
| LF | &J | * | (J |
| VT | &K | ++ | ++ |
| FF | &L | ‘ | (L |
| CR | &M | - | - |
| SO | &N | . | . |
| SI | &O | / | / |
| DLE | &P | 0 | O |
| DC1 | &Q | 1 | 1 |
| DC2 | &R | 2 | 2 |
| DC3 | &S | 3 | 3 |
| DC4 | &T | 4 | 4 |
| NAK | &U | 5 | 5 |
| SYN | &V | 6 | 6 |
| ETB | &W | 7 | 7 |
| CAN | &X | 8 | 8 |
| EM | &Y | 9 | 9 |
| SUB | &Z | : | (Z |
| ESC | ‘A | ; | ‘F |
| FS | ‘B | < | ‘G |
| FS | ‘C | = | ‘H |
| RS | ‘D | > | ‘I |
| US | ‘E | ? | ‘J |

**Table 5 • Code 93 Full ASCII Mode**

| ASCII | Code 93 |
|---|---|
| @ | ‘V |
| A | A |
| B | B |
| C | C |
| D | D |
| E | E |
| F | F |
| G | G |
| H | H |
| I | I |
| J | J |
| K | K |
| L | L |
| M | M |
| N | N |
| O | O |
| P | P |
| Q | Q |
| R | R |
| S | S |
| T | T |
| U | U |
| V | V |
| W | W |
| X | X |
| Y | Y |
| Z | Z |
| [ | ‘K |
| \ | ‘L |
| ] | ‘M |
| ^ | ‘N |
| _ | ‘O |

| ASCII | Code 93 |
|---|---|
| ‘ | ‘W |
| a | )A |
| b | )B |
| c | )C |
| d | )D |
| e | )E |
| f | )F |
| g | )G |
| h | )H |
| I | )I |
| j | )J |
| k | )K |
| l | )L |
| m | )M |
| n | )N |
| o | )O |
| p | )P |
| q | )Q |
| r | )R |
| s | )S |
| t | )T |
| u | )U |
| v | )V |
| w | )W |
| x | )X |
| y | )Y |
| z | )Z |
| { | ‘P |
| \| | ‘Q |
| } | ‘R |
| ~ | ‘S |
| DEL | ‘T |

# ^BB

## CODABLOCK Bar Code

**Description** The ^BB command produces a two-dimensional, multirow, stacked symbology. It is ideally suited for applications that require large amounts of information.

Depending on the mode selected, the code consists of one to 44 stacked rows. Each row begins and ends with a start and stop pattern.

- CODABLOCK A supports variable print ratios.
- CODABLOCK E and F support only fixed print ratios.

**Format** `^BBo,h,s,c,r,m`

**Important •** If additional information about the CODABLOCK bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* N |
| h = bar code height for individual rows (in dots) | *Accepted Values:* 2 to 32000<br>*Default Value:* 8<br>This number, multiplied by the module, equals the height of the individual row in dots. |
| s = security level | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y<br>Security level determines whether symbol check-sums are generated and added to the symbol. Check sums are never generated for single-row symbols. This can be turned off only if parameter m is set to A. |
| c = number of characters per row (data columns) | *Accepted Values:* 2 to 62 characters<br>This is used to encode a CODABLOCK symbol. It gives the you control over the width of the symbol. |

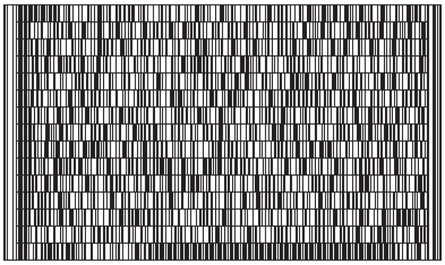
| Parameters | Details |
|---|---|
| r = number of rows to encode | *Accepted Values:*<br>for CODABLOCK A: 1 to 22<br>for CODABLOCK E and F: 2 to 4<br>• If values for c and r are not specified, a single row is produced.<br>• If a value for r is not specified, and c exceeds the maximum range, a single row equal to the field data length is produced.<br>• If a value for c is not specified, the number of characters per row is derived by dividing the field data by the value of r.<br>• If both parameters are specified, the amount of field data must be less than the product of the specified parameters. If the field data exceeds the value of the product, either no symbol or an error code is printed (if ^CV is active).<br>• If the data field contains primarily numeric data, fewer than the specified rows might be printed. If the field data contains several shift and code-switch characters, more than the specified number of rows might be printed. |
| m = mode | *Accepted Values:* A, E, F<br>CODABLOCK A uses the Code 39 character set.<br>CODABLOCK F uses the Code 128 character set.<br>CODABLOCK E uses the Code 128 character set and automatically adds FNC1.<br>*Default Value:* F |

**Example •** This is an example of a CODABLOCK bar code:

ZPL II CODE

```
^XA
^BY2,3
^FO10,10^BBN,30,,30,44,E
^FDZebra Technologies
Corporation strives to be
the expert supplier of
innovative solutions to
speciality demand labeling
and ticketing problems of
business and government.
We will attract and retain
the best people who will
understand our customer's
needs and provide them with
systems, hardware, software,
consumables and service
offering the best value,
high quality, and reliable
performance, all delivered
in a timely manner.^FS
^XZ
```

CODABLOCK BAR CODE



### Special Considerations for the ^BY Command When Using ^BB

The parameters for the `^BYw,r,h` command, when used with a `^BB` code, are as follows:

`w` = **module width (in dots)**

*Accepted Values:* `2` to `10` (CODABLOCK A only)

*Default Value:* `2`

`r` = **ratio**

*Fixed Value:* `3` (ratio has no effect on CODABLOCK E or F)

`h` = **height of bars (in dots)**

*Accepted Values:* `1` to `32,32000`

*Default Value:* `10`

CODABLOCK uses this as the overall symbol height only when the row height is not specified in the `^BB h` parameter.

## Special Considerations for ^FD Character Set When Using ^BB

The character set sent to the printer depends on the mode selected in parameter m.

**CODABLOCK A:** CODABLOCK A uses the same character set as Code 39. If any other character is used in the ^FD statement, either no bar code is printed or an error message is printed (if ^CV is active).

**CODABLOCK E:** The Automatic Mode includes the full ASCII set except for those characters with special meaning to the printer. Function codes or the Code 128 Subset A <nul> character can be inserted using of the ^FH command.

| | |
|---|---|
| **<fnc1> = 80 hex** | **<fnc3> = 82 hex** |
| **<fnc2> = 81 hex** | **<fnc4> = 83 hex** |
| **<nul> = 84 hex** | |

For any other character above 84 hex, either no bar code is printed or an error message is printed (if ^CV is active).

**CODABLOCK F:** CODABLOCK F uses the full ASCII set, except for those characters with special meaning to the printer. Function codes or the Code 128 Subset A <nul> character can be inserted using of the ^FH command.

| | |
|---|---|
| **<fnc1> = 80 hex** | **<fnc3> = 82 hex** |
| **<fnc2> = 81 hex** | **<fnc4> = 83 hex** |
| **<nul> = 84 hex** | |

# ^BC

## Code 128 Bar Code (Subsets A, B, and C)

**Description** The `^BC` command creates the Code 128 bar code, a high-density, variable length, continuous, alphanumeric symbology. It was designed for complexly encoded product identification.

Code 128 has three subsets of characters. There are 106 encoded printing characters in each set, and each character can have up to three different meanings, depending on the character subset being used. Each Code 128 character consists of six elements: three bars and three spaces.

- `^BC` supports a fixed print ratio.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.

**Format** `^BCo,h,f,g,e,m`

❗ **Important •** If additional information about the Code 128 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:* `Y` (yes) or `N` (no)<br>*Default Value:* `Y`<br>The interpretation line can be printed in any font by placing the font command before the bar code command. |
| `g` = print interpretation line above code | *Accepted Values:* `Y` (yes) or `N` (no)<br>*Default Value:* `N` |

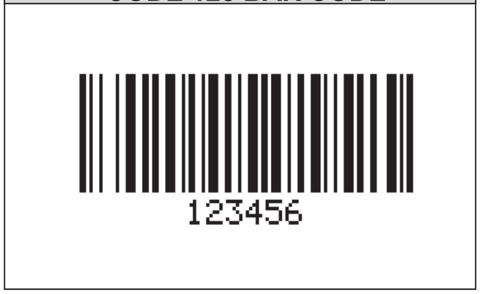
| Parameters | Details |
|---|---|
| e = UCC check digit | *Accepted Values:* Y (turns on) or N (turns off)<br>Mod 103 check digit is always there. It cannot be turned on or off. Mod 10 and 103 appear together with e turned on.<br>*Default Value:* N |
| m = mode | *Accepted Values:*<br>N = no selected mode<br>U = UCC Case Mode<br>• More than 19 digits in ^FD or **^SN** are eliminated.<br>• Fewer than 19 digits in ^FD or ^SN add zeros to the right to bring the count to 19. This produces an invalid interpretation line.<br>A = Automatic Mode<br>This analyzes the data sent and automatically determines the best packing method. The full ASCII character set can be used in the ^FD statement — the printer determines when to shift subsets. A string of four or more numeric digits causes an automatic shift to Subset C.<br>D = UCC/EAN Mode (x.11.x and newer firmware)<br>This allows dealing with UCC/EAN with and without chained application identifiers. The code starts in the appropriate subset followed by FNC1 to indicate a UCC/EAN 128 bar code. The printer automatically strips out parentheses and spaces for encoding, but prints them in the human-readable section. The printer automatically determines if a check digit is required, calculate it, and print it. Automatically sizes the human readable.<br>*Default Value:* N |

**Example •** This is an example of a Code 128 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BCN,100,Y,N,N
^FD123456^FS
^XZ
```

**CODE 128 BAR CODE**



## Code 128 Subsets

The Code 128 character subsets are referred to as Subset A, Subset B, and Subset C. A subset can be selected in these ways:

- A special Invocation Code can be included in the field data (`^FD`) string associated with that bar code.
- The desired Start Code can be placed at the beginning of the field data. If no Start Code is entered, Subset B are used.

To change subsets within a bar code, place the Invocation Code at the appropriate points within the field data (`^FD`) string. The new subset stays in effect until changed with the Invocation Code. For example, in Subset C, `>7` in the field data changes the Subset to A.

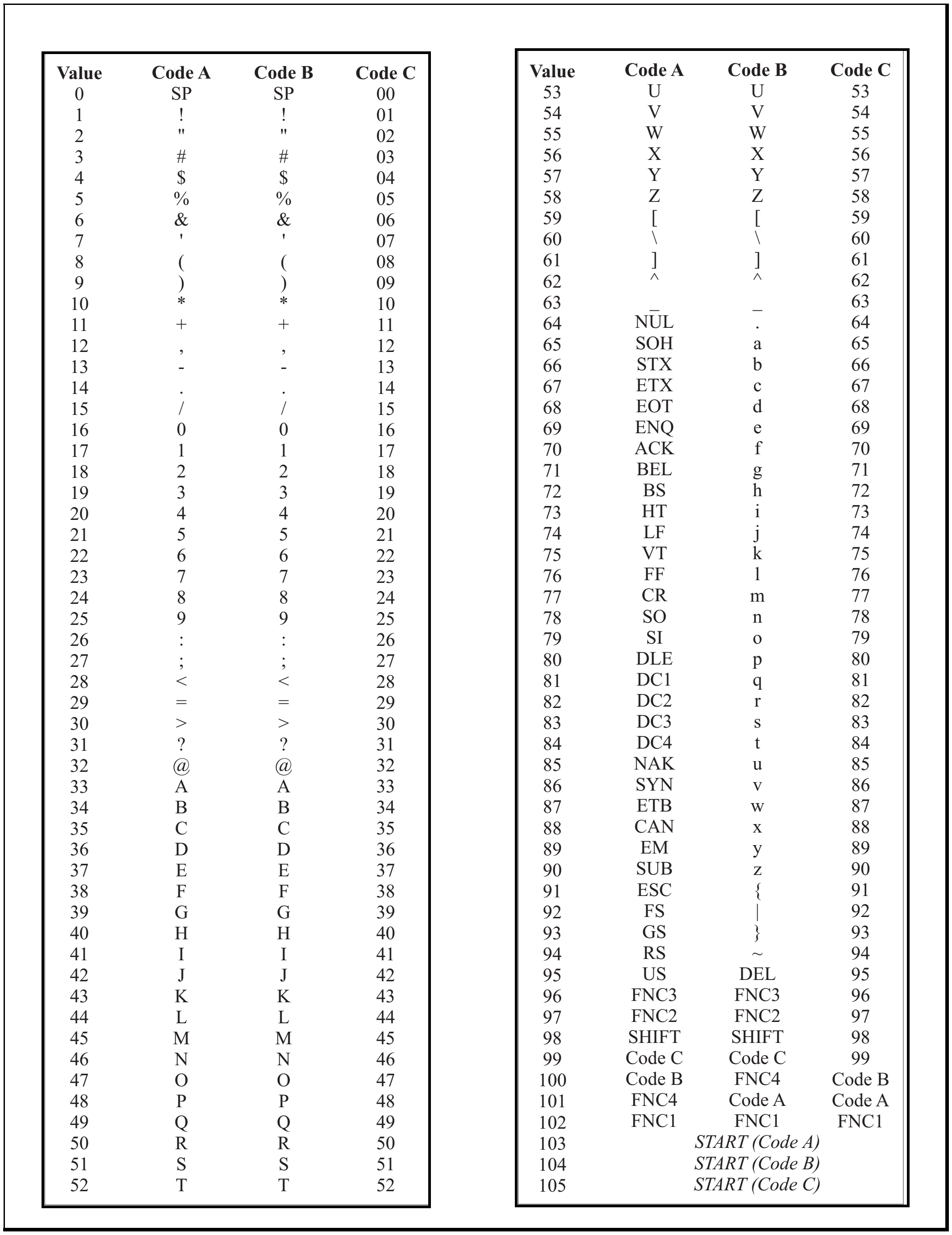
Table 6 shows the Code 128 Invocation Codes and Start Characters for the three subsets.

**Table 6 • Code 128 Invocation Characters**

| Invocation Code | Decimal Value | Subset A Character | Subset B Character | Subset C Character |
|---|---|---|---|---|
| >< | 62 | | | |
| >0 | 30 | > | > | |
| >= | 94 | | ~ | |
| >1 | 95 | USQ | DEL | |
| >2 | 96 | FNC 3 | FNC 3 | |
| >3 | 97 | FNC 2 | FNC 2 | |
| >4 | 98 | SHIFT | SHIFT | |
| >5 | 99 | CODE C | CODE C | |
| >6 | 100 | CODE B | FNC 4 | CODE B |
| >7 | 101 | FNC 4 | CODE A | CODE A |
| >8 | 102 | FNC 1 | FNC 1 | FNC 1 |
| **Start Characters** | | | | |
| >9 | 103 | Start Code A | (Numeric Pairs give Alpha/Numerics) | |
| >: | 104 | Start Code B | (Normal Alpha/Numeric) | |
| >; | 105 | Start Code C | (All numeric (00 - 99) | |

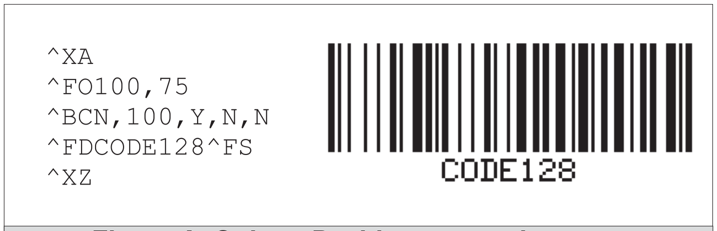
Table 7 shows the character sets for Code 128:

## Table 7 • Code 128 character sets



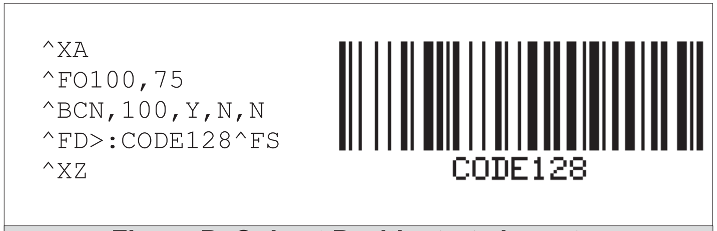
| Value | Code A | Code B | Code C |
|---|---|---|---|
| 0 | SP | SP | 00 |
| 1 | ! | ! | 01 |
| 2 | " | " | 02 |
| 3 | # | # | 03 |
| 4 | $ | $ | 04 |
| 5 | % | % | 05 |
| 6 | & | & | 06 |
| 7 | ' | ' | 07 |
| 8 | ( | ( | 08 |
| 9 | ) | ) | 09 |
| 10 | * | * | 10 |
| 11 | + | + | 11 |
| 12 | , | , | 12 |
| 13 | - | - | 13 |
| 14 | . | . | 14 |
| 15 | / | / | 15 |
| 16 | 0 | 0 | 16 |
| 17 | 1 | 1 | 17 |
| 18 | 2 | 2 | 18 |
| 19 | 3 | 3 | 19 |
| 20 | 4 | 4 | 20 |
| 21 | 5 | 5 | 21 |
| 22 | 6 | 6 | 22 |
| 23 | 7 | 7 | 23 |
| 24 | 8 | 8 | 24 |
| 25 | 9 | 9 | 25 |
| 26 | : | : | 26 |
| 27 | ; | ; | 27 |
| 28 | < | < | 28 |
| 29 | = | = | 29 |
| 30 | > | > | 30 |
| 31 | ? | ? | 31 |
| 32 | @ | @ | 32 |
| 33 | A | A | 33 |
| 34 | B | B | 34 |
| 35 | C | C | 35 |
| 36 | D | D | 36 |
| 37 | E | E | 37 |
| 38 | F | F | 38 |
| 39 | G | G | 39 |
| 40 | H | H | 40 |
| 41 | I | I | 41 |
| 42 | J | J | 42 |
| 43 | K | K | 43 |
| 44 | L | L | 44 |
| 45 | M | M | 45 |
| 46 | N | N | 46 |
| 47 | O | O | 47 |
| 48 | P | P | 48 |
| 49 | Q | Q | 49 |
| 50 | R | R | 50 |
| 51 | S | S | 51 |
| 52 | T | T | 52 |
| 53 | U | U | 53 |
| 54 | V | V | 54 |
| 55 | W | W | 55 |
| 56 | X | X | 56 |
| 57 | Y | Y | 57 |
| 58 | Z | Z | 58 |
| 59 | [ | [ | 59 |
| 60 | \ | \ | 60 |
| 61 | ] | ] | 61 |
| 62 | ^ | ^ | 62 |
| 63 | _ | _ | 63 |
| 64 | NUL | . | 64 |
| 65 | SOH | a | 65 |
| 66 | STX | b | 66 |
| 67 | ETX | c | 67 |
| 68 | EOT | d | 68 |
| 69 | ENQ | e | 69 |
| 70 | ACK | f | 70 |
| 71 | BEL | g | 71 |
| 72 | BS | h | 72 |
| 73 | HT | i | 73 |
| 74 | LF | j | 74 |
| 75 | VT | k | 75 |
| 76 | FF | l | 76 |
| 77 | CR | m | 77 |
| 78 | SO | n | 78 |
| 79 | SI | o | 79 |
| 80 | DLE | p | 80 |
| 81 | DC1 | q | 81 |
| 82 | DC2 | r | 82 |
| 83 | DC3 | s | 83 |
| 84 | DC4 | t | 84 |
| 85 | NAK | u | 85 |
| 86 | SYN | v | 86 |
| 87 | ETB | w | 87 |
| 88 | CAN | x | 88 |
| 89 | EM | y | 89 |
| 90 | SUB | z | 90 |
| 91 | ESC | { | 91 |
| 92 | FS | \| | 92 |
| 93 | GS | } | 93 |
| 94 | RS | ~ | 94 |
| 95 | US | DEL | 95 |
| 96 | FNC3 | FNC3 | 96 |
| 97 | FNC2 | FNC2 | 97 |
| 98 | SHIFT | SHIFT | 98 |
| 99 | Code C | Code C | 99 |
| 100 | Code B | FNC4 | Code B |
| 101 | FNC4 | Code A | Code A |
| 102 | FNC1 | FNC1 | FNC1 |
| 103 |  | *START (Code A)* |  |
| 104 |  | *START (Code B)* |  |
| 105 |  | *START (Code C)* |  |

**Example •** Figures A and B are examples of identical bar codes, and Figure C is an example of switching from Subset C to B to A, as follows:



```
^XA
^FO100,75
^BCN,100,Y,N,N
^FDCODE128^FS
^XZ
```

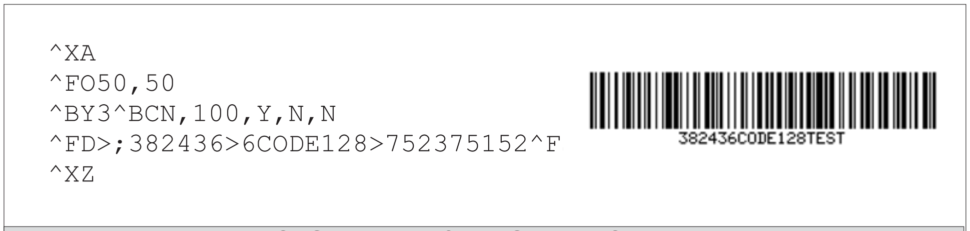
*Figure A: Subset B with no start character*



```
^XA
^FO100,75
^BCN,100,Y,N,N
^FD>:CODE128^FS
^XZ
```

*Figure B: Subset B with start character*

Because Code 128 Subset B is the most commonly used subset, ZPL II defaults to Subset B if no start character is specified in the data string.



```
^XA
^FO50,50
^BY3^BCN,100,Y,N,N
^FD>;382436>6CODE128>752375152^F
^XZ
```

*Figure C: Switching from Subset C to B to A*

## How ^BC Works Within a ZPL II Script

**^XA** – the first command starts the label format.

**^FO100,75** – the second command sets the field origin at 100 dots across the x-axis and 75 dots down the y-axis from the upper-left corner.

**^BCN,100,Y,N,N** – the third command calls for a Code 128 bar code to be printed with no rotation (N) and a height of 100 dots. An interpretation line is printed (Y) below the bar code (N). No UCC check digit is used (N).

**^FDCODE128^FS** (Figure A) ^FD>:CODE128^FS (Figure B) – the field data command specifies the content of the bar code.

**^XZ** – the last command ends the field data and indicates the end of the label.

The interpretation line prints below the code with the UCC check digit turned off.

The ^FD command for Figure A does not specify any subset, so Subset B is used. In Figure B, the ^FD command specifically calls Subset B with the >: Start Code. Although ZPL II defaults to Code B, it is good practice to include the Invocation Codes in the command.

Code 128 – Subset B is programmed directly as ASCII text, except for values greater than 94 decimal and a few special characters that must be programmed using the invocation codes. Those characters are:

^ > ~

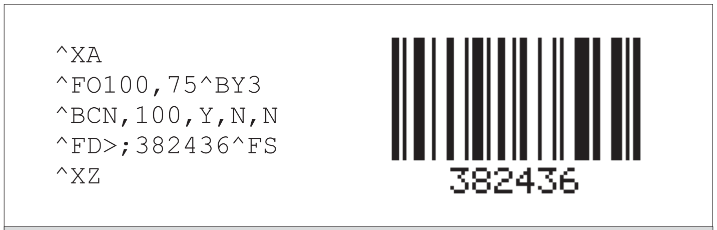
**Example • Code 128 – Subsets A and C**

Code 128, Subsets A and C are programmed in pairs of digits, 00 to 99, in the field data string. For details, see *Table 6 on page 80*.

In Subset A, each pair of digits results in a single character being encoded in the bar code; in Subset C, characters are printed as entered. Figure E below is an example of Subset A (>9 is the Start Code for Subset A).

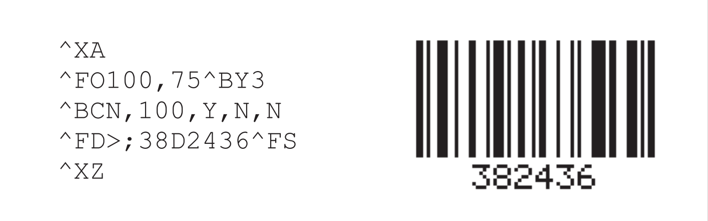
Nonintegers programmed as the first character of a digit pair (D2) are ignored. However, nonintegers programmed as the second character of a digit pair (2D) invalidate the entire digit pair, and the pair is ignored. An extra unpaired digit in the field data string just before a code shift is also ignored.

Figure C and Figure D below are examples of Subset C. Notice that the bar codes are identical. In the program code for Figure D, the *D* is ignored and the 2 is paired with the 4.



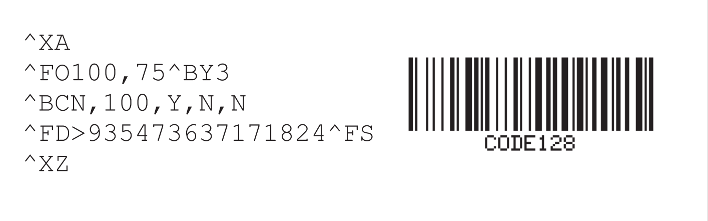
```
^XA
^FO100,75^BY3
^BCN,100,Y,N,N
^FD>;382436^FS
^XZ
```

**Figure C: Subset C with normal data**



```
^XA
^FO100,75^BY3
^BCN,100,Y,N,N
^FD>;38D2436^FS
^XZ
```

**Figure D: Subset C with ignored alpha character**



```
^XA
^FO100,75^BY3
^BCN,100,Y,N,N
^FD>935473637171824^FS
^XZ
```

**Figure E: Subset A**

## The UCC/EAN-128 Symbology

The symbology specified for the representation of Application Identifier data is UCC/EAN-128, a variant of Code 128, exclusively reserved to EAN International and the Uniform Code Council (UCC).

**Note •** It is not intended to be used for data to be scanned at the point of sales in retail outlets.

UCC/EAN-128 offers several advantages. It is one of the most complete, alphanumeric, one-dimensional symbologies available today. The use of three different character sets (A, B and C), facilitates the encoding of the full 128 ASCII character set. Code 128 is one of the most compact linear bar code symbologies. Character set C enables numeric data to be represented in a double density mode. In this mode, two digits are represented by only one symbol character saving valuable space. The code is concatenated. That means that multiple AIs and their fields may be combined into a single bar code. The code is also very reliable. Code 128 symbols use two independent self-checking features which improves printing and scanning reliability.

UCC/EAN-128 bar codes always contain a special non-data character known as function 1 (FNC 1), which follows the start character of the bar code. It enables scanners and processing software to auto-discriminate between UCC/EAN-128 and other bar code symbologies, and subsequently only process relevant data.

The UCC/EAN-128 bar code is made up of a leading quiet zone, a Code 128 start character A, B, or C, a FNC 1 character, Data (Application Identifier plus data field), a symbol check character, a stop character, and a trailing quiet zone.

UCC/EAN, UCC/128 are a couple of ways you'll hear someone refer to the code. This just indicates that the code is structured as dictated by the application identifiers that are used.

SSCC (Serial Shipping Container Code) formatted following the data structure layout for Application Identifier 00. See Table 8, *UCC Application Identifier Table* on page 89. It could be 00 which is the SSCC code. The customer needs to let us know what application identifiers are used for their bar code so we can help them.

There are several ways of writing the code to print the code to Application Identifier '00' structure.

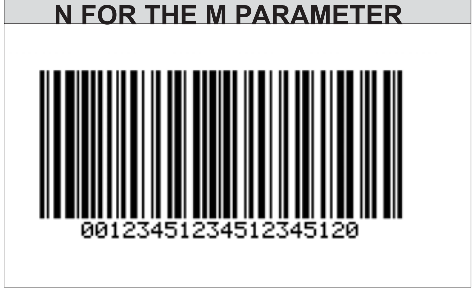
## Using N for the mode (m) parameter

**Example •** This example shows with application identifier 00 structure:

ZPL II CODE

```
^XA
^FO90,200^BY4
^BCN,256,Y,N,Y,N
^FD>;>80012345123451234512^FS
^XZ
```

N FOR THE M PARAMETER



- >;>8' sets it to subset C, function 1
- '00' is the application identifier followed by '17 characters', the check digit is selected using the 'Y' for the (e) parameter to automatically print the 20th character.
- you are not limited to 19 characters with mode set to N

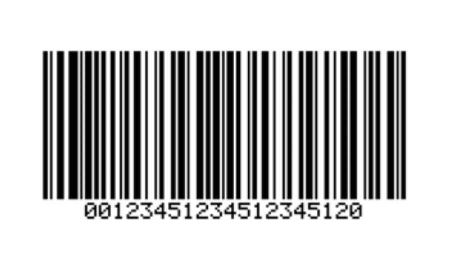
## Using U for the mode (m) parameter

**Example •** The example shows the application identifier 00 format:

ZPL II CODE

```
^XA
^FO90,200
^BY4^BC,256,Y,N,,U
^FD0012345123451234512^FS
^XZ
```

U FOR THE M PARAMETER



UCC Case Mode

- Choosing U selects UCC Case mode. You will have exactly 19 characters available in ^FD.
- Subset C using FNC1 values are automatically selected.
- Check digit is automatically inserted.

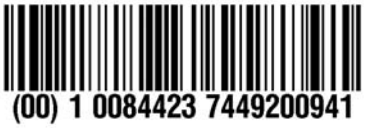
## Using D for the mode (m) parameter

**Example •** This example shows application identifier 00 format ((x.11.x or later):

**ZPL II CODE**

```
^XA
^FO50,200^BCN,150,Y,N,,D
^FD(00)10084423 7449200940^FS
^XZ
```

**D FOR THE M PARAMETER**



(0 at end of field data is a bogus character that is inserted as a place holder for the check digit the printer will automatically insert.

- Subset C using FNC1 values are automatically selected.
- Parentheses and spaces can be in the field data. '00' application identifier, followed by 17 characters, followed by bogus check digit place holder.
- Check digit is automatically inserted. The printer will automatically calculate the check digit and put it into the bar code and interpretation line.
- The interpretation line will also show the parentheses and spaces but will strip them out from the actual bar code.

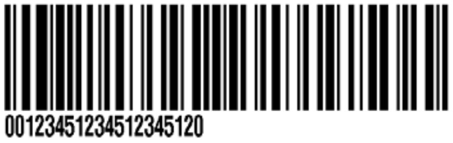
## Printing the Interpretation Line

**Example •** This example shows printing the interpretation in a different font with firmware x.11.x or later:

**ZPL II CODE**

```
^XA
^FO50,200
^A0N,40,30^BCN,150,Y,N,Y
^FD>;>80012345123451234512^FS
^XZ
```

**INTERPRETATION LINE**



The font command (`^A0N,40,30`) can be added and changed to alter the font and size of the interpretation line.

### With firmware version later than x.10.x

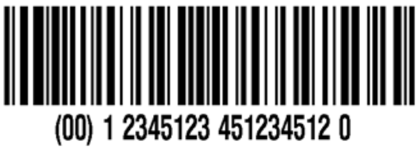
- A separate text field needs to be written.
- The interpretation line needs to be turned off.
- `^A0N,50,40` is the font and size selection for the separate text field.

- You have to make sure you enter the correct check digit in the text field.
- Creating a separate text field allows you to format the interpretation line with parentheses and spaces.

ZPL II CODE

```
^XA
^FO25,25
^BCN,150,N,N,Y
^FD>;>80012345123451234512^FS
^FO100,190
^A0N,50,40
^FD(00) 1 2345123 451234512 0^FS
^XZ
```

FIRMWARE OLDER THAN X.10.X



## Application Identifiers — UCC/EAN APPLICATION IDENTIFIER

An Application Identifier is a prefix code used to identify the meaning and the format of the data that follows it (data field).

There are AIs for identification, traceability, dates, quantity, measurements, locations, and many other types of information.

For example, the AI for batch number is 10, and the batch number AI is always followed by an alphanumeric batch code not to exceed 20-characters.

The UCC/EAN Application Identifiers provide an open standard that can be used and understood by all companies in the trading chain, regardless of the company that originally issued the codes.

**Table 8 • UCC Application Identifier Table**

| Data Content | AI | Plus The Following Data Structure |
|---|---|---|
| Serial Shipping Container Code (SSCC) | 00 | exactly 18 digits |
| Shipping Container Code | 01 | exactly 14 digits |
| Batch Numbers | 10 | up to 20 alpha numerics |
| Production Date (YYMMDD) | 11 | exactly 6 digits |
| Packaging Date (YYMMDD) | 13 | exactly 6 digits |
| Sell By Date (YYMMDD) | 15 | exactly 6 digits |
| Expiration Date (YYMMDD) | 17 | exactly 6 digits |
| Product Variant | 20 | exactly 2 digits |
| Serial Number | 21 | up to 20 alpha numerics |
| HIBCC Quantity, Date, Batch and Link | 22 | up to 29 alpha numerics |
| Lot Number | 23* | up to 19 alpha numerics |
| Quantity Each | 30 | |
| Net Weight (Kilograms) | 310** | exactly 6 digits |
| Length, Meters | 311** | exactly 6 digits |
| Width or Diameter (Meters) | 312** | exactly 6 digits |
| Depths (Meters) | 313** | exactly 6 digits |
| Area (Sq. Meters) | 314** | exactly 6 digits |
| Volume (Liters) | 315** | exactly 6 digits |
| Volume (Cubic Meters) | 316** | exactly 6 digits |
| Net Weight (Pounds) | 320** | exactly 6 digits |
| Customer PO Number | 400 | up to 29 alpha numerics |
| Ship To (Deliver To) Location Code using EAN 13 or DUNS Number with leading zeros | 410 | exactly 13 digits |
| Bill To (Invoice To) Location Code using EAN 13 or DUNS Number with leading zeros | 411 | exactly 13 digits |
| Purchase from | 412 | exactly 13 digits |
| Ship To (Deliver To) Postal Code within single postal authority | 420 | up to 9 alpha numerics |
| Ship To (Deliver To) Postal Code with 3-digit ISO Country Code Prefix | 421 | 3 digits plus up to 9 alpha numerics |
| Roll Products - width, length, core diameter, direction and splices | 8001 | exactly 14 digits |
| Electronic Serial number for cellular mobile phone | 8002 | up to 20 alpha numerics |

**Note •** Table 8 is a partial table showing the application identifiers. For more current and complete information, search the Internet for **UCC Application Identifier**.

For date fields that only need to indicate a year and month, the day field is set to `00`.

* Plus one digit for length indication.

** Plus one digit for decimal point indication.

## Chaining several application identifiers (firmware x.11.x or later)

The FNC1, which is invoked by >8, is inserted just before the AI's so that the scanners reading the code sees the FNC1 and knows that an AI follows.

**Example** • This is an example with the mode parameter set to A (automatic):

```
^XA
^BY2,2.5,193
^FO33,400
^BCN,,N,N,N,A
^FD>;>80204017773003486100008535>8910001>837252^FS
^FT33,625^AEN,0,0^FD(02)04017773003486(10)0008535(91)
0001(37)252^FS
^XZ
```

**Example** • This is an example with the mode parameter set to U:

```
^XA
^BY3,2.5,193
^FO33,200
^BCN,,N,N,N,U
^FD>;>80204017773003486>8100008535>8910001>837252^FS
^FT33,455^A0N,30,30^FD(02)04017773003486(10)0008535(9
1)0001(37)252^FS
^XZ
```

**Example** • This is an example with the mode parameter set to D*:

```
^XA
^PON
^LH0,0
^BY2,2.5,145
^FO218,343
^BCB,,Y,N,N,D
^FD(91)0005886>8(10)0000410549>8(99)05^FS
^XZ
```

D* — When trying to print the last Application Identifier with an odd number of characters, a problem existed when printing EAN128 bar codes using Mode D. The problem was fixed in firmware version v60.13.0.6.

# ^BD

## UPS MaxiCode Bar Code

**Description** The ^BD command creates a two-dimensional, optically read (not scanned) code. This symbology was developed by UPS (United Parcel Service).

Notice that there are no additional parameters for this code and it does not generate an interpretation line. The ^BY command has no effect on the UPS MaxiCode bar code. However, the ^CV command can be activated.

**Format** `^BDm,n,t`

This table identifies the parameters for this format:

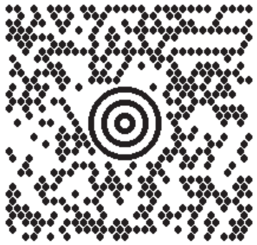
| Parameters | Details |
|---|---|
| m = mode | *Accepted Values:*<br>2 = structured carrier message: numeric postal code (U.S.)<br>3 = structured carrier message: alphanumeric postal code (non-U.S.)<br>4 = standard symbol, secretary<br>5 = full EEC<br>6 = reader program, secretary<br>*Default Value:* 2 |
| n = symbol number | *Accepted Values:* 1 to 8 can be added in a structured document<br>*Default Value:* 1 |
| t = total number of symbols | *Accepted Values:* 1 to 8, representing the total number of symbols in this sequence<br>*Default Value:* 1 |

**Example •** This is an example of UPS MAXICODE - MODE 2 bar code:

**ZPL II CODE**

```
^XA
^FO50,50
^CVY
^BD^FH^FD001840152382802
[)>_1E01_1D961Z00004951_1DUPSN_
1D_06X610_1D159_1D1234567_1D1/1_
1D_1DY_1D634 ALPHA DR_
1DPITTSBURGH_1DPA_1E_04^FS
^FO30,300^A0,30,30^FDMode2^FS
^XZ
```

**UPS MAXICODE - MODE 2**



## Special Considerations for `^FD` when Using `^BD`

The `^FD` statement is divided into two parts: a high priority message (`hpm`) and a low priority message (`lpm`). There are two types of high priority messages. One is for a U.S. Style Postal Code; the other is for a non-U.S. Style Postal Code. The syntax for either of these high priority messages must be exactly as shown or an error message is generated.

**Format** `^FD <hpm><lpm>`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `<hpm>` = high priority message (applicable only in Modes 2 and 3) | *Accepted Values:* `0` to `9`, except where noted<br>U.S. Style Postal Code (Mode 2)<br>**`<hpm>`** = aaabbbcccccdddd<br>`aaa` = three-digit class of service<br>`bbb` = three-digit country zip code<br>`ccccc` = five-digit zip code<br>`dddd` = four-digit zip code extension (if none exists, four zeros (0000) must be entered)<br>**non-U.S. Style Postal Code (Mode 3)**<br>**`<hpm>`** = `aaabbbcccccc`<br>`aaa` = three-digit class of service<br>`bbb` = three-digit country zip code<br>`ccccc` = six-digit zip code (`A` through `Z` or `0` to `9`) |
| `<lpm>` = low priority message (only applicable in Modes 2 and 3) | GS is used to separate fields in a message (0x1D). RS is used to separate format types (0x1E). EOT is the end of transmission characters.<br>**Message Header** []>RS<br>**Transportation Data**<br>**Format Header** 01GS96<br>**Tracking Number*** <tracking number><br>**SCAC*** GS<SCAC><br>**UPS Shipper Number** GS<shipper number><br>**Julian Day of Pickup** GS<day of pickup><br>**Shipment ID Number** GS<shipment ID number><br>**Package n/x** GS<n/x><br>**Package Weight** GS<weight><br>**Address Validation** GS<validation><br>**Ship to Street Address** GS<street address><br>**Ship to City** GS<city><br>**Ship to State** GS<state><br>**RS** RS<br>**End of Message** EOT<br>(* Mandatory Data for UPS) |

### Comments

- The formatting of **`<hpm>`** and **`<lpm>`** apply only when using Modes 2 and 3.
  Mode 4, for example, takes whatever data is defined in the `^FD` command and places it in the symbol.
- UPS requires that certain data be present in a defined manner. When formatting MaxiCode data for UPS, always use uppercase characters. When filling in the *fields* in the **`<lpm>`** for UPS, follow the data size and types specified in *Guide to Bar Coding with UPS*.
- If you do not choose a mode, the default is Mode 2. If you use non-U.S. Postal Codes, you probably get an error message (invalid character or message too short). When using non-U.S. codes, use Mode 3.
- ZPL II doesn’t automatically change your mode based on the zip code format.
- When using special characters, such as GS, RS, or EOT, use the `^FH` command to tell ZPL II to use the hexadecimal value following the underscore character ( _ ).

# ^BE

## EAN-13 Bar Code

**Description** The `^BE` command is similar to the UPC-A bar code. It is widely used throughout Europe and Japan in the retail marketplace.

The EAN-13 bar code has 12 data characters, one more data character than the UPC-A code. An EAN-13 symbol contains the same number of bars as the UPC-A, but encodes a 13th digit into a parity pattern of the left-hand six digits. This 13th digit, in combination with the 12th digit, represents a country code.

- `^BE` supports fixed print ratios.
- Field data (`^FD`) is limited to exactly 12 characters. ZPL II automatically truncates or pads on the left with zeros to achieve the required number of characters.
- When using JAN-13 (Japanese Article Numbering), a specialized application of EAN-13, the first two non-zero digits sent to the printer must be 49.

**Format** `^BEo,h,f,g`

**Note •** Use Interleaved 2 of 5 for UCC and EAN 14.

**Important •** If additional information about the EAN-13 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

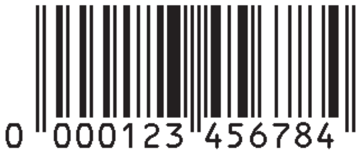
| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `Y` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example** • This is an example of an EAN-13 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BEN,100,Y,N
^FD12345678^FS
^XZ
```

**EAN-13 BAR CODE**



| EAN-13 BAR CODE CHARACTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

**Comments** The EAN-13 bar code uses the Mod 10 check-digit scheme for error checking. For more information on Mod 10, see *Mod 10 Check Digit* on page 790.

# ^BF

## MicroPDF417 Bar Code

**Description** The ^BF command creates a two-dimensional, multi-row, continuous, stacked symbology identical to PDF417, except it replaces the 17-module-wide start and stop patterns and left/right row indicators with a unique set of 10-module-wide row address patterns. These reduce overall symbol width and allow linear scanning at row heights as low as 2X.

MicroPDF417 is designed for applications with a need for improved area efficiency but without the requirement for PDF417's maximum data capacity. It can be printed only in specific combinations of rows and columns up to a maximum of four data columns by 44 rows.

Field data (^FD) and field hexadecimal (^FH) are limited to:

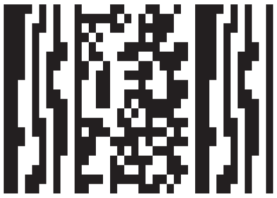
- 250 7-bit characters
- 150 8-bit characters
- 366 4-bit numeric characters

**Format** `^BFo,h,m`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = bar code height (in dots) | *Accepted Values:* 1 to 9999<br>*Default Value:* value set by ^BY or 10 (if no ^BY value exists). |
| m = mode | *Accepted Values:* 0 to 33 (see *MicroPDF417 Mode* on page 99)<br>*Default Value:* 0 (see *MicroPDF417 Mode* on page 99) |

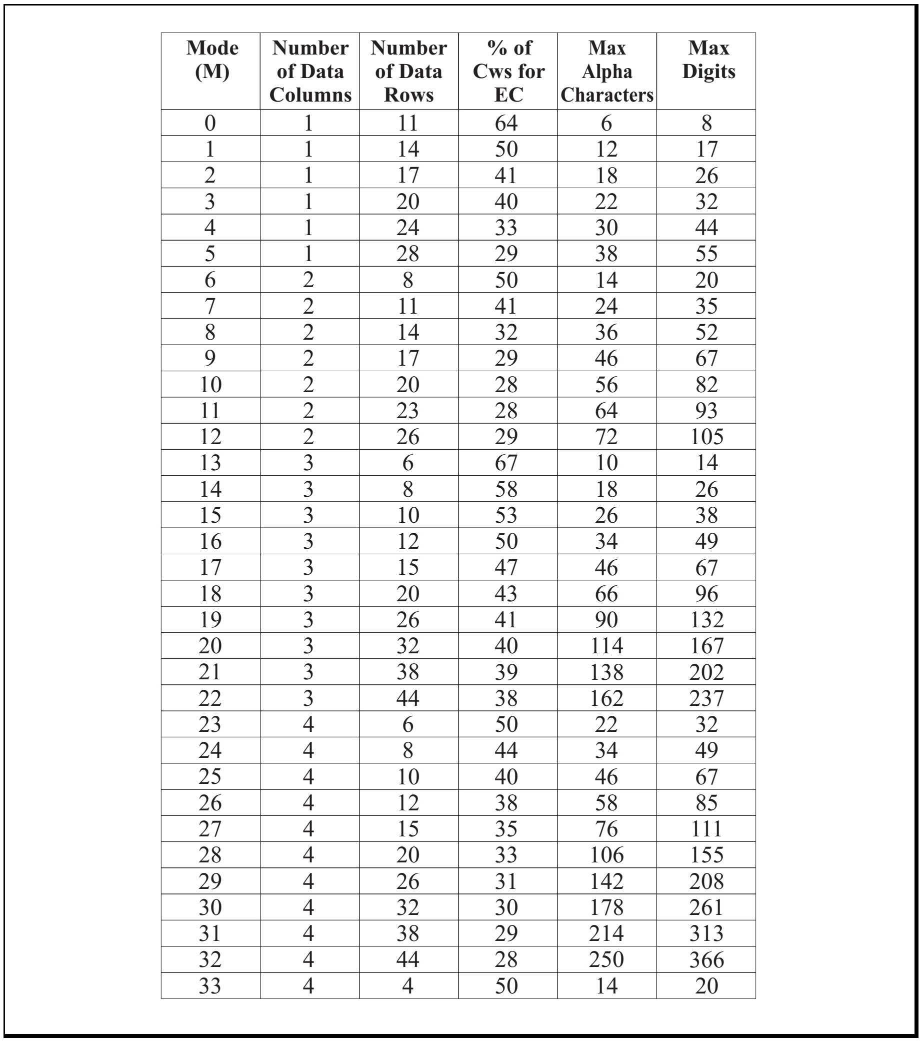
**Example** • This is an example of a MicroPDF417 bar code:

| ZPL II CODE | MICRO-PDF417 BAR CODE |
|---|---|
| `^XA`<br>`^FO100,100^BY6`<br>`^BFN,8,3`<br>`^FDABCDEFGHIJKLMNOPQRSTUV^FS`<br>`^XZ` |  |

## To encode data into a MicroPDF417 bar code, complete these steps:

1. Determine the type of data to be encoded (for example, ASCII characters, numbers, 8-bit data, or a combination).
2. Determine the maximum amount of data to be encoded within the bar code (for example, number of ASCII characters, quantity of numbers, or quantity of 8-bit data characters).
3. Determine the percentage of check digits that are used within the bar code. The higher the percentage of check digits that are used, the more resistant the bar code is to damage — however, the size of the bar code increases.
4. Use the chart *MicroPDF417 Mode* on page 99 with the information gathered from the questions above to select the mode of the bar code.

Table 9 • MicroPDF417 Mode



| Mode (M) | Number of Data Columns | Number of Data Rows | % of Cws for EC | Max Alpha Characters | Max Digits |
|---|---|---|---|---|---|
| 0 | 1 | 11 | 64 | 6 | 8 |
| 1 | 1 | 14 | 50 | 12 | 17 |
| 2 | 1 | 17 | 41 | 18 | 26 |
| 3 | 1 | 20 | 40 | 22 | 32 |
| 4 | 1 | 24 | 33 | 30 | 44 |
| 5 | 1 | 28 | 29 | 38 | 55 |
| 6 | 2 | 8 | 50 | 14 | 20 |
| 7 | 2 | 11 | 41 | 24 | 35 |
| 8 | 2 | 14 | 32 | 36 | 52 |
| 9 | 2 | 17 | 29 | 46 | 67 |
| 10 | 2 | 20 | 28 | 56 | 82 |
| 11 | 2 | 23 | 28 | 64 | 93 |
| 12 | 2 | 26 | 29 | 72 | 105 |
| 13 | 3 | 6 | 67 | 10 | 14 |
| 14 | 3 | 8 | 58 | 18 | 26 |
| 15 | 3 | 10 | 53 | 26 | 38 |
| 16 | 3 | 12 | 50 | 34 | 49 |
| 17 | 3 | 15 | 47 | 46 | 67 |
| 18 | 3 | 20 | 43 | 66 | 96 |
| 19 | 3 | 26 | 41 | 90 | 132 |
| 20 | 3 | 32 | 40 | 114 | 167 |
| 21 | 3 | 38 | 39 | 138 | 202 |
| 22 | 3 | 44 | 38 | 162 | 237 |
| 23 | 4 | 6 | 50 | 22 | 32 |
| 24 | 4 | 8 | 44 | 34 | 49 |
| 25 | 4 | 10 | 40 | 46 | 67 |
| 26 | 4 | 12 | 38 | 58 | 85 |
| 27 | 4 | 15 | 35 | 76 | 111 |
| 28 | 4 | 20 | 33 | 106 | 155 |
| 29 | 4 | 26 | 31 | 142 | 208 |
| 30 | 4 | 32 | 30 | 178 | 261 |
| 31 | 4 | 38 | 29 | 214 | 313 |
| 32 | 4 | 44 | 28 | 250 | 366 |
| 33 | 4 | 4 | 50 | 14 | 20 |

# ^BI

## Industrial 2 of 5 Bar Codes

**Description** The `^BI` command is a discrete, self-checking, continuous numeric symbology. The Industrial 2 of 5 bar code has been in use the longest of the 2 of 5 family of bar codes. Of that family, the Standard 2 of 5 (`^BJ`) and Interleaved 2 of 5 (`^B2`) bar codes are also available in ZPL II.

With Industrial 2 of 5, all of the information is contained in the bars. Two bar widths are employed in this code, the wide bar measuring three times the width of the narrow bar.

- `^BI` supports a print ratio of 2.0:1 to 3.0:1.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.

**Format** `^BIo,h,f,g`

**Important •** If additional information about the Industrial 2 of 5 bar code, go to www.aimglobal.org.

This table identifies the parameters for this format:

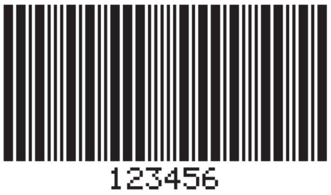
| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `Y` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example •** This is an example of an Industrial 2 of 5 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BIN,150,Y,N
^FD123456^FS
^XZ
```

**INDUSTRIAL 2 OF 5 BAR CODE**



| INDUSTRIAL 2 OF 5 BAR CODE CHARACTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

**Start/Stop (internal)**

# ^BJ

## Standard 2 of 5 Bar Code

**Description** The `^BJ` command is a discrete, self-checking, continuous numeric symbology.

With Standard 2 of 5, all of the information is contained in the bars. Two bar widths are employed in this code, the wide bar measuring three times the width of the narrow bar.

- `^BJ` supports a print ratio of 2.0:1 to 3.0:1.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.

**Format** `^BJo,h,f,g`

**Important •** If additional information about the Standard 2 of 5 bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

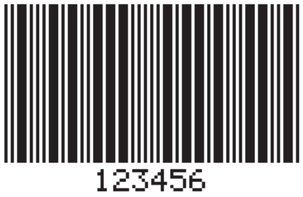
| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `Y` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example** • This is an example of a Standard 2 of 5 bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BJN,150,Y,N
^FD123456^FS
^XZ
```

**STANDARD 2 OF 5 BAR CODE**



**STANDARD 2 OF 5 BAR CODE CHARACTERS**

0 1 2 3 4 5 6 7 8 9

**Start/Stop (automatic)**

# ^BK

## ANSI Codabar Bar Code

**Description** The ANSI Codabar bar code is used in a variety of information processing applications such as libraries, the medical industry, and overnight package delivery companies. This bar code is also known as USD-4 code, NW-7, and 2 of 7 code. It was originally developed for retail price labeling.

Each character in this code is composed of seven elements: four bars and three spaces. Codabar bar codes use two character sets, numeric and control (start and stop) characters.

- ^BK supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label.

**Format** `^BKo,e,h,f,g,k,l`

**Important •** If additional information about the ANSI Codabar bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

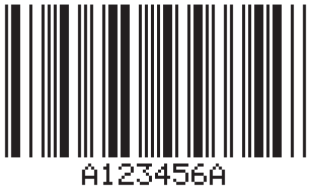
| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| e = check digit | *Fixed Value:* N |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |
| k = designates a start character | *Accepted Values:* A, B, C, D<br>*Default Value:* A |
| l = designates stop character | *Accepted Values:* A, B, C, D<br>*Default Value:* A |

**Example •** This is an example of an ANSI Codabar bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BKN,N,150,Y,N,A,A
^FD123456^FS
^XZ
```

**ANSI CODABAR BAR CODE**



**ANSI CODABAR BAR CODE CHARACTERS**

0 1 2 3 4 5 6 7 8 9

**Control Characters**

- : . $ / +

**Start/Stop Characters**

A B C D

# ^BL

## LOGMARS Bar Code

**Description** The ^BL command is a special application of Code 39 used by the Department of Defense. LOGMARS is an acronym for Logistics Applications of Automated Marking and Reading Symbols.

- ^BL supports a print ratio of 2.0:1 to 3.0:1.
- Field data (^FD) is limited to the width (or length, if rotated) of the label. Lowercase letters in the ^FD string are converted to the supported uppercase LOGMARS characters.

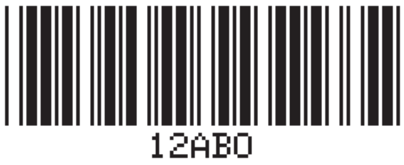
**Format** `^BLo,h,g`

**Important •** If additional information about the LOGMARS bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |

**Example** • This is an example of a LOGMARS bar code:

| ZPL II CODE | LOGMARS BAR CODE |
|---|---|
| `^XA`<br>`^FO100,75^BY3`<br>`^BLN,100,N`<br>`^FD12AB^FS`<br>`^XZ` |  |

**LOGMARS BAR CODE CHARACTERS**

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
- . $ / + %
SPACE

**Comments** The LOGMARS bar code produces a *mandatory* check digit using Mod 43 calculations. For further information on the Mod 43 check digit, see *Mod 43 Check Digit* on page 791.

# ^BM

## MSI Bar Code

**Description** The ^BM command is a pulse-width modulated, continuous, non-self-checking symbology. It is a variant of the Plessey bar code (^BP).

Each character in the MSI bar code is composed of eight elements: four bars and four adjacent spaces.

- ^BM supports a print ratio of 2.0:1 to 3.0:1.
- For the bar code to be valid, field data (^FD) is limited to 1 to 14 digits when parameter e is B, C, or D. ^FD is limited to 1 to 13 digits when parameter e is A, plus a quiet zone.

**Format** `^BMo,e,h,f,g,e2`

**Important •** If additional information about the MSI bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| e = check digit selection | *Accepted Values:*<br>A = no check digits<br>B = 1 Mod 10<br>C = 2 Mod 10<br>D = 1 Mod 11 and 1 Mod 10<br>*Default Value:* B |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |

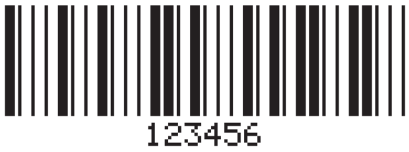
| Parameters | Details |
|---|---|
| `g` = print interpretation line above code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*`Default Value:`* `N` |
| `e2` = inserts check digit into the interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*`Default Value:`* `N` |

**Example •** This is an example of a MSI bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BMN,B,100,Y,N,N
^FD123456^FS
^XZ
```

**MSI BAR CODE**



**MSI BAR CODE CHARACTERS**

1 2 3 4 5 6 7 8 9

# ^BO

## Aztec Bar Code Parameters

**Description** The ^BO command creates a two-dimensional matrix symbology made up of square modules arranged around a bulls-eye pattern at the center.

**Note •** The Aztec bar code works with firmware version v60.13.0.11A and v50.13.2 or later.

**Format** `^BOa,b,c,d,e,f,g`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = orientation | *Accepted Values:*<br>N = normal<br>R = rotated<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| b = magnification factor | *Accepted Values:* 1 to 10<br>*Default Value:*<br>1 on 150 dpi printers<br>2 on 200 dpi printers<br>3 on 300 dpi printers<br>6 on 600 dpi printers |
| c = extended channel interpretation code indicator | *Accepted Values:*<br>Y = if data contains ECICs<br>N = if data does not contain ECICs.<br>*Default Value:* N |
| d = error control and symbol size/type indicator | *Accepted Values:*<br>0 = default error correction level<br>01 to 99 = error correction percentage (minimum)<br>101 to 104 = 1 to 4-layer compact symbol<br>201 to 232 = 1 to 32-layer full-range symbol<br>300 = a simple Aztec “Rune”<br>*Default Value:* 0 |
| e = menu symbol indicator | *Accepted Values:*<br>Y = if this symbol is to be a menu (bar code reader initialization) symbol<br>N = if it is not a menu symbol<br>*Default Value:* N |

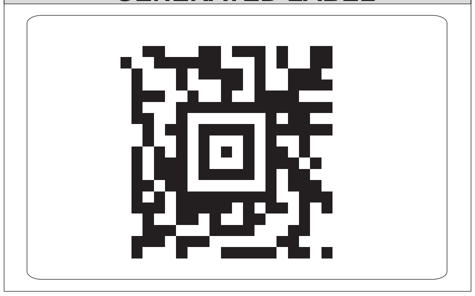
| Parameters | Details |
|---|---|
| `f` = number of symbols for structured append | *Accepted Values:* `1` through `26`<br>*Default Value:* `1` |
| `g` = *optional* ID field for structured append | The ID field is a text string with 24-character maximum<br>*Default Value:* no ID |

**Example •** This is an example of the `^B0` command:

ZPL II CODE

```
^XA
^B0R,7,N,0,N,1,0
^FD 7. This is testing label 7^FS
^XZ
```

GENERATED LABEL



# ^BP

## Plessey Bar Code

**Description** The `^BP` command is a pulse-width modulated, continuous, non-self-checking symbology.

Each character in the Plessey bar code is composed of eight elements: four bars and four adjacent spaces.

- `^BP` supports a print ratio of 2.0:1 to 3.0:1.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.

**Format** `^BPo,e,h,f,g`

**Important •** If additional information about the Plessey bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

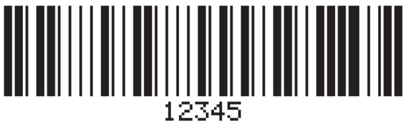
| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `e` = print check digit | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |
| `h` = bar code height (in dots) | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `Y` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example** • This is an example of a Plessey bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BPN,N,100,Y,N
^FD12345^FS
^XZ
```

**PLESSEY BAR CODE**



**PLESSEY BAR CODE CHARACTERS**

0 1 2 3 4 5 6 7 8 9
A B C D E F

# ^BQ

## QR Code Bar Code

**Description** The ^BQ command produces a matrix symbology consisting of an array of nominally square modules arranged in an overall square pattern. A unique pattern at three of the symbol's four corners assists in determining bar code size, position, and inclination.

A wide range of symbol sizes is possible, along with four levels of error correction. User-specified module dimensions provide a wide variety of symbol production techniques.

QR Code Model 1 is the original specification, while QR Code Model 2 is an enhanced form of the symbology. Model 2 provides additional features and can be automatically differentiated from Model 1.

Model 2 is the recommended model and should normally be used.

This bar code is printed using field data specified in a subsequent ^FD string.

Encodable character sets include numeric data, alphanumeric data, 8-bit byte data, and Kanji characters.

**Format** `^BQa,b,c,d,e`

**Important •** If additional information about the QR Code bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = field orientation | *Fixed Value:* normal (^FW has no effect on rotation) |
| b = model | *Accepted Values:* 1 (original) and 2 (enhanced – recommended)<br>*Default Value:* 2 |
| c = magnification factor | *Accepted Values:* 1 to 10<br>*Default Value:*<br>1 on 150 dpi printers<br>2 on 200 dpi printers<br>3 on 300 dpi printers<br>6 on 600 dpi printers |

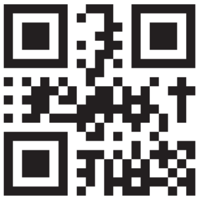
| Parameters | Details |
|---|---|
| d = H,Q,M,L | *Accepted Values:*<br>H = ultra-high reliability level<br>Q = high reliability level<br>M = standard level<br>L = high density level<br>*Default Value:*<br>Q = if empty<br>M = invalid values |
| e = N,A,B.K | *Accepted Values:* 1 - 7<br>*Default Value:* 7 |

**Example** • This is an example of a QR Code bar code:

ZPL II CODE

```
^XA
^FO100,100
^BQN,2,10
^FDMM,AAC-42^FS
^XZ
```

QR CODE BAR CODE



On the pages that follow are specific commands for formatting the ^BQ command with the ^FD statements that contain the information to be coded.

## Considerations for ^FD When Using the QR Code:

### QR Switches (formatted into the ^FD field data)

**mixed mode <D>**

D = allows mixing of different types of character modes in one code.

**code No. <01 16>**

Value = subtracted from the Nth number of the divided code (must be two digits).

**No. of divisions <02 16>**

Number of divisions (must be two digits).

**parity data <1 byte>**

Parity data value is obtained by calculating at the input data (the original input data before divided byte-by-byte through the EX-OR operation).

**error correction level <H, Q, M, L>**

H = ultra-high reliability level

Q = high reliability level

M = standard level (default)

L = high density level

**character Mode <N, A, B, K>**

N = numeric

A = alphanumeric

Bxxxx = 8-bit byte mode. This handles the 8-bit Latin/Kana character set in accordance with JIS X 0201 (character values 0x00 to 0xFF).

xxxx = number of data characters is represented by two bytes of BCD code.

K = Kanji — handles only Kanji characters in accordance with the Shift JIS system based on JIS X 0208. This means that all parameters after the character mode *K* should be 16-bit characters. If there are any 8-bit characters (such as ASCII code), an error occurs.

**data character string <Data>**

Follows character mode or it is the last switch in the ^FD statement.

**data input <A, M>**

A = Automatic Input (default). Data character string JIS8 unit, Shift JIS. When the input mode is Automatic Input, the binary codes of 0x80 to 0x9F and 0xE0 to 0xFF cannot be set.

M = Manual Input

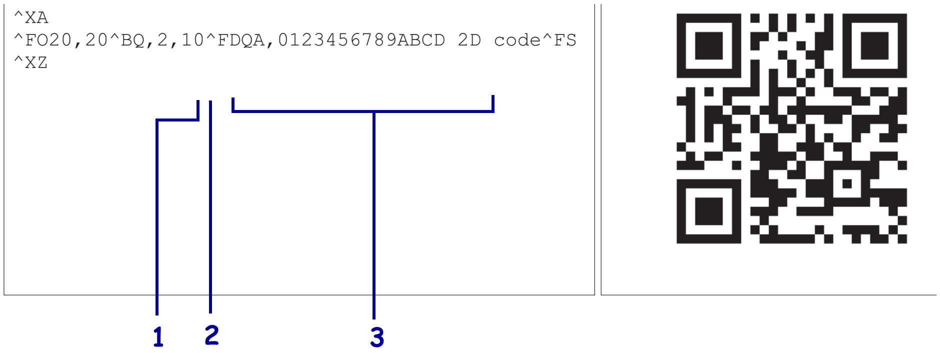
Two types of data input mode exist: Automatic (A) and Manual (M). If A is specified, the character mode does not need to be specified. If M is specified, the character mode must be specified.

### ^FD Field Data (Normal Mode)

Automatic Data Input (A) with Switches

```
^FD
<error correction level>A,
<data character string>
^FS
```

**Example •** QR Code, normal mode with automatic data input.



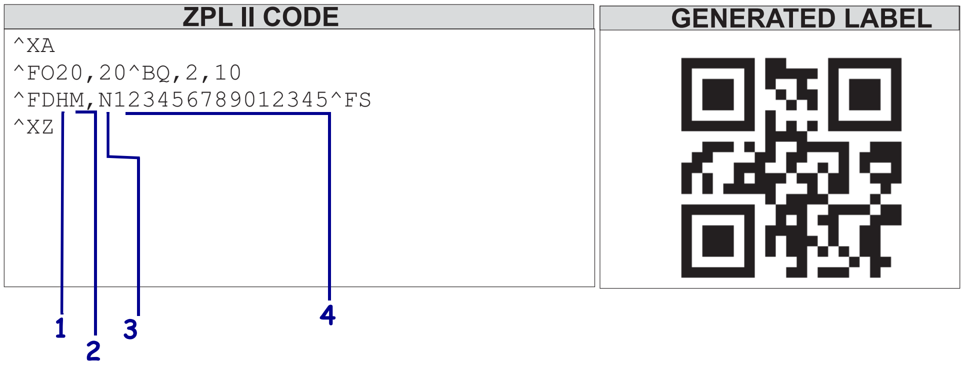
```
^XA
^FO20,20^BQ,2,10^FDQA,0123456789ABCD 2D code^FS
^XZ
```

| | |
|---|---|
| 1 | Q = error correction level |
| 2 | A, = automatic setting |
| 3 | data string character |

## Manual Data Input (M) with Switches

```
^FD
<error correction level>M,
<character mode><data character string>
^FS
```

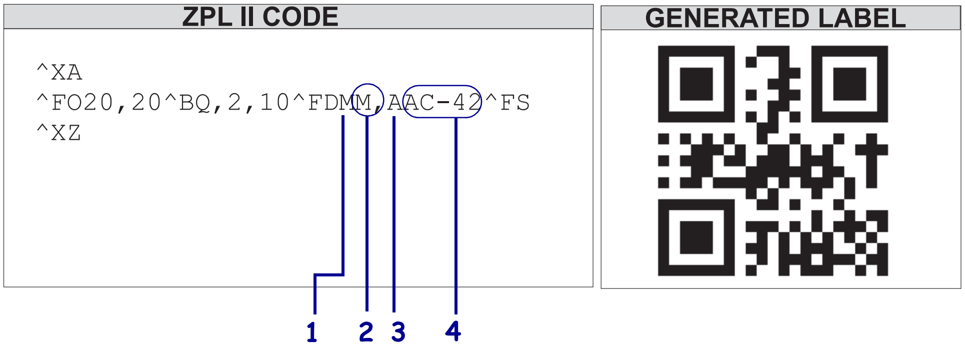
**Example** • QR Code, normal mode with manual data input:



```
^XA
^FO20,20^BQ,2,10
^FDHM,N123456789012345^FS
^XZ
```

| | |
|---|---|
| **1** | `H` = error correction level (ultra-high reliability level |
| **2** | `M,` = input mode (manual input) |
| **3** | `N` = character mode (numeric data) |
| **4** | data character string |

**Example** • QR Code, normal mode with standard reliability and manual data input:



```
^XA
^FO20,20^BQ,2,10^FDMM,AAC-42^FS
^XZ
```

| | |
|---|---|
| **1** | `M` = error correction level (standard-high reliability level |
| **2** | `M,` = manual input |
| **3** | `A` = alphanumeric data |
| **4** | `AC-42` = data character string |

## ^FD Field Data (Mixed Mode – requires more switches)

### Automatic Data Input (A) with Switches

```
^FD
<D><code No.> <No. of divisions> <parity data>,
<error correction level> A,
<data character string>,
<data character string>,
<  :  >,
<data character string n**>
^FS
```

### Manual Data Input (M) with Switches

```
^FD
<code No.> <No. of divisions> <parity data>,
<error correction level> M,
<character mode 1> <data character string 1>,
<character mode 2> <data character string 2>,
< :  > <  :  >,
<character mode n> <data character string n**>
^FS
```

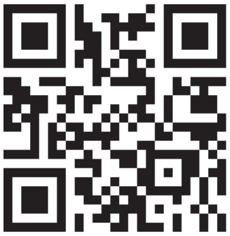
n** up to 200 in mixed mode

**Example** • QR Code, mixed mode with manual data input:

**ZPL II CODE**

```
^XA
^FO,20,20^BQ,2,10
^FDD03048F,LM,N0123456789,A12AABB,B0006qrcode^FS
^XZ
```

**GENERATED LABEL**



| | | |
|---|---|---|
| **`<mixed mode identifier>`** | D | (mixed) |
| **`<code No.>`** | M | (code number) |
| **`<No. of divisions>`** | D | (divisions) |
| **`<parity data>`** | M | (0x8F) |
| | ‘ | |
| **`<error correction level>`** | L | (high-density level) |
| **`<input mode>`** | M | (manual input) |
| | ‘ | |
| **`<character mode>`** | N | (numeric data) |
| **`<data character string>`** | | 0123456789 |
| | ‘ | |
| **`<character mode>`** | A | (alphanumeric data) |
| **`<data character string>`** | | 12AABB |
| | ‘ | |
| **`<character mode>`** | B | (8-bit byte data) |
| | 0006 | (number of bytes) |
| **`<data character string>`** | | qrcode |

**Example •** This is an example of QR Code, mixed mode with automatic data input:

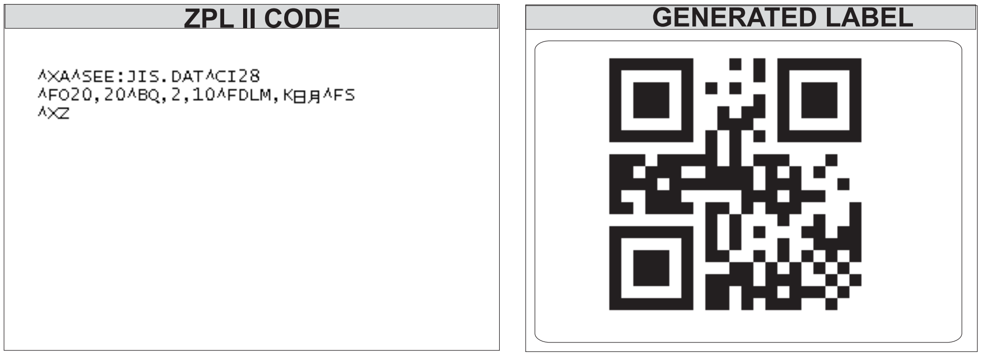
```
^XA
^FO20,20^BQ,2,10
^FDD03048F,LA,012345678912AABBqrcode^FS
^XZ
```

| | | |
|---|---|---|
| **`<mixed mode identifier>`** | D | (mixed) |
| **`<code No.>`** | M | (code number) |
| **`<No. of divisions>`** | D | (divisions) |
| **`<parity data>`** | M | (0x8F) |
| **`<error correction level>`** | L | (high-density level) |
| **`<input mode>`** | A | (automatic input) |
| **`<data character string>`** | | 012345678912AABBqrcode |

.14↑

For proper functionality, when encoding Kanji characters in `^CI28-30` (Unicode) be sure the `JIS.DAT` table is loaded on the printer and specified.

**Example •** This is a Unicode example:


ZPL II CODE

```
^XA^SEE:JIS.DAT^CI28
^FO20,20^BQ,2,10^FDLM,K日月^FS
^XZ
```

GENERATED LABEL

# ^BR

## RSS (Reduced Space Symbology) Bar Code

**Description** The ^BR command is bar code types for space-constrained identification from EAN International and the Uniform Code Council, Inc.

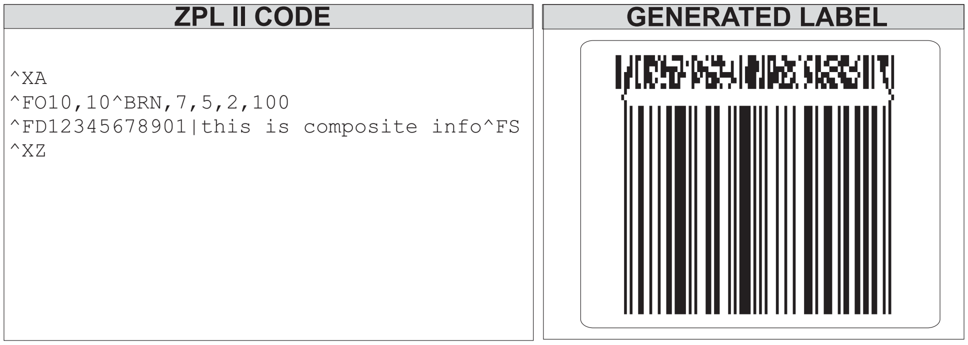
**Format** `^BRa,b,c,d,e,f`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = orientation | *Accepted Values:*<br>N = Normal<br>R = Rotated<br>I = Inverted<br>B = Bottom-up<br>*Default Value:* R |
| b = symbology type in the RSS-14 family | *Accepted Values:*<br>1 = RSS14<br>2 = RSS14 Truncated<br>3 = RSS14 Stacked<br>4 = RSS14 Stacked Omnidirectional<br>5 = RSS Limited<br>6 = RSS Expanded<br>7 = UPC-A<br>8 = UPC-E<br>9 = EAN-13<br>10 = EAN-8<br>11 = UCC/EAN-128 and CC-A/B<br>12 = UCC/EAN-128 and CC-C<br>*Default Value:* 1 |
| c = magnification factor | *Accepted Values:* 1 to 10<br>*Default Value:*<br>24 dot = 6, 12 dot is 3, 8 dot and lower is 2<br>12 dot = 6, > 8 dot is 3, 8 dot and less is 2) |
| d = separator height | *Accepted Values:* 1 or 2<br>*Default Value:* 1 |

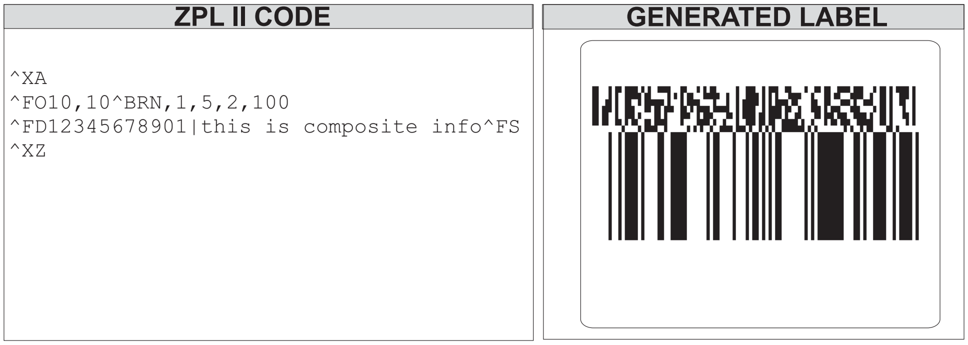
| Parameters | Details |
|---|---|
| `e` = bar code height | The bar code height only affects the linear portion of the bar code. Only UCC/EAN and CC-A/B/C.<br>*Accepted Values:* `1` to `32000` dots<br>*Default Value:* `25` |
| `f` = the segment width (RSS expanded only) | *Accepted Values:* `2` to `22`, even numbers only, in segments per line<br>*Default Value:* `22` |

**Example •** This is an example of Symbology Type 7 - UPC-A:



```
^XA
^FO10,10^BRN,7,5,2,100
^FD12345678901|this is composite info^FS
^XZ
```

**Example •** This is an example of Symbology Type 1 - RSS14:



```
^XA
^FO10,10^BRN,1,5,2,100
^FD12345678901|this is composite info^FS
^XZ
```

# ^BS

## UPC/EAN Extensions

**Description** The ^BS command is the two-digit and five-digit add-on used primarily by publishers to create bar codes for ISBNs (International Standard Book Numbers). These extensions are handled as separate bar codes.

The ^BS command is designed to be used with the UPC-A bar code (^BU) and the UPC-E bar code (^B9).

- ^BS supports a fixed print ratio.
- Field data (^FD) is limited to exactly two or five characters. ZPL II automatically truncates or pads on the left with zeros to achieve the required number of characters.

**Format** `^BSo,h,f,g`

**Important •** If additional information about the UPC/EAN bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

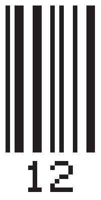
| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = bar code height (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |

**Example •** This is an example of a UPC/EAN Two-digit bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BSN,100,Y,N
^FD12^FS
^XZ
```

**UPC/EAN 2-DIGIT BAR CODE**



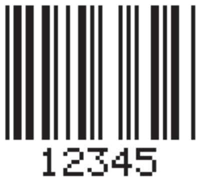
| UPC/EAN 2-DIGIT BAR CODE CHARACTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

**Example •** This is an example of a UPC/EAN Five-digit bar code:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BSN,100,Y,N
^FD12345^FS
^XZ
```

**UPC/EAN 5-DIGIT BAR CODE**



| UPC/EAN 5-DIGIT BAR CODE CHARACTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

Care should be taken in positioning the UPC/EAN extension with respect to the UPC-A or UPC-E code to ensure the resulting composite code is within the UPC specification.

For UPC codes, with a module width of **2** (default), the field origin offsets for the extension are:

**Example •** This is an example of a UPC-A:

| | Supplement Origin<br>X - Offset | Adjustment<br>Y - Offset |
|---|---|---|
| ***Normal*** | 209 Dots | 21 Dots |
| ***Rotated*** | 0 | 209 Dots |

This is an example of a UPC-E:

| | Supplement Origin<br>X - Offset | Adjustment<br>Y - Offset |
|---|---|---|
| ***Normal*** | 122 Dots | 21 Dots |
| ***Rotated*** | 0 | 122 Dots |

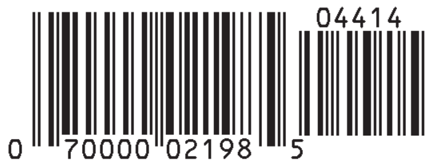
Additionally, the bar code height for the extension should be 27 dots (0.135 inches) shorter than that of the primary code. A primary UPC code height of 183 dots (0.900 inches) requires an extension height of 155 dots (0.765 inches).

**Example •** This example illustrates how to create a normal UPC-A bar code for the value 7000002198 with an extension equal to 04414:

**ZPL II CODE**

```
^XA
^FO100,100^BY3
^BUN,137
^FD07000002198^FS
^FO400,121
^BSN,117
^FD04414^FS
^XZ
```

**UPC-A BAR CODE WITH EXTENSION**



# ^BT

## TLC39 Bar Code

**Description** The ^BT bar code is the standard for the TCIF can tag telecommunications equipment.

The TCIF CLEI code, which is the MicroPDF417 bar code, is always four columns. The firmware must determine what mode to use based on the number of characters to be encoded.

**Format** `^BTo,w1,r1,h1,w2,h2`

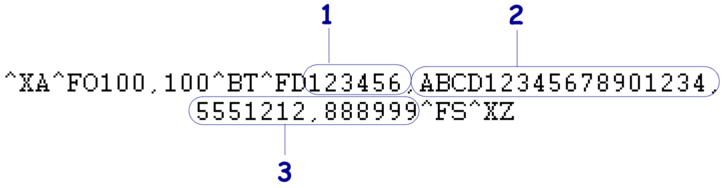
This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated<br>I = inverted<br>B = bottom up |
| w1 = width of the Code 39 bar code | *Accepted Value (in dots):* 1 to 10<br>*Default Value (600 dpi printers):* 4<br>*Default Value (200- and 300 dpi printer):* 2 |
| r1 = wide to narrow bar width ratio the Code 39 bar code | *Accepted Values:* 2.0 to 3.0(increments of 0.1)<br>*Default Value:* 2.0 |
| h1 = height of the Code 39 bar code | *Accepted Values (in dots):* 1 to 9999<br>*Default Value (600 dpi printer):* 120<br>*Default Value (300 dpi printer):* 60<br>*Default Value (200 dpi printer):* 40 |
| h2 = row height of the MicroPDF417 bar code | *Accepted Values (in dots):* 1 to 255<br>*Default Value (600 dpi printer):* 8<br>*Default Value (200- and 300 dpi printers):* 4 |
| w2 = narrow bar width of the MicroPDF417 bar code | *Accepted Values (in dots):* 1 to 10<br>*Default Value (600 dpi printer):* 4<br>*Default Value (200- and 300 dpi printers):* 2 |

**Example • TLC39 Bar Code**

This is an example on how to print TLC39 bar code. The callouts identify the key components and are followed by a detailed description below:

Use the command defaults to get results that are in compliance with TCIF industry standards; regardless of printhead density.



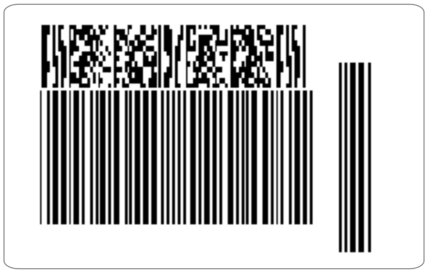
```
^XA^FO100,100^BT^FD123456,ABCD12345678901234,
5551212,888999^FS^XZ
```

| | |
|---|---|
| 1 | **ECI Number.** If the seventh character is **not** a comma, only Code 39 prints. This means if more than 6 digits are present, Code 39 prints for the first six digits (and no Micro-PDF symbol is printed).<br>• Must be 6 digits.<br>• Firmware generates invalid character error if the firmware sees anything but 6 digits.<br>• This number is not padded. |
| 2 | **Serial number.** The serial number can contain up to 25 characters and is variable length. The serial number is stored in the Micro-PDF symbol. If a comma follows the serial number, then additional data is used below.<br>• If present, must be alphanumeric (letters and numbers, no punctuation).<br>This value is used if a comma follows the ECI number. |
| 3 | **Additional data.** If present, it is used for things such as a country code.<br>Data cannot exceed 150 bytes. This includes serial number commas.<br>• Additional data is stored in the Micro-PDF symbol and appended after the serial number. A comma must exist between each maximum of 25 characters in the additional fields.<br>• Additional data fields can contain up to 25 alphanumeric characters per field.<br>The result is: |

**ZPL II CODE**

```
^XA^FO100,
100^BT^FD123456,
ABCd12345678901234,
5551212,
88899
^FS^XZ
```

**GENERATED LABEL**



# ^BU

## UPC-A Bar Code

**Description** The ^BU command produces a fixed length, numeric symbology. It is primarily used in the retail industry for labeling packages. The UPC-A bar code has 11 data characters. The 6 dot/mm, 12 dot/mm, and 24 dot/mm printheads produce the UPC-A bar code (UPC/EAN symbologies) at 100 percent size. However, an 8 dot/mm printhead produces the UPC/EAN symbologies at a magnification factor of 77 percent.

- ^BU supports a fixed print ratio.
- Field data (^FD) is limited to exactly 11 characters. ZPL II automatically truncates or pads on the left with zeros to achieve required number of characters.

**Format** ^BUo,h,f,g,e

**Important •** If additional information about the UPC-A bar code is required, go to www.aimglobal.org.

This table identifies the parameters for this format:

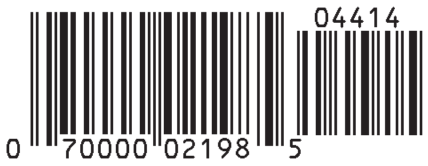
| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = bar code height (in dots) | *Accepted Values:* 1 to 9999<br>*Default Value:* value set by ^BY |
| f = print interpretation line | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |
| g = print interpretation line above code | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |
| e = print check digit | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |

The font style of the interpretation line depends on the modulus (width of narrow bar) selected in ^BY:

**Note •** Zero is not allowed.

- **6 dot/mm printer:** a modulus of 2 dots or greater prints with an OCR-B interpretation line; a modulus of 1 dot prints font A.
- **8 dot/mm printer:** a modulus of 3 dots or greater prints with an OCR-B interpretation line; a modulus of 1 or 2 dots prints font A.
- **12 dot/mm printer:** a modulus of 5 dots or greater prints with an OCR-B interpretation line; a modulus of 1, 2, 3, or 4 dots prints font A.
- **24 dot/mm printer:** a modulus of 9 dots or greater prints with an OCR-B interpretation line; a modulus of 1 to 8 dots prints font A.

**Example •** This is an example of a UPC-A bar code with extension:

| ZPL II CODE | UPC-A BAR CODE WITH EXTENSION |
|---|---|
| ^XA<br>^FO100,100^BY3<br>^BUN,137<br>^FD07000002198^FS<br>^FO400,121<br>^BSN,117<br>^FD04414^FS<br>^XZ |  |

**Comments** The UPC-A bar code uses the Mod 10 check digit scheme for error checking. For further information on Mod 10, see *Mod 10 Check Digit* on page 790.

# ^BX

## Data Matrix Bar Code

**Description** The ^BX command creates a two-dimensional matrix symbology made up of square modules arranged within a perimeter finder pattern.

The ability to create a rectangular Datamatrix bar code is not available as a ZPL coding option.

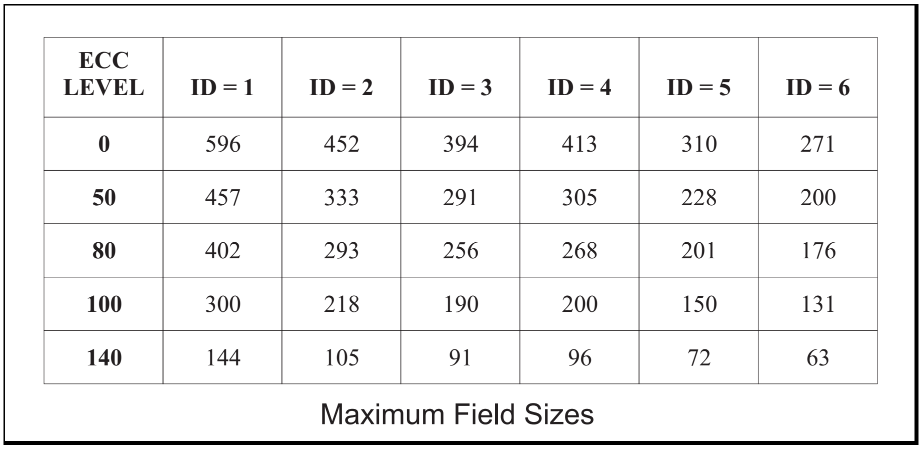
**Format** `^BXo,h,s,c,r,f,g`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| o = orientation | *Accepted Values:*<br>N = normal<br>R = rotated 90 degrees (clockwise)<br>I = inverted 180 degrees<br>B = read from bottom up, 270 degrees<br>*Default Value:* current ^FW value |
| h = dimensional height of individual symbol elements | *Accepted Values:* 1 to the width of the label<br>The individual elements are square — this parameter specifies both module and row height. If this parameter is zero (or not given), the h parameter (bar height) in ^BY is used as the approximate symbol height. |
| s = quality level | *Accepted Values:* 0, 50, 80, 100, 140, 200<br>*Default Value:* 0<br>*Quality* refers to the amount of data that is added to the symbol for error correction. The AIM specification refers to it as the ECC value. ECC 50, ECC 80, ECC 100, and ECC 140 use convolution encoding; ECC 200 uses Reed-Solomon encoding. For new applications, ECC 200 is recommended. ECC 000-140 should be used only in closed applications where a single party controls both the production and reading of the symbols and is responsible for overall system performance. |

| Parameters | Details |
|---|---|
| `c` = columns to encode | *Accepted Values:* `9` to `49`<br>Odd values only for quality 0 to 140 (10 to 144); even values only for quality 200.<br>Odd values only for quality 0 to 140 (10 to 144); even values only for quality 200. The number of rows and columns in the symbol is automatically determined. You might want to force the number of rows and columns to a larger value to achieve uniform symbol size. In the current implementation, quality 0 to 140 symbols are square, so the larger of the rows or columns supplied are used to force a symbol to that size. If you attempt to force the data into too small of a symbol, no symbol is printed. If a value greater than 49 is entered, the rows or columns value is set to zero and the size is determined normally. If an even value is entered, it generates INVALID-P (invalid parameter). If a value less than 9 but not 0, or if the data is too large for the forced size, no symbol prints; if `^CV` is active, INVALID-L prints. |
| `r` = rows to encode | *Accepted Values:* `9` to `49` |
| `f` = format ID (0 to 6) — not used with quality set at 200 | *Accepted Values:*<br>`1` = field data is numeric + space (0..9,”) – No \&’’<br>`2` = field data is uppercase alphanumeric + space (A..Z,’’) – No \&’’<br>`3` = field data is uppercase alphanumeric + space, period, comma, dash, and slash (0..9,A..Z,“.-/”)<br>`4` = field data is upper-case alphanumeric + space (0..9,A..Z,’’) – no \&’’<br>`5` = field data is full 128 ASCII 7-bit set<br>`6` = field data is full 256 ISO 8-bit set<br>*Default Value:* `6` |
| `g` = escape sequence control character | *Accepted Values:* any character<br>*Default Value:* ~ (tilde)<br>This parameter is used only if quality 200 is specified. It is the escape character for embedding special control sequences within the field data.<br>**Important •** A value must always be specified when using the escape sequence control character. If no value is entered, the command is ignored.<br>**Note •** The **g** parmeter will continue to be underscore (_) for anyone with firmware version: V60.13.0.12, V60.13.0.12Z, V60.13.0.12B, V60.13.0.12ZB, or later. |

**Table 10 • Maximum Field Sizes**



| ECC LEVEL | ID = 1 | ID = 2 | ID = 3 | ID = 4 | ID = 5 | ID = 6 |
|---|---|---|---|---|---|---|
| **0** | 596 | 452 | 394 | 413 | 310 | 271 |
| **50** | 457 | 333 | 291 | 305 | 228 | 200 |
| **80** | 402 | 293 | 256 | 268 | 201 | 176 |
| **100** | 300 | 218 | 190 | 200 | 150 | 131 |
| **140** | 144 | 105 | 91 | 96 | 72 | 63 |

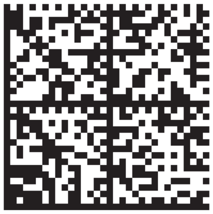
Maximum Field Sizes

**Example •** This is an example of a Data Matrix bar code:

**ZPL II CODE**

```
^XA
^FO100,100
^BXN,10,200
^FDZEBRA TECHNOLOGIES CORPORATION
333 CORPORATE WOODS PARKWAY
VERNON HILLS, IL
60061-3109^FS
^XZ
```

**DATA MATRIX BAR CODE**



## Effects of ^BY on ^BX

`w` = **module width** (no effect)

**r** = **ratio** (no effect)

**h** = **height of symbol**

If the dimensions of individual symbol elements are not specified in the `^BD` command, the height of symbol value is divided by the required rows/columns, rounded, limited to a minimum value of one, and used as the dimensions of individual symbol elements.

## Field Data (^FD) for ^BX

### Quality 000 to 140

- The \& and || can be used to insert carriage returns, line feeds, and the backslash, similar to the PDF417. Other characters in the control character range can be inserted only by using `^FH`. Field data is limited to 596 characters for quality *0* to *140*. Excess field data causes no symbol to print; if `^CV` is active, INVALID-L prints. The field data must correspond to a user-specified format ID or no symbol prints; if `^CV` is active, INVALID-C prints.
- The maximum field sizes for quality *0* to *140* symbols are shown in the table in the **g** parameter.

### Quality 200

- If more than 3072 bytes are supplied as field data, it is truncated to 3072 bytes. This limits the maximum size of a numeric Data Matrix symbol to less than the 3116 numeric characters that the specification would allow. The maximum alphanumeric capacity is 2335 and the maximum 8-bit byte capacity is 1556.
- If `^FH` is used, field hexadecimal processing takes place before the escape sequence processing described below.
- The underscore is the default escape sequence control character for quality 200 field data. A different escape sequence control character can be selected by using parameter g in the `^BX` command.

The information that follows applies to firmware version: V60.13.0.12, V60.13.0.12Z, V60.13.0.12B, V60.13.0.12ZB, or later. The input string escape sequences can be embedded in quality 200 field data using the ASCII 95 underscore character ( _ ) or the character entered in parameter `g`:

- `_X` is the shift character for control characters (e.g., `_@=NUL,_G=BEL,_0 is PAD`)
- `_1` to `_3` for FNC characters 1 to 3 (explicit FNC4, upper shift, is not allowed)
- FNC2 (Structured Append) must be followed by nine digits, composed of three-digit numbers with values between 1 and 254, that represent the symbol sequence and file identifier (for example, symbol 3 of 7 with file ID 1001 is represented by `_2214001001`)
- 5NNN is code page NNN where NNN is a three-digit code page value (for example, Code Page 9 is represented by `_5009`)
- `_dNNN` creates ASCII decimal value NNN for a code word (must be three digits)
- _ in data is encoded by __ (two underscores)

The information that follows applies to all other versions of firmware. The input string escape sequences can be embedded in quality 200 field data using the ASCII 7E tilde character (~) or the character entered in parameter `g`:

- `~X` is the shift character for control characters (e.g., `~@=NUL,~G=BEL,~0 is PAD`)
- `~1` to `~3` for FNC characters 1 to 3 (explicit FNC4, upper shift, is not allowed)
- FNC2 (Structured Append) must be followed by nine digits, composed of three-digit numbers with values between 1 and 254, that represent the symbol sequence and file identifier (for example, symbol 3 of 7 with file ID 1001 is represented by `~2214001001`)
- 5NNN is code page NNN where NNN is a three-digit code page value (for example, Code Page 9 is represented by `~5009`)
- `~dNNN` creates ASCII decimal value NNN for a code word (must be three digits)
- ~ in data is encoded by a ~ (tilde)

# ^BY

## Bar Code Field Default

**Description** The `^BY` command is used to change the default values for the module width (in dots), the wide bar to narrow bar width ratio and the bar code height (in dots). It can be used as often as necessary within a label format.

**Format** `^BYw,r,h`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `w` = module width (in dots) | *Accepted Values:* `1` to `10`<br>*Initial Value at power-up:* `2` |
| `r` = wide bar to narrow bar width ratio | *Accepted Values:* `2.0` to `3.0`, in 0.1 increments<br>This parameter has no effect on fixed-ratio bar codes.<br>*`Default Value: 3.0`* |
| `h` = bar code height (in dots) | *Initial Value at power-up:* 10 |

For parameter `r`, the actual ratio generated is a function of the number of dots in parameter `w`, module width. See Table 11 on page 136.

**Example •** Set module width (`w`) to 9 and the ratio (`r`) to 2.4. The width of the narrow bar is 9 dots wide and the wide bar is 9 by 2.4, or 21.6 dots. However, since the printer rounds out to the nearest dot, the wide bar is actually printed at 22 dots.

This produces a bar code with a ratio of 2.44 (22 divided by 9). This ratio is as close to 2.4 as possible, since only full dots are printed.

Module width and height (w and h) can be changed at anytime with the ^BY command, regardless of the symbology selected.

**Table 11 • Shows module width ratios in dots**

| **Ratio Selected (r)** | **Module Width in Dots (w)** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **2.0** | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 |
| **2.1** | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2:1 | 2.1:1 |
| **2.2** | 2:1 | 2:1 | 2:1 | 2:1 | 2.2:1 | 2.16:1 | 2.1:1 | 2.12:1 | 2.1:1 | 2.2:1 |
| **2.3** | 2:1 | 2:1 | 2.3:1 | 2.25:1 | 2.2:1 | 2.16:1 | 2.28:1 | 2.25:1 | 2.2:1 | 2.3:1 |
| **2.4** | 2:1 | 2:1 | 2.3:1 | 2.25:1 | 2.4:1 | 2.3:1 | 2.28:1 | 2.37:1 | 2.3:1 | 2.4:1 |
| **2.5** | 2:1 | 2.5:1 | 2.3:1 | 2.5:1 | 2.4:1 | 2.5:1 | 2.4:1 | 2.5:1 | 2.4:1 | 2.5:1 |
| **2.6** | 2:1 | 2.5:1 | 2.3:1 | 2.5:1 | 2.6:1 | 2.5:1 | 2.57:1 | 2.5:1 | 2.5:1 | 2.6:1 |
| **2.7** | 2:1 | 2.5:1 | 2.6:1 | 2.5:1 | 2.6:1 | 2.6:1 | 2.57:1 | 2.65:1 | 2.6:1 | 2.7:1 |
| **2.8** | 2:1 | 2.5:1 | 2.6:1 | 2.75:1 | 2.8:1 | 2.6:1 | 2.7:1 | 2.75:1 | 2.7:1 | 2.8:1 |
| **2.9** | 2:1 | 2.5:1 | 2.6:1 | 2.75:1 | 2.8:1 | 2.8:1 | 2.85:1 | 2.87:1 | 2.8:1 | 2.9:1 |
| **3.0** | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 | 3:1 |

**Comments** Once a ^BY command is entered into a label format, it stays in effect until another ^BY command is encountered.

# ^BZ

## POSTNET Bar Code

**Description** The POSTNET bar code is used to automate the handling of mail. POSTNET uses a series of five bars, two tall and three short, to represent the digits 0 to 9.

- `^BZ` supports a print ratio of 2.0:1 to 3.0:1.
- Field data (`^FD`) is limited to the width (or length, if rotated) of the label.

**Format** `^BZo,h,f,g`

**Important •** If additional information about the POSTNET bar code is required, go to www.aimglobal.org, or contact the United States Postal Service and ask for Publication 25 — Designing Letter Mail, which includes a full specification for POSTNET. You can also download Publication 25 from:

http://www.usps.com/

This table identifies the parameters for this format:

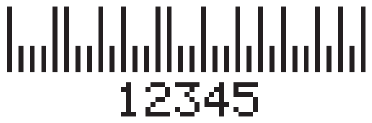
| Parameters | Details |
|---|---|
| `o` = orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees (clockwise)<br>`I` = inverted 180 degrees<br>`B` = read from bottom up, 270 degrees<br>*Default Value:* current `^FW` value |
| `h` = bar code height (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* value set by `^BY` |
| `f` = print interpretation line | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |
| `g` = print interpretation line above code | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example** • This is an example of a POSTNET bar code:

ZPL II CODE

```
^XA
^FO100,100^BY3
^BZN,40,Y,N
^FD12345^FS
^XZ
```

POSTNET BAR CODE



POSTNET BAR CODE CHARACTERS

0 1 2 3 4 5 6 7 8 9

# ^CC ~CC

## Change Caret

**Description** The ^CC command is used to change the format command prefix. The default prefix is the caret (^).

**Format** ^CCx or ~CCx

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| x = caret character change | *Accepted Values:* any ASCII character<br>*Default Value:* a parameter is required. If a parameter is not entered, the next character received is the new prefix character. |

**Example** • This is an example of how to change the format prefix to / from a ::

```
^XA
^CC/
/XZ
```

The forward slash (/) is set at the new prefix. Note the /XZ ending tag uses the new designated prefix character (/).

**Example** • This is an example of how to change the format prefix from ~ to a /:

```
~CC/
/XA/JUS/XZ
```

# ^CD ~CD

## Change Delimiter

**Description** The `^CD` and `~CD` commands are used to change the delimiter character. This character is used to separate parameter values associated with several ZPL II commands. The default delimiter is a comma (,).

**Format** `^CDa or ~CDa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = delimiter character change | *Accepted Values:* any ASCII character<br>*Default Value:* a parameter is required. If a parameter is not entered, the next character received is the new prefix character. |

**Example** • This shows how to change the character delimiter to a semi-colon (`;`):

```
^XA
^FO10,10
^GB10,10,3
^XZ
^XA
^CD;
^FO10;10
^GB10;10;3
^XZ
```

- To save, the `JUS` command is required. Here is an example using `JUS`:

```
~CD;
^XA^JUS^XZ
```

# ^CF

## Change Alphanumeric Default Font

**Description** The ^CF command sets the default font used in your printer. You can use the ^CF command to simplify your programs.

**Format** `^CFf,h,w`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| f = specified default font | *Accepted Values:* A through Z and 0 to 9<br>*Initial Value at power-up:* A |
| h = individual character height (in dots) | *Accepted Values:* 0 to 32000<br>*Initial Value at power-up:* 9 |
| w = individual character width (in dots) | *Accepted Values:* 0 to 32000<br>*Initial Value at power-up:* 5 or last permanent saved value |

Parameter f specifies the default font for every alphanumeric field. Parameter h is the default height for every alphanumeric field, and parameter w is the default width value for every alphanumeric field.

The default alphanumeric font is A. If you do not change the alphanumeric default font and do not use any alphanumeric field command (^AF) or enter an invalid font value, any data you specify prints in font A.

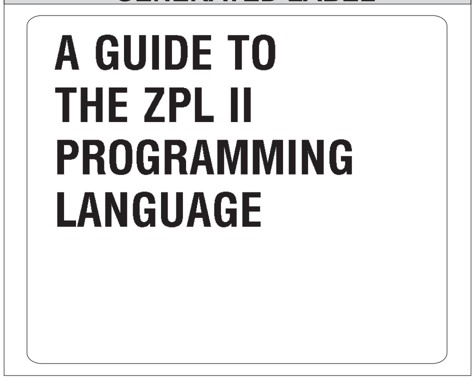
Defining only the height or width forces the magnification to be proportional to the parameter defined. If neither value is defined, the last ^CF values given or the default ^CF values for height and width are used.

**Example •** This is an example of ^CF code and the result of the code:

ZPL II CODE

```
^XA
^CF0,89
^FO20,50
^FDA GUIDE TO^FS
^FO20,150
^FDTHE ZPL II^FS
^FO20,250
^FDPROGRAMMING^FS
^FO20,350
^FDLANGUAGE^FS
^XZ
```

GENERATED LABEL



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**Comments** Any font in the printer, including downloaded fonts, EPROM stored fonts, and fonts A through Z and 0 to 9, can also be selected with ^CW.

# ^CI

## Change International Font/Encoding

**Description** Zebra printers can print fonts using international character sets: U.S.A.1, U.S.A.2, UK, Holland, Denmark/Norway, Sweden/Finland, Germany, France 1, France 2, Italy, Spain, and several other sets, .including the Unicode character set.

The `^CI` command enables you to call up the international character set you want to use for printing. You can mix character sets on a label.

This command allows character remapping. when parameter a = 0 - 13. Any character within a font can be remapped to a different numerical position.

**Format** `^CIa,s1,d1,s2,d2,...`

This table identifies the parameters for this format:

| **Parameters** | **Details** |
|---|---|
| `a` = desired character set (continued) | Accepted values `0` - `12` are Zebra Code Page 850 with specific character replacements. For details, see *International Character Sets* on page 145 and/or *Zebra Code Page 850* on page 766.<br>*Accepted Values:*<br>`0` = Single Byte Encoding - U.S.A. 1 Character Set<br>`1` = Single Byte Encoding - U.S.A. 2 Character Set<br>`2` = Single Byte Encoding - U.K. Character Set<br>`3` = Single Byte Encoding - Holland Character Set<br>`4` = Single Byte Encoding - Denmark/Norway Character Set<br>`5` = Single Byte Encoding - Sweden/Finland Character Set<br>`6` = Single Byte Encoding - Germany Character Set<br>`7` = Single Byte Encoding - France 1 Character Set<br>`8` = Single Byte Encoding - France 2 Character Set<br>`9` = Single Byte Encoding - Italy Character Set<br>`10` = Single Byte Encoding - Spain Character Set<br>`11` = Single Byte Encoding - Miscellaneous Character Set<br>`12` = Single Byte Encoding - Japan (ASCII with Yen symbol) Character Set<br>`13` = Zebra Code Page 850 (see page 766)<br>`14` = Double Byte Asian Encodings *<br>`15` = Shift-JIS **<br>`16` = EUC-JP and EUC-CN *<br>`17` = Deprecated - UCS-2 Big Endian ****<br>`18` to `23` = Reserved<br>`24` = Single Byte Asian Encodings *<br>`25` = Reserved<br>`26` = Multibyte Asian Encodings with ASCII Transparency * and ***<br>`27` = Zebra Code Page 1252 (see page 768) |
| These parameters are only valid when parameter **a =** 1 - 13 | |
| `a` = desired character set (continued)<br>.14↑<br>Values 28 to 30 are only supported in firmware version V60.14.x, V50.14.x, or later. | `28` = Unicode (UTF-8 encoding) - Unicode Character Set<br>`29` = Unicode (UTF-16 Big-Endian encoding) - Unicode Character Set<br>`30` = Unicode (UTF-16 Little-Endian encoding) - Unicode Character Set<br>*Initial Value at power-up:* `0` |

| Parameters | Details |
|---|---|
| s1 = source 1 (character output image) | *Accepted Values:* decimals 0 to 255 |
| d1 = destination 1 (character input) | *Accepted Values:* decimals 0 to 255 |
| s2 = source 2 (character output image) | *Accepted Values:* decimals 0 to 255 |
| d2 = destination 2 (character input) | *Accepted Values:* decimals 0 to 255 |
| … = continuation of pattern | Up to 256 source and destination pairs can be entered in this command. |

* The encoding is controlled by the conversion table (*.DAT). The correct table must be present for the conversion to function. The table generated by ZTools™ is the TrueType fonts internal encoding (Unicode).

** Shift-JIS encoding converts Shift-JIS to JIS and then looks up the JIS conversion in JIS.DAT. This table must be present for Shift-JIS to function.

*** Supports ASCII transparency for Asian encodings. 7F and less are treated as single byte characters. 80 to FE is treated as the first byte of a 2 byte character 8000 to FEFF in the encoding table for Unicode. 80 to FF could mean quad byte in GB18030. The ^CI26 command can also be used to support the GB 18030 and Big5 HKSCS encodings. The GB 18030 uses the GB18030.DAT encoding table and BIG5 HKSCS uses the BIG5HK.DAT encoding table.

**** The ^CI17 command has been deprecated, along with the ^F8 and ^F16 commands that are required for the ^CI17 command to function. The recommended replacement is the ^CI28-30 commands.

.14↑

We recommend that a ^CI command (or Unicode BOM) is included at the beginning of each ZPL script. This is important when ZPL scripts with different encodings are being sent to a single printer. To assist in the interleaving of encoding schemes, the printer maintains two encoding states (^CI0-28 and ^CI29-30). It automatically acknowledges when it should switch encoding states, allowing it to distinguish between encodings, and maintains a ^CI for each, but endianess is shared.

**Example •** This example remaps the Euro symbol (21) decimal to the dollar sign value (36) decimal. When the dollar sign character is sent to the printer, the Euro symbol prints:

**ZPL II CODE**

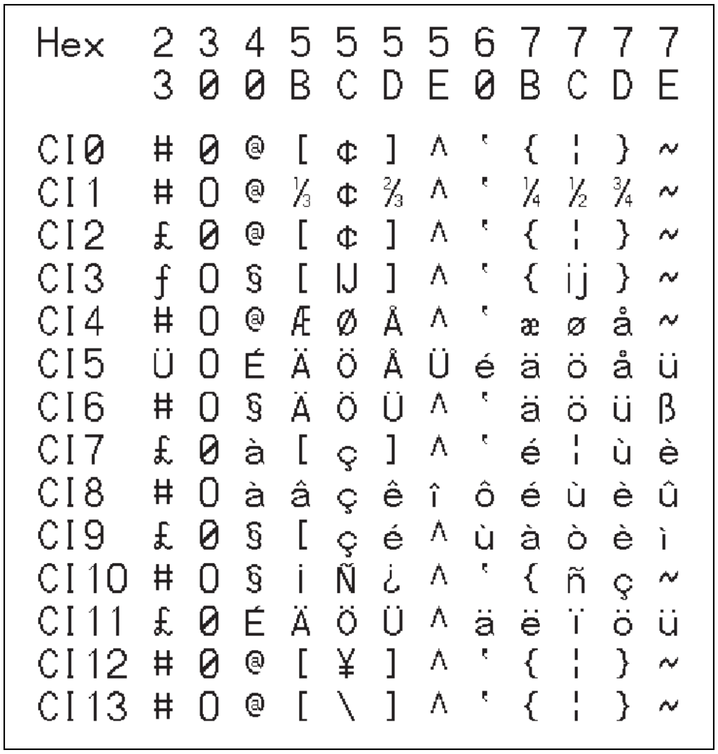
```
^XA
^CI0,21,36
^FO100,200^A0N50,50^FD$0123^FS
^XZ
```

**GENERATED LABEL**

€0123

The font selected determines the shape and resolution of the printed symbol.

## International Character Sets



| Hex | 23 | 30 | 40 | 5B | 5C | 5D | 5E | 60 | 7B | 7C | 7D | 7E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CI0 | # | 0 | @ | [ | ¢ | ] | ^ | ` | { | ¦ | } | ~ |
| CI1 | # | 0 | @ | ⅓ | ¢ | ⅔ | ^ | ` | ¼ | ½ | ¾ | ~ |
| CI2 | £ | 0 | @ | [ | ¢ | ] | ^ | ` | { | ¦ | } | ~ |
| CI3 | ƒ | 0 | § | [ | Ĳ | ] | ^ | ` | { | ĳ | } | ~ |
| CI4 | # | 0 | @ | Æ | Ø | Å | ^ | ` | æ | ø | å | ~ |
| CI5 | Ü | 0 | É | Ä | Ö | Å | Ü | é | ä | ö | å | ü |
| CI6 | # | 0 | § | Ä | Ö | Ü | ^ | ` | ä | ö | ü | ß |
| CI7 | £ | 0 | à | [ | ç | ] | ^ | ` | é | ¦ | ù | è |
| CI8 | # | 0 | à | â | ç | ê | î | ô | é | ù | è | û |
| CI9 | £ | 0 | § | [ | ç | é | ^ | ù | à | ò | è | ì |
| CI10 | # | 0 | § | ¡ | Ñ | ¿ | ^ | ` | { | ñ | ç | ~ |
| CI11 | £ | 0 | É | Ä | Ö | Ü | ^ | ä | ë | ï | ö | ü |
| CI12 | # | 0 | @ | [ | ¥ | ] | ^ | ` | { | ¦ | } | ~ |
| CI13 | # | 0 | @ | [ | \ | ] | ^ | ` | { | ¦ | } | ~ |

**Note •** `^CI 13 =` US keyboard

**Comments** The *space* character cannot be remapped for any font.

# ^CM

## Change Memory Letter Designation

**Description** The ^CM command allows you to reassign a letter designation to the printer's memory devices. If a format already exists, you can reassign the memory device to the corresponding letter without forcing, altering, or recreating the format itself.

Using this command affects every subsequent command that refers to specific memory locations.

**Format** `^CMa,b,c,d`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = memory alias for B: | *Accepted Values:* B:, E:,R:, A:, and NONE<br>*Default Value:* B: |
| b = memory alias for E: | *Accepted Values:* B:, E:,R:, A:, and NONE<br>*Default Value:* E: |
| c = memory alias for R: | *Accepted Values:* B:, E:,R:, A:, and NONE<br>*Default Value:* R: |
| d = memory alias for A: | *Accepted Values:* B:, E:,R:, A:, and NONE<br>*Default Value:* A: |

**Comments** If two or more parameters specify the same letter designator, all letter designators are set to their default values.

It is recommended that after entering the ^CM command, ^JUS is entered to save changes to EEPROM. Any duplicate parameters entered reset the letter designations back to the default.

If any of the parameters are out of specification, the command is ignored.

**Example •** This example designates letter E: to point to the B: memory device, and the letter B: to point to the E: memory device.

```
^XA
^CME,B,R,A
^JUS
^XZ
```

# ^CO

## Cache On

**Note •** If you have firmware x.12 or greater this command is not required because the printer firmware automatically expands the size of the character cache as needed.

**Description** The ^CO command is used to change the size of the character cache. By definition, a *character cache* (referred to as cache) is a portion of the DRAM reserved for storing scalable characters. All printers have a default 40K cache that is always turned on. The maximum single character size that can be stored, without changing the size of the cache, is 450 dots by 450 dots.

There are two types of fonts used in Zebra printers: bitmapped and scalable. Letters, numbers, and symbols in a bitmapped font have a fixed size (for example: 10 points, 12 points, 14 points). By comparison, scalable fonts are not fixed in size.

Because their size is fixed, bitmapped fonts can be moved quickly to the label. In contrast, scalable fonts are much slower because each character is built on an as-needed basis before it is moved to the label. By storing scaled characters in a cache, they can be recalled at a much faster speed.

The number of characters that can be stored in the cache depends on two factors: the size of the cache (memory) and the size of the character (in points) being saved. The larger the point size, the more space in the cache it uses. The default cache stores every scalable character that is requested for use on a label. If the same character, with the same rotation and size is used again, it is quickly retrieved from cache.

It is possible that after a while the print cache could become full. Once the cache is full, space for new characters is obtained by eliminating an existing character from the print cache. Existing characters are eliminated by determining how often they have been used. This is done automatically. For example, a 28-point *Q* that was used only once would be a good candidate for elimination from the cache.

Maximum size of a single print cache character is 1500 dots by 1500 dots. This would require a cache of 274K.

When the cache is too small for the desired style, smaller characters might appear but larger characters do not. If possible, increase the size of the cache.

**Format** `^COa,b,c`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = cache on | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |
| b = amount of additional memory to be added to cache (in K) | *Accepted Values:* 1 to 9999<br>*Default Value:* 40 |
| c = cache type | *Accepted Values:*<br>0 = cache buffer (normal fonts)<br>1 = internal buffer (recommended for Asian fonts)<br>*Default Value:* 0 |

**Example •** To resize the print cache to 62K, assuming a 22K existing cache:

```
^COY,40
```

To resize the print cache to 100K, assuming a 22K existing cache:

```
^COY,78
```

## Print Cache Performance

For printing large characters, memory added to the cache by the ^CO command is not physically added to the 22K cache already in the printer. In the second example above, the resulting 100K cache is actually two separate blocks of memory, 22K and 78K.

Because large characters need contiguous blocks of memory, a character requiring a cache of 90K would not be completely stored because neither portion of the 100K cache is big enough. Therefore, if large characters are needed, the ^CO command should reflect the actual size of the cache you need.

Increasing the size of the cache improves the performance in printing scalable fonts. However, the performance decreases if the size of the cache becomes large and contains too many characters. The performance gained is lost because of the time involved searching the cache for each character.

**Comments** The cache can be resized as often as needed. Any characters in the cache when it is resized are lost. Memory used for the cache reduces the space available for label bitmaps, graphic, and fonts.

Some Asian fonts require an internal working buffer that is much larger than the normal cache. Since most fonts do not require this larger buffer, it is now a selectable configuration option. Printing with the Asian fonts greatly reduces the printer memory available for labels, graphics, fonts, formats, and label bitmaps.

# ^CT ~CT

## Change Tilde

**Description** The `^CT` and `~CT` commands are used to change the control command prefix. The default prefix is the tilde (~).

**Format** `^CTa or ~CTa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = change control command character | *Accepted Values:* any ASCII character<br>*Default Value:* a parameter is required. If a parameter is not entered, the next character received is the new control command character. |

**Example •** This is an example of how to change the control command prefix from a `^` to a `+`:

```
^XA
^CT+
^XZ
+HS
```

# ^CV

## Code Validation

**Description** The `^CV` command acts as a switch to turn the code validation function on and off. When this command is turned on, all bar code data is checked for these error conditions:

- character not in character set
- check-digit incorrect
- data field too long (too many characters)
- data field too short (too few characters)
- parameter string contains incorrect data or missing parameter

When invalid data is detected, an error message and code is printed in reverse image in place of the bar code. The message reads `INVALID - X` where `X` is one of these error codes:

`C` = character not in character set<br>
`E` = check-digit incorrect<br>
`L` = data field too long<br>
`S` = data field too short<br>
`P` = parameter string contains incorrect data (occurs only on select bar codes)

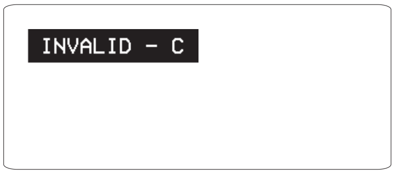
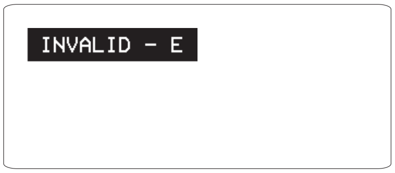
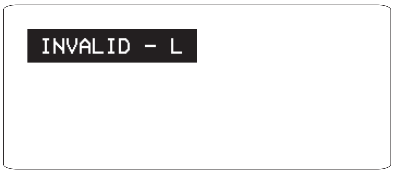
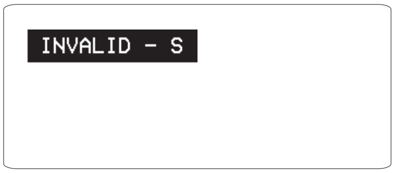
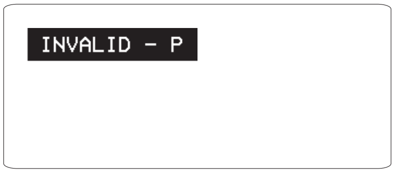
Once turned on, the `^CV` command remains active from format to format until turned off by another `^CV` command or the printer is turned off. The command is not permanently saved.

**Format** `^CVa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = code validation | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example** • The examples below show the error labels `^CVY` generates when incorrect field data is entered. Compare the letter following *INVALID* – to the listing on the previous page.

| ZPL II CODE | GENERATED LABEL |
|---|---|
| `^XA`<br>`^CVY`<br>`^FO50,50`<br>`^BEN,100,Y,N`<br>`^FD97823456 890^FS`<br>`^XZ` | <br>INVALID - C |
| `^XA`<br>`^CVY`<br>`^FO50,50`<br>`^BEN,100,Y,N`<br>`^FD9782345678907^FS`<br>`^XZ` | <br>INVALID - E |
| `^XA`<br>`^CVY`<br>`^FO50,50`<br>`^BEN,100,Y,N`<br>`^FD97823456789081^FS`<br>`^XZ` | <br>INVALID - L |
| `^XA`<br>`^CVY`<br>`^FO50,50`<br>`^BEN,100,Y,N`<br>`^FD97823456789^FS`<br>`^XZ` | <br>INVALID - S |
| `^XA`<br>`^CVY`<br>`^FO50,50`<br>`^BQN2,3`<br>`^FDHM,BQRCODE-22^FS`<br>`^XZ` | <br>INVALID - P |

**Comments** If more than one error exists, the first error detected is the one displayed.

The `^CV` command tests the integrity of the data encoded into the bar code. It is not used for (or to be confused with) testing the scan-integrity of an image or bar code.

# ^CW

## Font Identifier

**Description** All built-in fonts are referenced using a one-character identifier. The `^CW` command assigns a single alphanumeric character to a font stored in DRAM, memory card, EPROM, or Flash.

If the assigned character is the same as that of a built-in font, the downloaded font is used in place of the built-in font. The new font is printed on the label wherever the format calls for the built-in font. If used in place of a built-in font, the change is in effect only until power is turned off.

If the assigned character is different, the downloaded font is used as an additional font. The assignment remains in effect until a new command is issued or the printer is turned off.

**Format** `^CWa,d:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = letter of existing font to be substituted, or new font to be added | *Accepted Values:* `A` through `Z` and `0` to `9`<br>*Default Value:* a one-character entry is required |
| `d` = device to store font in (optional) | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = name of the downloaded font to be substituted for the built-in, or as an additional font | *Accepted Values:* any name up to 8 characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension<br>.14↑<br>`.TTE` is only supported in firmware version V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>`.FNT` = Font<br>`.TTF` = TrueType Font<br>`.TTE` = TrueType Extension |

**Example** • These examples show how to use:

- `MYFONT.FNT` stored in DRAM whenever a format calls for Font A:

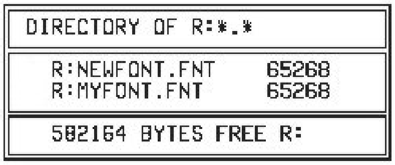
```
^XA
^CWA,R:MYFONT.FNT
^XZ
```

- `MYFONT.FNT` stored in DRAM additionally as Font Q:

```
^XA
^CWQ,R:MYFONT.FNT
^XZ
```

- `NEWFONT.FNT` stored in DRAM whenever a format calls for font F:

```
^XA
^CWF,R:NEWFONT.FNT
^XZ
```

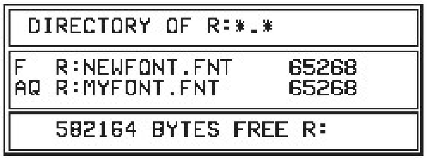


```
DIRECTORY OF R:*.*

   R:NEWFONT.FNT     65268
   R:MYFONT.FNT      65268

   582164 BYTES FREE R:
```

**Label Listing Before Assignment**



```
DIRECTORY OF R:*.*

F  R:NEWFONT.FNT      65268
AQ R:MYFONT.FNT       65268

   582164 BYTES FREE R:
```

**Label Listing After Assignment**

# ~DB

## Download Bitmap Font

**Description** The `~DB` command sets the printer to receive a downloaded bitmap font and defines native cell size, baseline, space size, and copyright.

This command consists of two portions, a ZPL II command defining the font and a structured data segment that defines each character of the font.

**Format** `~DBd:o.x,a,h,w,base,space,#char,©,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = drive to store font | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = name of font | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension | *Fixed Value:* `.FNT` |
| `a` = orientation of native font | *Fixed Value:* normal |
| `h` = maximum height of cell (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* a value must be specified |
| `w` = maximum width of cell (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* a value must be specified |
| `base` = dots from top of cell to character baseline | *Accepted Values:* `1` to `32000`<br>*Default Value:* a value must be specified |
| `space` = width of space or non-existent characters | *Accepted Values:* `1` to `32000`<br>*Default Value:* a value must be specified |
| `#char` = number of characters in font | *Accepted Values:* `1` to `256` (must match the characters being downloaded)<br>*Default Value:* a value must be specified |

| Parameters | Details |
|---|---|
| © = copyright holder | *Accepted Values:* 1 to 63 alphanumeric characters<br>*Default Value:* a value must be specified |
| data = structured ASCII data that defines each character in the font | The # symbol signifies character code parameters, which are separated with periods. The character code is from 1 to 4 characters to allow for large international character sets to be downloaded to the printer.<br>The data structure is:<br>#xxxx.h.w.x.y.i.data<br>#xxxx = character code<br>h = bitmap height (in dot rows)<br>w = bitmap width (in dot rows)<br>x = x-offset (in dots)<br>y = y-offset (in dots)<br>i = typesetting motion displacement (width, including inter character gap of a particular character in the font)<br>data = hexadecimal bitmap description |

**Example •** This is an example of how to use the ~DB command. It shows the first two characters of a font being downloaded to DRAM.

```
~DBR:TIMES.FNT,N,5,24,3,10,2,ZEBRA 1992,
#0025.5.16.2.5.18.
OOFF
OOFF
FFOO
FFOO
FFFF
#0037.4.24.3.6.26.
OOFFOO
OFOOFO
OFOOFO
OOFFOO
```

# ~DE

## Download Encoding

**Description** The standard encoding for TrueType Windows® fonts is always Unicode. The ZPL II field data must be converted from some other encoding to Unicode that the Zebra printer understands. The required translation tables are provided with font packs. Some tables can be downloaded from www.zebra.com.

**Format** `~DEd:o.x,s,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = location of table | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = name of table | *Accepted Values:* any valid name, up to 8 characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension | *Fixed Value:* `.DAT` |
| `s` = table size | *Accepted Values:* the number of memory bytes required to hold the Zebra downloadable format of the font<br>*Default Value:* if an incorrect value or no value is entered, the command is ignored |
| `data` = data string | *Accepted Values:* a string of ASCII hexadecimal values<br>*Default Value:* if no data is entered, the command is ignored |

→ **Example** • This is an example of how to download the required translation table:

```
~DER:JIS.DAT,27848,300021213001...
```

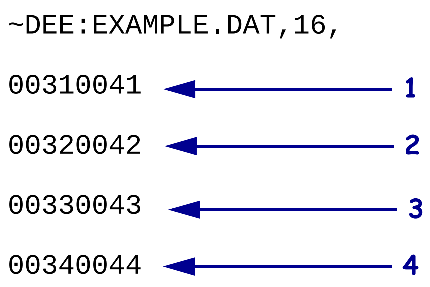
(27848 two-digit hexadecimal values)

**Comments** For more information on ZTools or ZebraNet Bridge, see the program documentation included with the software.

For assistance with editing or adding mappings to `.DAT` tables, ZebraNet Bridge includes a `.DAT` table editor in the font wizard.

Encoding scheme for the data sent to the printer is the second four character and the encoding scheme for the font is the first four characters throughout the `.DAT` file. The data must be ordered by the second four characters (the encoding table).

**Example** • This is an example of a `.DAT` table. The table below the example identifies the elements:



```
~DEE:EXAMPLE.DAT,16,
00310041
00320042
00330043
00340044
```

| | |
|---|---|
| **1** | Input stream with `0041` will be mapped to 0031. The printer prints "1". |
| **2** | Input stream with `0042` will be mapped to 0032. The printer prints "2". |
| **3** | Input stream with `0043` will be mapped to 0033. The printer prints "3". |
| **4** | Input stream with `0044` will be mapped to 0034. The printer prints "4". |

Data must have 0041, 0042, 0043, and 0044 in order. Multiple pairs can be on the same line.

# ^DF

## Download Format

**Description** The ^DF command saves ZPL II format commands as text strings to be later merged using ^XF with variable data. The format to be stored might contain field number (^FN) commands to be referenced when recalled.

While use of stored formats reduces transmission time, no formatting time is saved—this command saves ZPL II as text strings formatted at print time.

Enter the ^DF stored format command immediately after the ^XA command, then enter the format commands to be saved.

**Format** `^DFd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = device to store image | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |
| o = image name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Fixed Value:* .ZPL |

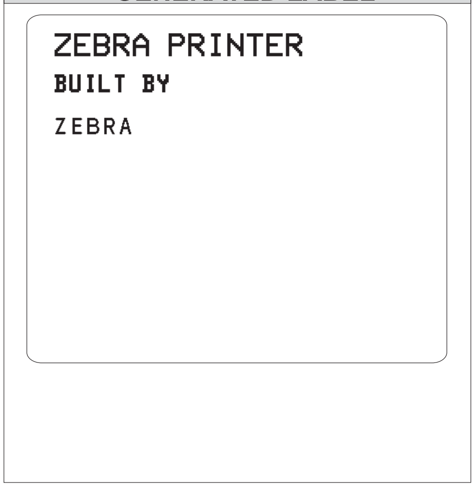
For a complete example of the ^DF and ^XF command, see *^DF and ^XF — Download format and recall format* on page 41.

**Example** • This example is generated using the ^XF command to recall this format:

ZPL II CODE

```
^XA
^DFR:STOREFMT.ZPL^FS
^FO25,25
^AD,36,20^FN1^FS
^FO165,25
^AD,36,20^FN2^FS
^FO25,75
^AB,22,14^FDBUILT BY^FS
^FO25,125
^AE,28,15^FN1
^XZ
^XA
^XFR:STOREFMT.ZPL^FS
^FN1^FDZEBRA^FS
^XZ
```

GENERATED LABEL



ZEBRA PRINTER
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ZEBRA

# ~DG

## Download Graphics

**Description** The `~DG` command downloads an ASCII Hex representation of a graphic image. If `.GRF` is not the specified file extension, `.GRF` is automatically appended.

For more saving and loading options when downloading files, see *~DY* on page 166.

**Format** `~DGd:o.x,t,w,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = device to store image | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = image name | *Accepted Values:* `1` to `8` alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension | *Fixed Value:* `.GRF` |
| `t` = total number of bytes in graphic | See the formula in the examples below. |
| `w` = number of bytes per row | See the formula in the examples below. |
| `data` = ASCII hexadecimal string defining image | The data string defines the image and is an ASCII hexadecimal representation of the image. Each character represents a horizontal nibble of four dots. |

This is the key for the examples that follow:

| | | |
|---|---|---|
| x | = | width of the graphic in millimeters |
| y | = | height of the graphic in millimeters |
| z | = | dots/mm = print density of the printer being programmed |
| 8 | = | bits/byte |

**Examples** • These are some example related to the `~DG` command:

To determine the `t` parameter use this formula:

$$\frac{xz}{8} \times yz = \text{totalbytes}$$

To determine the correct t parameter for a graphic 8 mm wide, 16 mm high, and a print density of 8 dots/mm, use this formula:

$$8 \times 128 = 1024$$
$$t = 1024$$

**Raise any portion of a byte to the next whole byte.**

To determine the `w` parameter (the width in terms of bytes per row) use this formula:

$$w = 8$$

To determine the correct `w` parameter for a graphic 8 mm wide and a print density of 8 dots/mm, use this formula:

$$w = 8$$

**Raise any portion of a byte to the next whole byte.**

Parameter `w` is the first value in the `t` calculation.

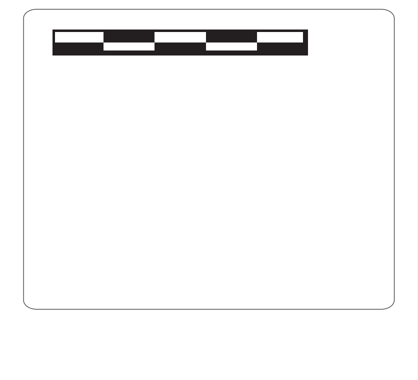
The data parameter is a string of hexadecimal numbers sent as a representation of the graphic image. Each hexadecimal character represents a horizontal nibble of four dots. For example, if the first four dots of the graphic image are white and the next four black, the dot-by-dot binary code is 00001111. The hexadecimal representation of this binary value is 0F. The entire graphic image is coded in this way, and the complete graphic image is sent as one continuous string of hexadecimal values.

This is an example of using the ~DG command to load a checkerboard pattern into DRAM. The name used to store the graphic is SAMPLE.GRF:

ZPL II CODE

```
~DGR:SAMPLE.GRF,00080,010,
FFFFFFFFFFFFFFFFFFFF
8000FFFF0000FFFF0001
8000FFFF0000FFFF0001
8000FFFF0000FFFF0001
FFFF0000FFFF0000FFFF
FFFF0000FFFF0000FFFF
FFFF0000FFFF0000FFFF
FFFFFFFFFFFFFFFFFFFF
^XA
^F020,20^XGR:SAMPLE.GRF,1,1^FS
^XZ
```

GENERATED LABEL



**Comments** Do not use spaces or periods when naming your graphics. Always use different names for different graphics.

If two graphics with the same name are sent to the printer, the first graphic is erased and replaced by the second graphic.

# ~DN

## Abort Download Graphic

**Description** After decoding and printing the number of bytes in parameter `t` of the `~DG` command, the printer returns to normal Print Mode. Graphics Mode can be aborted and normal printer operation resumed by using the `~DN` command.

**Format** `~DN`

**Comments** If you need to stop a graphic from downloading, you should abort the transmission from the host device. To clear the `~DG` command, however, you must send a `~DN` command.

# ~DS

## Download Intellifont (Scalable Font)

**Description** The ~DS command is used to set the printer to receive a downloadable scalable font and defines the size of the font in bytes.

The ~DS command, and its associated parameters, is the result of converting a vendor-supplied font for use on a Zebra printer. To convert this font use the ZTools utility.

**Format** `~DSd:o.x,s,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = device to store image | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |
| o = image name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Fixed Value:* .FNT |
| s = size of font in bytes | *Fixed Value:* this number is generated by ZTools and should not be changed |
| data = ASCII hexadecimal string that defines font | *Fixed Value:* this number is generated by ZTools and should not be changed |

**Example •** This example shows the first three lines of a scalable font that was converted using the ZTools program and is ready to be downloaded to the printer. If necessary, the destination and object name can be changed.

```
~DSB:CGTIMES.FNT,37080,
OOFFOOFFOOFFOOFF
FFOAECB28FFFOOFF
```

**Comments** Downloaded scalable fonts are not checked for integrity. If they are corrupt, they cause unpredictable results at the printer.

.14↑

If you are using a TrueType font use these commands: ~DT, ~DU, and ~DY. To determine when to use the noted commands, see *~DT* on page 164, *~DU* on page 165, and *~DY* on page 166.

# ~DT

## Download Bounded TrueType Font

**Description** Use ZTools to convert a TrueType font to a Zebra-downloadable format. that has less than 256 characters in it. To convert a font that has more than 256 characters, see *~DU* on page 165. ZTools creates a downloadable file that includes a `~DT` command. For information on converting and downloading Intellifont information, see *~DS* on page 163.

**Format** `~DTd:o.x,s,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = font location | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = font name | *Accepted Values:* any valid TrueType name, up to 8 characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension | *Fixed Value:* `.DAT` |
| `s` = font size | *Accepted Values:* the number of memory bytes required to hold the Zebra-downloadable format of the font<br>*Default Value:* if an incorrect value or no value is entered, the command is ignored |
| `data` = data string | *Accepted Values:* a string of ASCII hexadecimal values (two hexadecimal digits/byte). The total number of two-digit values must match parameter `s`.<br>*Default Value:* if no data is entered, the command is ignored |

**Example •** This is an example of how to download a true type font:

```
~DTR:FONT,52010,00AF01B0C65E...
```

(52010 two-digit hexadecimal values)

# ~DU

## Download Unbounded TrueType Font

**Description** Some international fonts, such as Asian fonts, have more than 256 printable characters. These fonts are supported as *large TrueType fonts* and are downloaded to the printer with the `~DU` command. Use ZTools to convert the large TrueType fonts to a Zebra-downloadable format.

The Field Block (`^FB`) command cannot support the large TrueType fonts.

**Format** `~DUd:o.x,s,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = font location | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = font name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension | *Fixed Value:* `.FNT` |
| s = font size | *Accepted Values:* the number of memory bytes required to hold the Zebra-downloadable format of the font<br>*Default Value:* if no data is entered, the command is ignored |
| `data` = data string | *Accepted Values:* a string of ASCII hexadecimal values (two hexadecimal digits/byte). The total number of two-digit values must match parameter `s`.<br>*Default Value:* if no data is entered, the command is ignored |

**Example** • This is an example of how to download an unbounded true type font:

```
~DUR:KANJI,86753,60CA017B0CE7...
```

(86753 two-digit hexadecimal values)

For similar commands, see *~DS* on page 163, *~DT* on page 164, and *~DY* on page 166.

# ~DY

## Download Objects

**Description** The ~DY command downloads to the printer graphic objects or fonts in any supported format. This command can be used in place of ~DG for more saving and loading options. ~DY is the preferred command to download TrueType fonts on printers with firmware later than X.13. It is faster than ~DU. The ~DY command also supports downloading wireless certificate files.

**Note •** When using certificate files, your printer supports:

- Using Privacy Enhanced Mail (PEM) formatted certificate files.
- Using the client certificate and private key as two files, each downloaded separately.
- Using exportable PAC files for EAP-FAST.

**Format** `~DYd:f,b,x,t,w,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = file location<br>.15↑<br>.NRD and .PAC files reside on E: in firmware versions V60.15.x, V50.15.x, or later. | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |
| f = file name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| b = format downloaded in data field<br>.14↑<br>.TTE and .TTF are only supported in firmware versions V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>A = uncompressed (ZB64, ASCII)<br>B = uncompressed (.TTE, .TTF, binary)<br>C = AR-compressed (used only by Zebra's BAR-ONE® v5)<br>P = portable network graphic (.PNG) - ZB64 encoded<br>*Default Value:* a value must be specified |

| Parameters | Details |
|---|---|
| `x` = extension of stored file<br>.14↑<br>`.TTE` and `.OTF` are only supported in firmware versions V60.14.x, V50.14.x, or later.<br>.15↑<br>`.NRD` and `.PAC` are only supported in firmware versions V60.15.x, V50.15.x, or later. | *Accepted Values:*<br>`B` = bitmap<br>`E` = TrueType Extension (`.TTE`)<br>`G` = raw bitmap (`.GRF`)<br>`P` = store as compressed (`.PNG`)<br>`T` = TrueType (`.TTF`) or OpenType (`.OTF`)<br>`X` = Paintbrush (`.PCX`)<br>`D` = Non Readable File (`.NRD`)<br>`Z` = Protected Access Credential (`.PAC`)<br>*Default Value:* a value other than the accepted values defaults to `.GRF` |
| `t` = total number of bytes in file<br>.14↑<br>`.TTE` is only supported in firmware versions V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>`.BMP`<br>This parameter refers to the actual size of the file, not the amount of disk space.<br>`.GRF` images: the size after decompression into memory<br>This parameter refers to the actual size of the file, not the amount of disk space.<br>`.PCX`<br>This parameter refers to the actual size of the file, not the amount of disk space.<br>`.PNG` images:<br>This parameter refers to the actual size of the file, not the amount of disk space.<br>`.TTF`<br>This parameter refers to the actual size of the file, not the amount of disk space.<br>`.TTE`<br>This parameter refers to the actual size of the file, not the amount of disk space. |

| Parameters | Details |
|---|---|
| `w` = total number of bytes per row<br>.14↑<br>`.TTE` is only supported in firmware version V60.14.x, V50.14.x, or later.<br>.15↑<br>`.NRD` and `.PAC` files are supported in firmware version V60.15.x, V50.15.x, or later. | *Accepted Values:*<br>`.GRF` images: number of bytes per row<br>`.PNG` images: value ignored<br>`.TTF` images: value ignored<br>`.TTE` images: value ignored<br>`.NRD` images: value ignored<br>`.PAC` images: value ignored |
| `data` = data | ASCII hexadecimal encoding, ZB64, or binary data, depending on `b`.<br>`A, P` = ASCII hexadecimal or ZB64<br>`B, C` = binary<br>When binary data is sent, all control prefixes and flow control characters are ignored until the total number of bytes needed for the graphic format is received. |

**Note •** The `~DY` command and the binary font file or binary graphic file can be sent as two separate files. If the files are sent to the printer separately, the data light might remain lit until the printer receives the TrueType font file. **SIZE number** of bytes must be received for the download to complete successfully. The graphic files must be monochrome (black and white).

**Example •** This is an example of how to download a binary TrueType Font file of Size bytes using the name fontfile.ttf and storing it to permanent flash memory on the printer:

```
~DYE:FONTFILE.TTF,B,T,SIZE,,
```

**Examples •** These examples show:

- that when the `^IM` command is used with the `^FO` command, the `^IM` command moves the `logo.png` file from a storage area to the 0,0 position on the label. This is the ZPL code:

```
^XA
^FO0,0^IMR:LOGO.PNG^FS
^XZ
```

- that when the `^IL` command is used at the beginning of a label format, it loads a stored image (`logo.png`) of a format and merges it with additional data. It is automatically positioned at the 0,0 position of the label and does not require the `^FO` command. This is the ZPL code:

```
^XA
^ILR:LOGO.PNG
^XZ
```

**Comments** For more information on ZB64 encoding and compression, see *ZB64 Encoding and Compression* on page 793.

.14↑

These are some important things to know about this command in firmware version V60.14.x, V50.14.x, or later:

- ZebraNet Bridge can be used to download fonts and graphics with this command.
- OpenType tables are only supported when downloading the font with this command
- OpenType fonts (`.OTF`) are supported if they are downloaded as a TrueType font. In the printer `.OTF` fonts have the `.TTF` extension.

# ~EG

## Erase Download Graphics

See *^ID* on page 225.

# ^FB

## Field Block

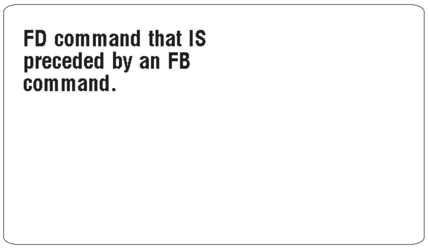
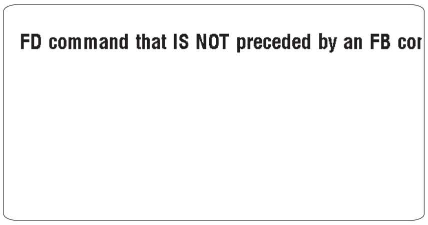
**Description** The ^FB command allows you to print text into a defined *block type* format. This command formats an ^FD or ^SN string into a block of text using the origin, font, and rotation specified for the text string. The ^FB command also contains an automatic word-wrap function.

**Format** `^FBa,b,c,d,e`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = width of text block line (in dots) | *Accepted Values:* 0 to the width of the label<br>*Default Value:* 0<br>If the value is less than font width or not specified, text does not print. |
| b = maximum number of lines in text block | *Accepted Values:* 1 to 9999<br>*Default Value:* 1<br>Text exceeding the maximum number of lines overwrites the last line. Changing the font size automatically increases or decreases the size of the block. |
| c = add or delete space between lines (in dots) | *Accepted Values:* -9999 to 9999<br>*Default Value:* 0<br>Numbers are considered to be positive unless preceded by a minus sign. Positive values add space; negative values delete space. |
| d = text justification | *Accepted Values:*<br>L = left<br>C = center<br>R = right<br>J = justified<br>*Default Value:* L<br>If J is used the last line is left-justified. |
| e = hanging indent (in dots) of the second and remaining lines | *Accepted Values:* 0 to 9999<br>*Default Value:* 0 |

**Example •** These are examples of how the ^FB command affects field data.

| ZPL II CODE | GENERATED LABEL |
|---|---|
| ^XA<br>^CF0,30,30^FO25,50<br>^FB250,4,,<br>^FDFD command that IS<br>preceded by an FB command.^FS<br>^XZ | <br>FD command that IS<br>preceded by an FB<br>command. |
| ^XA<br>^CF0,30,30^FO25,50<br>^FDFD command that IS NOT<br>preceded by an FB command.^FS<br>^XZ | <br>FD command that IS NOT preceded by an FB cor |

## Comments

This scheme can be used to facilitate special functions:

\& = carriage return/line feed
\(*) = soft hyphen (word break with a dash)
\\ = backslash (\)

**Item 1:** ^CI13 must be selected to print a backslash (\).

**Item 2:** If a soft hyphen escape sequence is placed near the end of a line, the hyphen is printed. If it is not placed near the end of the line, it is ignored.

(*) = any alphanumeric character

- If a word is too long to print on one line by itself (and no soft hyphen is specified), a hyphen is automatically placed in the word at the right edge of the block. The remainder of the word is on the next line. The position of the hyphen depends on word length, not a syllable boundary. Use a soft hyphen within a word to control where the hyphenation occurs.
- Maximum data-string length is 3K, including control characters, carriage returns, and line feeds.
- Normal carriage returns, line feeds, and *word spaces* at line breaks are discarded.
- When using ^FT (Field Typeset), ^FT uses the baseline origin of the last possible line of text. Increasing the font size causes the text block to increase in size from bottom to top. This could cause a label to print past its top margin.
- When using ^FO (Field Origin), increasing the font size causes the text block to increase in size from top to bottom.
- ^FS terminates an ^FB command. Each block requires its own ^FB command.

.14↑

While the ^FB command has a text justification parameter that defines the justification of the text within the block, it also interacts with the justification of ^FO and ^FT that define the justification of the origin.

The ^FB command does not support soft hyphens as a potential line break point. However, soft hyphen characters are always printed as if they were a hyphen.

The ^FB command does not support complex text. For complex text support, use ^TB.

# ^FC

## Field Clock

**Description** The **^FC** command is used to set the clock-indicators (delimiters) and the clock mode for use with the Real-Time Clock hardware. This command must be included within each label field command string each time the Real-Time Clock values are required within the field.

**Format** ^FCa,b,c

This table identifies the parameters for this format:

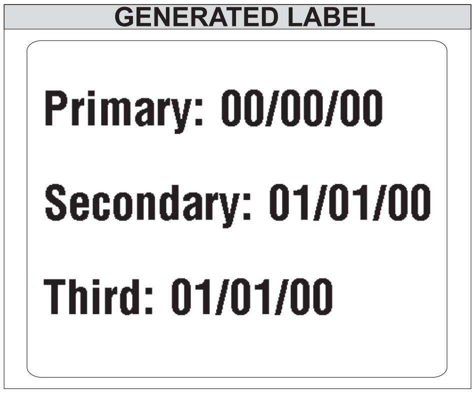
| Parameters | Details |
|---|---|
| a = primary clock indicator character | *Accepted Values:* any ASCII character<br>*Default Value:* % |
| b = secondary clock indicator character | *Accepted Values:* any ASCII character<br>*Default Value:* none—this value cannot be the same as a or c |
| c = third clock indicator character | *Accepted Values:* any ASCII character<br>*Default Value:* none—this value cannot be the same as a or b |

**Example** • Entering these ZPL commands sets the primary clock indicator to %, the secondary clock indicator to {, and the third clock indicator to #. The results are printed on a label with Primary, Secondary, and Third as field data.

**ZPL II CODE**

```
^XA
^FO10,100^A0N,50,50
^FC%,{,#
^FDPrimary: %m/%d/%y^FS
^FO10,200^A0N,50,50
^FC%,{,#
^FDSecondary: {m/{d/{y^FS
^FO10,300^A0N,50,50
^FC%,{,#
^FDThird: #m/#d/#y^FS
^XZ
```

**GENERATED LABEL**



Primary: 00/00/00

Secondary: 01/01/00

Third: 01/01/00

**Comments** The ^FC command is ignored if the Real Time Clock hardware is not present. As of V60.13.0.10, (**^SN**) functions with (**^FC**) capabilities.

For more details on the Real Time Clock, see *Real Time Clock* on page 805.

# ^FD

## Field Data

**Description** The `^FD` command defines the data string for the field. The field data can be any printable character except those used as command prefixes (`^` and `~`).

**Format** `^FDa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = data to be printed | *Accepted Values:* any data string up to 3072 bytes<br>*Default Value:* none—a string of characters must be entered |

**Comments** The `^` and `~` characters can be printed by changing the prefix characters—see *^CD ~CD* on page 140 and *^CT ~CT* on page 149. The new prefix characters cannot be printed.

Characters with codes above 127, or the `^` and `~` characters, can be printed using the `^FH` and `^FD` commands.

- `^CI13` must be selected to print a backslash (\).

For information on using soft hyphens, see *Comments on the ^FB command* on page 172.

# ^FH

## Field Hexadecimal Indicator

**Description** The ^FH command allows you to enter the hexadecimal value for any character directly into the ^FD statement. The ^FH command must precede each ^FD command that uses hexadecimals in its field.

Within the ^FD statement, the hexadecimal indicator must precede each hexadecimal value. The default hexadecimal indicator is _ (underscore). There must be a minimum of two characters designated to follow the underscore. The a parameter can be added when a different hexadecimal indicator is needed.

This command can be used with any of the commands that have field data (that is ^FD, ^FV (Field Variable), and ^SN (Serialized Data)).

Valid hexadecimal characters are:

```
0 1 2 3 4 5 6 7 8 9 A B C D E F a b c d e f
```

**Format** ^FHa

This table identifies the parameters for this format:

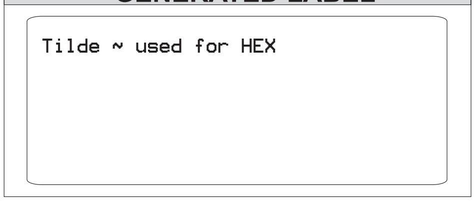
| Parameters | Details |
|---|---|
| a = hexadecimal indicator | *Accepted Values:* any character except current format and control prefix (^ and ~ by default)<br>*Default Value:* _ (underscore) |

**Example •** This is an example of how to enter a hexadecimal value directly into a ^FD statement: This is an example for ascii data using ^CI0.

**ZPL II CODE**

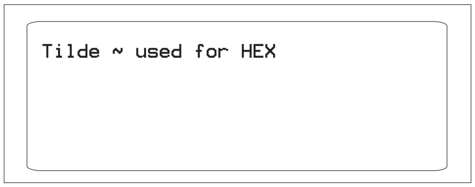
```
^XA
^FO100,100
^AD^FH
^FDTilde _7e used for HEX^FS
^XZ
```

**GENERATED LABEL**



Tilde ~ used for HEX

```
^XA
^FO100,100
^AD^FH\
^FDTilde \7E used for HEX^FS
^XZ
```



Tilde ~ used for HEX

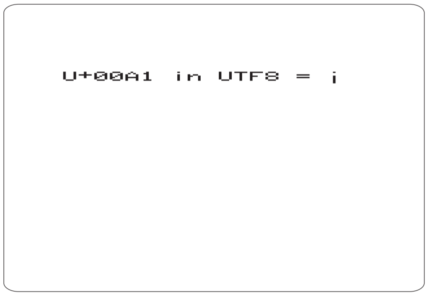
**Examples** • These are examples of how `^FH` works with UTF-8 and UTF-16BE:

### UTF-8

**ZPL II CODE**

```
^XA
^CI28
^LL500
^FO100,100
^AA,20,20
^FH^FDU+00A1 in UTF8 = _C2_A1^FS
^XZ
```

**GENERATED LABEL**



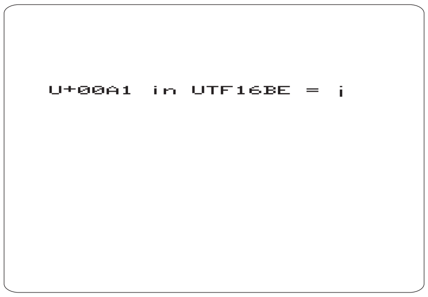
U+00A1 in UTF8 = ¡

### UTF-16BE

**ZPL II CODE**

```
^XA
^CI29
^LL500
^FO100,100
^AA,20,20
^FH^FDU+00A1 in UTF16BE = _00_A1^FS
^XZ
```

**GENERATED LABEL**



U+00A1 in UTF16BE = ¡

# ^FL

## Font Linking

This command is available only for printers with firmware versions V60.14.x, V50.14.x, or later.

**Description** The `^FL` command provides the ability to link any TrueType font, including private character fonts, to associated fonts. If the base font does not have a glyph for the required character, the printer looks to the linked fonts for the glyph. The font links are user-definable.

The font linking remains until the link is broken or the printer is turned off. To permanently save the font linking, use the `^JUS` command.

**Note** • For assistance in setting up the font links, please use the font wizard in ZebraNet Bridge.

**Format** `^FL<ext>,<base>,<link>`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `<ext>` | This is the fully-qualified filename of the extension. This file name does not accept wildcards.<br>The supported extensions for this parameter are: `.TTF` and `.TTE`. The format for this parameter is the memory device followed by the font name with the extension, as follows:<br>`E:SWISS721.TTF` |
| `<base>` | This is the filename of the base font(s) to which `<ext>` is associated. This can be partially or fully wild carded; all files that match the wildcard specification will have this extension associated with it.<br>The filename does not have to match a file that is currently defined on the printer. A specification of `*.TTF` results in all `*.TTF` font files loaded on the printer currently or in the future to be associated with the specified `<ext>` font extension. |
| `<link>` | This is an indicator that determines if the extension is to be linked with the base, or unlinked from the base, as follows:<br>*Accepted Values:*<br>`0` = `<ext>` is to be unlinked (disassociated) from the file(s) specified in `<base>`<br>`1` = `<ext>` is to be linked (associated) with the file(s) specified by `<base>`<br>*Default Value:* must be an accepted value or it is ignored |

**Comments** A font can have up to five fonts linked to it. The printer resident font, `0.FNT` is always the last font in the list of font links, but is not included in the five link maximum. It can also be placed anywhere in the font links list.

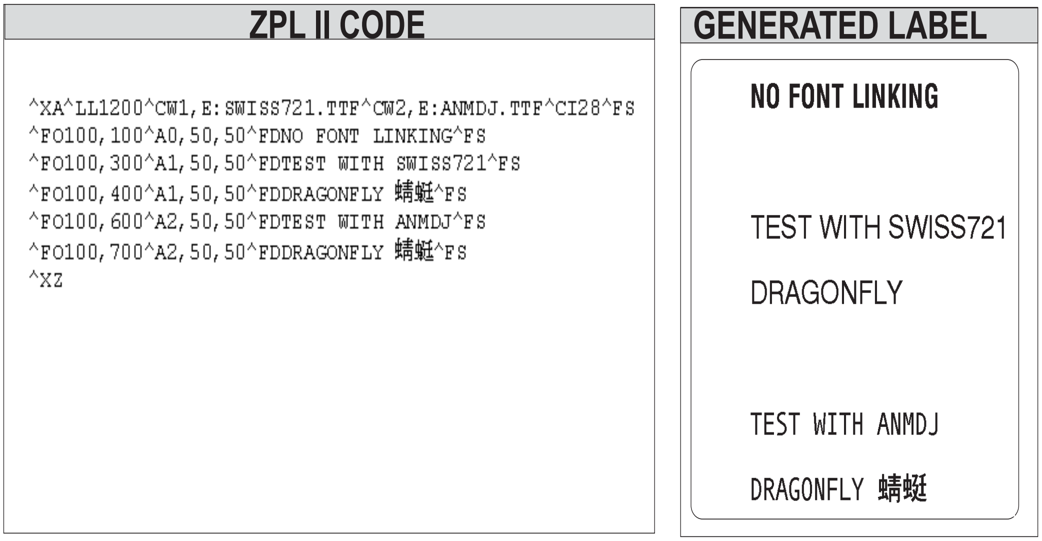
The default glyph prints when a glyph cannot be found in any of the fonts in the link list. The advanced layout command `^PA` determines if the default glyph is a space character or the default glyph of the base font, which is typically a hollow box.

The list of font links can be printed by using the `^LF` command or retrieved with the `^HT` command.

**Examples** • These examples show the code and output for no font linking and for font linking:

### No Font Linking

In the no font linking example, the Swiss721 font does not have the Asian glyphs, which is why Asian glyphs do not print.



ZPL II CODE

```
^XA^LL1200^CW1,E:SWISS721.TTF^CW2,E:ANMDJ.TTF^CI28^FS
^FO100,100^A0,50,50^FDNO FONT LINKING^FS
^FO100,300^A1,50,50^FDTEST WITH SWISS721^FS
^FO100,400^A1,50,50^FDDRAGONFLY 蜻蜓^FS
^FO100,600^A2,50,50^FDTEST WITH ANMDJ^FS
^FO100,700^A2,50,50^FDDRAGONFLY 蜻蜓^FS
^XZ
```

GENERATED LABEL

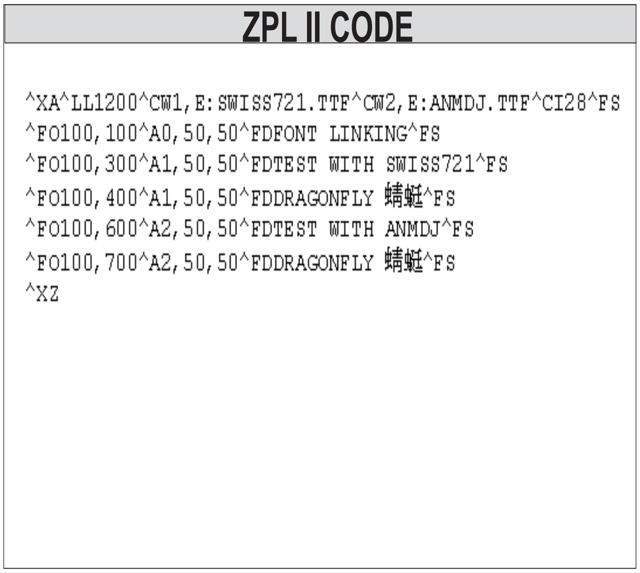
```
NO FONT LINKING


TEST WITH SWISS721

DRAGONFLY


TEST WITH ANMDJ

DRAGONFLY 蜻蜓
```

### Font Linking

In the font linking example, this code is sent down to link the `ANMDJ.TTF` font to `SWISS721.TTF` font:

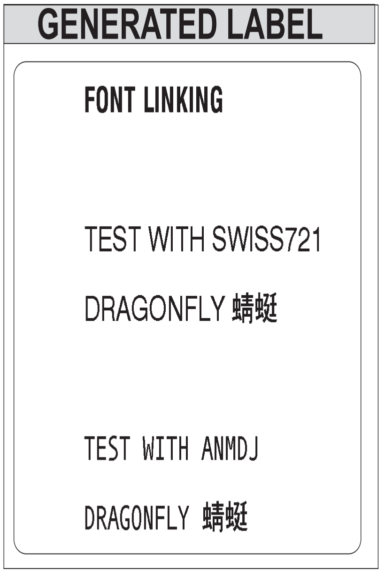
```
^XA
^FLE:ANMDJ.TTF,E:SWISS721.TTF,1^FS
^XZ
```

When the label reprints, the Asian characters are printed using the `ANMDJ.TTF` font, rather than the `SWISS721.TTF` font.



ZPL II CODE

```
^XA^LL1200^CW1,E:SWISS721.TTF^CW2,E:ANMDJ.TTF^CI28^FS
^FO100,100^A0,50,50^FDFONT LINKING^FS
^FO100,300^A1,50,50^FDTEST WITH SWISS721^FS
^FO100,400^A1,50,50^FDDRAGONFLY 蜻蜓^FS
^FO100,600^A2,50,50^FDTEST WITH ANMDJ^FS
^FO100,700^A2,50,50^FDDRAGONFLY 蜻蜓^FS
^XZ
```



GENERATED LABEL

FONT LINKING

TEST WITH SWISS721

DRAGONFLY 蜻蜓

TEST WITH ANMDJ

DRAGONFLY 蜻蜓

# ^FM

## Multiple Field Origin Locations

**Description** The ^FM command allows you to control the placement of bar code symbols.

It designates field locations for the PDF417 (^B7) and MicroPDF417 (^BF) bar codes when the structured append capabilities are used. This allows printing multiple bar codes from the same set of text information.

The structured append capability is a way of extending the text printing capacity of both bar codes. If a string extends beyond what the data limitations of the bar code are, it can be printed as a series: 1 of 3, 2 of 3, 3 of 3. Scanners read the information and reconcile it into the original, unsegmented text.

The ^FM command triggers multiple bar code printing on the same label with ^B7 and ^BF only. When used with any other commands, it is ignored.

**Format** `^FMx1,y1,x2,y2,...`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| x1 = x-axis location of first symbol (in dots) | *Accepted Values:*<br>0 to 32000<br>e = exclude this bar code from printing<br>*Default Value:* a value must be specified |
| y1 = y-axis location of first symbol (in dots) | *Accepted Values:*<br>0 to 32000<br>e = exclude this bar code from printing<br>*Default Value:* a value must be specified |
| x2 = x-axis location of second symbol (in dots) | *Accepted Values:*<br>0 to 32000<br>e = exclude this bar code from printing<br>*Default Value:* a value must be specified |
| y2 = y-axis location of second symbol (in dots) | *Accepted Values:*<br>0 to 32000<br>e = exclude this bar code from printing<br>*Default Value:* a value must be specified |
| … = continuation of X,Y pairs | *Maximum number of pairs:* 60 |

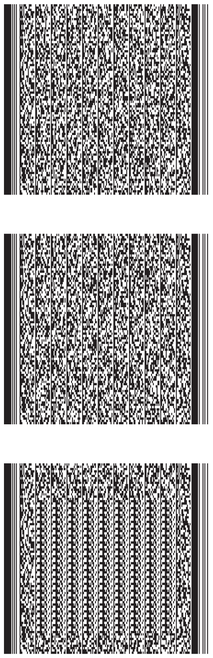
**Example •** This example shows you how to generate three bar codes with the text “Zebra Technologies Corporation strives to be…” would need to be repeated seven times, which includes 2870 characters of data (including spaces) between `^FD` and `^FS`:

**ZPL II CODE**

```
^XA
^FM100,100,100,600,100,1200
^BY2,3
^B7N,5,5,9,83,N
^FDZebra Technologies
Corporation strives to be
the expert supplier of
innovative solutions to
specialty demand labeling
and ticketing problems of
business and government.
We will attract and retain
the best people who will
understand our customer's
needs and provide them with
systems, hardware, software,
consumables and service
offering the best value,
high quality, and reliable
performance, all delivered
in a timely manner
…
^FS^XZ
```

1

**GENERATED LABEL**



| | |
|---|---|
| 1 | The ellipse is not part of the code. It indicates that the text needs to be repeated seven times, as mentioned in the example description. |

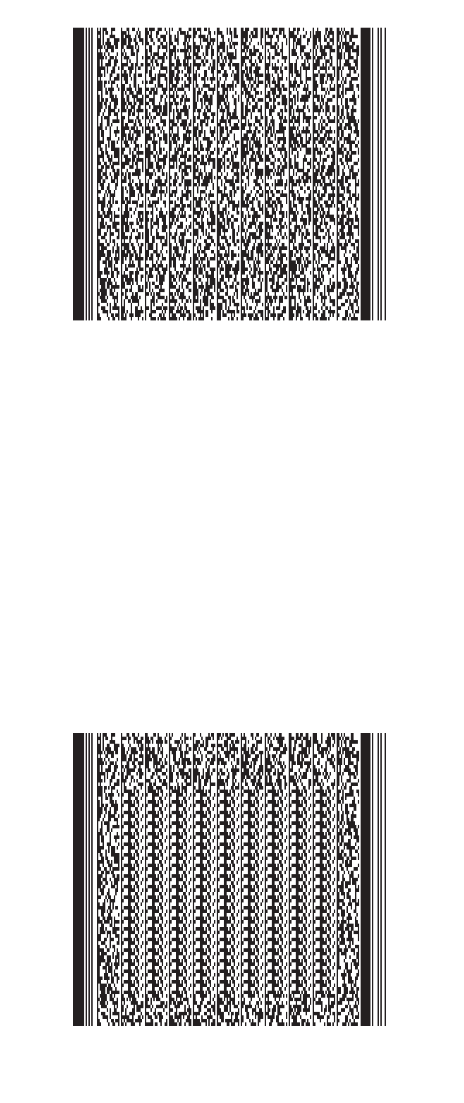
**Example** • This example assumes a maximum of three bar codes, with bar code 2 of 3 omitted:

ZPL II CODE

```
^XA
^FM100,100,e,e,100,1200
^BY2,3
^B7N,5,5,9,83,N
^FDZebra Technologies
Corporation strives to be
the expert supplier of
innovative solutions to
specialty demand labeling
and ticketing problems of
business and government.
We will attract and retain
the best people who will
understand our customer's
needs and provide them with
systems, hardware, software,
consumables and service
offering the best value,
high quality, and reliable
performance, all delivered
in a timely manner
…
^FS^XZ
```

1

GENERATED LABEL



| | |
|---|---|
| 1 | The ellipse is not part of the code. It indicates that the text needs to be repeated seven times, as mentioned in the example description. |

**Comments** Subsequent bar codes print once the data limitations of the previous bar code have been exceeded. For example, bar code 2 of 3 prints once 1 of 3 has reached the maximum amount of data it can hold. Specifying three fields does not ensure that three bar codes print; enough field data to fill three bar code fields has to be provided.

The number of the `x,y` pairs can exceed the number of bar codes generated. However, if too few are designated, no symbols print.

# ^FN

## Field Number

**Description** The ^FN command numbers the data fields. This command is used in both ^DF (Store Format) and ^XF (Recall Format) commands.

In a stored format, use the ^FN command where you would normally use the ^FD (Field Data) command. In recalling the stored format, use ^FN in conjunction with the ^FD command.

The optional "a" parameter can be used with the KDU Plus to cause prompts to be displayed on the KDU unit. Also, when the Print on Label link is selected on the Directory page of ZebraLink enabled printers the field prompt displays.

The number of fields and data that can be stored is dependent in the available printer memory.

**Note •** The maximum number of ^FN commands that can be used depends on the amount of data that is placed in the fields on the label. It is recommended to use 400 or fewer fields.

**Format** `^FN#"a"`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| # = number to be assigned to the field | *Accepted Values:* 0 to 9999<br>*Default Value:* 0 |
| "a" = optional parameter* | *Accepted Values:* 255 alphanumeric characters maximum (a-z,A-Z,1-9 and space)<br>*Default Value:* optional parameter |

* This parameter is only available on printers with firmware V50.13.2, V53.15.5Z, V60.13.0.1, or later.

For a complete example of the ^DF and ^XF command, see *^DF and ^XF — Download format and recall format* on page 41.

### Comments

- The same ^FN value can be stored with several different fields.
- If a label format contains a field with ^FN and ^FD, the data in that field prints for any other field containing the same ^FN value.
- For the "a" parameter to function as a prompt the characters used in the "a" parameter must be surrounded by double quotes (see example).

**Example •** The ^FN1”Name” would result in “Name” being used as the prompt on the KDU unit.

# ^FO

## Field Origin

**Description** The `^FO` command sets a field origin, relative to the label home (`^LH`) position. `^FO` sets the upper-left corner of the field area by defining points along the x-axis and y-axis independent of the rotation.

**Format** `^FOx,y,z`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `x` = x-axis location (in dots) | *Accepted Values:* `0` to `32000`<br>*Default Value:* `0` |
| `y` = y-axis location (in dots) | *Accepted Values:* `0` to `32000`<br>*Default Value:* `0` |
| `z` = justification<br>.14↑<br>The `z` parameter is only supported in firmware versions V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>`0` = left justification<br>`1` = right justification<br>`2` = auto justification (script dependent)<br>*Default Value:* last accepted `^FW` value or `^FW` default |

**Comments** If the value entered for the `x` or `y` parameter is too high, it could position the field origin completely off the label.

.14↑

This command interacts with the field direction parameter of `^FP` and with the rotation parameter of `^A`. For output and examples, see *Field Interactions* on page 799.

The auto justification option might cause unexpected results if variable fields or bidirectional text are used with `^FO`. For the best results with bidirectional text and/or variable fields, use either the left of right justification option.

# ^FP

## Field Parameter

**Description** The ^FP command allows vertical and reverse formatting of the font field, commonly used for printing Asian fonts.

**Format** `^FPd,g`

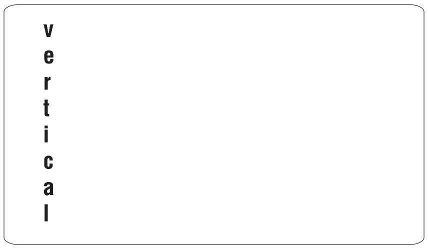
This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = direction | *Accepted Values:*<br>H = horizontal printing (left to right)<br>V = vertical printing (top to bottom)<br>R = reverse printing (right to left)<br>*Default Value:* H |
| g = additional inter-character gap (in dots) | *Accepted Values:* 0 to 9999<br>*Default Value:* 0 if no value is entered |

**Example** • This is an example of how to implement reverse and vertical print:

ZPL II CODE | GENERATED LABEL

```
^XA
^FO100,50
^FPV,10
^AV
^FDvertical^FS
^XZ
```



v
e
r
t
i
c
a
l

```
^XA
^FO350,50
^FPR,10
^AV
^FDreverse^FS
^XZ
```

esrever

For vertical and reverse printing directions, combining semantic clusters are used to place characters.

This command interacts with the justification parameters of ^FO and ^FT and with the rotation parameter of ^A. For output and examples, see *Field Interactions* on page 799.

# ^FR

## Field Reverse Print

**Description** The ^FR command allows a field to appear as white over black or black over white. When printing a field and the ^FR command has been used, the color of the output is the reverse of its background.

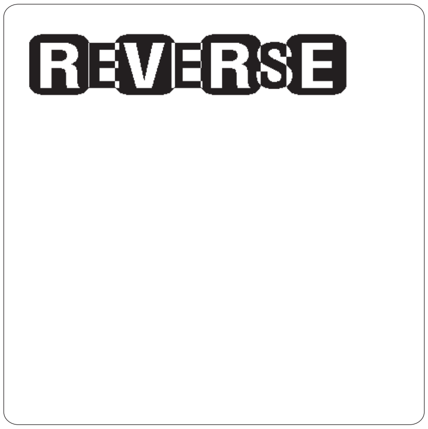
**Format** ^FR

**Example** • In this example, the ^GB command creates areas of black allowing the printing to appear white:

**ZPL II CODE**

```
^XA
^PR1
^FO100,100
^GB70,70,70,,3^FS
^FO200,100
^GB70,70,70,,3^FS
^FO300,100
^GB70,70,70,,3^FS
^FO400,100
^GB70,70,70,,3^FS
^FO107,110^CF0,70,93
^FR^FDREVERSE^FS
^XZ
```

**GENERATED LABEL**



**Comments** The ^FR command applies to only one field and has to be specified each time. When multiple ^FR commands are going to be used, it might be more convenient to use the ^LR command.

# ^FS

## Field Separator

**Description** The ^FS command denotes the end of the field definition. Alternatively, ^FS command can also be issued as a single ASCII control code SI (Control-O, hexadecimal 0F).

**Format** `^FS`

# ^FT

## Field Typeset

**Description** The `^FT` command sets the field position, relative to the home position of the label designated by the `^LH` command. The typesetting origin of the field is fixed with respect to the contents of the field and does not change with rotation.

**Note •** The `^FT` command is capable of concantination of fields.

**Format** `^FTx,y,z`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `x` = x-axis location (in dots) | *Accepted Values:* `0` to `32000`<br>*Default Value:* position after last formatted text field |
| `y` = y-axis location (in dots) | *Accepted Values:* `0` to `32000`<br>*Default Value:* position after last formatted text field |
| `z` = justification<br>.14↑<br>The `z` parameter is only supported in firmware version V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>`0` = left justification<br>`1` = right justification<br>`2` = auto justification (script dependent)<br>*Default Value:* last accepted `^FW` value or `^FW` default<br>The auto justification option may cause unexpected results if variable fields or bidirectional text are used with `^FT`. For best results with bidirectional text and/or variable fields, use either the left of right justification options. |

**Table 12 • Typeset Justification**

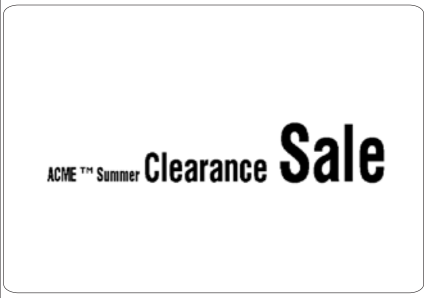
| | | |
|---|---|---|
| **Left Justified** | Text | For examples, see *Field Interactions* on page 799. |
| | Bar Codes | Origin is base of bar code, at left edge |
| | Graphic Boxes | Origin is bottom-left corner of the box |
| | Images | Origin is bottom-left corner of the image area |
| **Right Justified** | Text | For examples, see *Field Interactions* on page 799. |
| | Bar Codes | Origin is base of bar code, at right edge |
| | Graphic Boxes | Origin is bottom-right corner of the box |
| | Images | Origin is bottom-right corner of the image area |

**Example** • This is an example of the ^FT command and concatenation:

ZPL II CODE

```
^XA
^FT10,200^A0N,30,20^FDACME ^FS
^FT^GS^FDC^FS
^FT^A0N,30,20^FDSummer ^FS
^FT^A0N,60,50^FDClearance ^FS
^FT^A0N,120,100^FDSale ^FS
^XZ
```

GENERATED LABEL



When a coordinate is missing, the position following the last formatted field is assumed. This *remembering* simplifies field positioning with respect to other fields. Once the first field is positioned, other fields follow automatically.

There are several instances where using the ^FT command without specifying x and y parameters is not recommended:

- when positioning the first field in a label format
- at any time with the ^FN (Field Number) command
- following an ^SN (Serialization Data) command
- variable data
- bidirectional text

.14↑

The right typeset justified is available only for printers with firmware version V60.14.x, V50.14.x, or later.

This command interacts with the field direction parameters of ^FP and with the rotation parameter of ^A. For output and code examples, see *Field Interactions* on page 799

# ^FV

## Field Variable

**Description** ^FV replaces the ^FD (field data) command in a label format when the field is variable.

**Format** ^FVa

This table identifies the parameters for this format:

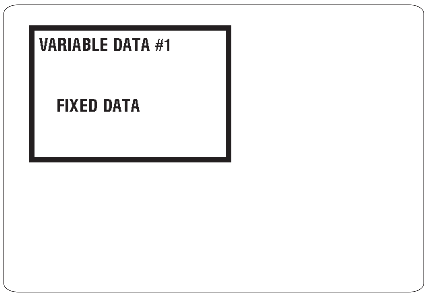
| Parameters | Details |
|---|---|
| a = variable field data to be printed | *Accepted Values:* 0 to 3072 byte string<br>*Default Value:* if no data is entered, the command is ignored |

**Example •** This is an example of how to use the ^MC and ^FV command:

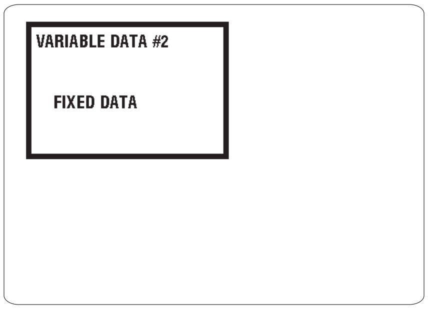
**ZPL II CODE**

```
^XA
^FO40,40
^GB300,203,8^FS
^FO55,60^CF0,25
^FVVARIABLE DATA #1^FS
^FO80,150
^FDFIXED DATA^FS
^MCN
^XZ
```

**GENERATED LABEL**



```
^XA
^FO55,60^CF0,25
^FVVARIABLE DATA #2^FS
^MCY
^XZ
```



**Comments** ^FV fields are always cleared after the label is printed. ^FD fields are not cleared.

# ^FW

## Field Orientation

**Description** The `^FW` command sets the default orientation for all command fields that have an orientation (rotation) parameter and sets the default justification for all commands with a justification parameter. Fields can be rotated 0, 90, 180, or 270 degrees clockwise by using this command. Justification can be left, right, or auto.

The `^FW` command affects only fields that follow it. Once you have issued a `^FW` command, the setting is retained until you turn off the printer or send a new `^FW` command to the printer.

**Format** `^FWr,z`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `r` = rotate field | *Accepted Values:*<br>`N` = normal<br>`R` = rotated 90 degrees<br>`I` = inverted 180 degrees<br>`B` = bottom-up 270 degrees, read from bottom up<br>*Initial Value at Power-up:* `N` |
| `z` = justification<br>.14↑<br>The `z` parameter is available only with printers with firmware version V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>`0` = left justification<br>`1` = right justification<br>`2` = auto justification (script dependent)<br>*Default Value:* auto for `^TB` and left for all other commands |

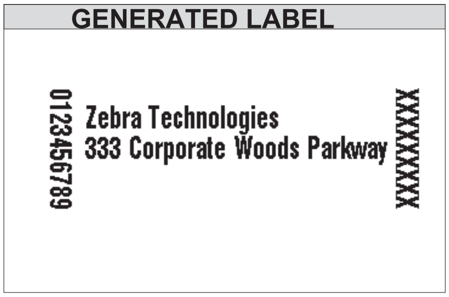
**Example** • This example shows how ^FW rotation works in conjunction with ^FO. In this example, note that:

- the fields using A0N print the field in normal rotation
- the fields with no rotation indicated (A0) follow the rotation used in the ^FW command (^FWR).

**ZPL II CODE**

```
^XA
^FWR
^FO150,90^A0N,25,20^FDZebra Technologies^FS
^FO115,75^A0,25,20^FD0123456789^FS
^FO150,115^A0N,25,20^FD333 Corporate Woods
Parkway^FS
^FO400,75^A0,25,20^FDXXXXXXXXX^FS
^XZ
```

**GENERATED LABEL**



0123456789
Zebra Technologies
333 Corporate Woods Parkway
XXXXXXXXX

**Comments** ^FW affects only the orientation in commands where the rotation parameter has not been specifically set. If a command has a specific rotation parameter, that value is used.

^FW affects only the justification in commands where the parameter has not been set. If a command has a specific justification parameter that value is used .

# ^FX

## Comment

**Description** The ^FX command is useful when you want to add *non-printing* informational comments or statements within a label format. Any data after the ^FX command up to the next caret (^) or tilde (~) command does not have any effect on the label format. Therefore, you should avoid using the caret (^) or tilde (~) commands within the ^FX statement.

**Format** ^FXc

This table identifies the parameters for this format:

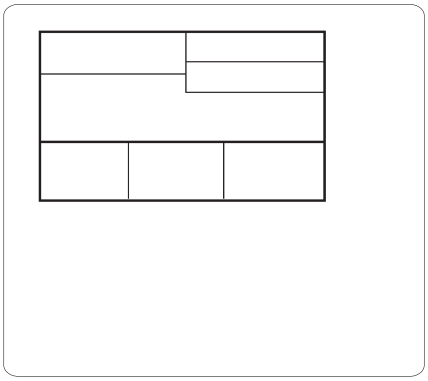
| Parameters | Details |
|---|---|
| c = non printing comment | Creates a non-printable comment. |

**Example** • This is an example of how to use the ^FX command effectively:

ZPL II CODE

```
^XA
^LH100,100^FS
^FXSHIPPING LABEL^FS
^FO10,10^GB470,280,4^FS
^FO10,190^GB470,4,4^FS
^FO10,80^GB240,2,2^FS
^FO250,10^GB2,100,2^FS
^FO250,110^GB226,2,2^FS
^FO250,60^GB226,2,2^FS
^FO156,190^GB2,95,2^FS
^FO312,190^GB2,95,2^FS
^XZ
```

GENERATED LABEL



**Comments** Correct usage of the ^FX command includes following it with the ^FS command.

# ^GB

## Graphic Box

**Description** The ^GB command is used to draw boxes and lines as part of a label format. Boxes and lines are used to highlight important information, divide labels into distinct areas, or to improve the appearance of a label. The same format command is used for drawing either boxes or lines.

**Format** `^GBw,h,t,c,r`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `w` = box width (in dots) | *Accepted Values:* value of `t` to `32000`<br>*Default Value:* value used for thickness (t) or 1 |
| `h` = box height (in dots) | *Accepted Values:* value of `t` to `32000`<br>*Default Value:* value used for thickness (t) or 1 |
| `t` = border thickness (in dots) | *Accepted Values:* `1` to `32000`<br>*Default Value:* `1` |
| `c` = line color | *Accepted Values:*<br>`B` = black<br>`W` = white<br>*Default Value:* `B` |
| `r` = degree of corner-rounding | *Accepted Values:* `0` (no rounding) to `8` (heaviest rounding)<br>*Default Value:* `0` |

For the `w` and `h` parameters, keep in mind that printers have a default of 6, 8, 12, or 24 dots/millimeter. This comes out to 153, 203, 300, or 600 dots per inch. To determine the values for w and h, calculate the dimensions in millimeters and multiply by 6, 8, 12, or 24.

If the width and height are not specified, you get a solid box with its width and height as specified by value `t`.

The roundness-index is used to determine a rounding-radius for each box. Formula:

**rounding-radius = (rounding-index / 8) * (shorter side / 2)**

where the shorter side is the lesser of the width and height (after adjusting for minimum and default values).

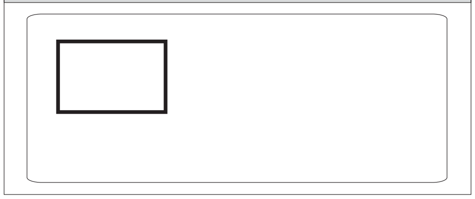
**Examples** • Here are a few examples of graphic boxes:

**Width: 1.5 inch; Height: 1 inch; Thickness: 10; Color: default; Rounding: default**

**ZPL II CODE**

```
^XA
^FO50,50
^GB300,200,10^FS
^XZ
```

**GENERATED LABEL**

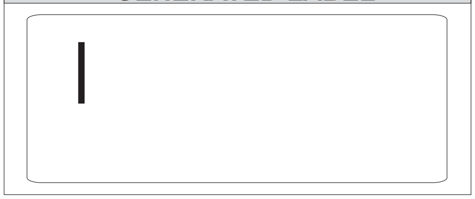


**Width: 0 inch; Height: 1 inch; Thickness: 20; Color: default; Rounding: default:**

**ZPL II CODE**

```
^XA
^FO50,50
^GB0,203,20^FS
^XZ
```

**GENERATED LABEL**

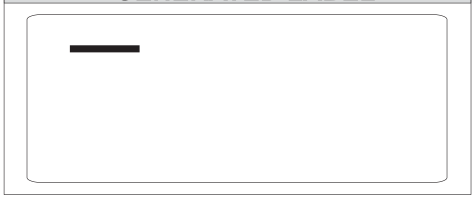


**Width: 1 inch; Height: 0 inch; Thickness: 30; Color: default; Rounding: default**

**ZPL II CODE**

```
^XA
^FO50,50
^GB203,0,20^FS
^XZ
```

**GENERATED LABEL**

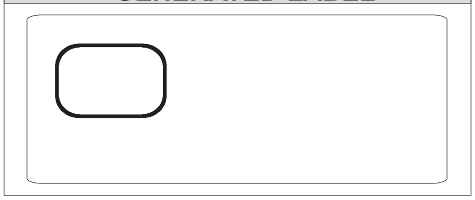


**Width: 1.5 inch; Height: 1 inch; Thickness: 10; Color: default; Rounding: 5**

**ZPL II CODE**

```
^XA
^FO50,50
^GB300,200,10,,5^FS
^XZ
```

**GENERATED LABEL**



# ^GC

## Graphic Circle

**Description** The ^GC command produces a circle on the printed label. The command parameters specify the diameter (width) of the circle, outline thickness, and color. Thickness extends inward from the outline.

**Format** ^GCd,t,c

This table identifies the parameters for this format:

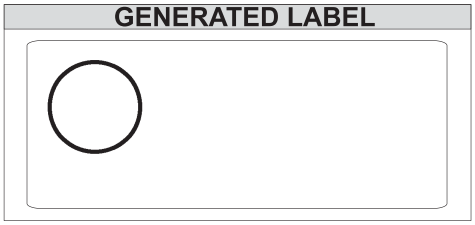
| Parameters | Details |
|---|---|
| d = circle diameter (in dots) | *Accepted Values:* 3 to 4095 (larger values are replaced with 4095)<br>*Default Value:* 3 |
| t = border thickness (in dots) | *Accepted Values:* 2 to 4095<br>*Default Value:* 1 |
| c = line color | *Accepted Values:*<br>B = black<br>W = white<br>*Default Value:* B |

**Example •** This is an example of how to create a circle on the printed label:

**ZPL II CODE**

```
^XA
^FO50,50
^GC250,10,B^FS
^XZ
```

**GENERATED LABEL**



# ^GD

## Graphic Diagonal Line

**Description** The `^GD` command produces a straight diagonal line on a label. This can be used in conjunction with other graphic commands to create a more complex figure.

**Format** `^GDw,h,t,c,o`

This table identifies the parameters for this format:

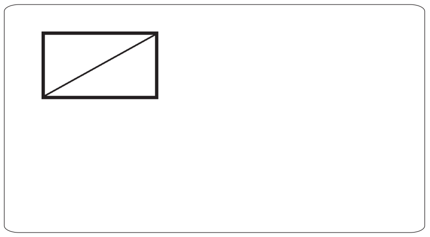
| Parameters | Details |
|---|---|
| `w` = box width (in dots) | *Accepted Values:* `3` to `32000`<br>*Default Value:* value of `t` (thickness) or `1` |
| `h` = box height (in dots) | *Accepted Values:* `3` to `32000`<br>*Default Value:* value of `t` (thickness) or `1` |
| `t` = border thickness (in dots) | *Accepted Values:* 1 to 32000<br>*Default Value:* 1 |
| `c` = line color | *Accepted Values:*<br>`B` = black<br>`W` = white<br>*Default Value:* `B` |
| `o` = orientation (direction of the diagonal) | *Accepted Values:*<br>R (or /) = right-leaning diagonal<br>L (or \) = left-leaning diagonal<br>*Default Value:* R |

**Example** • This is an example of how to create a diagonal line connecting one corner with the opposite corner of a box on a printed label:

**ZPL II CODE**

```
^XA
^FO150,100
^GB350,203,10^FS
^FO155,110
^GD330,183,10,,R^FS
^XZ
```

**GENERATED LABEL**



# ^GE

## Graphic Ellipse

**Description** The `^GE` command produces an ellipse in the label format.

**Format** `^GEw,h,t,c`

This table identifies the parameters for this format:

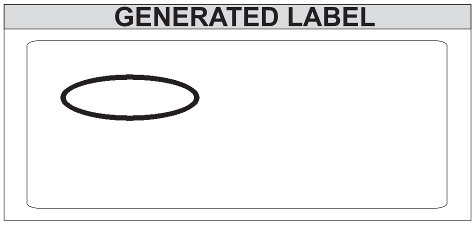
| Parameters | Details |
|---|---|
| `w` = ellipse width (in dots) | *Accepted Values:* 3 to 4095 (larger values are replaced with 4095)<br>*Default Value:* value used for thickness (`t`) or `1` |
| `h` = ellipse height (in dots) | *Accepted Values:* 3 to 4095<br>*Default Value:* value used for thickness (`t`) or `1` |
| `t` = border thickness (in dots) | *Accepted Values:* 2 to 4095<br>*Default Value:* 1 |
| `c` = line color | *Accepted Values:*<br>`B` = black<br>`W` = white<br>*Default Value:* `B` |

**Example •** This is an example of how to create a ellipse on a printed label:

**ZPL II CODE**

```
^XA
^FO100,100
^GE300,100,10,B^FS
^XZ
```

**GENERATED LABEL**



# ^GF

## Graphic Field

**Description** The ^GF command allows you to download graphic field data directly into the printer's bitmap storage area. This command follows the conventions for any other field, meaning a field orientation is included. The graphic field data can be placed at any location within the bitmap space.

**Format** `^GFa,b,c,d,data`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = compression type | *Accepted Values:*<br>A = ASCII hexadecimal (follows the format for other download commands)<br>B = binary (data sent after the c parameter is strictly binary)<br>C = compressed binary (data sent after the c parameter is in compressed binary format. The data is compressed on the host side using Zebra's compression algorithm. The data is then decompressed and placed directly into the bitmap.)<br>*Default Value:* A |
| b = binary byte count | *Accepted Values:* 1 to 99999<br>This is the total number of bytes to be transmitted for the total image or the total number of bytes that follow parameter d. For ASCII download, the parameter should match parameter c. Out-of-range values are set to the nearest limit.<br>*Default Value:* command is ignored if a value is not specified |
| c = graphic field count | *Accepted Values:* 1 to 99999<br>This is the total number of bytes comprising the graphic format (width x height), which is sent as parameter d. Count divided by bytes per row gives the number of lines in the image. This number represents the size of the image, not necessarily the size of the data stream (see d).<br>*Default Value:* command is ignored if a value is not specified |

| Parameters | Details |
|---|---|
| `d` = bytes per row | *Accepted Values:* 1 to 99999<br>This is the number of bytes in the downloaded data that comprise one row of the image.<br>*Default Value:* command is ignored if a value is not specified |
| `data` = data | *Accepted Values:*<br>ASCII hexadecimal data: 00 to FF<br>A string of ASCII hexadecimal numbers, two digits per image byte. CR and LF can be inserted as needed for readability. The number of two-digit number pairs must match the above count. Any numbers sent after count is satisfied are ignored. A comma in the data pads the current line with *00* (white space), minimizing the data sent. `~DN` or any caret or tilde character prematurely aborts the download.<br>**Binary data:** Strictly binary data is sent from the host. All control prefixes are ignored until the total number of bytes needed for the graphic format is sent. |

**Example •** This example downloads 8,000 total bytes of data and places the graphic data at location 100,100 of the bitmap. The data sent to the printer is in ASCII form.

```
^FO100,100^GFA,8000,8000,80,ASCII data
```

**Example •** This example downloads 8,000 total bytes of data and places the graphic data at location 100,100 of the bitmap. The data sent to the printer is in binary form.

```
^FO100,100^GFB,8000,8000,80,Binary data
```

# ^GS

## Graphic Symbol

**Description** The `^GS` command enables you to generate the registered trademark, copyright symbol, and other symbols.

**Format** `^GSo,h,w`

This table identifies the parameters for this format:

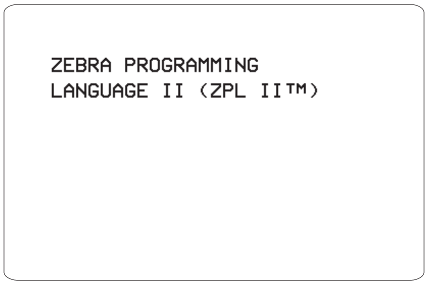
| Parameters | Details |
|---|---|
| `o` = field orientation | *Accepted Values:*<br>`N` = normal<br>`R` = rotate 90 degrees clockwise<br>`I` = inverted 180 degrees<br>`B` = bottom-up, 270 degrees<br>*Default Value:* N or last `^FW` value |
| h = character height proportional to width (in dots) | *Accepted Values:* 0 to 32000<br>*Default Value:* last `^CF` value |
| w = character width proportional to height (in dots) | *Accepted Values:* 0 to 32000<br>*Default Value:* last `^CF` value |

**Example** • Use the ^GS command followed by ^FD and the appropriate character (A through E) within the field data to generate the desired character:

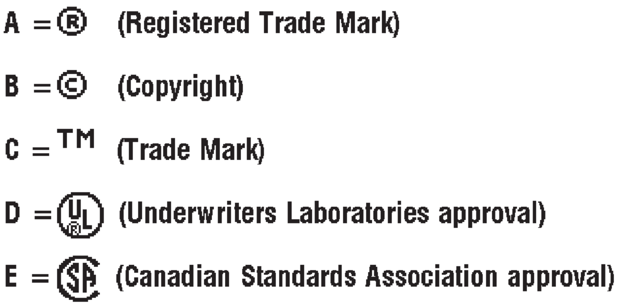
**ZPL II CODE**

```
^XA^CFD
^FO50,50
^FDZEBRA PROGRAMMING^FS
^FO50,75
^FDLANGUAGE II (ZPL II )^FS
^FO280,75
^GS^FDC^FS
^XZ
```

**GENERATED LABEL**



ZEBRA PROGRAMMING
LANGUAGE II (ZPL II™)


A = ® (Registered Trade Mark)
B = © (Copyright)
C = ™ (Trade Mark)
D = (Underwriters Laboratories approval)
E = (Canadian Standards Association approval)

# ~HB

## Battery Status

**Description** When the ~HB command is sent to the printer, a data string is sent back to the host. The string starts with an <STX> control code sequence and terminates by an <ETX><CR><LF> control code sequence.

! **Important** • This command only responds to mobile printers.

**Format** `~HB`

**Parameters:** when the printer receives the command, it returns:

```
<STX>bb.bb,hh.hh,bt<ETX><CR><LF>
```

| | | |
|---|---|---|
| <STX> | = | ASCII start-of-text character |
| bb.bb | = | current battery voltage reading to the nearest 1/4 volt |
| hh.hh | = | current head voltage reading to the nearest 1/4 volt |
| bt | = | battery temperature in Celsius |
| <ETX> | = | ASCII end-of-text character |
| <CR> | = | ASCII carriage return |
| <LF> | = | ASCII line feed character |

**Comments** This command is used for the power-supply battery of the printer and should not be confused with the battery backed-up RAM.

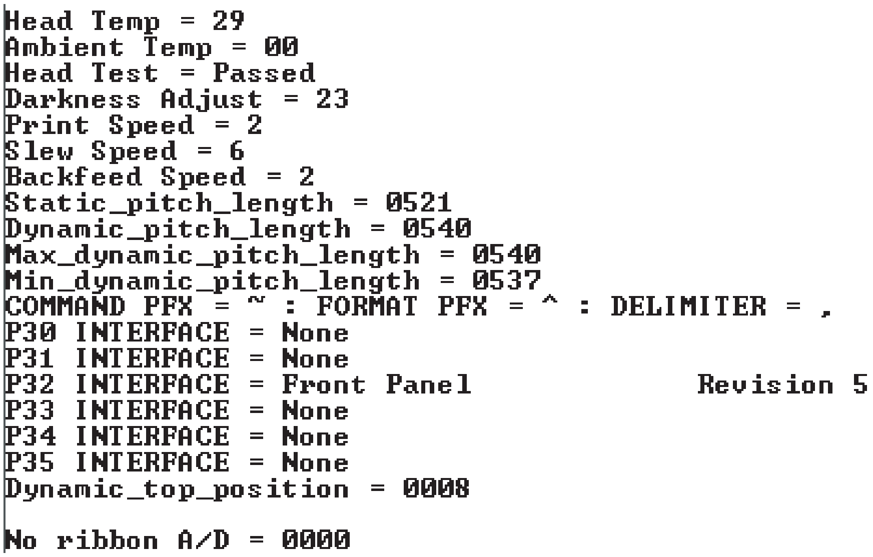
# ~HD

## Head Diagnostic

**Description** The ~HD command echoes printer status information that includes the power supply and head temperature using the terminal emulator.

**Format** ~HD

**Example •** This is an example of the ~HD command:



```
Head Temp = 29
Ambient Temp = 00
Head Test = Passed
Darkness Adjust = 23
Print Speed = 2
Slew Speed = 6
Backfeed Speed = 2
Static_pitch_length = 0521
Dynamic_pitch_length = 0540
Max_dynamic_pitch_length = 0540
Min_dynamic_pitch_length = 0537
COMMAND PFX = ~ : FORMAT PFX = ^ : DELIMITER = ,
P30 INTERFACE = None
P31 INTERFACE = None
P32 INTERFACE = Front Panel             Revision 5
P33 INTERFACE = None
P34 INTERFACE = None
P35 INTERFACE = None
Dynamic_top_position = 0008

No ribbon A/D = 0000
```

# ^HF

## Host Format

**Description** The ^HF command sends stored formats to the host.

**Format** `^HFd,o,x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = device to recall image | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |
| o = image name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Fixed Value:* .ZPL |

**Example •** This example shows the sequence and results.

Using a terminal emulator, you download this code to the printer:

```
^XA
^DFB:FILE1.ZPL
^FO100,100^A0,100
^FDTEST^FS
^XZ
```

Then you send this code to the printer:

```
^XA
^HFB:FILE1.ZPL
^XZ
```

The terminal emulator returns this code:

```
^XA^DFFILE1,
^FO100,100^A0,100^FDTEST^FS
^XZ
```

# ^HG

## Host Graphic

**Description** The ^HG command is used to upload graphics to the host. The graphic image can be stored for future use, or it can be downloaded to any Zebra printer.

**Format** `^HGd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = device location of object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* search priority |
| o = object name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Fixed Value:* .GRF |

**Comments** For more information on uploading graphics, see *^HY* on page 222.

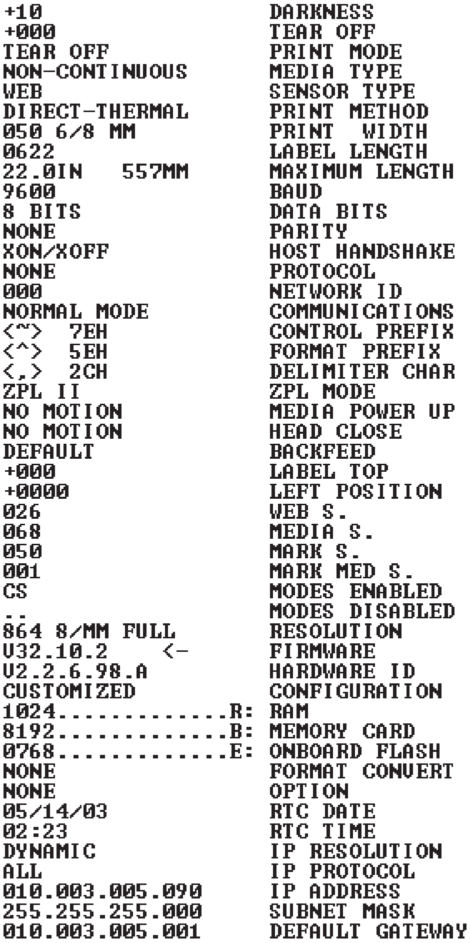
# ^HH

## Configuration Label Return

**Description** The `^HH` command echoes printer configuration back to the host, using a terminal emulator.

**Format** `^HH`

**Example •** This is an example of what is returned to the host when `^XA^HH^XZ` is sent to the printer:



```
+10                 DARKNESS
+000                TEAR OFF
TEAR OFF            PRINT MODE
NON-CONTINUOUS      MEDIA TYPE
WEB                 SENSOR TYPE
DIRECT-THERMAL      PRINT METHOD
050 6/8 MM          PRINT  WIDTH
0622                LABEL LENGTH
22.0IN   557MM      MAXIMUM LENGTH
9600                BAUD
8 BITS              DATA BITS
NONE                PARITY
XON/XOFF            HOST HANDSHAKE
NONE                PROTOCOL
000                 NETWORK ID
NORMAL MODE         COMMUNICATIONS
<~>  7EH            CONTROL PREFIX
<^>  5EH            FORMAT PREFIX
<,>  2CH            DELIMITER CHAR
ZPL II              ZPL MODE
NO MOTION           MEDIA POWER UP
NO MOTION           HEAD CLOSE
DEFAULT             BACKFEED
+000                LABEL TOP
+0000               LEFT POSITION
026                 WEB S.
068                 MEDIA S.
050                 MARK S.
001                 MARK MED S.
CS                  MODES ENABLED
..                  MODES DISABLED
864 8/MM FULL       RESOLUTION
V32.10.2    <-      FIRMWARE
V2.2.6.98.A         HARDWARE ID
CUSTOMIZED          CONFIGURATION
1024.............R: RAM
8192.............B: MEMORY CARD
0768.............E: ONBOARD FLASH
NONE                FORMAT CONVERT
NONE                OPTION
05/14/03            RTC DATE
02:23               RTC TIME
DYNAMIC             IP RESOLUTION
ALL                 IP PROTOCOL
010.003.005.090     IP ADDRESS
255.255.255.000     SUBNET MASK
010.003.005.001     DEFAULT GATEWAY
```

# ~HI

## Host Identification

**Description** The `~HI` command is designed to be sent from the host to the Zebra printer to retrieve information. Upon receipt, the printer responds with information on the model, software version, dots-per-millimeter setting, memory size, and any detected objects.

**Format** `~HI`

When the printer receives this command, it returns:

```
XXXXXX,V1.0.0,dpm,000KB,X
```

**XXXXXX = model of Zebra printer**

**V1.0.0** = version of software

**dpm = dots/mm**

6, 8, 12, or 24 dots/mm printheads

**000KB = memory**

| | | |
|---|---|---|
| `512KB` | = | 1/2 MB |
| `1024KB` | = | 1 MB |
| `2048KB` | = | 2 MB |
| `4096KB` | = | 4 MB |
| `8192KB` | = | 8 MB |

**x = recognizable objects**

only options specific to printer are shown (cutter, options, et cetera.)

# ~HM

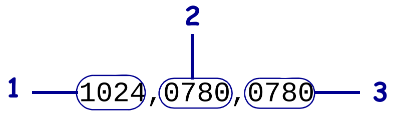
## Host RAM Status

**Description** Sending `~HM` to the printer immediately returns a memory status message to the host. Use this command whenever you need to know the printer's RAM status.

When `~HM` is sent to the Zebra printer, a line of data containing information on the total amount, maximum amount, and available amount of memory is sent back to the host.

**Format** `~HM`

**Example •** This example shows when the `~HM` is sent to the printer, a line of data containing three numbers are sent back to the host. Each set of numbers is identified and explained in the table that follows:



| | |
|---|---|
| 1 | The total amount of RAM (in kilobytes) installed in the printer. In this example, the printer has 1024K RAM installed. |
| 2 | The maximum amount of RAM (in kilobytes) available to the user. In this example, the printer has a maximum of 780K RAM available. |
| 3 | The amount of RAM (in kilobytes) currently available to the user. In this example, there is 780K of RAM in the printer currently available to the user. |

**Comments** Memory taken up by bitmaps is included in the currently available memory value (due to `^MCN`).

Downloading a graphic image, fonts, or saving a bitmap affects only the amount of RAM. The total amount of RAM and maximum amount of RAM does not change after the printer is turned on.

# ~HQ

## Host Query

**Description** The ~HQ command group requests information from the printer. This command is only supported on printers using firmware V60.15.8Z and V53.15.5Z, and later.

**Format** `~HQquery-type`

This table identifies the parameters for this format:

| Parameter | Details |
|---|---|
| `query-type` | For detailed examples of these parameters, see *~HQ Examples on page 212*.<br>*Accepted Values:*<br>`MA` = maintenance alert settings<br>`MI` = maintenance information<br>`OD` = odometer<br>`PH` = printhead life history<br>*Default Value:* must be an accepted value or the command is ignored |

**Comments** The response to the `~HQ` command starts with STX, a CR LF is inserted between each line, and the response ends with ETX.

## ~HQ Examples

**Example** • This is an example of how to use the maintenance alert query for the `~HQ` command.

1. To get the current settings, type `~HQMA`.
   The printer responds with data similar to this:

```
~HQMA
   MAINTENANCE ALERT SETTINGS
   HEAD REPLACEMENT INTERVAL:      1 km
   HEAD REPLACEMENT FREQUENCY:     0 M
   HEAD CLEANING INTERVAL:         0 M
   HEAD CLEANING FREQUENCY:        0 M
   PRINT REPLACEMENT ALERT:         NO
   PRINT CLEANING ALERT:            NO
   UNITS:                            C
```

**Example** • This is an example of how to use the maintenance information query for the `~HQ` command. Note that the message is controlled by the `^MI` command.

1. To get the current settings, type `~HQMI`.
   The printer responds with data similar to this:

```
MAINTENANCE ALERT MESSAGES
   CLEAN: PLEASE CLEAN PRINT HEAD
   REPLACE: PLEASE REPLACE PRINT HEAD
```

**Example •** This is an example of how to use the odometer query for the `~HQ` command. Note that the units of measure are controlled by the `^MA` command. Also, if the "Early Warning Maintenance State" is turned "ON" the printer response would also list LAST CLEANED and CURRENT PRINTHEAD LIFE counters.

1. To get the current settings, type `~HQOD`.

   The printer responds with data similar to this:

```
PRINT METERS
   TOTAL NONRESETTABLE:         8560 "
   USER RESETTABLE CNTR1:          9 "
   USER RESETTABLE CNTR2:       8560 "
```

   The units of measure are set to inches.

2. To change the units of measure to centimeters, type:

```
   ^XA^MA,,,,C
   ^XZ
```

   The units of measure are set to centimeters.

3. To check the settings, type `~HQOD.`
   The printer responds with data similar to this:

```
PRINT METERS
   TOTAL NONRESETTABLE:        21744 cm
   USER RESETTABLE CNTR1:         24 cm
   USER RESETTABLE CNTR2:      21744 cm
```

**Example •** This is an example of how to use the printhead life query for the `~HQ` command. Note that the units of measure are controlled by the `^MA` command.

1. To get the current settings, type `~HQPH`.
   The printer responds with data similar to this:

```
LAST CLEANED: 257 "
HEAD LIFE HISTORY
   #   DISTANCE
   1:         257 "            1
   2:        1489 "
   3:        7070 "            2
```

| | |
|---|---|
| **1** | The current life of the print head. |
| **2** | Line items 2 through 10 (the example only shows 2 through 3) tracks the measurement for each time the print head is changed. |

# ~HS

## Host Status Return

**Description** When the host sends `~HS` to the printer, the printer sends three data strings back. Each string starts with an <`STX`> control code and is terminated by an <`ETX`><`CR`><`LF`> control code sequence. To avoid confusion, the host prints each string on a separate line.

**Note •** When a `~HS` command is sent, the printer will not send a response to the host if the printer is in one of these conditions:

- MEDIA OUT
- RIBBON OUT
- HEAD OPEN
- REWINDER FULL
- HEAD OVER-TEMPERATURE

**String 1** `<STX>aaa,b,c,dddd,eee,f,g,h,iii,j,k,l<ETX><CR><LF>`

| | | |
|---|---|---|
| **aaa** | = | communication (interface) settings* |
| **b** | = | paper out flag (1 = paper out) |
| **c** | = | pause flag (1 = pause active) |
| **dddd** | = | label length (value in number of dots) |
| **eee** | = | number of formats in receive buffer |
| **f** | = | *buffer full* flag (1 = receive buffer full) |
| **g** | = | *communications diagnostic mode* flag (1 = diagnostic mode active) |
| **h** | = | *partial format* flag (1 = partial format in progress) |
| **iii** | = | unused (always 000) |
| **j** | = | *corrupt RAM* flag (1 = configuration data lost) |
| **k** | = | temperature range (1 = under temperature) |
| **l** | = | temperature range (1 = over temperature) |

* This string specifies the printer's baud rate, number of data bits, number of stop bits, parity setting, and type of handshaking. This value is a three-digit decimal representation of an eight-bit binary number. To evaluate this parameter, first convert the decimal number to a binary number.

The nine-digit binary number is read according to this table:

| aaa = $a^8$ $a^7$ $a^6$ $a^5$ $a^4$ $a^3$ $a^2$ $a^1$ $a^0$ | |
|---|---|
| $a^7$ = Handshake<br>0 = Xon/Xoff<br>1 = DTR | $a^8$ $a^2 a^1 a^0$ = Baud<br><br>0 000 = 110<br>0 001 = 300<br>0 010 = 600<br>0 011 = 1200<br>0 100 = 2400<br>0 101 = 4800<br>0 110 = 9600<br>0 111 = 19200<br>1 000 = 28800 *(available only on certain printer models)*<br>1 001 = 38400 *(available only on certain printer models)*<br>1 010 = 57600 *(available only on certain printer models)*<br>1 011 = 14400 |
| $a^6$ = Parity Odd/Even<br>0 = Odd<br>1 = Even | |
| $a^5$ = Disable/Enable<br>0 = Disable<br>1 = Enable | |
| $a^4$ = Stop Bits<br>0 = 2 Bits<br>1 = 1 Bit | |
| $a^3$ = Data Bits<br>0 = 7 Bits<br>1 = 8 Bits | |

**String 2** `<STX>mmm,n,o,p,q,r,s,t,uuuuuuuu,v,www<ETX><CR><LF>`

| | | |
|---|---|---|
| **`mmm`** | = | function settings* |
| `n` | = | unused |
| `o` | = | *head up* flag (1 = head in up position) |
| `p` | = | *ribbon out* flag (1 = ribbon out) |
| `q` | = | *thermal transfer mode* flag (1 = Thermal Transfer Mode selected) |
| `r` | = | Print Mode<br>`0` = Rewind<br>`1` = Peel-Off<br>`2` = Tear-Off<br>`3` = Cutter<br>`4` = Applicator<br>`5` = Delayed cut<br>`6` = Reserved **<br>`7` = Reserved ** |
| `s` | = | print width mode |
| `t` | = | *label waiting* flag (1 = label waiting in Peel-off Mode) |
| `uuuuuuuu` | = | labels remaining in batch |
| `v` | = | *format while printing* flag (always 1) |
| `www` | = | number of graphic images stored in memory |

* This string specifies the printer's media type, sensor profile status, and communication diagnostics status. As in String 1, this is a three-digit decimal representation of an eight-bit binary number. First, convert the decimal number to a binary number.

** These values are only supported on the Zebra ZM400/ZM600™ printer.

The eight-digit binary number is read according to this table:

| mmm = m7 m6 m5 m4 m3 m2 m1 m0 | |
|---|---|
| m7 = Media Type<br>0 = Die-Cut<br>1 = Continuous | m4 m3 m2 m1 = Unused<br>0 = Off<br>1 = On |
| m6 = Sensor Profile<br>0 = Off | m0 = Print Mode<br>0 = Direct Thermal<br>1 = Thermal Transfer |
| m5 = Communications Diagnostics<br>0 = Off<br>1 = On | |

**String 3** `<STX>xxxx,y<ETX><CR><LF>`

| | | |
|---|---|---|
| xxxx | = | password |
| y | = | 0 (static RAM not installed) |
| | | 1 (static RAM installed) |

# ^HT

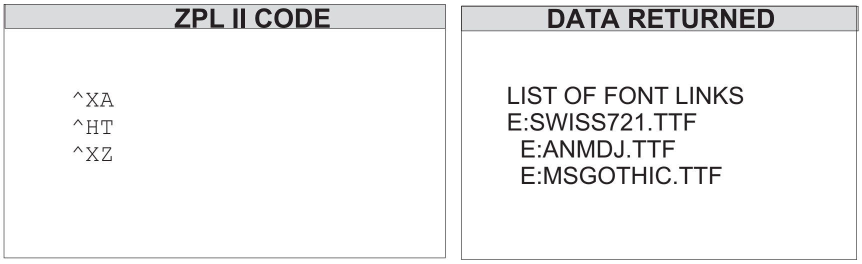
## Host Linked Fonts List

.14↑

This command is available only for printers with firmware version V60.14.x, V50.14.x, or later.

**Description** The ^HT command receives the complete list of font links over a communication port.

**Example •** The SWISS.721.TTF is the base font, ANMDJ.TTF is the first linked font, and MSGOTHIC.TTF is the second linked font:



ZPL II CODE

```
^XA
^HT
^XZ
```

DATA RETURNED

```
LIST OF FONT LINKS
E:SWISS721.TTF
  E:ANMDJ.TTF
  E:MSGOTHIC.TTF
```

This is the code that was used to establish the font links:

```
^XA
^FLE:ANMDJ.TTF,E:SWISS721.TTF,1^FS
^FLE:MSGOTHIC.TTF,E:SWISS721.TTF,1^FS
^XZ
```

# ~HU

## Return ZebraNet Alert Configuration

**Description** This command returns the table of configured ZebraNet Alert settings to the host.

**Format** `~HU`

**Example** • If the `~HU` command is sent to the printer with existing Alert messages set to go to e-mail and SNMP traps, the data returned would look something like the information below. See *^SX* on page 333 for complete information on the individual parameter settings.

```
B,C,Y,Y,ADMIN@COMPANY.COM,0
J,F,Y,Y,,0
C,F,Y,Y,,0
D,F,Y,Y,,0
E,F,Y,N,,0
F,F,Y,N,,0
H,C,Y,N,ADMIN@COMPANY.COM,0
N,C,Y,Y,ADMIN@COMPANY.COM,0
O,C,Y,Y,ADMIN@COMPANY.COM,0
P,C,Y,Y,ADMIN@COMPANY.COM,0
```

**Important** • If there are no `^SX` (alerts) set, the printer will not respond to the `~HU` command.

The first line indicates that condition B (ribbon out) is routed to destination C (e-mail address).

The next two characters, Y and Y, indicate that the *condition set* and *condition clear* options have been set to `yes`.

The following entry is the destination that the Alert e-mail should be sent to; in this example it is `admin@company.com`.

The last figure seen in the first line is 0, which is the port number.

Each line shows the settings for a different Alert condition as defined in the `^SX` command.

# ^HV

## Host Verification

**Description** This command is used to return data from specified fields, along with an optional ASCII header, to the host computer. The command can be used with any field that has been assigned a number with the `^RT` command or the `^FN` and `^RF` commands.

**Format** `^HV#,n,h`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `#` = field number specified with another command | The value assigned to this parameter should be the same as the one used in another command.<br>*Accepted Values:* `0` to `9999`<br>*Default Value:* `0` |
| `n` = number of bytes to be returned | *Accepted Values:* `1` to `256`<br>*Default Value:* `64` |
| `h` = header | Header to be returned with the data.<br>*Accepted Values:* `0` to `3072` bytes<br>*Default Value:* no header |

# ^HW

## Host Directory List

**Description** ^HW is used to transmit a directory listing of objects in a specific memory area (storage device) back to the host device. This command returns a formatted ASCII string of object names to the host.

Each object is listed on a line and has a fixed length. The total length of a line is also fixed. Each line listing an object begins with the asterisk (*) followed by a blank space. There are eight spaces for the object name, followed by a period and three spaces for the extension. The extension is followed by two blank spaces, six spaces for the object size, two blank spaces, and three spaces for option flags (reserved for future use). The format looks like this:

```
<STX><CR><LF>
DIR R: <CR><LF>
*Name.ext(2sp.)(6 obj. sz.)(2sp.)(3 option flags)
*Name.ext(2sp.)(6 obj. sz.)(2sp.)(3 option flags)
<CR><LF>
-xxxxxxx bytes free
<CR><LF>
<ETX>
<STX> = start of text
<CR><LR> = carriage return/line feed
<ETX> = end on text
```

The command might be used in a stand-alone file to be issued to the printer at any time. The printer returns the directory listing as soon as possible, based on other tasks it might be performing when the command is received.

This command, like all ^ (caret) commands, is processed in the order that it is received by the printer.

**Format** `^HWd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = location to retrieve object listing | *Accepted Values:* R:, E:, B:, A: and Z:<br>*Default Value:* R: |
| o = object name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* asterisk (*). A question mark (?) can also be used. |
| x = extension | *Accepted Values:* any extension conforming to Zebra conventions<br>*Default Value:* asterisk (*). A question mark (?) can also be used. |

**Example** • Listed is an example of the `^HW` command to retrieve from information `R:`

```
^XA
^HWR:*.*
^XZ
```

**Example** • The printer returned this information as the Host Directory Listing:`-DIR R:*.*`

```
*R:ARIALN1.FNT 49140
*R:ARIALN2.FNT 49140
*R:ARIALN3.FNT 49140
*R:ARIALN4.FNT 49140
*R:ARIALN.FNT 49140
*R:ZEBRA.GRF 8420
-794292 bytes free R:RAM
```

# ^HY

## Upload Graphics

**Description** The ^HY command is an extension of the ^HG command. ^HY is used to upload graphic objects from the printer in any supported format.

**Format** `^HYd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = location of object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* search priority |
| o = object name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* an object name must be specified |
| x = extension | *Accepted Values:*<br>G = .GRF (raw bitmap format)<br>P = .PNG (compressed bitmap format)<br>*Default Value:* format of stored image |

**Comments** The image is uploaded in the form of a ~DY command. The data field of the returned ~DY command is always encoded in the ZB64 format.

# ^HZ

## Display Description Information

**Description** The `^HZ` command is used for returning printer description information in XML format. The printer returns information on format parameters, object directories, individual object data, and print status information.

**Format** `^HZb`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `b` = display description to return | *Accepted Values:*<br>`a` = display all information<br>`f` = display printer format setting information<br>`l` = display object directory listing information<br>`o` = display individual object data information<br>`r` = display printer status information<br>*Default Value:* if the value is missing or invalid, the command is ignored |

**Format** `^HZO,d:o.x,l`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = location of stored object | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = object name | *Accepted Values:* `1` to `8`, or `1` to `16` alphanumeric characters based on parameter **`l`**.<br>*Default Value:* if a name is not specified, `UNKNOWN` is used. |

| Parameters | Details |
|---|---|
| x = extension | Supported extensions for objects (parameter o) include:<br>.FNT — font<br>.GRF — graphic<br>.PNG — compressed graphic<br>.ZPL — stored format<br>.DAT — encoding table<br>.ZOB — downloadable object<br>.STO — Alert data file |
| l = long filename support | *Accepted Values:*<br>Y = Yes<br>If Y, the object data stores the filename as 16 characters. The data is only compatible with firmware version V60.13.0.5, or later.<br>N = No<br>If N, the object data stores the filename as 8 characters. The data is forward and backward compatible with all versions of firmware.<br>*Default Value:* N |

**Example •** This example shows the object data information for the object SAMPLE.GRF located on R:.

```
^XA
^HZO,R:SAMPLE.GRF
^XZ
```

# ^ID

## Object Delete

**Description** The ^ID command deletes objects, graphics, fonts, and stored formats from storage areas. Objects can be deleted selectively or in groups. This command can be used within a printing format to delete objects before saving new ones, or in a stand-alone format to delete objects.

The image name and extension support the use of the asterisk (*) as a wild card. This allows you to easily delete a selected groups of objects.

**Format** `^IDd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = location of stored object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |
| o = object name | *Accepted Values:* any 1 to 8 character name<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Accepted Values:* any extension conforming to Zebra conventions<br>*Default Value:* .GRF |

**Example** • To delete stored formats from DRAM:

```
^XA
^IDR:*.ZPL^FS
^XZ
```

**Example** • To delete formats and images named SAMPLE from DRAM, regardless of the extension:

```
XA
^IDR:SAMPLE.*^FS
^XZ
```

**Example** • To delete the image SAMPLE1.GRF prior to storing SAMPLE2.GRF:

```
^XA
^FO25,25^AD,18,10
^FDDelete^FS
^FO25,45^AD,18,10
^FDthen Save^FS
^IDR:SAMPLE1.GRF^FS
^ISR:SAMPLE2.GRF^FS^XZ
```

**Example** • In this the * is a wild card, indicating that all objects with the .GRF extension are deleted:

```
^XA
^IDR:*.GRF^FS
^XZ
```

**Comments** When an object is deleted from R:, the object can no longer be used and memory is available for storage. This applies only to R: memory. With the other memory types (A:, B:, E:) the deleted object is no longer available. The memory space recovers when an automatic defragmentation or initiallization occurs.

The ^ID command also frees up the uncompressed version of the object in DRAM.

If the name is specified as *.ZOB, all downloaded bar code fonts (or other objects) are deleted.

If the named downloadable object cannot be found in the R:, E:, B:, and A: device, the ^ID command is ignored.

# ^IL

## Image Load

**Description** The `^IL` command is used at the beginning of a label format to load a stored image of a format and merge it with additional data. The image is always positioned at `^FO0,0`.

**Important •** See ^IS on page 230.

Using this technique to overlay the image of constant information with variable data greatly increases the throughput of the label format.

**Format** `^ILd:o.x`

This table identifies the parameters for this format:

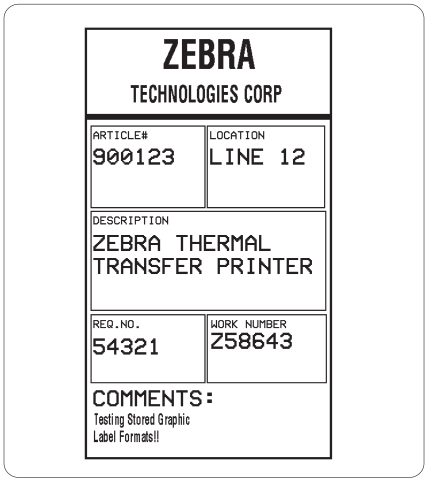
| Parameters | Details |
|---|---|
| `d` = location of stored object | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = object name | *Accepted Values:* `1` to `8` alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| `x` = extension | *Fixed Value:* `.GRF`, `.PNG` |

**Example •** This example recalls the stored image `SAMPLE2.GRF` from DRAM and overlays it with the additional data. The graphic was stored using the `^IS` command. For the stored label format, see the *^IS* on page 230 command.

ZPL II CODE

```
^XA
^ILR:SAMPLE2.GRF^FS
^CFD,36,20
^FO15,210
^FD900123^FS
^FO218,210
^FDLINE 12^FS
^FO15,360^AD
^FDZEBRA THERMAL^FS
^FO15,400^AD
^FDTRANSFER PRINTER^FS
^FO15,540
^FD54321^FS
^FO220,530
^FDZ58643^FS
^FO15,670^A0,27,18
^FDTesting Stored Graphic^FS
^FO15,700^A0,27,18
^FDLabel Formats!!^FS
^XZ
```

GENERATED LABEL



ZEBRA
TECHNOLOGIES CORP

ARTICLE#
900123

LOCATION
LINE 12

DESCRIPTION
ZEBRA THERMAL
TRANSFER PRINTER

REQ.NO.
54321

WORK NUMBER
Z58643

COMMENTS:
Testing Stored Graphic
Label Formats!!

# ^IM

## Image Move

**Description** The ^IM command performs a direct move of an image from storage area into the bitmap. The command is identical to the ^XG command (Recall Graphic), except there are no sizing parameters.

**Format** ^IMd:o.x

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = location of stored object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* search priority |
| o = object name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Fixed Value:* .GRF, .PNG |

**Example •** This example moves the image SAMPLE.GRF from DRAM and prints it in several locations in its original size.

```
^XA
^FO100,100^IMR:SAMPLE.GRF^FS
^FO100,200^IMR:SAMPLE.GRF^FS
^FO100,300^IMR:SAMPLE.GRF^FS
^FO100,400^IMR:SAMPLE.GRF^FS
^FO100,500^IMR:SAMPLE.GRF^FS
^XZ
```

**Comments** By using the ^FO command, the graphic image can be positioned anywhere on the label.

The difference between ^IM and ^XG: ^IM does not have magnification, and therefore might require less formatting time. However, to take advantage of this, the image must be at a 8-, 16-, or 32-bit boundary.

# ^IS

## Image Save

**Description** The ^IS command is used within a label format to save that format as a graphic image, rather than as a ZPL II script. It is typically used toward the end of a script. The saved image can later be recalled with virtually no formatting time and overlaid with variable data to form a complete label.

Using this technique to overlay the image of constant information with the variable data greatly increases the throughput of the label format.

! **Important** • See *^IL* on page 227.

**Format** `^ISd:o.x,p`

This table identifies the parameters for this format:

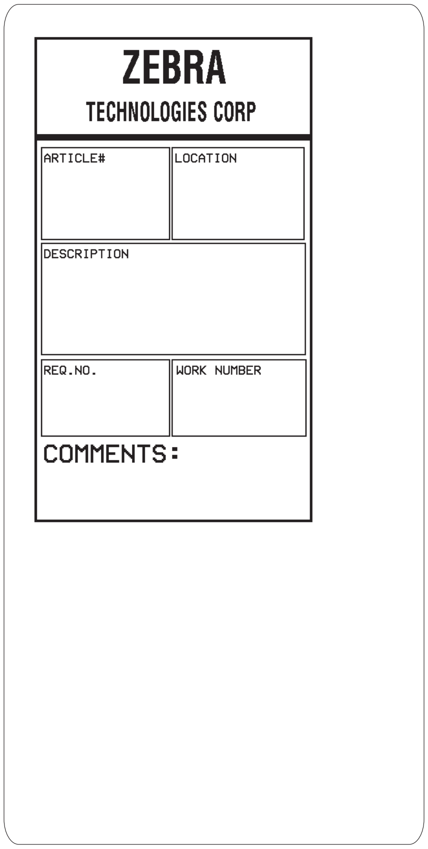
| Parameters | Details |
|---|---|
| d = location of stored object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* R: |
| o = object name | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension | *Accepted Values:* .GRF or .PNG<br>*Default Value:* .GRF |
| p = print image after storing | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y |

**Example •** This is an example of using the `^IS` command to save a label format to DRAM. The name used to store the graphic is `SAMPLE2.GRF`.

**ZPL II CODE**

```
^XA
^LH10,15^FWN^BY3,3,85^CFD,36
^GB430,750,4^FS
^FO10,170^GB200,144,2^FS
^FO10,318^GB410,174,2^FS
^FO212,170^GB206,144,2^FS
^FO10,498^GB200,120,2^FSR
^FO212,498^GB209,120,2^FS
^FO4,150^GB422,10,10^FS
^FO135,20^A0,70,60
^FDZEBRA^FS
^FO80,100^A0,40,30
^FDTECHNOLOGIES CORP^FS
^FO15,180^CFD,18,10^FS
^FDARTICLE#^FS
^FO218,180
^FDLOCATION^FS
^FO15,328
^FDDESCRIPTION^FS
^FO15,508
^FDREQ.NO.^FS
^FO220,508
^FDWORK NUMBER^FS
^FO15,630^AD,36,20
^FDCOMMENTS:^FS
^ISR:SAMPLE2.GRF,Y
^XZ
```

**GENERATED LABEL**



# ~JA

## Cancel All

**Description** The ~JA command cancels all format commands in the buffer. It also cancels any batches that are printing.

The printer stops after the current label is finished printing. All internal buffers are cleared of data and the DATA LED turn off.

Submitting this command to the printer scans the buffer and deletes only the data before the ~JA in the input buffer — it does not scan the remainder of the buffer for additional ~JA commands.

**Format** `~JA`

# ^JB

## Initialize Flash Memory

**Description** The ^JB command is used to initialize various types of Flash memory available in the Zebra printers.

**Format** ^JBa

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = device to initialize | *Acceptable Values:*<br>A = Option Flash memory<br>B = Flash card (PCMCIA)<br>E = internal Flash memory<br>*Default Value:* a device must be specified |

**Example** • This is an example of initializing the different types of flash memory:

^JBA – initializes initial Compact Flash memory when installed in the printer.

^JBB – initializes the optional Flash card when installed in the printer.

^JBE – initializes the optional Flash memory when installed in the printer.

**Note** • Initializing memory can take several minutes. Be sure to allow sufficient time for the initialization to complete before power cycling the printer.

# ~JB

## Reset Optional Memory

**Description** The `~JB` command is used for these conditions:

- The `~JB` command must be sent to the printer if the battery supplying power to the battery powered memory card fails and is replaced. A bad battery shows a *battery dead* condition on the Printer Configuration Label.
- The `~JB` command can also be used to intentionally clear (reinitialize) the `B:` memory card. The card must **not** be write protected.

**Format** `~JB`

**Comments** If the battery is replaced and this command is not sent to the printer, the memory card cannot function.

# ~JC

## Set Media Sensor Calibration

**Description** The `~JC` command is used to force a label length measurement and adjust the media and ribbon sensor values.

**Format** `~JC`

**Comments** In Continuous Mode, only the media and ribbon sensors are calibrated.

# ~JD

## Enable Communications Diagnostics

**Description** The `~JD` command initiates Diagnostic Mode, which produces an ASCII printout (using current label length and full width of printer) of all characters received by the printer. This printout includes the ASCII characters, the hexadecimal value, and any communication errors.

**Format** `~JD`

# ~JE

## Disable Diagnostics

**Description** The `~JE` command cancels Diagnostic Mode and returns the printer to normal label printing.

**Format** `~JE`

# ~JF

## Set Battery Condition

**Description** There are two low battery voltage levels sensed by the *PA*/*PT400*™ printers. When battery voltage goes below the first level, the green LED begins flashing as a warning but printing continues. When this warning occurs, it is recommended to recharge the battery.

As printing continues, a second low voltage level is reached. At this point, both green and orange LEDs flash as a warning, and printing automatically pauses.

When pause on low voltage is active (`~JFY`) and the battery voltage level falls below the second *low voltage* level, printing pauses and an error condition is displayed as an indication that the printer should be plugged into the battery charger. By pressing FEED, printing continues on a label-by-label basis, but there is a high risk of losing label format information due to the continued decrease of battery voltage.

When pause on low voltage is not active (`~JFN`), and the battery voltage level falls below the second *low voltage* level, printing continues and the orange LED remains off. If the battery voltage continues to decrease, label information could be lost and cause the printer to stop operating. This option should be selected only when the printer is connected to the Car Battery Adapter. From time to time the printer might sense that battery voltage is below the first *low voltage* level, but due to the continuous recharging of the car battery, further loss of battery voltage is not a concern and printing continues.

If this option is not selected when using the Car Battery Adapter, you might need to press FEED to take the printer out of Pause Mode and print each label.

**Format** `~JFp`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `p` = pause on low voltage | *Accepted Values:* `Y` (pause on low voltage) or `N` (do not pause)<br>`N` is suggested when the printer is powered by the Car Battery Adapter.<br>*Default Value:* `Y` |

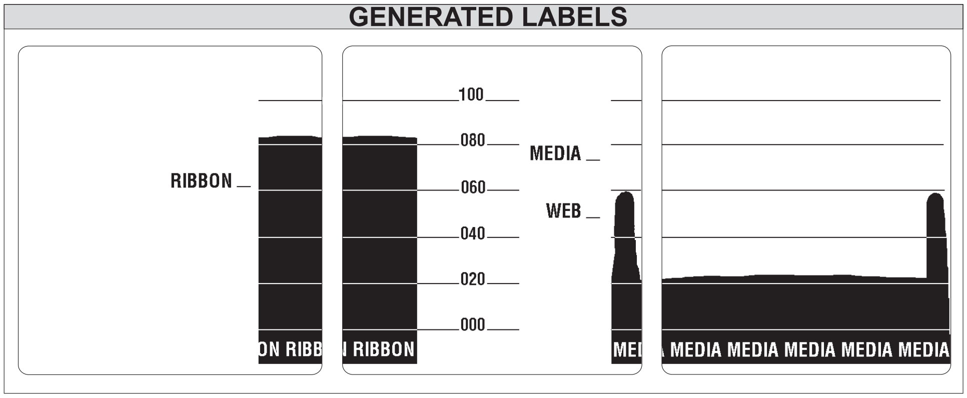
# ~JG

## Graphing Sensor Calibration

**Description** The ~JG command prints a graph (media sensor profile) of the sensor values.

**Format** ~JG

**Example •** Sending the ~JG command to a printer configured for thermal transfer produces a series of labels resembling this image:



# ^JH

## Early Warning Settings

**Description** The `^JH` command configures the early warning messages that appear on the LCD. This command is supported on the Zebra *Xi*III™, *PAX*4™, ZM400/ZM600™, and S4M™ printers.

**Important •** These are parameter and printer specific things to be aware of:

- Parameters `a` through `e` are only supported on the Zebra *Xi*III*Plus*™ and PAX series printers. The remaining parameters are supported on Zebra *Xi*III™, *PAX*4™, ZM400/ZM600™, and S4M™ printers.

**Format** `^JHa,b,c,d,e,f,g,h,i,j`

This table identifies the parameters for this format:

| Parameter | Details |
|---|---|
| `a` = early warning media | *Accepted Values:*<br>`E` = enable<br>`D` = disable<br>*Default Value:* `D` |
| `b` = labels per roll | *Accepted Values:* `100` to `9999`<br>*Default Value:* 900 |
| `c` = media replaced | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*Default Value:* `N` |
| `d` = ribbon length | The accepted values for the *XiIII* series printers are 100M through 450M. *PAX*4 printers allow for values up to 900M.<br>*Accepted Values:*<br>`0` = 100M<br>`1` = 150M<br>`2` = 200M<br>`3` = 250M<br>`4` = 300M<br>`5` = 350M<br>`6` = 400M<br>`7` = 450M<br>`8` = 500M<br>`9` = 550M<br>`10` = 600M<br>`11` = 650M<br>`12` = 700M<br>`13` = 750M<br>`14` = 800M<br>`15` = 850M<br>`16` = 900M<br>*Default Value:* `7` |

| Parameter | Details |
|---|---|
| e = ribbon replaced | *Accepted Values:*<br>Y = yes<br>N = no<br>*Default Value:* N |
| f = early warning maintenance | *Accepted Values:*<br>E = enabled<br>D = disabled<br>*Default Value:* D |
| g = head cleaning interval | **Accepted value exceptions:** accepted values for *Xi*III printer are 100M through 450M; accepted values for 600 dpi *Xi*III printers are 100M through 150M; accepted values for *PAX*4 series printers can accept values up to 900M by increments of 50M; accepted values for ZM400/ZM600 and S4M printers are 0M through 450M.<br>*Accepted Values:*<br>0 = 100M<br>1 = 150M (default for 96XiIII)<br>2 = 200M<br>3 = 250M<br>4 = 300M<br>5 = 350M<br>6 = 400M<br>7 = 450M (default for all except 96XiIII)<br>8 = 500M<br>9 = 550M<br>10= 600M<br>11 = 650M<br>12 = 700M<br>13 = 750M<br>14 = 800M<br>15 = 850M<br>16 = 900M<br>*Default Value:* see above |
| h = head clean | *Accepted Values:*<br>N = No<br>Y = Yes<br>*Default Value:* N |
| i = head life threshold | *Accepted Values:*<br>0 – 0 in or off<br>100-3500000 in<br>*Default Value:* 1000000 |
| j = head replaced | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |

**Comments** To permanently save the changes to the ^JH command, send ^XA^JUS^XZ.

# ^JI

## Start ZBI (Zebra BASIC Interpreter)

.16↑ Identifies features that are available in printers with firmware version V60.16.x, V53.16.x, or later.

**Description** `^JI` works much like the `~JI` command. Both commands are sent to the printer to initialize the Zebra BASIC Interpreter.

In interactive mode, `^JI` can be sent through one of the communication ports (serial, parallel, or Ethernet) to initialize the printer to receive ZBI commands. In interactive mode, `^JI` can be sent through one of the communication ports (serial, parallel, or Ethernet) to initialize the printer to receive ZBI commands. This command can be sent from one of the Zebra software utilities, such as ZTools, or from a terminal emulation program.

When the command is received, the printer responds by sending a ZBI header back to the console, along with the program version number. This indicates that the interpreter is active.

**Format** `^JId:o.x,b,c,d`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = location of program to run after initialization | *Acceptable Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* location must be specified |
| `o` = name of program to run after initialization | *Accepted Values:* any valid program name<br>*Default Value:* name must be specified |
| `x` = extension of program to run after initialization<br>`.`BAE is only supported in firmware version V60.16.x or later | *Fixed Value:* `.BAS`, `.BAE` |
| `b` = console control | *Accepted Values:*<br>`Y` = console on<br>`N` = console off<br>*Default Value:* `Y` |
| `c` = echoing control | *Accepted Values:*<br>`Y` = echo on<br>`N` = echo off<br>*Default Value:* `Y` |
| `d` = memory allocation for ZBI * | *Accepted Values:* `20K` to `1024K`<br>*Default Value*: `50K` |

* This parameter is only available on printers with firmware V60.12.0.x or earlier.

**Comments** When the printer is turned on, it can receive ZPL II commands and label formats. However, for the printer to recognize ZBI commands and programs, it must be initialized using `^JI` or `~JI`.

Only one ZBI interpreter can be active in the printer at a time. If a second `^JI` or `~JI` command is received while the interpreter is running, the command is ignored.

The interpreter is deactivated by entering one of two commands:

`ZPL` at the ZBI prompt

`~JQ` at an active ZPL port

# ~JI

## Start ZBI (Zebra BASIC Interpreter)

.16↑ Identifies features that are available in printers with firmware version V60.16.x, V53.16.x, or later.

**Description** `~JI` works much like the `^JI` command. Both commands are sent to the printer to initialize the Zebra BASIC Interpreter.

In interactive mode, `~JI` can be sent through one of the communication ports (serial, parallel, or Ethernet) to initialize the printer to receive ZBI commands. This command can be sent from one of the Zebra software utilities, such as ZTools, or from a standard PC program, such as Hyper terminal.

When the command is received, the printer responds by sending a ZBI header back to the console, along with the program version number. This indicates that the interpreter is active.

**Format** `~JI`

**Comments** While receiving commands, the printer *echoes* the received characters back to the source. This can be toggled on and off with the ZBI ECHO command.

When the printer is turned on, it can receive ZPL II commands and label formats. However, for the printer to recognize ZBI commands and formats, it must be initialized using `^JI` or `~JI`.

Only one ZBI interpreter can be active in the printer at a time. If a second `~JI` or `^JI` command is received while the interpreter is running, the command is ignored.

The interpreter is deactivated by entering one of these commands:

`ZPL` at the ZBI prompt

`~JQ` at an active ZPL port

# ^JJ

## Set Auxiliary Port

**Description** The `^JJ` command allows you to control an online verifier or applicator device.

**Format** `^JJa,b,c,d,e,f`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = operational mode for auxiliary port | *Accepted Values:*<br>`0` = off<br>`1` = reprint on error—the printer stops on a label with a verification error. When PAUSE is pressed, the label reprints (if `^JZ` is set to reprint). If a bar code is near the upper edge of a label, the label feeds out far enough for the bar code to be verified and then backfeeds to allow the next label to be printed and verified.<br>`2` = maximum throughput—the printer stops when a verification error is detected. The printer starts printing the next label while the verifier is still checking the previous label. This mode provides maximum throughput, but does not allow the printer to stop immediately on a label with a verification error.<br>*Default Value:* `0` |
| `b` = application mode | *Accepted Values:*<br>`0` = off<br>`1` = End Print signal normally high, and low only when the printer is moving the label forward.<br>`2` = End Print signal normally low, and high only when the printer is moving the label forward.<br>`3` = End Print signal normally high, and low for 20 ms when a label has been printed and positioned.<br>`4` = End Print signal normally low, and high for 20 ms when a label has been printed and positioned.<br>*Default Value:* `0` |
| `c` = application mode start signal print | *Accepted Values:*<br>`p` = Pulse Mode – Start Print signal must be de-asserted before it can be asserted for the next label.<br>`l` = Level Mode – Start Print signal does not need to be de-asserted to print the next label. As long as the Start Print signal is low and a label is formatted, a label prints.<br>*Default Value:* `0` |

| Parameters | Details |
|---|---|
| `d` = application label error mode | *Accepted Values:*<br>`e` = error mode—the printer asserts the *Service Required* signal (svce_req - pin 10) on the application port, enters into Pause Mode, and displays an error message on the LCD.<br>`f` = Feed Mode—a blank label prints when the web is not found where expected to sync the printer to the media.<br>*Default Value:* `f` |
| `e` = reprint mode | *Accepted Values:*<br>`e` = enabled—the last label reprints after the signal is asserted. If a label is canceled, the label to be reprinted is also canceled. This mode consumes more memory because the last printed label is not released until it reprints.<br>`d` = disabled—printer ignores the Reprint signal.<br>*Default Value:* `d` |
| `f` = ribbon low mode | *Accepted Values:*<br>`e` = *enabled* – printer warning issued when ribbon low.<br>`d` = *disabled* – printer warning not issued when ribbon low.<br>*Default Value:* `e` |

# ~JL

## Set Label Length

**Description** The `~JL` command is used to set the label length. Depending on the size of the label, the printer feeds one or more blank labels.

**Format** `~JL`

# ^JM

## Set Dots per Millimeter

**Description** The ^JM command lowers the density of the print—24 dots/mm becomes 12, 12 dots/mm becomes 6, 8 dots/mm becomes 4, and 6 dots/mm becomes 3. ^JM also affects the field origin (^FO) placement on the label (see example below).

When sent to the printer, the ^JM command doubles the format size of the label. Depending on the printhead, normal dot-per-millimeter capabilities for a Zebra printer are 12 dots/mm (304 dots/inch), 8 dots/mm (203 dots/inch) or 6 dots/mm (153 dots/inch).

This command must be entered before the first ^FS command in a format. The effects of ^JM are persistent.

**Format** `^JMn`

This table identifies the parameters for this format:

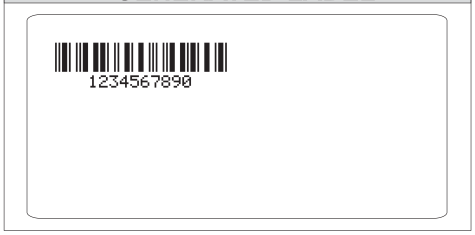
| Parameters | Details |
|---|---|
| n = set dots per millimeter | *Accepted Values:*<br>A = 24 dots/mm, 12 dots/mm, 8 dots/mm or 6 dots/mm<br>B = 12 dots/mm, 6 dots/mm, 4 dots/mm or 3 dots/mm<br>*Default Value:* A |

**Example •** This example of the affects of alternating the dots per millimeter:

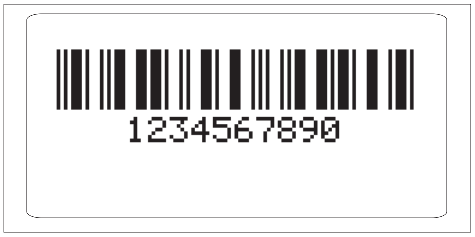
ZPL II CODE

```
^XA
^JMA^FS
^FO100,100
^B2N,50,Y,N,N
^FD1234567890^FS
^XZ
```

GENERATED LABEL



```
^XA
^JMB^FS
^FO100,100
^B2N,50,Y,N,N
^FD1234567890^FS
^XZ
```



**Comments** If ^JMB is used, the UPS MaxiCode bar code becomes out of specification.

# ~JN

## Head Test Fatal

**Description** The ~JN command turns on the head test option. When activated, ~JN causes the printer to halt when a head test failure is encountered.

Once an error is encountered the printer remains in error mode until the head test is turned off (~JO) or power is cycled.

**Format** ~JN

**Comments** If the communications buffer is full, the printer is not able to receive data. In this condition, the ~JO command is not received by the printer.

# ~JO

## Head Test Non-Fatal

**Description** The `~JO` command turns off the head test option. `~JO` is the default printhead test condition and overrides a failure of printhead element status check. This state is changed when the printer receives a `~JN` (Head Test Fatal) command. The printhead test does not produce an error when `~JO` is active.

**Format** `~JO`

# ~JP

## Pause and Cancel Format

**Description** The ~JP command clears the format currently being processed and places the printer into Pause Mode.

The command clears the next format that would print, or the oldest format from the buffer. Each subsequent ~JP command clears the next buffered format until the buffer is empty. The DATA indicator turns off when the buffer is empty and no data is being transmitted.

Issuing the ~JP command is identical to using CANCEL on the printer, but the printer does not have to be in Pause Mode first.

**Format** `~JP`

# ~JQ

## Terminate Zebra BASIC Interpreter

.16↑ Identifies features that are available in printers with firmware version V60.16.x, V53.16.x, or later.

**Description** The `~JQ` command is used when Zebra BASIC Interpreter is active. Sending `~JQ` to the printer terminates the ZBI session.

**Format** `~JQ`

**Comments** Entering ZPL at the command prompt also terminates a ZBI session.

# ~JR

## Power On Reset

**Description** The ~JR command resets all of the printer's internal software, performs a power-on self-test (POST), clears the buffer and DRAM, and resets communication parameters and default values. Issuing a ~JR command performs the same function as a manual power-on reset.

**Format** ~JR

# ^JS

## Sensor Select

**Format** `^JSa`

**Note •** This command is ignored on Zebra ZM400/ZM600™ printers.This command is only for use with the Z series and S4M printers (with the exception of the ZM400/ZM600).

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = sensor selection | *Accepted Values:*<br>A = auto select<br>R = reflective sensor<br>T = transmissive sensor<br>*Default Value:* Z series = A and the S4M = R |

# ~JS

## Change Backfeed Sequence

**Description** The ~JS command is used to control the backfeed sequence. This command can be used on printers with or without built-in cutters.

These are the primary applications:

- to allow programming of the *rest point* of the cut edge of continuous media.
- provide immediate backfeed after peel-off when the printer is used in a print/apply application configuration.

This command stays in effect only until the printer is turned off, a new ~JS command is sent, or the setting is changed on the control panel. When a ~JS command is encountered, it overrides the current control panel setting for the Backfeed Sequence.

The most common way of eliminating backfeed is to operate in Rewind Mode. Rewind Mode does not backfeed at all. After a label prints, the leading edge of the next label is placed at the print line. This eliminates the need to backfeed and does not introduce a non printable area at the leading edge or bottom of the label. It also does not allow the label to be taken from the printer because it is not fed out from under the printhead.

Running in another mode with backfeed turned off allows the label to be removed and eliminates the time-reduction of the backfeed sequence.

**Format** ~JSb

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| b = backfeed order in relation to printing | *Accepted Values:*<br>A = 100 percent backfeed after printing and cutting<br>B = 0 percent backfeed after printing and cutting, and 100 percent before printing the next label<br>N = normal — 90 percent backfeed after label is printed<br>O = off — turn backfeed off completely<br>10 to 90 = percentage value<br>The value entered must be a multiple of 10. Values not divisible by 10 are rounded to the nearest acceptable value. For example, ~JS55 is accepted as 50 percent backfeed.<br>*Default Value:* N |

**Comments** When using a specific value, the difference between the value entered and 100 percent is calculated before the next label is printed. For example, a value of 40 means 40 percent of the backfeed takes place after the label is cut or removed. The remaining 60 percent takes place before the next label is printed.

The value for this command is also reflected in the Backfeed parameter on the printer configuration label.

For `~JSN` — the Backfeed parameter is listed as DEDAULT

For `~JSA` — or 100% the Backfeed parameter is listed as AFTER

For `~JSB` — or 0% the Backfeed parameter is listed as BEFORE

For `~JS10` — 10% of the backfeed takes place after the label is cut or removed. The remaining 90% takes place before the next label is printed.

# ^JT

## Head Test Interval

**Description** The ^JT command allows you to change the printhead test interval from every 100 labels to any desired interval. With the ^JT command, the printer is allowed to run the test after printing a label. When a parameter is defined, the printer runs the test after printing a set amount of labels.

The printer's default head test state is off. Parameters for running the printhead test are defined by the user.

**Format** `^JT####,a,b,c`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `####` = four-digit number of labels printed between head tests | *Accepted Values:* `0000` to `9999`<br>If a value greater than `9999` is entered, it is ignored.<br>*Default Value:* `0000` (off) |
| `a` = manually select range of elements to test | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Initial Value at Power-up:* `N` |
| `b` = first element to check when parameter `a` is Y | *Accepted Values:* `0` to `9999`<br>*Initial Value at Power-up:* `0` |
| `c` = last element to check when parameter `a` is Y | *Accepted Values:* `0` to `9999`<br>*Initial Value at Power-up:* `9999` |

**Comments** The ^JT command supports testing a range of print elements. The printer automatically selects the test range by tracking which elements have been used since the previous test.

^JT also turns on Automatic Mode to specify the first and last elements for the head test. This makes it possible to select any specific area of the label or the entire print width.

If the last element selected is greater than the print width selected, the test stops at the selected print width.

Whenever the head test command is received, a head test is performed on the next label unless the count is set to 0 (zero).

# ^JU

## Configuration Update

**Description** The `^JU` command sets the active configuration for the printer.

**Format** `^JUa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = active configuration | *Accepted Values:*<br>`F` = reload factory settings<br>`N` = reload factory network settings<br>These values are lost at power-off if not saved with `^JUS`.<br>`R` = recall last saved settings<br>`S` = save current settings<br>These values are used at power-on.<br>*Default Value:* a value must be specified |

# ^JW

## Set Ribbon Tension

**Description** `^JW` sets the ribbon tension for the printer it is sent to.

**Format** `^JWt`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `t` = tension | *Accepted Values:*<br>`L` = low<br>`M` = medium<br>`H` = high<br>*Default Value:* a value must be specified |

**Comments** `^JW` is used only for *PAX* series printers.

# ~JX

## Cancel Current Partially Input Format

**Description** The ~JX command cancels a format currently being sent to the printer. It does not affect any formats currently being printed, or any subsequent formats that might be sent.

**Format** ~JX

# ^JZ

## Reprint After Error

**Description** The ^JZ command reprints a partially printed label caused by a Ribbon Out, Media Out, or Head Open error condition. The label is reprinted as soon as the error condition is corrected.

This command remains active until another ^JZ command is sent to the printer or the printer is turned off.

**Format** ^JZa

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = reprint after error | *Accepted Values:*<br>N = no<br>Y = yes<br>*Initial Value at Power-up:* Y |

**Comments** ^JZ sets the error mode for the printer. If ^JZ changes, only labels printed after the change are affected.

If the parameter is missing or incorrect, the command is ignored.

# ~KB

## Kill Battery (Battery Discharge Mode)

**Description** To maintain performance of the rechargeable battery in the portable printers, the battery must be fully discharged and recharged regularly. The ~KB command places the printer in battery discharge mode. This allows the battery to be drained without actually printing.

**Format** ~KB

**Comments** While the printer is in Discharge Mode, the green power LED flashes in groups of three flashes.

Discharge Mode might be terminated by sending a printing format to the printer or by pressing either of the control panel keys.

If the battery charger is plugged into the printer, the battery is automatically recharged once the discharge process is completed.

# ^KD

## Select Date and Time Format (for Real Time Clock)

**Description** The `^KD` command selects the format that the Real-Time Clock’s date and time information presents as on a configuration label. This is also displayed on the *Printer Idle* LCD control panel display, and displayed while setting the date and time.

**Format** `^KDa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = value of date and time format | *Accepted Values:*<br>`0` = normal, displays *Version Number* of firmware<br>`1` = MM/DD/YY (24-hour clock)<br>`2` = MM/DD/YY (12-hour clock)<br>`3` = DD/MM/YY (24-hour clock)<br>`4` = DD/MM/YY (12-hour clock)<br>*Default Value:* `0` |

**Comments** If the Real-Time Clock hardware is not present, Display Mode is set to 0 (Version Number).

If Display Mode is set to 0 (Version Number) and the Real-Time Clock hardware is present, the date and time format on the configuration label is presented in format 1.

If Display Mode is set to 0 (Version Number) and the Real-Time Clock hardware is present, the date and time format on the control panel display is presented in format 1.

For more details on select date and time format for the Real Time Clock, see *Real Time Clock* on page 805.

# ^KL

## Define Language

**Description** The ^KL command selects the language displayed on the control panel.

**Format** `^KLa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = language | *Accepted Values:*<br>1 = English<br>2 = Spanish<br>3 = French<br>4 = German<br>5 = Italian<br>6 = Norwegian<br>7 = Portuguese<br>8 = Swedish<br>9 = Danish<br>10 = Spanish2<br>11 = Dutch<br>12 = Finnish<br>13 = Japanese<br>14 = Korean *<br>15 = Simplified Chinese *<br>16 = Traditional Chinese *<br>*Default Value:* 1 |

* These values are only supported on Zebra ZM400/ZM600™ printer.

# ^KN

## Define Printer Name

**Description** The printer's network name and description can be set using the ^KN command. ^KN is designed to make your Zebra printer easy for users to identify. The name the administrator designates is listed on the configuration label and on the Web page generated by the printer.

**Format** `^KNa,b`

This table identifies the parameters for this format:

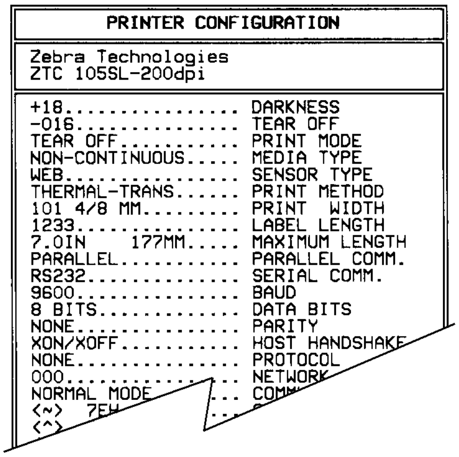
| Parameters | Details |
|---|---|
| a = printer name | *Accepted Values:* up to 16 alphanumeric characters<br>*Default Value:* if a value is not entered, the parameter is ignored<br>If more than 16 characters are entered, only the first 16 are used. |
| b = printer description | *Accepted Values:* up to 35 alphanumeric characters<br>*Default Value:* if a value is not entered, the parameter is ignored<br>If more than 35 characters are entered, only the first 35 are used. |

**Example** • This is an example of how to change the printer’s network name an description:

This shows how a configuration looks before using this command and after using this command:

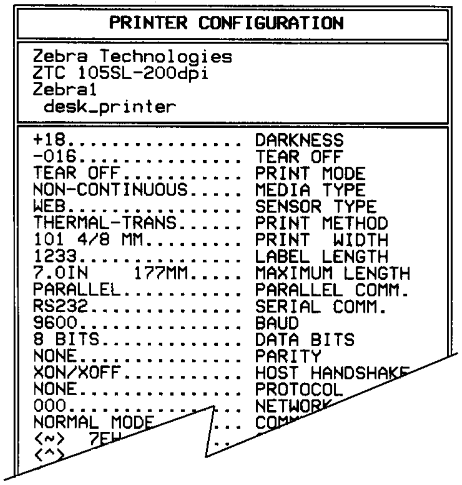
```
^XA
^KNZebra1,desk_printer
^XZ
```

**Before using this command:**



```
PRINTER CONFIGURATION

Zebra Technologies
ZTC 105SL-200dpi

+18................ DARKNESS
-016............... TEAR OFF
TEAR OFF........... PRINT MODE
NON-CONTINUOUS..... MEDIA TYPE
WEB................ SENSOR TYPE
THERMAL-TRANS...... PRINT METHOD
101 4/8 MM......... PRINT  WIDTH
1233............... LABEL LENGTH
7.0IN    177MM..... MAXIMUM LENGTH
PARALLEL........... PARALLEL COMM.
RS232.............. SERIAL COMM.
9600............... BAUD
8 BITS............. DATA BITS
NONE............... PARITY
XON/XOFF........... HOST HANDSHAKE
NONE............... PROTOCOL
000................ NETWORK
NORMAL MODE     ... COMM
<~>  7EH
<^>
```

**After using this command:**



```
PRINTER CONFIGURATION

Zebra Technologies
ZTC 105SL-200dpi
Zebra1
 desk_printer

+18................ DARKNESS
-016............... TEAR OFF
TEAR OFF........... PRINT MODE
NON-CONTINUOUS..... MEDIA TYPE
WEB................ SENSOR TYPE
THERMAL-TRANS...... PRINT METHOD
101 4/8 MM......... PRINT  WIDTH
1233............... LABEL LENGTH
7.0IN    177MM..... MAXIMUM LENGTH
PARALLEL........... PARALLEL COMM.
RS232.............. SERIAL COMM.
9600............... BAUD
8 BITS............. DATA BITS
NONE............... PARITY
XON/XOFF........... HOST HANDSHAKE
NONE............... PROTOCOL
000................ NETWORK
NORMAL MODE     ... COMM
<~>  7EH
<^>
```

# ^KP

## Define Password

**Description** The ^KP command is used to define the password that must be entered to access the control panel switches and LCD Setup Mode.

**Format** `^KPa,b`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = mandatory four-digit password | *Accepted Values:* any four-digit numeric sequence<br>*Default Value:* `1234` |
| b = password level | *Accepted Values:* 1, 2, 3, 4<br>*Default Value:* 3 |

→ **Example •** This is an example of how to set a new control panel password:

```
^XA
^KP5678
^XZ
```

**Comments** If you forget your password, the printer can be returned to a default Setup Mode and the default password *1234* is valid again. Caution should be used, however — this also sets the printer configuration values back to their defaults.

To return the printer to the default factory settings using ZPL, send this:

```
^XA
^JUF
^XZ
```

To return the printer to the default factory settings using the control panel keys, see your printer’s User Guide for the procedure.

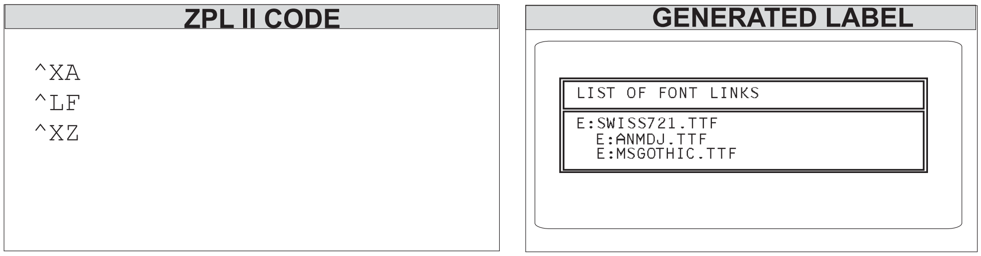
# ^LF

## List Font Links

.14↑ This command is available only for printers with firmware version V60.14.x, V50.14.x, or later.

**Description** The ^LF command prints out a list of the linked fonts.

**Example •** This example shows that SWISS721.TTF is the based font. ANMDJ.TTF is the first linked font, and MSGOTHIC.TTF is the second linked extension:



```
^XA
^LF
^XZ
```

```
LIST OF FONT LINKS
E:SWISS721.TTF
  E:ANMDJ.TTF
  E:MSGOTHIC.TTF
```

This is the code that established the font links:

```
^XA
^FLE:ANMDJ.TTF,E:SWISS721.TTF,1^FS
^FLE:MSGOTHIC.TTF,E:SWISS721.TTF,1^FS
^XZ
```

# ^LH

## Label Home

**Description** The ^LH command sets the label home position.

The default home position of a label is the upper-left corner (position 0,0 along the x and y axis). This is the axis reference point for labels. Any area below and to the right of this point is available for printing. The ^LH command changes this reference point. For instance, when working with preprinted labels, use this command to move the reference point below the preprinted area.

This command affects only fields that come after it. It is recommended to use ^LH as one of the first commands in the label format.

**Format** ^LHx,y

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| x = x-axis position (in dots) | *Accepted Values:* 0 to 32000<br>*Initial Value at Power-up:* 0 or last permanently saved value |
| y = y-axis position (in dots) | *Accepted Values:* 0 to 32000<br>*Initial Value at Power-up:* 0 or last permanently saved value |

Depending on the printhead used in your printer, use one of these when figuring the values for x and y:

6 dots = 1 mm, 152 dots = 1 inch
8 dots = 1 mm, 203 dots = 1 inch
11.8 dots = 1 mm, 300 dots = 1 inch
24 dots = 1 mm, 608 dots = 1 inch

**Comments** To be compatible with existing printers, this command must come before the first ^FS (Field Separator) command. Once you have issued an ^LH command, the setting is retained until you turn off the printer or send a new ^LH command to the printer.

# ^LL

## Label Length

**Description** The `^LL` command defines the length of the label. This command is necessary when using continuous media (media not divided into separate labels by gaps, spaces, notches, slots, or holes).

To affect the current label and be compatible with existing printers, `^LL` must come before the first `^FS` (Field Separator) command. Once you have issued `^LL`, the setting is retained until you turn off the printer or send a new `^LL` command.

**Format** `^LLy`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `y` = y-axis position (in dots) | *Accepted Values:* `1` to `32000`, not to exceed the maximum label size.<br>While the printer accepts any value for this parameter, the amount of memory installed determines the maximum length of the label.<br>*Default Value:* typically set through the LCD (if applicable), or to the maximum label length capability of the printer. |

**Comments** These formulas can be used to determine the value of y:

| | |
|---|---|
| **For 6 dot/mm printheads...** | Label length in inches x 152.4 (dots/inch) = y |
| **For 8 dot/mm printheads...** | Label length in inches x 203.2 (dots/inch) = y |
| **For 12 dot/mm printheads...** | Label length in inches x 304.8 (dots/inch) = y |
| **For 24 dot/mm printheads...** | Label length in inches x 609.6 (dots/inch) = y |

Values for `y` depend on the memory size. If the entered value for `y` exceeds the acceptable limits, the bottom of the label is cut off. The label also shifts down from top to bottom.

If multiple `^LL` commands are issued in the same label format, the last `^LL` command affects the next label unless it is prior to the first `^FS`.

# ^LR

## Label Reverse Print

**Description** The ^LR command reverses the printing of all fields in the label format. It allows a field to appear as white over black or black over white.

Using the ^LR is identical to placing an ^FR command in all current and subsequent fields.

**Format** ^LRa

This table identifies the parameters for this format:

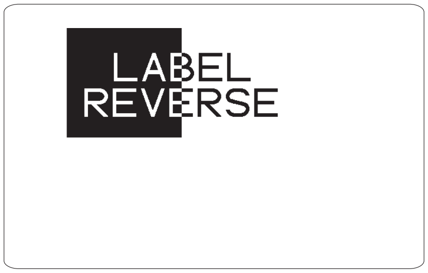
| Parameters | Details |
|---|---|
| a = reverse print all fields | *Accepted Values:*<br>N = no<br>Y = yes<br>*Initial Value at Power-up:* N or last permanently saved value |

**Example** • This is an example that shows printing white over black and black over white. The ^GB command is used to create the black background.

ZPL II CODE

```
^XA^LRY
^FO100,50
^GB195,203,195^FS
^FO180,110^CFG
^FDLABEL^FS
^FO130,170
^FDREVERSE^FS
^XZ
```

GENERATED LABEL



**Comments** The ^LR setting remains active unless turned off by ^LRN or the printer is turned off.

**Note** • ^GB needs to be used together with ^LR.

Only fields following this command are affected.

# ^LS

## Label Shift

**Description** The `^LS` command allows for compatibility with Z-130 printer formats that are set for less than full label width. It is used to shift all field positions to the left so the same commands used on a Z-130 or Z-220 Printer can be used on other Zebra printers.

To determine the value for the `^LS` command, use this formula:

`Z-130 and Z-220 values for ^LHx + ^FOx`

(distance from edge of label) = printer value for `^LSa`

If the print position is less than 0, set `^LS` to 0.

**Format** `^LSa`

**Important •** The ability to save the `^LS` command depends on the version of firmware.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = shift left value (in dots) | *Accepted Values:* `-9999` to `9999`<br>*Initial Value at Power-up:* `0` |

**Comments** When entering positive values, it is not necessary to use the + sign. The value is assumed to be positive unless preceded by a negative sign (-).

To be compatible with existing Zebra printers, this command must come before the first `^FS` (Field Separator) command. Once you have issued an `^LS` command, the setting is retained until you turn off the printer or send a new `^LS` command to the printer.

# ^LT

## Label Top

**Description** The ^LT command moves the entire label format a maximum of 120 dot rows up or down from its current position, in relation to the top edge of the label. A negative value moves the format towards the top of the label; a positive value moves the format away from the top of the label.

This command can be used to fine-tune the position of the finished label without having to change any of the existing parameters.

**Important •** For some printer models, it is possible to request a negative value large enough to cause the media to backup into the printer and become unthreaded from the platen. This condition can result in a printer error or unpredictable results.

**Format** `^LTx`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| x = label top (in dot rows) | *Accepted Values:* -120 to 120<br>*Default Value:* a value must be specified or the command is ignored |

**Comments** The Accepted Value range for x might be smaller depending on the printer platform.

The ^LT command does not change the media rest position.

# ^MA

## Set Maintenance Alerts

**Description** The `^MA` command controls how the printer issues printed maintenance alerts. Maintenance alerts are labels that print with a warning that indicates the printhead needs to be cleaned or changed. This command is only supported on printers using firmware V60.15.8Z, V53.15.5Z, and later.

**Description**

**Format** `^MAtype,print,printlabel_threshold,frequency,units`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `type` = type of alert | *Accepted Values:*<br>`R` = head replacement<br>`C` = head cleaning<br>*Default Value:* This parameter must be specified as R or C for `print`, `printlabel_threshold`, and `frequency` to be saved. However, `units` will always be set. |
| `print` = determines if the alert prints a label | *Accepted Values:*<br>`Y` = print a label<br>`N` = do not print label<br>*Default Value:* `N` |
| `printlabel threshold=` distance where the first alert occurs | *Accepted Values:*<br>`R` = head replacement (unit of measurement for head is km with a range of 0 to 150 km)<br>`C` = clean head (unit of measurement is 1 meter = 39.37 inches with a range of 0 to 2000 meters.)<br>`0` = off (when set to 0, the selected alert is disabled; otherwise it is enabled.<br>*Default Value:* `R = ` 50 km (1,968,500 inches) and `C = ` 0 (off). |
| `frequency =` distance before reissuing the alert | The unit of measurement is in meters. The range is 0 to 2000. When set to `0`, the alert label is only printed on power-up or when the printer is reset.<br>*Default Value:* `0` (print on power-up). |
| `units = ` odometer and printhead maintenance commands | The units parameter reports units of the odometer and printhead maintenance commands, as follows: `~HQOD,~HQPH,~WQOD`, `~WQPH`.<br>*Accepted Values:*<br>`C` = centimeters (displays as: `cm`)<br>`I` = inches (displays as: `"`)<br>`M` = meters (displays as: `M`)<br>*Default Value:* `I` |

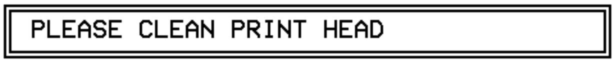
**Example •** This example sets the printed head cleaning message to print after five meters and to repeat every one meter after that until a `~ROC` command is issued.

The Early Warning Maintenance setting must be ON.

1. To set `^MA` to print out a label flagging the need to clean the head, type:

   ```
   ^XA^MAC,Y,5,1^XZ
   ```

   When the threshold is met a label will print indicating that the head needs to be clean.
2. For this example, the message on the label looks like this:



PLEASE CLEAN PRINT HEAD

For details resetting the units of measure, see the `~HQ` examples on page 212.

**Comments** Any values outside the specified range are ignored.

The intent of this command is to cause a label to print when the defined threshold is reached.

# ^MC

## Map Clear

**Description** In normal operation, the bitmap is cleared after the format has been printed. The ^MC command is used to retain the current bitmap. This applies to current and subsequent labels until cleared with ^MCY.

**Format** ^MCa

! **Important •** To produce a label template, ^MC must be used with ^FV.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = map clear | *Accepted Values:* Y (clear bitmap) or N (do not clear bitmap)<br>*Initial Value at Power-up:* Y |

**Comments** The ^MC command retains the image of the current label after formatting. It appears in the background of the next label printed.

# ^MD

## Media Darkness

**Description** The `^MD` command adjusts the darkness relative to the current darkness setting.

**Format** `^MDa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = media darkness level | *Accepted Values:* `-30` to `30`, depending on current value<br>*Initial Value at Power-up:* `0`<br>If no value is entered, this command is ignored. |

**Example •** These examples show setting the printer to different darkness levels:

- If the current value (value on configuration label) is 16, entering the command `^MD-9` decreases the value to 7.
- If the current value (value on configuration label) is 1, entering the command `^MD15` increases the value to 16.
- If the current value (value on configuration label) is 25, entering the command `^MD10` increases only the value to 30, which is the maximum value allowed.

Each `^MD` command is treated separately in relation to the current value as printed on the configuration label.

**Important •** The darkness setting range for the *Xi*III*Plus* is 0 to 30 in increments of 0.1. The firmware is setup so that the `^MD` and `~SD` commands (ZPL darkness commands) accepts that range of settings.

**Example •** These are examples of the *Xi*III*Plus* Darkness Setting:

```
^MD8.3
```

```
~SD8.3
```

**Example •** For example, this is what would happen if two `^MD` commands were received:

Assume the current value is 15. An `^MD-6` command is received that changes the current value to 9. Another command, `^MD2`, is received. The current value changes to 17.

The two `^MD` commands are treated individually in relation to the current value of 15.

**Comments** The `~SD` command value, if applicable, is added to the `^MD` command.

# ^MF

## Media Feed

**Description** The `^MF` command dictates what happens to the media at power-up and at head-close after the error clears.

**Format** `^MFp,h`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `p` = feed action at power-up | *Accepted Values:*<br>`F` = feed to the first web after sensor<br>`C` = (see *~JC* on page 235 definition)<br>`L` = (see *~JL* on page 247 definition)<br>`N` = no media feed<br>`S` = short calibration *<br>*Default Value:* `C` |
| `h` = feed action after closing printhead | *Accepted Values:*<br>`F` = feed to the first web after sensor<br>`C` = (see *~JC* on page 235 definition)<br>`L` = (see *~JL* on page 247 definition)<br>`N` = no media feed<br>`S` = short calibration *<br>*Default Value:* `C` |

* This value is only supported on Zebra *Xi*III*Plus*, *PAX*, ZM400/ZM600, and S4M printers.

**Comments** It is important to remember that if you choose the `N` setting, the printer assumes that the media and its position relative to the printhead are the same as before power was turned off or the printhead was opened. Use the `^JU` command to save changes.

# ^MI

## Set Maintenance Information Message

**Description** The ^MI command controls the content of maintenance alert messages, which are reminders printed by the printer to instruct the operator to clean or replace the printhead. This command is only supported on printers using firmware V60.15.8Z, V53.15.5Z, and later.

**Description**

**Format** `^MItype,message`

This table identifies the parameters for this format:

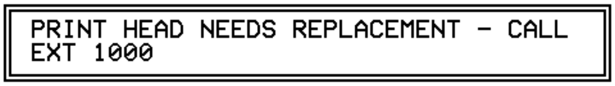
| Parameters | Details |
|---|---|
| `type` = identifies the type of alert | *Accepted Values:*<br>`R` = head replacement<br>`C` = head cleaning<br>*Default Value:* `R` |
| `message` = message that prints on the label when a maintenance alert occurs | The maximum length of each message is 63 characters. All characters following the comma and preceding the next tilde (~) or carat (^) define the message string. Commas (,) are not allowed in the message.<br>*Default Value:*<br>`HEAD CLEANING` = please clean printhead<br>`HEAD REPLACEMENT` = please replace printhead |

**Example •** This example sets the printhead (head) replacement warning message. Printing of this message is controlled by the ^MA command.

1. To customize the text of this label, type something like this:

   ```
   ^XA^MIR,PRINT HEAD NEEDS REPLACEMENT - CALL EXT 1000^XZ
   ```

   The label prints whatever you program it to say.
2. For this example, the message on the label looks like this:



```
PRINT HEAD NEEDS REPLACEMENT - CALL
EXT 1000
```

# ^ML

## Maximum Label Length

**Description** The `^ML` command lets you adjust the maximum label length.

**Format** `^MLa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = maximum label length (in dot rows) | *Accepted Values:* `0` to maximum length of label<br>*Default Value:* last permanently saved value |

**Comments** For calibration to work properly, you must set the maximum label length equal to or greater than your actual label length.

# ^MM

## Print Mode

**Description** The ^MM command determines the action the printer takes after a label or group of labels has printed.

**Format** `^MMa,b`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = desired mode | *Accepted Values:*<br>T = Tear-off<br>P = Peel-off (not available on *S*-300)<br>R = Rewind (depends on printer model)<br>A = Applicator (depends on printer model)<br>C = Cutter (depends on printer model)<br>D = Delayed cutter<br>F = RFID<br>L = Reserved *<br>U = Reserved *<br>*Default Value:*<br>The values available for parameter a depend on the printer being used and whether it supports the option.<br>For RFID printers:<br>A = R110PAX4 print engines<br>F = other RFID printers |
| b = prepeel select | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N<br>The command is ignored if parameters are missing or invalid. The current value of the command remains unchanged. |

* These values are only supported on the Zebra ZM400/ZM600™ printer.

This list identifies the different modes of operation:

- Tear-off — after printing, the label advances so the web is over the tear bar. The label, with liner attached, can be torn off manually.

- Peel-off — after printing, the label moves forward and activates a Label Available Sensor. Printing stops until the label is manually removed from the printer.

  *Power Peel* – liner automatically rewinds using an optional internal rewind spindle.

  *Value Peel* – liner feeds down the front of the printer and is manually removed.

  *Prepeel* – after each label is manually removed, the printer feeds the next label forward to prepeel a small portion of the label away from the liner material. The printer then backfeeds and prints the label. The prepeel feature assists in the proper peel operation of some media types.
- Rewind — the label and backing are rewound on an (optional) external rewind device. The next label is positioned under the printhead (no backfeed motion).
- Applicator — when used with an application device, the label move far enough forward to be removed by the applicator and applied to an item.
- Cutter — after printing, the media feeds forward and is automatically cut into predetermined lengths.
- Delayed cutter — When the printer is in the Delayed Cut PRINT MODE, it will cut the label when it receives the `~JK` (Delayed Cut) command. To activate the `~JK` command, the printer's PRINT MODE must be set to Delayed Cut and there must be a label waiting to be cut. When the printer is not in the Delayed Cut PRINT MODE, the printer will not cut the label when it receives the `~JK` command.

  The Delayed Cut feature can be activated:

  - through PRINT MODE on the printer’s control panel
  - with a `^MMD` command
- RFID — increases throughput time when printing batches of RFID labels by eliminating backfeed between labels.

**Comments** Be sure to select the appropriate value for the print mode being used to avoid unexpected results.

# ^MN

## Media Tracking

**Description** The ^MN command relays to the printer what type of media is being used (continuous or non-continuous) for purposes of tracking. This bulleted list shows the types of media associated with this command:

- Continuous Media – this media has no physical characteristic (such as a web, notch, perforation, black mark) to separate labels. Label length is determined by the ^LL command.
- Non-continuous Media – this media has some type of physical characteristic (such as web, notch, perforation, black mark) to separate the labels.

**Format** `^MNa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = media being used | *Accepted Values:*<br>N = continuous media<br>Y = non-continuous media web sensing *<br>W = non-continuous media web sensing *<br>M = non-continuous media mark sensing<br>*Default Value:* a value must be entered or the command is ignored |

* provides the same result.

# ^MP

## Mode Protection

**Description** The ^MP command is used to disable the various mode functions on the control panel. Once disabled, the settings for the particular mode function can no longer be changed and the LED associated with the function does not light.

Because this command has only one parameter, each mode must be disabled with an individual ^MP command.

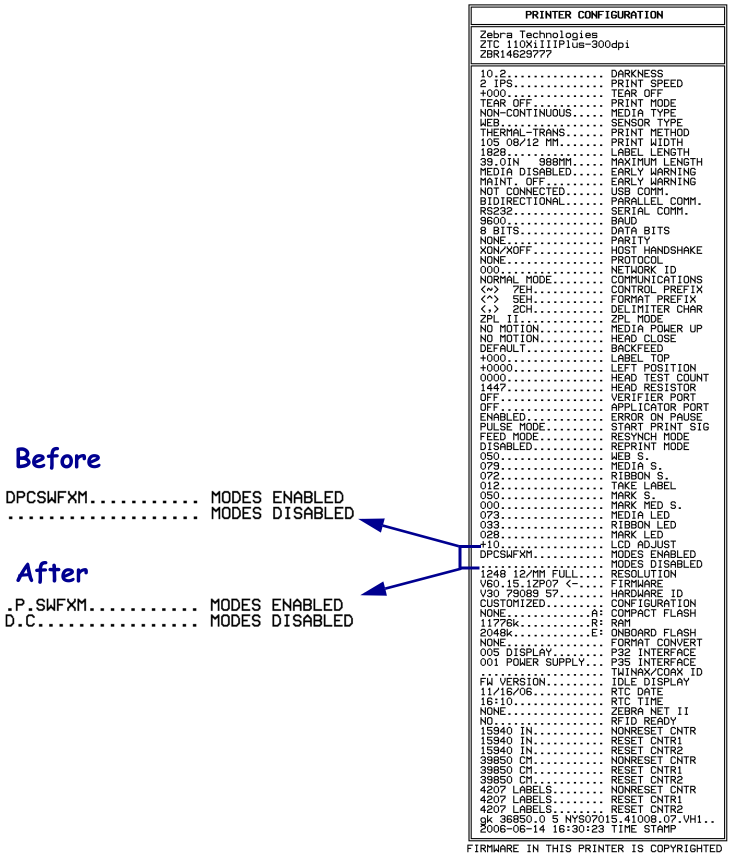
**Format** ^MPa

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = mode to protect | *Accepted Values:*<br>D = disable Darkness Mode<br>P = disable Position Mode<br>C = disable Calibration Mode<br>E = enable all modes<br>S = disable all mode saves (modes can be adjusted but values are not saved)<br>W = disable Pause<br>F = disable Feed<br>X = disable Cancel<br>M = disable menu changes<br>*Default Value:* a value must be entered or the command is ignored |

**Example •** This example shows the ZPL code that disables modes D and C. It also shows the effects on the configuration label before and after the ZPL code is sent:

```
^XA
^MPD
^MPC
^XZ
```



Before

```
DPCSWFXM........... MODES ENABLED
................... MODES DISABLED
```

After

```
.P.SWFXM........... MODES ENABLED
D.C................ MODES DISABLED
```

```
PRINTER CONFIGURATION

Zebra Technologies
ZTC 110XiIIIPlus-300dpi
ZBR14629777

10.2................. DARKNESS
2 IPS................ PRINT SPEED
+000................. TEAR OFF
TEAR OFF............. PRINT MODE
NON-CONTINUOUS....... MEDIA TYPE
WEB.................. SENSOR TYPE
THERMAL-TRANS........ PRINT METHOD
105 08/12 MM......... PRINT WIDTH
1828................. LABEL LENGTH
39.0IN   988MM....... MAXIMUM LENGTH
MEDIA DISABLED....... EARLY WARNING
MAINT. OFF........... EARLY WARNING
NOT CONNECTED........ USB COMM.
BIDIRECTIONAL........ PARALLEL COMM.
RS232................ SERIAL COMM.
9600................. BAUD
8 BITS............... DATA BITS
NONE................. PARITY
XON/XOFF............. HOST HANDSHAKE
NONE................. PROTOCOL
000.................. NETWORK ID
NORMAL MODE.......... COMMUNICATIONS
<~>  7EH............. CONTROL PREFIX
<^>  5EH............. FORMAT PREFIX
<,>  2CH............. DELIMITER CHAR
ZPL II............... ZPL MODE
NO MOTION............ MEDIA POWER UP
NO MOTION............ HEAD CLOSE
DEFAULT.............. BACKFEED
+000................. LABEL TOP
+0000................ LEFT POSITION
0000................. HEAD TEST COUNT
1447................. HEAD RESISTOR
OFF.................. VERIFIER PORT
OFF.................. APPLICATOR PORT
ENABLED.............. ERROR ON PAUSE
PULSE MODE........... START PRINT SIG
FEED MODE............ RESYNCH MODE
DISABLED............. REPRINT MODE
050.................. WEB S.
079.................. MEDIA S.
072.................. RIBBON S.
012.................. TAKE LABEL
050.................. MARK S.
000.................. MARK MED S.
073.................. MEDIA LED
033.................. RIBBON LED
028.................. MARK LED
+10.................. LCD ADJUST
DPCSWFXM............. MODES ENABLED
..................... MODES DISABLED
1248 12/MM FULL...... RESOLUTION
V60.15.1ZP07 <-...... FIRMWARE
V30 79089 57......... HARDWARE ID
CUSTOMIZED........... CONFIGURATION
NONE...............A: COMPACT FLASH
11776k.............R: RAM
2048k..............E: ONBOARD FLASH
NONE................. FORMAT CONVERT
005 DISPLAY.......... P32 INTERFACE
001 POWER SUPPLY..... P35 INTERFACE
..................... TWINAX/COAX ID
FW VERSION........... IDLE DISPLAY
11/16/06............. RTC DATE
16:10................ RTC TIME
NONE................. ZEBRA NET II
NO................... RFID READY
15940 IN............. NONRESET CNTR
15940 IN............. RESET CNTR1
15940 IN............. RESET CNTR2
39850 CM............. NONRESET CNTR
39850 CM............. RESET CNTR1
39850 CM............. RESET CNTR2
4207 LABELS.......... NONRESET CNTR
4207 LABELS.......... RESET CNTR1
4207 LABELS.......... RESET CNTR2
gk 36850.0 5 NYS07015.41008.07.VH1..
2006-06-14 16:30:23 TIME STAMP
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

# ^MT

## Media Type

**Description** The ^MT command selects the type of media being used in the printer. There are the choices for this command:

- Thermal Transfer Media – this media uses a high-carbon black or colored ribbon. The ink on the ribbon is bonded to the media.
- Direct Thermal Media – this media is heat sensitive and requires no ribbon.

**Format** `^MTa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = media type used | *Accepted Values:*<br>T = thermal transfer media<br>D = direct thermal media<br>*Default Value:* a value must be entered or the command is ignored |

# ^MU

## Set Units of Measurement

**Description** The `^MU` command sets the units of measurement the printer uses. `^MU` works on a field-by-field basis. Once the mode of units is set, it carries over from field to field until a new mode of units is entered.

`^MU` also allows for printing at lower resolutions — 600 dpi printers are capable of printing at 300, 200, and 150 dpi; 300 dpi printers are capable of printing at 150 dpi.

**Format** `^MUa,b,c`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = units | *Accepted Values:*<br>`D` = dots<br>`I` = inches<br>`M` = millimeters<br>*Default Value:* `D` |
| `b` = format base in dots per inch | *Accepted Values:* `150`, `200`, `300`<br>*Default Value:* a value must be entered or the command is ignored |
| `c` = desired dots-per-inch conversion | *Accepted Values:* `300`, `600`<br>*Default Value:* a value must be entered or the command is ignored |

**Example** • This is an example of Setting Units:

Assume 8 dot/millimeter (203 dot/inch) printer.

*Field based on dots:*

```
^MUd^FO100,100^GB1024,128,128^FS
```

*Field based on millimeters:*

```
^MUm^FO12.5,12.5^GB128,16,16^FS
```

*Field based on inches:*

```
^MUi^FO.493,.493^GB5.044,.631,.631^FS
```

**Example** • This is an example of Converting dpi Values.

*Convert a 150 dpi format to a 300 dpi format with a base in dots:*

```
^MUd,150,300
```

*Convert a 150 dpi format to a 600 dpi format with a base in dots:*

```
^MUd,150,600
```

*Convert a 200 dpi format to a 600 dpi format with a base in dots:*

```
^MUd,200,600
```

*To reset the conversion factor to the original format, enter matching values for parameters* `b` *and* `c`*:*

```
^MUd,150,150
^MUd,200,200
^MUd,300,300
^MUd,600,600
```

**Comments** This command should appear at the beginning of the label format to be in proper ZPL II format.

To turn the conversion off, enter matching values for parameter `b` and `c`.

# ^MW

## Modify Head Cold Warning

**Description** The `^MW` command allows you to set the head cold warning indicator based on the operating environment.

**Format** `^MWa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = enable head cold warning | *Accepted Values:*<br>`Y` = enable head cold warning<br>`N` = disable head cold warning |

**Important •** When a parameter is **not** given, the instruction is *ignored*.

# ^NC

## Select the Primary Network Device

**Description** The ^NC command selects the wired or wireless print server as the primary network device. This command is supported only on Zebra ZM400/ZM600™ printers.

The ZM400 and ZM600 printers support the simultaneous installation of an internal, external, and a wireless print server. Even though all three print servers may be installed, only one is connected to the network and is the active print server. Table 1 outlines priorities and identifies which device becomes the active print server when multiple print servers are installed.

**Table 1 • Effect of Primary Network Setting on Active Print Server**

| If the Primary Network is set to: | Installed and Connected to a Live Ethernet Network | | | Then, the Active Print Server will be: |
|---|---|---|---|---|
| | Internal | External | Wireless* | |
| **Wired** | X | X | X | Internal |
| | | X | X | External |
| | | | X | Wireless |
| **Wireless** | X | X | X | Wireless |
| | X | X | | Internal |
| | | X | | External |

* NOTE: A wireless option board must have an active radio that can properly associate to an access point.

**Format** `^NCa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = primary network device | *Accepted Values:*<br>`1` = wired primary<br>`2` = wireless primary<br>*Default Value:* `1`<br>must be an accepted value or it is ignored |

# ~NC

## Network Connect

**Description** The `~NC` command is used to connect a particular printer to a network by calling up the printer's network ID number.

**Format** `~NC###`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `###` = network ID number assigned (must be a three-digit entry) | *Accepted Values:* `001` to `999`<br>*Default Value:* `000` (none) |

**Comments** Use this command at the beginning of any label format to specify which printer on the network is going to be used. Once the printer is established, it continues to be used until it is changed by another `~NC` command. This command must be included in the label format to *wake up the printer.*

The commands `^MW, ~NC`, `^NI`, `~NR`, and `~NT` are used only with RS-422/485 printer communications.

# ^ND

## Change Network Settings

**Description** The ^ND command changes the network settings on Zebra ZM400/ZM600™ and S4M™ printers running V53.15.xZ or later.

For the external wired print server settings, the ^ND command is the same as the ^NS command. For the wireless print server settings, the ^ND command is the same as the ^WI command. This command is only supported on Zebra ZM400/ZM600™ and S4M™ printers running V53.15.xZ or later.

**Format** `^NDa,b,c,d,e,f,g,h,i,j`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = the device that is being modified | *Accepted Values:*<br>1 = external wired<br>2 = internal wired<br>3 = wireless |
| b = IP resolution | *Accepted Values:*<br>A = All<br>B = BOOTP<br>C = DHCP and BOOTP<br>D = DHCP<br>G = Gleaning only (Not recommended when the Wireless Print Server or Wireless Plus Print Server is installed.)<br>R = RARP<br>P = Permanent<br>*Default Value:* A |
| c = IP address | *Accepted Values:* Any properly formatted IP address in the xxx.xxx.xxx.xxx format. |
| d = subnet mask | *Accepted Values:* Any properly formatted subnet mask in the xxx.xxx.xxx.xxx format. |
| e = default gateway | *Accepted Values:* Any properly formatted gateway in the xxx.xxx.xxx.xxx format. |
| f = WINS server address | *Accepted Values:* Any properly formatted WINS server in the xxx.xxx.xxx.xxx format. |
| g = connection timeout checking | *Accepted Values:*<br>Y = yes<br>N = no<br>*Default Value:* Y |
| h = timeout value | Time, in seconds, before the connection times out.<br>*Accepted Values:* 0 through 9999<br>*Default Value:* 300 |

| Parameters | Details |
|---|---|
| `i` = ARP broadcast interval | Time, in minutes, that the broadcast is sent to update the device's ARP cache.<br>*Accepted Values:* `0` through `30`<br>*Default Value:* `0` (no ARP sent) |
| `j` = base raw port number | The port number that the printer should use for its RAW data.<br>*Accepted Values:* `1` through `65535`<br>*Default Value:* `9100` |

# ^NI

## Network ID Number

**Description** The ^NI command is used to assign a network ID number to the printer. This must be done before the printer can be used in a network.

**Format** ^NI###

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| ### = network ID number assigned (must be a three-digit entry) | *Accepted Values:* 001 to 999<br>*Default Value:* 000 (none) |

**Comments** The last network ID number set is the one recognized by the system.

The commands ~NC, ^NI, ~NR, and ~NT are used only with RS-485 printer communications.

# ~NR

## Set All Network Printers Transparent

**Description** The `~NR` command sets all printers in the network to be transparent, regardless of ID or current mode.

**Format** `~NR`

**Comments** The commands `~NC`, `^NI`, `~NR`, and `~NT` are used only with RS-485 printer communications.

# ^NS

## Change Wired Networking Settings

**Description** Use this command to change the wired print server network settings.

**Format** `^NSa,b,c,d,e,f,g,h,i`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `a` = IP resolution | *Accepted Values:*<br>A = ALL<br>B = BOOTP<br>C = DHCP AND BOOTP<br>D = DHCP<br>G = GLEANING ONLY<br>R = RARP<br>P = PERMANENT<br>*Default Value:* `A`<br>Use of GLEANING ONLY is not recommended when the Wireless Print Server or Wireless Plus Print Server is installed. |
| `b` = IP address | *Accepted Values:* Any properly formatted IP address in the xxx.xxx.xxx.xxx format. |
| `c` = subnet mask | *Accepted Values:* Any properly formatted subnet mask in the xxx.xxx.xxx.xxx format. |
| `d` = default gateway | *Accepted Values:* Any properly formatted gateway in the xxx.xxx.xxx.xxx format. |
| `e` = WINS server address | *Accepted Values:* Any properly formatted WINS server in the xxx.xxx.xxx.xxx format. |
| `f` = connection timeout checking | *Accepted Values:*<br>`Y` = Yes<br>`N` = No<br>*Default Value:* `Y` |
| `g` = timeout value | Time, in seconds, before the connection times out.<br>*Accepted Values:* `0` through `9999`<br>*Default Value:* `300` |

| Parameters | Details |
|---|---|
| h = ARP broadcast interval | Time, in minutes, that the broadcast is sent to update the device's ARP cache.<br>*Accepted Values:* 0 through 30<br>*Default Value:* 0 (no ARP sent) |
| i = base raw port number | The port number that the printer should use for its RAW data.<br>*Accepted Values:* 1 through 65535<br>*Default Value:* 9100 |

**Comments** For the ZM400 and ZM600 printers, Zebra recommends that you use the ^ND command instead of the ^NS command.

**Example •**

```
^XA
^NSa,192.168.0.1,255.255.255.0,192.168.0.2
^XZ
```

# ~NT

## Set Currently Connected Printer Transparent

**Description** The ~NT command sets the currently connected network printer to be transparent.

**Format** ~NT

**Comments** With Z Series® printers, the ~NT command functions the same as the ~NR command. All Z Series printers on a network receive the transmission.

The commands ~NC, ^NI, ~NR, and ~NT are used only with RS-485 printer communications.

# ^PA

## Advanced Text Properties

.14↑

This command is available only for printers with firmware version V60.14.x, V50.14.x, or later.

**Description** The `^PA` command is used to configure advanced text layout features.

**Format** `^PAa,b,c,d`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = default glyph | This determines whether the default glyph is a space character or the default glyph of the base font, which is typically a hollow box.<br>*Accepted Values:*<br>`0` = off (space as default glyph)<br>`1` = on (default glyph of font is used, often a hollow box, but depends on the font.)<br>*`Default Value:`* `0` |
| `b` = bidirectional text layout | This determines whether the bidirectional text layout is turned on or off.<br>*Accepted Values:*<br>`0` = off<br>`1` = on<br>*`Default Value:`* `0` |
| `c` = character shaping | This determines whether character shaping is turned on or off.<br>*Accepted Values:*<br>`0` = off<br>`1` = on<br>*Default Value:* `0` |
| `d` = OpenType table support | This determines whether the OpenType support is turned on or off.<br>*Accepted Values:*<br>`0` = off<br>`1` = on<br>*Default Value:* `0` |

# ^PF

## Slew Given Number of Dot Rows

**Description** The ^PF command causes the printer to slew labels (move labels at a high speed without printing) a specified number of dot rows from the bottom of the label. This allows faster printing when the bottom portion of a label is blank.

**Format** `^PF#`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| # = number of dots rows to slew | *Accepted Values:* 0 to 32000<br>*Default Value:* a value must be entered or the command is ignored |

# ^PH ~PH

## Slew to Home Position

**Description** The `^PH` or `~PH` command causes the printer to feed one blank label.

The `~PH` command feeds one label after the format currently being printed is done or when the printer is placed in pause.

The `^PH` command feeds one blank label after the current format prints.

**Format** `^PH or ~PH`

# ^PM

## Printing Mirror Image of Label

**Description** The `^PM` command prints the entire printable area of the label as a mirror image. This command flips the image from left to right.

**Format** `^PMa`

This table identifies the parameters for this format:

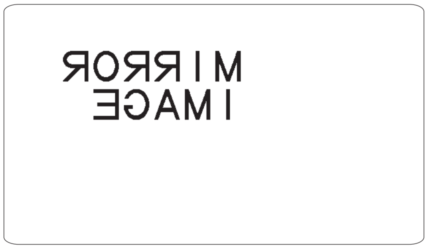
| Parameters | Details |
|---|---|
| `a` = print mirror image of entire label | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example •** This is an example of printing a mirror image on a label:

ZPL II CODE

```
^XA^PMY
^FO100,100
^CFG
^FDMIRROR^FS
^FO100,160
^FDIMAGE^FS
^XZ
```

GENERATED LABEL



**Comments** If the parameter is missing or invalid, the command is ignored. Once entered, the `^PM` command remains active until `^PMN` is received or the printer is turned off.

# ^PO

## Print Orientation

**Description** The ^PO command inverts the label format 180 degrees. The label appears to be printed upside down. If the original label contains commands such as ^LL, ^LS, ^LT and ^PF, the inverted label output is affected differently.

**Format** ^POa

This table identifies the parameters for this format:

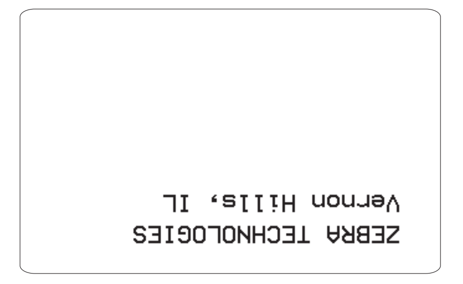
| Parameters | Details |
|---|---|
| a = invert label 180 degrees | *Accepted Values:* N (normal) or I (invert)<br>*Default Value:* N |

**Example** • This is an example of printing a label at 180 degrees:

ZPL II CODE

```
^XA^CFD
^POI
^LH330,10
^FO50,50
^FDZEBRA TECHNOLOGIES^FS
^FO50,75
^FDVernon Hills, IL^FS
^XZ
```

GENERATED LABEL



The ^POI command inverts the x, y coordinates. All image placement is relative to these inverted coordinates. Therefore, a different ^LH (Label Home) can be used to move the print back onto the label.

**Comments** If multiple ^PO commands are issued in the same label format, only the last command sent to the printer is used.

Once the ^PO command is sent, the setting is retained until another ^PO command is received or the printer is turned off.

# ^PP ~PP

## Programmable Pause

**Description** The ~PP command stops printing after the current label is complete (if one is printing) and places the printer in Pause Mode.

The ^PP command is not immediate. Therefore, several labels might print before a pause is performed. This command pauses the printer after the current format prints.

The operation is identical to pressing PAUSE on the control panel of the printer. The printer remains paused until PAUSE is pressed or a ~PS (Print Start) command is sent to the printer.

**Format** `^PP or ~PP`

# ^PQ

## Print Quantity

**Description** The ^PQ command gives control over several printing operations. It controls the number of labels to print, the number of labels printed before printer pauses, and the number of replications of each serial number.

**Format** `^PQq,p,r,o`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| q = total quantity of labels to print | *Accepted Value:* 1 to 99,999,999<br>*Default Value:* 1 |
| p = pause and cut value (labels between pauses) | *Accepted Value:* 1 to 99,999,999<br>*Default Value:* 0 (no pause) |
| r = replicates of each serial number | *Accepted Value:* 0 to 99,999,999 replicates<br>*Default Value:* 0 (no replicates) |
| o = override pause count | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N |

If the o parameter is set to Y, the printer cuts but does not pause, and the printer does **not** pause after every group count of labels has been printed. With the o parameter set to N (default), the printer pauses after every group count of labels has been printed.

**Example •** This example shows the control over print operations:

**^PQ50,10,1,Y**: This example prints a total of 50 labels with one replicate of each serial number. It prints the total quantity in groups of 10, but does not pause after every group.

**^PQ50,10,1,N**: This example prints a total of 50 labels with one replicate of each serial number. It prints the total quantity in groups of 10, pausing after every group.

# ^PR

## Print Rate

**Description** The ^PR command determines the media and slew speed (feeding a blank label) during printing.

The printer operates with the selected speeds until the setting is reissued or the printer is turned off.

The print speed is application-specific. Because print quality is affected by media, ribbon, printing speeds, and printer operating modes, it is very important to run tests for your applications.

**Important** • Some models go to default print speed when power is turned off.

**Note** • To set the print rate to 1 inch per second the 600 dpi *Xi*III*Plus* accepts a ^PR1 command.

**Format** ^PRp,s,b

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| p = print speed | *Accepted Values:*<br>A or 2 = 50.8 mm/sec. (2 inches/sec.)<br>B or 3 = 76.2 mm/sec. (3 inches/sec.)<br>C or 4 = 101.6 mm/sec. (4 inches/sec.)<br>5 = 127 mm/sec.(5 inches/sec.)<br>D or 6 = 152.4 mm/sec. (6 inches/sec.)<br>E or 8 = 203.2 mm/sec. (8 inches/sec.)<br>9 = 220.5 mm/sec. 9 inches/sec.)<br>10 = 245 mm/sec.(10 inches/sec.)<br>11 = 269.5 mm/sec.(11 inches/sec.)<br>12 = 304.8 mm/sec. 12 inches/sec.)<br>*Default Value:* A |

| Parameters | Details |
|---|---|
| s = slew speed | *Accepted Values:*<br>A or 2 = 50.8 mm/sec. (2 inches/sec.)<br>B or 3 = 76.2 mm/sec. (3 inches/sec.)<br>C or 4 = 101.6 mm/sec. (4 inches/sec.)<br>5 = 127 mm/sec. 5 inches/sec.)<br>D or 6 = 152.4 mm/sec. (6 inches/sec.)<br>E or 8 = 203.2 mm/sec. (8 inches/sec.)<br>9 = 220.5 mm/sec. (9 inches/sec.)<br>10 = 245 mm/sec. (10 inches/sec.)<br>11 = 269.5 mm/sec. 11 inches/sec.)<br>12 = 304.8 mm/sec. 12 inches/sec.)<br>*Default Value:* D |
| b = backfeed speed | *Accepted Values:*<br>A or 2 = 50.8 mm/sec. (2 inches/sec.)<br>B or 3 = 76.2 mm/sec. (3 inches/sec.)<br>C or 4 = 101.6 mm/sec. (4 inches/sec.)<br>5 = 127 mm/sec.(5 inches/sec.)<br>D or 6 = 152.4 mm/sec. (6 inches/sec.)<br>E or 8 = 203.2 mm/sec. (8 inches/sec.)<br>9 = 220.5 mm/sec. 9 inches/sec.)<br>10 = 245 mm/sec. 10 inches/sec.)<br>11 = 269.5 mm/sec. 11 inches/sec.)<br>12 = 304.8 mm/sec. 12 inches/sec.)<br>*Default Value:* A |

**Comments** The speed setting for p, s, and b is dependent on the limitations of the printer. If a particular printer is limited to a rate of 6 ips (inches per second), a value of 12 can be entered but the printer performs only at a 6 ips rate. See your printer’s User Guide for specifics on performance.

# ~PR

## Applicator Reprint

**Description** The ~PR command is supported only by the *PAX* and *PAX*2 series printers. If the ~PR command is enabled (see ^*JJ* on page 245), the last label printed reprints, similar to the applicator asserting the Reprint signal on the applicator port.

**Format** ~PR

**Comments** Pressing PREVIOUS on the control panel also causes the last label to reprint.

# ~PS

## Print Start

**Description** The ~PS command causes a printer in Pause Mode to resume printing. The operation is identical to pressing PAUSE on the control panel of the printer when the printer is already in Pause Mode.

**Format** ~PS

# ^PW

## Print Width

**Description** The `^PW` command allows you set the print width.

**Format** `^PWa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = label width (in dots) | *Accepted Values:* `2`, to the width of the label<br>If the value exceeds the width of the label, the width is set to the label's maximum size.<br>*Default Value:* last permanently saved value |

**Limitation** Not all Zebra printers support the `^PW` command.

# ~RO

## Reset Advanced Counter

**Description** The ~RO command resets the advanced counters used by the printer to monitor label generation in inches, centimeters, and number of labels. These resettable counters are available and can be reset.

**Format** ~ROc

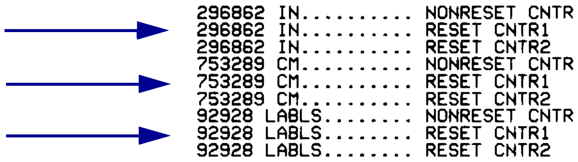
This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| c = counter number | *Accepted Values:*<br>1 = reset counter 1<br>2 = reset counter 2<br>R = reset head replaced counter *<br>R resets the head cleaned counter and the head replaced counter.<br>C = reset head cleaned counter *<br>*Default Value:* a value must be specified or the command is ignored |

* These values are only supported on printers using firmware V60.15.8Z, V53.15.3Z, and later.

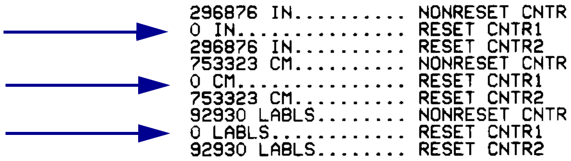
**Example •** This example shows how the counter portion of the printer configuration label looks when counter 1 is reset by sending ~RO1:

Before



```
296862 IN.......... NONRESET CNTR
296862 IN.......... RESET CNTR1
296862 IN.......... RESET CNTR2
753289 CM.......... NONRESET CNTR
753289 CM.......... RESET CNTR1
753289 CM.......... RESET CNTR2
92928 LABLS........ NONRESET CNTR
92928 LABLS........ RESET CNTR1
92928 LABLS........ RESET CNTR2
```

After



```
296876 IN.......... NONRESET CNTR
0 IN............... RESET CNTR1
296876 IN.......... RESET CNTR2
753323 CM.......... NONRESET CNTR
0 CM............... RESET CNTR1
753323 CM.......... RESET CNTR2
92930 LABLS........ NONRESET CNTR
0 LABLS............ RESET CNTR1
92930 LABLS........ RESET CNTR2
```

# ^SC

## Set Serial Communications

**Description** The `^SC` command allows you to change the serial communications parameters you are using.

**Format** `^SCa,b,c,d,e,f`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = baud rate | *Accepted Values:* `110*`; `300`; `600`; `1200`; `2400`; `4800`; `9600`; `14400`; `19200`; `28800`; `38400`; or `57600;` `115200`<br>*Default Value:* must be specified or the parameter is ignored |
| `b` = word length (in data bits) | *Accepted Values:* `7` or `8`<br>*Default Value:* must be specified |
| `c` = parity | *Accepted Values:* `N` (none), `E` (even), or `O` (odd)<br>*Default Value:* must be specified |
| `d` = stop bits | *Accepted Values:* `1` or `2`<br>*Default Value:* must be specified |
| `e` = protocol mode | *Accepted Values:*<br>`X` = XON/XOFF<br>`D` = DTR/DSR<br>`R` = RTS<br>*Default Value:* must be specified |
| `f` = Zebra protocol | *Accepted Values:*<br>`A` = ACK/NAK<br>`N` = none<br>`Z` = Zebra<br>*Default Value:* must be specified |

* This value is not supported on Zebra ZM400/ZM600™ and S4M™ printers.

**Comments** If any of the parameters are missing, out of specification, not supported by a particular printer, or have a ZPL-override DIP switch set, the command is ignored.

A `^JUS` command causes the changes in Communications Mode to persist through power-up and software resets.

# ~SD

## Set Darkness

**Description** The ~SD command allows you to set the darkness of printing. ~SD is the equivalent of the darkness setting parameter on the control panel display.

**Format** ~SD##

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| ## = desired darkness setting (two-digit number) | *Accepted Values:* 00 to 30<br>*Default Value:* last permanently saved value |

**Important •** The darkness setting range for the *Xi*III*Plus* is 0 to 30 in increments of 0.1. The firmware is setup so that the ^MD and ~SD commands (ZPL darkness commands) accepts that range of settings.

**Example •** These are examples of the *Xi*III*Plus* Darkness Setting:

```
^MD8.3
```

```
~SD8.3
```

**Comments** The ^MD command value, if applicable, is added to the ~SD command.

# ^SE

## Select Encoding Table

**Description** The ^SE command is used to select the desired ZPL or ZPL II encoding table.

**Format** `^SEd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = location of encoding table | *Accepted Values:* `R:`, `E:`, `B:`, and `A:`<br>*Default Value:* `R:` |
| `o` = name of encoding table | *Accepted Value:* `1` to `8` alphanumeric characters<br>*Default Value:* a value must be specified |
| `x` = extension | *Fixed Value:* `.DAT` |

The encoding tables are provided with the font card or downloaded in flash with the font. The table appears as `XXXXXXX.DAT` in a directory label printed by the ZPL commands.

The most active encoding table is indicated by the `*` on the directory label.

**Example •**

```
^XA^WD*:*.*^XZ
```

# ^SF

## Serialization Field (with a Standard ^FD String)

**Description** The ^SF command allows you to serialize a standard ^FD string. Strings are serialized from the last character in the backing store with regard to the alignment of the mask and increment strings. The maximum size of the mask and increment string is 3K combined. For combining semantic clusters that do not get incremented, the mask character % needs to be added to the increment string.

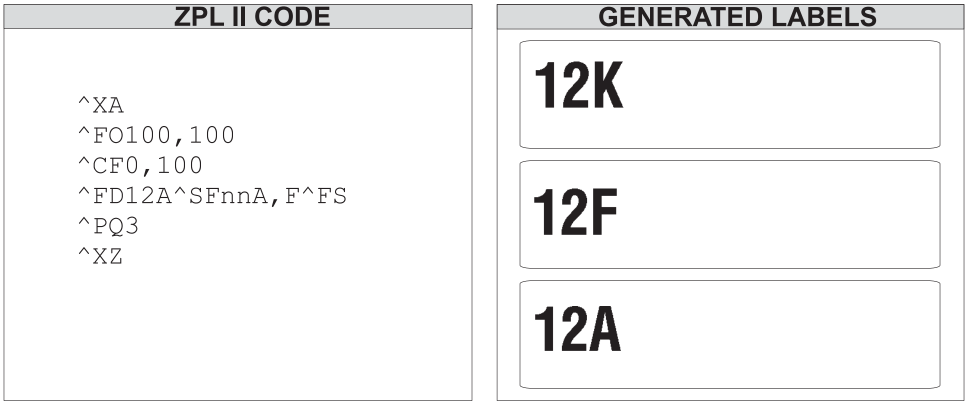
**Format** `^SFa,b`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = mask string | The mask string sets the serialization scheme. The length of the string mask defines the number of characterscombining semantic clusters in the current ^FD string to be serialized. The mask is aligned to the characterscombining semantic clusters in the ^FD string starting with the right-mostlast in the backing store position.<br>*Mask String placeholders:*<br>D or d – Decimal numeric 0–9<br>H or h – Hexadecimal 0–9 plus a-f or A-F<br>O or o – Octal 0–7<br>A or a – Alphabetic A–Z or a–z<br>N or n – Alphanumeric 0–9 plus A–Z or a–z<br>% – Ignore character or skip |
| b = increment string | The increment string is the value to be added to the field on each label. The default value is equivalent to a decimal value of one. The string is composed of any characterscombining semantic clusters defined in the serial string. Invalid characterscombining semantic clusters are assumed to be equal to a value of zero in that characterscombining semantic clusters position.<br>The increment value for alphabetic strings start with ‘A’ or ‘a’ as the zero placeholder. This means to increment an alphabetic charactercombining semantic cluster by one, a value of ‘B’ or ‘b’ must be in the increment string. |

For characters that do not get incremented, the % character needs to be added to the increment string.

**Example •** This is an example of serializing a `^FD` string. The ZPL II code generates three separate labels as seen in Generated Labels:



ZPL II CODE

```
^XA
^FO100,100
^CF0,100
^FD12A^SFnnA,F^FS
^PQ3
^XZ
```

GENERATED LABELS

This mask has the first characterscombining semantic clusters as alphanumeric (`nn = 12`) and the last digit as uppercase alphabetic (A). The decimal value of the increment number is equivalent to 5 (F). The number of labels generated depends on the number specified by the `^PQ` command.

In a similar instance, the `^FD` string could be replaced with either of the `^FD` strings below to generate a series of label, determined by `^PQ`.

Using this ZPL code:

```
^FDBL0000^SFAAdddd,1
```

The print sequence on this series of labels is:

```
BL0000, BL0001,...BL0009, BL0010,...
BL0099, BL0100,...BL9999, BM0000...
```

Using this ZPL code:

```
^FDBL00-0^SFAAdd%d,1%1
```

The print sequence on this series of labels is:

```
BL00-0, BL01-1, BL02-2,...BL09-9,
BL11-0, BL12-1...
```

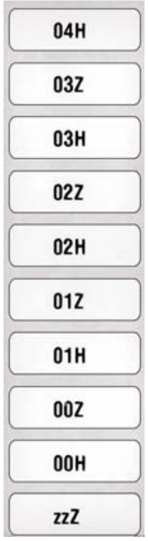
**Examples •** These examples show the importance of capitalization and location within the mask.

In this example, the printer cycles with every two printed labels and alternates between H (position 18), and then Z (position 36). With n or N, the serial number increments from 0 - 9 and a–z or A–Z (36 positions overall). With each completed cycle, the second cluster (nn) increments one position (from 00, 01, 02 …) per cycle:

**ZPL II CODE**

```
^XA
^FO100,50^A0N,50,50^FDzzZ^SFnnN,I^FS
^PQ10
^XZ
```

**GENERATED LABELS**

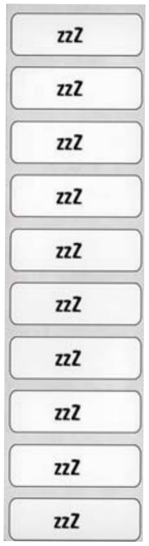


In this example, lower case i increments with a mask string of nnN. Nothing changes because the first cluster (Z) never triggers the second cluster (zz) to change.

**ZPL II CODE**

```
^XA
^FO100,50^A0N,50,50^FDzzZ^SFnnN,i^FS
^PQ10
^XZ
```

**GENERATED LABELS**



.14↑

Important notes about masking for firmware version V60.14.x, V50.14.x, or later:

- A single % masks an entire combining semantic cluster rather than a single code point.
- The mask string and increment string should be aligned at the last code point in their respective backing stores.
- Control and bidirectional characters do not require a mask and are ignored for serialization purposes.

# ^SI

## Set Sensor Intensity

**Description** The ^SI command is used to change the values for the media sensors, which are also set during the media calibration process. The media calibration process is described in your specific printer’s user’s guide. This command is only supported on Zebra ZM400/ZM600™ printers.

**Format** `^SIa,b`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = indicates the setting to modify | *Accepted Values:*<br>1 = transmissive sensor brightness setting<br>2 = transmissive sensor baseline setting<br>*Default Value:* must be an accepted value or the entire command is ignored |
| b = the value to use for the sensor being configured | The ranges for this parameter are the same for the accepted values in parameter a.<br>*Accepted Values:* 0 to 196<br>*Default Value:* must be an accepted value or the entire command is ignored |

# ^SL

## Set Mode and Language (for Real-Time Clock)

**Description** The ^SL command is used to specify the Real-Time Clock's mode of operation and language for printing information.

**Important •**

- Time is read when the image is created. If the image stays in the queue longer than the specified time the image will be recreated with a new time.
- There are incidents when the same time or a larger space of time may be printed on labels. This is due to the format complexity and print speed.

**Format** `^SLa,b`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = mode | *Accepted Values:*<br>S = Start Time Mode. This is the time that is read from the Real-Time Clock when label formatting begins (when ^XA is received). The first label has the same time placed on it as the last label.<br>T = Time Now Mode. This is the time that is read from the Real-Time Clock when the label to be printed is placed in print queue. *Time Now* is similar to a serialized time or date field.<br>Numeric Value = With the Enhanced Real Time Clock (V60.13.0.10 or later) a time accuracy tolerance can be specified. Range = 1 to 999 seconds, 0 = one second tolerance<br>Example: SL30,1 = Accuracy tolerance of 30 seconds and use English.<br>*Default Value:* S |

| Parameters | Details |
|---|---|
| b = language<br>.14↑<br>Value 13 is only supported in firmware versions V60.14.x, V50.14.x, or later. | *Accepted Values:*<br>1 = English<br>2 = Spanish<br>3 = French<br>4 = German<br>5 = Italian<br>6 = Norwegian<br>7 = Portuguese<br>8 = Swedish<br>9 = Danish<br>10 = Spanish 2<br>11 = Dutch<br>12 = Finnish<br>13 = Japanesed<br>14 = Korean *<br>15 = Simplified Chinese *<br>16 = Traditional Chinese *<br>*Default Value:* the language selected with `^KL` or the control panel |

* These values are only supported on Zebra ZM400/ZM600™ printers.

**Comments** These are some comments to be aware of:

- The **`^SL`** command must be placed before the first **`^FO`** command.
- As of V60.13.0.10 all supported printers have Enhanced Real Time Clock capabilities the RTC will not print time fields that are more than sixty seconds old, rather it will update the time prior to printing (**`^SLT`** or **`^SL60`**). To control time with increments other than sixty seconds the **`^SL`** command can be used with a numeric value (**`^SL30`**).
  **`^SLS`** can keep times longer than sixty seconds.

For more details on set mode and language with the Real-Time Clock, see *Real Time Clock* on page 805.

# ^SN

## Serialization Data

**Description** The `^SN` command allows the printer to index data fields by a selected increment or decrement value, making the data fields increase or decrease by a specified value each time a label is printed. This can be performed on 100 to 150 fields in a given format and can be performed on both alphanumeric and bar code fields. A maximum of 12 of the right-most integers are subject to indexing. The first integer found when scanning from right to left starts the the end of the backing store towards the beginning starts the indexing portion of the data field.

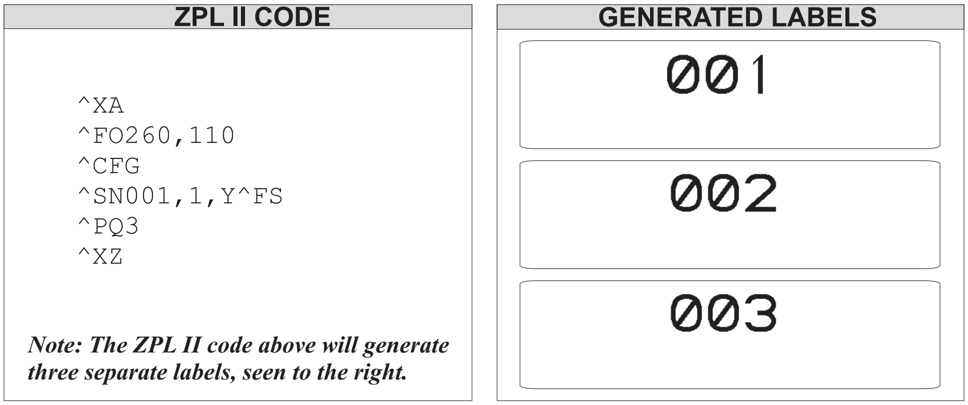
If the backing store of the alphanumeric field to be indexed ends with an alpha character, the data is scanned, character by character, from right to leftthe end of the backing store until a numeric character is encountered. Serialization takes place using the value of the first number found.

**Format** `^SNv,n,z`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `v` = starting value | *Accepted Values:* 12-digits maximum for the portion to be indexed<br>*Default Value:* `1` |
| `n` = increment or decrement value | *Accepted Values:* 12-digit maximum<br>*Default Value:* `1`<br>To indicate a decrement value, precede the value with a minus (–) sign. |
| `z` = add leading zeros (if needed) | *Accepted Values:*<br>`N` = no<br>`Y` = yes<br>*Default Value:* `N` |

**Example •** This example shows incrementing by a specified value:



ZPL II CODE

```
^XA
^FO260,110
^CFG
^SN001,1,Y^FS
^PQ3
^XZ
```

*Note: The ZPL II code above will generate three separate labels, seen to the right.*

GENERATED LABELS

001

002

003

**Comments** Incrementing and decrementing takes place for each serial-numbered field when all replicates for each serial number have been printed, as specified in parameter `r` of the `^PQ` (print quality) command.

If, during the course of printing serialized labels, the printer runs out of either paper or ribbon, the first label printed (after the media or ribbon has been replaced and calibration completed) has the same serial number as the *partial* label printed before the *out* condition occurred. This is done in case the last label before the *out* condition did not fully print. This is controlled by the `^JZ` command.

## Using Leading Zeros

In the `^SN` command, the `z` parameter determines if leading zeros are printed or suppressed. Depending on which value is used (`Y =` print leading zeros; `N =` do not print leading zeros), the printer either prints or suppresses the leading zeros.

The default value for this parameter is `N` (do not print leading zeros).

## Print Leading Zeros

The starting value consists of the right-mostfirst number working backwards in the backing store consecutive sequence of digits. The width (number of digits in the sequence) is determined by scanning from right to left until the first non-digit (space or alpha character) is encountered. To create a specific width, manually place leading zeros as necessary.

## Suppressing Leading Zeros

The starting value consists of the right-mostfirst number working backwards in the backing store consecutive sequence of digits, including any leading spaces. The width (number of digits in the sequence) is determined by scanning from right to left until the first alpha character (except a space) is encountered. To create a specific width, manually place leading spaces or zeros as necessary. Suppressed zeros are replaced by spaces. During the serialization process, when the entire number contains all zeros, the last zero is not suppressed.

The `^SN` command replaces the Field Data (`^FD`) command within a label formatting program.

# ^SO

## Set Offset (for Real-Time Clock)

**Description** The ^SO command is used to set the secondary and the tertiary offset from the primary Real-Time Clock.

**Note •** For each label only one SO2 command can be used. If more than one offset is required, SO3 must be used.

**Format** `^SOa,b,c,d,e,f,g`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = clock set | *Accepted Values:*<br>2 = secondary<br>3 = third<br>*Default Value:* value must be specified |
| b = months offset | *Accepted Values:* –32000 to 32000<br>*Default Value:* 0 |
| c = days offset | *Accepted Values:* –32000 to 32000<br>*Default Value:* 0 |
| d = years offset | *Accepted Values:* –32000 to 32000<br>*Default Value:* 0 |
| e = hours offset | *Accepted Values:* –32000 to 32000<br>*Default Value:* 0 |
| f = minutes offset | *Accepted Values:* –32000 to 32000<br>*Default Value:* 0 |
| g = seconds offset | *Accepted Values:* –32000 to 32000<br>*Default Value:* 0 |

For more detail on set offset, see *Real Time Clock* on page 805.

# ^SP

## Start Print

**Description** The ^SP command allows a label to start printing at a specified point before the entire label has been completely formatted. On extremely complex labels, this command can increase the overall throughput of the print.

The command works as follows: Specify the dot row at which the ^SP command is to begin. This creates a label *segment*. Once the ^SP command is processed, all information in that segment prints. During the printing process, all of the commands after the ^SP continue to be received and processed by the printer.

If the segment after the ^SP command (or the remainder of the label) is ready for printing, media motion does not stop. If the next segment is not ready, the printer stops mid-label and wait for the next segment to be completed. Precise positioning of the ^SP command requires a trial-and-error process, as it depends primarily on print speed and label complexity.

The ^SP command can be effectively used to determine the worst possible print quality. You can determine whether using the ^SP command is appropriate for the particular application by using this procedure.

If you send the label format up to the first ^SP command and then wait for printing to stop before sending the next segment, the printed label is a sample of the worst possible print quality. It drops any field that is out of order.

If the procedure above is used, the end of the label format must be:

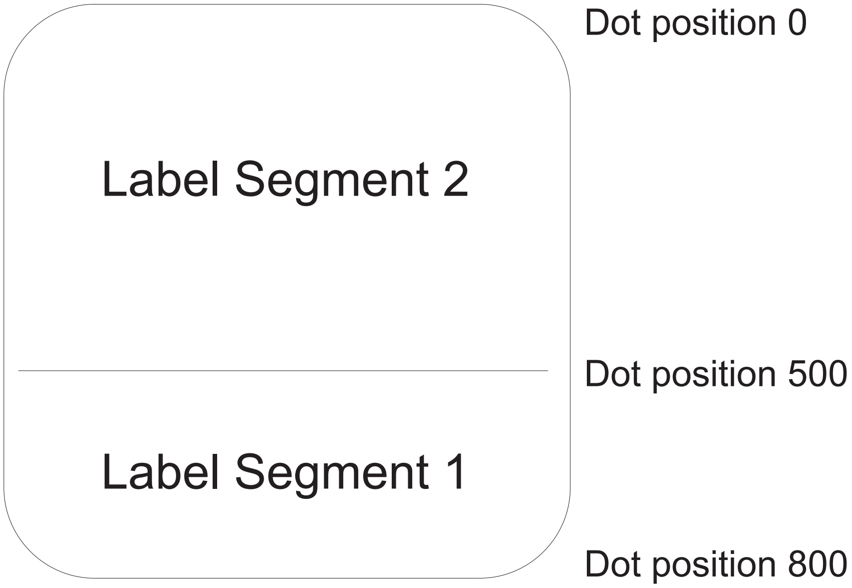
```
^SP#^FS
```

**Comments** `^SPa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = dot row to start printing | *Accepted Values:* 0 to 32000<br>*Default Value:* 0 |

**Example** • In this example, a label 800 dot rows in length uses `^SP500`. Segment 1 prints while commands in Segment 2 are being received and formatted.



# ^SQ

## Halt ZebraNet Alert

**Description** The `^SQ` command is used to stop the ZebraNet Alert option.

**Format** `^SQa,b,c`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = condition type | *Accepted Values:*<br>A = paper out<br>B = ribbon out<br>C = printhead over-temp<br>D = printhead under-temp<br>E = head open<br>F = power supply over-temp<br>G = ribbon-in warning (Direct Thermal Mode)<br>H = rewind full<br>I = cut error<br>J = printer paused<br>K = PQ job completed<br>L = label ready<br>M = head element out<br>N = ZBI (Zebra BASIC Interpreter) runtime error<br>O = ZBI (Zebra BASIC Interpreter) forced error<br>P = power on<br>Q = clean printhead<br>R = media low<br>S = ribbon low<br>T = replace head<br>U = battery low<br>V = RFID error (in RFID printers only)<br>W = all errors (in RFID printers only)<br>* = all errors (in non-RFID printers) |

| Parameters | Details |
|---|---|
| b = destination | *Accepted Values:*<br>A = serial port<br>B = parallel port<br>C = e-mail address<br>D = TCP/IP<br>E = UDP/IP<br>F = SNMP trap<br>* = wild card to stop alerts for all destinations |
| c = halt messages | *Accepted Values:*<br>Y = halt messages<br>N = start messages<br>*Default Value:* Y |

# ^SR

## Set Printhead Resistance

**Description** The ^SR command allows you to set the printhead resistance.

**Format** ^SR####

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| #### = resistance value (four-digit numeric value) | *Accepted Value:* 0488 to 1175<br>*Default Value:* last permanently saved value |

**Comments** To avoid damaging the printhead, this value should be less than or equal to the value shown on the printhead being used. Setting a higher value could damage the printhead.

**Note** • New printer models automatically set head resistance.

# ^SS

## Set Media Sensors

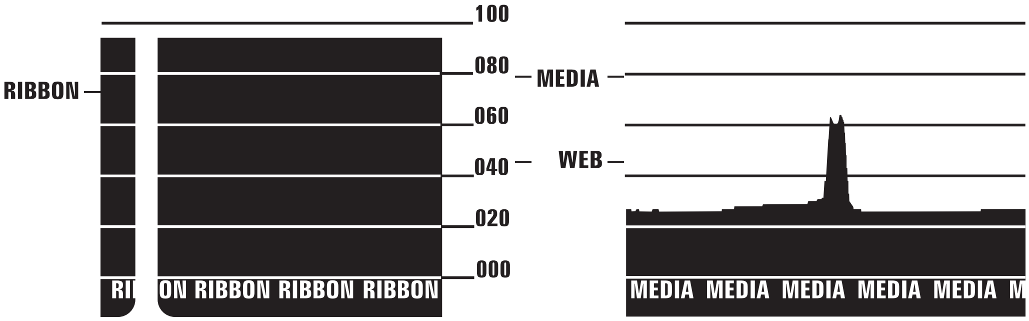
**Description** The ^SS command is used to change the values for media, web, ribbon, and label length set during the media calibration process. The media calibration process is described in your specific printer's user's guide.

**Format** `^SSw,m,r,l,m2,r2,a,b,c`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `w` = web (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value shown on the media sensor profile or configuration label |
| `m` = media (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value shown on the media sensor profile or configuration label |
| `r` = ribbon (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value shown on the media sensor profile or configuration label |
| `l` = label length (in dots, four-digit value) | *Accepted Values:* `0001` to `32000`<br>*Default Value:* value calculated in the calibration process |
| `m2` = intensity of media LED (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value calculated in the calibration process |
| `r2` = intensity of ribbon LED (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value calculated in the calibration process |
| `a` = mark sensing (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value calculated in the calibration process |
| `b` = mark media sensing (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value calculated in the calibration process |
| `c` = mark LED sensing (three-digit value) | *Accepted Values:* `000` to `100`<br>*Default Value:* value calculated in the calibration process |

**Example** • Below is an example of a media sensor profile. Notice the numbers from 000 to 100 and where the words WEB, MEDIA, and RIBBON appear in relation to those numbers. Also notice the black vertical spike. This represents where the printer sensed the transition from media-to-web-to-media.



The media and sensor profiles produced vary in appearance from printer to printer.

**Comments** The `m2` and `r2` parameters have no effect in Stripe® *S*-300 and *S*-500 printers.

Maximum values for parameters depend on which printer platform is being used.

# ^ST

## Set Date and Time (for Real-Time Clock)

**Description** The `^ST` command sets the date and time of the Real-Time Clock.

**Format** `^STa,b,c,d,e,f,g`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = month | *Accepted Values:* `01` to `12`<br>*Default Value:* current month |
| `b` = day | *Accepted Values:* `01` to `31`<br>*Default Value:* current day |
| `c` = year | *Accepted Values:* `1998` to `2097`<br>*Default Value:* current year |
| `d` = hour | *Accepted Values:* `00` to `23`<br>*Default Value:* current hour |
| `e` = minute | *Accepted Values:* `00` to `59`<br>*Default Value:* current minute |
| `f` = second | *Accepted Values:* `00` to `59`<br>*Default Value:* current second |
| `g` = format | *Accepted Values:*<br>`A` = a.m.<br>`P` = p.m.<br>`M` = 24-hour military<br>*Default Value:* `M` |

For more details on set date and time, see *Real Time Clock* on page 805.

# ^SX

## Set ZebraNet Alert

**Description** The `^SX` command is used to configure the ZebraNet Alert System.

**Format** `^SXa,b,c,d,e,f`

This table identifies the parameters for this format:

**Note •** The values in this table apply to firmware version V48.12.4 or later.

| Parameters | Details |
|---|---|
| a = condition type | *Accepted Values:*<br>A = paper out<br>B = ribbon out<br>C = printhead over-temp<br>D = printhead under-temp<br>E = head open<br>F = power supply over-temp<br>G = ribbon-in warning (Direct Thermal Mode)<br>H = rewind full<br>I = cut error<br>J = printer paused<br>K = PQ job completed<br>L = label ready<br>M = head element out<br>N = ZBI (Zebra BASIC Interpreter) runtime error<br>O = ZBI (Zebra BASIC Interpreter) forced error<br>P = power on<br>Q = clean printhead<br>R = media low<br>S = ribbon low<br>T = replace head<br>U = battery low<br>V = RFID error (in RFID printers only)<br>W = all errors (in RFID printers only)<br>* = all errors (in non-RFID printers)<br>*Default Value:* if the parameter is missing or invalid, the command is ignored |
| b = destination for route alert | *Accepted Values:*<br>A = serial port<br>B* = parallel port<br>C = e-mail address<br>D = TCP/IP<br>E = UDP/IP<br>F = SNMP trap<br>*Default Value:* if this parameter is missing or invalid, the command is ignored<br>*** Requires** bidirectional communication. |
| c = enable *condition set* alert to this destination | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* Y or previously configured value |

| Parameters | Details |
|---|---|
| d = enable condition clear alert to this destination | *Accepted Values:*<br>N = no<br>Y = yes<br>*Default Value:* N or previously configured value<br>Parameters e and f are sub-options based on destination. If the sub-options are missing or invalid, these parameters are ignored. |
| e = destination setting | *Accepted Values:*<br>Internet e-mail address (e.g. user@company.com)<br>IP address (for example, 10.1.2.123)<br>SNMP trap<br>IP or IPX addresses |
| f = port number | *Accepted Values:*<br>TCP port # (0 to 65535)<br>UPD port # (0 to 65535) |

**Example •** This is an example of the different (b) destinations that you can send for the condition type (a):

Serial: `^SXA,A,Y,Y`

Parallel: `^SXA,B,Y,Y`

E-Mail: `^SXA,C,Y,Y,admin@company.com`

TCP: `^SXA,D,Y,Y,123.45.67.89,1234`

UDP: `^SXA,E,Y,Y,123.45.67.89,1234`

SNMP Trap: `^SXA,F,Y,Y,255.255.255.255`

**Comments** In the example above for SNMP Trap, entering 255.255.255.255 broadcasts the notification to every SNMP manager on the network. To route the device to a single SNMP manager, enter a specific address (123.45.67.89).

# ^SZ

## Set ZPL

**Description** The ^SZ command is used to select the programming language used by the printer. This command gives you the ability to print labels formatted in both ZPL and ZPL II.

This command remains active until another ^SZ command is sent to the printer or the printer is turned off.

**Format** `^SZa`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = ZPL version | *Accepted Values:*<br>1 = ZPL<br>2 = ZPL II<br>*Default Value:* 2 |

**Comments** If the parameter is missing or invalid, the command is ignored.

# ~TA

## Tear-off Adjust Position

**Description** The ~TA command lets you adjust the rest position of the media after a label is printed, which changes the position at which the label is torn or cut.

**Format** `~TA###`

**Important** • These are some important facts about this command:

- For 600 dpi printers, the step size doubles.
- If the number of characters is **less than** 3, the command is ignored.

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `###` = change in media rest position (3-digit value in dot rows must be used.) | *Accepted Values:* `-120` to `120`<br>*Default Value:* last permanent value saved |

**Comments** If the parameter is missing or invalid, the command is ignored.

# ^TB

## Text Blocks

This command is available only for printers with firmware version V60.14.x, V50.14.x, or later.

**Description** The `^TB` command prints a text block with defined width and height. The text block has an automatic word-wrap function. If the text exceeds the block height, the text is truncated. This command supports complex text layout features.

**Note •** `^TB` is the preferred command for printing fields or blocks of text, instead of `^FB`.

**Format** `^TBa,b,c`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `a` = block rotation | *Accepted Values:*<br>`N` = normal<br>`R` = rotate 90 degrees clockwise<br>`I` = invert 180 degrees<br>`B` = read from bottom up-270 degrees<br>*Default Value:* whatever was specified by the last `^A` (which has the default of `^FW`) |
| `b` = block width in dots | *Accepted Values:*<br>`1` to the width of the label in dots<br>*Default Value:* 1 dot |
| `c` = block height in dots | *Accepted Values:*<br>`1` to the length of the label in dots<br>*Default Value:* 1 dot |

**Comments** Facts about the `^TB` command:

- Justification of `^TB` command comes from `^FO`, `^FT`, or `^FN` command. If no justification is determined then the default is auto justification.
- Data between < and > is processed as an escape sequence. This is a list of defined escape sequences: <<> prints <.
- The `^TB` command has an automatic word-wrap function. Soft hyphens do not print and are not used as a line break position.

# ^TO

## Transfer Object

**Description** The ^TO command is used to copy an object or group of objects from one storage device to another. It is similar to the copy function used in PCs.

Source and destination devices must be supplied and must be different and valid for the action specified. Invalid parameters cause the command to be ignored.

The asterisk (*) can be used as a wild card for object names and extensions. For instance, ZEBRA.* or *.GRF are acceptable forms for use with the ^TO command.

At least one source parameter (d, o, or x) and one destination parameter (s, o, or x) must be specified. If only ^TO is entered, the command is ignored.

**Format** `^TOs:o.x,d:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| s = source device of stored object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* if a drive is not specified, all objects are transferred to the drive set in parameter s |
| o = stored object name | *Accepted Values:* any existing object conforming to Zebra conventions<br>*Default Value:* if a name is not specified, * is used — all objects are selected |
| x = extension | *Accepted Values:* any extension conforming to Zebra conventions<br>*Default Value:* if an extension is not specified, * is used — all extensions are selected |
| d = destination device of the stored object | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* a destination must be specified |
| o = name of the object at destination | *Accepted Values:* up to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, the name of the existing object is used |
| x = extension | *Accepted Values:* any extension conforming to Zebra conventions<br>*Default Value:* if an extension is not specified, the extension of the existing object is used |

**Comments** Parameters o, x, and s support the use of the wild card (*).

If the destination device does not have enough free space to store the object being copied, the command is canceled.

Zebra files (`Z:*.*`) cannot be transferred. These files are copyrighted by Zebra Technologies.

### Transferring Objects

These are some examples of using the `^TO` command.

**Example** • To copy the object **`ZLOGO.GRF`** from DRAM to an optional Memory Card and rename it **`ZLOGO1.GRF`**, write the following format:

```
^XA
^TOR:ZLOGO.GRF,B:ZLOGO1.GRF
^XZ
```

**Example** • To copy the object **`SAMPLE.GRF`** from an optional Memory Card to DRAM and keep the same name, write this format:

```
^XA
^TOB:SAMPLE.GRF,R:SAMPLE.GRF
^XZ
```

### Transferring Multiple Objects

The asterisk (`*`) can be used to transfer multiple object files (except `*.FNT`) from DRAM to the Memory Card. For example, assume you have several object files that contain logos. These files are named `LOGO1.GRF`, `LOGO2.GRF`, and `LOGO3.GRF`.

To transfer all these files to the memory card using the name NEW instead of LOGO, place an asterisk after the names NEW and LOGO in the transfer command. This copies all files beginning with LOGO in one command.

```
^XA
^TOR:LOGO*.GRF,B:NEW*.GRF
^XZ
```

During a multiple transfer, if a file is too big to be stored on the memory card, that file is skipped. All remaining files attempt to be transferred. All files that can be stored within the space limitations are transferred, while other files are ignored.

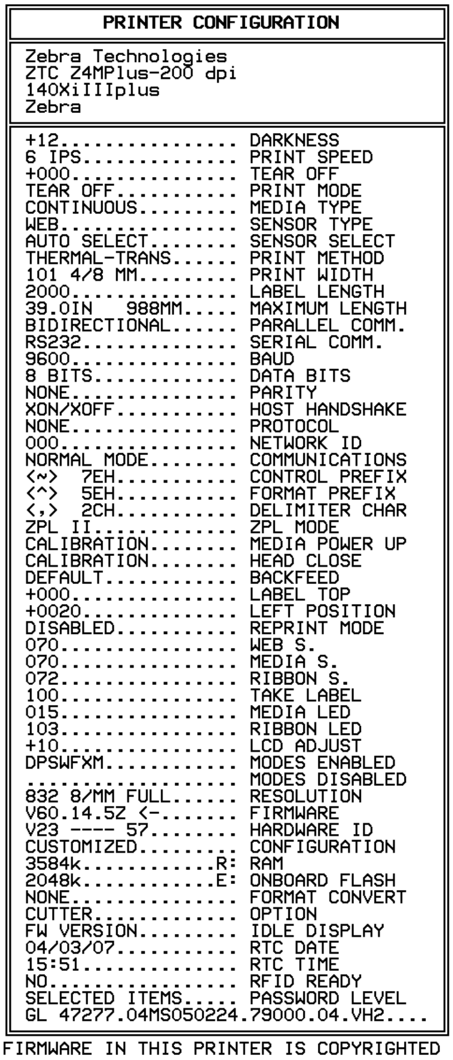
# ~WC

## Print Configuration Label

**Description** The `~WC` command is used to generate a printer configuration label. The printer configuration label contains information about the printer setup, such as sensor type, network ID, ZPL mode, firmware version, and descriptive data on the `R:`, `E:`, `B:`, and `A:` devices.

**Format** `~WC`

**Comments** This command works only when the printer is idle.



```
PRINTER CONFIGURATION

Zebra Technologies
ZTC Z4MPlus-200 dpi
140XiIIIplus
Zebra

+12................ DARKNESS
6 IPS.............. PRINT SPEED
+000............... TEAR OFF
TEAR OFF........... PRINT MODE
CONTINUOUS......... MEDIA TYPE
WEB................ SENSOR TYPE
AUTO SELECT........ SENSOR SELECT
THERMAL-TRANS...... PRINT METHOD
101 4/8 MM......... PRINT WIDTH
2000............... LABEL LENGTH
39.0IN   988MM..... MAXIMUM LENGTH
BIDIRECTIONAL...... PARALLEL COMM.
RS232.............. SERIAL COMM.
9600............... BAUD
8 BITS............. DATA BITS
NONE............... PARITY
XON/XOFF........... HOST HANDSHAKE
NONE............... PROTOCOL
000................ NETWORK ID
NORMAL MODE........ COMMUNICATIONS
<~>  7EH........... CONTROL PREFIX
<^>  5EH........... FORMAT PREFIX
<,>  2CH........... DELIMITER CHAR
ZPL II............. ZPL MODE
CALIBRATION........ MEDIA POWER UP
CALIBRATION........ HEAD CLOSE
DEFAULT............ BACKFEED
+000............... LABEL TOP
+0020.............. LEFT POSITION
DISABLED........... REPRINT MODE
070................ WEB S.
070................ MEDIA S.
072................ RIBBON S.
100................ TAKE LABEL
015................ MEDIA LED
103................ RIBBON LED
+10................ LCD ADJUST
DPSWFXM............ MODES ENABLED
................... MODES DISABLED
832 8/MM FULL...... RESOLUTION
V60.14.5Z <-....... FIRMWARE
V23 ---- 57........ HARDWARE ID
CUSTOMIZED......... CONFIGURATION
3584k............R: RAM
2048k............E: ONBOARD FLASH
NONE............... FORMAT CONVERT
CUTTER............. OPTION
FW VERSION......... IDLE DISPLAY
04/03/07........... RTC DATE
15:51.............. RTC TIME
NO................. RFID READY
SELECTED ITEMS..... PASSWORD LEVEL
GL 47277.04MS050224.79000.04.VH2....
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

# ^WD

## Print Directory Label

**Description** The ^WD command is used to print a label listing bar codes, objects stored in DRAM, or fonts.

For bar codes, the list shows the name of the bar code. For fonts, the list shows the name of the font, the number to use with ^A command, and size. For objects stored in DRAM, the list shows the name of the object, extension, size, and option flags. All lists are enclosed in a double-line box.

**Format** `~WDd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `d` = source device — optional | *Accepted Values:* `R:`, `E:`, `B:`, `A:` and `Z:`<br>*Default Value:* `R:` |
| `o` = object name — optional | *Accepted Values:* `1` to `8` alphanumeric characters<br>*Default Value:* `*`<br>The use of a `?` (question mark) is also allowed. |
| `x` = extension — optional<br>.14↑<br>`.TTF` and `.TTE` are only supported in firmware version V60.14.x, V50.14.x, or later. | *Accepted Values:* any extension conforming to Zebra conventions<br>`.FNT` = font<br>`.BAR` = bar code<br>`.ZPL` = stored ZPL format<br>`.GRF` = GRF graphic<br>`.CO` = memory cache<br>`.DAT` = font encoding<br>`.BAS` = ZBI encrypted program<br>`.BAE` = ZBI encrypted program<br>`.STO` = data storage<br>`.PNG` = PNG graphic<br>`*` = all objects<br>`.TTF` = TrueType Font<br>`.TTE` = True Type Extension<br>*Default Value:* `*`<br>The use of a `?` (question mark) is also allowed. |

**Example** • To print a label listing all objects in DRAM, enter:

```
^XA
^WDR:*.*
^XZ
```

**Example** • To print a label listing all resident bar codes, enter:

```
^XA
^WDZ:*.BAR
^XZ
```

**Example** • To print a label listing all resident fonts, enter:

```
^XA
^WDZ:*.FNT
^XZ
```

# ~WQ

## Write Query

**Description** The `~WQ` command triggers the printer to print a label with odometer, maintenance or alert, and printhead history information. This command is only supported on printers using firmware V60.15.8Z, V53.15.5Z, and later.

**Format** `~WQquery-type`

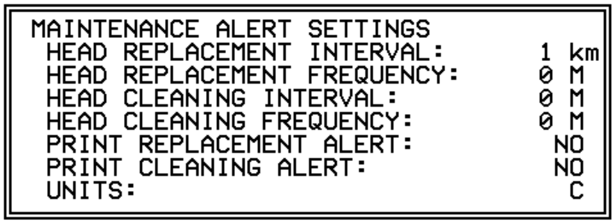
This table identifies the parameters for this format:

| Parameter | Details |
|---|---|
| `query-type` | For detailed examples of these parameters, see *~WQ Examples* on page 345.<br>*Accepted Values:*<br>`MA` = maintenance alert settings<br>`MI` = maintenance information<br>`OD` = odometer<br>`PH` = printhead life history<br>*Default Value:* must be an accepted value or the command is ignored |

## ~WQ Examples

**Example •** This is an example of how to print the maintenance alert query for the `~WQ` command.

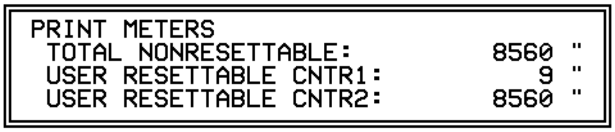
1. To get the current settings, type `~WQMA`:
   A label similar to this prints out:



```
MAINTENANCE ALERT SETTINGS
 HEAD REPLACEMENT INTERVAL:          1 km
 HEAD REPLACEMENT FREQUENCY:         0 M
 HEAD CLEANING INTERVAL:             0 M
 HEAD CLEANING FREQUENCY:            0 M
 PRINT REPLACEMENT ALERT:            NO
 PRINT CLEANING ALERT:               NO
 UNITS:                               C
```

**Example •** This is an example of how to use the odometer query for the `~WQ` command. Note that the units of measure are controlled by the `^MA` command. Also, if the "Early Warning Maintenance State" is turned "ON" the printer response would also list LAST CLEANED and CURRENT PRINTHEAD LIFE counters.

1. To get the current settings, type `~WQOD`:
   A label similar to this prints out:



```
PRINT METERS
 TOTAL NONRESETTABLE:             8560 "
 USER RESETTABLE CNTR1:              9 "
 USER RESETTABLE CNTR2:           8560 "
```

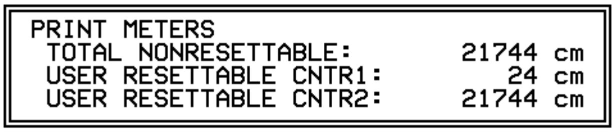
   The units of measure are set to inches.

2. To change the units of measure to centimeters, type:

```
^XA^MA,,,,C
^XZ
```

   The units of measure are set to centimeters.

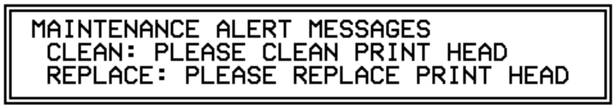
3. To check the settings, type `~WQOD`.
   A label similar to this prints out:



```
PRINT METERS
 TOTAL NONRESETTABLE:           21744 cm
 USER RESETTABLE CNTR1:            24 cm
 USER RESETTABLE CNTR2:         21744 cm
```

**Example** • This is an example of how to print the maintenance information query for the `~WQ` command. Note that the message is controlled by the `^MI` command.

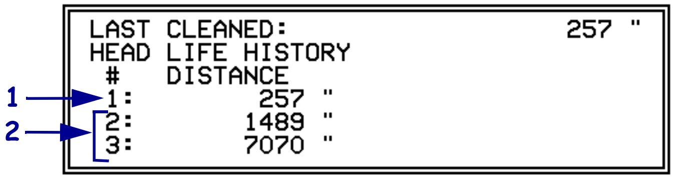
1. To get the current settings, type `~WQMI`:
   A label similar to this prints out:



```
MAINTENANCE ALERT MESSAGES
 CLEAN: PLEASE CLEAN PRINT HEAD
 REPLACE: PLEASE REPLACE PRINT HEAD
```

**Example** • This is an example of how to print the printhead life query for the `~WQ` command. Note that the units of measure are controlled by the `^MA` command.

1. To get the current settings, type `~WQPH`:
   A label similar to this prints out:



```
LAST CLEANED:                   257 "
HEAD LIFE HISTORY
 #   DISTANCE
 1:         257 "
 2:        1489 "
 3:        7070 "
```

| | |
|---|---|
| 1 | The current life of the print head. |
| 2 | Line items 2 through 10 (the example only shows 2 through 3) tracks the measurement for each time the print head is changed. |

# ^XA

## Start Format

**Description** The ^XA command is used at the beginning of ZPL II code. It is the opening bracket and indicates the start of a new label format. This command is substituted with a single ASCII control character STX (control-B, hexadecimal 02).

**Format** ^XA

**Comments** Valid ZPL II format requires that label formats should start with the ^XA command and end with the ^XZ command.

# ^XB

## Suppress Backfeed

**Description** The ^XB command suppresses forward feed of media to tear-off position depending on the current printer mode. Because no forward feed occurs, a backfeed before printing of the next label is not necessary; this improves throughput. When printing a batch of labels, the last label should not contain this command.

**Format** ^XB

### ^XB in the Tear-off Mode

*Normal Operation:* backfeed, print, and feed to rest

^XB *Operation:* print (Rewind Mode)

### ^XB in Peel-off Mode

*Normal Operation:* backfeed, print, and feed to rest

^XB *Operation:* print (Rewind Mode)

**Note •** To prevent jamming in cutter mode, ^XB suppresses backfeed and cutting.

# ^XF

## Recall Format

**Description** The ^XF command recalls a stored format to be merged with variable data. There can be multiple ^XF commands in one format, and they can be located anywhere within the code.

When recalling a stored format and merging data using the ^FN (Field Number) function, the calling format must contain the ^FN command to merge the data properly.

While using stored formats reduces transmission time, no formatting time is saved. The ZPL II format being recalled is saved as text strings that need to be formatted at print time.

**Format** `^XFd:o.x`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = source device of stored image | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* search priority (R:, E:, B:, and A:) |
| o = name of stored image | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension l | *Fixed Value:* .ZPL |

For a complete example of the ^DF and ^XF command, see *^DF and ^XF — Download format and recall format* on page 41.

# ^XG

## Recall Graphic

**Description** The ^XG command is used to recall one or more graphic images for printing. This command is used in a label format to merge graphics, such as company logos and piece parts, with text data to form a complete label.

An image can be recalled and resized as many times as needed in each format. Other images and data might be added to the format.

**Format** `^XGd:o.x,mx,my`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| d = source device of stored image | *Accepted Values:* R:, E:, B:, and A:<br>*Default Value:* search priority (R:, E:, B:, and A:) |
| o = name of stored image | *Accepted Values:* 1 to 8 alphanumeric characters<br>*Default Value:* if a name is not specified, UNKNOWN is used |
| x = extension l | *Fixed Value:* .GRF |
| mx = magnification factor on the x-axis | *Accepted Values:* 1 to 10<br>*Default Value:* 1 |
| my = magnification factor on the y-axis | *Accepted Values:* 1 to 10<br>*Default Value:* 1 |

**Example** • This is an example of using the ^XG command to recall the image SAMPLE.GRF from DRAM and print it in five different sizes in five different locations on the same label:

```
^XA
^FO100,100^XGR:SAMPLE.GRF,1,1^FS
^FO100,200^XGR:SAMPLE.GRF,2,2^FS
^FO100,300^XGR:SAMPLE.GRF,3,3^FS
^FO100,400^XGR:SAMPLE.GRF,4,4^FS
^FO100,500^XGR:SAMPLE.GRF,5,5^FS
^XZ
```

# ^XS

## Set Dynamic Media Calibration

**Description** The ^XS command controls whether dynamic media calibration is performed to compensate for variations in label length, position, transmissivity, and/or reflectance after a printer is powered-up or the printer has been opened (for example to change or check the media). This command is only supported on Zebra G-Series™ printers.

**Format** `^XSlength,threshold`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `length` = dynamic length calibration | *Accepted Values:*<br>`Y` = enable<br>`N` = disable<br>*Default Value:* `Y` |
| `threshold` = dynamic threshold calibration | *Accepted Values:*<br>`Y` = enable<br>`N` = disable<br>*Default Value:* `Y` |

# ^XZ

## End Format

**Description** The ^XZ command is the ending (closing) bracket. It indicates the end of a label format. When this command is received, a label prints. This command can also be issued as a single ASCII control character ETX (Control-C, hexadecimal 03).

**Format** ^XZ

**Comments** Label formats must start with the ^XA command and end with the ^XZ command to be in valid ZPL II format.

# ^ZZ

## Printer Sleep

**Description** The `^ZZ` command places the printer in an idle or shutdown mode.

**Format** `^ZZt,b`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `t` = number of second (idle time) prior to shutdown | *Accepted Values:* `0` to `999999` – setting `0` disables automatic shutdown<br>*Default Value:* last permanently saved value or `0` |
| `b` = label status at shutdown | *Accepted Values:*<br>`Y` = indicates to shutdown when labels are still queued<br>`N` = indicates all labels must be printed before shutting down<br>*Default Value:* `N` |

**Comments** The `^ZZ` command is only valid on the PA400 and PT400 battery-powered printers.

**Notes •** ___________________________________________

___________________________________________

___________________________________________

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# 3

# ZPL RFID Commands

This section contains the ZPL II commands for RFID-specific applications.

For more information about the RFID commands, refer to the *RFID Programming Guide*. A copy is available on the User CD provided with your printer and online at http://www.zebra.com/manuals.

# RFID Command Overview

In addition to reading or encoding RFID tags, the RFID ZPL commands also provide for RFID exception handling, such as setting the number of read/write retries before declaring a transponder defective (set with ^RR, ^RT, and ^WT) or setting the number of labels that will be attempted if an error occurs (set with ^RS).

For example, if an RFID label fails to program correctly or if the transponder cannot be detected, the printer ejects the label and prints VOID across it. The printer will try to print another label with the same data and format for the number of RFID labels specified by the ^RS command. If the problem persists, the printer follows the error handling instructions specified by the ^RS command: the printer may remove the problematic format from the print queue and proceed with the next format (if one exists in the buffer), or it may place the printer in Pause or Error mode.

**Important •** Consider the following before using any command in this section:

- Before using a particular command, verify that it is compatible with your printer and firmware version. See Table 2 on page 357.
- If a parameter in the following tables is designated as *not applicable* for a particular printer, any value entered for the parameter will be ignored, but the place holder for the field is required.

# Printer and Firmware Compatibility

Table 2 shows which RFID ZPL commands you can use with different printers and firmware versions.

**Table 2 • Supported Commands Based on Printer and Firmware**

| Command | Function | UHF Printers | | | | | | | | | HF Printers | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R110*Xi* and R170*Xi* | | R110*PAX4* | | R4Mplus | | | | | R110*Xi* HF | R2844-Z |
| | | Firmware | | | | | | | | | Firmware | |
| | | R60.13.X | R60.15.X | R62.13.X | R63.13.X | SP994X | SP999X | SP1027X | SP1056X | SP1082X | all | all |
| *^HL or ~HL* on page 359 | Return RFID Data Log to Host | * | * | * | * | * | * | * | * | * | * | — |
| *^HR* on page 360 | Calibrate RFID Transponder Position | * | * | * | * | * | * | * | * | * | * | — |
| *^RA* on page 362 | Read AFI or DSFID Byte | — | — | — | — | — | — | — | — | — | * | — |
| *^RB* on page 364 | Define EPC Data Structure | * | * | * | * | * | * | * | * | * | * | — |
| *^RE* on page 366 | Enable/Disable E.A.S. Bit | — | — | — | — | — | — | — | — | — | * | * |
| *^RF* on page 367 | Read or Write RFID Format | * | * | * | * | * | * | * | * | * | * | — |
| *^RI* on page 370 | Get RFID Tag ID | * (R60.13.0.13ZD or later) | * | * (R62.13.0.13ZC or later) | * (R63.13.0.11Z or later) | * | * | * | * | * | * | * |
| *^RM* on page 371 | Enable RFID Motion | * | * | * | * | * | * | * | * | * | * | — |
| *^RN* on page 372 | Detect Multiple RFID Tags in Encoding Field | * (R60.13.0.3 or later) | * | * | * | — | — | — | — | — | * | — |
| *~RO* on page 311 | Reset Advanced Counters | * | * | * | * | * | * | * | * | * | * | — |
| *^RQ* on page 375 | Quick Write EPC Data and Passwords | — | * (R60.15.7Z or later) | * (R62.15.7Z or later) | — | — | — | — | — | — | — | — |
| *^RR* on page 377 | Specify RFID Retries for a Block | * | * | * | * | * | * | * | * | * | * | — |

* = Supported — = Not supported

a. Use the ^RF, ^RM, and ^RR commands rather than the ^RT command.

b. Use the ^RF, ^RM, ^RR, and ^WV commands rather than the ^WT command.

**Table 2 • Supported Commands Based on Printer and Firmware (Continued)**

| Command | Function | UHF Printers | | | | | | | | | HF Printers | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R110*Xi* and R170*Xi* | | R110*PAX*4 | | R4Mplus | | | | | R110*Xi* HF | R2844-Z |
| | | Firmware | | | | | | | | | Firmware | |
| | | R60.13.X | R60.15.X | R62.13.X | R63.13.X | SP994X | SP999X | SP1027X | SP1056X | SP1082X | all | all |
| *^RS* on page 378 | Set Up RFID Parameters | * | * | * | * | * | * | * | * | * | * | * |
| *^RT* on page 384 | Read RFID Tag | * a | * a | * a | * a | * a | * a | * a | * a | * a | * a | * |
| *~RV* on page 387 | Report RFID Encoding Results | * | * | * | * | * (SP994J or later) | * (SP999C or later) | * | * | * | — | — |
| *^RW* on page 388 | Set RFID Read and Write Power Levels | * | * | * | * | * | * | * | * | * | * | — |
| *^RZ* on page 390 | Set RFID Tag Password and Lock Tag | * | * | * | * | * | * | * | * | * | — | — |
| *^WF* on page 393 | Encode AFI or DSFID Byte | — | — | — | — | — | — | — | — | — | * | — |
| *^WT* on page 395 | Write (Encode) Tag | * b | * b | * b | * b | * b | * b | * b | * b | * b | * b | * |
| *^WV* on page 397 | Verify RFID Encoding Operation | * | * | * | * | * | * | * | * | * | — | — |

* = Supported — = Not supported

a. Use the ^RF, ^RM, and ^RR commands rather than the ^RT command.

b. Use the ^RF, ^RM, ^RR, and ^WV commands rather than the ^WT command.

# ^HL or ~HL

## Return RFID Data Log to Host

**Description** The printer continually logs RFID data and stores it in the printer's RAM. Use this command to request that the RFID data log be returned to the host computer, to clear the current data log, and to restart data recording. The data returned show the status of the RFID read, write, and lock commands and show any resulting error codes.

**Format** `^HL` or `~HL`

### Comments

- Data is shown in the format sent by the `^RFW` command (ASCII, Hex, or EPC).
- In the log, the data displays in this manner:

  ```
  C,EEEE,DDDDDDDDDDDDDDDDDDDDDDDD
  ```

  where

  `C` = the RFID operation (R = read, W = write, L = lock)

  `EEEE` = the RFID error code

  `DDDDDDDDDDDDDDDDDDDDDDDD` = data read or written
- If the log exceeds 64K (approximately 2000 operations), the data log is cleared automatically, and data recording restarts. When this happens, the following appears in the log:

  ```
  Logfile automatically reset
  ```
- If the printer loses power, the log is lost. If the log results are important to you, retrieve the log frequently.

# ^HR

## Calibrate RFID Transponder Position

**Description** Use this command to initiate an RFID transponder calibration for a specific RFID label. Results are returned to the host computer. This calibration is used to determine the optimal programming position for RFID media that may not meet the transponder placement specifications for the printer.

During transponder calibration, the printer feeds the RFID label one-dot row at a time while taking readings (via the READ TAG command and the WRITE TAG commands) to profile the RFID transponder. Based on the results, the printer determines the optimal programming position for the label and returns a results table to the host. The calibrated value is used as the programming position for the ^RS command, can be overwritten by the ^RS command, and is saved to nonvolatile memory (the value is saved even if the power is turned off).

This calibration takes into account the print mode, backfeed mode, and tear off position. The RUN option in the RFID TAG CALIB control panel parameter performs the same calibration but does not create a results table.

**Important** • If a label format specifies a value for parameter p (read/write position of the transponder) in the ^RS command, that value will be used for the programming position for all RFID labels until a new position is specified or until the printer is turned Off (**O**) and then back On (**I**).

**Format** `^HRa,b`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = start string | User text to appear before the results table.<br>*Accepted values:* any string less than 65 characters<br>*Default value:* `start` |
| b = end string | User text to appear after the results table.<br>*Accepted values:* any string less than 65 characters<br>*Default value:* `end` |

### Comments

- Based on the recommended transponder placement position for most RFID labels, the printer's default RFID programming position is zero for the R110*PAX*4. For other RFID printers, the default programming position is the label length minus 1 mm (0.04 in.). To return to the default programming position at any time, use the RESTORE option in the RFID TAG CALIB control panel parameter.

- At the end of calibration, a results table is returned to the host. Each line in the results table appears as:

  Row, Read Result, Write Result

  where

  Row = the dot row where calibration occurred

  Read Result = results of calibration (R = read, “ ” = unable to read)

  Write Result = results of calibration (W = write, “ ” = unable to write)

**Example •** If the following command is sent to the printer:

```
^XA^HR^XZ
```

The printer starts the transponder calibration and returns a results table such as the following:

```
start
position=195
215, ,
214, ,
213, ,
212, ,
211, ,
210, ,W
209,R,
208, ,
207, ,
206, ,W
205,R,
204, ,
203, ,
202, ,W
201,R,W
200,R,W
199,R,W
198,R,W
197,R,W
196,R,W
195,R,W <---****
194,R,W
193,R,W
192,R,W
191,R,W
190,R,W
189,R,
188, ,
187, ,
186, ,
185, ,
.
.
.
end
```

In this example, the optimal programming position is 195. This is identified at the top of the table (`position=195`) and with an the arrow (`<---****`) in the table.

# ^RA

## Read AFI or DSFID Byte

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to read the AFI or DSFID byte. The data can be returned to the host via the `^HV` command.

**Format** `^RA#,f,r,m,b`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `#` = field number specified with another command | The value assigned to this parameter should be the same as the one used in the `^RT` command.<br>*Accepted values:* 0 to 9999<br>*Default value:* 0 |
| `f` = format | *Accepted values:*<br>`0` = ASCII<br>`1` = Hexadecimal<br>*Default value:* 0 |
| `r` = number of retries | *Accepted values:* 0 to 10<br>*Default value:* 0 |
| `m` = motion | *Accepted values:*<br>`0` = Feed label after writing.<br>`1` = No Feed after writing. Other ZPL may cause a feed.<br>*Default value:* 0 |
| b = type of byte to read | *Accepted values:*<br>`A` = AFI byte<br>`D` = DSFID byte<br>*Default value:* A |

**Example 1 •**This example reads the AFI byte in ASCII format and returns `AFI Byte:x` to the host. The printer will retry the command five times if necessary. A voided label is generated if the read is unsuccessful after these retries. The data read will go into the `^FN1` location of the recalled format.

```
^XA
^FO20,120^A0N,60^FN1^FS
^RA1,0,5,0^FS
^HV1,,AFI Byte:^FS
^XZ
```

**Example 2 •**This example reads the DSFID byte in ASCII format and returns `DSFID Byte:x` to the host. The printer will retry the command three times if necessary. A voided label is generated if the read is unsuccessful after these retries. The data read will go into the `^FN1` location of the recalled format.

```
^XA
^FO20,120^A0N,60^FN1^FS
^RA1,0,3,0,D^FS
^HV1,,DSFID Byte:^FS
^XZ
```

# ^RB

## Define EPC Data Structure

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to define the structure of EPC data, which can be read from or written to an RFID transponder. For more information about EPC specifications, refer to the EPC Global web site. All parameters in this command are persistent and will be used in subsequent formats if not provided. The values are initially set to the default values.

RFID transponders can have different partitions defined. This command specifies the number of partitions and how many bits are in each partition.

**Format** `^RBn,p0,p1,p2, ..., p15`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `n` = total bit size of the partitions | Specify the number of bits to include in the partitions.<br>*Accepted values:* 1 to *n*, where *n* is the bit size of the tag.<br>*Default value:* `96` |
| `p0 ... p15` = partition sizes | Specify the number of bits to include in the individual partitions. The partition sizes must add up to the bit size specified for the previous parameter. The largest individual partition size is 64 bits.<br>*Accepted values:* 1 to 64<br>*Default value:* `1` |

**Example 1** •The following command specifies that there are 96 bits used with three fields. Fields 1, 2, and 3 contain 10, 26, and 60 bits, respectively.

```
^RB96,10,26,60
```

The ZPL code to encode a tag with this format would look like this:

```
^RFW,E^FD1000.67108000.1122921504606846976^FS
```

When the tag is being encoded, the tag stores the data in the following way:

- Field 1 contains `1000`. This value is stored in the first 10 bits
- Field 2 contains `67108000`. This value is stored in the next 26 bits.
- Field 3 contains `1122921504606846976`. This value is stored in the remaining 60 bits.

**Example 2** •The following command specifies that there are 64 bits used with eight 8-bit fields.

```
^RB64,8,8,8,8,8,8,8,8^FS
```

The ZPL code to encode a tag with this format would look like this:

```
^RFW,E^FD1.123.160.200.249.6.1.0^FS
```

When writing to the tag, each set of data is written in its respective 8-bit field.

**Example 3** •This example uses the SGTIN-64 standard, which defines 64-bit structure in the following way:

| | Header | Filter Value | Company Prefix Index | Item Reference | Serial Number |
|---|---|---|---|---|---|
| SGTIN-64 | 2 bits | 3 bits | 14 bits | 20 bits | 25 bits |
| | 10 (binary value) | 8 (decimal capacity) | 16,383 (decimal capacity) | 9 to 1,048,575 (decimal capacity*) | 33,554,431 (decimal capacity) |

* Capacity of Item Reference field varies with the length of the company prefix.

The ZPL code to encode a tag with this format would look like this:

```
^XA
^RB64,2,3,14,20,25
^RFW,E^FD0,3,12345,544332,22335221^FS
^XZ
```

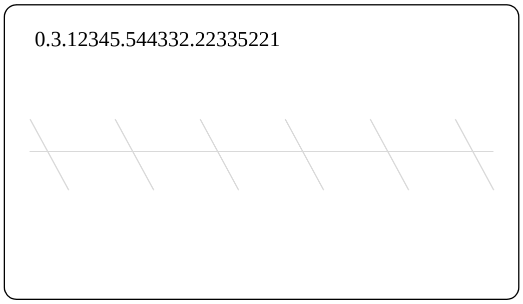
These commands would put

- `0` in the header
- `3` as the filter value
- `12345` as the company prefix
- `544332` as the item reference
- `22335221` as the serial number

To read this EPC data and print the results on the label, you would use the following code:

```
^XA
^RB64,2,3,14,20,25
^FO50,50^A0N,40^FN0^FS
^FN0^RFR,E^FS
^XZ
```

The resulting label would look like this:



0.3.12345.544332.22335221

# ^RE

## Enable/Disable E.A.S. Bit

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to enable or disable the Electronic Article Surveillance (E.A.S.) bit that is available in some ISO15693 tags (such as Philips). This command works only on those ISO15693 transponders and will be ignored if the tag does not support E.A.S.

**Format** `^REt,r`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| t = Enable/disable the E.A.S. bit in the ISO15693 transponder | *Accepted values:*<br>`N` = Disable E.A.S.<br>`Y` = Enable E.A.S.<br>*Default value:* N |
| `r` = number of retries | *Accepted values:* 0 to 10<br>*Default value:* 0 |

**Example •** This example enables the E.A.S. bit in the transponder. It will retry the command five times if necessary.

```
^XA
^REy,5
^XZ
```

# ^RF

## Read or Write RFID Format

**Description** Use this command to read or write to (encode) an RFID tag. When using this command to read a tag, you may use a field variable to print the tag data on the label or to return the data to the host.

**Format** `^RFo,f,b,n,m`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `o` = operation | Specifies the action to be performed.<br>*Accepted Values:*<br>`W` = write to (encode) the tag<br>`L` = write with LOCK (if supported by tag type; Gen 2 tag type does not use this locking function)<br>`R` = read the tag<br>`P` = read password (Gen 2 tag type only)<br>*Default Value:* `W` |
| `f` = format | *Accepted Values:*<br>`A` = ASCII<br>`H` = Hexadecimal<br>`E` = EPC (ensure proper setup with the `^RB` command)<br>*Default Value:* `H` |
| `b` = starting block number | **For tag types other Gen 2:**<br>Specifies the starting block number.<br>*Accepted Values:* 0 to *n*, where *n* is the maximum number of blocks for the tag.<br>*Default Value:* `0`<br>**For Gen 2 tag type only:**<br>What you specify for this parameter depends on what you entered for the operation parameter.<br>• When `W`, `L`, or `R` are specified for the operation parameter, this parameter specifies a 16-bit word block number.<br>*Accepted Values:* 0 to *n*, where *n* is the maximum number of blocks for the bank specified in the memory bank parameter<br>*Default Value:* `0`<br>• When `P` is specified for the operation parameter, this parameter specifies which password to read.<br>*Accepted Values:*<br>`K` = kill password<br>`A` = access password |

| Parameters | Details |
|---|---|
| `n` = number of bytes to read or write | Specifies the number of bytes to read or write.<br>**For high-frequency (HF) printers:**<br>*Accepted Values:* 1 to *n*, where *n* is the maximum number of bytes for the tag.<br>*Default Value:* 1<br>**For Gen 2 tag type only:**<br>When `E` is specified for the memory bank parameter, this value is not required.<br>*Accepted Values:* 1 to *n*, where *n* is the maximum number of bytes for the tag.<br>*Default Value:* 1<br>**For all other printers and tag types:**<br>This parameter applies only when the starting block number is 1.<br>*Accepted Values:* 1 to *n*, where *n* is the maximum number of bytes for the tag. For UCODE EPC 1.19, *n* is 32.<br>*Default Value:* 1 |
| `m` = memory bank | **Note •** This parameter applies to Gen 2 tags only.<br>Specifies the Gen 2 memory bank. See the *RFID Programming Guide* for more information about Gen 2 memory.<br>*Accepted Values:*<br>`E` = EPC 96-bit (command automatically performs operation on Gen 2 bit address $20_h$ and accesses 12 bytes of the EPC memory bank)<br>`0` = Reserved<br>`1` = EPC<br>`2` = TID (Tag ID)<br>`3` = User<br>*Default Value:* `E` |

**Example 1 •** This example encodes 96-bit data in ASCII format.

```
^XA
^RS4
^RFw,a^FD00 my data^FS
^XZ
```

**Example 2 •** This example encodes 64-bit data in hexadecimal format.

```
^XA
^RS3
^RFW,H^FD1122334455667788^FS
^XZ
```

**Example 3** • This example encodes 96-bit EPC data, as specified by the ^RB command.

```
^XA
^RB96,8,3,3,20,24,38
^RFw,e^FD16,3,5,78742,146165,1234567891^FS
^XZ
```

**Example 4** • This example encodes 4 bytes of hexadecimal formatted data, starting in block 3 of Gen 2 EPC bank 1.

```
^XA
^RS8
^RFW,H,3,4,1^FD11112222^FS
^XZ
```

**Example 5** • This example reads the extended Gen 2 tag ID (TID), which is not read by the ^RI command, and returns the results to the host computer. The results are labeled with the header “8-byte Tag ID Data.”

```
^XA
^RS8
^RFR,H,0,8,2^FN1^FS^HV1,,8-byte Tag ID Data:^FS
^XZ
```

# ^RI

## Get RFID Tag ID

**Description** Use this command to get the unique serial number of the tag and return it in hexadecimal format. The data can be sent back to the host via the `^HV` command.

For Gen 2 tag types, this command will return the 32-bit tag ID (TID) for the tag. If your Gen 2 tag supports TID data beyond 32 bits, see *^RF* on page 367 to access the TID memory bank.

**Format** `^RI#,s,r,m`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| # = number to be assigned to the field | *Accepted values:* 0 to 9999<br>*Default value:* 0 |
| s = specify data order | **Note •** This parameter applies only to the R110*Xi* HF and R2844-Z printers.<br>*Accepted values:*<br>*Accepted Values:*<br>0 = Most significant byte first for Tag*It and PicoTag. Least significant byte first for I*code and ISO15693.<br>1 = Reverse the data order<br>*Default value:* 0 |
| r = number of retries | *Accepted values:* 0 to 10<br>*Default value:* 0 |
| m = motion | *Accepted values:*<br>0 = Feed label after writing<br>1 = No Feed after writing (other ZPL commands may cause a feed)<br>*Default value:* 0 |

**Example •** This example reads a tag ID, prints it on a label, and sends string `Tag ID:xxxxxxxx` to the host. The data read will go into the `^FN0` location of the format. The printer will retry the command five times, if necessary.

```
^XA
^FO20,120^A0N,60^FN0^FS
^RI0,,5^FS
^HV0,,Tag ID:^FS
^XZ
```

# ^RM

## Enable RFID Motion

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to enable or disable RFID motion. By default, labels automatically print at the end of the format. This command allows you to inhibit the label from actually moving when it reaches the program position, which is useful for debugging, setup, and custom applications. This parameter is not persistent (carried over from label to label).

**Format** `^RMe`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `e` = enable | *Accepted values:*<br>`Y` = Yes, move the label<br>`N` = No, do not move the label<br>*Default value:* Y |

# ^RN

## Detect Multiple RFID Tags in Encoding Field

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to enable or disable detection of multiple RFID tags in the encoding field. By default, the printer checks for more than one tag in the field before attempting to read or write. If more than one tag is found, the label over the antenna support is voided, and the `RFID ERR STATUS` parameter on the control panel displays `MULTIPLE TAGS`. To speed up printing and encoding by up to 200 ms, the check may be disabled. This parameter is persistent (carried over from label to label).

**Format** ^RNe

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| e = enable | *Accepted Values:*<br>Y = Yes, check for multiple tags<br>N = No, do not check for multiple tags<br>*Default Value:* Y |

# ~RO

## Reset Advanced Counters

**Important** • This command is not supported by all printers or firmware. See Table 2 on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to reset the advanced counters used by the printer to monitor label generation in inches and centimeters, the number of labels printed, and the number of valid and voided RFID labels. Any single error during programming of an RFID tag will result in that label being considered “void” by the counter.

Four resettable counters are available. The values for the counters are displayed on the printer configuration label.

**Note** • For the R4Mplus, the counter values are not saved, so power cycling the printer resets all counters to zero.

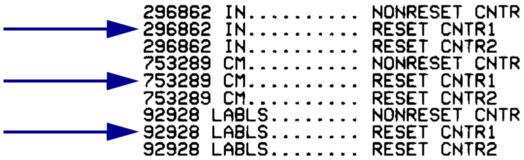
**Format** `~ROc`

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `c` = counter to reset | *Accepted Values:*<br>`1` = counter 1<br>`2` = counter 2<br>`3` = valid RFID label counter<br>`4` = voided RFID label counter<br>*Default Value:* None. If a value is not specified, the command is ignored. |

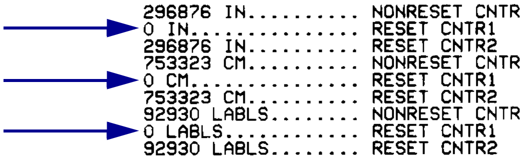
**Example 1** •This example shows how the counter portion of the printer configuration labels looks when counter 1 is reset by sending `~RO1`.

Before



```
296862 IN.......... NONRESET CNTR
296862 IN.......... RESET CNTR1
296862 IN.......... RESET CNTR2
753289 CM.......... NONRESET CNTR
753289 CM.......... RESET CNTR1
753289 CM.......... RESET CNTR2
92928 LABLS........ NONRESET CNTR
92928 LABLS........ RESET CNTR1
92928 LABLS........ RESET CNTR2
```

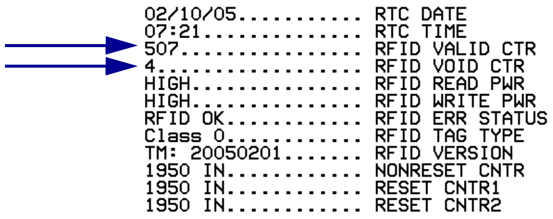
After



```
296876 IN.......... NONRESET CNTR
0 IN............... RESET CNTR1
296876 IN.......... RESET CNTR2
753323 CM.......... NONRESET CNTR
0 CM............... RESET CNTR1
753323 CM.......... RESET CNTR2
92930 LABLS........ NONRESET CNTR
0 LABLS............ RESET CNTR1
92930 LABLS........ RESET CNTR2
```

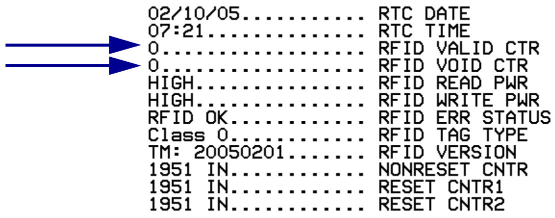
**Example 2** •This example shows how the counter portion of the printer configuration labels looks when the RFID counters are reset by sending `~RO3` and `~RO4`.

**Before**



```
02/10/05........... RTC DATE
07:21.............. RTC TIME
507................ RFID VALID CTR
4.................. RFID VOID CTR
HIGH............... RFID READ PWR
HIGH............... RFID WRITE PWR
RFID OK............ RFID ERR STATUS
Class 0............ RFID TAG TYPE
TM: 20050201....... RFID VERSION
1950 IN............ NONRESET CNTR
1950 IN............ RESET CNTR1
1950 IN............ RESET CNTR2
```

**After**



```
02/10/05........... RTC DATE
07:21.............. RTC TIME
0.................. RFID VALID CTR
0.................. RFID VOID CTR
HIGH............... RFID READ PWR
HIGH............... RFID WRITE PWR
RFID OK............ RFID ERR STATUS
Class 0............ RFID TAG TYPE
TM: 20050201....... RFID VERSION
1951 IN............ NONRESET CNTR
1951 IN............ RESET CNTR1
1951 IN............ RESET CNTR2
```

# ^RQ

## Quick Write EPC Data and Passwords

**Important •** This command is not supported by all RFID tags, printers, or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command with an Alien Higgs RFID tag and appropriate firmware to write the EPC data, access password, and kill password with one command. Doing so reduces the encoding time.

**Note •** The access password on the tag to be written to must be 00000000 prior to sending this command.

**Format** `^RQf,c,o[data]`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `f` = format | *Accepted Values:*<br>`A` = ASCII<br>`H` = Hexadecimal<br>`E` = EPC<br>*Default Value:* `H` |
| `c` = chip type | *Accepted Values:* `0` (Higgs IC tag)<br>*Default Value:* `0` |
| `o` = option | *Accepted Values:* `0` (write 96-bit EPC)<br>*Default Value:* `0` |
| `data` = the EPC data, access password, and kill password | Use the `^FD` command to specify the passwords in the following format:<br>`^FD[`*`EPC`*`],[`*`access`*`],[`*`kill`*`]`<br>where:<br>`EPC` = the EPC data in the format specified by the `f` parameter. The data should match what would be programmed with the ^RF command.<br>`access` = an optional access password in hexadecimal format. If this field is left blank, 0x00000000 is written as the access password.<br>`kill` = an optional kill password in hexadecimal format. If this field is left blank, 0x00000000 is written as the kill password. |

**Example 1 •** This example writes the EPC data to the tag in hexadecimal format. The unspecified access and kill passwords are written as zeroes (0x00000000).

```
^XA^RQ^FD112233445566778899001122^XZ
```

**Example 2 •** This example writes the EPC data to the tag in hexadecimal format. The access password is written as 0xAAAAAAAA, and the kill password is written as 0xBBBBBBBB.

```
^XA^RQ^FD112233445566778899001122,AAAAAAAA,BBBBBBBB^XZ
```

**Example 3 •** This example writes the EPC data to the tag in EPC format. The unspecified access and kill passwords are written as zeroes (0x00000000).

```
^XA^RB96,30,30,30,6^RQE^FD1234.5678.9012.12^XZ
```

**Example 4 •** This example writes the EPC data to the tag in hexadecimal format. The access password is written as 0xAAAAAAAA, and the unspecified kill password is written as zeroes (0x00000000).

```
^XA^RB96,30,30,30,6^RQE^FD1234.5678.9012.12,AAAAAAAA^XZ
```

# ^RR

## Specify RFID Retries for a Block

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to change the number of times that the printer attempts to read or write to a particular block of a single RFID tag. By default, the printer will attempt six retries. This command is persistent and will be used in subsequent formats if not provided.

**Note •** This command's function is different than the "number of labels" parameter in the `^RS` command.

**Format** `^RRn`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `n` = number of retries | *Accepted Values:* `0` to `10`<br>*Default Value:* `0` |

**Examples •**

**Set read block retries to 5**

```
^XA
^FN1^RR5^RFR,H^FS
^HV1^FS
^XZ
```

**Set write block retries to 2**

```
^XA
^RR2^RFW,H^FD1234^FS
^XZ
```

# ^RS

## Set Up RFID Parameters

**Description** Use this command to set up RFID parameters including tag type, read/write position of the transponder, and error handling.

**Important •** Use care when using this command in combination with `^RT` or `^RF` for reading tag data. Problems can occur if the data read from the tag is going to be printed on the label. Any data read from the transponder must be positioned to be printed above the read/write position. Failure to do this will prevent read data from being printed on the label.

**Format** `^RSt,p,v,n,e,a,c,s`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `t` = tag type | Tells the printer/print engine which tag type you are using. If you specify a tag type that is not supported by your printer or firmware, the printer uses the default value. For the supported tag types and defaults, see Table 3 on page 381.<br>**UHF Printers**<br>`0` = None<br>`1` = EPC Class 0<br>`2` = EPC Class 0 Plus<br>`3` = EPC Class 1 64-bit<br>`4` = EPC Class 1 96-bit<br>`5` = UCODE EPC 1.19<br>`6` = Impinj Class 0 Plus<br>`7` = ISO 18000-06A<br>`8` = EPC Class 1, Generation 2 (Gen 2)<br>`9` = ISO 18000-06B<br>**HF Printers**<br>**Note •** Only the R110*Xi* HF printer (firmware version R65.X.X) supports the use of letters for this parameter. All other printers use the numbers.<br>`A` or `0` = None<br>`B` or `1` = Auto detect (query tag to determine)<br>`C` or `2` = Tag*It (Texas Instruments Tagit tags)<br>`D` or `3` = `I`*code (Phillips Icode tags)<br>`E` or `4` = Pico Tag (Inside Technology’s)<br>`F` or `5` = ISO 15693<br>`G` or `6` = EPC tag (13.56 MHz)<br>`H` or `7` = UID Tag<br>`I` or `8` = Mifare UltraLight |

| Parameters | Details |
|---|---|
| p = read/write position of the transponder | Sets the read/write position of the transponder in vertical (Y axis) dot rows from the top of the label. Set to 0 (no movement) if the transponder is already in the effective area without moving the media.<br>**Important •** If a label format specifies a value for this parameter, this value will be used for the programming position for all labels until a new position is specified or until the printer is turned off (**O**) and then back on (**I**).<br>*Accepted values:* 0 to label length<br>*Default value:*<br>**For the R110*PAX*4 and R2844-Z:** 0<br>**For all other supported printers:** label length minus 1 mm (1/16 in.) |
| v = length of void printout | Sets the length of the void printout in vertical (Y axis) dot rows.<br>*Accepted values:* 0 to label length<br>*Default value:* label length |
| n = number of labels | The number of labels that will be attempted in case of read/encode failure.<br>*Accepted values:* 1 to 10<br>*Default value:* 3 |
| e = error handling | If an error persists after the specified number of labels are tried, perform this error handling action.<br>*Accepted values:*<br>N = No action (printer drops the label format causing the error and moves to the next queued label)<br>P = Place printer in Pause mode (label format stays in the queue until the user cancels)<br>E = Place printer in Error mode (label format stays in the queue until the user cancels)<br>*Default value:* N<br>**Note •** You can set the printer to send an error message to the host for each failure. To enable or disable this unsolicited error message, refer to the ^SX and ^SQ ZPL commands. Use V for the condition type for an RFID error. |

| Parameters | Details |
|---|---|
| a = signals on applicator | **Note •** This parameter does not apply to the R2844-Z. For the R4Mplus, this parameter applies only to printers with firmware version SP994*X* (R4Mplus European version).<br>When the value for parameter p (read/write position of the transponder) is nonzero, this parameter changes the number of start and stop print signals required for printing.<br>In Single mode, one start print command is required. In Double mode, two are required, so the printer will resume printing only after the second start print command is received.<br>*Accepted values:*<br>S = single signal<br>D = double signal (For the R110*PAX*4, Double mode will work only if the read/write position is changed from the default of zero.)<br>*Default value:* S |
| c = certify tag with a pre-read | Not applicable. |
| s = void print speed | **Note •** This parameter does not apply to the R2844-Z. For the R4Mplus, this parameter applies only to printers with firmware version SP994*X* (R4Mplus European version).<br>If a label is voided, the speed at which “VOID” will be printed across the label.<br>*Accepted values:* any valid print speed<br>*Default value:* the printer’s maximum print speed |

**Supported Tag Types** Table 3 shows the tag types supported by different RFID printers/print engines and firmware versions. Depending on your country or on the firmware version that you are using, your printer may not support all of the tag types listed. If you specify an unsupported tag type in the ^RS command, the printer uses the default value. If a tag type is shown as supported but does not work with your printer, you may need to upgrade the printer's firmware (see http://www.zebra.com/firmware).

### Table 3 • Supported Tag Types and Default Values

| | UHF Printers | | | | | | HF Printers | |
|---|---|---|---|---|---|---|---|---|
| | R60.13.X | R62.13.X | R63.13.X | SP920X | SP994X,<br>SP999X,<br>SP1027X | SP1056X | R110*Xi* HF | R2844-Z |
| Tag Type | R110*Xi*<br>R170*Xi* | R110*PAX4* | | R4Mplus | | | | |
| **UHF Tag Types and Options** | | | | | | | | |
| None (no tag type specified) | * | * | — | — | — | — | — | — |
| EPC Class 0 | * | * | — | — | — | — | — | — |
| EPC Class 0 Plus | * | * | — | — | — | — | — | — |
| EPC Class 1 64-bit | * | * | — | * | * | — | — | — |
| EPC Class 1 96-bit | # | # | — | # | * | — | — | — |
| UCODE EPC 1.19 | * * | — | # | # | # | * | — | — |
| Impinj Class 0 Plus | * | * | — | — | — | — | — | — |
| ISO 18000-06A | — | * | — | — | * | — | — | — |
| EPC Class 1, Generation 2 (Gen 2) | * | * | — | — | * | # | — | — |
| ISO 18000-06B | * | * | — | — | * | — | — | — |
| **HF Tag Types and Options** | | | | | | | | |
| Auto-detect the tag type by querying the tag | — | — | — | — | — | — | — | # |
| Tag*It (Texas Instruments Tagit tags) | — | — | — | — | — | — | — | * |
| I*code (Phillips Icode tags) | — | — | — | — | — | — | — | * |
| Pico Tag (Inside Technology's) | — | — | — | — | — | — | — | * |
| ISO 15693 | — | — | — | — | — | — | # | * |
| EPC tag | — | — | — | — | — | — | — | * |
| UID Tag | — | — | — | — | — | — | — | — |
| Mifare UltraLight | — | — | — | — | — | — | * | — |

| | |
|---|---|
| # | = Default value |
| * | = Accepted value |

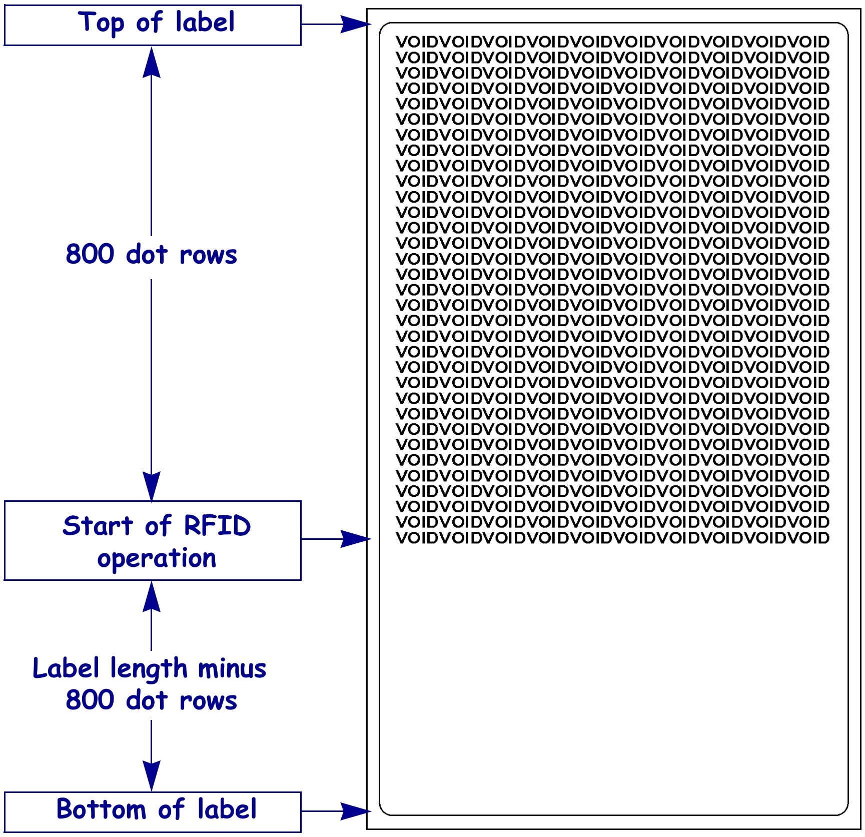
*. Requires R60.13.0.13ZD or later.

**Example 1** •This example sets the printer to move the media to 800 dots from the top of the media [or label length minus 800 from the bottom (leading edge) of the media] and voids the rest of the media in case of an error. The printer will try to print two labels and then will pause if printing and encoding fail.

```
^XA
^RS,800,,2,P^FS
^XZ
```

Figure 1 shows the resulting voided label. Note where the void starts. The media has been moved 800 dot rows from the top of the label (label length minus 800 dot rows from the bottom (leading edge) of a label) to bring the transponder into the effective area to read/write a tag. If the printer fails the operation, the rest of the media is voided.

**Figure 1 • Sample Void Label, Remainder of Label Voided**

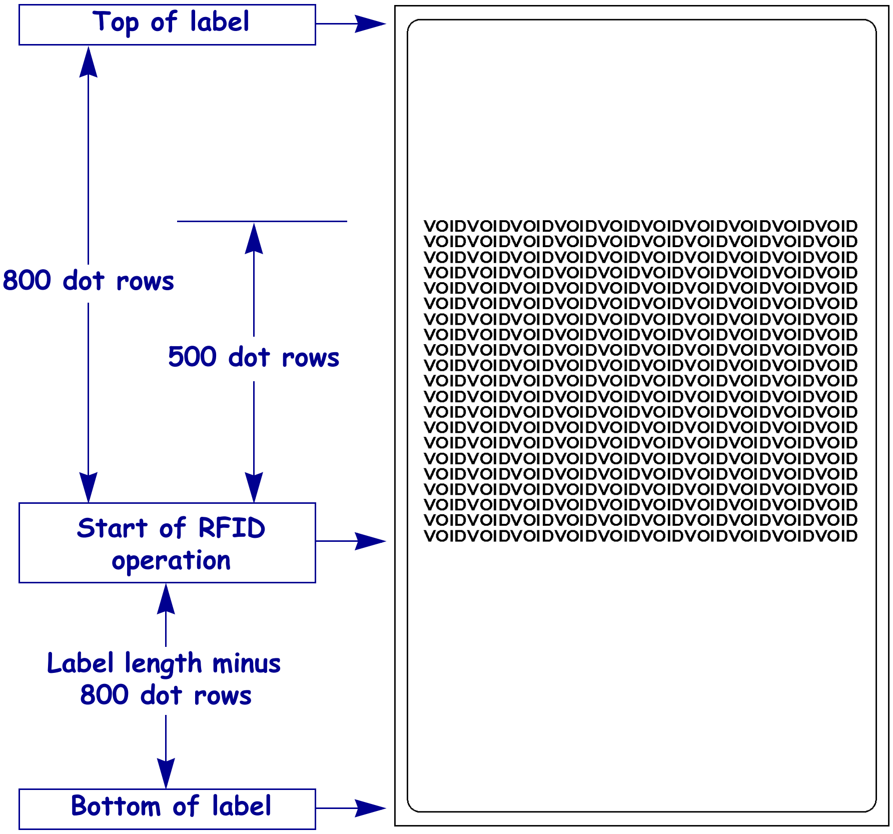

Top of label
800 dot rows
Start of RFID operation
Label length minus 800 dot rows
Bottom of label
VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID

**Example 2 •**This example sets the printer to move the media to 800 dots from the top of the media [or label length - 500 from the bottom (leading edge) of the media] and prints “VOID” 500 dots in vertical length (Y axis) in case of an error.

```
^XA
^RS,800,500,2,P^FS
^XZ
```

Figure 2 shows the resulting voided label. Note where the void starts. The media has been moved 800 dot rows from the top of the label [label length minus 800 dot rows from the bottom (leading edge) of a label] to bring the transponder into the effective area to read/write a tag. If the printer fails the operation, an area that is 500 dot rows of the media is voided instead of the entire rest of the media.

**Figure 2 • Sample Void Label, 500 Dot Row Area Voided**


Top of label
800 dot rows
500 dot rows
Start of RFID operation
Label length minus 800 dot rows
Bottom of label
VOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOIDVOID

# ^RT

## Read RFID Tag

**Note •** The ^RT command is provided only for backward-compatibility with label formats that were developed for older Zebra RFID printers. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you should not use this command.

**Description** Use this command to tell the printer to read the current RFID tag data. The data can be returned to the host via the ^HV command.

**Format** `^RT#,b,n,f,r,m,s`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| # = number to be assigned to the field | *Accepted values:* 0 to 9999<br>*Default value:* 0 |
| b = starting block number | *Accepted values:* 0 to *n*, where *n* is the maximum number of blocks for the tag.<br>*Default value:* 0 |
| n = number of blocks/bytes to read | **Note •** This parameter does NOT apply to R4Mplus printers with firmware version SP920*X* (R4Mplus U.S. version).<br>**For R4Mplus printers with firmware version SP994*X* (European version):**<br>This parameter applies only when the starting block number (parameter b) is 1.<br>*Accepted values:* 1 to *n*, where *n* is the maximum number of bytes for the tag. For UCODE EPC 1.19, *n* is 32.<br>*Default value:* 1<br>**For all other supported printers:**<br>*Accepted values:* 1 to *n*, where *n* is the maximum number of blocks for the tag type minus the starting block number. For example, if the tag has 8 blocks (starting with block 0) and you start with block 6, *n* can be 2. This would return block 6 and block 7 information.<br>*Default value:* 1 |
| f = format | *Accepted values:*<br>0 = ASCII<br>1 = Hexadecimal<br>*Default value:* 0 |

| Parameters | Details |
|---|---|
| `r` = number of retries | Changes the number of times that the printer attempts to read a particular block of a single RFID tag. (Same retry rules as the `^RR` command.)<br>*Accepted values:* 0 to 10<br>*Default value:* 0 |
| `m` = motion | Enables or disables RFID motion for the current field.<br>*Accepted values:*<br>`0` = Feed label after writing.<br>1 = No feed after writing. Other ZPL may cause a feed.<br>*Default value:* 0 |
| `s` = special mode | **Note •** This parameter is used only for the printers referenced here.<br>**For R4Mplus printers with firmware version SP920*X* (U.S. version):**<br>Specify actions for mismatched checksums. For EPC Class 1 (Alien reader) only. Not applicable for EPC class 0.<br>*Default value:* 0<br>*Accepted values:*<br>`0` = Do not read if mismatched checksum<br>`1` = Read even if mismatched checksum<br>**For R110*Xi* HF and R2844-Z printers:**<br>Specify data order.<br>*Default value:* 0<br>*Accepted values:*<br>`0` = least significant byte first<br>`1` = most significant byte first |

**Example 1** •This example reads a tag, prints the data on a label, and sends the string `Tag Data:`*`xxxxxxxx`* back to the host. The data read will go into the `^FN1` location of the format. The printer will retry the command five times, if necessary.

```
^XA
^FO20,120^A0N,60^FN1^FS
^RT1,,,,5^FS
^HV1,,Tag Data:^FS
^XZ
```

**Example 2** •This example reads from a tag twice and prints the results on a label.

```
^XA
^FO20,120^A0N,60^FN1^FS
^FO20,100^A0N,20^FN2^FS
^RT1,7,3,,5^FS
^RT2,3,2,,5^FS
^XZ
```

The first ^RT command starts at block 7 and reads three blocks of data in ASCII format. The data read will go into the ^FN1 location of the format. The printer will retry the command five times, if necessary.

The second ^RT command starts at block 2 and reads two blocks of data in ASCII format. The data read will go into the ^FN2 location of the format. The printer will retry the command five times, if necessary.

# ~RV

## Report RFID Encoding Results

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to tell the printer to send RFID encoding success or failure results to the host computer after each label format completes.

**Format** ~RVa

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| a = enable/disable | Enables or disables the results reporting feature.<br>*Accepted Values:*<br>E = Enable<br>D = Disable<br>*Default Value:* D |

**Example 1 •**Assume that the following code is sent and that there is no RFID tag in the field.

```
~RVE
^XA
^RS8,0,,3
^RMY
^RFR,H
^XZ
```

The printer attempts to program a tag three times and then returns the following to the host:

```
_-,3_
```

The minus sign indicates that the programming attempt failed entirely and voided three labels.

**Example 2 •**Assume that the same code is sent and that the first two attempts at programming a tag are unsuccessful. The third attempt succeeds.

```
~RVE
^XA
^RS8,0,,3
^RMY
^RFR,H
^XZ
```

The printer attempts to program a tag three times and then returns the following to the host:

```
_+,2_
```

The plus sign indicates that the programming attempt was successful and voided two labels.

# ^RW

## Set RFID Read and Write Power Levels

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to set the read and write power levels. This function is useful when using different tag types or transponders that require different power levels to obtain the best read and write abilities. If not enough power is applied, the transponder may not have sufficient power for programming, and tag data will fail to encode. If too much power is applied, the extra power may disable the tag may or cause data communication errors.

**Format** ^RWr,w

This table identifies the parameters for this format:

| Parameters | Details |
|---|---|
| `r` = read power | Sets the power level to match the desired output as calibrated in the factory.<br>*Accepted Values:*<br>`H` = high<br>`M` = medium<br>`L` = low<br>*Default Value:* H |

| Parameters | Details |
|---|---|
| `w` = write power | **Note •** This parameter is ignored on the R110*Xi* HF printer because read and write powers cannot be specified separately. The printer uses the value that you specified for read power for both the read and write power settings.<br>Sets the power level to match the desired output as calibrated in the factory.<br>*Accepted Values:*<br>`H` = high<br>`M` = medium<br>`L` = low<br>*Default Value:* H |
| `a` = RFID antenna selection | **Note •** This parameter applies only to the R110*Xi* HF printer.<br>Selects the antenna port that provides the best results for reading and writing.<br>*Accepted Values:*<br>`1` = antenna port 1<br>`2` = antenna port 2<br>*Default Value:* 1 |

# ^RZ

## Set RFID Tag Password and Lock Tag

**Description** Use this command to define a password for a tag during writing.

With Gen 2 tags, you can lock a tag's memory bank with an access password or define a kill password that can be used to permanently disable the tag. If you do not set access or kill passwords for a tag, the tag ignores any read or write commands that try to use these functions.

**Note •** The printer can set a kill password, but the printer cannot kill a tag.

**Format** `^RZp,m,l`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `p` = password | Sets a password.<br>**For tag types other than Gen 2:**<br>The password is 8 bits. The memory bank and lock style parameters are ignored. The password must be 2 hexadecimal characters long.<br>*Accepted Values:* 00 to FF (hexadecimal)<br>*Default Value:* 00<br>**For Gen 2 tag type only:**<br>Gen 2 tags use a 32-bit password and specify the memory bank and lock style. The password must be 8 hexadecimal characters long. Use *^RF* on page 367 to read the passwords.<br>*Accepted Values:* 00000000 to FFFFFFFF (hexadecimal)<br>*Default Value:* none |
| `m` = memory bank | **Note •** This parameter applies to Gen 2 tags only.<br>*Accepted Values:*<br>`K` = kill password<br>`A` = access password<br>`E` = EPC<br>`T` = tag identifier (TID)<br>`U` = user<br>*Default Value:* none |

| Parameters | Details |
|---|---|
| `l` = lock style | **Note •** This parameter applies to Gen 2 tags only.<br>*Accepted Values:*<br>`U` = unlocked<br>`L` = locked<br>`O` = permanently unlocked (open)<br>`P` = permanently locked (protected)<br>`W` = write value (used only for the kill password memory bank)<br>*Default Value:* none |

**Example 1 •** On a tag that is not Gen 2, this example encodes `5A` as the tag password.

```
^XA
^RZ5A^FS
^XZ
```

**Example 2 •** On a Gen 2 tag, this example encodes EPC data `112233445566778899001122` to the tag in Hex format, write protects the tag's EPC data with password `1234ABCD`, and leaves the tag's access password unlocked.

```
^XA
^RFW,H^FD112233445566778899001122^FS
^RZ1234ABCD,E,L^FS
^XZ
```

**Example 3 •** On a Gen 2 tag, this example encodes EPC data `112233445566778899001122` to the tag in Hex format, write protects the tag's EPC data with password `1234ABCD`, and makes the tag's access password unreadable.

```
^XA
^RFW,H^FD112233445566778899001122^FS
^RZ1234ABCD,E,L^FS
^RZ1234ABCD,A,L^FS
^XZ
```

The following code unprotects EPC data `112233445566778899001122` using the password `1234ABCD`, encodes EPC data `newdata` to the tag in ASCII format, and then write protects the tag's new EPC data. The access password and its lock state are not changed, so the access password remains unreadable.

```
^XA
^RZ1234ABCD,E,U^FS
^RFW,A^FDnewdata^FS
^RZ1234ABCD,E,L^FS
^xz
```

**Example 4** • On a Gen 2 tag, this example unlocks the locked access password from the previous example.

```
^XA
^RZ1234ABCD,A,U^FS
^XZ
```

# ^WF

## Encode AFI or DSFID Byte

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to encode the AFI or DSFID byte to a tag. Error handling is set by the ^RS command.

**Format** `^WFr,m,w,f,b`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `r` = number of retries | *Accepted values:* 0 to 10<br>*Default value:* 0 |
| `m` = motion | *Accepted values:*<br>0 = Feed label after writing.<br>1 = No Feed after writing. Other ZPL may cause a feed.<br>*Default value:* 0 |
| `w` = write protect | *Accepted values:*<br>0 = Not write protected<br>1 = Write protect<br>*Default value:* 0 |
| `f` = data format | *Accepted values:*<br>0 = ASCII<br>1 = Hexadecimal<br>*Default value:* 0 |
| b = type of byte to read | *Accepted values:*<br>`A` = AFI byte<br>`D` = DSFID byte<br>*Default value:* A |

**Example 1 •**This example encodes data “R” (hex 52) as the AFI byte. The printer will try the command up to five times, if necessary.

```
^XA
^WF5^FDR
^XZ
```

**Example 2** •This example encodes data hex 66 as the AFI byte. The printer will try the command up to three times, if necessary.

```
^XA
^WF3,,,1^FD66
^XZ
```

**Example 3** •This example encodes data hex 77 as the DSFID byte. The printer will try the command up to four times, if necessary.

```
^XA
^WF4,,,1,D^FD77
^XZ
```

# ^WT

## Write (Encode) Tag

**Note •** The ^WT command is provided only for backward-compatibility with label formats that were developed for older Zebra RFID printers. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you should not use this command.

**Description** Use this command to encode the current RFID tag. Check the amount of data memory available for the tag that you will be using. If you send more data than the memory can hold, the printer truncates the data.

**Format** `^WTb,r,m,w,f,v`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `b` = block number | Specifies the block number to encode. This parameter is tag-dependent.<br>• For most tags, use block 0.<br>• For EPC Class 0 Plus, block 0 is EPC data, and block 1 is user data.<br>• For the R4Mplus, this parameter does not apply to printers with firmware version SP902*X*. With other versions of firmware in this printer, you can encode 12 bytes (96 bits) to block 0, but you can encode only the first byte of block 1.<br>*Accepted values:* 0 to *n*, where *n* is the maximum number of blocks for the tag.<br>*Default value:* 0 |
| `r` = number of retries | Changes the number of times that the printer attempts to encode a particular block of a single RFID tag. (Same function as the `^RR` command.)<br>*Accepted values:* 0 to 10<br>*Default value:* 0 |
| `m` = motion | Enables or disables RFID motion. (Same function as the `^RM` command.)<br>*Accepted values:*<br>`0` = Feed label after writing<br>`1` = No feed after writing (other ZPL may cause a feed)<br>*Default value:* `0` |
| `w` = write protect | *Accepted values:*<br>`0` = Not write protected<br>`1` = Write protected<br>*Default value:* 0 |

| Parameters | Details |
|---|---|
| `f` = data format | *Accepted values:*<br>`0` = ASCII<br>`1` = Hexadecimal<br>*Default value:* 0 |
| **For the R110*Xi* HF:**<br>`v` = reverse the data order<br>**For other supported printers:**<br>`v` = verify valid data | This parameter is not used in the R2844-Z.<br>**For the R110*Xi* HF:**<br>Reverses the data order.<br>*Accepted values:*<br>`N` = Do not reverse the data order (Most significant byte first for Tag*It and PicoTag. Last significant byte first for I*code and ISO 15693)<br>`Y` = Reverse the data order<br>*Default value:* N<br>**For other supported printers:**<br>For reliability, some manufacturers encode tags with known data (such as `A5A5`). This parameter flags whether the preprogrammed data is verified. (Same function as the `^WV` command.)<br>*Accepted values:*<br>`N` = Do not verify<br>`Y` = Verify valid data before writing<br>*Default value:* N |

**Example** • This sample encodes data “RFIDRFID” and will try writing up to five times, if necessary.

```
^XA
^WT,5^FDRFIDRFID^FS
^XZ
```

# ^WV

## Verify RFID Encoding Operation

**Important •** This command is not supported by all printers or firmware. See *Printer and Firmware Compatibility* on page 357 for the list of printers and firmware with which you can use this command.

**Description** Use this command to enable or disable the write verify function. When write verify is enabled, this command verifies the RFID encoding operation to ensure that the tag about to be programmed contains the hex data “A5A5” in the first two bytes. This parameter is not persistent (carried over from label to label).

**Format** `^WVe`

This table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `e` = enable | *Accepted values:* Y or N<br>*Default value:* N |

**Notes •** ____________________________________________

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# 4

# ZPL Wireless Commands

This section contains new or modified ZPL commands for the Wireless and Wireless Plus print servers.

# ^KC

## Set Client Identifier (Option 61)

**Description** The ^KC command allows the print server to have its own client identifier (CID).

**Format** `^KCa,b,c,d`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = enable or disable | *Accepted Values:*<br>0 = disable (default)<br>1 = enabled, use MAC address<br>2 = enabled, ASCII value<br>3 = enabled, HEX value<br>*Default Value:* 0 |
| b = device | *Accepted Values:*<br>0 = all devices<br>1 = wireless<br>2 = external wired *<br>3 = internal wired<br>*Default Value:* 1 |
| c = prefix (optional) | *Accepted Values:* 11 ASCII characters or 22 hexadecimal values.<br>The prefix can be cleared by defaulting the network settings on the printer. |
| d = identifier | *Accepted Values:* 60 ASCII characters or 120 hexadecimal values. Minimum field length is 2 bytes.<br>The suffix can be cleared by defaulting the network settings on the printer. |

* This applies only to the Zebra ZM400/ZM600™ printer when it is used with the external ZebraNet 10/100 print server using firmware v1.1.5.

# ^NB

## Search for Wired Print Server during Network Boot

**Description** Use this command to tell the printer whether to search for a wired print server at bootup. This command is ignored on the Zebra ZM400/ZM600™ printer.

**Note •** Only one print server can be installed in the S4M at one time, so this check does not occur.

Table 4 identifies which device becomes the active print server under different conditions.

**Table 4 • Results of Check for Wired Print Server**

| If the Check for Wired Print Server is set to: | Installed and Connected to a Live Ethernet Network | | Then, the Active Print Server will be: |
|---|---|---|---|
| | Wired | Wireless* | |
| **Skip** | X | X | Wireless |
| | X | | Wired |
| | | X | Wireless |
| **Check** | X | X | Wired |
| | X | | Wired |
| | | X | Wireless |

* NOTE: A wireless option board must have an active radio that can properly associate to an access point.

**Format** ^NBa

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = check for wired print server at boot time | *Accepted Values:* C (CHECK), S (SKIP CHECK)<br>*Default Value:* S |

# ^NN

## Set SNMP

**Description** Use this command to set the Simple Network Management Protocol (SNMP) parameters.

**Format** ^NNa,b,c,d,e,f

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `a` = system name | Same as printer name.<br>*Accepted Values:* Up to 17 alphanumeric characters |
| `b` = system contact | Any contact information as desired (such as a name or phrase)<br>*Accepted Values:* Up to 50 alphanumeric characters |
| `c` = system location | The printer’s model information.<br>*Accepted Values:* Up to 50 alphanumeric characters |
| `d` = get community name | *Accepted Values:* Up to 19 alphanumeric characters<br>*Default Value:* `public` |
| `e` = set community name | *Accepted Values:* Up to 19 alphanumeric characters<br>*Default Value:* `public` |
| `f` = trap community name | *Accepted Values:* Up to 20 alphanumeric characters<br>*Default Value:* `public` |

# ^NP

## Set Primary/Secondary Device

**Description** Use this command to specify whether to use the printer’s or the print server’s LAN/WLAN settings at boot time. The default is to use the printer’s settings.

- When the printer is set as the primary device, you can set it up using ZPL commands or the Wireless Setup Wizard utility, and any wired print server inserted into the printer will use those settings.

**Format** ^NPa

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = device to use as primary | *Accepted Values:*<br>P = PRINTER<br>M = MPS/PRINTSERVER<br>*Default Value:* P |

# ^NT

## Set SMTP

**Description** Use this command to set the Simple Mail Transfer Protocol (SMTP) parameters. This allows you to set the e-mail settings for alerts.

**Format** ^NTa,b

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = SMTP server address | *Accepted Values:* Any properly formatted server address in the xxx.xxx.xxx.xxx format |
| b = print server domain | *Accepted Values:* Any properly formatted print server domain name. A domain name is one or more labels separated by a period (“dot”), and a label consists of letters, numbers, and hyphens. An example of a domain name is zebra.com |

# ^NW

## Set Web Authentication Timeout Value

**Description** Use this command to set the timeout value for the printer home page. The printer will prompt for the printer password only the first time that certain screens are accessed until 1) the web authentication timeout value is reached (default value is 5 minutes) or 2) the printer is reset. At that time, the printer will prompt for the password again.

**Format** ^NWa

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = timeout value | The timeout value in minutes for an IP address to be authenticated to the printer web pages.<br>*Accepted Values:* 0 (no secure pages can be accessed without entering the printer password) to 255 minutes<br>*Default Value:* 5 |

# ^WA

## Set Antenna Parameters

**Description** Use this command to set the values for the receive and transmit antenna.

**Format** ^WAa,b

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = receive antenna | *Accepted Values:* D (Diversity), L (Left), R (Right)<br>*Default Value:* D |
| b = transmit antenna | *Accepted Values:* D (Diversity), L (Left), R (Right)<br>*Default Value:* D |

# ^WE

## Set WEP Mode

**Note •** The ^WE command is provided only for backward-compatibility with printers using firmware prior to V50.15.x, V53.15.x, or V60.15.x. For these firmware versions and later, use *^WX* on page 418 to set the security type and related parameters.

**Description** Use this command to command enable Wired Equivalent Privacy (WEP) mode and set WEP values. WEP is a security protocol for wireless local area networks (WLANs).

Be careful to include the exact number of commas required for this command when setting encryption keys (parameters e through h). A missing or extra comma will cause the keys to be stored in the wrong slots and can prevent the printer from joining the wireless network.

**Format** ^WEa,b,c,d,e,f,g,h

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = encryption mode | *Accepted Values:* OFF, 40 (40-bit encryption), 128 (128-bit encryption)<br>*Default Value:* OFF |
| b = encryption index | Tells the printer which encryption key to use.<br>*Accepted Values:* 1 (Key 1), 2 (Key 2), 3 (Key 3), 4 (Key 4)<br>*Default Value:* 1 |
| c = authentication type | *Accepted Values:* O (Open System), S (Shared Key)<br>*Default Value:* O<br>**Note •** If you enable Shared Key authentication with Encryption Mode set to OFF, this value resets to Open. |
| d = encryption key storage | *Accepted Values:* H (Hex key storage), S (string key storage)<br>*Default Value:* H |
| e, f, g, h = encryption keys 1 through 4 | *Accepted Values:* The actual value for the encryption key<br>The encryption mode affects what can be entered for the encryption keys:<br>• For 40-bit, encryption keys can be set to any 5 hex pairs or any 10 alphanumeric characters.<br>• For 128-bit, encryption keys can be set to any 13 hex pairs or any 26 alphanumeric characters.<br>**Note •** When using hex storage, do not add a leading 0x on the WEP key. |

➡ **Example 1 •**This example sets encryption to 40-bit, activates encryption key 1, and sets encryption key 1 to the string `12345`.

```
^WE40,,,,12345
```

In this example, the Encryption Index, Authentication Type, and Encryption Key Storage parameters are left blank with commas as placeholders for the fields. The printer uses the default values for these parameters.

➡ **Example 2 •**This example sets encryption to 128-bit, activates encryption key 2, and sets encryption keys 1 and 2 to hex values.

```
^WE128,2,,H,12345678901234567890123456,98765432109876543
210987654
```

The value for encryption key 1 is stored and can be activated in the future by the following command:

```
^WE128,1
```

➡ **Example 3 •**This example sets encryption to 128-bit, activates encryption key 4, and sets encryption key 4 to a hex value.

```
^WE128,4,,H,,,,98765432109876543210987654
```

Values are not required for encryption keys 1 through 3 when setting encryption key 4. In this example, commas are used as placeholders for the fields for encryption keys 1 through 3. Any previously stored values for these encryption keys do not change.

**Important •** Make sure that you include the exact number of commas required to get to the slot for encryption key 4 (parameter `h`).

# ^WI

## Change Wireless Network Settings

**Description** Use this command to change the wireless network settings. On Zebra ZM400/ZM600™ and S4M™ printers running V53.15.xZ or later, Zebra recommends using *^ND* on page 292 for these settings.

**Format** `^WIa,b,c,d,e,f,g,h,i`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| `a` = IP resolution | *Accepted Values:*<br>`A` = All<br>`B` = BOOTP<br>`C` = DHCP and BOOTP<br>`D` = DHCP<br>`G` = Gleaning only (Not recommended when the Wireless Print Server or Wireless Plus Print Server is installed.)<br>`R` = RARP<br>`P` = Permanent<br>*Default Value:* A |
| `b` = IP address | *Accepted Values:* Any properly formatted IP address in the xxx.xxx.xxx.xxx format.<br>*Default Value:* `000.000.000.000` |
| `c` = subnet mask | *Accepted Values:* Any properly formatted subnet mask in the xxx.xxx.xxx.xxx format.<br>*Default Value:* `000.000.000.000` |
| `d` = default gateway | *Accepted Values:* Any properly formatted gateway in the xxx.xxx.xxx.xxx format.<br>*Default Value:* `000.000.000.000` |
| `e` = WINS server address | *Accepted Values:* Any properly formatted WINS server in the xxx.xxx.xxx.xxx format.<br>*Default Value:* `000.000.000.000` |
| `f` = connection timeout checking | *Accepted Values:*<br>`Y` = yes<br>`N` = no<br>*Default Value:* `Y` |
| `g` = timeout value | Time, in seconds, before the connection times out.<br>*Accepted Values:* `0` through `9999`<br>*Default Value:* `300` |

| Parameters | Details |
|---|---|
| h = ARP broadcast interval | Time, in minutes, that the broadcast is sent to update the device's ARP cache.<br>*Accepted Values:* 0 through 30<br>*Default Value:* 0 (no ARP sent) |
| i = base raw port number | The port number that the printer should use for its RAW data.<br>*Accepted Values:* 1 through 65535<br>*Default Value:* 9100 |

# ^WL

## Set LEAP Parameters

**Note •** The `^WL` command is provided only for backward-compatibility with printers using firmware prior to V50.15.x or V60.15.x. For these firmware versions and later, use *^WX* on page 418 to set the security type and related parameters.

**Description** Use this command to enable Cisco® Lightweight Extensible Authentication Protocol (LEAP) mode and set parameters. LEAP is user authentication method that is available with some wireless radio cards.

**Format** `^WLa,b,c`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = mode | *Accepted Values:* OFF, ON<br>*Default Value:* OFF |
| b = user name | *Accepted Values:* Any 4 to 40 alphanumeric characters<br>*Default Value:* user |
| c = password | *Accepted Values:* Any 4 to 40 alphanumeric characters<br>*Default Value:* password |

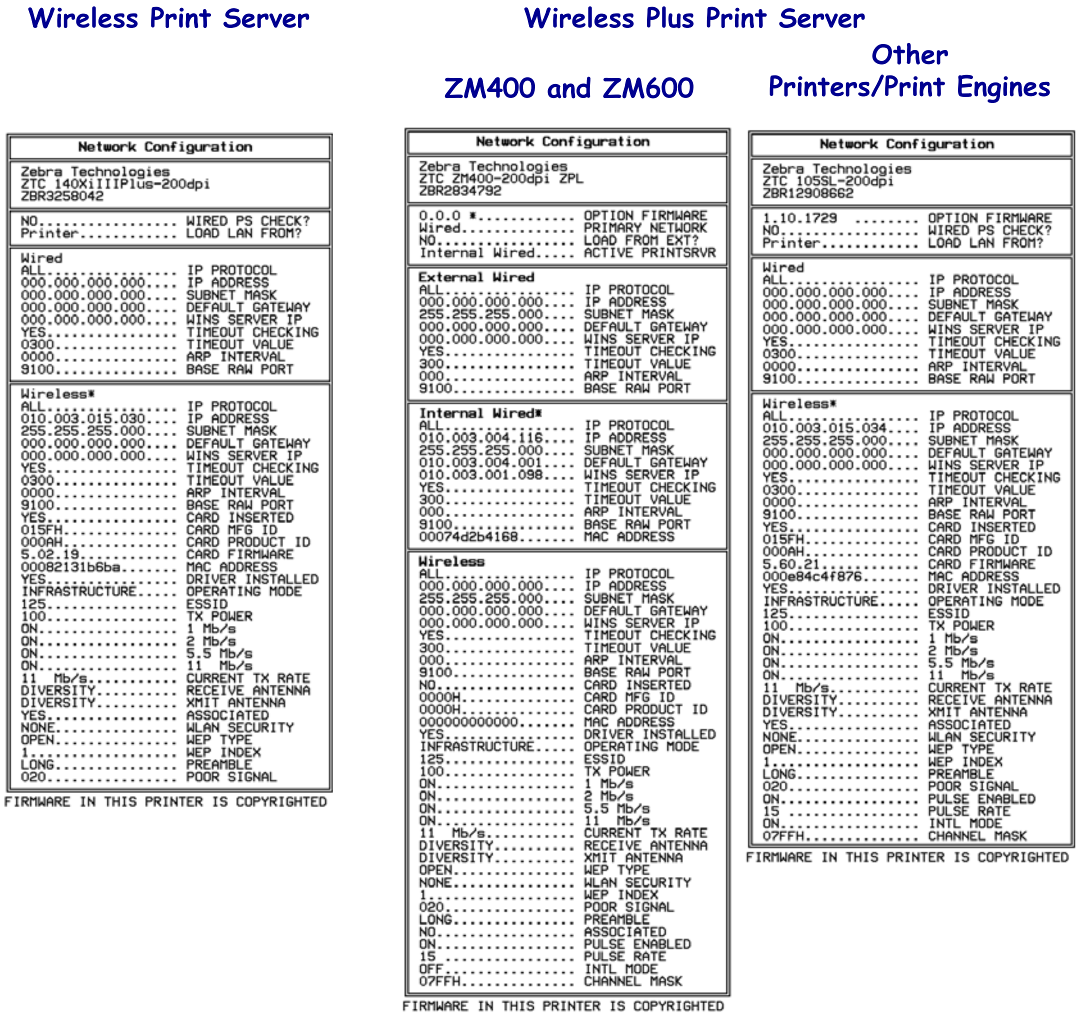
# ~WL

## Print Network Configuration Label

**Description** Use this command to generate a network configuration label (Figure 3).

**Format** ~WL

**Figure 3 • Network Configuration Label**



Wireless Print Server

```
                Network Configuration

 Zebra Technologies
 ZTC 140XiIIIPlus-200dpi
 ZBR3258042

 NO.................... WIRED PS CHECK?
 Printer............... LOAD LAN FROM?

 Wired
 ALL................... IP PROTOCOL
 000.000.000.000.... IP ADDRESS
 000.000.000.000.... SUBNET MASK
 000.000.000.000.... DEFAULT GATEWAY
 000.000.000.000.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 0300.................. TIMEOUT VALUE
 0000.................. ARP INTERVAL
 9100.................. BASE RAW PORT

 Wireless*
 ALL................... IP PROTOCOL
 010.003.015.030.... IP ADDRESS
 255.255.255.000.... SUBNET MASK
 000.000.000.000.... DEFAULT GATEWAY
 000.000.000.000.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 0300.................. TIMEOUT VALUE
 0000.................. ARP INTERVAL
 9100.................. BASE RAW PORT
 YES................... CARD INSERTED
 015FH................. CARD MFG ID
 000AH................. CARD PRODUCT ID
 5.02.19............... CARD FIRMWARE
 00082131b6ba.......... MAC ADDRESS
 YES................... DRIVER INSTALLED
 INFRASTRUCTURE........ OPERATING MODE
 125................... ESSID
 100................... TX POWER
 ON.................... 1 Mb/s
 ON.................... 2 Mb/s
 ON.................... 5.5 Mb/s
 ON.................... 11  Mb/s
 11  Mb/s.............. CURRENT TX RATE
 DIVERSITY............. RECEIVE ANTENNA
 DIVERSITY............. XMIT ANTENNA
 YES................... ASSOCIATED
 NONE.................. WLAN SECURITY
 OPEN.................. WEP TYPE
 1..................... WEP INDEX
 LONG.................. PREAMBLE
 020................... POOR SIGNAL
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

Wireless Plus Print Server

ZM400 and ZM600

```
                Network Configuration

 Zebra Technologies
 ZTC ZM400-200dpi ZPL
 ZBR2834792

 0.0.0 *............... OPTION FIRMWARE
 Wired................. PRIMARY NETWORK
 NO.................... LOAD FROM EXT?
 Internal Wired........ ACTIVE PRINTSRVR

 External Wired
 ALL................... IP PROTOCOL
 000.000.000.000.... IP ADDRESS
 255.255.255.000.... SUBNET MASK
 000.000.000.000.... DEFAULT GATEWAY
 000.000.000.000.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 300................... TIMEOUT VALUE
 000................... ARP INTERVAL
 9100.................. BASE RAW PORT

 Internal Wired*
 ALL................... IP PROTOCOL
 010.003.004.116.... IP ADDRESS
 255.255.255.000.... SUBNET MASK
 010.003.004.001.... DEFAULT GATEWAY
 010.003.001.098.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 300................... TIMEOUT VALUE
 000................... ARP INTERVAL
 9100.................. BASE RAW PORT
 00074d2b4168.......... MAC ADDRESS

 Wireless
 ALL................... IP PROTOCOL
 000.000.000.000.... IP ADDRESS
 255.255.255.000.... SUBNET MASK
 000.000.000.000.... DEFAULT GATEWAY
 000.000.000.000.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 300................... TIMEOUT VALUE
 000................... ARP INTERVAL
 9100.................. BASE RAW PORT
 NO.................... CARD INSERTED
 0000H................. CARD MFG ID
 0000H................. CARD PRODUCT ID
 000000000000.......... MAC ADDRESS
 YES................... DRIVER INSTALLED
 INFRASTRUCTURE........ OPERATING MODE
 125................... ESSID
 100................... TX POWER
 ON.................... 1 Mb/s
 ON.................... 2 Mb/s
 ON.................... 5.5 Mb/s
 ON.................... 11  Mb/s
 11  Mb/s.............. CURRENT TX RATE
 DIVERSITY............. RECEIVE ANTENNA
 DIVERSITY............. XMIT ANTENNA
 OPEN.................. WEP TYPE
 NONE.................. WLAN SECURITY
 1..................... WEP INDEX
 020................... POOR SIGNAL
 LONG.................. PREAMBLE
 NO.................... ASSOCIATED
 ON.................... PULSE ENABLED
 15 ................... PULSE RATE
 OFF................... INTL MODE
 07FFH................. CHANNEL MASK
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

Other
Printers/Print Engines

```
                Network Configuration

 Zebra Technologies
 ZTC 105SL-200dpi
 ZBR12908662

 1.10.1729  ........... OPTION FIRMWARE
 NO.................... WIRED PS CHECK?
 Printer............... LOAD LAN FROM?

 Wired
 ALL................... IP PROTOCOL
 000.000.000.000.... IP ADDRESS
 000.000.000.000.... SUBNET MASK
 000.000.000.000.... DEFAULT GATEWAY
 000.000.000.000.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 0300.................. TIMEOUT VALUE
 0000.................. ARP INTERVAL
 9100.................. BASE RAW PORT

 Wireless*
 ALL................... IP PROTOCOL
 010.003.015.034.... IP ADDRESS
 255.255.255.000.... SUBNET MASK
 000.000.000.000.... DEFAULT GATEWAY
 000.000.000.000.... WINS SERVER IP
 YES................... TIMEOUT CHECKING
 0300.................. TIMEOUT VALUE
 0000.................. ARP INTERVAL
 9100.................. BASE RAW PORT
 YES................... CARD INSERTED
 015FH................. CARD MFG ID
 000AH................. CARD PRODUCT ID
 5.60.21............... CARD FIRMWARE
 000e84c4f876.......... MAC ADDRESS
 YES................... DRIVER INSTALLED
 INFRASTRUCTURE........ OPERATING MODE
 125................... ESSID
 100................... TX POWER
 ON.................... 1 Mb/s
 ON.................... 2 Mb/s
 ON.................... 5.5 Mb/s
 ON.................... 11  Mb/s
 11  Mb/s.............. CURRENT TX RATE
 DIVERSITY............. RECEIVE ANTENNA
 DIVERSITY............. XMIT ANTENNA
 YES................... ASSOCIATED
 NONE.................. WLAN SECURITY
 OPEN.................. WEP TYPE
 1..................... WEP INDEX
 LONG.................. PREAMBLE
 020................... POOR SIGNAL
 ON.................... PULSE ENABLED
 15 ................... PULSE RATE
 ON.................... INTL MODE
 07FFH................. CHANNEL MASK
FIRMWARE IN THIS PRINTER IS COPYRIGHTED
```

# ^WP

## Set Wireless Password

**Description** Use this command to set the four-digit wireless password (not the same as the general printer password). If the wireless password is **0000**, the Wireless and Wireless Plus print servers run in an “unprotected” mode, which means that you do not need to enter the wireless password through the control panel to view or modify wireless settings.

If a wireless password is set, the values for the following parameters will not appear through the control panel until the wireless password is entered:

- MAC Address
- ESSID
- WLAN Security
- WEP Type
- WEP Index
- Reset Network

**Format** ^WPa,b

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = old wireless password | *Accepted Values:* 0000 through 9999<br>*Default Value:* 0000 |
| b = new wireless password | *Accepted Values:* 0000 through 9999<br>*Default Value:* 0000 |

# ^WR

## Set Transmit Rate

**Description** Use this command to change the transmission parameters.

**Format** `^WRa,b,c,d,e`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = rate 1 | Sets the 1 Mb/s transmit rate.<br>*Accepted Values:* Y (On), N (Off) |
| b = rate 2 | Sets the 2 Mb/s transmit rate.<br>*Accepted Values:* Y (On), N (Off) |
| c = rate 5.5 | Sets the 5.5 Mb/s transmit rate.<br>*Accepted Values:* Y (On), N (Off) |
| d = rate 11 | Sets the 11 Mb/s transmit rate.<br>*Accepted Values:* Y (On), N (Off) |
| e = transmit power | *Accepted Values:* 1, 5, 20, 30, 50, 100 |

# ~WR

## Reset Wireless Radio Card and Print Server

**Description** Use this command to reinitialize the wireless radio card and the print server (wired or wireless) when the Wireless or Wireless Plus print server is running. The command also causes any wireless radio card in the printer to reassociate to the wireless network.

**Format** ~WR

# ^WS

## Set Wireless Radio Card Values

**Description** Use this command to set the wireless radio card values for ESSID, Operating Mode, and Card Preamble.

**Format** `^WSe,o,p,h,i,j,k`

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| e = ESSID value | *Accepted Values:* Any value up to 32 characters, including all ASCII and Extended ASCII characters, including the space character. When this parameter is left blank, the ESSID is not changed.<br>*Default Value:* 125 |
| o = operating mode | *Accepted Values:* I (Infrastructure), A (Adhoc)<br>*Default Value:* I |
| p = wireless radio card preamble | *Accepted Values:* L (Long), S (Short)<br>*Default Value:* L |
| h = wireless pulse<br>.15↑<br>This parameter is supported in firmware version V60.15.x, V50.15.x, or later. | Adds a pulse to the network traffic generated by the printer. This pulse is necessary with some network configurations to keep the printer online.<br>*Accepted Values:* 1 (Enabled), 0 (Disabled)<br>*Default Value:* 1 |
| i = wireless pulse interval<br>.15↑<br>This parameter is supported in firmware version V60.15.x, V50.15.x, or later. | Sets the interval at which the wireless pulse is sent when the wireless pulse feature is enabled.<br>*Accepted Values:* 5 to 300 seconds<br>*Default Value:* 15 |

| Parameters | Details |
|---|---|
| j = channel mask<br>.15↑<br>This parameter is supported in firmware version V60.15.x, V50.15.x, or later. | For commonly used channel masks, see Table 5.<br>*Accepted Values:* 4 Hexadecimal digits preceded by “0x” (0x0000 to 0xFFFF)<br>*Default Value:* 0x7FF |
| k = international mode<br>.15↑<br>This parameter is supported in firmware version V60.15.x, V50.15.x, or later. | *Accepted Values:* 0 (Disabled), 1 (Enabled)<br>*Default Value:* 0 |

**Table 5 • Channel Mask Settings**

| Region | Channel Mask |
|---|---|
| United States, Canada, Latin America | 0x7FF |
| Europe, Middle East, Africa, other | 0x1FFF |
| Japan | 0x3FFF |

# ^WX

## Configure Wireless Securities

**Description** Use this command to configure the wireless security settings for your printer. Values entered for this command must match what is configured on your WLAN and must be supported by the wireless radio card that you are using.

This command applies to printers with firmware version V60.15.x, V50.15.x, or later.

**Note •** When using certificate files, your printer supports:

- Using Privacy Enhanced Mail (PEM) formatted certificate files.
- Using the client certificate and private key as two files, each downloaded separately.
- Using exportable PAC files for EAP-FAST.

The `^WX` command replaces individual ZPL commands for different security types.

**Format** `^WXa,[zero or more supporting parameters]`

**Note •** The supporting parameters that are required vary based on the security type that you select. See *Supporting Parameters for Different Security Types* on page 422 for instructions for each security type.

The following table identifies the parameters for this format.

| Parameters | Details |
|---|---|
| a = security type | Enter the two-digit code for the security type that your WLAN uses. For which supporting parameters (b through n) to use with the different security types, see *Supporting Parameters for Different Security Types* on page 422.<br>**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.<br>*Accepted Values:* `01` to `15`<br>`01` = No wireless security is active<br>`02` = WEP 40-bit<br>`03` = WEP 128-bit<br>`04` = EAP-TLS<br>`05` = EAP-TTLS<br>`06` = EAP-FAST<br>`07` = PEAP<br>`08` = LEAP<br>`09` = WPA PSK (Key rotation for WPA2 PSK is supported in firmware versions V53.15.7Z , V60.15.7Z, and later.))<br>`10` = WPA EAP-TLS<br>`11` = WPA EAP-TTLS<br>`12` = WPA EAP-FAST<br>`13` = WPA PEAP<br>`14` = WPA LEAP<br>`15` = Kerberos<br>*Default Value:* `01` |
| b = WEP encryption index* | Specifies which encryption key to use for WEP encryption. A value must be specified if using WEP 40-bit or WEP 128-bit.<br>*Accepted Values:* 1, 2, 3, 4<br>*Default Value:* 1 |
| c = WEP authentication type* | Enables the WEP key authentication type. A value must be specified if using WEP 40-bit or WEP 128-bit.<br>*Accepted Values:* `O` or `S`<br>`O` = open system<br>`S` = shared key<br>*Default Value:* `O` |
| d = WEP key type* | Specifies the format of the WEP key. A value must be specified if using WEP 40-bit or WEP 128-bit.<br>*Accepted Values:* `H` or `S`<br>`H` = hex key storage<br>`S` = string key storage<br>*Default Value:* `S` |

* Not used for all security types

| Parameters | Details |
|---|---|
| e,f,g,h =<br>WEP encryption keys 1 through 4* | Specifies the actual values of any WEP encryption keys to be used. A value must be specified for at least one WEP encryption key if you specify 40-bit or 128-bit WEP encryption for the security type.<br>**Important •** Be careful to include the exact number of commas required for this command when setting encryption keys (parameters `e` through `h`). A missing or extra comma will cause the keys to be stored in the wrong slots and can prevent the printer from joining the wireless network.<br>The encryption mode affects what can be entered for the encryption keys:<br>• For 40-bit, encryption keys can be set to any 5 hex pairs or any 10 alphanumeric characters.<br>• For 128-bit, encryption keys can be set to any 13 hex pairs or any 26 alphanumeric characters.<br>**Note •** When using hex storage, do not add a leading 0x on the WEP key.<br>*Accepted Values:* The actual value for the encryption key<br>*Default Value:* None |
| i = user ID* | Specifies a user ID for security types that require one. A value must be specified if using the following security types:<br>• EAP-TTLS<br>• LEAP<br>• WPA LEAP<br>• PEAP<br>• WPA PEAP<br>• WPA EAP-TTLS<br>• Kerberos<br>*Accepted Values:* The actual value for the user ID.<br>*Default Value:* user |

* Not used for all security types

| Parameters | Details |
|---|---|
| j = password* | Specifies a password for security types that require one. A value must be specified if using the following security types:<br>• EAP-TTLS<br>• LEAP<br>• WPA LEAP<br>• PEAP<br>• WPA PEAP<br>• WPA EAP-TTLS<br>• Kerberos<br>*Accepted Values:* The actual value for the password.<br>*Default Value:* password |
| k = optional private key password* | Specifies an optional private key password for security types that require one. A value must be specified if using the following security types:<br>• EAP-TLS<br>• EAP-FAST<br>• WPA EAP-TLS<br>• WPA EAP-FAST<br>*Accepted Values:* The actual value for the optional private key.<br>*Default Value:* None |
| l = realm* | Specifies the realm for security types that require it. A value must be specified if using Kerberos.<br>*Accepted Values:* The actual value for the realm.<br>*Default Value:* kerberos |
| m = Key Distribution Center (KDC)* | Specifies the KDC for security types that require it. A value must be specified if using Kerberos.<br>*Accepted Values:* The actual value for the KDC.<br>*Default Value:* krbtgt" |
| n = Pre-Shared Key (PSK) value* | Enter the PSK value. This value is calculated and must be the same for each device on the WLAN. Use ZebraNet Bridge to generate the PSK value. A value must be specified if using WPA PSK.<br>! **Important •** Do not enter a pass phrase for this field in this command. To use a pass phrase, use the ZebraNet Bridge Enterprise Wireless Setup Wizard.<br>*Accepted Values:* a minimum of 64 hexadecimal digits<br>*Default Value:* None |

* Not used for all security types

## Supporting Parameters for Different Security Types

The supporting parameters required for this command vary based on the security type that you select. You should not use all of the supporting parameters each time that you use this command, nor will you use extra commas to separate unused fields. Follow the example and format for your specific security type in this section, substituting your own wireless network data.

### Security Type 01: No Wireless Security Active

**Format** `^WX01`

**Example •** This example turns off all wireless securities controlled under this command, but it does not reset the printer's wireless settings to their defaults.

```
^XA
^WX01
^JUS^XZ
```

### Security Type 02: WEP 40-Bit

**Format** `^WX02,b,c,d,e,f,g,h`

**Example •** This example configures the printer for WEP 40-bit encryption using index key 1, open authentication, and a hexadecimal WEP key with a value of "`A1B2C3D4F5`."

```
^XA
^WX02,1,O,H,A1B2C3D4F5,,,
^JUS
^XZ
```

### Security Type 03: WEP 128-Bit

**Format** `^WX03,b,c,d,e,f,g,h`

**Example •** This example configures the printer for WEP 128-bit encryption using index key 2, open authentication, and four hexadecimal WEP keys.

```
^XA
^WX03,2,O,H,001122334455667788,112233445566778899,223344
556677889900,334455667788990011
^JUS
^XZ
```

## Security Type 04: EAP-TLS

**Format** `^WX04,k`

**Example •** This example configures the printer for EAP-TLS authentication with an optional private key password with a value of “`private`.”

```
^XA
^WX04,private
^JUS
^XZ
```

## Security Type 05: EAP-TTLS

**Format** `^WX05,i,j`

**Example •** This example configures the printer for EAP-TTLS authentication, including a user ID of “`user`” and a password of “`password`.”

```
^XA
^WX05,user,password
^JUS
^XZ
```

## Security Type 06: EAP-FAST

**Format** `^WX06,i,j,k`

**Example •** This example configures the printer for EAP-FAST authentication, including a user ID of “`user`,” a password of “`password`,” and an optional private key of “`private`.”

```
^XA
^WX06,user,password,private
^JUS
^XZ
```

## Security Type 07: PEAP

**Format** `^WX07,i,j`

**Example •** This example configures the printer for PEAP authentication, including a user ID with a value of "`user`" and a password with a value of "`password`."

```
^XA
^WX07,user,password
^JUS
^XZ
```

## Security Type 08: LEAP

**Format** `^WX08,i,j`

**Example •** This example configures the printer for LEAP authentication, including a user ID with a value of "`user`" and a password with a value of "`password`."

```
^XA
^WX08,user,password
^JUS
^XZ
```

## Security Type 09: WPA PSK

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments. Key rotation for WPA2 PSK is supported in firmware version 60.15.7Z and later and in firmware version 53.15.7Z and later.

**Format** `^WX09,n`

**Example •** This example configures the printer for WPA PSK authentication with a PSK value of all zeroes (64 hexadecimal digits).

```
^XA
^WX09,00000000...
^JUS
^XZ
```

## Security Type 10: WPA EAP-TLS

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

**Format** `^WX10,k`

**Example •** This example configures the printer for WPA EAP-TLS authentication with an optional private key password with a value of “`private`.”

```
^XA
^WX10,private
^JUS
^XZ
```

## Security Type 11: WPA EAP-TTLS

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

**Format** `^WX11,i,j`

**Example •** This example configures the printer for WPA EAP-TTLS authentication, including a user ID with a value of “`user`” and a password with a value of “`password`.”

```
^XA
^WX11,user,password
^JUS
^XZ
```

## Security Type 12: WPA EAP-FAST

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

**Format** `^WX12,i,j,k`

**Example •** This example configures the printer for WPA EAP-FAST authentication, including a user ID of “`user`,” a password of “`password`,” and an optional private key of “`private`.”

```
^XA
^WX12,user,password,private
^JUS
^XZ
```

## Security Type 13: WPA PEAP

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

**Format** `^WX13,i,j`

**Example •** This example configures the printer for WPA PEAP authentication, including a user ID with a value of "`user`" and a password with a value of "`password`."

```
^XA
^WX13,user,password
^JUS
^XZ
```

## Security Type 14: WPA LEAP

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

**Format** `^WX14,i,j`

**Example •** This example configures the printer for WPA LEAP authentication, including a user ID with a value of "`user`" and a password with a value of "`password`."

```
^XA
^WX14,user,password
^JUS
^XZ
```

## Security Type 15: Kerberos

**Format** `^WX15,i,j,l,m`

**Example •** This example configures the printer for Kerberos encryption, including a Kerberos user ID with a value of "`user`," a Kerberos password with a value of "`password`," a realm of "`zebra`," and a KDC of "`krbtgt`."

```
^XA
^WX15,user,password,zebra,krbtgt
^JUS
^XZ
```

# 5

# ZBI Commands

This section explains the Zebra Basic Interpreter, its commands, descriptions, formats, and parameters. Examples are shown and comments provided for you as well.

## Contents

## Contents (Continued)

## Command and Function Reference Format

This section describes how commands and functions are presented in this document.

# Command/Function NAME

### Description

This heading has a description of how the command is used, its capabilities, and its characteristics.

### Format

The Format section explains how the command is arranged and its parameters. For example, the `AUTONUM` command starts the auto-numbering option. The format for the command is `AUTONUM <A>,<B>`. The `<A>` and `<B>` are parameters of this command and are replaced with values determined by the user.

For functions, parameters are enclosed within parentheses and separated by commas, such as `EXTRACT$(A$,START$,STOP$).`

Numeric parameters are written as a name, while string parameters are written as a name followed by a dollar sign.

### Parameters

If a command has parameters that make a command or function more specific, they are listed under this heading. Still using the `AUTONUM` example, the `<A>` parameter is defined as:

`<A>` = number used to start the auto-numbering sequence

### Return Value (functions only)

The return value is the result of evaluating the function or expression.

### Example

When a command is best clarified in a programming context, an example of the ZBI code is provided. Text indicating parameters, exact code to be entered, or data returned from the host is printed in the `Courier` font to be easily recognizable.

**Example •** An example of `PRINT` code is:

```
10 PRINT "HELLO WORLD"
RUN
HELLO WORLD
```

### Comments

This section is reserved for notes that are of value to a programmer, warnings of potential command interactions, or command-specific information that should be taken into consideration. An example comment could be: This is a program command and must be preceded by a line number.

## Function Rules

Functions built into this interpreter can be used in expressions only. The function names are not case sensitive.

If input parameters exist, they are enclosed in parentheses. If no parameters exist, no parentheses are used.

Variables referenced in the functions could be substituted by functions or expressions of the same type. If the function name ends with a $, it returns a string value. Otherwise, it returns a numeric value.

# Introduction to Zebra Basic Interpreter (ZBI)

## What is ZBI and why is it for me?

ZBI is an "on-the-printer" programing language that offers many of the functions found in ANSI BASIC. The ZBI language allows the user to create applications that are run on the printer to manipulate data streams. By using ZBI, it is possible to have the printer perform the same functions that a computer or programmable terminal might otherwise be used for.

With the connectivity options available on Zebra printers, you may not need a separate computer. Simply load a ZBI program on your printers, add them to your network, and let the printers serve as the gateway for moving data.

Here are some of the applications that can be written using ZBI:

- Connect a barcode scanner to the printer. Based on scanned data, reprint tags, verify printed output, and manage a list of items.
- Connect a scale to the printer and print labels, tags, or receipts based on the weight of an item.
- Connect the printer to a PC-based database and send queries from the printer to retrieve or upload data.
- Convert incoming data into the commands that can be used to print a label. This is useful for replacing other brands of printers with new Zebra units.
- Provide fail-over to another printer when the target printer is in an error state.

## Printers, ZBI Keys, & ZBI Versions

Information about ZBI 1.x and ZBI 2.x:

### ZBI versions 1.0 through 1.5:

ZBI 1.x was available on printers with X.10 or higher firmware (such as V48.10.x). To determine if the printer supports ZBI version 1, check the firmware version loaded on the printer. This can be determined by the absence of a “Z” in the firmware version number (for example, firmware V60.13.0.12 supports ZBI version 1, while V60.13.0.12Z does not). The following printers support the ZBI 1.x firmware:

- *LP/TLP 284x-Z and 384x-Z*
- *S300/S400/S500/S600*
- Z4000/Z6000
- Z4Mplus/Z6Mplus
- Z4Mplus/Z6Mplus
- 105*SL*
- *PAX*3
- *Xi*II
- *Xi*III

ZBI-Developer can be used to create programs for use on printers that support ZBI version 1.x., however, the features that are only available in ZBI v2.x cannot be used with printers running ZBI v1.x. For example, “on-printer” debugging advanced file encryption and commands added in ZBI 2 are not supported in printers running ZBI 1.x. If you do not have a printer that meets this requirement, contact your reseller.

**Note •** Support for ZBI versions 1.0 through 1.5 is limited to syntax checking only. On-printer debugging is not supported for ZBI versions 1.0 through 1.5.

### ZBI versions 2.0 and higher:

Printers with firmware versions X.16 or later (for example, V60.16.x and V53.16.x) can support ZBI version 2.0 and later. The following printers support the ZBI 2.x firmware:

- *Xi*III *Plus*
- Z4Mplus/Z6Mplus
- 105*SL*
- S4M
- *PAX*4
- ZM400/ZM600

These printers can be either ZBI-Ready or ZBI-Enabled, depending on whether or not a ZBI Key file has been loaded on the printer. ZBI Keys can be loaded onto printers during manufacturing or later purchased at www.zebrasoftware.com. A Downloader Utility/ZBI Key Manager software utility is available to assist in the task of sending ZBI Keys to printers.

The ZBI.nrd file is required to be present on the printer for ZBI 2.0 to be enabled. The ZBI Key is stored on the printer's E: memory location with the name ZBI.nrd. The file is persistent. It cannot be deleted even if the printer's memory is initialized. For example, if the `^JB` command is used to initialize the location, the ZBI Key file will not be deleted.

When a printer is ZBI-Ready but not ZBI-Enabled, the firmware version will display a "Z" at the end of the version string (for example, V60.16.0Z). Additionally, the printer's configuration label will show that the printer is not ZBI-Enabled.

When a printer is ZBI-Enabled, the firmware version will not display a "Z" at the end of the version string (for example, V60.16.0). Additionally, the printer's configuration label will show that the printer is ZBI-Enabled.

**Note •** Each single ZBI Key can only be used once. When multiple printers are to be ZBI-Enabled multiple Keys will be needed. The ZBI Key cannot retrieved from printer to a host system.

# Section Organization

The sections in this guide are arranged based on programming topics. A brief description of the sections is listed below.

**Editing Commands** This section describes the commands which are used to manipulate the interpreter and enter programs.

**Running and Debugging** Outlines the control commands used to run and debug programs.

**Base Types and Expressions** Fundamental structure for manipulating strings and computing numeric and boolean values.

**Control and Flow** Commands to conditionally execute code and control the flow of the program

**Input and Output** Outlines how to communicate with the physical ports, internal ports, and network.

**File System** Shows how programs and formats can be saved and recalled

**Events** Explains how to capture and trigger internal events in the printer

**Systems** Contains miscellaneous systems interface functions

**String Functions** Handles string manipulation

**Math Functions** Handles mathematical calculations

**Time and Date Functions** Functions to access the real time clock option

**Set/Get/Do Interface** Functions to directly interface with the Set/Get/Do system

**Example Programs** More examples to give a head start in creating your applications

## Writing ZBI Programs

There are two main ways to develop ZBI programs. The preferred method is to use the ZBI-Developer application. ZBI-Developer allows you to create and test programs before a printer is even turned on. In addition, many features of this program allow for quicker program creation and more meaningful debugging. ZBI-Developer can be downloaded from the Zebra web site.

An alternate method for developing a program is through a direct connection to the printer using a terminal emulation program.

# Editing Commands

This section details the Editing Commands. This section describes the commands which are used to manipulate the interpreter and enter programs. These commands are used while controlling the ZBI environment from a console connection. Here is a quick list of these commands:

**NEW** – Clears out the program and variables currently in memory

**REM and !** – Comment commands

**LIST** – Lists the program currently in memory

**AUTONUM** – Automatically generates the next line number

**RENUM** – Renumbers the program currently in memory

**ECHO** – Controls whether characters received on the console are echoed back

If you are using ZBI-Developer, the commands that will be most useful are AUTONUM and REM/!.

The following example shows the use of Editing commands from within a console connection.

**Preview:**

```
NEW
AUTONUM 10,5
10 REM "Hello World" Application
15 PRINT "Hello World" ! comment...
20

LIST
10 REM "Hello World" Application
15 PRINT "Hello World"

NEW
LIST
```

Entered automatically when AUTONUM is used

A blank line stops AUTONUM

**Preview when viewed in ZBI-Developer**

```
AUTONUM 10,5
REM "Hello World" Application
PRINT "Hello World" ! comment...
```

# NEW

## Description

This command clears the interpreter’s memory, including the line buffer and variables, but not any open ports. Use this command when creating code to restart the coding process or before resending a program from a file to the interpreter.

## Format

```
NEW
```

## Parameters

N/A

**Example •** This is an example of how to use the `NEW` command:

```
10 PRINT "Hello World"
RUN
Hello World

LIST
10 PRINT "Hello World"

NEW
LIST
```

## Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# REM

### Description

A numbered remark line starts with REM and includes text in any form after it. This line is ignored by the interpreter.

### Format

```
REM <comment>
```

### Parameters

The comment string can contain any character and is terminated by a carriage return.

**Example •** This is an example of how to use the REM command:

```
10 REM COMMAND LINES 20-100 PRINT A LABEL
```

### Comments

Remarks are used for program description and are included as a separate program line. To append a comment to the end of a program line, use the exclamation mark (!).

A useful method to keep comments in a stored file (but not in the printer) is to always start the REM line with the number 1. When all of the lines are sent to the printer, only the last REM line will stay resident in the printer. This will require less RAM for large programs.

**Example •** This is an example of how to re-use the REM command:

```
1 REM MYPROGRAM COPYRIGHT ME Inc. 2008
1 REM While debugging a port may be left open
5 CLOSE ALL
1 REM Open the ports this program will use
10 OPEN #0: NAME: "SER" ! Restart the console
```

# ! (EXCLAMATION MARK)

### Description

The exclamation mark is the marker for adding comments to the end of numbered programming lines. Any text following the ! is ignored when the line or command is processed.

### Format

```
!<comment>
```

### Parameters

The comment string can contain any character and is terminated by the carriage return.

**Example** • This is an example of how to use the `!` (comments) command:

```
10 LET A=10 ! Indicates number of labels to print
```

### Comments

None

# LIST

## Description

This command lists the program lines currently in memory.

## Format

```
LIST
LIST <A>
LIST <A>-<B>
```

## Parameters

`default` = lists all lines in memory

<A> = line to start listing the program

<B> = line to stop listing the program. If not specified, only the line at <A> will print.

**Example •** This is an example of how to use the `LIST` command:

```
1 REM MYPROGRAM COPYRIGHT ME Inc. 2008
1 REM While debugging a port may be left open
5 CLOSE ALL
1 rem Open the ports this program will use
10 OPEN #0: NAME: "SER" ! Restart the console
20 PRINT #0: "Hello World"
LIST
1 REM Open the ports this program will use
5 CLOSE ALL
10 OPEN #0: NAME: "SER" ! Restart the console
20 PRINT #0: "Hello World"

LIST 1
1 REM Open the ports this program will use

LIST 5-10
5 CLOSE ALL
10 OPEN #0: NAME: "SER" ! Restart the console
```

## Comments

The output of the `LIST` command may not match exactly what was entered. It is based on how the program lines are stored in memory. Notice that the last comment line the REM is entered in lower case characters. When it is listed, the REM is displayed in uppercase.

This is an interactive command that takes effect as soon as it is received by the printer.

# AUTONUM

## Description

This command automatically generates sequential program line numbers.

## Format

```
AUTONUM <A>,<B>
```

## Parameters

A = the number used to start the auto-numbering sequence

B = the automatic increment between the new line numbers

**Example •** This example shows specifying the starting line number in the increment between new line number. Type the following at the prompt:

```
AUTONUM 10,5
SUB START
PRINT "HELLO WORLD"
GOTO START

LIST
```

Will produce:

```
AUTONUM 10,5
10 SUB START
15 PRINT "HELLO WORLD"
20 GOTO START
```

The three lines are automatically started with the `AUTONUM` parameters; in this case, the first line starts with 10 and each subsequent line increments by 5.

## Comments

This feature is disabled by overwriting the current line number and entering the desired interactive mode commands, or leaving the line blank.

Use of the `SUB` command allows for `GOTO` and `GOSUB` statements that do not require line numbers in your program.

This is an interactive command that takes effect as soon as it is received by the printer.

# RENUM

### Description

This command renumbers the lines of the program being edited. RENUM can reorganize code when line numbers become over- or under-spaced. The line references following GOTO and GOSUB statements are renumbered if they are constant numeric values. Renumbering does not occur if the line numbers are outside of the range limits of 1 to 10000.

### Format

```
RENUM <A>,<B>
```

### Parameters

<A> = the number to start the renumbering sequence

<B> = the automatic increment between the new line numbers

**Example** • This is an example of how to use the RENUM command:

```
LIST
13 LET A=6
15 LET B=10
17 GOTO 13
RENUM 10,5
LIST
10 LET A=6
15 LET B=10
20 GOTO 10
```

**Note** • The target of the GOTO command changes from 13 to 10 to reflect the renumbering.

### Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# ECHO

## Description

When Console Mode is enabled, this command controls whether the printer echoes the characters back to the communications port. If `ECHO ON` is entered, keystroke results return to the screen. If `ECHO OFF` is entered, keystroke results do not return to the screen.

## Format

```
ECHO ON
ECHO OFF
```

## Parameters

`<ON/OFF>` = toggles the ECHO command on or off

## Example

N/A

## Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

# Running and Debugging Commands

The following commands were written before the development of the ZBI-Developer application. With that application, and when using ZBI version 1, the following commands are essentially obsolete. However, for those who started developing ZBI applications before ZBI-Developer, the following reference will be helpful.

**RUN** – Starts executing the program currently in memory at the first line of the program

**CTRL-C** Sends an end-of-transmission character, ETX , to the console to terminate the ZBI program currently running.

**RESTART** – Starts executing the program currently in memory where it was last stopped

**STEP** – Executes one line of the program in memory where it was last stopped

**DEBUG** – This mode controls whether or not the TRACE and BREAK commands are processed

**TRACE** – Shows which lines have been executed and which variables have been changed

**BREAK** – Stops the currently running program

**ADDBREAK** – Adds a break to an existing line

**DELBREAK** – Deletes an existing break

**ZPL** Terminates and exits the ZBI environment.

This example shows many of the Running and Debug Commands in practice.

**Example** • Preview:

ZBI Program

```
10 PRINT "TEN"
20 PRINT "TWENTY"
30 PRINT "THIRTY"
RUN
```

Runs the whole program

```
TEN
TWENTY
THIRTY

STEP
```

Runs one line

```
TEN

RESTART
```

Completes running the program where STEP left off

```
TWENTY
THIRTY

ADDBREAK 20
```

Adds a breakpoint on line 20

```
RUN
TEN
<Program Break> on line: 20
```

Turn Trace On

```
DEBUG ON
TRACE ON
RESTART
<TRACE> 20
TWENTY
<TRACE> 30
THIRTY
```

# RUN

## Description

This command executes the current program, starting with the lowest line number. The interpreter will continue to execute the program lines in order unless a control statement directs the flow to a different point. When a higher line number does not exist or the END command is processed, the `RUN` command will stop.

## Format

```
RUN
```

## Parameters

N/A

**Example** • This is an example of how to use the `RUN` command:

```
10 PRINT "ZBI"
20 PRINT "Programming"
RUN
ZBI
Programming

15 END
RUN
ZBI
```

## Comments

Ports that are open when the application is activated will remain open after the application has terminated. Variables also remain after the application has terminated.

To execute programs when the printer is powered on, use the `^JI` command in the Autoexec.zpl file.

This is an interactive command that takes effect as soon as it is received by the printer.

# CTRL-C

### Description

Sending an end-of-transmission character, ETX (3 in hex), to the console (port 0) terminates the ZBI program currently running.

### Format

N/A

### Parameters

N/A

### Example

N/A

### Comments

In most terminal programs, you terminate the program using the Ctrl-C key sequence. Another method is to store an ETX character in a file and have the terminal program send the file to the console port.

**Note •** It is not recommended to use RESTART after using a CTRL-C because a command may have been prematurely interrupted. Restarting will have an undefined result.

# RESTART

### Description

If a program was halted by a break point or the BREAK command, the RESTART command can be used to reactivate the program at the point it stopped. RESTART functions similar to RUN, except the program attempts to restart from the point where it was last terminated. It also works in conjunction with the STEP command, picking up where the STEP command ended.

### Format

```
RESTART
```

### Parameters

N/A

**Example** • An example of the RESTART command:

```
10 PRINT "TEN"
20 PRINT "TWENTY"
30 PRINT "THIRTY"
RUN
TEN
TWENTY
THIRTY

STEP
TEN

RESTART
TWENTY
THIRTY

ADDBREAK 20
RUN
TEN
<Program Break> on line: 20

DEBUG ON
TRACE ON
RESTART
<TRACE> 20
TWENTY
<TRACE> 30
THIRTY
```

### Comments

If the program has not been run or has finished, RESTART runs the program from the beginning.

This is an interactive command that takes effect as soon as it is received by the printer.

# STEP

### Description

If a program was stopped by a BREAK command, STEP attempts to execute the program one line from where it last ended. If the program has not been run or has been completed, this executes the lowest numbered line.

### Format

```
STEP
```

### Parameters

N/A

**Example •** This is an example of how to use the STEP command:

```
10 PRINT "Hello World"
20 Print "TWENTY"
STEP
Hello World

STEP
TWENTY
```

### Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# DEBUG

### Description

DEBUG enables and disables the TRACE and BREAK commands.

### Format

```
DEBUG ON
DEBUG OFF
```

### Parameters

ON = turns the debug mode on enabling the TRACE and BREAK commands to be processed.

OFF = turns the debug mode off. This disables the TRACE mode and causes BREAK commands to be ignored.

**Example •** See *TRACE* on page 452 and *BREAK* on page 454.

### Comments

This command has no effect on the processing of break points in ZBI-Developer. It is recommended that you avoid using the DEBUG command when writing programs in the ZBI-Developer environment, instead use the Debug capabilities of ZBI-Developer.

# TRACE

### Description

This command enables you to debug an application by outputting the executed line numbers and changed variables to the console.

### Format

```
TRACE ON
TRACE OFF
```

### Parameters

`<ON/OFF>` = controls whether `TRACE` is active (ON) or disabled (OFF).

If `DEBUG` is activated and the `TRACE` command is on, trace details are displayed. When any variables are changed, the new value displays as follows:

```
<TRACE> Variable = New Value
```

Every line processed has its line number printed as follows:

```
<TRACE> Line Number
```

**Example •** An example of TRACE command in use:

```
10 LET A=5
20 GOTO 40
30 PRINT "Error"
40 PRINT A
DEBUG ON
TRACE ON
RUN
<TRACE> 10
<TRACE> A=5
<TRACE> 20
<TRACE> 40
5
```

**Example** • An example of TRACE used as a program command

```
10 FOR I = 1 TO 100
20 IF (I = 50) THEN
25 TRACE ON
30 LET I = 75
35 TRACE OFF
40 END IF
50 NEXT I
DEBUG ON
TRACE OFF
RUN
<TRACE> 30
<TRACE> I=75
<TRACE> 35
```

## Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

It is recommended that you avoid using the `TRACE` command when writing programs in the ZBI-Developer environment, instead use the Debug capabilities of ZBI-Developer.

# BREAK

### Description

This command allows you to stop the program when the program reaches this line.

### Format

```
BREAK
```

### Parameters

N/A

**Example •** An example of BREAK command in use:

```
10 LET A=5
20 BREAK
30 PRINT A
DEBUG ON
TRACE ON
RUN
<TRACE> 10
<TRACE> A=5
<TRACE> 20
<USER BREAK>
```

### Comments

This command is available only when the `DEBUG` function has been activated. When `DEBUG` is on, `BREAK` halts processing. `RUN` starts the program from the beginning. `RESTART` allows the program to continue from where it left off.

When using ZBI-Developer, this command will interfere with the debugging operations built into the application.

This is a program command that must be preceded by a line number.

# ADDBREAK

### Description

This command allows you to stop the program when the program reaches a specified line.

### Format

```
ADDBREAK <A>
```

### Parameters

A = the line number to break on. If the number specified is not in the program, the program will not break.

**Example •** An example of the ADDBREAK command.

```
10 LET A=5
20 PRINT A
ADDBREAK 20
RUN
<PROGRAM BREAK> ON LINE:20

RESTART
5
```

### Comments

This command is available only when the DEBUG function has been activated. When DEBUG is on, BREAK halts processing. RUN starts the program from the beginning. RESTART allows the program to continue from where it left off.

This is the command used internally by ZBI-Developer when the user right-clicks over a program line and adds a Breakpoint via the "Toggle Breakpoint" selection.

It is the recommended method for setting breakpoints in ZBI.

A maximum of 16 breakpoints can be set in an application.

This is an interactive command that takes effect as soon as it is received by the printer.

# DELBREAK

## Description

This command allows you to remove existing breakpoints.

## Format

```
DELBREAK <A>
```

## Parameters

A = the line number from which to remove the break. If 0 is specified, all break points will be removed. If the number specified is not a breakpoint, the command will have no effect.

**Example •** An example of the DELBREAK command:

```
10 LET A=5
20 PRINT A
ADDBREAK 20
DEBUG ON
TRACE ON
RUN
<TRACE> 10
<TRACE> A=5
<PROGRAM BREAK> ON LINE:20

RESTART
<TRACE> 20
5

DELBREAK 20
RUN
<TRACE> 10
<TRACE> A=5
<TRACE> 20
5
```

### Comments

This command is available only when the DEBUG function has been activated. When DEBUG is on, BREAK halts processing, RUN starts the program from the beginning, and RESTART allows the program to continue where it left off.

This is the command used internally by ZBI-Developer when the user right-clicks over a program line and removes a Breakpoint via the "Toggle Breakpoint" selection.

A maximum of 16 breakpoints can be set in an application.

This is an interactive command that takes effect as soon as it is received by the printer.

# ZPL

### Description

This command terminates and exits the ZBI environment.

### Format

```
ZPL
```

### Parameters

N/A

**Example** • An example of the ZPL command.

```
ZPL
ZBI TERMINATED
```

### Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# Base Types and Expressions

There are two base types in the ZBI language. These types are Integers and Strings. Integers are whole numbers that contain no fractional part. The range of values for integers is:

-2,147,483,648 to +2,147,483,647

Strings are character arrays. The string length is only limited by the amount of memory in the system (version 2.0 and higher). Each character can have a value between 0 and 255 (version 2.0 and higher).

The use of control characters (0-31) may be difficult to debug based on the handling of control characters in different communications programs. In addition the ETX (3) will terminate a ZBI application when it is received on the console port. Use the CHR$ function when control characters must be placed into strings.

**Note •** In ZBI version 1.4 and lower, there was a string length limit of 255 characters.

## Variable Names

To distinguish strings from integers, string variable names must end in a $. Variable names must start with a letter and can include any sequence of letters, digits, and underscores. Function and command names must not be used as a variable name. Variable names are not case sensitive and are converted to uppercase by the interpreter.

A common mistake is to use a command or function name as a variable. To avoid using these reserved words, ZBI-Developer can be a useful resource. Reserved words are highlighted making it easier to spot this occurrence and thus, saving debugging time.

### Valid variable names:

I, J, K, VARNAME, VARSTR$, MYSTR$,MY_STR9$

### Invalid Names:

STR$ = Reserved word

ORD = Reserved word

VAL = Reserved word

W# = Invalid character (# )

9THSTR = Variable can not start with a number

## Variable Declarations

ZBI will allow storage of up to 255 variables. If more variables are needed, consider using arrays to store data. The base array will take up one of the 255 variable slots, but it can be declared to allow for many indices.

Variables can be declared explicitly or implicitly. If a variable has not been used before, it will be declared when used. The default value for an integer will be zero and the default value of a string will be an empty string.

**Explicit:**

```
DECLARE INTEGER  <variable_name>
DECLARE STRING  <variable_name$>
```

If the variable existed before the DECLARE statement, it will be defaulted.

**Implicit:**

```
LET <variable_name> = INTEGER EXPRESSION
LET <variable_name$> = STRING EXPRESSION
```

The Interpreter is limited to 255 variables. If more variables are required, consider using arrays.

## Constants

Integers are represented simply by numbers, such as 5, -10, 10000. Do not use commas in integer constants. Strings are enclosed by parenthesis. If a parenthesis is required in the string, use a double parenthesis, such as “Look here->””<-“ would result in the string – Look here->”<-.

## Arrays

An array is a collection of string or integer values used by a program. Array indices are accessed through parentheses. Array indices start at 1 and end at the length of an array (for example, MyArray(3) returns the value in the third location of the variable array). One- and two-dimensional arrays are allowed. Two-dimensional arrays are referenced with two indices in parentheses, separated by a comma.

Arrays must be allocated through the use of the `DECLARE` command. Arrays can be re-dimensioned by using `DECLARE`, however, this will replace the original array.

Array size is limited only by the size of the memory available.

### Format

```
DECLARE STRING <ARRAYNAME$>(<SIZE>)

DECLARE STRING <ARRAYNAME$>(<ROWS>,<COLUMNS>)

DECLARE NUMERIC <ARRAYNAME>(<SIZE>)

DECLARE NUMERIC <ARRAYNAME>(<ROWS>,<COLUMNS>)
```

### Parameters

```
<SIZE> = number of entries in a single dimension array
<ROWS> = number of rows in a two dimensional array
<COLUMNS> = number of columns in a two dimensional array
```

**Example** • An example of ARRAY code is:

```
10 DECLARE STRING INARRAY$(3)
20 FOR I = 1 TO 3
30 PRINT "Name "; I; ": ";
40 INPUT INARRAY$(I)
50 NEXT I
60 PRINT INARRAY$(1); ", "; INARRAY$(2); ", and ";
INARRAY$(3);
70 PRINT " went to the park"
RUN
Name 1: Jim
Name 2: Jose
Name 3: Jack
Jim, Jose, and Jack went to the park
```

### Comments

If you attempt to access an array outside of its allocated bounds, an error will occur.

## Assignment

All lines must start with a command. In order to assign a value to a variable, use the LET command. Multiple variables can be placed before the =. The variable types must match the expression type.

The right side of the assignment is always calculated completely before the assignment is made. This allows a variable to be the target and source of the assignment.

When a value is assigned to a string variable with a sub-string qualifier, it replaces the value of the sub-string qualifier. The length of the value of the string variable may change as a result of this replacement.

**Example** • An `ASSIGNMENT` example:

```
10 LET A=5
20 LET B$="HELLO"
30 LET B$(5:5)=B$
```

## Numeric Expressions

A base numerical expression can be either a constant, variable, or another numerical expression enclosed in parentheses. The five types used (addition, subtraction, multiplication, division, and exponentiation) are listed below. When evaluating an expression exceeding the maximum or minimum values at any point creates an undefined result. (maximum value: 2,147,487,647; minimum value: -2,147,483,648)

Floating point is not supported.

When using division, the number is always rounded down. For example, 5/2=2. Use `MOD` to determine the remainder.

### Format

1. `+` (addition) Addition expressions use this format:

   ```
   <A>+<B>
   5+2 result = 7
   VAL ("25") +2 result =27
   ```

2. – (subtraction) Subtraction expressions use this format:

   ```
   <A>-<B>
   5-2 result = 3
   VAL ("25") -2 result =23
   ```

3. `*` (multiplication) Multiplication expressions use this format:

   ```
   <A>*<B>
   5*2 result = 10
   VAL ("25") *2 result =50
   ```

4. `/` (division) Division expressions use this format:

   ```
   <A>/<B>
   5/2 result = 2
   VAL ("25") /2 result =12
   ```

5. `^` (exponentiation) Exponentiation expressions use this format:

   ```
   <A>^<B>
   5^2 result = 25
   VAL ("25") ^2 result =625
   ```

## Order of Precedence

In mathematics, the order of precedence describes the sequence that items in an expression are processed. All expressions have a predefined order of precedence.

The order of precedence is listed below:

| |
|---|
| Functions |
| Parenthetical Expressions () |
| ^ |
| * and / |
| + and - |

The * and / have the same precedence, and the + and - have the same precedence. Items with the same order of precedence are processed from left to right.

For example, this expression 5+(8+2)/5 is processed as 8+2=10, followed by 10/5=2, then 5+2 to give a result of 7.

Functions and parenthetical expressions always have the highest order of precedence, meaning that they are processed first.

## String Concatenation (&)

The basic string expression may be either a constant or a variable, and concatenation (&) is supported. Using the concatenation operator (&) adds the second string to the first string.

```
<A$> & <B$>
```

**Example •** This is an example of how to use the STRING CONCATENATION (&) command:

```
10 LET A$= "ZBI-"
20 LET B$= "Programming"
30 LET C$= A$ & B$
40 PRINT C$
RUN
ZBI-Programming
```

## Sub-strings

### Description

Using a sub-string operator on a string allows a specific portion of the string to be accessed. This portion may be the target of an assignment operation or a reference to a portion of the string. To determine the coordinates of the string portion to be used, count the characters from the beginning to the end of the string, including spaces.

### Format

```
LET <STRVAR$>(<A>:<B>)=<C$>
LET <C$> = <STRVAR$>(<A>:<B>)
```

### Parameters

<A> = the position of the first character in the desired string

<B> = the position of the last character in the desired string.

<STRVAR$> = base string variable

If the A parameter is less than 1, it is automatically assigned a value of 1. Because the string is calculated starting with 1, the A parameter cannot be less than 1.

If B is greater than the length of the string, it is replaced with the length of the string.

If A is greater than B, a NULL string (""), which points to the location of the smaller of A or the end of the string, is returned. This is used when adding a string in the middle of another string without removing a character.

**Example** • This is an example of a sub-string reference:

```
LET A$="Zebra Quality Printers"
LET B$=A$(1:13)
PRINT B$
Zebra Quality
```

**Example** • This is an example of a sub-string assignment.

```
LET A$= "1234"
LET A$(2:3)= "55" ! A$ NOW = 1554
LET A$(2:3)= "" ! A$ NOW = 14

LET A$= "1234"
LET A$(2:3)= A$(1:2) ! A$ NOW = 1124

LET A$= "1234"
LET A$(2:1)= "5" ! A$ NOW = 15234
```

The best way to think of assignment to a sub-string is as follows: an assignment is like selecting a word, and pasting over the selection with the new string.

## Boolean Expressions

### Description

A Boolean expression holds 0 (zero) as false and non-zero as true.

### Formats

```
<STRING EXPRESSION> <BOOLEAN COMPARE> <STRING EXPRESSION>
<NUMERIC EXPRESSION> <BOOLEAN COMPARE> <NUMERIC EXPRESSION>
NOT(<BOOLEAN EXPRESSION>)
```

### Parameters

`<STRING EXPRESSION>` = a string variable, string constant or any combination with concatenation

`<NUMERIC EXPRESSION>` = any mathematical operation

### Comments

A numeric expression cannot be compared to a string expression.

Numeric expressions can substitute a Boolean expression where a value of 0 (zero) represents false and a non-zero value represents true.

Base Boolean expressions:

1. < (less than)

| Expression | Result |
|---|---|
| 1< 2 | true |
| 2<2 | false |
| 2<1 | false |

2. <= (less than or equal to)

| Expression | Result |
|---|---|
| 1<=2 | true |
| 2<=2 | true |
| 2<=1 | false |

3. > (greater than)

| Expression | Result |
|---|---|
| 1> 2 | false |
| 2>2 | false |
| 2>1 | true |

4. >= (greater than or equal to)

| Expression | Result |
|---|---|
| 1>=2 | false |
| 2>=2 | true |
| 2>=1 | true |

5. = (equal to)

| Expression | Result |
|---|---|
| 1=2 | false |
| 2=2 | true |
| "A"="AA" | false |
| "A"="A" | true |

6. <> (not equal to)

| Expression | Result |
|---|---|
| 1<>2 | true |
| 2<>2 | false |
| "A"<>"AA" | true |
| "A"<>"A" | false |

## Combined Boolean Expressions

AND, OR, and NOT can be used in conjunction with base Boolean expressions to recreate expanded Boolean expressions.

1. NOT — Negate the target expression.

| Expression | Result |
|---|---|
| NOT 1=2 | true |
| NOT 1=1 | false |

2. AND — Both expressions must be true for a true result.

| Expression | Result |
|---|---|
| 1=2 AND 1=2 | false |
| 2=2 AND 1=2 | false |
| 1=2 AND 2=2 | false |
| 2=2 AND 2=2 | true |

3. OR — If either expression is true, the result will be true.

| Expression | Result |
|---|---|
| 1=2 OR 1=2 | false |
| 1=2 OR 2=2 | true |
| 2=2 OR 1=2 | true |
| 2=2 OR 2=2 | true |

### Order of Precedence

The order of precedence is listed below:

| |
|---|
| Expressions and Functions |
| Parenthetical expressions () |
| <, <=, <>, =, =>, > |
| NOT, AND, OR |

# Control and Flow

This section outlines the commands to conditionally execute code and control the flow of the program. Here is a quick list of these commands:

**IF Statements** Executes or skips a sequence of statements, depending on the value of a Boolean expression.

**DO Loops** Repeats instructions based on the results of a comparison.

**FOR Loops** A control flow statement which allows code to be executed iteratively.

**GOTO/GOSUB** Causes an unconditional jump or transfer of control from one point in a program to another.

**SUB** Allows you to "substitute" names instead of actual line numbers as the target of `GOSUB`s and `GOTO`s.

**EXIT** Used to exit the `DO` and `FOR` loops.

**END** Terminates any program currently running.

# IF Statements

### Description

If the value of the <Boolean expression> in an IF statement is true and a program line follows the keyword THEN, this program line is executed. If the value of the Boolean expression is false and a program line follows the keyword ELSE, this program line is executed. If ELSE is not present, then execution continues in sequence, with the line following the END IF statement.

Nesting of blocks is permitted, subject to the same nesting constraints as DO-LOOPs (no overlapping blocks).

ELSE IF statements are treated as an ELSE line followed by an IF line, with the exception that the ELSE IF shares the END IF line of the original IF statement.

### Format

```
IF <Boolean expression> THEN
~~BODY~~
[ELSE IF <Boolean expression> THEN
~~BODY~~]*
[ELSE
~~BODY~~]
END IF
```

### Parameters

N/A

**Example** • This is an example of how to use the IF statement command:

```
10 IF A$="0" THEN
20 PRINT "ZBI IS FUN"
30 ELSE IF A$="1" THEN
40 PRINT "ZBI IS EASY"
50 ELSE IF TIME=1 THEN
60 PRINT "It is one second past midnight"
70 ELSE
80 PRINT "X=0"
90 END IF
```

# DO Loops

### Description

Processing of the loop is controlled by a `<WHILE/UNTIL>` expression located on the `DO` or `LOOP` line.

Processing a `WHILE` statement is the same on either the `DO` or `LOOP` lines. The Boolean expression is evaluated and if the statement is true, the `LOOP` continues at the line after the `DO` statement. Otherwise, the line after the corresponding `LOOP` is the next line to be processed.

Processing an `UNTIL` statement is the same on either the `DO` or `LOOP` lines. The Boolean expression is evaluated and if the statement is false, the `LOOP` continues at the line after the `DO` statement. Otherwise, the line after the corresponding `LOOP` is the next to be processed.

If `<WHILE/UNTIL>` is on the `LOOP` line, the `BODY` of the loop is executed before the Boolean expression is evaluated.

If neither the `DO` or `LOOP` line has a `<WHILE/UNTIL>` statement, the loop continues indefinitely.

Some notes about `DO-LOOP`s:

- can be nested
- cannot overlap
- have two formats

### Format

```
DO [<WHILE/UNTIL> <Boolean expression>]
~~BODY~~
LOOP [<WHILE/UNTIL> <Boolean expression>]
```

**Example •** This is an example of how to use the `DO-LOOP` command with the conditional on the DO line:

```
10 DO WHILE A$="70"
20 INPUT A$
30 LOOP
```

**Example •** This is an example of how to use the `DO UNTIL LOOP` command with conditional on the LOOP line:

```
10 DO
20 INPUT A$
30 LOOP UNTIL A$="EXIT"
```

### Comments

This is a program command that is preceded by a line number.

# FOR Loops

### Description

FOR loops are an easy way to iterate through a range of values and run a body of code for each value iterated.

### Format

```
FOR <I> = <A> TO <B> [STEP <C>]
~~BODY~~
NEXT <I>
```

### Parameters

<I> = indicates a numeric variable is used. <I> increments each time through the FOR-LOOP.

<A> = the value assigned to <I> the first time through the loop

<B> = the last value through the loop

<C> = (Optional) the amount <I> increments each time through the loop

Values of I for the following situations:

| Statement | Result |
|---|---|
| FOR I=1 TO 10 | {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} |
| FOR I=10 TO 1 | {10, 9, 8, 7, 6, 5, 4, 3, 2, 1} |
| FOR I=1 TO 10 STEP 2 | {1, 3, 5, 7, 9} |
| FOR I=10 TO 1 STEP 2 | {10, 8, 6, 4, 2} |
| FOR I=10 TO 1 STEP 2 | { } FOR LOOP skipped |

**Example •** This is an example of how to use the FOR LOOP command:

```
10 FOR X=1 TO 10 STEP 1
20 PRINT X; ":ZBI IS FUN"
30 NEXT X
```

### Comments

FOR loops can be nested but cannot overlap. Variables cannot be reused by the nested loops.

# GOTO/GOSUB

### Description

GOSUB is followed by a line number. The program will attempt to process the line the GOSUB command points to rather than the next line of the program. Upon executing the GOSUB statement, the interpreter continues running at the line number specified following GOSUB. If the line number referenced does not exist, an error will occur.

Before executing the next line, the GOSUB command stores the line number of the GOSUB line. When the RETURN statement is called, the program moves back to the next line following the GOSUB.

Executing a RETURN statement without a corresponding GOSUB statement causes an error.

GOSUB statements can be nested.

GOTO works the same way as GOSUB except that no return address will be stored.

### Format

```
GOSUB <A>
RETURN
GOTO <A>
```

### Parameters

<A> = the program location executed immediately after the GOTO or GOSUB.

**Example** • This is an example of how to use the GOSUB command:

```
10 PRINT "Call Subroutine"
20 GOSUB 1000
30 PRINT "Returned from Subroutine"
40 END
1000 PRINT "In Subroutine"
1010 RETURN
```

**Example** • This is an example of how to use the GOTO command:

```
10 PRINT "Prepare to Jump!"
20 GOTO 1000
30 PRINT "Jump Missed..."
1000 PRINT "Jump Successful"
1010 END
```

### Comments

These are program commands and must be preceded by line numbers.

# SUB

## Description

This command allows you to use names instead of actual line numbers as the target of GOSUBs and GOTOs. AUTONUM can be used at the beginning of a file and there is no need to compute the line number where the jump will go.

## Format

```
10 SUB <A>
```

## Parameters

<A> = the integer variable to use as a target for the GOTO/GOSUB

**Example •** This is an example of how to use the SUB  command:

```
AUTONUM 1,1
GOSUB INITCOMM
DO
GOSUB GETINPUT
GOSUB PROCESSINPUT
LOOP
SUB INITCOMM
OPEN #1:NAME "SER"
RETURN
SUB GETINPUT
INPUT #1: A$
RETURN
SUB PROCESSINPUT
PRINT A$
RETURN
```

## Comments

<A> is a numeric variable. If this variable is changed in the program, any GOSUB/GOTO to this variable may fail.

# EXIT

## Description

This command is used to exit the DO and FOR loops.

## Format

```
EXIT DO
EXIT FOR
```

## Parameters

The specified loop type is exited. For the DO command, the program will continue execution on the line following the next LOOP. Likewise for the FOR command, the program will continue on the line after the next NEXT command.

## Example

N/A

## Comments

This is a program command that is preceded by a line number. To be explicit and reduce errors, it is recommended to use GOTO instead of EXIT.

# END

### Description

The END command terminates any program currently running. When the END command is received, the interpreter returns to interpreting commands (>).

### Format

```
END
```

### Parameters

N/A

**Example •** This is an example of how to use the END command:

```
10 PRINT "THIS PROGRAM WILL TERMINATE"
20 PRINT "WHEN THE END COMMAND IS RECEIVED"
30 END
40 PRINT "THIS SHOULD NOT PRINT"
RUN
THIS PROGRAM WILL TERMINATE
WHEN THE END COMMAND IS RECEIVED
```

### Comments

This is a program command and is preceded by a line number.

# Input and Output

This section oulines how to communicate with physical ports, internal ports, and the network.

ZBI allows access to the physical and network connections in the printer. Most ports are, by default, connected to the ZPL processor. When a port is opened in ZBI, the port will be disconnected from ZPL and connected into the interpreter. Depending on the type of connection, there are two methods you may use to start the connection. For the static connections, the `OPEN` command should be used. These are the connections that you open when starting your program and leave open for the duration of your program. For dynamic connections, servers and clients are set up following the "Sockets" model. On servers, the actual connections are started upon successful calls to `ACCEPT`. Below are the available connections that can be made and the preferred accessors.

## Available Ports

| Port/Connection | ZBI Name | Preferred Access Commands/Functions |
|---|---|---|
| Serial | "SER" | OPEN, CLOSE |
| Parallel | "PAR" | OPEN, CLOSE |
| USB | "USB" | OPEN, CLOSE |
| ZPL parser | "ZPL" | OPEN, CLOSE |
| TCP Server | "TCP", "TCPX" | SERVERSOCKET, SERVERCLOSE, ACCEPT, CLOSE |
| TCP Client | "TCP" | CLIENTSOCKET, CLOSE |
| UDP Server | "UDP" | SERVERSOCKET, SERVERCLOSE, ACCEPT, CLOSE |
| UDP Client | "UDP" | CLIENTSOCKET, CLOSE |
| Email Sender | "EML" | OPEN, CLOSE |
| Generic Network (Incoming TCP, FTP, and E-mail) | "PSR" | OPEN, CLOSE |
| Note: TCPx will not work on PS2 or PS100 print servers. | | |

## Creating Connections

Here is a quick list of the commands in this section:

**OPEN** Opens a port for transmitting and receiving data.

**CLOSE** Closes specific ports that are in use.

**DATAREADY** Determines if there is data received on a specified port.

**SERVERSOCKET** Opens a listening socket for incoming UDP packets or TCP connections.

**CLIENTSOCKET** Creates an outgoing TCP connection or sets up UDP transmissions.

**ACCEPT** Accepts incoming TCP or UDP connections and assigns a channel for the connection.

# OPEN

### Description

This command is used to open a port for transmitting and receiving data.

### Format

```
OPEN #<CHANNEL>: NAME <PORT$>
```

### Parameters

`<CHANNEL>` = a number to use as a handle to the port for all future communications

*Accepted Values:* 0 to 9

*Default Value:* a port must be specified

`<PORT$> =` port name to open. See *Available Ports* on page 478.

**Example •** This is an example of how to use the `OPEN` command:

```
10 OPEN #1: NAME "ZPL"
```

The port being opened no longer allows data to pass directly into its buffer, it disconnects, and the interpreter now controls the data flow.

Data already in the buffer stays in the buffer.

### Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

# CLOSE

## Description

This command is implemented to close specific ports that are in use. If a port is open on a channel and the `CLOSE` command is entered, the port closes and returns to communicating with the ZPL buffer.

## Format

```
CLOSE #<A>
CLOSE ALL
```

## Parameters

`<A>` = Numeric value of part to close

*Accepted Values:* 0 through 9

`All` = closes all open ports and network connections

**Note •** `CLOSE ALL` will close the console.

**Example •** This example shows the closing of channel 1:

```
10 CLOSE #1
```

## Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

# DATAREADY

### Description

This function is used to determine if there is data received on a specified port.

### Format

```
DATAREADY (A)
```

### Parameters

A = the port to check

### Returns

1 if there is data, 0 if there is no data.

**Example •** This is an example of how to check if there is a data on a port:

```
10 PRINT DATAREADY(0)
RUN
```

The result, assuming no data is waiting, is:

```
0
```

### Comments

If this command follows the `INPUT` command, it may return 1 if the line received was ended with a CRLF. In this case, `INBYTE` can be used to take the LF out of the buffer.

# SERVERSOCKET

ZBI 2.0↑

## Description

This function opens a listening socket for incoming UDP packets or TCP connections. It must be used in conjunction with the `ACCEPT` function.

## Format

```
SERVERSOCKET (TYPE$,PORT)
```

## Parameters

`TYPE$` = listens for any of the following communication protocols:

- `"TCP"` = TCP must be 9100
- `"TCPX"` = TCP – any open port
- `"UDP"` = UDP – any open port

## Returns

`NUMERIC` = returns the handle of the server upon success.

**Example •** See the examples for *TCP Server* on page 499 and *UDP Server* on page 501.

## Comments

When using `TCPX`, care needs to be taken not to use a port that is already open on the printer. No error message will be returned until the `ACCEPT` function is called.

# CLIENTSOCKET

ZBI 2.0↑

### Description

This function creates an outgoing TCP connection or sets up UDP transmissions. Once set up for UDP, packets can be sent by printing to the socket. Packets are sent when the size limit is met or a EOT character is written.

### Format

```
CLIENTSOCKET (TYPE$, IPADDR$, PORT)
```

### Parameters

TYPE$ = set to "UDP" or "TCP".

IPADDR$ = connects to this address.

PORT = connects to this IP port.

### Returns

The port number assigned to the connection.

**Example** • See the examples for *TCP Server* on page 499 and *UDP Server* on page 501.

### Comments

Multiple communications connections can be made up to the maximum of 10. Each protocol may have a different limit based on the support of the print server used. Test the worst case situation based on your application’s needs or use ONERROR to recover from failed connection attempts.

# ACCEPT

ZBI 2.0↑

## Description

This function will accept incoming TCP or UDP connections and assign a channel for the connection. SERVERSOCKET must be used to set up the listening socket before ACCEPT can be used.

## Format

```
ACCEPT (SERVER, CLIENT_INFO$)
```

## Parameters

SERVER = the handle returned by the SERVERSOCKET call.

CLIENT_INFO$ = string variable will have the connecting client’s IP address and port separated by a space when using UDP.

## Returns

The channel number to use to communicate with the client.

**Example •** See the examples for *TCP Server* on page 499 and *UDP Server* on page 501.

## Comments

It is best to poll this function at regular intervals. When there is no connection waiting, this function will trigger an error. Follow this function with the ON ERROR command to divert to a section of code that handles an unsuccessful connection.

ACCEPT can be called before closing a previous connection. This allows for processing multiple incoming streams of data. There are limits on the number of simultaneous incoming connections based on the print server model on the printer.

Connection closure can be detected when any input or output command to the port triggers an error. These commands should be followed by an ON ERROR statement to send the program into a recovery state and to shutdown the connection cleanly.

## Reading and Writing

This manual has detailed various functions to read and write to all of the ports. The following section gives an overview of the commands, functions, and when each should be used.

To start, it is important to understand the term "blocking". In communications code, a function or command is "blocking" if it waits for all of the requested data to be received before it returns.

**INPUT (blocking)** Reads one line into each string specified.

**PRINT (blocking)** Simple method to write specified expressions out.

**OUTBYTE (blocking)** Writes one byte out.

**INBYTE (blocking)** Reads in one byte.

**READ (non-blocking)** Reads in all available data up to the maximum amount specified.

**WRITE (non-blocking)** Writes out as much data as possible up to a maximum specified amount.

**SEARCHTO$ (blocking)** Reads in data (does not keep) until a search parameter is found. Non-matching data can be redirected to another port.

# INPUT

## Description

If the variable is numeric and the value entered cannot be converted to a number, it writes as 0. This operation scans the data from left to right, shifting any number into the variable. It ignores any non-numeric character except the return character, which terminates the input, or Ctrl-C (`^C`) which terminates the program. The variable can be in string or numeric form.

## Format

```
INPUT [<CHANNEL>:] <A$> [,<B$>]*
INPUT [<CHANNEL>:] <A>[,<B>]*
```

If the `[<channel>:]` is omitted, the default port, 0, will be used.

## Parameters

`<CHANNEL>` = read data from this port. Default = 0.

`<A,B,...,N>` = variables to write.

When using multiple variables as targets, a corresponding number of lines are read. String and numeric variables can be intermixed.

**Example •** This is an example of how to use the `INPUT` command:

```
10 OPEN #1: NAME "ZPL"
20 PRINT #1: "~HS"
30 FOR I = 1 TO 3
40 INPUT #1: A$
50 PRINT A$
60 NEXT I
```

In this example, a host status prints to the console after submitting the host status request `~HS` to the ZPL port.

The Input/Output command of the ZBI interpreter is limited to the communications ports. File I/O is not supported.

`INPUT` ends processing a line with a `CR` or `LF`. This leads to a tricky situation. There are many ways different systems end a line: `CR`, `CRLF`, `LF`. If the ZBI program only uses `INPUT`, the next execution of the `INPUT` command will remove the extra `LF` or `CR`, in case of `LFCR`. However, if the program instead uses `INBYTE`, `DATAREADY` or the other commands, the extra `LF` will show up on the port. Here's a simple workaround to explicitly look for the `CRLF` that is in use:

```
SEARCHTO(<PORT>,CHR$(13)&CHR$(10),<INSTRING$>)
```

**Note •** The `INPUT` command does not accept control characters or the delete character. If these characters need to be processed, please use the READ command.

### Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

If an invalid port is specified, `Error: Invalid port` is returned.

**Example** • This shows the input command reading in multiple lines.

```
10 INPUT A$,B,C,D$,E$
```

Five lines would be read in: 3 strings and 2 numbers.

# PRINT

## Description

This command sends data to the printer to be printed.

## Format

```
PRINT [CHANNEL:] <expression> [,or; <expression>]* [;]
```

## Parameters

`<CHANNEL>` = write data to this port

`<expression>` = the value to write

The expression can be either a string or a numeric expression.

Using a , to separate expressions adds a space between them.

Using a ; to separate expressions does not put a space between them.

Using a ; at the end of a line ends the print statement without adding a new line (CR/LF).

**Example •** This is an example of how to use the `PRINT` command:

```
10 LET A$ = "This is an example"
20 LET B$ = "of the PRINT Command."
30 PRINT A$, B$ ! adds a space between expressions
40 PRINT A$; B$ ! no space added
RUN
```

The result is:

```
This is an example of the PRINT Command.
This is an exampleof the PRINT Command.
```

## Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

# OUTBYTE

### Description

This command outputs a byte to a port.

### Format

```
OUTBYTE [<CHANNEL>:] <A>
OUTBYTE [<CHANNEL>:] <A$>
```

### Parameters

`<CHANNEL>` = sends the byte to this port. Default = 0.

`<A>` = This is a numeric expression.

*Accepted Values:* 0 through 255. If it is not within that range, it is truncated.

`<A$>` = This is the string expression. The first character is used. In the case of a NULL string, 0 is sent.

**Example** • This is an example of how to use the `OUTBYTE` command:

```
LET A$="Hello"
OUTBYTE A$
```

This would only print the H character to the console.

```
OUTBYTE 4
```

This would print the control character `EOT` to the console. See an ASCII table for a list of the control characters.

### Comments

This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

# INBYTE

### Description

This command forces the interpreter to pause until data is available. Use the DATAREADY function to determine if there is data on the port.

### Format

```
INBYTE [<CHANNEL>:] <A>
INBYTE [<CHANNEL>:] <A$>
```

### Parameters

<CHANNEL> = reads from this port. Default = 0.

<A> = integer value is set to the byte received.

<A$> = A single byte string is created with the byte received.The first character is used. In the case of a NULL string, 0 is sent.

**Example •** This is an example of how to use the INBYTE to create an echo program:

```
10 INBYTE A$ !Takes one byte (char) from port #0
20 PRINT A$ !Prints the character to the console
30 GOTO 10
```

In this example, the interpreter pauses until the data is entered, then continues processing. This command enters all bytes in a string or integer, including control codes.

### Comments

INBYTE will block until a byte is received on the specified port. This can be an interactive command that takes effect as soon as it is received by the printer, or a program command that is preceded by a line number.

# READ

## Description

ZBI 2.0↑

This is a non-blocking input function. It will read in all of the bytes available on the specified port.

## Format

```
READ (<CHANNEL>, <A>, <MAXBYTES>)
```

## Parameters

<CHANNEL> = reads from this port. Default = 0.

<A$> = the string where the data will be placed

<MAXBYTES> = the maximum number of bytes to read

## Returns

The number of bytes read.

**Example** • This is an example of the READ command:

```
1 CLOSE ALL
2 LET INPORT = CLIENTSOCKET("TCP","192.168.0.1",9100)
3 ON ERROR GOTO RECOVERY
4 LET WATERMARK = 5000
5 DO WHILE 1
6 IF LEN(DATA$) < WATERMARK THEN
7 LET BYTESREAD = READ(INPORT,DATA$,500)
8 ON ERROR GOTO RECOVERY
9 END IF
10 IF (LEN(DATA$) > 0) THEN
11 LET BYTES_WRITTEN = WRITE(INPORT,DATA$,LEN(DATA$))
12 ON ERROR GOTO RECOVERY
13 LET DATA$(1,BYTES_WRITTEN) = ""
14 END IF
15 IF BYTESREAD = 0 AND BYTESWRITTEN = 0 THEN
16 SLEEP 1 ! DON'T BOMBARD IF IDLE
17 END IF
18 LOOP
19 SUB RECOVERY
20 CLOSE #INPORT
```

# WRITE

### Description

This is a non-blocking output function. It will write as many bytes as the output buffer can hold.

### Format

```
WRITE (<CHANNEL>, <A>, <BYTES>)
```

### Parameters

`<CHANNEL>` = reads from this port. Default = 0.

`<A$>` = the string to write out.

`<MAXBYTES>` = The number of bytes to write

### Returns

The number of bytes written.

**Example •** This is an example of `WRITE` command:

```
1 CLOSE ALL
2 LET INPORT = CLIENTSOCKET("TCP","192.168.0.1",9100)
3 ON ERROR GOTO RECOVERY
4 LET WATERMARK = 5000
5 DO WHILE 1
6 IF LEN(DATA$) < WATERMARK THEN
7 LET BYTESREAD = READ(INPORT,DATA$,500)
8 ON ERROR GOTO RECOVERY
9 END IF
10 IF (LEN(DATA$) > 0) THEN
11 LET BYTES_WRITTEN = WRITE(INPORT,DATA$,LEN(DATA$))
12 ON ERROR GOTO RECOVERY
13 LET DATA$(1,BYTES_WRITTEN) = ""
14 END IF
15 IF BYTESREAD = 0 AND BYTESWRITTEN = 0 THEN
16 SLEEP 1 ! DON'T BOMBARD IF IDLE
17 END IF
18 LOOP
19 SUB RECOVERY
20 CLOSE #INPORT
```

# SEARCHTO$

### Description

This function performs a search up to a string, which is defined by B$ on port A. The string the search yields is displayed.

### Format

```
SEARCHTO$(A,B$)
SEARCHTO$(A,B$,C)
```

### Parameters

A = port number (0 to 9) to which requested data is sent

B$ = string variable or string array. If B$ is an array, this command searches for all non-null strings in the B$ array.

C = a port in which the input is directed until B$ is found

### Returns

The string found.

**Example** • This example shows how to use SEARCHTO to find a string on a port:

```
10 OPEN #1: NAME "SER"
20 LET A$ = SEARCHTO$(1,"^XA")
30 PRINT "FOUND:", A$
```

**Example** • This example shows how to search for an array of strings:

```
10 OPEN #1: NAME "SER"
20 DECLARE STRING FIND$(3)
30 LET FIND$(1) = "ONE"
40 LET FIND$(2) = "TWO"
50 LET FIND$(3) = "THREE"
60 LET A$ = SEARCHTO$(1,FIND$)
70 PRINT "FOUND:", A$
```

**Example •** This example shows unused data routed to a port

```
10 OPEN #1: NAME "PAR"
20 OPEN #2: NAME "SER"
30 DECLARE STRING FIND$(3)
40 LET FIND$(1) = "ONE"
50 LET FIND$(2) = "TWO"
60 LET FIND$(3) = "THREE"
70 LET A$ = SEARCHTO$(1,FIND$,2)
80 PRINT "FOUND:", A$
```

### Comments

`SEARCHTO` will block (wait) until the search string is found. If you want to be able to run other code while doing something similar, consider using `READ` with `POS`.

## Port Usage Examples

Before diving into the syntax of all the commands, let’s look at some simple applications using the different features of the communications systems in ZBI.

### Physical Ports (Serial, Parallel, USB)

Though the types of devices interacting with the printer's ports may vary greatly, internal to the printer, the ports are all handled in the same way. These ports are opened with the ZBI `OPEN` command and closed with the ZBI `CLOSE` command. When one of these ports is opened, it is disconnected from the ZPL parser and any data in the buffer will be redirected to the ZBI environment.

**Example •** In the following example, "`SER`" could be replaced by "`PAR`" or "`USB`" depending on the application.

```
10 CLOSE ALL
20 LET INPORT = 1
30 OPEN #INPORT: NAME "SER"
40 PRINT #INPORT: "Enter your name:";
50 INPUT #INPORT: YOURNAME$
60 PRINT #INPORT: "You entered: "; YOURNAME$
70 CLOSE #INPORT
```

## ZPL Parser

To make a ZBI program print, it is necessary to create a connection from the program to the ZPL parser on the printer. The connection will function in the same way as a connection to a physical port, except that the connection will not automatically terminate. The ZPL parser in the printer can handle many incoming connections simultaneously. For example, a ZBI program could take control of the serial port and send label formats to the ZPL parser, while the parallel port (unopened by ZBI) could also be used to send label formats directly into the parser.

**Note •** The ZPL parser will lock onto one port once a format is started (via the ^XA command). So, in some cases, is it desirable to start and stop your communications to ZPL in one continuous sequence.

Another use of ZBI is to check printer status, while another application prints to another port.

**Example •** Here is how that can be done:

```
10 OPEN #1: NAME "ZPL"
20 PRINT #1: "~HS"
30 FOR I = 1 TO 3
40 INPUT #1: A$
50 PRINT A$
60 NEXT I
```

## TCP Client

There are two methods for making a TCP connection to another server. The first method uses the `OPEN` command while the second method uses the `CLIENTSOCKET` method.

`CLIENTSOCKET` is the preferred method.

**Example •** The following example demonstrates this method:

```
10 CLOSE ALL
20 LET INPORT = CLIENTSOCKET("TCP","192.168.0.1",9100)
40 LET OUTSTR$ = "REQUESTING SERVER NAME";
50 DO WHILE (LEN(OUTSTR$) > 0)
60 LET BYTES_WRITTEN = WRITE(INPORT,OUTSTR$,LEN(OUTSTR$))
70 ON ERROR GOTO RECOVERY
80 LET OUTSTR$ = OUTSTR$(1+BYTES_WRITTEN:LEN(OUTSTR$))
90 LOOP
100 INPUT #INPORT: YOURNAME$
110 PRINT #INPORT: "Server returned: "; YOURNAME$
120 CLOSE #INPORT
130 SUB RECOVERY
140 END
```

## TCP Server

Setting up a listening server in the printer can be accomplished with the SERVERSOCKET function. To connect to incoming TCP sessions, use the ACCEPT function.

When starting the application, call SERVERSOCKET. This function will create a handle for this listening server. Check for incoming connections at regular intervals with the ACCEPT function. If there are no pending sessions, the ACCEPT function will return with an error. Handle the error using the ON ERROR command and continue looking for other sessions later.

Depending on how the program is set up, it is possible to handle one or more sessions at a time. If the program is configured to allow only one session, the other connections will remain pending until they are shut down by the requesting client or the ZBI program connects them.

**Example** • Here is an example of the SERVERSOCKET and ACCEPT commands:

```
10 CLOSE ALL
20 LET SERVER_HANDLE = SERVERSOCKET("TCPX",19100)
30 REM There are no connections yet we are just listening
for them
40 REM Lets loop until we get a connection
50 SLEEP 1
60 LET INPORT = ACCEPT(SERVER_HANDLE,CLIENT_INFO$)
70 ON ERROR GOTO 50
80 PRINT #INPORT: "You have successfully connected!"
90 PRINT #INPORT: "Login:";
100 INPUT #INPORT: LOGIN$
110 PRINT #INPORT: "Password:";
120 INPUT #INPORT: PASSWORD$
130 REM We will not be nice and reject the connection
130 PRINT #INPORT: "Login failed"
140 CLOSE #INPORT
150 GOTO 60 ! Go look for the next connection
160 END
```

## UDP Client

There are also two methods for making a UDP connection to another server. The first method uses the `OPEN` command, while the second method uses the `CLIENTSOCKET` method. UDP is a one way communication medium, thus, you can only use output commands. Because UDP is connectionless, the output will be queued up until an `EOT` character is written or the maximum packet size is exceeded. Once the `EOT` character is written, the packet is formatted and sent.

With UDP, it is important to be careful about understanding what the network being used will support.

In many cases, there will be a limit to the size of the packet that can be used, typically between 1000 and 1500 bytes, but some networks cut this down into the 500 to 600 byte range. To be safe, keep your packets less than 500 bytes.

UDP does not guarantee transmission. See UDP specifications for more details.

**Example •** Since `CLIENTSOCKET` is the preferred method, an example is shown below.

```
10 CLOSE ALL
20 LET INPORT = CLIENTSOCKET("UDP","192.168.0.1",22222)
30 LET EOT$ = CHR$(4)
40 PRINT #INPORT: "Packet #"; I; EOT$;
50 LET I = I + 1
60 SLEEP 1
70 GOTO 40
```

## UDP Server

Setting up a listening server in the printer can be accomplished with the `SERVERSOCKET` function. Then, to connect to incoming UDP packets, use the function `ACCEPT`. When starting your application, call `SERVERSOCKET`. This function will create a handle for this listening server. Check for incoming packets at a regular interval with the `ACCEPT` function. If there are no pending sessions, the `ACCEPT` function will return with an error. Just handle the error using the `ON ERROR` command and continue looking for other sessions later. You will need to call `ACCEPT` for each incoming packet. When the accept is successful, all of the data will be available. Call `READ` with a `MAX` string size of 2000 and you will have the whole packet in your string. Close the port and wait for the next packet. You can only read in data using a UDP server.

**Example •** Here is an example:

```
10 CLOSE ALL
20 LET ZPLPORT = 1
35 OPEN #ZPLPORT: NAME "ZPL"
40 LET SERVER_HANDLE = SERVERSOCKET("UDP",33333)
50 REM There are no connections yet: listening
60 REM Let’s loop until we get a connection
70 SLEEP 1
80 LET INPORT = ACCEPT(SERVER_HANDLE,CLIENT_INFO$)
90 ON ERROR GOTO 70
100 LET PACKET_SIZE = READ(INPORT,PACKET$,2000)
110 PRINT #ZPLPORT: "^XA^FO100,100^A0N,40,40^FDPACKET FROM:";
115 PRINT #ZPLPORT: CLIENT_INFO$; "^FS"
120 PRINT #ZPLPORT: "^FO100,150^A0N,40,40^FDPACKET SIZE:";
125 PRINT #ZPLPORT: PACKET_SIZE; "^FS"
130 PRINT #ZPLPORT: "^FO100,200^A0N,40,40^FDPACKET DATA:";
135 PRINT #ZPLPORT: PACKET$; "^FS^XZ"
140 CLOSE #INPORT
150 GOTO 60 ! go look for the next connection
160 END
```

## E-mail

ZBI can be used to enhance the printer’s ability to send status via e-mail messages. The process is simple: open the email port "EML", send the recipient list, send the header, and send the body of the message.

The printer can only process a limited number of outgoing email messages at one time. For this reason, error handling should be used when opening the connection to wait for the printer to be ready to send the message. The EOT character is important for delimiting sections of the email message. If it is left out, the message will not be sent properly.

Before the following code will work, the email settings for the print server must be set up. Consult the print server manual to learn how to configure the unit.

**Example •** Here is an example:

```
1 REM EOT$ this is used to denote end of transmission
5 LET EOT$ = CHR$(4)
1 REM Open a connection to the e-mail port and if it errors
1 REM try again until complete
10 OPEN #1: NAME "EML"
15 ON ERROR GOTO 10
1 REM Specify address to send message to then end signal end
1 REM of recipients with EOT$
1 REM To send to multiple addressees separate addressees by
1 REM space
20 PRINT #1: "youraddress@yourdomain.com";EOT$;
1 REM Fill in the message information
30 PRINT #1: "From: HAL"
40 PRINT #1: "To: Dave"
50 PRINT #1: "Subject: A message from HAL"
60 PRINT #1: ""
70 PRINT #1: "Dave, I am sorry I can not let you do that."
80 PRINT #1: i
1 REM Terminate message
90 PRINT #1: "";EOT$
1 REM You must close the port, each open port is only good
1 REM for sending one message
100 CLOSE #1
```

# File System

This section shows how programs and formats can be saved and recalled. Here's a quick list of these commands:

**STORE** Saves the program currently in memory as the specified file name.

**LOAD** Transfers a program file previously stored in the printer's memory and opens it in the ZBI Program Memory.

**DIR** With no filter included, prompts the printer to list all of the ZBI programs residing in all printer memory locations.

**DELETE** Removes a specified file from the printer's memory.

## Runtime Access

The following example is a method to store runtime data in the printer memory. The file system in the printer is limited to writing one file at a time. Since only one component of the printer can have write access to the file system, the ZPL parser is the component with this access. For ZBI to use the ZPL parser as a gateway into printer memory, the ZPL comment command (^FX) is used.

**Example** • Here is an example:

```
AUTONUM 1,1
REM ******* TEST FOR SUBROUTINES **********************
LET ZPLPORT = 1 OPEN #ZPLPORT: NAME "ZPL"
LET SIZE = 5
LET FILENAME$ = "R:TESTSYS.ZPL"
DECLARE STRING DATAIN$(SIZE)
LET DATAIN$(1) = "ONE"
LET DATAIN$(2) = "TWO"
LET DATAIN$(3) = "THREE"
LET DATAIN$(4) = "FOUR"
LET DATAIN$(5) = "FIVE"
GOSUB STOREDATA
GOSUB GETDATA
FOR I = 1 TO SIZE
IF DATAIN$(I) <> DATAOUT$(I) THEN
PRINT #ZPLPORT: "^XA^FO100,100^A0N,50,50^FDERROR:";
PRINT #ZPLPORT: DATAOUT$(I);"^XZ"
END IF
NEXT I
END
REM **** SUBROUTINE STOREDATA **************************
REM INPUT: ZPLPORT, DATAIN$, SIZE, FILENAME$ ***********
SUB STOREDATA
PRINT #ZPLPORT: "^XA^DF" & FILENAME$ & "^FS"
PRINT #ZPLPORT: "^FX"; SIZE; "^FS"
FOR I = 1 TO SIZE
```

```
PRINT #ZPLPORT: "^FX" & DATAIN$(I) & "^FS"
NEXT I
PRINT #ZPLPORT: "^XZ"
RETURN
REM **** SUBROUTINE GETDATA - **************************
REM INPUT: ZPLPORT, FILENAME$ *************************
REM ** OUTPUT: DECLARES AND FILLS DATAOUT$ AND FILLS SIZE
SUB GETDATA
PRINT #ZPLPORT: "^XA^HF" & FILENAME$ & "^XZ"
SLEEP 1
LET RESULT$ = ""
FOR J = 1 TO 25
LET A = READ(ZPLPORT,TEMP$,5000)
LET RESULT$ = RESULT$ & TEMP$
IF POS(RESULT$,"^XZ") <> 0 THEN
EXIT FOR
END IF
SLEEP 1
NEXT J
LET RESULT$(1:POS(RESULT$,"^FX")+2) = ""
LET SIZE = VAL(EXTRACT$(RESULT$,"","^"))
DECLARE STRING DATAOUT$(SIZE)
FOR I = 1 TO SIZE
LET RESULT$(1:POS(RESULT$,"^FX")+2) = ""
LET DATAOUT$(I) = EXTRACT$(RESULT$,"","^")
NEXT I
LET RESULT$ = ""
LET TEMP$ = ""
RETURN
```

# STORE

## Description

This command saves the program currently in memory as the specified file name. The format listed below is used.

## Format

```
STORE <filename$>
```

## Parameters

`<filename$>` = the name of the file to be stored. Drive location and file name must be in quotation marks.

**Example •** This is an example of how to use the `STORE` command:

```
STORE "E:PROGRAM1.BAS"
```

## Comments

For a file name to be valid, it must conform to the 8.3 Rule: each file must have no more than eight characters in the file name and have a three-character extension. Here the extension is always `.BAS` (for example, `MAXIMUM8.BAS`).

This is an interactive command that takes effect as soon as it is received by the printer.

The ZBI-Developer IDE will take care of this for you with the `SEND TO` option on your program.

# LOAD

## Description

This command transfers a program file previously stored in the printer’s memory and opens it in the ZBI Program Memory.

If the program file does not exist, the ZBI Program Memory is cleared and no program is opened.

## Format

```
LOAD <filename$>
```

## Parameters

`<filename$>` = the file name to be loaded into memory. Drive location and file name must be in quotation marks. If the drive location is not specified, all drives will be searched.

**Example •** Here are examples of how to use the `LOAD` command:

```
LOAD "PROGRAM1.BAS"
LOAD "E:PROGRAM1.BAS"
```

## Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# DIR

### Description

This command, with no filter included, prompts the printer to list all of the ZBI programs residing in all printer memory locations.

Including a filter signals the printer to limit the search; including a drive location signals the printer to search in only one location.

Asterisks (*) are used as wild cards. A wild card (*) finds every incidence of a particular request. The example here, `DIR "B:*.BAS"`, signals the printer to search for every file with a `.BAS` extension in B: memory.

### Format

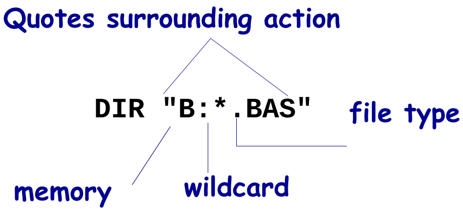
```
DIR [<filter$>]
```

### Parameters

`[<filter$>]` = the name of the file to be accessed (optional). Drive location and file name must be in quotation marks.

Default = `"*:*.bas"`

**Important •** Quotes must be around what you are doing. This shows you how to use the wildcard (`*`) to search for all `.BAS` files in `B:` memory:



### Example

N/A

### Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# DELETE

### Description

This command removes a specified file from the printer’s memory.

### Format

```
DELETE <filename$>
```

### Parameters

`<filename$>` = the name of the file to be deleted. Drive location and filename must be in quotation marks.

**Example •** This is an example of deleting a specified file from printer memory:

```
DELETE "E:PROGRAM1.BAS"
```

### Comments

This is an interactive command that takes effect as soon as it is received by the printer.

# Events

This section explains how to capture and trigger internal events in the printer. Here’s a quick list of these commands:

**Available Events** A table that correlates a ZBI event with an identification number.

**ZBI Key Names** Details the names of each printer’s front panel buttons, ZBI names, and ZBI event ID.

**REGISTEREVENT** Sets up the `HANDLEEVENT` function to receive notification when the specified event has occurred.

**UNREGISTEREVENT** Allows events that are currently set to be captured by the program to no longer be captured.

**HANDLEEVENT** Once events have been registered, this function is used to see what events have occurred.

**TRIGGEREVENT** Allows for front panel buttons to be triggered programatically.

There are certain events in the printer that a ZBI 2.0 program can receive. To do this, the program first registers for the event. On a regular basis, call a function to handle events. When an event occurs that the program is registered for, the function will return the event’s identification number.

## Available Events

| ZBI Event ID | ZBI Event |
|---|---|
| 1 | menu key |
| 2 | pause key |
| 3 | feed key |
| 4 | cancel key |
| 5 | up arrow key |
| 6 | plus key |
| 7 | minus key |
| 8 | enter key |
| 9 | setup exit key |
| 10 | select key |
| 11 | cancel all event |
| 12 | config label |
| 13 | timer1 |
| 14 | timer2 |
| 15 | timer3 |
| 16 | timer4 |
| 17 | timer5 |
| 18 | spare unused |
| 19 | previous key |
| 20 | next save key |
| 21 | calibrate key |
| 22 | paper out set |
| 23 | paper out clear |
| 24 | ribbon out set |
| 25 | ribbon out clear |
| 26 | head too hot set |
| 27 | head too hot clear |
| 28 | head cold set |
| 29 | head cold clear |
| 30 | head open set |
| 31 | head open clear |
| 32 | supply too hot set |
| 33 | supply too hot clear |
| 34 | ribbon in set |
| 35 | ribbon in clear |
| 36 | rewind full set |
| 37 | rewind full clear |
| 38 | cutter jammed set |
| 39 | cutter jammed clear |

| ZBI Event ID | ZBI Event |
|---|---|
| 40 | paused set |
| 41 | paused clear |
| 42 | pq completed set |
| 43 | pq completed clear |
| 44 | label ready set |
| 45 | label ready clear |
| 46 | head element bad set |
| 47 | head element bad clear |
| 48 | basic runtime set |
| 49 | basic runtime clear |
| 50 | basic forced set |
| 51 | basic forced clear |
| 52 | power on set |
| 53 | power on clear |
| 54 | clean printhead set |
| 55 | clean printhead clear |
| 56 | media low set |
| 57 | media low clear |
| 58 | ribbon low set |
| 59 | ribbon low clear |
| 60 | replace head set |
| 61 | replace head clear |
| 62 | battery low set |
| 63 | battery low clear |
| 64 | rfid error set |
| 65 | rfid error clear |
| 66 | any messages set |
| 67 | any messages clear |

## ZBI Key Names

This section details the names to use for each printer's front panel buttons when creating ZBI 2.0 programs to capture the buttons.

### *Xi*III*Plus*/*PAX*4

| Front Panel Key | ZBI Event ID | ZBI Name |
|---|---|---|
| Left Oval | 7 | `minus key` |
| Right Oval | 6 | `plus key` |
| Previous | 19 | `previous key` |
| Next/Save | 20 | `next save key` |
| Setup/Exit | 9 | `setup exit key` |
| Pause | 2 | `pause key` |
| Feed | 3 | `feed key` |
| Cancel | 4 | `cancel key` |
| Calibrate | 21 | `calibrate key` |

### 105*SL*

| Front Panel Key | ZBI Event ID | ZBI Name |
|---|---|---|
| Minus | 7 | `minus key` |
| Plus | 6 | `plus key` |
| Previous | 19 | `previous key` |
| Next/Save | 20 | `next save key` |
| Setup/Exit | 9 | `setup exit key` |
| Pause | 2 | `pause key` |
| Feed | 3 | `feed key` |
| Cancel | 4 | `cancel key` |
| Calibrate | 21 | `calibrate key` |

## ZM400/ZM600/Z4Mplus/Z6Mplus

| Front Panel Key | ZBI Event ID | ZBI Name |
|---|---|---|
| Feed | 3 | `feed key` |
| Pause | 2 | `pause key` |
| Cancel | 4 | `cancel key` |
| Setup/Exit | 9 | `setup exit key` |
| Select | 10 | `select key` |
| Plus (+) | 6 | `plus key` |
| Minus (-) | 7 | `minus key` |

## S4M

| Front Panel Key | ZBI Event ID | ZBI Name |
|---|---|---|
| Menu | 1 | `menu key` |
| Enter | 8 | `enter key` |
| Cancel | 4 | `cancel key` |
| Feed | 3 | `feed key` |
| Pause | 2 | `pause key` |
| Left Arrow | 4 | `cancel key` |
| Right Arrow | 3 | `feed key` |
| Up Arrow | 5 | `up arrow key` |
| Down Arrow | 2 | `pause key` |

# REGISTEREVENT

### Description

This function will set up the `HANDLEEVENT` function to receive notification when the specified event has occurred. Events can be registered for one time or until the program is exited.

**Important •** If an event occurs twice or more before the `HANDLEEVENT` function is called, only one event will be received.

### Format

```
REGISTEREVENT(X)
REGISTEREVENT(X,Y)
REGISTEREVENT(X,Y,Z)
```

### Parameters

`(X)` = This is the ID of the event being registered for.

`(Y)` = If Y=1: the event happens once; If Y=0: the event stays registered for the duration of the program, or until it is unregistered.

`(Z)` = For System Events: if Z=0, the event will still be handled by the printer. If Z=1, then only ZBI will receive the event.

For Timer Events: this is the timer interval in mSec. If the interval is less than 0 or greater than 1,000,000,000, it is set to 1000.

### Returns

The ID of the successfully registered event. If an event was not successfully registered, a -1 is returned.

**Example •** Here is an example of how to use the REGISTEREVENT command:

```
1 REM This example shows how to override the functionality of the feed
1 REM key
1 REM using the event system. After all why waste a label when you
1 REM could put
1 REM valuable information there
AUTONUM 1,1
CLOSE ALL
LET ZPLPORT = 1
OPEN #ZPLPORT: NAME "ZPL"
LET FEEDKEY = 3
LET TMP = REGISTEREVENT(FEEDKEY, 0, 1)
DO WHILE 1 = 1
LET EVT = HANDLEEVENT()
IF EVT = FEEDKEY THEN
GOSUB PRINTINFO
END IF
SLEEP 1
LOOP
REM **** SUBROUTINE PRINTINFO *** expects ZPLPORT *******
SUB PRINTINFO
PRINT #ZPLPORT: "^XA"
PRINT #ZPLPORT: "^FO30,30^A0N,50,50^FDZebra Technologies^FS"
PRINT #ZPLPORT: "^FO30,85^A0N,35,35^FDwww.zebra.com^FS"
PRINT #ZPLPORT: "^FO30,125^A0N,35,35^FDsupport.zebra.com^FS"
PRINT #ZPLPORT: "^FO30,165^A0N,35,35^FDFW Version: "
PRINT #ZPLPORT: GETVAR$("appl.name") & "^FS"
PRINT #ZPLPORT: "^FO30,205^A0N,35,35^FDPrinter Unique ID:"
PRINT #ZPLPORT: GETVAR$("device.unique_id") & "^FS"
PRINT #ZPLPORT: "^FO30,245^A0N,35,35^FDActive Network: "
PRINT #ZPLPORT: GETVAR$("ip.active_network") & "^FS"
PRINT #ZPLPORT: "^FO30,285^A0N,35,35^FDZBI Memory Usage: "
PRINT #ZPLPORT: GETVAR$("zbi.start_info.memory_alloc") & "^FS"
PRINT #ZPLPORT: "^FO30,325^A0N,35,35^FDOdometer: "
PRINT #ZPLPORT: GETVAR$("odometer.total_print_length") & "^FS"
PRINT #ZPLPORT: "^XZ"
```

### Comments

None

# UNREGISTEREVENT

### Description

This function allows events that are currently set to be captured by the program to no longer be captured. Once called events will return to the normal method of processing if the REGISTEREVENT function Z parameter was set to 1.

### Format

```
UNREGISTEREVENT(X)
```

### Parameters

`(X)` = the ID of the event to stop

### Returns

0 if the event is a valid event to unregister. A -1 if the event does not exist.

**Example •** Here is an example of how to use the `UNREGISTEREVENT` command:

```
AUTONUM 1,1
LET OUTSTR$ = "Processing"
LET LOOPCTR = 200
LET TIMER5 = 17
LET TMP = REGISTEREVENT(TIMER5, 0, 1000)
DO WHILE LOOPCTR > 0
LET EVT = HANDLEEVENT()
IF EVT = TIMER5 THEN
LET A = SETVAR("device.frontpanel.line2",OUTSTR$)
LET OUTSTR$ = OUTSTR$ & "."
IF LEN(OUTSTR$) >16 THEN
LET OUTSTR$ = "Processing"
END IF
END IF
LET LOOPCTR = LOOPCTR - 1
SLEEP 1
LOOP
LET TMP = UNREGISTEREVENT(TIMER5)
LET A = SETVAR("device.frontpanel.line2","")
END
```

### Comments

None

# HANDLEEVENT

### Description

Once events have been registered, this function is used to see what events have occurred.

### Format

```
HANDLEEVENT()
```

### Parameters

N/A

### Returns

The ID of the event that occurred. One event at a time will be returned through this function. The order of the events are based on priority. The priority is based on the ID number of the event, with the exception of the timer events, which have the highest priority.

**Example •** Here are examples of how to use the `HANDLEEVENT` command:

```
1 REM This example shows how to override the feed key functionality
1 REM using the event system. Why waste a label when you could put
1 REM valuable information there
AUTONUM 1,1
CLOSE ALL
LET ZPLPORT = 1
OPEN #ZPLPORT: NAME "ZPL"
LET FEEDKEY = 3
LET TMP = REGISTEREVENT(FEEDKEY, 0, 1)
DO WHILE 1 = 1
LET EVT = HANDLEEVENT()
IF EVT = FEEDKEY THEN
GOSUB PRINTINFO
END IF
SLEEP 1
LOOP
REM ******** SUBROUTINE PRINTINFO ***
REM *** expects ZPLPORT *************
SUB PRINTINFO
PRINT #ZPLPORT: "^XA"
PRINT #ZPLPORT: "^FO30,30^A0N,50,50";
PRINT #ZPLPORT: "^FDZebra Technologies^FS"
PRINT #ZPLPORT: "^FO30,85^A0N,35,35";
PRINT #ZPLPORT: "^FDwww.zebra.com^FS"
PRINT #ZPLPORT: "^FO30,125^A0N,35,35";
PRINT #ZPLPORT: "^FDsupport.zebra.com^FS"
PRINT #ZPLPORT: "^FO30,165^A0N,35,35";
PRINT #ZPLPORT: "^FDFW Version: ";
PRINT #ZPLPORT: GETVAR$("appl.name") & "^FS"
PRINT #ZPLPORT: "^FO30,205^A0N,35,35";
PRINT #ZPLPORT: "^FDPrinter Unique ID:";
PRINT #ZPLPORT: GETVAR$("device.unique_id") & "^FS"
PRINT #ZPLPORT: "^FO30,245^A0N,35,35";
PRINT #ZPLPORT: "^FDActive Network: ";
PRINT #ZPLPORT: GETVAR$("ip.active_network") & "^FS"
PRINT #ZPLPORT: "^FO30,285^A0N,35,35";
PRINT #ZPLPORT: "^FDZBI Memory Usage: ";
PRINT #ZPLPORT: GETVAR$("zbi.start_info.memory_alloc") & "^FS"
PRINT #ZPLPORT: "^FO30,325^A0N,35,35";
PRINT #ZPLPORT: "^FDOdometer: ";
PRINT #ZPLPORT: GETVAR$("odometer.total_print_length") & "^FS"
PRINT #ZPLPORT: "^XZ"
```

## Comments

None

# TRIGGEREVENT

ZBI 2.0↑

### Description

This function allows for front panel buttons to be triggered programatically.

### Format

```
TRIGGEREVENT(X)
```

### Parameters

X = the ID of the event from the possible event list to TRIGGER.

See the following printer tables for events that can be triggered by this command:

- *XiIIIPlus/PAX4* on page 513
- *105SL* on page 513
- *ZM400/ZM600/Z4Mplus/Z6Mplus* on page 514
- *S4M* on page 514

### Returns

Always returns 0.

**Example •** Here are examples of how to use the `TRIGGEREVENT` command:

```
1 REM THIS IS AN EXAMPLE OF HOW TO TRIGGER AN EVENT
AUTONUM 1,1
LET PAUSEKEY = 2
DO WHILE 1 = 1
LET A = TRIGGEREVENT(PAUSEKEY)
LET A = SETVAR("device.frontpanel.line2",str$(A))
SLEEP 2
LOOP
```

### Comments

None

# Systems

This section contain miscellaneous systems interface functions. Here's a quick list of these commands:

**ISERROR** Returns a non-zero value if there is an internal error set in the printer.

**ISWARNING** Returns a non-zero value if there is an internal warning set in the printer.

**SLEEP** Specifies the time that the interpreter pauses.

**SETERR** Sends a message to the printer to set the error flag.

**CLRERR** Sends a message to the printer to clear the error flag.

**ON ERROR** Prevents a program from halting in the event of an error.

# ISERROR

### Description

This function returns a non-zero value if there is an internal error set in the printer. Otherwise, the numeral returned will 0.

### Format

```
ISERROR
```

### Parameters

N/A

### Returns

0 for no errors; 1 if there is an error.

**Example** • Here is an example of the `ISERROR` command.

```
10 PRINT ISERROR
RUN
0
```

### Comments

None

# ISWARNING

### Description

This function returns a non-zero value if there is an internal warning set in the printer. Otherwise, the numeral returned will 0.

### Format

```
ISWARNING
```

### Parameters

N/A

### Returns

0 for no errors; 1 if there is an error.

**Example •** Here is an example of the `ISWARNING` command.

```
10 PRINT ISWARNING
RUN
0
```

### Comments

None

# SLEEP

## Description

This command specifies the time that the interpreter pauses. This command could be sent to the printer after sending a label format to be printed. The interpreter pauses in its processing for the amount of time specified.

## Format

```
SLEEP <A>
```

## Parameters

<A> = the time in seconds (0 to 500) the interpreter pauses.

**Example** • This is an example of how to use the SLEEP command:

```
10 SLEEP 450
```

## Comments

If a timer is needed, use the Event system. The timer will allow for processing other items, where SLEEP will stop execution of any ZBI commands for the specified SLEEP period.

This is a program command and must be preceded by a line number.

# SETERR

## Description

This command sends a message to the printer to set the error flag. A logical interpreter flag is triggered in the printer. This error is referenced as a BASIC Forced Error.

## Format

```
SETERR
```

## Parameters

N/A

**Example •** An example of the `SETERR` and `CLRERR` commands.

```
AUTONUM 1,1
OPEN #1:NAME "ZPL"
PRINT #1: "^XA^SXO,A,Y,Y^XZ"
CLOSE #1
FOR I=1 TO 10
SLEEP 5
IF MOD(I,2)=1 THEN
SETERR
ELSE
CLRERR
ENDIF
NEXT I
```

## Comments

This is a program command and must be preceded by a line number.

# CLRERR

### Description

This command sends a message to the printer to clear the error flag. A logical interpreter flag is cleared in the printer. This error is referenced as a BASIC Forced Error.

### Format

```
10 CLRERR
```

### Parameters

N/A

**Example** • See *SETERR* on page 525.

### Comments

This is a program command that is preceded by a line number.

# ON ERROR

### Description

The `ON ERROR` command can be used to prevent a program from halting in the event of an error. If an error occurs in a previous line during program execution, the `ON ERROR` statement calls the `GOTO` or `GOSUB` statement and allows the program to continue.

### Format

```
ON ERROR GOTO <A>
ON ERROR GOSUB <A>
```

### Parameters

`<A>` = the destination location in the program should an error be triggered on the previous line

**Example •** This is an example of how to use the `ON ERROR` command:

```
30 LET A = B/C
40 ON ERROR GOTO 100
...
100 PRINT "DIVIDE BY ZERO OCCURRED"
110 LET A = 0
120 GOTO 50
...
```

**Example •** See *TCP Server* on page 499 or *UDP Server* on page 501.

### Comments

If there is no error, this line is ignored.

This is a program command that is preceded by a line number.

## Applicator Functions

The printer applicator port option can be controlled in part or completely by ZBI 2. When ZBI takes control of a pin, the printer’s built-in applicator functionality will not have access to that pin. This function will allow the printer to perform some of the functionality that a programmable logic controller (PLC) could.

**AUXPORT_STEALPIN** Takes control of a pin and allows ZBI to perform other actions on the pin.

**AUXPORT_SETPIN** Sets the output level on an applicator pin.

**AUXPORT_GETPIN** Retrieves the state of the applicator pin.

**AUXPORT_RELEASEPIN** Returns a pin controlled by ZBI to normal printer operation.

# AUXPORT_STEALPIN

ZBI 2.0↑

### Description

This function will take control of a pin and allow ZBI to perform other actions on the pin.

### Format

```
AUXPORT_STEALPIN(X)
```

### Parameters

X = perform action on this applicator port pin.

### Returns

This function returns -1 upon failure and 0 upon success.

**Example** • This is an example of the AUXPORT_STEALPIN command:

```
1 REM Demo applicator to show control of applicator pins
1 REM on the printer
1 REM The application is to create a light pole with an
1 REM external feed button
AUTONUM 1,1
LET RED = 9
LET YELLOW = 10
LET GREEN = 11
LET BUTTON = 4
LET FEED_KEY = 3
LET TMP = AUXPORT_STEALPIN(RED)
LET TMP = AUXPORT_STEALPIN(YELLOW)
LET TMP = AUXPORT_STEALPIN(GREEN)
LET TMP = AUXPORT_STEALPIN(BUTTON)
DO WHILE 1 = 1
SLEEP 1
IF ISERROR = 1 THEN
LET TMP = AUXPORT_SETPIN(RED,1)
LET TMP = AUXPORT_SETPIN(YELLOW,0)
LET TMP = AUXPORT_SETPIN(GREEN,0)
ELSE IF ISWARNING = 1 THEN
LET TMP = AUXPORT_SETPIN(RED,0)
LET TMP = AUXPORT_SETPIN(YELLOW,1)
LET TMP = AUXPORT_SETPIN(GREEN,0)
ELSE
LET TMP = AUXPORT_SETPIN(RED,0)
LET TMP = AUXPORT_SETPIN(YELLOW,0)
LET TMP = AUXPORT_SETPIN(GREEN,1)
END IF
IF AUXPORT_GETPIN(BUTTON) = 1 THEN
LET A = TRIGGEREVENT(FEED_KEY)
END IF
LOOP
```

## Comments

If this pin is not controlled via ZBI (power pin), this function will return -1.

# AUXPORT_SETPIN

ZBI 2.0↑

## Description

This function sets the output level on an applicator pin.

## Format

```
AUXPORT_SETPIN(X,Y)
```

## Parameters

X = perform action on this applicator port pin.

Y = The value to set on the pin (1 = high, 0 = low).

## Returns

This function returns -1 upon failure and 0 upon success.

**Example** • See *AUXPORT_STEALPIN* on page 528.

## Comments

If this pin is not controlled via ZBI (power pin), this function will return -1. See *AUXPORT_STEALPIN* on page 528.

# AUXPORT_GETPIN

ZBI 2.0↑

### Description

This function will retrieve the state of the applicator pin.

### Format

```
AUXPORT_GETPIN(X)
```

### Parameters

X = perform action on this applicator port pin.

### Returns

This function returns 1 if pin is in high state, 0 in low state, and -1 upon failure.

**Example •** See *AUXPORT_STEALPIN* on page 528.

### Comments

If this pin is not controlled via ZBI (power pin), this function will return -1. See *AUXPORT_STEALPIN* on page 528.

# AUXPORT_RELEASEPIN

ZBI 2.0↑

### Description

This function returns a pin controlled by ZBI to normal printer operation.

### Format

```
AUXPORT_RELEASEPIN(X)
```

### Parameters

X = perform action on this applicator port pin.

### Returns

This function returns -1 upon failure and 0 upon success.

**Example •** This is an example of the AUXPORT_RELEASEPIN command:

```
90 LET TMP = AUXPORT_RELEASEPIN(X)
```

### Comments

If this pin is not controlled via ZBI (power pin), this function will return -1. See *AUXPORT_STEALPIN* on page 528.

# String Functions

This section identifies how to handle string manipulation. Here is a quick list of these commands:

**LCASE$** Converts a string to all lowercase characters.

**CHR$** Takes a value between 0 and 255 and puts that value into a string.

**LTRIM$** Removes leading spaces from a string.

**REPEAT$** Creates multiple copies of a string combined into a new string.

**RTRIM$** Returns a string with trailing spaces removed

**SPLIT** Splits a string into sub-strings

**SPLITCOUNT** Returns the number of sub-strings that would be returned by the SPLIT function.

**UCASE$** Converts a string to all uppercase characters

**EXTRACT$** Searches for a string based on a starting and ending string.

**ORD** Returns the ASCII value of the first character of string A$.

**POS** Returns the location of the first occurrence of a search string in the target string.

**LEN** Returns the length of a string.

# LCASE$

### Description

This function will convert a string to all lowercase characters.

### Format

```
LCASE$ (A$)
```

### Parameters

`(A$)` = the string that will be converted

### Returns

The characters in `A$` converted to lowercase.

**Example •** This is an example of how to use the `LCASE$` command.

```
10 LET B$=LCASE$ ("Hello World")
20 PRINT B$
RUN
hello world
```

### Comments

This will only work on non-accented Latin characters, A-Z.

# CHR$

### Description

This function takes a value between 0 and 255 and puts that value into a string.

### Format

```
CHR$(VAL)
```

### Parameters

```
(VAL)= The numeric value of the string character
```

### Returns

A single character string containing the value entered.

**Example** • This is an example of how to use the `CHR$` command to easily put control characters into strings:

```
10 LET NULL$=CHR$(0)
20 LET STX$=CHR$(2)
30 LET ETX$=CHR$(3)
40 LET EOT$=CHR$(4)
```

### Comments

None

# LTRIM$

### Description

This function removes leading spaces from a string.

### Format

```
LTRIM$(A$)
```

### Parameters

`(A$) =` the string to convert

### Returns

The string in `A$` with no spaces.

**Example** • This is an example of how to use the `LTRIM$(A$)` command:

```
10 LET A$=" Hello"
20 PRINT LTRIM$(A$)
RUN
Hello
```

### Comments

None

# REPEAT$

### Description

This function creates multiple copies of a string combined into a new string.

### Format

```
REPEAT$(A$,M)
```

### Parameters

`A$` = the base string to duplicate

`M` = the number of times to duplicate `A$`

### Returns

A string containing `M` copies of `A$`. **Note:** When M=0, an empty string is returned.

**Example •** This is an example of how to use the `REPEAT$(A$,M)` command:

```
10 PRINT REPEAT$("Hello",3)
RUN
HelloHelloHello
```

### Comments

None

# RTRIM$

### Description

This function returns a string with trailing spaces removed.

### Format

```
RTRIM$(A$)
```

### Parameters

`(A$)` = the base string

### Returns

A$ with trailing spaces removed.

**Example** • This is an example of how to use the `RTRIM$(A$)`command:

```
10 LET A$="Hello "
20 LET B$="World"
30 PRINT A$ & B$
40 PRINT RTRIM$(A$)& B$
RUN
Hello World
HelloWorld
```

### Comments

None

# SPLIT

## Description

This function allows a string to be split into sub-strings

## Format

```
SPLIT(DEST$,SOURCE$,DELIMITER$)
SPLIT(DEST$,SOURCE$,DELIMITER$,MAXCOUNT)
```

## Parameters

`DEST$` = the array to populate with the sub-strings created by the split

`SOURCE$` = the string that will be searched for the provided delimiter

`DELIMITER$` = the delimiter string (may be more than one character) to search for

`MAXCOUNT` = the maximum number of sub-strings the string should be split into. A negative value will return every sub-string created by the split. A value of zero will return empty strings in the array. If not specified, the limit will be the maximum size of the array.

## Returns

The number of sub-strings placed into the DEST$ array. If the number of sub-strings is less than the size of DEST$, the remaining elements of the array will be set to empty strings.

**Example •** This is an example of how to use the `SPLIT` command:

```
1 REM Example - This example show how the SPLIT and SPLITCOUNT
1 REM commands can be
1 REM used to merge a comma separated variable string(CSV)
1 REM into a stored format
AUTONUM 1,1
SLEEP 10
DECLARE STRING TESTDATA$(5)
REM data format = <Format Name>,<VAR 1>,<VAR 2>,...,<VAR N>
LET TESTDATA$(1) = "E:PRICETAG.ZPL,FRED'S OATS,$1.25,C:126789:325,123456789"
LET TESTDATA$(2) = "E:PRICETAG.ZPL,FRED'S OATS,$2.25,C:126789:325,123456789"
LET TESTDATA$(3) = "E:PRICETAG.ZPL,FRED'S OATS,$3.25,C:126789:325,123456789"
LET TESTDATA$(4) = "E:PRICETAG.ZPL,FRED'S OATS,$4.25,C:123489:325,123456789"
LET TESTDATA$(5) = "E:PRICETAG.ZPL,FRED'S OATS,$5.25,C:123459:325,123456789"
LET ZPLPORT = 2
OPEN #ZPLPORT: NAME "ZPL"
FOR T = 1 TO 5
LET DATA$ = TESTDATA$(T)
GOSUB CSVPRINTER
NEXT T
END
```

```
REM ******* Subroutine CSVPRINTER, expects DATA$ and ZPLPORT ****************
SUB CSVPRINTER
LET CNT = SPLITCOUNT(DATA$, ",")
DECLARE STRING SPLITSTRING$(CNT)
ON ERROR GOTO RECOVERY
LET CNT = SPLIT(SPLITSTRING$,DATA$,",")
PRINT #ZPLPORT: "^XA^XF";SPLITSTRING$(1);"^FS"
IF CNT >= 2 THEN
FOR I = 2 TO CNT
PRINT #ZPLPORT: "^FN";I-1;"^FD";SPLITSTRING$(I);"^FS"
NEXT I
END IF
PRINT #ZPLPORT: "^XZ"
SUB RECOVERY
RETURN
```

**Example •** This is an example of how to use the `SPLIT` command:

```
1 REM Example - Shows how the SPLIT and SPLITCOUNT commands can be used to
1 REM merge a comma separated variable string(CSV) into a stored format
AUTONUM 1,1
SLEEP 10
DECLARE STRING TESTDATA$(5)
REM data format = <Format Name>,<VAR 1>,<VAR 2>,...,<VAR N>
LET F$="E:PRICETAG.ZPL"
LET TESTDATA$(1) = F$&",FRED'S ROLLED OATS,$1.25,C:123456789:325,123456789"
LET TESTDATA$(2) = F$&",FRED'S ROLLED OATS,$2.25,C:123456789:325,123456789"
LET TESTDATA$(3) = F$&",FRED'S ROLLED OATS,$3.25,C:123456789:325,123456789"
LET TESTDATA$(4) = F$&",FRED'S ROLLED OATS,$4.25,C:123456789:325,123456789"
LET TESTDATA$(5) = F$&",FRED'S ROLLED OATS,$5.25,C:123456789:325,123456789"
LET ZPLPORT = 2
OPEN #ZPLPORT: NAME "ZPL"
FOR T = 1 TO 5
LET DATA$ = TESTDATA$(T)
GOSUB CSVPRINTER
NEXT T
END
REM ******* Subroutine CSVPRINTER, expects DATA$ and ZPLPORT *****************
SUB CSVPRINTER
LET CNT = SPLITCOUNT(DATA$, ",")
DECLARE STRING SPLITSTRING$(CNT)
ON ERROR GOTO RECOVERY
LET CNT = SPLIT(SPLITSTRING$,DATA$,",")
PRINT #ZPLPORT: "^XA^XF";SPLITSTRING$(1);"^FS"
IF CNT >= 2 THEN
FOR I = 2 TO CNT
PRINT #ZPLPORT: "^FN";I-1;"^FD";SPLITSTRING$(I);"^FS"
NEXT I
END IF
PRINT #ZPLPORT: "^XZ"
SUB RECOVERY
RETURN
```

## Comments

If the delimiter is an empty string, or does not appear in the SOURCE$ string, the first entry of the array will be the source string and all other elements will be empty strings.

When the SPLIT function encounters a delimiter at the beginning or end of the source string, or two delimiters in a row, it populates the corresponding array element with an empty string.

If MAXCOUNT is larger than the number of returned sub-strings (N), the last MAXCOUNT - N array elements will be empty strings. If MAXCOUNT is larger than the destination array or is negative, the size of the array will be used as the MAXCOUNT. Therefore, the smallest value among the value of MAXCOUNT, the size of the return array, or the number of sub-strings found determines the maximum number of sub-strings that will be returned.

If MAXCOUNT is less than the number of delimiters in a string the last string in the array will hold the end of the string starting from where the last delimiter was found. For example, if SOURCE$ = "one,two,three,four,five", DELIMITER$ = ",", and MAXCOUNT = 2, the output would be two strings: "one" and "two,three,four,five".

If a two dimensional array is provided for DEST$, the array will be filled linearly. For example, an array that is 2 x 3 (for example, DELCARE STRING MYARRAY$(2,3)) will be filled from (0,0), then (0,1) up to (2,3).

# SPLITCOUNT

## Description

This function returns the number of sub-strings that would be returned by the SPLIT function.

## Format

```
SPLITCOUNT(SOURCE$, DELIMITER$)
```

## Parameters

SOURCE$ = the string that will be searched for the provided delimiter.

DELIMITER$ =5

## Returns

The number of sub-strings that would be returned by the SPLITCOUNT function.

**Example •** This function shows how to determine the number of sub-strings that the SPLITCOUNT command would produce

```
10 LET CNT = SPLITCOUNT("ONE,,,FOUR,FIVE,,SEVEN,", ",")
20 PRINT "Number of sub-strings returned is", STR$(CNT)
RUN
Number of sub-strings returned is 8
```

## Comments

None

# UCASE$

### Description

This function converts a string to all uppercase characters.

### Format

```
UCASE$(A$)
```

### Parameters

A$ = the base string to convert

### Returns

A$ converted to uppercase.

**Example** • This is an example of how to use the `UCASE$(A$)` command:

```
10 LET A$="Zebra Technologies"
20 PRINT UCASE$(A$)
RUN
ZEBRA TECHNOLOGIES
```

**Example** • This is an example of how to capitalize a line.

```
10 LET A$="The Cow jUmped Over THE Moon."
20 LET A$=LCASE$(A$)
30 LET A$(1:1)=UCASE$(A$(1:1))
40 PRINT A$
RUN
The cow jumped over the moon.
```

### Comments

This will only convert non-accented Latin characters, a-z.

# EXTRACT$

### Description

This function searches for a string based on a starting and ending string. When these two strings are found, the string between them is returned.

**Important •** If the EXTRACT$ command encounters a carriage return line feed before encountering the beginning character or the ending character, it returns null.

### Format

```
EXTRACT$ (CHANNEL, START$, STOP$)
EXTRACT$ (A$, START$, STOP$)
```

### Parameters

CHANNEL = extracts data from this channel

A$ = the source string

START$ = Once this string is found, the extract pulls characters immediately following.

STOP$ = the extraction stops when this string is found

**Example •** This example shows how to extract the word Technologies from this string: `Zebra,Technologies,Corporation.`

This is what the program looks like to accomplish this:

```
10 LET A$ = "Zebra,Technologies,Corporation,"
20 LET DATA$ = EXTRACT$(A$,",",",")
```

**Example •** This example shows how the EXTRACT$ command works from an open port:

```
10 OPEN #1: NAME "SER"
20 LET DATA$ = EXTRACT$(1,",",",")
```

Notice how the quotes are used to show a literal character, in this case a comma.

**Example •** This example shows how the start and stop points are variable; a variable name is used instead of the literal:

```
10 LET B$ = ","
20 LET A$ = "Zebra,Technologies,Corporation"
30 LET DATA$ = EXTRACT$(A$,B$,B$)
40 PRINT DATA$
RUN
Technologies
```

**Example** • This example shows how an empty string can be used to extract from the start of the input string to the end string:

```
10 LET IN$ = "BLAH BLAH <END>"
20 LET B$ = EXTRACT$(IN$, "", "<END>")
30 PRINT B$
RUN
BLAH BLAH
```

**Example** • This example will use an empty string to extract to the end of a line:

```
10 LET IN$ = "BLAH <START> THE DATA"
20 LET B$ = EXTRACT$(IN$, "<START>", "")
30 PRINT B$
RUN
THE DATA
```

### Comments

EXTRACT$ reads in and discards data until the start criteria is met. Then, all data is returned up to the stop criteria.

# ORD

### Description

This function returns the ASCII value of the first character of string A$.

### Format

```
ORD(A$)
```

### Parameters

A$ = Input string: only the first character will be used.

### Returns

The ASCII value of the first character.

**Example** • This is an example of how to use the ORD(A$)command:

```
10 LET A$="ABC"
20 PRINT ORD(A$)
RUN
65
```

### Comments

None

# POS

## Description

This function returns the location of the first occurrence of a search string in the target string. It can be assigned an index.

## Format

```
POS(A$,B$)
POS(A$,B$,M)
```

## Parameters

`A$` = the target string to search

`B$` = the search string to find in `A$`

`M` = The index to start looking for `B$`. If omitted, the search will start at the beginning of the string. `M` must be greater than zero.

## Returns

The location of the string. If the string is not found, this will return 0.

**Example •** This is an example of how to use the `POS` command:

```
10 LET A$="Hello World"
20 LET B$="o"
30 PRINT POS(A$,B$)
40 PRINT POS(A$,B$,1)
50 PRINT POS(A$,B$,6)
RUN
5
5
8
```

## Comments

None

# LEN

## Description

This function returns the length of a string.

## Format

```
LEN(A$)
```

## Parameters

A$ = the target string from which to determine the length.

## Returns

The length of the string.

**Example** • This example identifies the length of a string. Hello World is 11 characters, as follows:

```
10 LET A$="Hello World"
20 PRINT LEN(A$)
RUN
11
```

## Comments

None

# Math Functions

This section identifies how to handle mathematical calculations. Here is a quick list of these commands:

**STR$** Converts a number to a string.

**MAX** Returns the greater value between two numbers.

**MIN** Returns the smaller value of two numbers.

**MAXNUM** returns the largest number permitted by this machine.

**MOD** Computes the remainder from division.

**VAL** Evaluates the number represented by a string.

**INTTOHEX$** Takes a numeric value and converts it into a hexadecimal string.

**HEXTOINT** Converts hexadecimal strings to integers.

# STR$

## Description

This function converts a number to a string.

## Format

```
STR$(X)
```

## Parameters

X = the number to convert to a string

## Returns

A string representing X.

**Example** • This is an example of how to use the STR$(X) command:

```
10 LET A=53
20 PRINT STR$(A)
RUN
53
```

## Comments

None

# MAX

### Description

This function returns the greater value between two numbers.

### Format

```
MAX(X,Y)
```

### Parameters

`X` = the first number to compare

`Y` = the second number to compare

### Returns

The greater of `X` or `Y.`

**Example** • This is an example of how to use the `MAX(X,Y)` command:

```
10 LET A=-2
20 LET B=1
30 PRINT MAX(A,B)
RUN
1
```

### Comments

None

# MIN

## Description

This function returns the smaller value of two numbers.

## Format

```
MIN(X,Y)
```

## Parameters

X = the first number to compare

Y = the second number to compare

## Returns

The smaller of X or Y.

**Example •** This is an example of how to use the MIN(X,Y)command:

```
10 LET A=-2
20 LET B=0
30 PRINT MIN(A,B)
RUN
-2
```

## Comments

None

# MAXNUM

### Description

This function returns the largest number permitted by this machine: 2,147,483,647.

### Format

```
MAXNUM
```

### Parameters

N/A

### Returns

The largest number that the NUMERIC type can handle (2,147,483,647).

**Example** • This is an example of how to use the `MAXNUM` command:

```
10 PRINT MAXNUM
RUN
2147483647
```

### Comments

None

# MOD

## Description

This function computes the remainder from division. (This is known as the modulus.)

## Format

`MOD(X,Y)`

## Parameters

X = the value to be modulated (numerator).

Y = the base number or divisor (denominator).

## Returns

The remainder of the division (X/Y).

**Example •** This is an example of how to use the `MOD(X,Y)` command:

```
10 PRINT MOD(25,10)
20 PRINT MOD(2,1)
30 PRINT MOD(3,2)
40 PRINT MOD(9,2)
50 PRINT MOD(-2,9)
60 PRINT MOD(2,0)
RUN
5
0
1
1
-2
ERROR OCCURRED ON LINE 60:DIVIDE BY ZERO
```

## Comments

None

# VAL

## Description

This function evaluates the number represented by a string.

## Format

```
VAL(A$)
```

## Parameters

A$ = This is the input string to pull the number from. Non-numbers are ignored.

## Returns

The numeric representation of the string.

**Example** • This is an example of how to use the VAL(A$)command:

```
10 LET A$="123"
20 LET C=VAL(A$)
30 PRINT C
RUN
123

PRINT VAL("321A123")
321123
```

## Comments

None

# INTTOHEX$

ZBI 2.0↑

### Description

This function will take a numeric value and convert it into a hexadecimal string. The range of values for integers is:

-2,147,483,648 to +2,147,483,647

### Format

```
INTTOHEX$(A)
```

### Parameters

A = The numeric value to convert.

### Returns

A string representing the integer in hex.

**Example** • These print statements show the output of the `INTTOHEX$` function given different values.

```
PRINT INTTOHEX$(1)
1

PRINT INTTOHEX$(10)
A

PRINT INTTOHEX$(16)
10

PRINT INTTOHEX$(20)
14

PRINT INTTOHEX$(30)
1E

PRINT INTTOHEX$(100)
64

PRINT INTTOHEX$(123124)
1EOF4

PRINT INTTOHEX$(-5)
0

PRINT INTTOHEX$(-99)
0
```

### Comments

Negative values will be returned as 0.

# HEXTOINT

ZBI 2.0↑

### Description

This function will convert hexadecimal strings to integers.

### Format

```
HEXTOINT(A$)
```

### Parameters

A$ = The hex string to convert.

### Returns

A integer string computed from the hexadecimal string.

**Example •** These print statements show the output of the `INTTOHEX` function given different values.

```
PRINT HEXTOINT("0")
0

PRINT HEXTOINT("A")
10

PRINT HEXTOINT("a")
10

PRINT HEXTOINT("1A")
26

PRINT HEXTOINT("10")
16

PRINT HEXTOINT("AaAa")
43690

PRINT HEXTOINT("AAAA")
43690

PRINT HEXTOINT("-1")
0

PRINT HEXTOINT("-A")
0
```

### Comments

Negative values will be returned as 0.

# Time and Date Functions

This section describes the functions to access the real time clock option. Here is a quick list of these commands:

**DATE$** Returns the date as a string

**TIME$** Returns the current time in a string.

**DATE** Gets the current date as a number.

**TIME** Gets the current time as a number.

# DATE$

### Description

This function returns the date as a string.

### Format

```
DATE$
```

### Parameters

N/A

### Returns

The current date in string form `YYYYMMDD`. If the Real-Time Clock is not installed, an empty string is returned.

**Example** • This is an example of how to use the `DATE$` command:

```
10 PRINT DATE$
RUN
```

The result, assuming the date is January 1, 2003 is:

```
20030101
```

**Example** • This is another example of the `DATE$` command used with the sub-string operator to get the day of the month:

```
10 LET A$=DATE$(7:8)
20 IF A$ <> DATE$(7:8)
30 LET A$=DATE$(7:8)
40 IF A$="01"
50 PRINT "IT IS THE FIRST OF THE MONTH"
60 END IF
70 END IF
80 SLEEP 100
90 GOTO 20
```

### Comments

None

# TIME$

### Description

This function returns the current time in a string.

### Format

```
TIME$
```

### Parameters

N/A

### Returns

This function returns the time of day in format HH:MM:SS (hours:minutes:seconds). If the Real-Time Clock is not installed, an empty string is returned.

**Example •** This is an example of how to use the `TIME$`command:

```
10 PRINT TIME$
RUN
10:00:00
```

### Comments

None

# DATE

## Description

This function gets the current date as a number.

## Format

```
DATE
```

## Parameters

N/A

## Returns

This function returns the current date in `YYYYDDD` format, where `YYYY` is the year and `DDD` is the number of days since the beginning of the year. If the Real-Time Clock is not installed, `0` is returned.

**Example** • This example assumes the current date is January 1, 2003:

```
10 PRINT DATE
RUN
2003001
```

## Comments

None

# TIME

### Description

This function gets the current time as a number.

### Format

```
TIME
```

### Parameters

N/A

### Returns

This function returns the time past midnight (2400h) in seconds. If the Real-Time Clock is not installed, 0 is returned.

This is an example of how to use the `TIME` command [assuming the time is one minute past midnight]:

**Example •**

```
10 PRINT TIME
RUN
60
```

### Comments

None

# Set/Get/Do Interactions

The printer's Set/Get/Do data can be directly accessed via ZBI. For a complete listing of what can be accessed, see the ZPL Manual, Set-Get-Do Command chapters, or type the following:

```
! U1 getvar "allcv"
```

Here's a quick list of these commands:

**SETVAR** Allows the direct setting of printer parameters.

**GETVAR** Retrieves printer parameters.

# SETVAR

## Description

SETVAR allows the direct setting of printer parameters.

## Format

```
SETVAR (PARAM$, VALUE$)
```

## Parameters

PARAM$ = The printer parameter to set. (See the ZPL Manual for specific parameters.)

VALUE$ = the value to set

## Returns

Parameter dependent.

**Example •** This is an example of the SETVAR command:

```
AUTONUM 1,1
LET OUTSTR$ = "Processing"
LET LOOPCTR = 200
LET TIMER5 = 17
LET TMP = REGISTEREVENT(TIMER5, 0, 1000)
DO WHILE LOOPCTR > 0
LET EVT = HANDLEEVENT()
IF EVT = TIMER5 THEN
LET A = SETVAR("device.frontpanel.line2",OUTSTR$)
LET OUTSTR$ = OUTSTR$ & "."
IF LEN(OUTSTR$) >16 THEN
LET OUTSTR$ = "Processing"
END IF
END IF
LET LOOPCTR = LOOPCTR - 1
SLEEP 1
LOOP
LET TMP = UNREGISTEREVENT(TIMER5)
LET A = SETVAR("device.frontpanel.line2","")
END
```

## Comments

None

# GETVAR

## Description

ZBI 2.0↑

This function retrieves printer parameters.

## Format

```
GETVAR (PARAM$, VALUE$)
```

## Parameters

PARAM$ = the printer parameter to get. (See the ZPL Manual for specific parameters.)

VALUE$ = the string variable where the retrieved data will be placed.

## Returns

For specific parameters, see the *SGD Printer Setting Commands* on page 587.

**Example •** This is an example of the GETVAR command:

```
AUTONUM 1,1
LET SGDCOUNT = 7
DECLARE STRING SGDQUERY$(2,SGDCOUNT)
LET SGDQUERY$(1,1) = "appl.name"
LET SGDQUERY$(1,2) = "device.printhead.serialnum"
LET SGDQUERY$(1,3) = "internal_wired.ip.addr"
LET SGDQUERY$(1,4) = "internal_wired.ip.netmask"
LET SGDQUERY$(1,5) = "internal_wired.ip.gateway"
LET SGDQUERY$(1,6) = "internal_wired.ip.port"
LET SGDQUERY$(1,7) = "internal_wired.mac_addr"
FOR I = 1 TO SGDCOUNT
LET SGDQUERY$(2,I) = GETVAR$(SGDQUERY$(1,I))
NEXT I
OPEN #1: NAME "ZPL"
PRINT #1: "^XA"
FOR I = 1 TO SGDCOUNT
PRINT #1: "^FO50,";50*I;"^A0N,25,25^FD";SGDQUERY$(1,I);"=";
PRINT #1: SGDQUERY$(2,I);"^FS"
NEXT I
PRINT #1: "^XZ"
```

## Comments

None

# Example Programs

The next section provides example programs of common tasks using ZBI commands.

## Array Program

This program prompts a user to enter first a name; when it is entered, it is added to an array of all names entered. The user is them prompted to enter an address, which is then added to an array of all addresses entered. After the user enters a total or five names and addresses, the program uses the arrays to print the entered data on five labels.

**Example •** This is an example of Array

```
1 rem *********************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of using arrays to store and use data within
1 rem ZBI.
1 rem *********************************************************
1 rem close all ports except for the console
1 rem**********************************************************
10 for i = 1 to 9 step 1
20    close #i
30    next i
1 rem *********************************************************
1 rem open a port to the print engine
1 rem *******************************************************
40 open #1: name "ZPL"
1 rem *********************************************************
1 rem create string arrays five elements in size to hold names and
1 rem addresses
1 rem *********************************************************
50 declare string name$(5)
60 declare string address$(5)
1 rem *********************************************************
1 rem infinite loop to put name and address data from console into
1 rem arrays
1 rem *********************************************************
```

```
70 do
80 for i = 1 to 5 step 1
90    print "PLEASE ENTER THE NAME"
1 rem ********************************************************
1 rem get data from console; input command looks for CRLF
1 rem ********************************************************
100    input name$(i)
1 rem ********************************************************
1 rem if the user inputs end or END, the program will end
1 rem ********************************************************
110    if name$(i) = "END" or name$(i) = "end" then
120       end
130    end if
140    print "PLEASE ENTER THE ADDRESS"
150    input address$(i)
160    if address$(i) = "END" or address$(i) = "end" then
170       end
180    end if
190 next i
200 for index = 1 to 5 step 1 ! For loop To Print data no label
1 rem ********************************************************
1 rem semicolon at the end prints with no CRLF
1 rem ********************************************************
210    print #1: "^XA^FO30,30^A0N,30,30^FD"&NAME$(INDEX)&"^FS";
1 rem ********************************************************
1 rem ampersand used to concatenate data into strings
1 rem ********************************************************
220    print #1: "^FO30,70^A0N,30,30^FD"&ADDRESS$(INDEX)&"^FS^XZ"
230 next index
240 loop ! loops back To Line 60
250 end
```

## DPI Conversion Program

This program converts a ZPL format being sent to the printer on the parallel port to 300 dpi (dots per inch) from 200 dpi (dots per inch). This is done by searching for and extracting ZPL commands with resolution-dependent arguments and scaling the arguments for a 300 dpi printer.

**Example •** This is an example of dpi conversion:

```
1 rem **************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of converting a printer from 200 dpi (dots 1
rem per inch
1 rem to 300 dpi. This example covers only some of the ZPL commands 1
rem that
1 rem could be affected by converting from 200 to 300 dpi printing.
1 rem **************************************************
1 rem open the ports for input and output
1 rem **************************************************
10 close #1
20 close #2
30 open #1 : name "PAR"
40 open #2 : name "ZPL"
1 rem **************************************************
1 rem create an array with the search parameters
1 rem **************************************************
50 declare string find$(20)
60 let find$(1) = "^FO"
70 let find$(2) = "^A0"
80 let find$(3) = "^GB"
90 let find$(4) = "^XZ"
100 let find$(5) = "^A@"
110 let find$(6) = "^LL"
120 let find$(7) = "^LH"
130 let find$(8) = "FO"
140 let find$(9) = "A0"
150 let find$(10) = "GB"
160 let find$(11) = "XZ"
170 let find$(12) = "A@"
180 let find$(14) = "LH"
190 let find$(15) = "^BY"
200 let find$(16) = "BY"
210 let find$(17) = "^B3"
220 let find$(18) = "B3"
```

```
1 rem *******************************************************
1 rem search for the parameters
1 rem *******************************************************
300 do
310    let in$ = searchto$(1, find$, 2)
1 rem ********************************************************
1 rem once a parameter is found, determine how to handle it
1 rem ********************************************************
320    if in$ = "^FO" or in$ = "FO" then
330       gosub 520
340    else if in$ = "^LH" or in$ = "LH" then
350       gosub 520
360    else if in$ = "^A0" or in$ = "A0" then
370       gosub 700
380    else if in$ = "^A@" or in$ = "A@" then
390       gosub 700
400    else if in$ = "^GB" or in$ = "GB" then
410       gosub 1100
420    else if in$ = "^LL" then
430       gosub 1300
440    else if in$ = "^BY" or in$ = "BY" then
450       gosub 1400
460    else if in$ = "^B3" or in$ = "B3" then
470       gosub 1600
480    else if in$ = "^XZ" then
490       print #2: in$;
500    end if
510 loop
1 rem ********************************************************
1 rem convert the ^FO and ^LH commands from 200 to 300 dpi
1 rem ********************************************************
520 inbyte #1: a$
530 let a = ord(a$)
540 if a >= 65 then
550    print #2: in$&a$;
560    goto 660
570 end if
580 let x$ = extract$(1, "", ", ")
590 let x2$ = a$&x$
600 let y$ = extract$(1, "", "^")
610 let x = val(x2$)
620 let y = val(y$)
630 let x2 = (x/2)+x
640 let y2 = (y/2)+y
650 print #2: in$; x2; ","; y2; "^";
660 return
```

```
1 rem ********************************************************
1 rem convert the ^A0 and ^A@ commands from 200 to 300 dpi
1 rem ********************************************************
700 inbyte #1: a$
710 let a = ord(a$)
720 let b = 0
730 let c = 0
740 if a >= 65 then
750    print #2: in$&a$; ",";
760    let b = 1
770 end if
780 inbyte #1: a$
790 let h$ = extract$(1, "", ",")
800 if in$ = "^A@" or in$ = "A@" then
810    let c = 1
820   let w$ = extract$(1, "", ",")
830    let m$ = extract$(1, "", "^")
840 else
850    let w$ = extract$(1, "", "^")
860 end if
870 let h = val(h$)
880 let w = val(w$)
900 let h2 = (h/2) + h
910 let w2 = (w/2) + w
920 if b = 1 then
930    print #2: h2; ","; w2;
940 else
950    print #2: in$&"N,"; h2; ","; w2;
960 end if
970 if c = 1 then
980    print #2: ","; m$;
990 end if
1000 print #2: "^";
1010 return
1 rem ********************************************************
1 rem convert the ^GB command from 200 to 300 dpi
1 rem ********************************************************
1020 let w$ = extract$(1, "", ",")
1030 let h$ = extract$(1, "", ",")
1040 let t$ = extract$(1, "", "^")
1050 let h = val(h$)
1060 let w = val(w$)
1070 let t = val(t$)
1080 let h2 = (h/2)+ h
1090 let w2 = (w/2)+ w
1100 let t2 = (t/2)+ t
1110 print #2: in$; w2; ","; h2; ","; t2; "^";
1120 return
```

```
1 rem ********************************************************
1 rem convert the ^LL command from 200 to 300 dpi
1 rem ********************************************************
1300 let l$ = extract$(1, "", "^")
1310 let l = VAL(l$)
1320 let l2 = (l/2) + l
1330 print #2: in$; l2; "^";
1340 return
1 rem ********************************************************
1 rem convert the ^BY command from 200 to 300 dpi
1 rem ********************************************************
1400 inbyte #1: a$
1410 let a = ord(a$)
1420 if a >= 48 and a <= 57 then
1460    let x$ = extract$(1, "", ", ")
1470    let x2$ = a$&x$
1480    let x = val(x2$)
1490    let x2 = (x/2) + x
1500       if x2 > 10 then
1510       let x2 = 10
1520       end if
1530    print #2: in$; x2; ",";
1540 else
1550    print #2: in$; a$;
1560 end if
1570 return
1 rem ********************************************************
1 rem convert the ^B3 command from 200 to 300 dpi
1 rem ********************************************************
1600 let o$ = extract$(1, "", ", ")
1610 let e$ = extract$(1, "", ", ")
1620 let h$ = extract$(1, "", ", ")
1630 let h = val(h$)
1640 let h2 = (h/2) + h
1650 print #2: in$; o$; ","; e$; ","; h2; ",";
1660 return
```

## Email Program

This program sends a simple email message to user@domain.com, assuming a valid email server is set up.  In order to write email via ZBI, the port written to must be named "EML".

**Example •** This is an example of email

```
1 rem **************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of connecting to an email server to send
1 rem email.
1 rem **************************************************
1 rem EOT$ is the special character used to denote end of transmission
1 rem **************************************************
5 let EOT$ = chr$(4)
1 rem **************************************************
1 rem Open a connection to the email port; if there is an error, try
1 rem again
1 rem **************************************************
10 open #1: name "EML"
15 on error goto 10
1 rem **************************************************
1 rem Specify address to send message to, signal end of recipients
1 rem with EOT$
1 rem Note: To send to multiple addressees, separate addressees with
1 rem a space
1 rem **************************************************
20 print #1: "user@domain.com";EOT$;
1 rem **************************************************
1 rem Fill in the message information
1 rem **************************************************
30 print #1: "From: Sample User"
40 print #1: "To: Recipient"
50 print #1: "Subject: This is a test"
60 print #1: ""
70 print #1: "Hello!"
80 print #1: i
1 rem **************************************************
1 rem Terminate message
1 rem **************************************************
90 print #1: "";EOT$
```

```
1 rem **************************************************
1 rem Close the port, since each open port is only good for sending
1 rem one message
1 rem **************************************************
100 close #1
110 sleep 2
120 let i = i + 1
130 goto 10
```

## Extraction 1 Program

This program finds and stores data of interest, which in this case is found in a format after the string "DATA = ". The extract command is used to get the data from the input stream, and it is inserted into a simple ZPL format to be printed.

**Example •** This is an example of Extraction 1.

```
1 rem **************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of using ZBI for data extraction.
1 rem There are two methods for doing extraction; this example shows
1 rem data extraction using a string.
1 rem
1 rem The data to extract is as follows:
1 rem START
1 rem DATA = "hello":
1 rem DATA = "goodbye":
1 rem END
1 rem **************************************************
1 rem close ports except console, open channels to parallel and serial
1 rem ports
1 rem **************************************************
05 for i = 1 to 9 step 1
10    close #i
20 next i
30 open #1: name "PAR"
40 open #2: name "ZPL"
1 rem **************************************************
1 rem create string array to hold data
1 rem **************************************************
50 declare string format$(3)
60 let format$(1) = "START"
70 let format$(2) = "END"
80 let format$(3) = "DATA"
1 rem **************************************************
1 rem main program; look for "START" keyword, if found print ^XA to
ZPL port
1 rem **************************************************
90 do
100    let begin$ = searchto$(1,format$,2)
110    if begin$ = "START" then
120    print #2: "^XA";
```

```
1 rem **************************************************
1 rem if "DATA" keyword is found, get two data strings
1 rem **************************************************
130    else if begin$ = "DATA" then
140       input #1: data_string1$
150      input #1: data_string2$
1 rem **************************************************
1 rem get data from between quotes and print to ZPL port with formatting
1 rem **************************************************
160       let extracted_data1$ = extract$(data_string1$,"""","""")
170       let extracted_data2$ = extract$(data_string2$,"""","""")
180       print #2:"^FO30,30^A0N,30,30^FD"&extracted_data1$&"^FS";
190       print #2:"^FO30,70^A0N,30,30^FD"&extracted_data2$&"^FS";
200    else if begin$ = "END" then
210       print #2: "^XZ"
220    end if
230 loop
```

## Extraction 2 Program

This program finds and stores data of interest, which in this case is found in a format after the string "DATA = ". The input command is used to get the data from the input stream, and it is inserted into a simple ZPL format to be printed.

**Example •** This is an example of Extraction 2.

```
1 rem******************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of using ZBI for data extraction.
1 rem There are two methods for doing extraction; this example shows
1 rem data extraction from the port directly.
1 rem
1 rem The data to extract is as follows:
1 rem START
1 rem DATA = "hello":
1 rem DATA = "goodbye":
1 rem END
1 rem******************************************************
1 rem close ports except console, open channels to parallel and serial
ports
1 rem******************************************************
05 for i = 1 to 9 step 1
10    close #i
20 next i
30 open #1: name "PAR"
40 open #2: name "ZPL"
1 rem******************************************************
1 rem create string array to hold data
1 rem*******quotes and print to ZPL port with formatting
1 rem***************************************************

50 declare string format$(3)
60 let format$(1) = "START"
70 let format$(2) = "END"
80 let format$(3) = "DATA"
1 rem******************************************************
1 rem main program; look for "START" keyword, if found print ^XA to
ZPL port
1 rem******************************************************
```

```
90 do
100    let begin$ = searchto$(1, format$, 2)
110    if begin$ = "START" then
120       print #2: "^XA";
1 rem******************************************************
1 rem if "DATA" keyword is found, get two data strings
1 rem******************************************************
130    else if begin$ = "DATA" then
1 rem***************************************************
1 rem get data from between q
140       let extracted_data1$ = extract$(1,"""","""")
150       input #1: junk$
170       let extracted_data2$ = extract$(1,"""","""")
180       print #2:"^FO30,30^A0N,30,30^FD" &extracted_data1$& "^FS";
190       print #2:"^FO30,70^A0N,30,30^FD" &extracted_data2$& "^FS";
200    else if begin$ = "END" then
210       print #2: "^XZ"
220    end if
230 loop
```

## Front Panel Control

This example shows how to intercept front panel button presses and write to the display to create a simple menu. The buttons used in this demo are set up for a Z4Mplus/Z6Mplus or ZM400/ZM600. This could be reconfigured to work with any other printer.

**Example •** This is an example of front panel control.

```
1 REM This example shows how to override the functionality of the feed key
1 REM and use the front panel display to show a option list
AUTONUM 1,1
REM CLOSE ALL
DECLARE STRING OPTIONS$(5)
FOR I = 1 TO 5
LET OPTIONS$(I) = "Option " & STR$(I)
NEXT I
LET ZPLPORT = 1
OPEN #ZPLPORT: NAME "ZPL"
LET FEEDKEY   = 3
LET SELECTKEY = 10
LET PLUSKEY   = 6
LET MINUSKEY  = 7
LET EXITKEY   = 9
LET TMP = REGISTEREVENT(FEEDKEY, 0, 1)
SUB NORMALLOOP
DO WHILE 1 = 1
LET EVT = HANDLEEVENT()
IF EVT = FEEDKEY THEN
LET INDEX = 1
GOSUB REGISTERKEYS
GOSUB SHOWMENU
GOTO FEEDLOOP
END IF
SLEEP 1
LOOP
SUB FEEDLOOP
DO WHILE 1 = 1
LET EVT = HANDLEEVENT()
IF EVT = FEEDKEY THEN
GOSUB RELEASEKEYS
GOSUB HIDEMENU
GOTO NORMALLOOP
ELSE IF EVT = SELECTKEY THEN
GOSUB HANDLEOPTION
ELSE IF EVT = PLUSKEY THEN
LET INDEX = INDEX + 1
IF INDEX > 5 THEN
LET INDEX = 1
END IF
```

```
GOSUB SHOWMENU
ELSE IF EVT = MINUSKEY THEN
LET INDEX = INDEX - 1
IF INDEX < 1 THEN
LET INDEX = 5
END IF
GOSUB SHOWMENU
ELSE IF EVT = EXITKEY THEN
GOSUB RELEASEKEYS
GOSUB HIDEMENU
GOTO NORMALLOOP
END IF
SLEEP 1
LOOP
REM ******** SUBROUTINE SHOWMENU ***
SUB SHOWMENU
LET LINE1$ = "FEED DISPLAY"
LET LINE2$ = OPTIONS$(INDEX)
GOSUB UPDATEDISPLAY
RETURN
REM ******** SUBROUTINE HIDEMENU ***
SUB HIDEMENU
LET LINE1$ = ""
LET LINE2$ = ""
GOSUB UPDATEDISPLAY
RETURN
SUB UPDATEDISPLAY
LET A = SETVAR("device.frontpanel.line1",LINE1$)
LET A = SETVAR("device.frontpanel.line2",LINE2$)
RETURN
SUB REGISTERKEYS
LET TMP = REGISTEREVENT(SELECTKEY, 0, 1)
LET TMP = REGISTEREVENT(PLUSKEY, 0, 1)
LET TMP = REGISTEREVENT(MINUSKEY, 0, 1)
LET TMP = REGISTEREVENT(EXITKEY, 0, 1)
RETURN
SUB RELEASEKEYS
LET TMP = UNREGISTEREVENT(SELECTKEY)
LET TMP = UNREGISTEREVENT(PLUSKEY)
LET TMP = UNREGISTEREVENT(MINUSKEY)
LET TMP = UNREGISTEREVENT(EXITKEY)
RETURN
SUB HANDLEOPTION
PRINT #ZPLPORT: "^XA^FO100,100^A0N,100,100^FD"; OPTIONS$(INDEX);"^XZ"
RETURN
```

## Recall Program

This program searches for a ZPL format named "FORMAT.ZPL" that is already saved in printer memory. If the format is found, a number within the format is extracted and shown on the console. The user is then prompted to enter a new number, which is then substituted into the format.

**Example •** This is an example of Recall.zpl

```
1 rem *********************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of recalling a ZPL format and extracting data
1 rem from it.
1 rem *********************************************************
1 rem close ports except console, open ZPL port and declare search
1 rem array
1 rem *********************************************************
10 for i = 1 to 9 step 1 ! Close all ports
20    close #i
30 next i
40 let zplport = 2
50 open #zplport: name "ZPL"
60 declare string search_zpl$(2)
70 let search_zpl$(1) = chr$(03)
80 let search_zpl$(2) = "FORMAT.ZPL"
1 rem *********************************************************
1 rem main program; look for format to recall on printer
1 rem *********************************************************
90 do
100    print #zplport: "^XA^HWE:*.ZPL^FS^XZ"
110       let present = 0
115   let find$ = ""
120    do until find$ = chr$(03)
130      let find$ = searchto$(zplport, search_zpl$)
140       if  find$ = "FORMAT.ZPL" then
150        let present = 1 ! format is present
160       end if
170    loop
```

```
1 rem ********************************************************
1 rem if format is not found, create a format and set data value to
1 rem 000
1 rem ********************************************************
180    if present = 0 then
190       print #zplport:"^XA^DFE:FORMAT.ZPL^FS";
200       print #zplport:"^FX000^FS^XZ"
210       let counter$ = "000"
1 rem ********************************************************
1 rem if format is found, extract the data from ^FX field
1 rem ********************************************************
220    else
230       print #zplport:"^XA^HFE:FORMAT.ZPL^FS^XZ"
240       let stop$ = searchto$(zplport, "^FX")
250       let counter$ = extract$(zplport, "", "^FS")
260       let stop$ = searchto$(zplport, "^XZ")
270    end if
1 rem ********************************************************
1 rem print current data value, prompt user to replace data
1 rem ********************************************************
280    print ""
290    print "Current number in format is " & counter$
300    print "Please enter new number (type EXIT to end) ";
310    input new_counter$
320   if new_counter$ = "EXIT" then
330      print "Program ending"
340       end
350    else
360       print #zplport:"^XA^DFE:FORMAT.ZPL^FS";
370       print #zplport:"^FX" & new_counter$ & "^FS^XZ"
380    end if
390 loop
```

## Scale Program

This program reads data from a scale connected to the serial port by sending a "W" to the scale and waiting for a weight to be returned. When the weight is received, it is inserted into a simple label format and printed.

**Example •** This is an example of Scale

```
1 rem *********************************************************
1 rem Zebra Technologies ZBI Sample Program
1 rem
1 rem Professional programming services are available. Please contact
1 rem ZBI-Experts@zebra.com for more information.
1 rem
1 rem This is an example of using ZBI to read scale data from the
1 rem serial port.
1 rem *********************************************************
1 rem close all ports except console, open channels to parallel and
1 rem serial ports
1 rem *********************************************************
05 for i = 1 to 9 step 1
10    close #i
20    next i
30 open # 2 : name "SER"
40 open # 1 : name "ZPL"
1 rem *********************************************************
1 rem main program; send serial port a 'W' in order to get a weight
1 rem *********************************************************
50 do
60    do
70       sleep 1   ! sleep so scale is not bombarded with incoming
1 rem data
80       print # 2 : "W" ;   ! semicolon ends sent W without a CRLF
1 rem *********************************************************
1 rem get response from scale; note that input requires a CRLF to be
1 rem entered
1 rem *********************************************************
90       input # 2 : a$
100      if a$ = "EXIT" then! back door exit - if EXIT is received, ZBI ends
110          close # 2
120          print #1: "^XZ"
130          close #1
140          end
150       end if
1 rem *********************************************************
1 rem loop until valid weight is received, then print on label
1 rem *********************************************************
160    loop while pos ( a$ , "000.00" ) = 1 or pos ( a$ , "?" ) = 1
170    print # 1 : "~SD25^XA^FS";
180    print # 1 : "^LH0,0^FS";
190    print # 1 : "^FO56,47^A0N,69,58^FDThis weighs^FS";
1 rem *********************************************************
1 rem print weight on label; & character concatenates strings
1 rem *********************************************************
200    print # 1 : "^FO56,150^A0N,69,58^FD" & A$ & " lbs^FS";
210    print # 1 : "^PQ1,0,0,N";
220    print # 1 : "^XZ"
```

```
1 rem ********************************************************
1 rem loop until weight is off scale, then repeat for next item
1 rem weighed
1 rem ********************************************************
230    do
240       print # 2 : "W" ;
250       input # 2 : A$
260    loop until pos(A$ , "000.00") = 1 or pos(A$ , "?") = 1
270 loop
```

**Notes •** ___________________________________________

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# B

# SGD Printer Setting Commands

This chapter provides a high-level overview of printer setting Set / Get / Do (SGD) commands. For printer support of these SGD commands, see *SGD Command Support* on page 825.

SGD commands are available in printers with firmware version V60.16.x , V60.15.xZ, V50.15.xZ, V53.16.x, V53.15.xZ, or later.

**Important •** These are important points to note when using ZPL and SGD commands:

- SGD commands are case-sensitive.
- ZPL and SGD commands should be sent to the printer as separate files.
- Certain settings can be controlled by both ZPL and SGD. Configuration changes made in ZPL can affect configuration changes made in SGD.
- Changes made with one command type (ZPL or SGD) will affect the data returned to the host in response to both ZPL and getvar commands. The command type (ZPL or SGD) that was sent last determines the current setting.
- Some RF cards do not support all of the SGD commands.

# Overview

This section describes how and why to use the Set / Get / Do (SGD) commands. It also provides an example of a typical command structure.

**Note •** SGD commands must be terminated by a carriage return or a space and line feed.

SGD commands are commands that allow you to configure all printers with firmware versions V60.15.xZ, V50.15.xZ, V53.15.xZ, or later. The printer performs the specified function immediately after receiving the command. The commands are:

- **`setvar`**
- **`getvar`**
- **do**

## setvar Command

`Setvar` commands:

- are used to configure printer settings to specific values by setting them in the printer
- must be terminated by a space character or a CR/ LF (0x0D, 0x0A)

**Important •** The setvar command and attributes must be specified in lower case.

## getvar Command

`Getvar` commands:

- are used to get the current value of the printer settings
- must be terminated by a space character or CR/LF (0x0D, 0x0A)

The printer responds with the printer setting of “?” if:

- the printer setting does not exist (usually due to incorrect spelling of the printer setting)
- it has not been configured yet

**Important •** The printer settings and attributes must be specified in lower case.

## do Command

`Do` commands:

- are used to instruct the printer to perform predefined actions
- must be terminated by a space character or a CR/LF (0x0D, 0x0A)

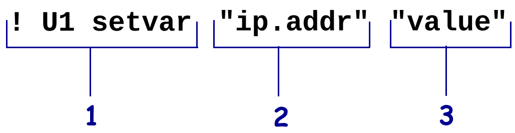
Some `Do` commands require additional settings which must be enclosed in double quotes.

**Important •** The values must be specified in lower case.

# Command Structure

It is important to understand the structure of the command and its components. A command structure illustration is provided for each command in this guide.

**Example** • This is an example of a command structure illustration:



```
! U1 setvar "ip.addr" "value"
```

| | |
|---|---|
| 1 | Command—always preceded with an exclamation point (!) and must be specified in lower case. A space resides between the **!** and **U1** and between **U1** and the command (**setvar** or **getvar**). |
| 2 | Attribute—always in double quotes and must be specified in lower case. |
| 3 | Chosen value—always in double quotes. Only applicable for **setvar** and **do**. |

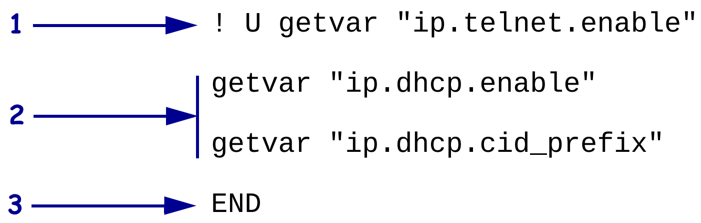
This command must be terminated by a space character or a CR/ LF (0x0D, 0x0A).

**Note** • Some RF cards do not support all of the SGD commands.

## How to Send Multiple SGD Commands

For any getvar, setvar, or do command, if you issue the syntax without the "1" and use the END command followed by a space, multiple SGD commands are sent simultaneously.

**Example** • This syntax shows how you can send multiple getvar commands:



```
! U getvar "ip.telnet.enable"
getvar "ip.dhcp.enable"
getvar "ip.dhcp.cid_prefix"
END
```

| | |
|---|---|
| 1 | The command portion of the string does not use the "1" after the "! U". |
| 2 | Commands issued after the first command do not require the "! U". |
| 3 | The string of commands is terminated by the word "END" with a space after the word, and by a carriage return/ line feed. |

# appl.bootblock

**Description** This command refers to the bootblock version. On the configuration label, the bootblock number is identified as the hardware ID. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the bootblock version number that appears on the configuration label .<br>*Format:* `! U1 getvar "appl.bootblock"` |

**Example •** In this example, the `getvar` returns the bootblock version number.

```
! U1 getvar "appl.bootblock"
```

# appl.name

**Description** This command refers to the printer's firmware version. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see .

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the printer's firmware version.<br>*Format:* `! U1 getvar "appl.name"` |

**Example •** In this example, the `getvar` returns the printer's firmware version.

```
! U1 getvar "appl.name"
```

# cutter.clean_cutter

**Description** This command determines if the clean cutter option is enabled or disabled. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar;setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the status of the clean cutter option.<br>*Format:* `! U1 getvar "cutter.clean_cutter"` |
| `setvar` | This command instructs the printer to set the clean cutter option.<br>*Format:* `! U1 setvar "cutter.clean_cutter"`<br>*Values:*<br>`"on"` = turns on clean cutter<br>`"off"` = turns off clean cutter<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "cutter.clean_cutter" "on"
```

When the setvar value is set to `"on"`, the `getvar` result is `"on"`.

# device.frontpanel.key_press

**Description** This command instructs the printer to press a button on the front panel. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see .

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the printer to press a button on the front panel.<br>*Format:* `! U1 setvar "device.frontpanel.key_press"`<br>*Values:* The values vary per printer, as follows:<br>**ZM400/ZM600, Z4Mplus/Z6Mplus values:**<br>`"A"` = Pause<br>`"B"` = Feed<br>`"C"` = Cancel<br>`"D"` = Setup/Exit<br>`"E"` = Minus<br>`"F"` = Select<br>`"G"` = Plus<br>**XiIIIplus:**<br>`"A"` = Pause<br>`"B"` = Feed<br>`"C"` = Cancel<br>`"D"` = Setup/Exit<br>`"E"` = Previous<br>`"F"` = Next/Save<br>`"G"` = Minus<br>`"H"` = Plus<br>`"I"` = Calibrate<br>**S4M:**<br>`"A"` = Pause<br>`"B"` = Feed<br>`"C"` = Up Arrow<br>`"D"` = Cancel<br>`"E"` = Menu<br>`"F"` = Enter |

**Example •** This `setvar` example shows the value set to `"A"`.

```
! U1 setvar "device.frontpanel.key_press" "A"
```

# device.frontpanel.line1

**Description** This command overrides the content that is shown on the first line of the front panel when the printer is showing the idle display. Use of the `getvar` function is dependent on first using the `setvar` function. For example, to have the first line of the idle display to show HELLO, you must first send a `setvar` command; then a `getvar` command can be sent to retrieve the value HELLO. For printer support, see *SGD Command Support* on page 825. For details on the supported character set, see *Character Set* on page 822.

**Type** `getvar;setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the content that is shown on line one of the front panel.<br>*Format:* `! U1 getvar "device.frontpanel.line1"` |
| `setvar` | This command instructs the printer to set the content that is shown on line one of the front panel.<br>*Format:*<br>`! U1 setvar "device.frontpanel.line1"` "value"<br>*Values:* The maximum amount of alphanumeric ASCII characters available for line 1 on the printer's front panel<br>*Default:* `""` |

**Example** • This `setvar` example shows the value set to `"sample line 1"`.

```
! U1 setvar "device.frontpanel.line1" "sample line 1"
```

When the `setvar` value is set to `"sample line 1"`, the `getvar` result is `"sample line 1"`.

# device.frontpanel.line2

**Description** This command overrides the content that is shown on the second line of the front panel when the printer is showing the idle display. Use of the `getvar` function is dependent on using the `setvar` function. For example, to have the second line of the idle display show HELLO, you must first send a `setvar` command; then a `getvar` command can be sent to retrieve the value HELLO. For printer support, see *SGD Command Support* on page 825. For details on the supported character set, see *Character Set* on page 822.

**Type** `getvar;setvar`

**Note** • For details on SGD command structure, see .

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the content that shows on line two of the front panel.<br>*Format:* `! U1 getvar "device.frontpanel.line2"` |
| `setvar` | This command instructs the printer to set the content that shows on line two of the front panel.<br>*Format:*<br>`! U1 setvar "device.frontpanel.line2"` "value"<br>*Values:* The maximum amount of alphanumeric ASCII characters available for line two on the printer's front panel<br>*Default:* `""` |

**Example** • This `setvar` example shows the value set to `"sample line 2"`.

```
! U1 setvar "device.frontpanel.line2" "sample line 2"
```

When the `setvar` value is set to `"sample line 2"`, the `getvar` result is `"sample line 2"`.

# device.frontpanel.xml

**Description** This command retrieves the current content of the front panel in an XML format. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the file that determines the representation of the front panel.<br>*Format:* `! U1 getvar "device.frontpanel.xml"` |

**Example •** In this example, the `getvar` shows the status of the LEDs and the two lines of the front panel in XML formatted text. The text below is formatted for easy reading. When you use this command the response will not contain line feeds.

```
   ! U1 getvar "device.frontpanel.xml"

<FRONT-PANEL>
  <LCD>
     <LINE1>PRINTER READY</LINE1>
     <LINE2>V53.16.0</LINE2>
  </LCD>
  <LEDS>
     <PAUSE-LED>STEADY-OFF</PAUSE-LED>
     <DATA-LED>STEADY-OFF</DATA-LED>
     <ERROR-LED>STEADY-OFF</ERROR-LED>
  </LEDS>
</FRONT-PANEL>
```

# device.unique_id

**Description** This command retrieves the printer identifier. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see .

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the established printer identifier<br>*Format:* `! U1 getvar "device.unique_id"` |

**Example •** In this example, assuming the printer's unique ID is 12345, the `getvar` shows `"12345"`.

```
! U1 getvar "device.unique_id"
```

# device.languages

**Description** This command identifies the programming language that the printer is currently using. This command is supported on printers running V60.15.8Z, V53.15.2Z, and later. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see .

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the programming language that the printer is currently using. Table 6 shows the possible response values.<br>*Format:* `! U1 getvar "device.languages"` |

**Example •** This example, the `getvar` result is the current programming language that the printer is using.

```
! U1 getvar "device.languages" "epl"
```

**Table 6 • Programming Languages**

| |
|---|
| zpl (Zebra Programming Language) |
| epl (Eltron Programming Language) |
| hybrid_xml_zpl (both XML and ZPL) |

# device.xml.enable

**Description** This command enables and disables language parsing support for XML. When enabled (on), the printer will parse both ZPL and XML. When disabled (off), the printer will not parse XML data. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar;getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command enables and disables language parsing support for XML.<br>*Format:* `! U1 getvar "device.xml.enable"` |
| `setvar` | This command instructs the printer to disable or enable the language parsing support for XML.<br>*Format:* `! U1 getvar "device.xml.enable"`<br>*Values:*<br>`"on"` = enables language parsing support for XML<br>`"off"` = disables language parsing support for XML<br>*Default Value:* `on` |

**Example •** This `setvar` example shows the language parsing support for XML set to `"on"`.

```
! U1 setvar "device.xml.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is language parsing support for XML set to `"on"`.

# device.pnp_option

**Description** This command defines the type of Plug and Play response that is sent by the printer after the printer is started. The printer must be restarted for a new PNP string to be reported. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar;setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the Plug and Play option setting.<br>*Format:* `! U1 getvar "device.pnp_option"` |
| `setvar` | This command instructs the printer to select the desired Plug and Play response option.<br>*Format:* `! U1 setvar "device.pnp_option"`<br>*Values:*<br>`"epl"` = Eltron Programming Language<br>`"zpl"` = Zebra Programming Language<br>*Default:* `"zpl"` |

**Example •** This `setvar` example shows the value set to `"zpl"`.

```
! U1 setvar "device.pnp_option" "epl"
```

When the `setvar` value is set to `"epl"`, the `getvar` result is `"epl"`.

# ip.active_network

**Description** This command displays if the printer is actively connected to wireless, external wired, or internal wired. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with what the printer is currently connected to internal wired, wireless, external wired, or unknown. Table 7 provides details on the potential return values.<br>*Format:* `! U1 getvar "ip.active_network"` |

**Example •** In this example, the `getvar` will return the current active network the printer is connected to.

```
! U1 getvar "ip.active_network"
```

**Table 7 • Printer Responses**

| Return Values | Details |
|---|---|
| “internal wired” | This is the return value when an internal wired device is detected. |
| “wireless” | This is the return value when a wireless device is detected. |
| “external wired” | This is the return value when an external wired device is detected. |
| “unknown” | This is the return value:<br>• if the printer has not established a network connection on any of the devices<br>• if you don't have any of the network devices plugged in<br>• if the printer is still trying to establish a connection (i.e. on wireless it is going through the association process). |

# ip.ftp.enable

**Description** This printer setting refers to the FTP protocol setting. This command tells the printer to turn FTP on or off. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the FTP status.<br>*Format:* `! U1 getvar "ip.ftp.enable"` |
| `setvar` | This command instructs the printer to turn FTP on or off.<br>*Format:* `! U1 setvar "ip.ftp.enable"` "value"<br>*Values:*<br>`"off" =` disables FTP<br>`"on" =` enables FTP<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the FTP status set to `"on"`.

```
! U1 setvar "ip.ftp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is that the FTP status is `"on"`.

# ip.http.enable

**Description** This printer setting refers to the HTTP protocol/web server setting. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the HTTP status.<br>*Format:* `! U1 getvar "ip.http.enable"` |
| `setvar` | This command instructs the printer to change HTTP to on or off.<br>*Format:* `! U1 setvar "ip.http.enable" "value"`<br>*Values:*<br>`"off"` = disables HTTP protocol<br>`"on"` = enables HTTP protocol<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.http.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.lpd.enable

**Description** This printer setting refers to the LPD (Line Printer Daemon) protocol setting. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** LPD communications from the host should be directed to port 515.

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the LPD status.<br>*Format:* `! U1 getvar "ip.lpd.enable"` |
| `setvar` | This command instructs the printer to turn LPD on or off.<br>*Format:* `! U1 setvar "ip.lpd.enable"` "value"<br>*Values:*<br>`"off"` = disables LPD protocol<br>`"on"` = enables LPD protocol<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.lpd.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.pop3.enable

**Description** This printer setting determines if the printer queries a POP3 mailbox for mail. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the POP3 status.<br>*Format:* `! U1 getvar "ip.pop3.enable"` |
| `setvar` | This command instructs the printer to turn POP3 on or off.<br>*Format:* `! U1 setvar "ip.pop3.enable"` "value"<br>*Values:*<br>`"off"` = disables POP3<br>`"on"` = enables POP3<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.pop3.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.pop3.password

**Description** This printer setting refers to the POP3 mailbox password. This only applies if "`ip.pop3.enable`" is set to on. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the POP3 password.<br>*Format:* `! U1 getvar "ip.pop3.password"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to change the POP3 password.<br>*Format:* `! U1 setvar "ip.pop3.password" "`value`"`<br>*Values:* A maximum of 20 alphanumeric characters<br>*Default:* `" "` |

**Example •** This `setvar` example shows the value set to `"password"`.

```
! U1 setvar "ip.pop3.password" "password"
```

When the `setvar` value is set to `"password"`, the `getvar` result is `"*"`.

# ip.pop3.poll

**Description** This printer setting refers to how frequent (in seconds) the printer queries a POP3 mailbox for new mail. This only applies if the "`ip.pop3.enable`" is set to on. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** A poll value of less then thirty seconds is not recommended. The printer is unresponsive for several seconds when polling for email depending on data transfer time from the server to the printer.

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the POP3 poll frequency (in seconds).<br>*Format:* `! U1 getvar "ip.pop3.poll"` |
| `setvar` | This command instructs the printer to change the POP3 poll interval. A value of `"0"` causes the printer to only query the POP3 mailbox one time, on printer power up, or following a network reset.<br>*Format:* `! U1 setvar "ip.pop3.poll"` "value"<br>*Values:* `"0"` through `"65535"`<br>*Default:* `"0"` |

**Example •** This `setvar` example shows the value set to `"0"`.

```
! U1 setvar "ip.pop3.poll" "0"
```

When the `setvar` value is set to `"0"`, the `getvar` result is `"0"`.

# ip.pop3.server_addr

**Description** This printer setting refers to the POP3 server IP address that the printer contacts when checking for new mail. This only applies if "`ip.pop3.enable`" is set to on. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the POP3 server address.<br>*Format:* `! U1 getvar "ip.pop3.server_addr"` |
| `setvar` | This command instructs the printer to change the POP3 server address.<br>*Format:* `! U1 setvar "ip.pop3.server_addr" "value"`<br>*Values:* Any valid POP3 server address<br>*Default:* `"0.0.0.0"` |

**Example •** This `setvar` example shows the value set to `"10.3.5.10"`.

```
! U1 setvar "ip.pop3.server_addr" "10.3.5.10"
```

When the `setvar` value is set to `"10.3.5.10"`, the `getvar` result is `"10.3.5.10"`.

# ip.pop3.username

**Description** This printer setting refers to the POP3 user name. This only applies if the "ip.pop3.enable" is set to on. For printer support, see *SGD Command Support* on page 825.

**Type** getvar; setvar

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| getvar | This command instructs the printer to respond with the POP3 user name.<br>*Format:* ! U1 getvar "ip.pop3.username" |
| setvar | This command instructs the printer to change the POP3 user name.<br>*Format:* ! U1 setvar "ip.pop3.username" "value"<br>*Values:* A maximum of 20 alphanumeric characters<br>*Default:* " " |

**Example •** This setvar example shows the value set to "user".

```
! U1 setvar "ip.pop3.username" "user"
```

When the setvar value is set to "user", the getvar result is "user".

# ip.primary_network

**Description** This command allows you to set the primary network to either wired or wireless. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the name of the current primary network device.<br>*Format:* `! U1 getvar "ip.primary_network"` |
| `setvar` | This command instructs the printer to set the current network device.<br>*Format:* `! U1 setvar "ip.primary_network" "`value`"`<br>*Values:*<br>`1 =` wired<br>`2 =` wireless<br>*Default:* `"1"` |

**Example •** This `setvar` example shows the value set to `"1"`.

```
! U1 setvar "ip.primary_network" "1"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"1"`.

# ip.smtp.domain

**Description** This printer setting refers to the domain name used by the printer in sending email with respect to the SMTP server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the SMTP domain name.<br>*Format:* `! U1 getvar "ip.smtp.domain"` |
| `setvar` | This command instructs the printer to change the SMTP domain name.<br>*Format:* `! U1 setvar "ip.smtp.domain" "`value`"`<br>*Values:* A maximum of 24 alphanumeric characters<br>*Default:* `"ZBRPrintServer"` |

**Example** • This `setvar` example shows the value set to `"ZBRPrintServer.com"`.

```
! U1 setvar "ip.smtp.domain" "ZBRPrintServer.com"
```

When the `setvar` value is set to `"ZBRPrintServer.com"`, the `getvar` result is `"ZBRPrintServer.com"`.

# ip.smtp.enable

**Description** This printer setting refers to the SMTP protocol. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the SMTP status.<br>*Format:* `! U1 getvar "ip.smtp.enable"` |
| `setvar` | This command instructs the printer to turn SMTP on or off.<br>*Format:* `! U1 setvar "ip.smtp.enable"` "value"<br>*Values:*<br>`"off"` = disables SMTP<br>`"on"` = enables SMTP<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.smtp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.smtp.server_addr

**Description** This printer setting refers to the IP address of the SMTP server used for sending email. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current SMTP server address.<br>*Format:* `! U1 getvar "ip.smtp.server_addr"` |
| `setvar` | This command instructs the printer to change the SMTP server address.<br>*Format:* `! U1 setvar "ip.smtp.server_addr" "value"`<br>*Values:* Any valid IP address.<br>*Default:* `0.0.0.0` |

**Example •** This `setvar` example shows the value set to `10.10.10.10`.

```
! U1 setvar "ip.smtp.server_addr" "10.10.10.10"
```

When the `setvar` value is set to `"10.10.10.10"`, the `getvar` result is `"10.10.10.10"`.

# ip.snmp.get_community_name

**Description** This printer setting is used when making SNMP queries. The SNMP client must supply the get community name that matches the printer's get community name in order to query any SNMP data. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to get the SNMP get community name string.<br>*Format:* `! U1 getvar "ip.snmp.get_community_name"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the SNMP get community name string.<br>*Format:*<br>`! U1 setvar "ip.snmp.get_community_name"` "value"<br>*Values:* A maximum of 19 alphanumeric characters.<br>*Default:* `"public"` |

**Example •** This `setvar` example shows the value set to `"public"`.

```
! U1 setvar "ip.snmp.get_community_name" "public"
```

When the `setvar` value is set to `"public"`, the `getvar` result is `"*"`.

# ip.snmp.set_community_name

**Description** This printer setting is used when changing SNMP data remotely. To alter any SNMP data, the SNMP client must supply the set community name that matches the printer's set community name. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the printer's SNMP set community name string.<br>*Format:* `! U1 getvar "ip.snmp.set_community_name"`<br>For protection a single `"*"` returns. |
| `setvar` | This command instructs the printer to set the SNMP set community name string.<br>*Format:* `! U1 setvar "ip.snmp.set_community_name" "value"`<br>*Values:* A maximum of 19 alphanumeric characters<br>*Default:* `"public"` |

**Example •** This `setvar` example shows the value set to `"public"`.

```
! U1 setvar "ip.snmp.set_community_name" "public"
```

When the `setvar` value is set to `"public"`, the `getvar` result is `"*"`.

# ip.telnet.enable

**Description** This printer setting refers to the TELNET (port 23) protocol. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the TELNET status.<br>*Format:* `! U1 getvar "ip.telnet.enable"` |
| `setvar` | This command instructs the printer to turn TELNET on or off.<br>*Format:* `! U1 setvar "ip.telnet.enable" "`value`"`<br>*Values:*<br>`"off"` = disables telnet protocol<br>`"on"` = enables telnet protocol<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.telnet.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.snmp.enable

**Description** This printer setting refers to the SNMP protocol. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the SNMP status.<br>*Format:* `! U1 getvar "ip.snmp.enable"` |
| `setvar` | This command instructs the printer to enable or disable the SNMP protocol.<br>*Format:* `! U1 setvar "ip.snmp.enable" "`value`"`<br>*Values:*<br>`"on"` = enable the SNMP protocol<br>`"off"` = disable the SNMP protocol<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.snmp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.tcp.enable

**Description** This printer setting refers to the TCP socket protocol. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the TCP status.<br>*Format:* `! U1 getvar "ip.tcp.enable"` |
| `setvar` | This command instructs the printer to turn the TCP on or off.<br>*Format:* `! U1 setvar "ip.tcp.enable"` "value"<br>*Values:*<br>`"off"` = disables TCP protocol<br>`"on"` = enables TCP protocol<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.tcp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.udp.enable

**Description** This printer setting refers to the UDP socket protocol. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the UDP status.<br>*Format:* `! U1 getvar "ip.udp.enable"` |
| `setvar` | This command instructs the printer to turn UDP on or off.<br>*Format:* `! U1 setvar "ip.udp.enable"` "value"<br>*Values:*<br>`"off"` = disables UDP protocol<br>`"on"` = enables UDP protocol<br>*Default:* `"off"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.udp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# media.printmode

**Description** This printer setting determines the action the printer takes after a label or group of labels has printed. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the the currently set media print mode.<br>*Format:* `! U1 getvar "media.printmode"` |
| `setvar` | This command instructs the printer to change the media print mode.<br>*Format:* `! U1 setvar "media.printmode"` "value"<br>*Values:*<br>tear off = `"T"`<br>peel off = `"P"`<br>rewind = `"R"`<br>applicator = `"A"`<br>cutter = `"C"`<br>delayed cutter = `"D"`<br>reserved = `"L" *`<br>reserved = `"U" *` |

* These values are only supported on the Zebra ZM400/ZM600™ printer.

**Example •** This `setvar` example shows the value set to `"T"`.

```
! U1 setvar "media.printmode" "T"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"tear off"`.

For more details on how each `setvar` value relates to the `getvar` responses, see Table 8, *Setvar / Getvar Relation* on page 622.

Table 8 • Setvar / Getvar Relation

| If the setvar is set to … | Then the getvar response and control panel display is … |
|---|---|
| "T" | TEAR OFF |
| "P" | PEEL OFF |
| "R" | REWIND |
| "A" | APPLICATOR |
| "C" | CUTTER |
| "D" | DELAYED CUT |
| "L" | RESERVED |
| "U" | RESERVED |

# odometer.headclean

**Description** This printer setting refers to the head clean odometer count. This counter tracks how many inches and centimeters have passed through the printer since the head was last cleaned. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to retrieve the values for the head clean counter.<br>*Format:* `! U1 getvar "odometer.headclean"` |
| `setvar` | This command instructs the printer to reset the head clean counter.<br>*Format:* `! U1 setvar "odometer.headclean" "value"`<br>*Values:*<br>`"0"` = reset the head clean counter<br>*Default:* must be an accepted value or it is ignored |

**Example** • This example shows how to get the odometer head clean, how to reset it, and how to confirm the settings changed.

1. To see the current settings, type:

   ```
   ! U1 getvar "odometer.headclean"
   ```

   Something similar to this is shown:

   ```
   "1489 INCHES, 3784 CENTIMETERS"
   ```

2. To reset the these values to 0, type:

   ```
   ! U1 setvar "odometer.headclean" "0"
   ```

3. To confirm this settings were reset, type:

   ```
   ! U1 getvar "odometer.headclean"
   ```

   If the resetting was successful, this is shown:

   ```
   "0 INCHES, 0 CENTIMETERS"
   ```

# odometer.headnew

**Description** This printer setting refers to the head replaced odometer count. This counter tracks how many inches and centimeter passed through the printer since the head was last replaced. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to retrieve the values for the head new counter.<br>*Format:* `! U1 getvar "odometer.headnew"` |
| `setvar` | This command instructs the printer to reset the head new counter.<br>*Format:* `! U1 setvar "odometer.headnew"` "value"<br>*Values:*<br>`"0"` = resets the head new counter<br>*Default:* must be an accepted value or it is ignored |

**Example •** This example shows how to get the odometer head new, how to reset it, and how to confirm the settings changed:

1. To see the current settings, type:

   ```
   ! U1 getvar "odometer.headnew"
   ```

   Something similar to this is shown:

   ```
   "1489 INCHES, 3784 CENTIMETERS"
   ```

2. To reset the these values to 0, type:

   ```
   ! U1 setvar "odometer.headnew" "0"
   ```

3. To confirm this settings were reset, type:

   ```
   ! U1 getvar "odometer.headnew"
   ```

   If the resetting was successful, this is shown:

   ```
   "0 INCHES, 0 CENTIMETERS
   ```

# odometer.label_dot_length

**Description** This command returns the length of the last label printed or fed (in dots). For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the length of the last label printed or fed (in dots).<br>*Format:*<br>`! U1 getvar "odometer.label_dot_length"` |

**Example •** This is an example of how to reset the length using the `^LL` command and how to use the getvar to confirm the change. For the `^LL` command to work the printer must be in continuous mode.

1. To change the odometer label dot length, type:

```
^XA
^LL500
^XZ
```

2. To get the current odometer label dot length, type:

```
! U1 getvar "odometer.label_dot_length"
```

Something similar to this is shown:

```
"500"
```

# odometer.media_marker_count1

**Description** This printer setting refers to the value of the first (count1) user resettable counter. The user resettable counters track how much media has passed through the printer in both inches or centimeters. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on the command structure of SGD commands, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the current value of the first (count1) user resettable counter in both inches and centimeters.<br>*Format:* `! U1 getvar "odometer.media_marker_count1"` |
| `setvar` | This command instructs the printer to reset the first user resettable counter.<br>*Format:*<br>`! U1 setvar "odometer.media_marker_count1" "`value`"`<br>*Values:*<br>`"0"` = reset the counter<br>*Default:* must be an accepted value or it is ignored |

**Example** • This example shows how to get the first user resettable counter, how to reset it, and how to confirm the settings have changed:

1. To see the current settings, type:

   ```
   ! U1 getvar "odometer.media_marker_count1"
   ```

   Something similar to this is shown:

   ```
   "8516 INCHES, 21632 CENTIMETERS"
   ```

2. To reset the these values to 0, type:

   ```
   ! U1 setvar "odometer.media_marker_count1" "0"
   ```

3. To confirm these settings were reset, type:

   ```
   ! U1 getvar "odometer.media_marker_count1"
   ```

   If the resetting was successful, this is shown:

   ```
   "0 INCHES, 0 CENTIMETERS"
   ```

# odometer.media_marker_count2

**Description** This printer setting refers to the value of the second (count2) user resettable counter. The user resettable counters track how much media has passed through the printer in both inches or centimeters. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the current value of the second (count2) user resettable counter in both inches and centimeters.<br>*Format:* `! U1 getvar "odometer.media_marker_count2"` |
| `setvar` | This command instructs the printer to reset the second user resettable counter.<br>*Format:*<br>`! U1 setvar "odometer.media_marker_count2" "`value`"`<br>*Values:*<br>`"0" =` reset the counter<br>*Default:* must be an accepted value or it is ignored |

**Example •** This example shows how to get the second user resettable counter, how to reset it, and how to confirm the settings have changed:

1. To see the current settings, type:

   ```
   ! U1 getvar "odometer.media_marker_count2"
   ```

   Something similar to this is shown:

   ```
   "8516 INCHES, 21632 CENTIMETERS"
   ```

2. To reset the these values to 0, type:

   ```
   ! U1 setvar "odometer.media_marker_count2" "0"
   ```

3. To confirm these settings were reset, type:

   ```
   ! U1 getvar "odometer.media_marker_count2"
   ```

   If the resetting was successful, this is shown:

   ```
   "0 INCHES, 0 CENTIMETERS"
   ```

# odometer.total_print_length

**Description** This command tracks the total length of media that printed over the life of the printer. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the value of the total length of media that printed over the life of the printer.<br>*Format:* `! U1 getvar "odometer.total_print_length"` |

**Example •** This example shows how to get the total length of media that printed over the life of the printer.

1. To get the total length of media that has printed to date, type:

```
! U1 getvar "odometer.total_print_length"
```

   Something similar to this is shown:

```
"8560 INCHES, 21744 CENTIMETERS"
```

# rfid.error.response

**Description** During an error condition, an error message shows on the second line of the display. This command can be used to retrieve that error message. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with any active RFID error messages.<br>*Format:* `! U1 getvar "rfid.error.response"` |

**Example •** This `getvar` example shows responses that you may get in different situations:

```
! U1 getvar "rfid.error.response"
```

If no RFID tag is present, you get the following response:

```
NO TAG FOUND
```

If an RFID tag is present and there are no errors, you get the following response:

```
RFID OK
```

# rfid.position.program

**Description** This command sets the read/write position of the transponder in vertical (Y axis) dot rows from the top of the label. Set to 0 (no movement) if the transponder is already in the effective area without moving the media.. For printer support, see *SGD Command Support* on page 825.

**Important •** If a label format specifies a value for this parameter, this value will be used for the programming position for all labels until a new position is specified or until the printer is turned off (**O**) and then back on (**I**).

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current programming position.<br>*Format:* `! U1 getvar "rfid.position.program"` |
| `setvar` | This command instructs the printer to set the programming position.<br>*Format:* `! U1 setvar "rfid.position.program" "value"`<br>*Values:*<br>0 to label length<br>*Default value:*<br>**For the R110*PAX*4 and R2844-Z:** 0<br>**For all other supported printers:** label length minus 1 mm (1/16 in.)<br>*Default:* 1 |

**Example •** This `setvar` example shows the programming position being set at 15 dot rows from the top of the label.

```
! U1 setvar "rfid.position.program" "15"
```

When the `setvar` value is set to `"15"`, the `getvar` result is `"15"`.

# rfid.reader_1.antenna_port

**Description** This command selects the RFID antenna port. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current antenna port.<br>*Format:* `! U1 getvar "rfid.reader_1.antenna_port"` |
| `setvar` | This command instructs the printer to set the antenna port.<br>*Format:* `! U1 setvar "rfid.reader_1.antenna_port" "value"`<br>*Values:*<br>`1` = antenna port 1<br>`2` = antenna port 2<br>*Default:* 1 |

**Example •** This `setvar` example shows the selection of antenna port 2.

```
! U1 setvar "rfid.reader_1.antenna_port" "2"
```

When the `setvar` value is set to `"2"`, the `getvar` result is `"2"`.

# rfid.reader_1.power.read

**Description** This command sets the RFID reader power level for reading RFID tags. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the antenna's current read power level.<br>*Format:* `! U1 getvar "rfid.reader_1.power.read"` |
| `setvar` | This command instructs the printer to set the antenna's read power level.<br>*Format:* `! U1 setvar "rfid.reader_1.power.read" "value"`<br>*Values:*<br>`H` = high<br>`M` = medium<br>`L` = low<br>*Default:* `L` |

**Example** • This `setvar` example sets the antenna to high power for reading RFID tags.

```
! U1 setvar "rfid.reader_1.power.read" "H"
```

When the `setvar` value is set to `"H"`, the `getvar` result is `"H"`.

# rfid.reader_1.power.single_power

**Description** This command sets the RFID reader power level for reading and writing to RFID tags for readers with a single power level. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current power level.<br>*Format:* `! U1 getvar "rfid.reader_1.power.single_power"` |
| `setvar` | This command instructs the printer to set the power level for reading and writing.<br>*Format:* `! U1 setvar "rfid.reader_1.power.single_power" "value"`<br>*Values:*<br>`H` = high<br>`M` = medium<br>`L` = low<br>*Default:* `L` |

**Example •** This `setvar` example sets the antenna to high power for writing to RFID tags.

```
! U1 setvar "rfid.reader_1.power.single_power" "H"
```

When the `setvar` value is set to `"H"`, the `getvar` result is `"H"`.

# rfid.reader_1.power.write

**Description** This command sets the RFID reader power level for writing to RFID tags. For printer support, see *SGD Command Support* on page 825.

**Note •** This parameter is ignored on the R110*Xi* HF printer because read and write powers cannot be specified separately. See *rfid.reader_1.power.single_power* on page 633 to set the power level for the R110*Xi* HF printer.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the antenna's current write power level.<br>*Format:* `! U1 getvar "rfid.reader_1.power.write"` |
| `setvar` | This command instructs the printer to set the wrtie power level.<br>*Format:* `! U1 setvar "rfid.reader_1.power.write" "value"`<br>*Values:*<br>`H` = high<br>`M` = medium<br>`L` = low<br>*Default:* `L` |

**Example •** This `setvar` example sets the antenna to high power for writing to RFID tags.

```
! U1 setvar "rfid.reader_1.power.write" "H"
```

When the `setvar` value is set to `"H"`, the `getvar` result is `"H"`.

# zbi.control.add_breakpoint

**Description** This command instructs the printer to set a ZBI program break point. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the printer to set a ZBI program break point.<br>*Format:*<br>`! U1 setvar "zbi.control.add_breakpoint" "`value`"`<br>*Values:* Any line number of the program currently being debugged. |

**Example** • This `setvar` example shows setting the breakpoint at line `"30"`.

```
! U1 setvar "zbi.control.add_breakpoint" "30"
```

# zbi.control.break

**Description** This command breaks the execution of the ZBI 2.0 program that is currently running. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command breaks the execution of the ZBI program that is currently running.<br>*Format:* `! U1 setvar "zbi.control.break" ""`<br>*Values:*<br>`""` |

**Example •** This `setvar` example shows the value set to `""`.

```
! U1 setvar "zbi.control.break" ""
```

# zbi.control.clear_breakpoints

**Description** This command deletes all breakpoints in the current ZBI 2.0 program. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the printer to delete all breakpoints.<br>*Format:*<br>`! U1 setvar "zbi.control.clear_breakpoints" ""`<br>*Values:* `""` |

**Example •** This `setvar` example shows the value set to `""`.

```
! U1 setvar "zbi.control.clear_breakpoints" ""
```

# zbi.control.delete_breakpoint

**Description** This command deletes a breakpoint in the current ZBI 2.0 program. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the printer to delete the breakpoint at the line indicated by the value parameter.<br>*Format:*<br>`! U1 setvar "zbi.control.delete_breakpoint" "`value`"`<br>*Values:* you can use the same value as add_breakpoint. |

**Example •** This `setvar` example shows the breakpoint set to `"30"`.

```
! U1 setvar "zbi.control.delete_breakpoint" "30"
```

# zbi.control.line_number

**Description** This command gives you control and information about which line of a stopped ZBI 2.0 program is being executed. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar;setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the line number that is currently being executed in the ZBI 2.0 program.<br>*Format:* `! U1 getvar "zbi.control.line_number"` |
| `setvar` | This command sets which line of the current ZBI 2.0 program should be executed.<br>*Format:*<br>`! U1 setvar "zbi.control.line_number" "value"`<br>*Values:* Any line number of the currently stopped ZBI program.<br>*Default:* `"0"` |

**Example •** This `setvar` example shows the value parameter set to `"30"`.

```
! U1 setvar "zbi.control.line_number" "30"
```

When the `setvar` value is set to `"30"`, the `getvar` result is `"30"`.

# zbi.control.restart

**Description** This command restarts a ZBI 2.0 program that is currently stopped. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command restarts a ZBI 2.0 program that is currently stopped.<br>*Format:* `! U1 setvar "zbi.control.restart"` "value"<br>*Values:*<br>`""` |

**Example •** This `setvar` example shows the value set to `""`.

```
! U1 setvar "zbi.control.restart" ""
```

# zbi.control.run

**Description** This command runs the current ZBI 2.0 program that is loaded in the interpreter. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command runs the ZBI 2.0 program that is loaded in the interpreter.<br>*Format:* `! U1 setvar "zbi.control.run" ""`<br>*Values:*<br>`""` |

**Example •** This `setvar` example shows the value set to `""`.

```
! U1 setvar "zbi.control.run" ""
```

# zbi.control.step

**Description** This command restarts the execution of the currently stopped ZBI 2.0program for one line. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the printer to restart the execution of the currently stopped ZBI 2.0 program for one line.<br>*Format:* `! U1 setvar "zbi.control.step" ""`<br>*Values:*<br>`""`<br>*Default:* `""` |

**Example •** This `setvar` example shows the value set to `""`.

```
! U1 setvar "zbi.control.step" ""
```

When the `setvar` value is set to `""`.

# zbi.control.terminate

**Description** This command instructs the ZBI 2.0 program to terminate and shuts down the interpreter. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the ZBI 2.0 program to terminate and shuts down the interpreter.<br>*Format:* `! U1 setvar "zbi.control.terminate"` "value"<br>*Values:*<br>`""` |

**Example •** This `setvar` example shows the value set to `""`.

```
! U1 setvar "zbi.control.terminate" ""
```

# zbi.control.variable_name

**Description** This command sets the name of the variable that is to be read or modified through `variable_value`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar;setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the variable value that is to show on the front panel.<br>*Format:* `! U1 getvar "zbi.control.variable_name"` |
| `setvar` | This command sets the variable that is to show on the front panel.<br>*Format:*<br>`! U1 setvar "zbi.control.variable_name" "`value`"`<br>*Values:* Any ZBI variable in the program that is currently being debugged.<br>*Default:* `""` |

**Example •** This `setvar` example shows the value set to `"MYVAR$"`.

```
! U1 setvar "zbi.control.variable_name" "MYVAR$"
```

When the `setvar` value is set to `"MYVAR$"`, the `getvar` result is `"MYVAR$"`.

# zbi.control.variable_value

**Description** This command identifies the variable name. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar;setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the variable name that is loaded into the variable_name.<br>*Format:* `! U1 getvar "zbi.control.variable_value"` |
| `setvar` | This command sets a value to the variable referenced by a variable_name.<br>*Format:*<br>`! U1 setvar "zbi.control.variable_value"` "value"<br>*Values:* A string or integer that is dependent on the variable type in `variable_name`.<br>*Default:* The current value of the variable referenced via variable_name |

**Example •** This `setvar` example shows the value set to `"Hello World"`.

```
! U1 setvar "zbi.control.variable_value" "Hello World"
```

When the `setvar` value is set to `"Hello World"`, the `getvar` result is `"Hello World"`.

# zbi.key

**Description** This command identifies if the ZBI 2.0 option is enabled or disabled on the printer. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the status of the ZBI 2.0 option on the printer.<br>*Format:* `! U1 getvar "zbi.key"` |

**Example •** In this example, the `getvar` shows the status of ZBI on the printer.

```
 ! U1 getvar "zbi.key"
"ENABLED"
```

# zbi.last_error

**Description** This command identifies the last error that the ZBI 2.0 interpreter encountered. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command shows the last error that the ZBI 2.0 interpreter encountered.<br>*Format:* `! U1 getvar "zbi.last_error"` |

**Example •** This example demonstrates how to make the ZBI 2.0 interpreter return the last error it encountered.

```
! U1 getvar "zbi.last_error"
```

# zbi.revision

**Description** This command identifies the current ZBI version. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the current ZBI version.<br>*Format:* `! U1 getvar "zbi.revision"` |

**Example •** In this example, the `getvar` shows the current ZBI version.

```
! U1 getvar "zbi.revision"
```

# zbi.running_program_name

**Description** This command identifies the name of the ZBI 2.0 program that is currently running. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the name of the currently running ZBI 2.0 program.<br>*Format:* `! U1 getvar "zbi.running_program_name"` |

**Example •** In this example, the `getvar` command causes the printer to respond that the program `choices.bas` is currently running.

```
 ! U1 getvar "zbi.running_program_name"
"CHOICES.BAS"
```

# zbi.start_info.execute

**Description** This command instructs the ZBI 2.0 environment to execute the program listed in the file_name. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `setvar` | This command instructs the ZBI 2.0 environment to execute the program listed in the file_name.<br>*Format:* `! U1 setvar "zbi.start_info.execute"` |

**Example •** This `setvar` example executes the `"choices.bas"` program.

```
! U1 setvar "zbi.start_info.execute" "choices.bas"
```

# zbi.start_info.file_name

**Description** This command prepares a program to run when the `zbi.start_info.execute` command is used. This command does not run the program. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar;setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command is used to return the file path and file name of a ZBI 2.0 program to run using the `zbi.start_info.execute` command.<br>*Format:* `! U1 getvar "zbi.start_info.file_name"`<br>*Default:* The last program run. If nothing has been run, `"*:\.BAZ"`. |
| `setvar` | This command is used to prepare a ZBI 2.0 program to be executed using the `zbi.start_info.execute` command.<br>*Format:* `! U1 setvar "zbi.start_info.file_name"` "value"<br>*Values:* a file name or path of a basic program |

**Example** • This `setvar` example shows the value set to `"E:PROGRAM1.BAS"`.

```
! U1 setvar "zbi.start_info.file_name" "E:PROGRAM1.BAS"
```

When the `setvar` value is set to `"E:PROGRAM1.BAS"`, the `getvar` result is `"E:PROGRAM1.BAS"`.

# zbi.start_info.memory_alloc

**Description** This command identifies the amount of memory currently in use in a ZBI 2.0 program. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command shows the amount of memory currently in use in bytes.<br>*Format:* `! U1 getvar "zbi.start_info.memory_alloc"` |

**Example •** In this example, the `getvar` shows the amount of memory currently in use.

```
! U1 getvar "zbi.start_info.memory_alloc"
"17203"
```

# zbi.state

**Description** This command shows the current state of the ZBI 2.0 program. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 590.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command retrieves the current state of ZBI.<br>*Format:* `! U1 getvar "zbi.state"`<br>*Values:*<br>`"running"` = ZBI Interpreter is active and running a program<br>`"off"` = ZBI Interpreter is inactive<br>`"stopped"` = ZBI Interpreter is active but not executing a program |

**Example •** In this example, the `getvar` shows that state of ZBI.

```
! U1 getvar "zbi.state"
"running"
```

**Notes •** ___________________________________________________________

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# SGD Wired Commands

This chapter provides a high-level overview of the wired Set / Get / Do (SGD) commands. For printer support of these SGD commands, see *SGD Command Support* on page 825.

SGD commands are available in printers with firmware version V60.15.x, V50.15.x, V53.15.xZ, or later.

**Important •** These are important points to note when using ZPL and SGD commands:

- SGD commands are case-sensitive.
- ZPL and SGD commands should be sent to the printer as separate files.
- Certain settings can be controlled by both ZPL and SGD. Configuration changes made in ZPL can affect configuration changes made in SGD.
- Changes made with one command type (ZPL or SGD) will affect the data returned to the host in response to both ZPL and getvar commands. The command type (ZPL or SGD) that was sent last determines the current setting.
- Some RF cards do not support all of the SGD commands.

# Overview

This section describes how and why to use the Set / Get / Do (SGD) commands. It also provides an example of a typical command structure.

**Note •** SGD commands must be terminated by a carriage return or a space and line feed.

SGD commands are commands that allow you to configure all printers with firmware version V60.15.x, V50.15.x, V53.15.xZ, or later. The printer performs the specified function immediately after receiving the command. The commands are:

- **`setvar`**
- **`getvar`**
- **do**

## setvar Command

`Setvar` commands:

- are used to configure printer settings to specific values by setting them in the printer
- must be terminated by a space character or a CR/ LF (0x0D, 0x0A)

**Important •** The setvar command and attributes must be specified in lower case.

## getvar Command

`Getvar` commands:

- are used to get the current value of the printer settings
- must be terminated by a space character or CR/LF (0x0D, 0x0A)

The printer responds with the printer setting of “?” if:

- the printer setting does not exist (usually due to incorrect spelling of the printer setting)
- it has not been configured yet

**Important •** The printer settings and attributes must be specified in lower case.

## do Command

`Do` commands:

- are used to instruct the printer to perform predefined actions
- must be terminated by a space character or a CR/LF (0x0D, 0x0A)

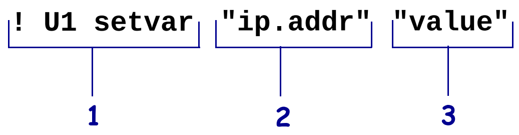
Some `Do` commands require additional settings which must be enclosed in double quotes.

**Important •** The values must be specified in lower case.

# Command Structure

It is important to understand the structure of the command and its components. A command structure illustration is provided for each command in this guide.

**Example** • This is an example of a command structure illustration:



```
! U1 setvar "ip.addr" "value"
```

| | |
|---|---|
| 1 | Command—always preceded with an exclamation point (!) and must be specified in lower case. A space resides between the **!** and **U1** and between **U1** and the command (**setvar** or **getvar**). |
| 2 | Attribute—always in double quotes and must be specified in lower case. |
| 3 | Chosen value—always in double quotes. Only applicable for **setvar** and **do**. |

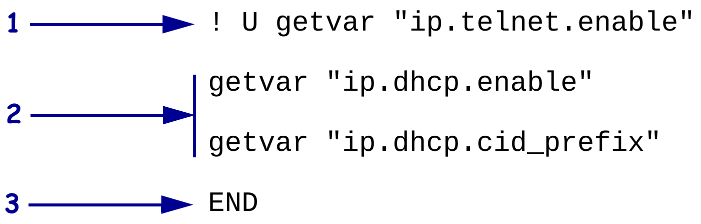
This command must be terminated by a space character or a CR/ LF (0x0D, 0x0A).

**Note** • Some RF cards do not support all of the SGD commands.

## How to Send Multiple SGD Commands

For any getvar, setvar, or do command, if you issue the syntax without the "1" and use the END command followed by a space, multiple SGD commands are sent simultaneously.

**Example** • This syntax shows how you can send multiple getvar commands:



```
! U getvar "ip.telnet.enable"
getvar "ip.dhcp.enable"
getvar "ip.dhcp.cid_prefix"
END
```

| | |
|---|---|
| 1 | The command portion of the string does not use the "1" after the "! U". |
| 2 | Commands issued after the first command do not require the "! U". |
| 3 | The string of commands is terminated by the word "END" with a space after the word, and by a carriage return/ line feed. |

# external_wired.ip.addr

**Description** This command allows you to get or set the external wired print servers's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important** • For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with its current external wired print server IP address.<br>*Format:* `! U1 getvar "external_wired.ip.addr"` |
| `setvar` | This command instructs the printer to change its current external wired print server IP address upon powering the printer on.<br>*Format:* `! U1 setvar "external_wired.ip.addr"` "value"<br>*Values:* any valid IP address<br>*Default:* `"0.0.0.0"` |

**Note** • The `setvar` value of this command can be affected by the `external_wired.ip.dhcp.enable` command.

**Example** • This `setvar` example shows the value set to `"10.14.4.235"`.

```
! U1 setvar "external_wired.ip.addr" "10.14.4.235"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"10.14.4.235"`.

# external_wired.ip.arp_interval

**Description** This print server setting allows you to specify the ARP (Address Resolution Protocol) interval or the ARP cache time out for the external wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the ARP interval or the ARP cache time out value for the external wired print server.<br>*Format:* `! U1 getvar "external_wired.ip.arp_interval"` |
| `setvar` | This command instructs the printer to change the ARP interval or the ARP cache time out for the external wired print server.<br>*Format:* `! U1 setvar "external_wired.ip.arp_interval" "value"`<br>*Values:* `0 - 30`<br>*Default:* `"0"` |

**Example •** This `setvar` example shows the value set to `"0"`.

```
! U1 setvar "external_wired.ip.arp_interval" "0"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"0"`.

# external_wired.ip.default_addr.enable

**Description** This command allows you to default the external wired print server's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to show the status of the setting of external wired print server's default IP address feature.<br>*Format:*<br>`! U1 getvar "external_wired.ip.default_addr.enable"` |
| `setvar` | This command tells the printer to use it's default address, if no address is provided through DHCP or BOOTP. If you do not assign an IP address after 2 minutes, the 10/100 Internal PS defaults to IP address 192.168.254.254.<br>*Format:*<br>`! U1 setvar "external_wired.ip.default_addr.enable" "`value`"`<br>*Values:*<br>`"on"` = enabled<br>`"off"` = disabled<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "external_wired.ip.default_addr.enable" "on"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"on"`.

# external_wired.ip.dhcp.cid_all

**Description** This printer setting defines the entire client identifier (DHCP option 61) if DHCP is enabled on the external print server and `"external_wired.ip.dhcp.cid_type"` is set to `"0"`, or `"2"`. The MAC address is used if the type is set to `"1"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix and suffix of the external wired print server.<br>*Format:*<br>`! U1 getvar "external_wired.ip.dhcp.cid_all"` |
| `setvar` | This command instructs the printer to change the client identifier prefix and suffix of the external wired print server. The prefix gets cleared and the suffix contains the entire client identifier.<br>*Format:*<br>`! U1 setvar "external_wired.ip.dhcp.cid_all"` "value"<br>*Values:* A maximum length of 60 characters if the CID type is ASCII, or 120 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example** • This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "external_wired.ip.dhcp.cid_all" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# external_wired.ip.dhcp.cid_enable

**Description** This command determines if DHCP (option 61) on the external wired print server is turned on or off. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the status of the client identifier of the external wired print server.<br>*Format:*<br>`! U1 getvar "external_wired.ip.dhcp.cid_enable"` |
| `setvar` | This command instructs the printer to set the status of the client identifier of the external wired print server.<br>*Format:*<br>`! U1 setvar "external_wired.ip.dhcp.cid_enable" "`value`"`<br>*Values:*<br>`"off"` = client identifier is turned off<br>`"on"` = client identifier is turned on<br>*Default:* `"off"` |

**Example •** This `setvar` example shows the value set to `"off"`.

```
! U1 setvar "external_wired.ip.dhcp.cid_enable" "off"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"off"`.

# external_wired.ip.dhcp.cid_prefix

**Description** This printer setting defines the prefix to be prepended to the DHCP client identifier (option 61) when DHCP is enabled on the external wired print server and `"external_wired.ip.dhcp.cid_type"` is set to `"0"` or `"2"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix of the external wired print server.<br>*Format:*<br>`! U1 getvar "external_wired.ip.dhcp.cid_prefix"` |
| `setvar` | This command instructs the printer to change the CID prefix of the external wired print server.<br>*Format:*<br>`! U1 setvar "external_wired.ip.dhcp.cid_prefix" "value"`<br>*Values:* Any text string up to 10 characters if the CID type is ASCII, or 20 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example** • This `setvar` example shows the value set to `"PRT001"`.

```
! U1 setvar "external_wired.ip.dhcp.cid_prefix" "PRT001"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"PRT001"`.

# external_wired.ip.dhcp.cid_suffix

**Description** This printer setting defines the unique suffix to be used as the client identifier (DHCP option 61) if DHCP is enabled repeated on the external wired print server and *external_wired.ip.dhcp.cid_type* on page 666 is set to `"0"` or `"2"`, not `"1"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier suffix on the external wired print server.<br>*Format:*<br>`! U1 getvar "external_wired.ip.dhcp.cid_suffix"` |
| `setvar` | This command instructs the printer to change the client identifier suffix value.<br>*Format:*<br>`! U1 setvar "external_wired.ip.dhcp.cid_suffix" "value"`<br>*Values:* The maximum length of a value allowed is 60 ASCII characters when the CID type is ASCII, or 120 hexadecimal values when the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows setting the suffix to `"printer"`.

```
! U1 setvar "external_wired.ip.dhcp.cid_suffix"
"printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# external_wired.ip.dhcp.cid_type

**Description** This printer setting defines the type of client identifier (DHCP option 61) that will be sent if DHCP is enabled on the external wired print server. A value of "1" means the type of "Ethernet" and the printer's MAC address will be used. A value of "0" or "2" means the client identifier sent will be "external_wired.ip.dhcp.cid_prefix" concatenated with "external_wired.ip.dhcp.cid_suffix". For printer support, see *SGD Command Support* on page 825.

**Type** getvar; setvar

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| getvar | This command instructs the printer to respond with the client identifier type for the external wired print server.<br>*Format:*<br>! U1 getvar "external_wired.ip.dhcp.cid_type" |
| setvar | This command instructs the printer to enable "synthetic" Client Identifier for the external wired print server.<br>*Format:*<br>! U1 setvar "external_wired.ip.dhcp.cid_type" "value"<br>*Values:*<br>"0" = ASCII string<br>"1" = wired print server's MAC address<br>"2" = HEX value<br>*Default Value:* "1" |

**Example •** This setvar example shows the value set to "1".

```
! U1 setvar "external_wired.ip.dhcp.cid_type" "1"
```

What the setvar value is set to is the getvar result. In this example, the getvar result is "1".

# external_wired.ip.gateway

**Description** This command instructs the printer to change the external wired print server's gateway address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** This setting refers to the gateway address. A set value is ignored if the IP protocol is not set to permanent.

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the external wired printer server's gateway address.<br>*Format:* `! U1 getvar "external_wired.ip.gateway"` |
| `setvar` | This command instructs the printer to change the external wired printer server's gateway address.<br>*Format:*<br>`! U1 setvar "external_wired.ip.gateway" "`value`"`<br>*Values:* Any valid gateway address<br>*Default:* `"0.0.0.0"` |

**Example •** This `setvar` example shows the value set to `"10.3.5.1"`.

```
! U1 setvar "external_wired.ip.gateway" "10.3.5.1"
```

When the `setvar` value is set to `"10.3.5.1"`, the `getvar` result is `"10.3.5.1"`.

# external_wired.ip.netmask

**Description** This setting refers to the external wired print server's subnet mask address. This value is ignored if the IP protocol is not set to permanent. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the external wired print server's subnet mask.<br>*Format:* `! U1 getvar "external_wired.ip.netmask"` |
| `setvar` | This command instructs the printer to change the external wired print servers's subnet mask.<br>*Format:*<br>`! U1 setvar "external_wired.ip.netmask"` "value"<br>*Values:* Any valid subnet mask.<br>*Default:* `"255.255.255.0"` |

**Example •** This `setvar` example shows the value set to `"255.255.255.0"`.

```
! U1 setvar "external_wired.ip.netmask" "255.255.255.0"
```

When the `setvar` value is set to `"255.255.255.0"`, the `getvar` result is `"255.255.255.0"`.

# external_wired.ip.port

**Description** This printer setting refers to the external wired print server's port number that the TCP print service is listening on. Normal TCP communications from the host should be directed to this port. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the external wired printer server's TCP/UDP port number.<br>*Format:* `! U1 getvar "external_wired.ip.port"` |
| `setvar` | This command instructs the printer to set the external wired print server's TCP/UDP port number.<br>*Format:* `! U1 setvar "external_wired.ip.port" "value"`<br>*Values:* 1 - 65535 (excluding any ports currently used by other services, such as 21, 23, 80, and 515).<br>*Default:* `"9100"` |

**Example •** This `setvar` example shows the value set to `"9100"`.

```
! U1 setvar "external_wired.ip.port" "9100"
```

When the `setvar` value is set to `"9100"`, the `getvar` result is `"9100"`.

# external_wired.ip.protocol

**Description** This command configures the IP addressing method used by the external wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the IP addressing method used by the external print server.<br>*Format:* `! U1 getvar "external_wired.ip.protocol"` |
| `setvar` | This command instructs the printer to configure the IP addressing method used by the external wired print server.<br>*Format:*<br>`! U1 setvar "external_wired.ip.protocol" "`value`"`<br>*Values:*<br>`"bootp" =` uses the standard bootp addressing method to obtain an IP address and configuration<br>`"dhcp" =` uses the standard dhcp addressing method to obtain an IP address and configuration for a server specified period of time<br>`"rarp" =` uses the standard rarp addressing method to obtain an IP address<br>`"glean" =` uses the IP address from a PING packet that is sent to its hardware address (unicast address)<br>`“permanent”` = uses static values assigned through other commands<br>`"all" =` tries all of the dynamic addressing methods, not permanent, to obtain an IP address<br>*Default:* `"all"` |

**Example •** In this example, the `setvar` result is the current programming language that the printer is using.

```
! U1 setvar "external_wired.ip.protocol" "bootp"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"bootp"`.

# external_wired.ip.timeout.enable

**Description** This network setting refers to enabling the connection timeout on the external wired 10/100 print server. For this to take effect, the print server must be reset. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return whether the timeout checking is enabled on the external wired print server.<br>*Format:*<br>`! U1 getvar "external_wired.ip.timeout.enable"` |
| `setvar` | This command instructs the printer to enable or disable the timeout checking on the external wired print server.<br>*Format:*<br>`! U1 setvar "external_wired.ip.timeout.enable" `"value"<br>*Values:*<br>`"off" =` turns off the connection checking<br>`"on" =` turns on the connection checking<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "external_wired.ip.timeout.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# external_wired.ip.timeout.value

**Description** This network setting refers to the number of seconds before the connection times out for the external wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the time of the external wired print server, in seconds, before the connection times out.<br>*Format:*<br>`! U1 getvar "external_wired.ip.timeout.value"` |
| `setvar` | This command instructs the printer to set the time of the external wired print server, in seconds, before the connection times out.<br>*Format:*<br>`! U1 setvar "external_wired.ip.timeout.value" "value"`<br>*Values:* `"1"` through `"3600"`<br>*Default:* `"300"` |

**Example** • This `setvar` example shows the value set to `"300"`.

```
! U1 setvar "external_wired.ip.timeout.value" "300"
```

When the `setvar` value is set to `"300"`, the `getvar` result is `"300"`.

# external_wired.mac_addr

**Description** This command retrieves the MAC address of the external wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the MAC address of the external wired print server.<br>*Format:* `! U1 getvar "external_wired.mac_addr"` |

**Example •** In this example, the `getvar` result is the MAC address of the external wired print server.

```
! U1 getvar "external_wired.mac_addr"
```

# internal_wired.ip.addr

**Description** This command allows you to get or set the internal wired print servers's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** getvar; setvar

**Important •** For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| getvar | This command instructs the printer to respond with its current internal wired print server IP address.<br>*Format:* ! U1 getvar "internal_wired.ip.addr" |
| setvar | This command instructs the printer to change its current internal wired print server IP address upon powering the printer on.<br>*Format:* ! U1 setvar "internal_wired.ip.addr" "value"<br>*Values:* any valid IP address<br>*Default:* "0.0.0.0" |

**Note •** The setvar value of this command can be affected by the internal_wired.ip.dhcp.enable command.

**Example •** This setvar example shows the value set to "10.14.4.235".

```
! U1 setvar "internal_wired.ip.addr" "10.14.4.235"
```

What the setvar value is set to is the getvar result. In this example, the getvar result is "10.14.4.235".

# internal_wired.ip.arp_interval

**Description** This print server setting allows you to specify the ARP (Address Resolution Protocol) interval or the ARP cache time out for the internal wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the ARP interval or the ARP cache time out value for the internal wired print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.arp_interval"` |
| `setvar` | This command instructs the printer to change the ARP interval or the ARP cache time out for the internal wired print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.arp_interval" "`value`"`<br>*Values:* `0 - 30`<br>*Default:* `"0"` |

**Example** • This `setvar` example shows the value set to `"0"`.

```
! U1 setvar "internal_wired.ip.arp_interval" "0"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"0"`.

# internal_wired.ip.default_addr.enable

**Description** This command allows you to default the internal wired print server's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to show the status of the setting of internal wired print server's default IP address feature.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.default_addr.enable"` |
| `setvar` | This command tells the printer to use it's default address, if no address is provided through DHCP or BOOTP. If you do not assign an IP address after 2 minutes, the 10/100 Internal PS defaults to IP address 192.168.254.254.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.default_addr.enable" "`value`"`<br>*Values:*<br>`"on"` = enabled<br>`"off"` = disabled<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "internal_wired.ip.default_addr.enable" "on"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"on"`.

# internal_wired.ip.dhcp.cid_all

**Description** This printer setting defines the entire client identifier (DHCP option 61) if DHCP is enabled on the internal print server and `"internal_wired.ip.dhcp.cid_type"` is set to `"0"`, or `"2"`. The MAC address is used if the type is set to `"1"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix and suffix of the internal wired print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.dhcp.cid_all"` |
| `setvar` | This command instructs the printer to change the client identifier prefix and suffix of the internal wired print server. The prefix gets cleared and the suffix contains the entire client identifer.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.dhcp.cid_all"` "value"<br>*Values:* A maximum length of 60 characters if the CID type is ASCII, or 120 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "internal_wired.ip.dhcp.cid_all" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# internal_wired.ip.dhcp.cid_enable

**Description** This command determines if DHCP (option 61) is turned on or off of the internal wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the status of the client identifier of the internal wired print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.dhcp.cid_enable"` |
| `setvar` | This command instructs the printer to set the status of the client identifier of the internal wired print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.dhcp.cid_enable" "`value`"`<br>*Values:*<br>`"off" =` client identifier is turned off<br>`"on" =` client identifier is turned on<br>*Default:* `"off"` |

**Example** • This `setvar` example shows the value set to `"off"`.

```
! U1 setvar "internal_wired.ip.dhcp.cid_enable" "off"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"off"`.

# internal_wired.ip.dhcp.cid_prefix

**Description** This printer setting defines the prefix to be prepended to the DHCP client identifier (option 61) when DHCP is enabled on the internal wired print server and `"internal_wired.ip.dhcp.cid_type"` is set to `"0"` or `"2"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix of the internal wired print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.dhcp.cid_prefix"` |
| `setvar` | This command instructs the printer to change the CID prefix of the internal wired print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.dhcp.cid_prefix" "value"`<br>*Values:* Any text string up to 10 characters if the CID type is ASCII, or 20 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example** • This `setvar` example shows the value set to `"PRT001"`.

```
! U1 setvar "internal_wired.ip.dhcp.cid_prefix" "PRT001"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"PRT001"`.

# internal_wired.ip.dhcp.cid_suffix

**Description** This printer setting defines the unique suffix to be used as the client identifier (DHCP option 61) if DHCP is enabled on the internal wired 10/100 print server and `"internal_wired.ip.dhcp.cid_type"` is set to `"0"` or `"2"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier suffix of the internal wired 10/100 print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.dhcp.cid_suffix"` |
| `setvar` | This command instructs the printer to change the client identifier suffix value of the internal wired 10/100 print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.dhcp.cid_suffix"` "value"<br>*Values:* The maximum length of a value allowed is 60 ASCII characters when the CID type is ASCII, or 120 hexadecimal values when the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "internal_wired.ip.dhcp.cid_suffix" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# internal_wired.ip.dhcp.cid_type

**Description** This printer setting defines the type of client identifier (DHCP option 61) that will be sent if DHCP is enabled on the internal wired print server. A value of `"1"` means the type of "Ethernet" and the printer's MAC address will be used.A value of `"0"` or `"2"` means the client identifier sent will be `"internal_wired.ip.dhcp.cid_prefix"` concatenated with `"internal_wired.ip.dhcp.cid_suffix"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier type for the internal wired print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.dhcp.cid_type"` |
| `setvar` | This command instructs the printer to enable "synthetic" Client Identifier for the internal wired print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.dhcp.cid_type" "value"`<br>*Values:*<br>`"0"` = ASCII string<br>`"1"` = wired print server's MAC address<br>`"2"` = HEX value<br>*Default Value:* `"1"` |

**Example** • This `setvar` example shows the value set to `"1"`.

```
! U1 setvar "internal_wired.ip.dhcp.cid_type" "1"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"1"`.

# internal_wired.ip.gateway

**Description** This command instructs the printer to change the internal wired print servers gateway address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** This setting refers to the gateway address. A set value is ignored if the IP protocol is not set to permanent.

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the internal wired printer servers gateway address.<br>*Format:* `! U1 getvar "internal_wired.ip.gateway"` |
| `setvar` | This command instructs the printer to change the internal wired printer servers gateway address.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.gateway" "`value`"`<br>*Values:* Any valid gateway address<br>*Default:* `"0.0.0.0"` |

**Example •** This `setvar` example shows the value set to `"10.3.5.1"`.

```
! U1 setvar "internal_wired.ip.gateway" "10.3.5.1"
```

When the `setvar` value is set to `"10.3.5.1"`, the `getvar` result is `"10.3.5.1"`.

# internal_wired.ip.netmask

**Description** This setting refers to the internal wired print server's subnet mask address. This value is ignored if the IP protocol is not set to permanent. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with internal wired print servers subnet mask.<br>*Format:* `! U1 getvar "internal_wired.ip.netmask"` |
| `setvar` | This command instructs the printer to change the internal wired print servers subnet mask.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.netmask" "`value`"`<br>*Values:* Any valid subnet mask.<br>*Default:* `"255.255.255.0"` |

**Example •** This `setvar` example shows the value set to `"255.255.255.0"`.

```
! U1 setvar "internal_wired.ip.netmask" "255.255.255.0"
```

When the `setvar` value is set to `"255.255.255.0"`, the `getvar` result is `"255.255.255.0"`.

# internal_wired.ip.port

**Description** This printer setting refers to the internal wired print servers port number that the TCP print service is listening on. Normal TCP communications from the host should be directed to this port. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the internal wired printer servers TCP/UDP port number.<br>*Format:* `! U1 getvar "internal_wired.ip.port"` |
| `setvar` | This command instructs the printer to set the internal wired print servers TCP/UDP port number.<br>*Format:* `! U1 setvar "internal_wired.ip.port"` "value"<br>*Values:* 1 - 65535 (excluding any ports currently used by other services, such as 21, 23, 80, and 515).<br>*Default:* `"9100"` |

**Example •** This `setvar` example shows the value set to `"9100"`.

```
! U1 setvar "internal_wired.ip.port" "9100"
```

When the `setvar` value is set to `"9100"`, the `getvar` result is `"9100"`.

# internal_wired.ip.protocol

**Description** This command configures the IP addressing method used by the internal wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the IP addressing method used by the internal wired print server.<br>*Format:* `! U1 getvar "internal_wired.ip.protocol"` |
| `setvar` | This command instructs the printer to configure the IP addressing method used by the internal wired print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.protocol"` "value"<br>*Values:*<br>`"bootp"` = uses the standard bootp addressing method to obtain an IP address and configuration<br>`"dhcp"` = uses the standard dhcp addressing method to obtain an IP address and configuration for a server specified period of time<br>`"rarp"` = uses the standard rarp addressing method to obtain an IP address<br>`"glean"` = uses the IP address from a PING packet that is sent to its hardware address (unicast address)<br>`“permanent”` = uses static values assigned through other commands<br>`"all"` = tries all of the dynamic addressing methods, not permanent, to obtain an IP address<br>*Default:* `"all"` |

**Example •** In this example, the `setvar` result is the current programming language that the printer is using.

```
! U1 setvar "internal_wired.ip.protocol" "bootp"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"bootp"`.

# internal_wired.ip.timeout.enable

**Description** This network setting refers to enabling the connection timeout on the internal wired print server. For this to take effect, the print server must be reset. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return whether the timeout checking is enabled on the internal wired print server.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.timeout.enable"` |
| `setvar` | This command instructs the printer to enable or disable the timeout checking on the internal wired print server.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.timeout.enable" "`value`"`<br>*Values:*<br>`"off" =` turns off the connection checking<br>`"on" =` turns on the connection checking<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "internal_wired.ip.timeout.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# internal_wired.ip.timeout.value

**Description** This network setting refers to the number of seconds before the connection times out for the internal wired print server. For this to take effect, the print server must be reset. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the time of the internal wired print server, in seconds, before the connection times out.<br>*Format:*<br>`! U1 getvar "internal_wired.ip.timeout.value"` |
| `setvar` | This command instructs the printer to set the time of the internal wired print server, in seconds, before the connection times out.<br>*Format:*<br>`! U1 setvar "internal_wired.ip.timeout.value"` "value"<br>*Values:* `"1"` through `"3600"`<br>*Default:* `"300"` |

**Example •** This `setvar` example shows the value set to `"300"`.

```
! U1 setvar "internal_wired.ip.timeout.value" "300"
```

When the `setvar` value is set to `"300"`, the `getvar` result is `"300"`.

# internal_wired.mac_addr

**Description** This command retrieves the MAC address of the internal wired print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 658.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the MAC address of the internal wired print server.<br>*Format:* `! U1 getvar "internal_wired.mac_addr"` |

**Example •** In this example, the `getvar` result is the MAC address of the internal wired print server.

```
! U1 getvar "internal_wired.mac_addr"
```

# D

# SGD Wireless Commands

This chapter provides a high-level overview of the wireless Set / Get / Do (SGD) commands and details on each SGD command. For printer support of these SGD commands, see *SGD Command Support* on page 825.

.15↑ SGD commands are available in printers with firmware version V60.15.x, V50.15.x, V53.15.xZ, or later.

**Note •** The commands listed in this chapter are for use with the Wireless Print Server and Wireless Plus Print Server, when used with firmware version V60.15.x, V50.15.x, or later.

**Important •** These are important points to note when using ZPL and SGD commands:

- SGD commands are case-sensitive.
- ZPL and SGD commands should be sent to the printer as separate files.
- Certain settings can be controlled by both ZPL and SGD. Configuration changes made in ZPL can affect configuration changes made in SGD.
- Changes made with one command type (ZPL or SGD) will affect the data returned to the host in response to both ZPL and getvar commands. The command type (ZPL or SGD) that was sent last determines the current setting.
- Some RF cards do not support all of the SGD commands.

# Overview

This section describes how and why to use the Set / Get / Do (SGD) commands. It also provides an example of a typical command structure.

**Note •** SGD commands must be terminated by a carriage return or a space and line feed.

SGD commands are commands that allow you to configure all printers with firmware version V60.15.x, V50.15.x, V53.15.xZ, or later. The printer performs the specified function immediately after receiving the command. The commands are:

- **`setvar`**
- **`getvar`**
- **`do`**

## setvar Command

`Setvar` commands:

- are used to configure printer settings to specific values by setting them in the printer
- must be terminated by a space character or a CR/ LF (0x0D, 0x0A)

**Important •** The setvar command and attributes must be specified in lower case.

## getvar Command

`Getvar` commands:

- are used to get the current value of the printer settings
- must be terminated by a space character or CR/LF (0x0D, 0x0A)

The printer responds with the printer setting of "?" if:

- the printer setting does not exist (usually due to incorrect spelling of the printer setting)
- it has not been configured yet

**Important •** The printer settings and attributes must be specified in lower case.

## do Command

Do commands:

- are used to instruct the printer to perform predefined actions
- must be terminated by a space character or a CR/LF (0x0D, 0x0A)

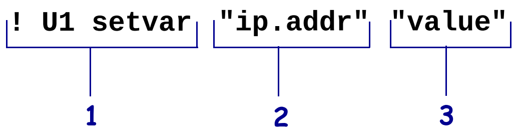
Some Do commands require additional settings which must be enclosed in double quotes.

**Important** • The values must be specified in lower case.

# Command Structure

It is important to understand the structure of the command and its components. A command structure illustration is provided for each command in this guide.

**Example •** This is an example of a command structure illustration:



```
! U1 setvar "ip.addr" "value"
```

| | |
|---|---|
| 1 | Command—always preceded with an exclamation point (!) and must be specified in lower case. A space resides between the **!** and **U1** and between **U1** and the command (**setvar** or **getvar**). |
| 2 | Attribute—always in double quotes and must be specified in lower case. |
| 3 | Chosen value—always in double quotes. Only applicable for **setvar** and **do**. |

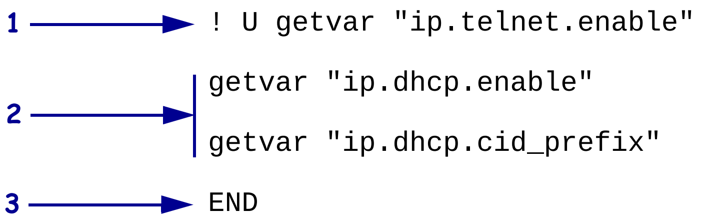
This command must be terminated by a space character or a CR/ LF (0x0D, 0x0A).

**Note •** Some RF cards do not support all of the SGD commands.

## How to Send Multiple SGD Commands

For any getvar, setvar, or do command, if you issue the syntax without the "1" and use the END command followed by a space, multiple SGD commands are sent simultaneously.

**Example •** This syntax shows how you can send multiple getvar commands:



```
! U getvar "ip.telnet.enable"
getvar "ip.dhcp.enable"
getvar "ip.dhcp.cid_prefix"
END
```

| | |
|---|---|
| 1 | The command portion of the string does not use the "1" after the "! U". |
| 2 | Commands issued after the first command do not require the "! U". |
| 3 | The string of commands is terminated by the word "END" with a space after the word, and by a carriage return/ line feed. |

# card.mac_addr

**Description** This command retrieves the MAC address of the wireless radio card. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the MAC address.<br>*Format:* `! U1 getvar "card.mac_addr"` |

**Example •** In this example, the `getvar` result is the MAC address for the wireless radio card.

```
! U1 getvar "card.mac_addr"
```

# card.inserted

**Description** This command indicates whether the wireless radio card is or is not inserted. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless radio card status. It's inserted or it's not inserted.<br>*Format:* `! U1 getvar "card.inserted"` |

**Example •** In this example, the `getvar` result is `"Inserted"`.

```
! U1 getvar "card.inserted"
```

# ip.addr

**Description** This command allows you to get or set the printer's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note •** For details on SGD command structure, see *SGD Wireless Commands* on page 689.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with its current IP address.<br>*Format:* `! U1 getvar "ip.addr"` |
| `setvar` | This command instructs the printer to change its current IP address upon powering the printer on.<br>*Format:* `! U1 setvar "ip.addr" "`value`"`<br>*Values:* any valid IP address<br>*Default:* `"0.0.0.0"` |

**Note •** The `setvar` value of this command can be affected by the `ip.dhcp.enable` command.

**Example •** This `setvar` example shows the value set to `"10.14.4.235"`.

```
! U1 setvar "ip.addr" "10.14.4.235"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"10.14.4.235"`.

# ip.arp_interval

**Description** This printer setting allows you to specify the ARP (Address Resolution Protocol) interval or the ARP cache time out. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the ARP interval or the ARP cache time out value in seconds.<br>*Format:* `! U1 getvar "ip.arp_interval"` |
| `setvar` | This command instructs the printer to change the ARP interval or the ARP cache time out.<br>*Format:* `! U1 setvar "ip.arp_interval" "value"`<br>*Values:* `0 - 30`<br>*Default:* `"0"` |

**Example •** This `setvar` example shows the value set to `"0"`.

```
! U1 setvar "ip.arp_interval" "0"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"0"`.

# ip.bootp.enable

**Description** This printer setting turns BOOTP on or off. BOOTP is a method for acquiring an IP address, netmask, and gateway automatically on printer power-up. It requires a BOOTP server on the local network. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** If you are using static IP addressing, the IP protocol must be set to permanent.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current BOOTP setting.<br>*Format:* `! U1 getvar "ip.bootp.enable"` |
| `setvar` | This command instructs the printer to turn BOOTP on or off.<br>*Format:* `! U1 setvar "ip.bootp.enable"` "value"<br>*Values:*<br>`"off"` = printer does not use BOOTP to get the IP address<br>`"on"` = printer uses BOOTP to get the IP address<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.bootp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.dhcp.cid_all

**Description** This printer setting defines the entire client identifier (DHCP option 61) if the DHCP is enabled and `"ip.dhcp.cid_type"` is set to `"0"`, or `"2"`. The MAC address is used if the type is set to `"1"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix and suffix.<br>*Format:* `! U1 getvar "ip.dhcp.cid_all"` |
| `setvar` | This command instructs the printer to change the CID prefix and suffix.<br>*Format:* `! U1 setvar "ip.dhcp.cid_all"` "value"<br>*Values:* A maximum length of 60 characters if the CID type is ASCII, or 120 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "ip.dhcp.cid_all" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# ip.dhcp.cid_enable

**Description** This command determines if DHCP (option 61) is turned on or off. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the status of the client identifier.<br>*Format:* `! U1 getvar "ip.dhcp.cid_enable"` |
| `setvar` | This command instructs the printer to set the status of the client identifier.<br>*Format:* `! U1 setvar "ip.dhcp.cid_enable" "value"`<br>*Values:*<br>`"off"` = client identifier is turned off<br>`"on"` = client identifier is turned on<br>*Default:* `"off"` |

**Example •** This `setvar` example shows the value set to `"off"`.

```
! U1 setvar "ip.dhcp.cid_enable" "off"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"off"`.

# ip.dhcp.cid_prefix

**Description** This printer setting defines the prefix to be prepended to the DHCP client identifier (option 61) when DHCP is enabled and `"ip.dhcp.cid_type"` is set to `"0"`or `"2".` For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix.<br>*Format:* `! U1 getvar "ip.dhcp.cid_prefix"` |
| `setvar` | This command instructs the printer to change the CID prefix.<br>*Format:* `! U1 setvar "ip.dhcp.cid_prefix"` "value"<br>*Values:* Any text string up to 10 characters if the CID type is ASCII, or 20 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows the value set to `"PRT001"`.

```
! U1 setvar "ip.dhcp.cid_prefix" "PRT001"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"PRT001"`.

# ip.dhcp.cid_suffix

**Description** This printer setting defines the unique suffix to be used as the client identifier (DHCP option 61) if DHCP is enabled and `"ip.dhcp.cid_type"` is set to `"0"` or `"2"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier suffix.<br>*Format:* `! U1 getvar "ip.dhcp.cid_suffix"` |
| `setvar` | This command instructs the printer to change the CID value.<br>*Format:* `! U1 setvar "ip.dhcp.cid_suffix"` "value"<br>*Values:* The maximum length of a value allowed is 60 ASCII characters when the CID type is ASCII, or 120 hexadecimal values when the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "ip.dhcp.cid_suffix" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# ip.dhcp.cid_type

**Description** This printer setting defines the type of client identifier (DHCP option 61) that will be sent if DHCP is enabled. A value of `"1"` means the type of "Ethernet" and the printer's MAC address will be used. A value of `"0"` or `"2"` means the client identifier sent will be `"ip.dhcp.cid_prefix"` concatenated with `"ip.dhcp.cid_suffix"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier type.<br>*Format:* `! U1 getvar "ip.dhcp.cid_type"` |
| `setvar` | This command instructs the printer to enable "synthetic" Client Identifier.<br>*Format:* `! U1 setvar "ip.dhcp.cid_type" "value"`<br>*Values:*<br>`"0"` = ASCII string<br>`"1"` = wireless radio card's MAC address<br>`"2"` = HEX value<br>*Default Value:* `"1"` |

**Example •** This `setvar` example shows the value set to `"1"`.

```
! U1 setvar "ip.dhcp.cid_type" "1"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"1"`.

# ip.dhcp.enable

**Definition** This printer setting turns DHCP on or off. DHCP is a method for acquiring an IP address, netmask, and gateway automatically on printer power-up. It requires a DHCP server on the local network. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** If you are using static IP addressing, the IP protocol must be set to permanent.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the DHCP status.<br>*Format:* `! U1 getvar "ip.dhcp.enable"` |
| `setvar` | This command instructs the printer to turn DHCP on or off.<br>*Format:* `! U1 setvar "ip.dhcp.enable" "`value`"`<br>*Values:*<br>`"off" =` printer does not use DHCP to get the IP address<br>`"on" =` printer uses DHCP to get the IP address<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "ip.dhcp.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# ip.gateway

**Description** This command instructs the printer to change the gateway address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** This setting refers to the gateway address. A set value is ignored if the IP protocol is not set to permanent.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the gateway address.<br>*Format:* `! U1 getvar "ip.gateway"` |
| `setvar` | This command instructs the printer to change the gateway address.<br>*Format:* `! U1 setvar "ip.gateway"` "value"<br>*Values:* Any valid gateway address<br>*Default:* `"0.0.0.0"` |

**Example •** This `setvar` example shows the value set to `"10.3.5.1"`.

```
! U1 setvar "ip.gateway" "10.3.5.1"
```

When the `setvar` value is set to `"10.3.5.1"`, the `getvar` result is `"10.3.5.1"`.

# ip.netmask

**Description** This setting refers to the subnet mask address. This value is ignored if the IP protocol is not set to permanent. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with subnet mask.<br>*Format:* `! U1 getvar "ip.netmask"` |
| `setvar` | This command instructs the printer to change the subnet mask.<br>*Format:* `! U1 setvar "ip.netmask"` "value"<br>*Values:* Any valid subnet mask.<br>*Default:* `"255.255.255.0"` |

**Example •** This `setvar` example shows the value set to `"255.255.255.0"`.

```
! U1 setvar "ip.netmask" "255.255.255.0"
```

When the `setvar` value is set to `"255.255.255.0"`, the `getvar` result is `"255.255.255.0"`.

# ip.port

**Description** This printer setting refers to the port number that the TCP print service is listening on. Normal TCP communications from the host should be directed to this port. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the TCP/UDP port number.<br>*Format:* `! U1 getvar "ip.port"` |
| `setvar` | This command instructs the printer to set the TCP/UDP port number.<br>*Format:* `! U1 setvar "ip.port"` "value"<br>*Values:* 1 - 65535 (excluding any ports currently used by other services, such as 21, 23, 80, and 515).<br>*Default:* `"9100"` |

**Example •** This `setvar` example shows the value set to `"9100"`.

```
! U1 setvar "ip.port" "9100"
```

When the `setvar` value is set to `"9100"`, the `getvar` result is `"9100"`.

# wlan.adhocautomode

**Description** This printer setting refers to enabling or disabling the adhoc auto mode. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the adhoc auto mode status.<br>*Format:* `! U1 getvar "wlan.adhocautomode"` |
| `setvar` | This command instructs the printer to set the adhoc auto mode.<br>*Format:* `! U1 setvar "wlan.adhocautomode" "`value`"`<br>*Values:*<br>`"on"` = adhoc auto mode enabled<br>`"off"` = adhoc auto mode disabled<br>*Default:* `"off"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "wlan.adhocautomode" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# wlan.adhocchannel

**Description** This printer setting refers to specifying the wireless channel for adhoc channel. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless channel for adhoc channel mode.<br>*Format:* `! U1 getvar "wlan.adhocchannel"` |
| `setvar` | This command instructs the printer to set the wireless channel for adhoc channel mode.<br>*Format:* `! U1 setvar "wlan.adhocchannel"` "value"<br>*Values:* Decimal value between 1 and 16 inclusive<br>*Default:* `"1"` |

**Example •** This `setvar` example shows the value set to `"1"`.

```
! U1 setvar "wlan.adhocchannel" "1"
```

When the `setvar` value is set to `"1"`, the `getvar` result is `"1"`.

# wlan.associated

**Description** This command refers to if the printer is or is not associated with an access point (AP). For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with yes or no, which identifies if it is associated with the AP.<br>*Format:* `! U1 getvar "wlan.associated"` |

**Example** • In this example, the `getvar` result is `"yes"`.

```
! U1 getvar "wlan.associated"
```

# wlan.channel_mask

**Description** This printer setting refers to specifying the wireless channel masks to enable and disable various channels. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless channel mask value.<br>*Format:* `! U1 getvar "wlan.channel_mask"` |
| `setvar` | This command instructs the printer to set the wireless channel mask value.<br>*Format:* `! U1 setvar "wlan.channel_mask"` "value"<br>*Values:* 4 Hexadecimal digits preceded by "0x" (0x0000 to 0xFFFF). For commonly used channel masks, see Table 9 on page 710.<br>*Default:* `"0x7FF"` |

**Table 9 • Channel Mask Settings**

| Region | Channel Mask |
|---|---|
| United States, Canada, Latin America | 0x7FF |
| Europe, Middle East, Africa, other | 0x1FFF |
| Japan | 0x3FFF |

**Example •** This `setvar` example shows the value set to `"0x7FF"`.

```
! U1 setvar "wlan.channel_mask" "0x7FF"
```

When the `setvar` value is set to `"0x7FF"`, the `getvar` result is `"0x7FF"`.

# wlan.essid

**Description** This printer setting refers to the printer's stored ESSID. Setting the ESSID to "" will set the printer in a `"broadcast"` mode. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the stored ESSID value.<br>*Format:* `! U1 getvar "wlan.essid"` |
| `setvar` | This command instructs the printer to change the ESSID.<br>*Format:* `! U1 setvar "wlan.essid"` "value"<br>*Values:* 32 character alphanumeric string<br>*Default:* `"125"` |

**Example •** This `setvar` example shows the value set to `"125"`.

```
! U1 setvar "wlan.essid" "125"
```

When the `setvar` value is set to `"125"`, the `getvar` result is `"125"`.

# wlan.firmware_version

**Description** This command refers to the firmware version of the wireless radio card. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current version of the wireless radio card firmware.<br>*Format:* `! U1 getvar "wlan.firmware_version"` |

**Example •** In this example, the `getvar` result is the version of Symbol 4137 card (for example, `"F3.91-69"`).

```
! U1 getvar "wlan.firmware_version"
```

# wlan.ip.addr

**Description** This command allows you to get or set the wireless print servers's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with its current wireless print server IP address.<br>*Format:* `! U1 getvar "wlan.ip.addr"` |
| `setvar` | This command instructs the printer to change its current wireless print server IP address upon powering the printer on.<br>*Format:* `! U1 setvar "wlan.ip.addr"` "value"<br>*Values:* any valid IP address<br>*Default:* `"0.0.0.0"` |

**Note •** The `setvar` value of this command can be affected by the `wlan.ip.dhcp.enable` command.

**Example •** This `setvar` example shows the value set to `"10.14.4.235"`.

```
! U1 setvar "wlan.ip.addr" "10.14.4.235"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"10.14.4.235"`.

# wlan.ip.arp_interval

**Description** This print server setting allows you to specify the ARP (Address Resolution Protocol) interval or the ARP cache time out for the wireless print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the ARP interval or the ARP cache time out value (in seconds) for the wireless print server.<br>*Format:* `! U1 getvar "wlan.ip.arp_interval"` |
| `setvar` | This command instructs the printer to respond with the ARP interval or the ARP cache time out value for the wireless print server.<br>*Format:* `! U1 setvar "wlan.ip.arp_interval" "`value`"`<br>*Values:* `0` to `30` seconds<br>*Default:* `"0"` |

**Example •** This `setvar` example shows the value set to `"0"`.

```
! U1 setvar "wlan.ip.arp_interval" "0"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"0"`.

# wlan.ip.default_addr.enable

**Description** This command allows you to default the wireless print server's IP address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** For a set IP address to take affect, the IP protocol must be set to permanent and the print server must be reset.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to show the status of the setting of the wireless print server's default IP address feature.<br>*Format:*<br>`! U1 getvar "wlan.ip.default_addr.enable"` |
| `setvar` | This command tells the printer to use it's default address, if no address is provided through DHCP or BOOTP. If you do not assign an IP address after 2 minutes, the 10/100 Internal PS defaults to IP address 192.168.254.254.<br>*Format:*<br>`! U1 setvar "wlan.ip.default_addr.enable" "`*value*`"`<br>*Values:*<br>`"on"` = enabled<br>`"off"` = disabled<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "wlan.ip.default_addr.enable" "on"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"on"`.

# wlan.ip.dhcp.cid_all

**Description** This printer setting defines the entire client identifier (DHCP option 61) if DHCP is enabled on the wireless print server and `"wlan.ip.dhcp.cid_type"` is set to `"0"`, or `"2"`. The MAC address is used if the type is set to `"1"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix and suffix of the wireless print server.<br>*Format:*<br>`! U1 getvar "wlan.ip.dhcp.cid_all"` |
| `setvar` | This command instructs the printer to change the client identifer prefix and suffix of the wireless print server. The prefix gets cleared and the suffix contains the entire client identifer.<br>*Format:*<br>`! U1 setvar "wlan.ip.dhcp.cid_all" "`value`"`<br>*Values:* A maximum length of 60 characters if the CID type is ASCII, or 120 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example** • This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "wlan.ip.dhcp.cid_all" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# wlan.ip.dhcp.cid_enable

**Description** This command determines if DHCP (option 61) is turned on or off of the wireless print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the status of the client identifier of the wireless print server.<br>*Format:*<br>`! U1 getvar "wlan.ip.dhcp.cid_enable"` |
| `setvar` | This command instructs the printer to set the status of the client identifier of the wireless print server.<br>*Format:*<br>`! U1 setvar "wlan.ip.dhcp.cid_enable" "`value`"`<br>*Values:*<br>`"off"` = client identifier is turned off<br>`"on"` = client identifier is turned on<br>*Default:* `"off"` |

**Example •** This `setvar` example shows the value set to `"off"`.

```
! U1 setvar "wlan.ip.dhcp.cid_enable" "off"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"off"`.

# wlan.ip.dhcp.cid_prefix

**Description** This printer setting defines the prefix to be prepended to the DHCP client identifier (option 61) when DHCP is enabled on the wireless print server and `"wlan.ip.dhcp.cid_type"` is set to `"0"` or `"2"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier prefix of the wireless print server.<br>*Format:*<br>`! U1 getvar "wlan.ip.dhcp.cid_prefix"` |
| `setvar` | This command instructs the printer to change the CID prefix of the wireless print server.<br>*Format:*<br>`! U1 setvar "wlan.ip.dhcp.cid_prefix"` "value"<br>*Values:* Any text string up to 10 characters if the CID type is ASCII, or 20 characters if the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example •** This `setvar` example shows the value set to `"PRT001"`.

```
! U1 setvar "wlan.ip.dhcp.cid_prefix" "PRT001"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"PRT001"`.

# wlan.ip.dhcp.cid_suffix

**Description** This printer setting defines the unique suffix to be used as the client identifier (DHCP option 61) if DHCP is enabled on the wireless print server and `"wlan.ip.dhcp.cid_type"` is set to `"0"` or `"2"`. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier suffix on the wireless print server.<br>*Format:*<br>`! U1 getvar "wlan.ip.dhcp.cid_suffix"` |
| `setvar` | This command instructs the printer to change the client identifier suffix value on the wireless print server.<br>*Format:*<br>`! U1 setvar "wlan.ip.dhcp.cid_suffix"` "value"<br>*Values:* The maximum length of a value allowed is 60 ASCII characters when the CID type is ASCII, or 120 hexadecimal values when the CID type is hexadecimal.<br>*Default Value:* `""` |

**Example** • This `setvar` example shows the value set to `"printer"`.

```
! U1 setvar "wlan.ip.dhcp.cid_suffix" "printer"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"printer"`.

# wlan.ip.dhcp.cid_type

**Description** This printer setting defines the type of client identifier (DHCP option 61) that will be sent if DHCP is enabled on the wireless print server. A value of "1" means the type of "Ethernet" and the printer's MAC address will be used. A value of "0" or "2" means the client identifier sent will be "wlan.ip.dhcp.cid_prefix" concatenated with "wlan.ip.dhcp.cid_suffix". For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the client identifier type for the wireless print server.<br>*Format:*<br>`! U1 getvar "wlan.ip.dhcp.cid_type"` |
| `setvar` | This command instructs the printer to enable "synthetic" client identifier for the wireless print server.<br>*Format:*<br>`! U1 setvar "wlan.ip.dhcp.cid_type"` "value"<br>*Values:*<br>"0" = ASCII string<br>"1" = wireless radio card's MAC address<br>"2" = HEX value<br>*Default Value:* "1" |

**Example •** This `setvar` example shows the value set to "1".

```
! U1 setvar "wlan.ip.dhcp.cid_type" "1"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is "1".

# wlan.ip.gateway

**Description** This command instructs the printer to change the wireless print server's gateway address. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** This setting refers to the gateway address. A set value is ignored if the IP protocol is not set to permanent.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless printer server's gateway address.<br>*Format:*<br>`! U1 getvar "wlan.ip.gateway"` |
| `setvar` | This command instructs the printer to change the wireless printer server's gateway address.<br>*Format:* `! U1 setvar "wlan.ip.gateway"` "value"<br>*Values:* Any valid gateway address<br>*Default:* `"0.0.0.0"` |

**Example •** This `setvar` example shows the value set to `"10.3.5.1"`.

```
! U1 setvar "wlan.ip.gateway" "10.3.5.1"
```

When the `setvar` value is set to `"10.3.5.1"`, the `getvar` result is `"10.3.5.1"`.

# wlan.ip.netmask

**Description** This setting refers to the wireless print server's subnet mask address. This value is ignored if the IP protocol is not set to permanent. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with wireless print server's subnet mask.<br>*Format:* `! U1 getvar "wlan.ip.netmask"` |
| `setvar` | This command instructs the printer to change the wireless print servers's subnet mask.<br>*Format:* `! U1 setvar "wlan.ip.netmask"` "value"<br>*Values:* Any valid subnet mask.<br>*Default:* `"255.255.255.0"` |

**Example** • This `setvar` example shows the value set to `"255.255.255.0"`.

```
! U1 setvar "wlan.ip.netmask" "255.255.255.0"
```

When the `setvar` value is set to `"255.255.255.0"`, the `getvar` result is `"255.255.255.0"`.

# wlan.ip.port

**Description** This printer setting refers to the wireless print server's port number that the TCP print service is listening on. Normal TCP communications from the host should be directed to this port.For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless printer server's TCP/UDP port number.<br>*Format:* `! U1 getvar "wlan.ip.port"` |
| `setvar` | This command instructs the printer to set the wireless print server's TCP/UDP port number.<br>*Format:* `! U1 setvar "wlan.ip.port" "`value`"`<br>*Values:* 1 - 65535 (excluding any ports currently used by other services, such as 21, 23, 80, and 515).<br>*Default:* `"9100"` |

**Example •** This `setvar` example shows the value set to `"9100"`.

```
! U1 setvar "wlan.ip.port" "9100"
```

When the `setvar` value is set to `"9100"`, the `getvar` result is `"9100"`.

# wlan.ip.protocol

**Description** This command configures the IP addressing method used by the wireless print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar; setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command returns the value of the currently selected IP protocol used by the wireless print server.<br>*Format:* `! U1 getvar "wlan.ip.protocol"` |
| `setvar` | This command instructs the printer to configure the IP addressing method used by the wireless print server.<br>*Format:*<br>`! U1 setvar "wlan.ip.protocol" "`value`"`<br>*Values:*<br>`"bootp" =` uses the standard bootp addressing method to obtain an IP address and configuration<br>`"dhcp" =` uses the standard dhcp addressing method to obtain an IP address and configuration for a server specified period of time<br>`"rarp" =` uses the standard rarp addressing method to obtain an IP address<br>`"glean" =` uses the IP address from a PING packet that is sent to its hardware address (unicast address)<br>`“permanent”` = uses static values assigned through other commands<br>`"all" =` tries all of the dynamic addressing methods, not permanent, to obtain an IP address<br>*Default:* `"all"` |

**Example •** In this example, the `setvar` result is the current programming language that the printer is using.

```
! U1 setvar "wlan.ip.protocol" "bootp"
```

What the `setvar` value is set to is the `getvar` result. In this example, the `getvar` result is `"bootp"`.

# wlan.ip.timeout.enable

**Description** This network setting refers to enabling the connection timeout on the wireless print server. For this to take effect, the print server must be reset. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return whether the timeout checking is enabled on the wireless print server.<br>*Format:* `! U1 getvar "wlan.ip.timeout.enable"` |
| `setvar` | This command instructs the printer to enable or disable the timeout checking on the wireless print server.<br>*Format:* `! U1 setvar "wlan.ip.timeout.enable" "`value`"`<br>*Values:*<br>`"off"` `=` turns off the connection checking<br>`"on"` `=` turns on the connection checking<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "wlan.ip.timeout.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# wlan.ip.timeout.value

**Description** This network setting refers to the number of seconds before the connection times out for the wireless print server. For this to take effect, the print server must be reset. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the time, in seconds, before the connection times out.<br>*Format:* `! U1 getvar "wlan.ip.timeout.value"` |
| `setvar` | This command instructs the printer to set the the time value of the wireless print server, in seconds, before the connection times out.<br>*Format:* `! U1 setvar "wlan.ip.timeout.value"` "value"<br>*Values:* `"1"` through `"3600"`<br>*Default:* `"300"` |

**Example •** This `setvar`  example shows the value set to `"300"`.

```
! U1 setvar "wlan.ip.timeout.value" "300"
```

When the `setvar` value is set to `"300"`, the `getvar` result is `"300"`.

# wlan.keep_alive.enable

**Description** This setting controls the printers ability to send a LSAP (link service access point) packet to the access point on an user controllable interval. This feature is included to accommodate access points that require a regular confirmation that wireless clients are still active. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *SGD Wireless Commands* on page 689.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the `wlan.keep_alive.enable` setting.<br>*Format:* `! U1 getvar "wlan.keep_alive.enable"` |
| `setvar` | This command instructs the printer to send a LSAP (link service access point) packet to the access point on an user controllable interval.<br>*Format:* `! U1 setvar "wlan.keep_alive.enable" "value"`<br>*Values:*<br>`"on"` = turns on keep_alive<br>`"off"` = turns off keep_alive<br>*Default:* `"on"` |

**Example •** This `setvar` example shows the value set to `"on"`.

```
! U1 setvar "wlan.keep_alive.enable" "on"
```

When the `setvar` value is set to `"on"`, the `getvar` result is `"on"`.

# wlan.keep_alive.timeout

**Description** This printer setting manages the interval at which the LSAP (link service access point) packet is sent. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the `wlan.keep_alive.timeout` interval value.<br>*Format:* `! U1 getvar "wlan.keep_alive.timeout"` |
| `setvar` | This command instructs the printer to configure the frequency at which the printer sends the `wlan.keep_alive packet`.<br>*Format:* `! U1 setvar "wlan.keep_alive.timeout"` "value"<br>*Values:* 5 to 300 seconds<br>*Default:* `"15"` |

**Example •** This `setvar` example shows the value set to `"15"`.

```
! U1 setvar "wlan.keep_alive.timeout" "15"
```

When the `setvar` value is set to `"15"`, the `getvar` result is `"15"`.

# wlan.kerberos.kdc

**Description** This printer setting refers to the Kerberos Key Distribution Center (KDC). The KDC is a trusted server which maintains a database with account information for all security principals (users) for a particular site or administrative domain (realm). For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current Kerberos KDC.<br>*Format:* `! U1 getvar "wlan.kerberos.kdc"` |
| `setvar` | This command instructs the printer to change the Kerberos KDC.<br>*Format:* `! U1 setvar "wlan.kerberos.kdc"` "value"<br>*Values:* 0-32 ASCII characters<br>*Default:* `"krbtgt"` |

**Example •** This `setvar` example shows the value set to `"krbtgt"`.

```
! U1 setvar "wlan.kerberos.kdc" "krbtgt"
```

When the `setvar` value is set to `"krbtgt"`, the `getvar` result is `"krbtgt"`.

# wlan.kerberos.password

**Description** This printer setting refers to the Kerberos password. The password must correspond to a user profile established on the Kerberos KDC server in use. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current Kerberos password.<br>*Format:* `! U1 getvar "wlan.kerberos.password"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the Kerberos password.<br>*Format:* `! U1 setvar "wlan.kerberos.password"` "value"<br>*Values:* 0-32 alphanumeric characters<br>*Default:* `"password"` |

**Example •** This `setvar` example shows the value set to `"password"`.

```
! U1 setvar "wlan.kerberos.password" "password"
```

When the `setvar` value is set to `"password"`, the `getvar` result is `"*"`.

# wlan.kerberos.realm

**Description** This printer setting refers to the Kerberos realm, an administrative domain with its own Kerberos server (KDC). For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** If you are using a Windows 2000 Server the realm must be all upper-case. For details, see the Windows 2000 Server example below.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current Kerberos realm.<br>*Format:* `! U1 getvar "wlan.kerberos.realm"` |
| `setvar` | This command instructs the printer to change the Kerberos realm.<br>*Format:* `! U1 setvar "wlan.kerberos.realm" "value"`<br>*Values:* 0-64 alphanumeric characters<br>*Default:* `"kerberos"` |

**Example •** This `setvar` example shows the value set to `"zebra"`.

```
! U1 setvar "wlan.kerberos.realm" "zebra"
```

When the `setvar` value is set to `"zebra"`, the `getvar` result is `"zebra"`.

**Example •** This `setvar` example shows the value set to `"ZEBRA"` on a Windows 2000 server.

```
! U1 setvar "wlan.kerberos.realm" "ZEBRA"
```

When the `setvar` value is set to `"ZEBRA"`, the `getvar` result is `"ZEBRA"`.

# wlan.kerberos.username

**Description** This printer setting refers to the Kerberos user name. The user name must correspond to a user profile established on the Kerberos KDC server in use. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current Kerberos user name.<br>*Format:* `! U1 getvar "wlan.kerberos.username"` |
| `setvar` | This command instructs the printer to change the Kerberos user name.<br>*Format:* `! U1 setvar "wlan.kerberos.username" "value"`<br>*Values:* 0-32 alphanumeric characters<br>*Default:* `"user"` |

**Example •** This `setvar` example shows the value set to `"user"`.

```
! U1 setvar "wlan.kerberos.username" "user"
```

When the `setvar` value is set to `"user"`, the `getvar` result is `"user"`.

# wlan.mac_addr

**Description** This command retrieves the MAC address of the wireless print server. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the MAC address of the wireless print server.<br>*Format:* `! U1 getvar "wlan.mac_addr"` |

**Example •** In this example, the `getvar` result is the MAC address for the wireless print server.

```
! U1 getvar "wlan.mac_addr"
```

# wlan.operating_mode

**Description** This printer setting refers to the network operating mode. Infrastructure mode means that the printer will try to associate with an access point. Ad hoc mode means that the printer will try to associate with a device other than an access point and join a standalone network. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

To use "ad hoc" mode configure the printer as follows:

- Set the ESSID to the new network's ESSID.
- Turn off the DHCP and assign an IP Address to the printer.
- Set the subnet mask on the printer to the new network's subnet mask.
- Change the operating mode on the printer to "ad hoc".

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the network-mode value.<br>*Format:* `! U1 getvar "wlan.operating_mode"` |
| `setvar` | This command instructs the printer to set the network operating mode.<br>*Format:* `! U1 setvar "wlan.operating_mode"` "value"<br>*Values:*<br>`"adhoc"` = printer will try to associate with a network device<br>`"infrastructure"` = printer will try to associate with an access point<br>*Default:* `"infrastructure"` |

**Example •** This `setvar` example shows the value set to `"infrastructure"`.

```
! U1 setvar "wlan.operating_mode" "infrastructure"
```

When the `setvar` value is set to `"infrastructure"`, the `getvar` result is `"infrastructure"`.

# wlan.password

**Description** This printer setting refers to the generic password that is used by the wireless securities that need a password. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** Kerberos has its own password field

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with a generic password for wireless securities.<br>*Format:* `! U1 getvar "wlan.password"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set a generic password for the wireless securities that need a password.<br>*Format:* `! U1 setvar "wlan.password" "`value`"`<br>*Values:* A maximum of 32 alphanumeric characters.<br>*Default:* `"password"` |

**Example •** This `setvar` example shows the value set to `"password"`.

```
! U1 setvar "wlan.password" "password"
```

When the `setvar` value is set to `"password"`, the `getvar` result is `"*"`.

# wlan.preamble

**Description** This printer setting selects the radio preamble length to be used. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current preamble length.<br>*Format:* `! U1 getvar "wlan.preamble"` |
| `setvar` | This command instructs the printer to set the preamble length.<br>*Format:* `! U1 setvar "wlan.preamble" "`value`"`<br>*Values:*<br>`"long" =` enables long preamble<br>`"short" =` enables short preamble<br>*Default:* `"long"` |

**Example** • This `setvar` example shows the value set to `"long"`.

```
! U1 setvar "wlan.preamble" "long"
```

When the `setvar` value is set to `"long"`, the `getvar` result is `"long"`.

# wlan.private_key_password

**Description** This printer setting allows the setting of the optional private key password. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the value of the private key password.<br>*Format:* `! U1 getvar "wlan.private_key_password"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the private key password.<br>*Format:* `! U1 setvar "wlan.private_key_password" "value"`<br>*Values:* A maximum of 32 alphanumeric characters<br>*Default:* `""` |

**Example •** This `setvar` example shows the value set to `"password"`.

```
! U1 setvar "wlan.private_key_password" "password"
```

When the `setvar` value is set to `"password"`, the `getvar` result is `"*"`.

# wlan.roam.interval

**Description** This printer setting refers to specifying the wireless roam interval. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the specified roam interval.<br>*Format:* `! U1 getvar "wlan.roam.interval"` |
| `setvar` | This command instructs the printer to set the wireless roam interval.<br>*Format:* `! U1 setvar "wlan.roam.interval" "`value`"`<br>*Values:* Decimal values between 5 and 255 inclusive<br>*Default:* `"20"` |

**Example •** This `setvar` example shows the value set to `"20"`.

```
! U1 setvar "wlan.roam.interval" "20"
```

When the `setvar` value is set to `"20"`, the `getvar` result is `"20"`.

# wlan.roam.signal

**Description** This printer setting refers to specifying the wireless roam signal. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the specified wireless roam signal.<br>*Format:* `! U1 getvar "wlan.roam.signal"` |
| `setvar` | This command instructs the printer to set the wireless roam signal.<br>*Format:* `! U1 setvar "wlan.roam.signal" "`value`"`<br>*Values:* Decimal values between 1 and 75 inclusive.<br>*Default:* `"50"` |

**Example •** This `setvar` example shows the value set to `"50"`.

```
! U1 setvar "wlan.roam.signal" "50"
```

When the `setvar` value is set to `"50"`, the `getvar` result is `"50"`.

# wlan.signal_noise

**Description** This command returns the signal noise on the wireless network. Values above 40% represent a very significant noise, and radio communication is not reliable. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the current signal noise on the wireless network.<br>*Format:* `! U1 getvar "wlan.signal_noise"` |

**Example •** In this example, the getvar result is the current signal_noise value.

```
! U1 getvar "wlan.signal_noise"
```

# wlan.security

**Description** This printer setting allows you to specify both the wireless encryption type and authentication type in one command. For printer support, see *SGD Command Support* on page 825.

**Note •** The supporting parameters that are required vary based on the security type that you select. See *Supporting SGD Commands for Different Security Types* on page 743 for instructions for each security type.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

**Note •** When using certificate files, Zebra printers support:

- using Privacy Enhanced Mail (PEM) formatted certificate files.
- using the client certificate and private key as two files, each downloaded separately.
- using exportable PAC files for EAP-FAST.

These certificate files can only be sent using ZPL, not SGD. The ZPL command to use when sending these certificate files is the `~DY` command.

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the name and not the type. If an invalid security mode is entered the printer returns Invalid Mode.<br>*Format:* `! U1 getvar "wlan.security" "value"` |
| `setvar` | This command instructs the printer to set the wireless security value.<br>*Format:* `! U1 setvar "wlan.security"` "value"<br>*Values:*<br>`"1"` = No wireless security or `"none"`<br>`"2"` = WEP 40-bit or `"wep 40-bit"`<br>`"3"` = WEP 128-bit or `"wep 128-bit"`<br>`"4"` = EAP-TLS or `"eap-tls"`<br>`"5"` = EAP-TTLS or `"eap-ttls"`<br>`"6"` = EAP-FAST or `"eap-fast"`<br>`"7"` = PEAP or `"peap"`<br>`"8"` = LEAP or `"leap"`<br>`"9"` = WPA PSK or `"wpa psk"` (Key rotation for WPA2 PSK is supported in firmware versions V53.15.8Z , V60.15.8Z, and later.)<br>`"10"` = WPA EAP-TLS or `"wpa eap-tls"`<br>`"11"` = WPA EAP-TTLS or `"wpa eap-ttls"`<br>`"12"` = WPA EAP-FAST or `"wpa eap-fast"`<br>`"13"` = WPA PEAP or `"wpa peap"`<br>`"14"` = WPA LEAP or `"wpa leap"`<br>`"15"` = Kerberos or `"kerberos"`<br>*Default:* `"1"` |

**Example •** This `setvar` example shows the value set to `"1"`.

```
! U1 setvar "wlan.security" "1"
```

When the `setvar` value is set to `"1"`, the `getvar` result is `"none"`.

## Supporting SGD Commands for Different Security Types

The supporting SGD commands required for `wlan.security` vary based on the security type that you select. You must send the additional commands for your printer to be able to work on your wireless network. Follow the example and format for your specific security type in this section, substituting your own wireless network data.

### Security Type 1: No Wireless Security Active

Additional parameters that need to be set: none

**Example •** This example turns off all wireless securities controlled under this command, but it does not reset the printer's wireless settings to their defaults.

```
! U1 setvar "wlan.security" "1"
```

### Security Type 2: WEP 40-Bit

Additional parameters that need to be set and the SGD commands to use:

- WEP encryption index (see *wlan.wep.index* on page 757)
- WEP authentication type (see *wlan.wep.auth_type* on page 756)
- WEP key type (see *wlan.wep.key_format* on page 762)
- the actual values of any WEP encryption keys to be used (see *wlan.wep.key1* on page 758, *wlan.wep.key2* on page 759, *wlan.wep.key3* on page 760, or *wlan.wep.key4* on page 761)

**Example •** This example configures the printer for WEP 40-bit encryption using index key 1, open authentication, and a hexadecimal WEP key with a value of "`A1B2C3D4F5`."

```
! U1 setvar "wlan.security" "2"
! U1 setvar "wlan.wep.index" "1"
! U1 setvar "wlan.wep.auth_type" "open"
! U1 setvar "wlan.wep.key_format" "hex"
! U1 setvar "wlan.wep.key1" "A1B2C3D4F5"
```

## Security Type 3: WEP 128-Bit

Additional parameters that need to be set and the SGD commands to use:

- WEP encryption index (see *wlan.wep.index* on page 757)
- WEP authentication type (see *wlan.wep.auth_type* on page 756)
- WEP key type (see *wlan.wep.key_format* on page 762)
- the actual values of any WEP encryption keys to be used (see *wlan.wep.key1* on page 758, *wlan.wep.key2* on page 759, *wlan.wep.key3* on page 760, or *wlan.wep.key4* on page 761)

**Example •** This example configures the printer for WEP 128-bit encryption using index key 2, open authentication, and four hexadecimal WEP keys.

```
! U1 setvar "wlan.security" "3"
! U1 setvar "wlan.wep.index" "2"
! U1 setvar "wlan.wep.auth_type" "open"
! U1 setvar "wlan.wep.key_format" "hex"
! U1 setvar "wlan.wep.key1" "001122334455667788"
! U1 setvar "wlan.wep.key2" "112233445566778899"
! U1 setvar "wlan.wep.key3" "223344556677889900"
! U1 setvar "wlan.wep.key4" "334455667788990011"
```

## Security Type 4: EAP-TLS

Additional parameters that need to be set and the SGD commands to use:

- optional private key password (see *wlan.private_key_password* on page 737)

**Example •** This example configures the printer for EAP-TLS authentication with an optional private key password with a value of “`private`.”

```
! U1 setvar "wlan.security" "4"
! U1 setvar "wlan.private_key_password" "private"
```

## Security Type 5: EAP-TTLS

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)

**Example •** This example configures the printer for EAP-TTLS authentication, including a user ID with a value of “`user`” and a password with a value of “`password`.”

```
! U1 setvar "wlan.security" "5"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
```

## Security Type 6: EAP-FAST

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)
- optional private key password (see *wlan.private_key_password* on page 737)

**Example •** This example configures the printer for EAP-FAST authentication, including a user ID of “`user`,” a password of “`password`,” and an optional private key of “`private`.”

```
! U1 setvar "wlan.security" "6"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
! U1 setvar "wlan.private_key_password" "private"
```

## Security Type 7: PEAP

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)

**Example •** This example configures the printer for PEAP authentication, including a user ID with a value of “`user`” and a password with a value of “`password`.”

```
! U1 setvar "wlan.security" "7"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
```

## Security Type 8: LEAP

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)

**Example •** This example configures the printer for LEAP authentication, including a user ID with a value of “`user`” and a password with a value of “`password`.”

```
! U1 setvar "wlan.security" "8"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
```

## Security Type 9: WPA PSK

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments. Key rotation for WPA2 PSK is supported in firmware version 60.15.8Z and later and in firmware version 53.15.8Z and later.

Additional parameters that need to be set and the SGD commands to use:

- Pre-Shared Key (PSK) value (see *wlan.wpa.psk* on page 763)

**Example •** This example configures the printer for WPA PSK authentication with a PSK value of all zeroes (64 hexadecimal digits).

```
! U1 setvar "wlan.security" "9"
! U1 setvar "wlan.wpa.psk" "00000000..."
```

## Security Type 10: WPA EAP-TLS

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

Additional parameters that need to be set and the SGD commands to use:

- optional private key password (see *wlan.private_key_password* on page 737)

**Example •** This example configures the printer for WPA EAP-TLS authentication with an optional private key password with a value of "`private`."

```
! U1 setvar "wlan.security" "10"
! U1 setvar "wlan.private_key_password" "private"
```

## Security Type 11: WPA EAP-TTLS

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)

**Example •** This example configures the printer for WPA EAP-TTLS authentication, including a user ID with a value of "`user`" and a password with a value of "`password`."

```
! U1 setvar "wlan.security" "11"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
```

## Security Type 12: WPA EAP-FAST

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)
- optional private key password (see *wlan.private_key_password* on page 737)

**Example •** This example configures the printer for WPA EAP-FAST authentication, including a user ID of “`user`,” a password of “`password`,” and an optional private key of “`private`.”

```
! U1 setvar "wlan.security" "12"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
! U1 setvar "wlan.private_key_password" "private"
```

## Security Type 13: WPA PEAP

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)

**Example •** This example configures the printer for WPA PEAP authentication, including a user ID with a value of “`user`” and a password with a value of “`password`.”

```
! U1 setvar "wlan.security" "13"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
```

## Security Type 14: WPA LEAP

**Note •** Configuring the printer for WPA also allows the printer to be used in WPA2 environments.

Additional parameters that need to be set and the SGD commands to use:

- user ID (see *wlan.username* on page 755)
- password (see *wlan.password* on page 735)

**Example •** This example configures the printer for WPA LEAP authentication, including a user ID with a value of “`user`” and a password with a value of “`password`.”

```
! U1 setvar "wlan.security" "14"
! U1 setvar "wlan.username" "user"
! U1 setvar "wlan.password" "password"
```

## Security Type 15: Kerberos

Additional parameters that need to be set and the SGD commands to use:

- Kerberos user ID (see *wlan.kerberos.username* on page 732)
- Kerberos password (see *wlan.kerberos.password* on page 730)
- realm (see *wlan.kerberos.realm* on page 731)
- Key Distribution Center (KDC) (see *wlan.kerberos.kdc* on page 729)

**Example •** This example configures the printer for Kerberos encryption, including a Kerberos user ID with a value of “`user`,” a Kerberos password with a value of “`password`,” a realm of “`zebra`,” and a KDC of “`krbtgt`.”

```
! U1 setvar "wlan.security" "15"
! U1 setvar "wlan.kerberos.username" "user"
! U1 setvar "wlan.kerberos.password" "password"
! U1 setvar "wlan.kerberos.realm" "zebra"
! U1 setvar "wlan.kerberos.kdc" "krbtgt"
```

# wlan.signal_quality

**Description** This command instructs the printer to return the current signal quality of the wireless network. Values below 40% represent a poor signal quality, and radio communication is not reliable. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to return the current signal quality of the wireless network.<br>*Format:* `! U1 getvar "wlan.signal_quality"` |

**Example •** In this example, the getvar result is the current signal_quality value.

```
! U1 getvar "wlan.signal_quality"
```

# wlan.signal_strength

**Description** This command returns the signal strength of the connection to the access point as a percentage value between zero (not connected) and 100 (strongest signal). Values below 40% represent a very poor signal and radio communication is not reliable. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the command for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the current signal strength.<br>*Format:* `! U1 getvar "wlan.signal_strength"` |

**Example •** In this example, the getvar result is `"93"`.

```
! U1 getvar "wlan.signal_strength"
```

# wlan.station_name

**Description** This printer setting refers to the station name. For printer support, see *SGD Command Support* on page 825.

**Type** `setvar;getvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the station name value.<br>*Format:* `! U1 getvar "wlan.station_name"` |
| `setvar` | This command instructs the printer to set the station name.<br>*Format:* `! U1 setvar "wlan.station_name"` "value"<br>*Values:* A maximum of 32 alphanumeric characters<br>*Default:* `"ZEBRA"` |

**Example •** This `setvar` example shows the value set to `"ZEBRA"`.

```
! U1 setvar "wlan.station_name" "ZEBRA"
```

When the `setvar` value is set to `"ZEBRA"`, the `getvar` result is `"ZEBRA"`.

# wlan.tx_power

**Description** This printer setting refers to specifying the wireless transmit power. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless transmit power.<br>*Format:* `! U1 getvar "wlan.tx_power"` |
| `setvar` | This command instructs the printer to set the wireless transmit power.<br>*Format:* `! U1 setvar "wlan.tx_power" "`value`"`<br>*Values:* Decimal values of 1, 5, 20, 30, 50, 100<br>*Default:* `"100"` |

**Example •** This `setvar` example shows the value set to `"100"`.

```
! U1 setvar "wlan.tx_power" "100"
```

When the `setvar` value is set to `"100"`, the `getvar` result is `"100"`.

# wlan.tx_rate

**Description** This printer setting refers to specifying the wireless transmit rate. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the wireless transmit rate.<br>*Format:* `! U1 getvar "wlan.tx_rate"` |
| `setvar` | This command instructs the printer to set the wireless transmit rate.<br>*Format:* `! U1 setvar "wlan.tx_rate"` `"value"`<br>*Values:* 1, 2, 5.5, 11, all<br>*Default:* `"all"` |

**Example** • This `setvar` example shows the value set to `"all"`.

```
! U1 setvar "wlan.tx_rate" "all"
```

When the `setvar` value is set to `"all"`, the `getvar` result is `"all"`.

# wlan.username

**Description** This printer setting refers to the generic user name that is used by the wireless securities that need a user name. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** Kerberos has its own user name field.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with a generic user name for the wireless securities that need a user name.<br>*Format:* `! U1 getvar "wlan.username"` |
| `setvar` | This command instructs the printer to set a generic user name for wireless securities that need a user name.<br>*Format:* `! U1 setvar "wlan.username" `"value"<br>*Values:* A maximum of 32 alphanumeric characters<br>*Default:* `"user"` |

**Example •** This `setvar` example shows the value set to `"user"`.

```
! U1 setvar "wlan.username" "user"
```

When the `setvar` value is set to `"user"`, the `getvar` result is `"user"`.

# wlan.wep.auth_type

**Description** For the WEP security type, this printer setting selects the authentication type to be used between the printer and the access point. The authentication types are open system and shared key. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to retrieve the current WEP authentication type.<br>*Format:* `! U1 getvar "wlan.wep.auth_type"` |
| `setvar` | This command instructs the printer to set the WEP authentication type.<br>*Format:* `! U1 setvar "wlan.wep.auth_type"` "value"<br>*Values:*<br>`"open"` = enables the open authentication type<br>`"shared"` = enables the shared authentication type<br>*Default:* `"open"` |

**Example** • This `setvar` example shows the value set to `"open"`.

```
! U1 setvar "wlan.wep.auth_type" "open"
```

When the `setvar` value is set to `"open"`, the `getvar` result is `"open"`.

# wlan.wep.index

**Description** This printer setting refers to the WEP (Wired Equivalent Privacy) encryption key index. This printer setting determines which one of the four encryption keys is to be used by the client (printer). For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the encryption key index.<br>*Format:* `! U1 getvar "wlan.wep.index"` |
| `setvar` | This command instructs the printer to set the encryption key index.<br>*Format:* `! U1 setvar "wlan.wep.index" "value"`<br>*Values:*<br>`"1"` = enables encryption key 1<br>`"2"` = enables encryption key 2<br>`"3"` = enables encryption key 3<br>`"4"` = enables encryption key 4<br>*Default:* `"1"` |

**Example •** This `setvar` example shows the value set to `"1"`.

```
! U1 setvar "wlan.wep.index" "1"
```

When the `setvar` value is set to `"1"`, the `getvar` result is `"1"`.

# wlan.wep.key1

**Description** This printer setting refers to the first indexed WEP encryption key. The WEP encryption key is a hexadecimal or string value. This key should match the wireless network WEP encryption key 1. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the encryption key.<br>*Format:* `! U1 getvar "wlan.wep.key1"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the encryption key.<br>*Format:* `! U1 setvar "wlan.wep.key1"` "value"<br>*Values:*<br>10 hexadecimal characters for 40-bit encryption<br>26 hexadecimal characters for 128-bit encryption<br>*Default:* All zeros |

**Example** • This `setvar` example shows the value set to `"A1B2C3D4F5"`.

```
! U1 setvar "wlan.wep.key1" "A1B2C3D4F5"
```

When the `setvar` value is set to `"A1B2C3D4F5"`, the `getvar` result is `"*"`.

# wlan.wep.key2

**Description** This printer setting refers to the second indexed WEP encryption key. The WEP encryption key is a hexadecimal string value. This key should match the wireless network WEP encryption key 2. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer respond with the encryption key.<br>*Format:* `! U1 getvar "wlan.wep.key2"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the encryption key.<br>*Format:* `! U1 setvar "wlan.wep.key2"` "value"<br>*Values:*<br>10 hexadecimal characters for 40-bit encryption<br>26 hexadecimal characters for 128-bit encryption<br>*Default:* All zeros |

**Example** • This `setvar` example shows the value set to `"A1B2C3D4F5"`.

```
! U1 setvar "wlan.wep.key2" "A1B2C3D4F5"
```

When the `setvar` value is set to `"A1B2C3D4F5"`, the `getvar` result is `"*"`.

# wlan.wep.key3

**Description** This printer setting refers to the third indexed WEP encryption key. The WEP encryption key is a hexadecimal string value. This key should match the wireless network WEP encryption key 3. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the encryption key.<br>*Format:* `! U1 getvar "wlan.wep.key3"`<br>*Format:* For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the encryption key.<br>*Format:* `! U1 setvar "wlan.wep.key3" "`value`"`<br>*Values:*<br>10 hexadecimal characters for 40-bit encryption<br>26 hexadecimal characters for 128-bit encryption<br>*Default:* All zeros |

**Example** • This `setvar` example shows the value set to `"A1B2C3D4F5"`.

```
! U1 setvar "wlan.wep.key3" "A1B2C3D4F5"
```

When the `setvar` value is set to `"A1B2C3D4F5"`, the `getvar` result is `"*"`.

# wlan.wep.key4

**Description** This printer setting refers to the fourth indexed WEP encryption key. The WEP encryption key is a hexadecimal string value. This key should match the wireless network WEP encryption key 4. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Note** • For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer respond with the encryption key.<br>*Format:* `! U1 getvar "wlan.wep.key4"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the encryption key.<br>*Format:* `! U1 setvar "wlan.wep.key4"` "value"<br>*Values:*<br>10 hexadecimal characters for 40-bit encryption<br>26 hexadecimal characters for 128-bit encryption<br>*Default:* All zeros |

**Example** • This `setvar` example shows the value set to `"A1B2C3D4F5"`.

```
! U1 setvar "wlan.wep.key4" "A1B2C3D4F5"
```

When the `setvar` value is set to `"A1B2C3D4F5"`, the `getvar` result is `"*"`.

# wlan.wep.key_format

**Description** This printer setting specifies the format for the WEP key. For printer support, see *SGD Command Support* on page 825.

**Type** `getvar`; `setvar`

**Important •** This printer setting should proceed any of the `wep.key` settings if you select a non-default value.

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the WEP key format.<br>*Format:* `! U1 getvar "wep.key_format"` |
| `setvar` | This command instructs the printer to set the WEP key format.<br>*Format:* `! U1 setvar "wlan.wep.key_format"` "value"<br>*Values:*<br>`"ascii" =` WEP key is set by ASCII string<br>`"hex" =` WEP key is a Hex string<br>*Default:* `"hex"` |

**Example •** This `setvar` example shows the value set to `"ascii"`.

```
! U1 setvar "wlan.wep.key_format" "ascii"
```

When the `setvar` value is set to `"ascii"`, the `getvar` result is `"ascii"`.

# wlan.wpa.psk

**Description** This printer setting specifies the pre-shared key (PSK) value to use when the WPA authentication is set to PSK. For printer support, see *SGD Command Support* on page 825..

**Type** `getvar`; `setvar`

**Note •** For details on SGD command structure, see *Command Structure* on page 692.

This table identifies the commands for this format:

| Commands | Details |
|---|---|
| `getvar` | This command instructs the printer to respond with the pre-shared key.<br>*Format:* `! U1 getvar "wlan.wpa.psk"`<br>For protection a single `"*"` prints. |
| `setvar` | This command instructs the printer to set the pre-shared key.<br>*Format:* `! U1 setvar "wlan.wpa.psk" "`value`"`<br>*Values:* 64 hexadecimal digits<br>*Default:* `64 zeros (00000000...)` |

**Example •** This `setvar` example shows the value set to `"00000000..."`.

```
! U1 setvar "wlan.wpa.psk" "00000000..."
```

When the `setvar` value is set to `"00000000..."`, the `getvar` result is `"*"`.

# A

# Zebra Code Pages

This section provides you with a visual of the different Zebra Code pages.

# Zebra Code Page 850

This is the Zebra Code Page 850:

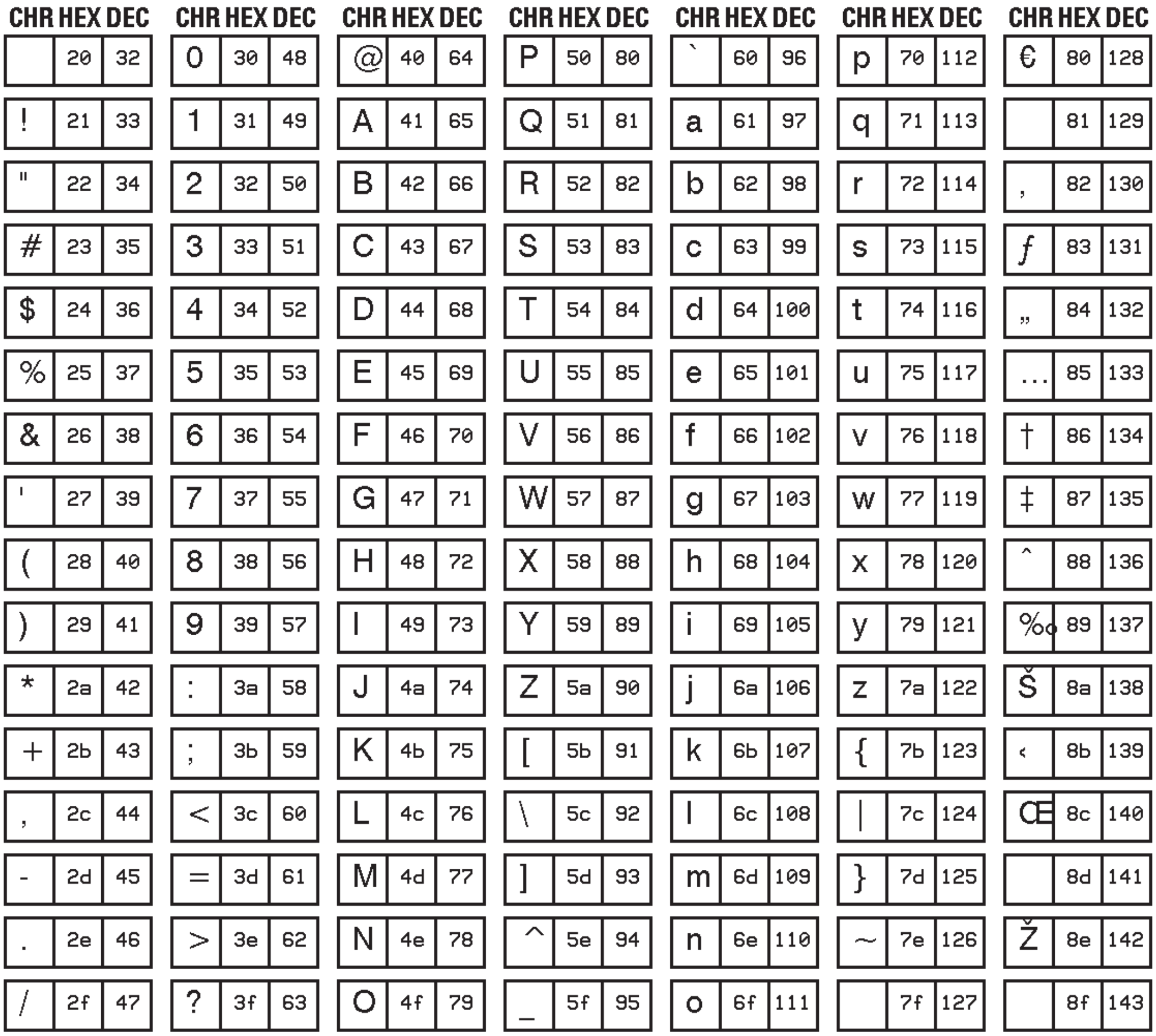
**Note •** For hex 5C, a cent sign prints for all printer resident fonts. A backslash prints for downloaded fonts.

| CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 20 | 32 | 0 | 30 | 48 | @ | 40 | 64 | P | 50 | 80 | ‘ | 60 | 96 | p | 70 | 112 | Ç | 80 | 128 |
| ! | 21 | 33 | 1 | 31 | 49 | A | 41 | 65 | Q | 51 | 81 | a | 61 | 97 | q | 71 | 113 | ü | 81 | 129 |
| " | 22 | 34 | 2 | 32 | 50 | B | 42 | 66 | R | 52 | 82 | b | 62 | 98 | r | 72 | 114 | é | 82 | 130 |
| # | 23 | 35 | 3 | 33 | 51 | C | 43 | 67 | S | 53 | 83 | c | 63 | 99 | s | 73 | 115 | â | 83 | 131 |
| $ | 24 | 36 | 4 | 34 | 52 | D | 44 | 68 | T | 54 | 84 | d | 64 | 100 | t | 74 | 116 | ä | 84 | 132 |
| % | 25 | 37 | 5 | 35 | 53 | E | 45 | 69 | U | 55 | 85 | e | 65 | 101 | u | 75 | 117 | à | 85 | 133 |
| & | 26 | 38 | 6 | 36 | 54 | F | 46 | 70 | V | 56 | 86 | f | 66 | 102 | v | 76 | 118 | å | 86 | 134 |
| ’ | 27 | 39 | 7 | 37 | 55 | G | 47 | 71 | W | 57 | 87 | g | 67 | 103 | w | 77 | 119 | ç | 87 | 135 |
| ( | 28 | 40 | 8 | 38 | 56 | H | 48 | 72 | X | 58 | 88 | h | 68 | 104 | x | 78 | 120 | ê | 88 | 136 |
| ) | 29 | 41 | 9 | 39 | 57 | I | 49 | 73 | Y | 59 | 89 | i | 69 | 105 | y | 79 | 121 | ë | 89 | 137 |
| * | 2a | 42 | : | 3a | 58 | J | 4a | 74 | Z | 5a | 90 | j | 6a | 106 | z | 7a | 122 | è | 8a | 138 |
| + | 2b | 43 | ; | 3b | 59 | K | 4b | 75 | [ | 5b | 91 | k | 6b | 107 | { | 7b | 123 | ï | 8b | 139 |
| , | 2c | 44 | < | 3c | 60 | L | 4c | 76 | ¢<br>\ | 5c | 92 | l | 6c | 108 | \| | 7c | 124 | î | 8c | 140 |
| – | 2d | 45 | = | 3d | 61 | M | 4d | 77 | ] | 5d | 93 | m | 6d | 109 | } | 7d | 125 | ì | 8d | 141 |
| . | 2e | 46 | > | 3e | 62 | N | 4e | 78 | ^ | 5e | 94 | n | 6e | 110 | ~ | 7e | 126 | Ä | 8e | 142 |
| / | 2f | 47 | ? | 3f | 63 | O | 4f | 79 | _ | 5f | 95 | o | 6f | 111 | ⌂ | 7f | 127 | Å | 8f | 143 |

| CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| É | 90 | 144 | á | a0 | 160 | ░ | b0 | 176 | └ | c0 | 192 | ð | d0 | 208 | Ó | e0 | 224 | - | f0 | 240 |
| æ | 91 | 145 | í | a1 | 161 | ▒ | b1 | 177 | ┴ | c1 | 193 | Ð | d1 | 209 | ß | e1 | 225 | ± | f1 | 241 |
| Æ | 92 | 146 | ó | a2 | 162 | ▓ | b2 | 178 | ┬ | c2 | 194 | Ê | d2 | 210 | Ô | e2 | 226 | ‗ | f2 | 242 |
| ô | 93 | 147 | ú | a3 | 163 | │ | b3 | 179 | ├ | c3 | 195 | Ë | d3 | 211 | Ò | e3 | 227 | ¾ | f3 | 243 |
| ö | 94 | 148 | ñ | a4 | 164 | ┤ | b4 | 180 | ─ | c4 | 196 | È | d4 | 212 | õ | e4 | 228 | ¶ | f4 | 244 |
| ò | 95 | 149 | Ñ | a5 | 165 | Á | b5 | 181 | ┼ | c5 | 197 | ı | d5 | 213 | Õ | e5 | 229 | § | f5 | 245 |
| û | 96 | 150 | ª | a6 | 166 | Â | b6 | 182 | ã | c6 | 198 | Í | d6 | 214 | µ | e6 | 230 | ÷ | f6 | 246 |
| ù | 97 | 151 | º | a7 | 167 | À | b7 | 183 | Ã | c7 | 199 | Î | d7 | 215 | þ | e7 | 231 | ¸ | f7 | 247 |
| ÿ | 98 | 152 | ¿ | a8 | 168 | © | b8 | 184 | ╚ | c8 | 200 | Ï | d8 | 216 | Þ | e8 | 232 | ° | f8 | 248 |
| Ö | 99 | 153 | ® | a9 | 169 | ╣ | b9 | 185 | ╔ | c9 | 201 | ┘ | d9 | 217 | Ú | e9 | 233 | ¨ | f9 | 249 |
| Ü | 9a | 154 | ¬ | aa | 170 | ║ | ba | 186 | ╩ | ca | 202 | ┌ | da | 218 | Û | ea | 234 | · | fa | 250 |
| ø | 9b | 155 | ½ | ab | 171 | ╗ | bb | 187 | ╦ | cb | 203 | █ | db | 219 | Ù | eb | 235 | ¹ | fb | 251 |
| £ | 9c | 156 | ¼ | ac | 172 | ╝ | bc | 188 | ╠ | cc | 204 | ▄ | dc | 220 | ý | ec | 236 | ³ | fc | 252 |
| Ø | 9d | 157 | ¡ | ad | 173 | ¢ | bd | 189 | ═ | cd | 205 | ¦ | dd | 221 | Ý | ed | 237 | ² | fd | 253 |
| × | 9e | 158 | « | ae | 174 | ¥ | be | 190 | ╬ | ce | 206 | Ì | de | 222 | ¯ | ee | 238 | ■ | fe | 254 |
| ƒ | 9f | 159 | » | af | 175 | ┐ | bf | 191 | ¤ | cf | 207 | ▀ | df | 223 | ´ | ef | 239 |  | ff | 255 |

# Zebra Code Page 1252

This is the Zebra Code Page 1252:



| CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 20 | 32 | 0 | 30 | 48 | @ | 40 | 64 | P | 50 | 80 | ` | 60 | 96 | p | 70 | 112 | € | 80 | 128 |
| ! | 21 | 33 | 1 | 31 | 49 | A | 41 | 65 | Q | 51 | 81 | a | 61 | 97 | q | 71 | 113 |  | 81 | 129 |
| " | 22 | 34 | 2 | 32 | 50 | B | 42 | 66 | R | 52 | 82 | b | 62 | 98 | r | 72 | 114 | ‚ | 82 | 130 |
| # | 23 | 35 | 3 | 33 | 51 | C | 43 | 67 | S | 53 | 83 | c | 63 | 99 | s | 73 | 115 | ƒ | 83 | 131 |
| $ | 24 | 36 | 4 | 34 | 52 | D | 44 | 68 | T | 54 | 84 | d | 64 | 100 | t | 74 | 116 | „ | 84 | 132 |
| % | 25 | 37 | 5 | 35 | 53 | E | 45 | 69 | U | 55 | 85 | e | 65 | 101 | u | 75 | 117 | … | 85 | 133 |
| & | 26 | 38 | 6 | 36 | 54 | F | 46 | 70 | V | 56 | 86 | f | 66 | 102 | v | 76 | 118 | † | 86 | 134 |
| ' | 27 | 39 | 7 | 37 | 55 | G | 47 | 71 | W | 57 | 87 | g | 67 | 103 | w | 77 | 119 | ‡ | 87 | 135 |
| ( | 28 | 40 | 8 | 38 | 56 | H | 48 | 72 | X | 58 | 88 | h | 68 | 104 | x | 78 | 120 | ˆ | 88 | 136 |
| ) | 29 | 41 | 9 | 39 | 57 | I | 49 | 73 | Y | 59 | 89 | i | 69 | 105 | y | 79 | 121 | ‰ | 89 | 137 |
| * | 2a | 42 | : | 3a | 58 | J | 4a | 74 | Z | 5a | 90 | j | 6a | 106 | z | 7a | 122 | Š | 8a | 138 |
| + | 2b | 43 | ; | 3b | 59 | K | 4b | 75 | [ | 5b | 91 | k | 6b | 107 | { | 7b | 123 | ‹ | 8b | 139 |
| , | 2c | 44 | < | 3c | 60 | L | 4c | 76 | \ | 5c | 92 | l | 6c | 108 | \| | 7c | 124 | Œ | 8c | 140 |
| - | 2d | 45 | = | 3d | 61 | M | 4d | 77 | ] | 5d | 93 | m | 6d | 109 | } | 7d | 125 |  | 8d | 141 |
| . | 2e | 46 | > | 3e | 62 | N | 4e | 78 | ^ | 5e | 94 | n | 6e | 110 | ~ | 7e | 126 | Ž | 8e | 142 |
| / | 2f | 47 | ? | 3f | 63 | O | 4f | 79 | _ | 5f | 95 | o | 6f | 111 |  | 7f | 127 |  | 8f | 143 |

| CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC | CHR | HEX | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 90 | 144 |  | a0 | 160 | ° | b0 | 176 | À | c0 | 192 | Ð | d0 | 208 | à | e0 | 224 | ð | f0 | 240 |
| ‘ | 91 | 145 | ¡ | a1 | 161 | ± | b1 | 177 | Á | c1 | 193 | Ñ | d1 | 209 | á | e1 | 225 | ñ | f1 | 241 |
| ’ | 92 | 146 | ¢ | a2 | 162 | ² | b2 | 178 | Â | c2 | 194 | Ò | d2 | 210 | â | e2 | 226 | ò | f2 | 242 |
| “ | 93 | 147 | £ | a3 | 163 | ³ | b3 | 179 | Ã | c3 | 195 | Ó | d3 | 211 | ã | e3 | 227 | ó | f3 | 243 |
| ” | 94 | 148 | ¤ | a4 | 164 | ´ | b4 | 180 | Ä | c4 | 196 | Ô | d4 | 212 | ä | e4 | 228 | ô | f4 | 244 |
| • | 95 | 149 | ¥ | a5 | 165 | µ | b5 | 181 | Å | c5 | 197 | Õ | d5 | 213 | å | e5 | 229 | õ | f5 | 245 |
| – | 96 | 150 | ¦ | a6 | 166 | ¶ | b6 | 182 | Æ | c6 | 198 | Ö | d6 | 214 | æ | e6 | 230 | ö | f6 | 246 |
| — | 97 | 151 | § | a7 | 167 | · | b7 | 183 | Ç | c7 | 199 | × | d7 | 215 | ç | e7 | 231 | ÷ | f7 | 247 |
| ˜ | 98 | 152 | ¨ | a8 | 168 | ¸ | b8 | 184 | È | c8 | 200 | Ø | d8 | 216 | è | e8 | 232 | ø | f8 | 248 |
| ™ | 99 | 153 | © | a9 | 169 | ¹ | b9 | 185 | É | c9 | 201 | Ù | d9 | 217 | é | e9 | 233 | ù | f9 | 249 |
| š | 9a | 154 | ª | aa | 170 | º | ba | 186 | Ê | ca | 202 | Ú | da | 218 | ê | ea | 234 | ú | fa | 250 |
| › | 9b | 155 | « | ab | 171 | » | bb | 187 | Ë | cb | 203 | Û | db | 219 | ë | eb | 235 | û | fb | 251 |
| œ | 9c | 156 | ¬ | ac | 172 | ¼ | bc | 188 | Ì | cc | 204 | Ü | dc | 220 | ì | ec | 236 | ü | fc | 252 |
|  | 9d | 157 | - | ad | 173 | ½ | bd | 189 | Í | cd | 205 | Ý | dd | 221 | í | ed | 237 | ý | fd | 253 |
| ž | 9e | 158 | ® | ae | 174 | ¾ | be | 190 | Î | ce | 206 | Þ | de | 222 | î | ee | 238 | þ | fe | 254 |
| Ÿ | 9f | 159 | ¯ | af | 175 | ¿ | bf | 191 | Ï | cf | 207 | ß | df | 223 | ï | ef | 239 | ÿ | ff | 255 |

**Notes •** ___________________________________________

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# B

# ASCII

This section shows the American Standard Code for Information Interchange (ASCII) code used by Zebra printers.

# ASCII Code Chart

Shaded areas in Table 10 indicate characters not recommended for command prefix, format prefix, or delimiter characters.

**Table 10 • Zebra Used ASCII Code**

| HEX | Character | HEX | Character | HEX | Character | HEX | Character |
|---|---|---|---|---|---|---|---|
| 00 | NUL | 20 | Space | 40 | @ | 60 | ‘ |
| 01 | SOH | 21 | ! | 41 | A | 61 | a |
| 02 | STX | 22 | “ | 42 | B | 62 | b |
| 03 | ETX | 23 | # | 43 | C | 63 | c |
| 04 | EOT | 24 | $ | 44 | D | 64 | d |
| 05 | ENQ | 25 | % | 45 | E | 65 | e |
| 06 | ACK | 26 | & | 46 | F | 66 | f |
| 07 | BEL | 27 | ‘ | 47 | G | 67 | g |
| 08 | BS | 28 | ( | 48 | H | 68 | h |
| 09 | HT | 29 | ) | 49 | I | 69 | i |
| 0A | LF | 2A | * | 4A | J | 6A | j |
| 0B | VT | 2B | + | 4B | K | 6B | k |
| 0C | FF | 2C | , | 4C | L | 6C | l |
| 0D | CR | 2D | - | 4D | M | 6D | m |
| 0E | SO | 2E | . | 4E | N | 6E | n |
| 0F | SI | 2F | / | 4F | O | 6F | o |
| 10 | DLE | 30 | 0 | 50 | P | 70 | p |
| 11 | DC1 | 31 | 1 | 51 | Q | 71 | q |
| 12 | DC2 | 32 | 2 | 52 | R | 72 | r |
| 13 | DC3 | 33 | 3 | 53 | S | 73 | s |
| 14 | DC4 | 34 | 4 | 54 | T | 74 | t |
| 15 | NAK | 35 | 5 | 55 | U | 75 | u |
| 16 | SYN | 36 | 6 | 56 | V | 76 | v |
| 17 | ETB | 37 | 7 | 57 | W | 77 | w |
| 18 | CAN | 38 | 8 | 58 | X | 78 | x |
| 19 | EM | 39 | 9 | 59 | Y | 79 | y |
| 1A | SUB | 3A | : | 5A | Z | 7A | z |
| 1B | ESC | 3B | ; | 5B | [ | 7B | { |
| 1C | FS | 3C | < | 5C | \ | 7C | \| |
| 1D | GS | 3D | = | 5D | ] | 7D | } |
| 1E | RS | 3E | > | 5E | ^ | 7E | ~ |
| 1F | US | 3F | ? | 5F | _ | 7F | DEL |

# C

# Fonts and Bar Codes

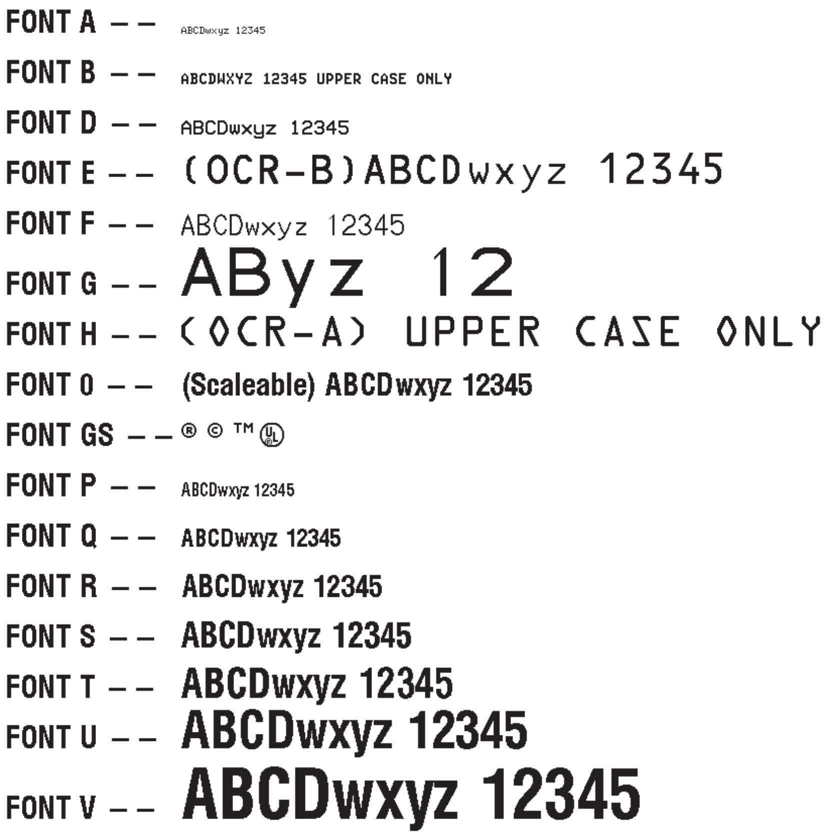
This section provides information about different fonts (type faces) and bar codes that can be used with the printer.

## Contents

# Standard Printer Fonts

Most Zebra printers come standard with 15 bitmapped fonts and one scalable font, see Figure 68. Additional downloadable bitmapped and scalable fonts are also available. Character size and density (how dark it appears) depend on the density of the printhead and the media used.

**Figure 68 • Examples of the Standard Printer Fonts**



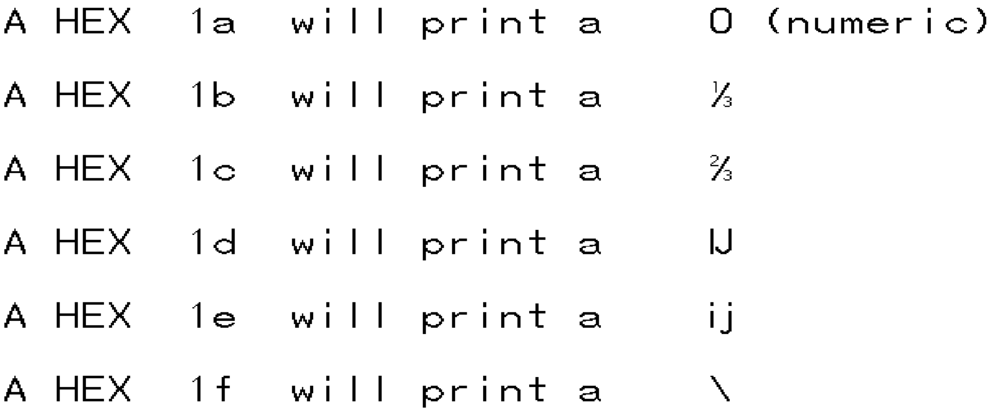
FONT A -- ABCDwxyz 12345
FONT B -- ABCDWXYZ 12345 UPPER CASE ONLY
FONT D -- ABCDwxyz 12345
FONT E -- (OCR-B)ABCDwxyz 12345
FONT F -- ABCDwxyz 12345
FONT G -- AByz 12
FONT H -- (OCR-A) UPPER CASE ONLY
FONT 0 -- (Scaleable) ABCDwxyz 12345
FONT GS --® © ™ UL
FONT P -- ABCDwxyz 12345
FONT Q -- ABCDwxyz 12345
FONT R -- ABCDwxyz 12345
FONT S -- ABCDwxyz 12345
FONT T -- ABCDwxyz 12345
FONT U -- ABCDwxyz 12345
FONT V -- ABCDwxyz 12345

To use one of these fonts, you must either use the change alphanumeric default font command (^CF) or specify an alphanumeric field command (^A).

The standard Zebra character set is Code 850 for character values greater than 20 HEX. There are six HEX character values below 20 HEX that are also recognized. Figure 69 shows how these character values are printed.

**Note •** Unidentified characters should default to a space.

**Figure 69 • Recognized HEX Values below 20 HEX**



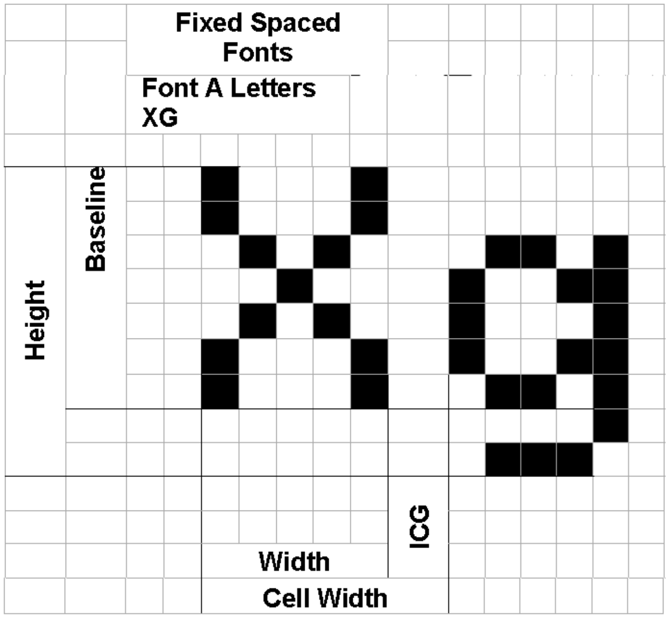
```
A HEX 1a will print a 0 (numeric)
A HEX 1b will print a ⅓
A HEX 1c will print a ⅔
A HEX 1d will print a Ĳ
A HEX 1e will print a ĳ
A HEX 1f will print a \
```

# Proportional and Fixed Spacing

Proportional spacing is different than fixed spacing. In Table 11, the intercharacter gap (ICG), the space between characters, is constant for fonts A through H, which means that the spacing between all characters is the same. For example, the spacing between the letters MW is the same as between the letters IE.

Figure 70 is an example of fixed space fonts:

**Figure 70 • Fixed Space Fonts Proportion**



The baseline is the imaginary line on which the bottom (base) of all characters (except any descenders) rest. The area between the baseline and the bottom of the matrix is used for any character "descenders." Baseline numbers define where the baseline is located in relationship to the top of the matrix. For example, the baseline for font "E" is 23 dots down from the top of the matrix.

**Table 11 • Intercharacter Gap and Baseline Parameters**

| Font | H x W (in dots) | Type | Intercharacter Gap (in dots) | Baseline (in dots) |
|---|---|---|---|---|
| A | 9 x 5 | U-L-D | 1 | 7 |
| B | 11 x 7 | U | 2 | 11 |
| C,D | 18 x 10 | U-L-D | 2 | 14 |
| E | 28 x 15 | OCR-B | 5 | 23 |
| F | 26 x 13 | U-L-D | 3 | 21 |
| G | 60 x 40 | U-L-D | 8 | 48 |
| H | 21 x 13 | OCR-A | 6 | 21 |

**Table 11 • Intercharacter Gap and Baseline Parameters**

| Font | H x W (in dots) | Type | Intercharacter Gap (in dots) | Baseline (in dots) |
|---|---|---|---|---|
| GS | 24 x 24 | SYMBOL | PROPORTIONAL | 3 x HEIGHT/4 |
| 0 | DEFAULT: 15 x 12 | | PROPORTIONAL | 3 x HEIGHT/4 |

# Scalable Versus Bitmapped Fonts

For scalable fonts, setting the height and width equally produces characters that appear the most balanced. Balanced characters are pleasing to the eye because actual height and width are approximately equal to each other. This is achieved through the use of a smooth-scaling algorithm in the printer.

For bitmapped fonts, this balancing is built into the font. In actuality, the height of a bitmap font is slightly larger than the width. Bitmap fonts are always at the maximum size of the character's cell.

## Scalable Fonts

All dot parameters used in the commands to create scalable fonts are translated into a point size because scalable fonts are measured in point sizes, not dots. To determine how many dots to enter to obtain a particular point size, use the following formula. The actual point size will be an approximate value.

$$\text{Dots} = \frac{\text{(Point size) x (Dots per inch of Printer)}}{72}$$

- For printers using a 6 dot/mm printhead the "dots per inch of printer" value is 152.4
- For printers using a 8 dot/mm printhead the "dots per inch of printer" value is 203.2
- For printers using a 12 dot/mm printhead the "dots per inch of printer" value is 304.8
- For printers using a 24 dot/mm printhead the "dots per inch of printer" value is 609.6

The actual height and width of the character in dots will vary, depending on the font style and the particular character. Therefore, some characters will be smaller and some will be larger than the actual dot size requested. The baselines for all scalable fonts are calculated against the dot size of the cell. The baseline is 3/4 down from the top of the cell. For example, if the size of the cell is 80 dots, the baseline will be 60 dots (3/4) down from the top of the cell.

For more information concerning fonts and related commands, see *~DB* on page 154 and *~DS* on page 163.

## Bitmapped Fonts

Internal bitmapped fonts can be magnified from 1 to 10 times their normal (default) size. The magnification factor is in whole numbers. Therefore, if the normal size of a bitmapped font is 9 dots high and 5 dots wide, a magnification factor of 3 would produce a character of 27 dots high and 15 dots wide. Height and width can be magnified independently.

### Magnification Factor

The font commands contain parameters for entering the height and width of printed characters. The values are always entered in dots. When entering these values for bitmapped fonts, use the following formula:

Base Height x Magnification Factor = Height Parameter Value

The same principle applies when calculating width.

Example:

Base height = 9 dots

Base width = 5 dots

To magnify a bitmapped character with the above specifics 3 times its size:

Height parameter = 27 [9 x 3]

Width parameter = 15 [5 x 3]

## Changing Bitmapped Font Size

Alphanumeric field command (`^A`) parameters h and w control the magnification and, therefore, the ultimate size of the font. The parameter is specified in dots, but ZPL II actually uses an integer multiplier times the original height/width of the font. For example, if you specify

```
^AD,54
```

you get characters three times their normal size (54 dots high), but if you specify

```
^AD,52
```

you receive the same result, not characters 52 dots high.

Defining only the height or width of a bitmapped font forces the magnification to be proportional to the parameter defined. If neither is defined, the `^CF` height and width are used. For example, if the height is twice the standard height, the width will be twice the standard width.

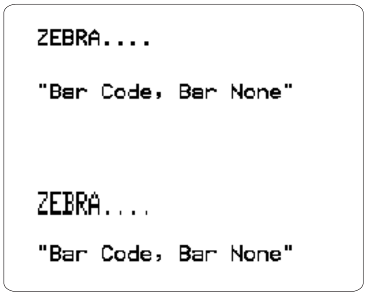
**Example •** If a `^CF` command, with height and width parameters defined, is used to set the first font, any `^A` commands (to select a different font) that follow must have the height and width parameter filled in.

If this is not done, the newly selected font will be magnified using values for the `^CF` height and width parameters. This is an example of what happens:.

**ZPL II CODE**

```
^XA^LL1800
^FO50,50^CFD,26,10^FDZEBRA....^FS
^FO50,100^FD"Bar Code, Bar None"^FS
^FO50,200^AA^FDZEBRA....^FS
^FO50,250^FD"Bar Code, Bar None"^FS
^XZ
```

**GENERATED LABEL**



ZEBRA....

"Bar Code, Bar None"

ZEBRA....

"Bar Code, Bar None"

# Font Matrices

**Type Key** **U** = Uppercase, **L** = Lowercase, **D** = Descenders

## 6 dot/mm printhead

**Table 12 •**

| Font | Matrix | Type | Character Size | | | |
|---|---|---|---|---|---|---|
| | HxW (in dots) | | HxW (in in.) | Char./in. | HxW (in mm) | Char. /mm |
| A | 9 x 5 | U-L-D | 0.059 x 0.039 | 25.4 | 1.50 x 0.99 | 1.01 |
| B | 11 x 7 | U | 0.072 x 0.059 | 16.9 | 1.82 x 1.50 | 0.066 |
| C, D | 18 x 10 | U-L-D | 0.118 x 0.079 | 12.7 | 2.99 x 2.00 | 0.05 |
| E | 21 x 10 | OCR-B | 0.138 x 0.085 | 11.7 | 3.50 x 2.16 | 0.46 |
| F | 26 x 13 | U-L-D | 0.170 x 0.105 | 9.53 | 4.32 x 2.67 | 0.37 |
| G | 60 x 40 | U-L-D | 0.394 x 0.315 | 3.18 | 10.0 x 8.00 | 0.125 |
| H | 17 x 11 | OCR-A | 0.111 x 0.098 | 10.2 | 2.81 x 2.48 | 0.40 |
| GS | 24 x 24 | SYMBOL | 0.157 x 0.157 | 6.35 | 3.98 x 3.98 | 0.251 |
| 0 | Default: 15 x 12 | | | | | |

## 8 dot/mm (203 dpi) printhead

**Table 13 •**

| Font | Matrix | Type | Character Size | | | |
|---|---|---|---|---|---|---|
| | HxW (in dots) | | HxW (in in.) | Char./in. | HxW (in mm) | Char. /mm |
| A | 9 X 5 | U-L-D | 0.044 x 0.030 | 33.3 | 1.12 x 0.76 | 1.31 |
| B | 11 X 7 | U | 0.054 x 0.044 | 22.7 | 1.37 x 1.12 | 0.89 |
| C, D | 18 X 10 | U-L-D | 0.089 x 0.059 | 16.9 | 2.26 x 1.12 | 0.66 |
| E | 28 x 15 | OCR-B | 0.138 x 0.098 | 10.2 | 3.50 x 2.49 | 0.40 |
| F | 26 x 13 | U-L-D | 0.128 x 0.079 | 12.7 | 3.25 x 2.00 | 0.50 |
| G | 60 x 40 | U-L-D | 0.295 x 0.197 | 4.2 | 7.49 x 5.00 | 0.167 |
| H | 21 x 13 | OCR-A | 0.103 x 0.093 | 10.8 | 2.61 x 2.36 | 0.423 |
| GS | 24 x 24 | SYMBOL | 0.118 x 0.118 | 8.5 | 2.99 x 2.99 | 0.334 |
| P | 20 x 18 | U-L-D | 0.098 x 0.089 | N/A | 2.50 x 2.25 | N/A |
| Q | 28 x 24 | U-L-D | 0.138 x 0.118 | N/A | 3.50 x 3.00 | N/A |
| R | 35 x 31 | U-L-D | 0.172 x 0.153 | N/A | 4.38 x 3.88 | N/A |
| S | 40 x 35 | U-L-D | 0.197 x 0.172 | N/A | 5.00 x 4.38 | N/A |
| T | 48 x 42 | U-L-D | 0.236 x 0.207 | N/A | 6.00 x 5.25 | N/A |
| U | 59 x 53 | U-L-D | 0.290 x 0.261 | N/A | 7.38 x 6.63 | N/A |
| V | 80 x 71 | U-L-D | 0.394 x 0.349 | N/A | 10.00 x 8.88 | N/A |
| 0 | Default: 15 x 12 | U-L-D | Scalable | | Scalable | |

## 12 dot/mm (300 dpi) printhead

**Table 14 •**

| Font | Matrix | Type | Character Size | | | |
|---|---|---|---|---|---|---|
| | HxW (in dots) | | HxW (in in.) | Char./in. | HxW (in mm) | Char. /mm |
| A | 9 X 5 | U-L-D | 0.030 x 0.020 | 50.8 | 0.75 x 0.50 | 2.02 |
| B | 11 X 7 | U | 0.036 x 0.030 | 33.8 | 0.91 x 0.75 | 1.32 |
| C, D | 18 X 10 | U-L-D | 0.059 x 0.040 | 25.4 | 1.50 x 1.00 | 1.00 |
| E | 42 x 20 | OCR-B | 0.138 x 0.085 | 23.4 | 1.75 x 1.08 | 0.92 |
| F | 26 x 13 | U-L-D | 0.085 x 0.053 | 19.06 | 2.16 x 1.34 | 0.74 |
| G | 60 x 40 | U-L-D | 0.197 x 0.158 | 6.36 | 5.00 x 4.00 | 0.25 |
| H | 34 x 22 | OCR-A | 0.111 x 0.098 | 10.20 | 2.81 x 2.48 | 0.40 |
| GS | 24 x 24 | SYMBOL | 0.079 x 0.079 | 12.70 | 1.99 x 1.99 | 0.52 |
| P | 20 x 18 | U-L-D | 0.067 x 0.060 | N/A | 1.69 x 1.52 | N/A |
| Q | 28 x 24 | U-L-D | 0.093 x 0.080 | N/A | 2.37 x 2.03 | N/A |
| R | 35 x 31 | U-L-D | 0.117 x 0.103 | N/A | 2.96 x 2.62 | N/A |
| S | 40 x 35 | U-L-D | 0.133 x 0.177 | N/A | 3.39 x 2.96 | N/A |
| T | 48 x 42 | U-L-D | 0.160 x 0.140 | N/A | 4.06 x 3.56 | N/A |
| U | 59 x 53 | U-L-D | 0.197 x 0.177 | N/A | 5.00 x 4.49 | N/A |
| V | 80 x 71 | U-L-D | 0.267 x 0.237 | N/A | 6.77 x 6.01 | N/A |
| 0 | Default: 15 x 12 | U-L-D | Scalable | | Scalable | |

## 24 dot/mm (600 dpi) printhead

**Table 15 •**

| Font | Matrix | Type | Character Size | | | |
|---|---|---|---|---|---|---|
| | HxW (in dots) | | HxW (in in.) | Char./in. | HxW (in mm) | Char. /mm |
| A | 9 X 5 | U-L-D | 0.015 x 0.010 | 100.00 | 0.38 x 0.25 | 4.00 |
| B | 11 X 7 | U | 0.018 x 0.015 | 66.66 | 0.46 x 0.38 | 2.60 |
| C, D | 18 X 10 | U-L-D | 0.030 x 0.020 | 50.00 | 0.77 x 0.51 | 2.0 |
| E | 42 x 20 | OCR-B | 0.137 x 0.087 | 11.54 | 3.47 x 2.20 | 0.45 |
| F | 26 x 13 | U-L-D | 0.043 x 0.027 | 37.5 | 1.10 x 0.68 | 1.50 |
| G | 60 x 40 | U-L-D | 0.100 x 0.080 | 12.50 | 2.54 x 2.04 | 0.50 |
| H | 34 x 22 | OCR-A | 0.100 x 0.093 | 10.71 | 2.54 x 2.37 | 0.42 |
| GS | 24 x 24 | SYMBOL | 0.040 x 0.040 | 25.00 | 1.02 x 1.02 | 1.00 |
| P | 20 x 18 | U-L-D | 0.067 x 0.060 | N/A | 1.69 x 1.52 | N/A |
| Q | 28 x 24 | U-L-D | 0.093 x 0.080 | N/A | 2.37 x 2.03 | N/A |
| R | 35 x 31 | U-L-D | 0.117 x 0.103 | N/A | 2.96 x 2.62 | N/A |
| S | 40 x 35 | U-L-D | 0.133 x 0.117 | N/A | 3.39 x 2.96 | N/A |
| T | 48 x 42 | U-L-D | 0.160 x 0.140 | N/A | 4.06 x 3.56 | N/A |
| U | 59 x 53 | U-L-D | 0.197 x 0.177 | N/A | 5.00 x 4.49 | N/A |
| V | 80 x 71 | U-L-D | 0.267 x 0.237 | N/A | 6.77 x 6.01 | N/A |
| 0 | Default: 15 x 12 | U-L-D | Scalable | | Scalable | |

# Bar Codes

Every bar code contains data made up of a sequence of light spaces and dark bars that represent letters, numbers, or other graphic characters. The usable characters differ among the various kinds of bar codes. Each bar code section in the *ZPL Commands* on page 31 provides a table of applicable characters. Start and stop characters and check digits are used by many, but not all, bar codes. These will be indicated in the specific bar code explanations.

Zebra printers can print the following kinds of bar codes:

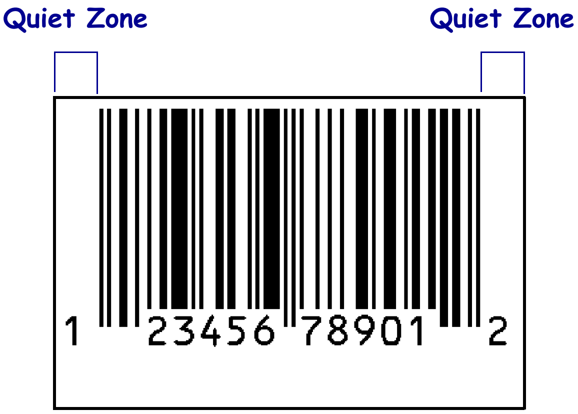
<table>
<tr><td><b>Bar code modulus “X” dimensions</b><br>• Picket fence (non-rotated) orientation:<br>  • 203 dpi = 0.0049 in. mil to 0.049 in.<br>  • 300 dpi = 0.0033 in. mil to 0.033 in.<br>• Ladder (rotated) orientation:<br>  • 203 dpi = 0.0049 in. mil to 0.049 in.<br>  • 300 dpi = 0.0039 in. mil to 0.039 in.</td><td rowspan="3"><b>Linear bar codes</b><br>• Codabar<br>• Code 11<br>• Code 39<br>• Code 93<br>• Code 128 with subsets A/B C and UCC Case Codes<br>• ISBT-128<br>• UPC-A<br>• UPC-E<br>• EAN-8<br>• EAN-13<br>• UPC and EAN 2 or 5 digit extensions<br>• Planet Code<br>• Plessey<br>• Postnet<br>• Standard 2 of 5<br>• Industrial 2 of 5<br>• Interleaved 2 of 5<br>• LOGMARS<br>• MSI<br>• RSS-14</td></tr>
<tr><td><b>Two-dimensional bar codes</b><br>• Aztec<br>• Code 49<br>• Maxi Code<br>• TLC39<br>• PDF-417<br>• QR Code<br>• Codablock<br>• DataMatrix<br>• Micro-PDF417</td></tr>
<tr><td><b>Bar code ratios</b><br>• 2:1<br>• 7:3<br>• 5:2<br>• 3:1</td></tr>
</table>

## Basic Format for Bar Codes

The basic format for bar codes is quiet zone, start character, data, check digit, stop character, and quiet zone. Not all bar codes require each of these elements.

Every bar code requires a quiet zone. A quiet zone (sometimes called a “clear area”) is an area adjacent to the machine-readable symbols that ensure proper reading (decoding) of the symbols. No printing is permissible within this area. Preprinted characters, borders, and background color are acceptable if they are invisible to the reading device; these are used in some applications but restrict the type of reading device that can be used. The size of the quiet zone depends on the size of bar widths (usually 10 times the width of the narrow bar).

**Figure 71 • Quiet Zone in a Bar Code**



## Bar Code Field Instructions

To create a bar code, a bar code field command must be contained in the label format. Table 16 shows the bar code field commands. The number in brackets denotes the print ratio. Each command produces a unique bar code.

**Important •** (*) for Fixed Printing Ratio means that the ratio between the width of the bars in the code is a fixed standard and cannot be changed.

As another reference to the bar code field commands ratio, see Table 11 on page 136.

**Table 16 • Bar Code Field Commands**

| ZPL Command | Command Description | Ratio |
|---|---|---|
| **^B0** | Aztec Bar Code Parameters | [Fixed] |
| **^B1** | Code 11 (USD-8) | [2.0 - 3.0] |
| **^B2** | Interleaved 2 of 5 | [2.0 - 3.0] |
| **^B3** | Code 39 (USD-3 and 3 of 9) | [2.0 - 3.0] |
| **^B4** | Code 49 (*) | [Fixed] |
| **^B5** | Planet Code Bar Code | [Fixed] |
| **^B7** | PDF417 (*) | [Fixed] |
| **^B8** | EAN-8 (*) | [Fixed] |
| **^B9** | UPC-E | [Fixed] |
| **^BA** | Code 93 (USS-93)(*) | [Fixed] |
| **^BB** | CODABLOCK A, E, F (*) | [Fixed] |
| **^BC** | Code 128 (USD-6) (*) | [Fixed] |
| **^BD** | UPS MaxiCode (*) | [Fixed] |
| **^BE** | EAN-13 | [Fixed] |
| **^BF** | Micro-PDF417 | [Fixed] |

**Table 16 • Bar Code Field Commands**

| ZPL Command | Command Description | Ratio |
|---|---|---|
| ^BI | Industrial 2 of 5 | [2.0 - 3.0] |
| ^BJ | Standard 2 of 5 | [2.0 - 3.0] |
| ^BK | ANSI Codabar (USD-4 and 2 of 7) | [2.0 - 3.0] |
| ^BL | LOGMARS | [2.0 - 3.0] |
| ^BM | MSI | [2.0 - 3.0] |
| ^BO | Aztec Bar Code Parameters | [Fixed] |
| ^BP | Plessey | [2.0 - 3.0] |
| ^BQ | QR Code (*) | [Fixed] |
| ^BR | RSS (reduced Space Symbology Bar Code) | [Fixed] |
| ^BS | UPC/EAN Extensions (*) | [Fixed] |
| ^BU | UPC-A (*) | [Fixed] |
| ^BX | Data Matrix (*) | [Fixed] |
| ^BZ | PostNet (*) | [Fixed] |

Additionally, each bar code field command can be issued with a definition parameter string. The parameter string defines field rotation, height, and interpretation line status for all bar codes. For some bar codes, the parameter string also sets a check digit, start character, and/or stop character. Use the definition parameter string to command the printer to print bar codes of appropriate heights and densities that conform to the specifications of the application.

The use of the parameter string is optional because all parameters have default values. If the default values for all of the bar code parameters suit the application, then only the bar code command needs to be entered.

Parameters in bar code field commands are "position specific." If a value (other than the default value) is manually entered for one parameter the ZPL II delimiter character (a comma) must be used to mark the position of the preceding parameters in the string.

To change just the third parameter, enter two commas and then the value for the third parameter. The default values will be automatically used for the first and second parameters.

## Bar Code Command Groups

Bar code commands are organized into four groups. Each group represents a type of bar code. Table 17 through Table 20 identify the groups and the bar codes they contain:

**Table 17 • Numeric Only Bar Codes**

| ZPL Command | Command Description |
|---|---|
| ^B0 | Aztec Bar Code Parameters |
| ^B1 | Code 11 |

### Table 17 • Numeric Only Bar Codes

| ZPL Command | Command Description |
|---|---|
| ^B5 | Planet Code Bar Code |
| **^BI** | Industrial 2 of 5 |
| **^BJ** | Standard 2 of 5 |
| **^BK** | ANSI Codabar (or NW-7) |
| **^BM** | MSI |
| **^BO** | Aztec Bar Code Parameters |
| **^BP** | Plessey |
| **^BZ** | POSTNET |

### Table 18 • Retail Labeling Bar Codes

| ZPL Command | Command Description |
|---|---|
| **^B0** | Aztec Bar Code Parameters |
| **^B8** | EAN-8 |
| **^B9** | UPC-E |
| **^BE** | EAN-13 |
| **^BO** | Aztec Bar Code Parameters |
| **^BS** | UPC/EAN extensions |
| **^BU** | UPC-A |

### Table 19 • Alphanumeric Bar Code

| ZPL Command | Command Description |
|---|---|
| **^B0** | Aztec Bar Code Parameters |
| **^B3** | Code 39 |
| **^BA** | Code 93 |
| **^BC** | Code 128 |
| **^BL** | LOGMARS |
| **^BO** | Aztec Bar Code Parameters |

### Table 20 • Two-Dimensional Bar Codes

| ZPL Command | Command Description |
|---|---|
| **^B0** | Aztec Bar Code Parameters |
| **^B4** | Code 49 |

**Table 20 • Two-Dimensional Bar Codes**

| | |
|---|---|
| **^B7** | PDF417 |
| **^BB** | CODABLOCK |
| **^BD** | UPS MaxiCode |
| **^BF** | MicroPDF417 |
| **^BQ** | QR Code |
| **^BO** | Aztec Bar Code Parameters |
| **^BR** | RSS (Reduced Space Symbology)Bar Code |
| **^BT** | TLC39 |
| **^BX** | Data Matrix |

**Notes •** ___________________________________________

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# D

# Mod 10 and Mod 43 Check Digits

This section provides information about Mod 10 and Mod 43 check digits.

## Contents

# Mod 10 Check Digit

The calculations for determining the Mod 10 Check Digit character are as follows:

1. Start at the first position and add the value of every other position together.

   0 + 2 + 4 + 6 + 8 + 0 = 20

2. The result of Step 1 is multiplied by 3.

   20 x 3 = 60

3. Start at the second position and add the value of every other position together.

   1 + 3 + 5 + 7 + 9 = 25

4. The results of steps 1 and 3 are added together.

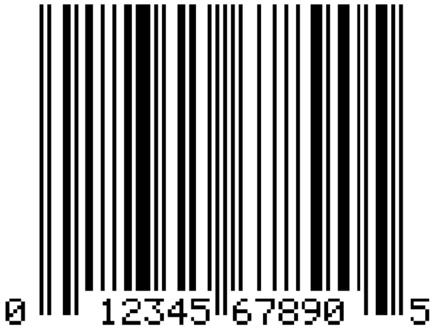
   60 + 25 = 85

5. The check character (12th character) is the smallest number which, when added to the result in step 4, produces a multiple of 10.

   85 + X = 90 (next higher multiple of 10)

   X = 5 Check Character

This bar code illustrates the above example. The digit on the right (5) is the check digit.



# Mod 43 Check Digit

The calculations for determining the Mod 43 check Digit character are as follows:

Each character in the Code 39 character set has a specific value, as follows:

| | | | |
|---|---|---|---|
| 0=0 | B=11 | M=22 | X=33 |
| 1=1 | C=12 | N=23 | Y=34 |
| 2=2 | D=13 | O=24 | Z=35 |
| 3=3 | E=14 | P=25 | - =36 |
| 4=4 | F=15 | Q=26 | . = 37 |
| 5=5 | G=16 | R=27 | Space=38 |
| 6=6 | H=17 | S=28 | $=39 |
| 7=7 | I=18 | T=29 | /=40 |
| 8=8 | J=19 | U=30 | +=41 |
| 9=9 | K=20 | V=31 | %=42 |
| A=10 | L=21 | W=32 | |

**Example •** Data string 2345ABCDE/

1. Add the sum of all the character values in the data string. Using the chart above, the sum of the character values is as follows:

   1 + 2 + 3 + 4 + 5 + 10 + 11 + 12 + 13 + 14 + 40 =115

2. Divide the total by 43. Keep track of the remainder.

   115/43 = 2 Remainder is 29

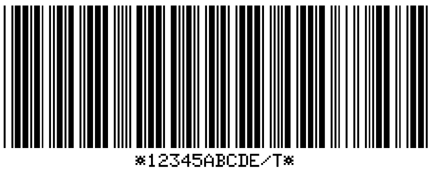
3. The “check digit” is the character that corresponds to the value of the remainder.

   Remainder = 29

   29 is the value for the letter T.

   T is the check digit.

Below is a bar code that illustrates the example. The character on the right, T, is the check digit.



```
^FO125,100^B3N,Y,150,Y,N^FD12345ABCDE/^FS
```

**Notes •** ___________________________________________

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# E

# ZB64 Encoding and Compression

This section describes the Base 64 MIME (ZB64) encoding and compression. This is the same type of MIME encoding that is used in e-mail.

## Contents

# Introduction to B64 and Z64

The first encoding, known as B64, encodes the data using the MIME Base64 scheme. Base64 is used to encode e-mail attachments and is specifically designed to address communications path limitations, such as control characters and 7-bit data links. It encodes the data using only the printable ASCII characters:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

0 1 2 3 4 5 6 7 8 9 + / =

With the use of ZPL, this has the added benefit of avoiding the caret (^) and tilde (~) characters. Base64 encodes six bits to the byte, for an expansion of 33 percent over the un-enclosed data. This is much better than the 100 percent expansion given by the existing ASCII hexadecimal encoding.

The second encoding, known as Z64, first compresses the data using the LZ77 algorithm to reduce its size. (This algorithm is used by the PKWARE® compression program PKZIP™ and is integral to the PNG graphics format.) The compressed data is then encoded using the MIME Base64 scheme as described above.

A CRC is calculated across the Base64-encoded data. If the CRC-check fails or the download is aborted, the object can be invalidated by the printer.

The robust encodings can be piggybacked on the existing download commands with full backward compatibility. This is done by prefacing the new encodings with a header that uniquely identifies them. The download routines in the printer firmware can key-off the header to determine whether the data is in the old ASCII hexadecimal encoding or one of the new encodings. This allows existing downloadable objects to be used in their present format, while new objects can be created using the same download commands with the new encodings for increased integrity and reduced download times.

For easy reference, B64 and Z64 are referred to as ZB64. In any reference to the ZB64 encoding, assume that both Base64-only (B64) and LZ77/Base64 (Z64) encodings are accepted.

**Example •** The following is an example of an existing download command using the new encoding:

```
~DTARIAL,59494,:Z64:H4sICMB8+DMAC0FSSUFMLlRURgDsmnd8VEW7x5+ZO
edsyibZNNJhlyWhbEJIwYSwJDGNkmwghJIgJYEEEhQIPSggKAjEAiIiVaSoIJ
YNBAkIGgGxUBVUUCGU0JQSC0WFnPvbE+SF18+9H+8f973X+3Jm93umzzNznvn
NSSFGRJ6ARAVZvXK7XDaXLyTiR5B7ontuZPQ824I5RKIa6ew+aba8+pU1rVDZ
iciv
```

[multiple lines deleted]

```
/O6DU5wZ7ie2+g4xzDPwCpwm3nqW2GAPcdclxF4fIP66jHjncmKvKzh/ZUNCx
l9/QQx2HXHYB4m/PkQcdCdx2G7OYt+mszkMh4iZxoifvkh89BFipo87kwD/Bf
/dOcycAAEA:a1b2
```

The parameters are identical to the existing `~DT` command:

**Table 21 • ~DT Command Parameters**

| Parameter | Details |
|---|---|
| `o` = font name | *Accepted Values:* any valid TrueType name, up to 8 characters<br>*Default Value:* if a name is not specified, UNKNOWN is used<br>In this example, Arial is the specified font. |
| `s` = font size | *Accepted Values:* the number of memory bytes required to hold the Zebra-downloadable format of the font<br>*Default Value:* if an incorrect value or no value is entered, the command is ignored<br>In this example, 59494 is the size.<br>To maintain compatibility with the existing ASCII hexadecimal encoding, this field must contain the size of the un-enclosed and uncompressed object — the number of bytes that are finally placed into the printer's memory, not the number of bytes downloaded. |
| `data` = data string | *Accepted Values:* a string of ASCII hexadecimal values (two hexadecimal digits/byte). The total number of two-digit values must match parameter `s`.<br>*Default Value:* if no data is entered, the command is ignored<br>Everything following the size field is data. The new encoding imposes a header with a unique signature. The new encoding must start with the characters :B64: (data encoded in Base-64 only) or :Z64: (data compressed with LZ77, then encoded in Base-64) followed by the encoded data.<br>After the data is presented, another colon (:) and four hexadecimal digits comprise the CRC. The Base64 standard allows new-line characters (carriage returns and line feeds) to be inserted into the encoded data for clarity. These characters are ignored by the printer. |

When downloading graphics, the colon is used in the current ASCII hexadecimal encoding indicate "repeat the previous dot row." Since this shorthand is invalid for the first character of data (no previous dot row has been downloaded), it is safe for the printer to detect the leading colon character as the lead-in for the new encodings.

# B64 and Z64 Encoding

These download encodings, B64 and Z64, are created as drop-in replacements for the existing ASCII hexadecimal encoding.

B64 encoding do the following:

- Encode the compressed data using the MIME Base64 algorithm.
- Calculate a CRC across the encoded data.
- Add a unique header to differentiate the new format from the existing ASCII hex encoding.

Z64 encoding do the following:

- Compress the data using the LZ77 algorithm.
- Encode the compressed data using the MIME Base64 algorithm.
- Calculate a CRC across the encoded data.
- Add a unique header to differentiate the new format from the existing ASCII hexadecimal encoding.

The data field have this format:

```
:id:encoded_data:crc
```

This table identifies the parameters for this format:

**Table 22 • Format Parameters**

| Parameter | Details |
|---|---|
| **:id** | the identifying string B64 or Z64 |
| **:iencoded_data** | data to download, compressed with LZ77 (if the id parameter is set to Z64) and encoded with Base64. |
| **:crc** | four hexadecimal digits representing the CRC calculated over the :encoded_data field. |

The printer calculates a CRC across the received data bytes and compare this to the CRC in the header. A CRC mismatch is treated as an aborted download.

The B64 and Z64 encodings can be used in place of the ASCII hexadecimal encoding in any download command. The commands are:

**~DB** – Download Bitmap Font

**~DE** – Download Encoding

**~DG** – Download Graphic

**~DL** – Download Unicode Bitmap Font

**~DS** – Download Scalable Font

**~DT** – Download TrueType Font

**~DU** – Download Unbounded TrueType Font

**^GF** – Graphic Field (with compression type set to “ASCII hex”)

The ~DB (Download Bitmap Font) command can use the new encodings in place of the ASCII hexadecimal encoding in data sub-fields. Each character is encoded individually. However, for small amounts of data, the identifying B64 or Z64 header and trailing CRC may negate any gains made by using the new format.

For backward compatibility, the ^HG (Host Graphic) command uses the ASCII hexadecimal encoding. It does not use the new encodings.

**Notes •** ___________________________________________

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# F

# Field Interactions

This section provides you with examples that show how commands interact with various justification parameters. The examples are in charts for these orientations:

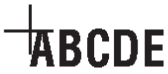
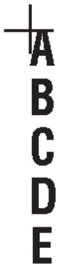
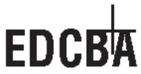
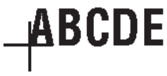
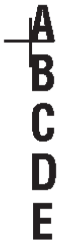
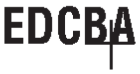
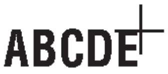
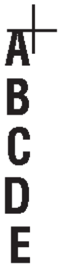
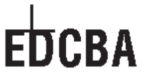
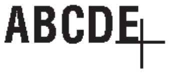
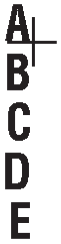
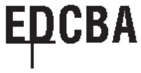
- Normal
- Rotated
- Bottom-up
- Inverted

These charts are designed so that you can identify the location of the field origin and interactions between the rotation, formatting and justification commands.

# Normal Orientation

Table 23 shows you the various normal orientation outputs:

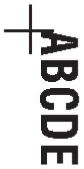
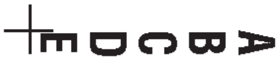
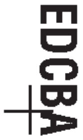
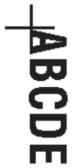
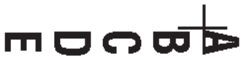
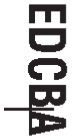
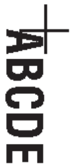
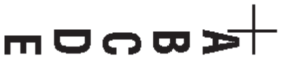
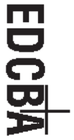
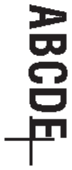
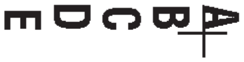
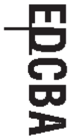
**Table 23 • Normal Orientation Examples**

| | ^FPH | ^FPV | ^FPR |
|---|---|---|---|
| **^FO Left Justified** |  |  |  |
| **^FT Left Justified** |  |  |  |
| **^FO Right Justified** |  |  |  |
| **^FT Right Justified** |  |  |  |

# Rotated Orientation

Table 24 shows you the various rotated orientation outputs:

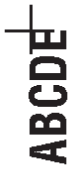
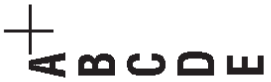
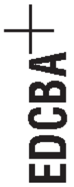
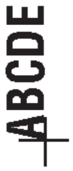
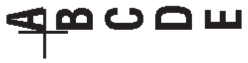
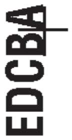
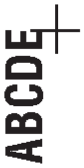
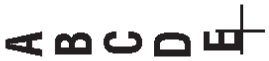
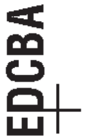
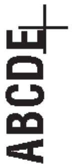
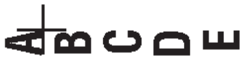
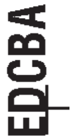
**Table 24 • Rotated Orientation Examples**

| | ^FPH | ^FPV | ^FPR |
|---|---|---|---|
| ^FO Left Justified |  |  |  |
| ^FT Left Justified |  |  |  |
| ^FO Right Justified |  |  |  |
| ^FT Right Justified |  |  |  |

# Bottom Up Orientation

Table 25 shows you the various bottom up orientation outputs:

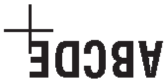
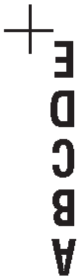
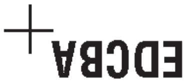
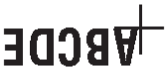
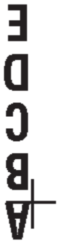
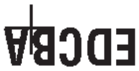
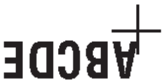
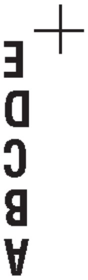
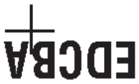
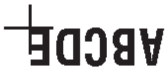
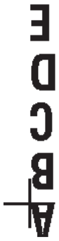
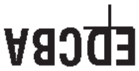
Table 25 • Bottom Orientation Examples

| | ^FPH | ^FPV | ^FPR |
|---|---|---|---|
| **^FO Left Justified** |  |  |  |
| **^FT Left Justified** |  |  |  |
| **^FO Right Justified** |  |  |  |
| **^FT Right Justified** |  |  |  |

# Inverted Orientation

Table 26 shows you the various inverted orientation outputs:

**Table 26 • Inverted Orientation Examples**

| | ^FPH | ^FPV | ^FPR |
|---|---|---|---|
| ^FO<br>Left<br>Justified |  |  |  |
| ^FT<br>Left<br>Justified |  |  |  |
| ^FO<br>Right<br>Justified |  |  |  |
| ^FT<br>Right<br>Justified |  |  |  |

**Notes •** ___________________________________________

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# G

# Real Time Clock

This appendix contains the information needed to install, program, and operate the Real Time Clock (RTC) option.

# Overview

This hardware option is available as either a factory-installed or field-installable option in specific printer products manufactured and sold by Zebra Technologies Corporation.

The Real Time Clock option is currently available for following printers, and requires that the firmware version shown is installed on that printer.

| Supported Zebra Printer and Print Engine Models | | Requires this Firmware Version or Later |
|---|---|---|
| 105*SL* printers that meet any one of the following criteria:<br>• if the printer was manufactured after April 2006<br>• if the RTC Date and the RTC Time fields are printed on the configuration label<br>• if the RTC Date and the RTC Time appear on the LCD display | | 60.13.0.13Z |
| *DA*402 & *T*402 printers | | 32.8.4 |
| LP2844-Z, TPL2844-Z, and TPL3844-Z printers | | 45.10.x |
| *PAX* Series print engines | *170PAX*2 print engines | 29.9.x or 31.9.x |
| | 110*PAX*3 print engines using Standard Font | 34.10.x |
| | 110*PAX*3 print engines using TT Font | 49.10.x |
| | 116*PAX*3 print engines using TT Font | 35.10.x |
| | 170*PAX*3 print engines using Standard Font | 37.10.x |
| | 170*PAX*3 print engines using TT Font | 38.10.x |
| | *110PAX*4 and 170*PAX*4 print engines | 60.13.0.12 |
| S4M printers (field-installable kit) | | 50.13.x |
| *S*600 printers | | 27.10.3 |
| *Xi* Series printers | 90*Xi*II, 140*Xi*II, 170*Xi*II & 220*Xi*II printers | 18.9.x |
| | 90*Xi*III, 96*Xi*III, 140*Xi*III, 170*Xi*III, and 220*Xi*III printers | 33.10.0 |
| | 90*Xi*III*Plus*, 96*Xi*III*Plus*, 140*Xi*III*Plus*, 170*Xi*III*Plus*, and 220*Xi*III*Plus* printers | 60.13.0.12 |
| *Z*4Mplus and *Z*6Mplus printers | | 60.13.0.12 |
| ZM400/ZM600 printers | | 53.15.xZ |

# Control Panel Programming

New parameters for the Real Time Clock have been added to the Control Panel Configuration. These parameters are located immediately following the FORMAT CONVERT prompt. Refer to the printer/print engine *User Guide* for complete configuration information.

- X.9.x firmware added the parameters to *Xi*II printers and 170*PAX*/170*PAX*2 print engines.
- X.10.x firmware added the parameters to *Xi*III printers and *PAX*3 print engines.
- X.13.x firmware added the parameters to *Xi*III*Plus* printers, *PAX*4 print engines.
- X.13.0.13Z firmware added the parameters to 105*SL* printers.

## Real Time Clock Parameters

The parameters listed on the following pages are added to the Control Panel Configuration prompts only when both the Real Time Clock hardware option and the appropriate version of firmware are installed:

- X.9.x or later firmware installed in the *Xi*II series printers or the 170*PAX*/170*PAX*2 series print engines.
- X.10.x or later firmware installed in the *Xi*III series printers or the *PAX*3 series print engines.
- X.13.0.13Z or later firmware installed in the 105*SL* printers
- X.13.x or later firmware installed in the *Xi*III*Plus* series printers, the *PAX*4 series print engines, or the S4M printers.

The RTC ZPL II commands apply to all printers/print engines with the Real Time Clock hardware option and proper firmware.

### Idle Display

Selects the printer/print engine Idle Display format and the method of displaying the time/date information. This parameter also affects the Configuration Label printout and the **RTC DATE** and **RTC TIME** formats.

#### Selections

- FW VERSION
- MM/DD/YY 24HR
- MM/DD/YY 12HR
- DD/MM/YY 24HR
- DD/MM/YY 12HR

If FW VERSION is selected, the format on the Configuration Label and on the RTC DATE and RTC TIME parameters is MM/DD/YY 24HR.

## RTC Date

Allows entry of the RTC date in the format selected by the IDLE DISPLAY parameter.

**Note •** The RTC parameters are password-protected. Refer to your printer’s user guide for specific instructions on accessing and modifying printer parameters.

| Printer Model | Action |
|---|---|
| *PAX* Series print engines, *Xi* Series printers, and 105*SL* printers | **1.** Use the **LEFT** oval key to select the position to be adjusted<br>**2.** Then, use the **RIGHT** oval key to select the correct value for that position. |
| Z4M*plus* and Z6M*plus* printers | **1.** Press SELECT to select the parameter.<br>**2.** Use the MINUS (-) key to select the position to be adjusted<br>**3.** Then, use the PLUS (+) key to select the correct value for that position.<br>**4.** Press SELECT to accept any changes and deselect the parameter. |
| S4M printer | **1.** Press ENTER. The printer displays the current RTC date.<br>**2.** Modify the values as follows:<br>• Press the right arrow to move to the next digit position.<br>• To increase the value, press the up arrow.<br>• To decrease the value, press the down arrow.<br>**3.** Press ENTER to accept the value shown. |

**Note •** Invalid dates, such as 2/29/1999, may be entered, but will not be saved.

## RTC Time

Allows entry of the RTC time in the format selected by the `IDLE DISPLAY` parameter.

**Note •** The RTC parameters are password-protected. Refer to your printer's user guide for specific instructions on accessing and modifying printer parameters.

| Printer Model | Action |
|---|---|
| *PAX* Series print engines, *Xi* Series printers, and 105*SL* printers | **1.** Use the **LEFT** oval key to select the position to be adjusted<br>**2.** Use the **RIGHT** oval key to select the correct value for that position. |
| *Z4Mplus* and *Z6Mplus* printers | **1.** Press SELECT to select the parameter.<br>**2.** Use the MINUS (-) key to select the position to be adjusted.<br>**3.** Use the PLUS (+) key to select the correct value for that position.<br>**4.** Press SELECT to accept any changes and deselect the parameter. |
| S4M printer | **1.** Press ENTER. The printer displays the current RTC date.<br>**2.** Modify the values as follows:<br>• Press the right arrow to move to the next digit position.<br>• To increase the value, press the up arrow.<br>• To decrease the value, press the down arrow.<br>**3.** Press ENTER to accept the value shown. |

# RTC General Information

The Real Time Clock commands are only applicable if the Real Time Clock option is installed in the printer. For those printers with an LCD control panel display, additional control panel configuration parameters are also included.

The ZPL II Field Clock **^FC** command is used to specify the clock-indicator character for the primary, secondary, and third clocks. This command must be included within each label field command string whenever the date or time clock values are required within the field. No date or time clock information can be printed in a label field unless this command is included. The **^FC** command can now be combined with the **^SN** command in V60.13.0.10 and later.

A clock-indicator can be any printable character except the ZPL II Format Prefix, Control Prefix, or Delimiter characters. The default value for the primary clock-indicator is the percent sign **%**. The secondary and third clock-indicators have no defaults and must be specified in order for that clock to be used.

The Field Data **^FD** command has been expanded to recognize the clock-indicators and associated command characters, and to replace them during the printing process with the corresponding time or date parameter. For example, if the primary clock-indicator is the percent sign **%**, then during printing, the character sequence **%H** in the **^FD** statement would be replaced by the 2-digit current hour.

**Note •** If the Real Time Clock is not installed, or the **^FC** command has not preceded the **^FD** statement, no replacement would occur. In this case, the characters **%H** would print as text on the label.

The name of the day of the week, the name of the month, and the AM or PM designation can also be inserted in place of a specific clock-indicator/command character sequence. See Table 27 on page 811 for the list of command characters and their functions.

**Table 27 • Command Characters**

| Command Character | Function |
|---|---|
| `%a` | is replaced by the abbreviated weekday name |
| `%A` | is replaced by the weekday name |
| `%b` | is replaced by the abbreviated month name |
| `%B` | is replaced by the month name |
| `%d` | is replaced by the day of the month number, 01 to 31 |
| `%H` | is replaced by the hour of the day (military), 00 to 23 |
| `%I` | is replaced by the hour of the day (civilian), 01 to 12 |
| `%j` | is replaced by the day of the year, 001 to 366 |
| `%m` | is replaced by the month number, 01 to 12 |
| `%M` | is replaced by the minute, 00 to 59 |
| `%p` | is replaced by the AM or PM designation |
| `%S` | is replaced by the seconds, 00 to 59 |
| `%U` | is replaced by the week# of the year, 00 to 53, Sunday is 1st day* |
| `%W` | is replaced by the week# of the year, 00 to 53, Monday is 1st day** |
| `%w` | is replaced by the day# of the week, 00 (Sunday) to 06 (Saturday) |
| `%y` | is replaced by the 2 digits of the year, 00 to 99 |
| `%Y` | is replaced by the full 4 digit year number—where% is the specified clock-indicator character |

*. %U establishes Sunday as the first day of the year.

**.%W establishes Monday as the first day of the year.

The Set Offset **^SO** command permits the printing of specific times and dates relative to the primary clock. The secondary (or third) clock is enabled when secondary (or third) offsets are entered using this command. The secondary (or third) clock time and date are determined by adding the offsets to the current clock reading.

One **^SO** command is required to set the secondary offset; an additional **^SO** command is required for a third offset. The offsets remain until changed or until the printer is either powered down or reset.

**Note •** Only dates from January 1, 1998 to December 31, 2097 are supported. Setting the offsets to values that result in dates outside this range is not recommended and may have unexpected results.

The Set Mode/Language **^SL** (see page 320) command is used to select the language the days of the week and the months are printed in. This command also sets the printing mode, which can be **S** for START TIME, **T** for TIME NOW, or a Numeric Value for the time accuracy. In START TIME mode, the time printed on the label is the time that is read from the Real Time Clock when the label formatting begins (when the **^XA** command is received by the printer). In TIME NOW mode, the time printed on the label is the time that is read from the Real Time Clock when the label is placed in the queue to be printed. In Numeric Value mode, a time accuracy tolerance can be specified.

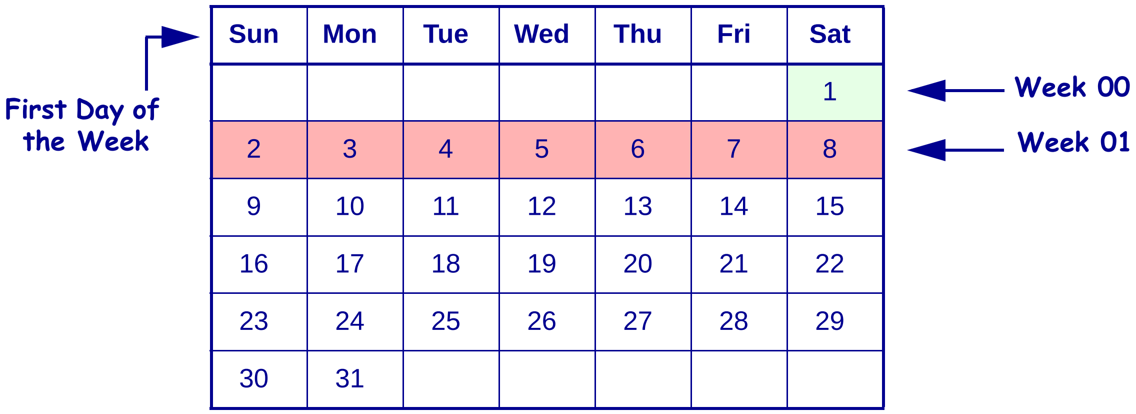
## First Day of the Week Affects Calendar Week

The **%U** and **%W** commands set the first day of the week. The week numbering starts at the beginning of the year with Week 01 representing the **first full week** of the year. Any day(s) before that established first day of the week are part of the Week 00. The following examples show how setting different days as the first day of the week affect the calendar week.

**Important •** The **%U** and **%W** commands determine the numbering for all weeks in the year.

**Example • January, 2005 with Week 00**

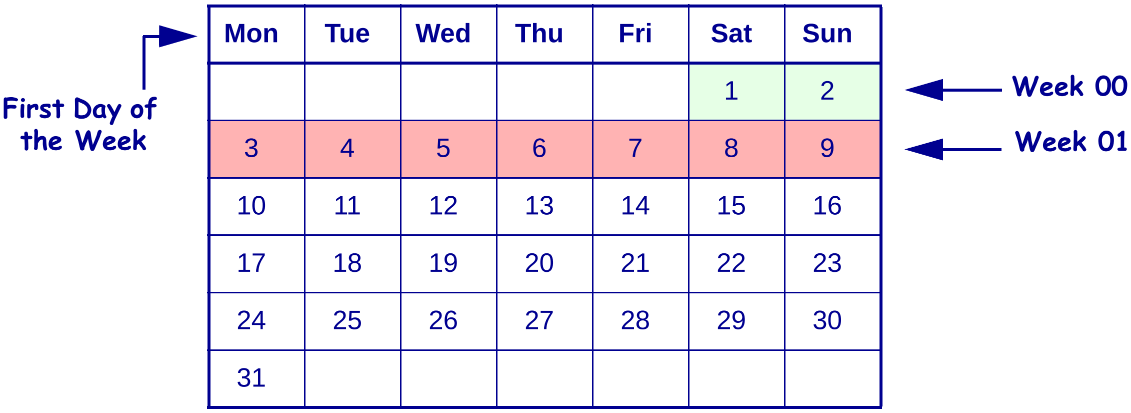
Set Sunday as the first day of the week using the **%U** command. In this example, notice that Saturday, January 1st is Week 00 and Sunday, January 2nd begins Week 01.



| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

### Example • January, 2005 with Week 00

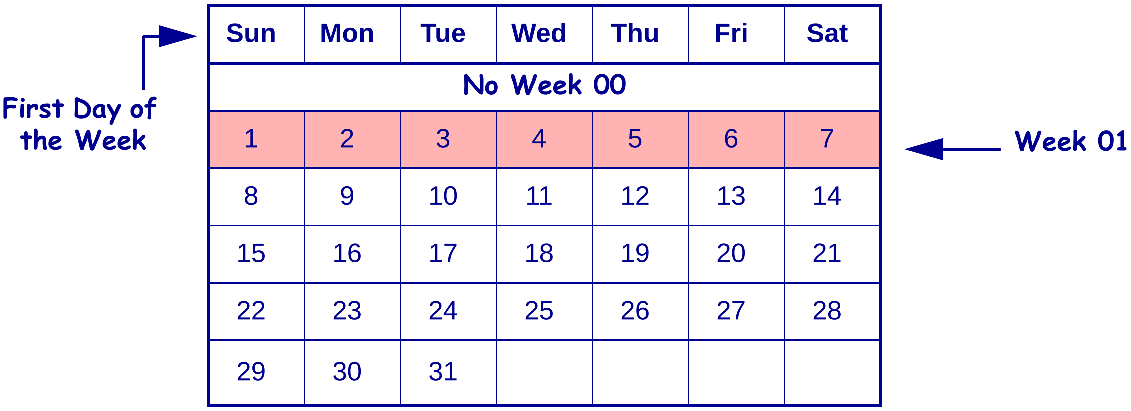
Set Monday as the first day of the week using the **%W** command. In this example, notice that Saturday, January 1st **and** Sunday, January 2nd are Week 00 and Monday, January 3rd begins Week 01.


First Day of the Week
Week 00
Week 01

| Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

### Example • January, 2006 without Week 00

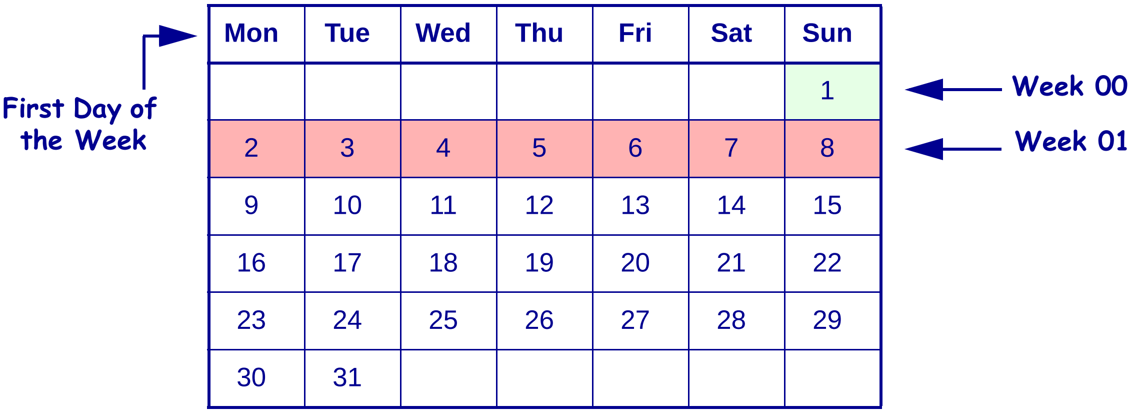
Set Sunday as the first day of the week using the **%U** command. Since 2006 begins on a Sunday, there is no Week 00 in this example.


First Day of the Week
Week 01

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| No Week 00 | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | | | | |

### Example • January, 2006 with Week 00

Set Monday as the first day of the week using the `%W` command. In this example, Saturday, January 1st is Week 00 and Sunday, January 2nd begins Week 01.



| Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

First Day of the Week
Week 00
Week 01

## Time and Date Precision

As of V60.13.0.1 firmware, the **^CO** command is now ignored. While the S4M printer has a lower firmware version number (V50.x), its firmware was recently released and follows the rule to ignore the **^CO** command.

The time and date placed in a label field is determined at the time the label bitmap is created by the printer (start time mode). If a batch of labels is formatted, the date and time will be the same for all labels in the batch. If the printer is paused during the printing process and remains in that state for a period of time, when printing resumes, the time and date will still be the same as when the batch was first started.

If more precise time and date stamps are required on versions prior to V60, follow the process below. For versions after V60, use the Numeric Value mode shown on page 320.

Cycle the printer/print engine power Off (**O**) and On (**I**) to clear the memory before performing the steps below.

1. Print a Memory Usage Label **(^XA^WD*:*.*^XZ)**
   and note the following value:
   Available RAM (in BYTES) (A) ___________

2. Print a Configuration Label and note these values:
   Printer "Print Width" (in DOTS) (B) ___________
   (NOT the Label Width)

   Label Length (in DOTS) (C) ___________

3. Determine the desired maximum number of queued labels with the same Time and Date value. (D) ___________

**Note •** Increasing the number of queued labels will improve throughput performance, but Real Time Clock values will be less accurate. Two is usually a good compromise.

4. Substitute the values for B through D from the previous page into the following formula:
   The "label queue" memory required (in BYTES) (E) ___________
   (B x C x D)/8 =

5. Substitute the values for A and E into the following formula:
   The **^CO** command memory required (in KBYTES) (F) ___________
   (A-E)/1024)-5=

**Note •** If the value of (F) is less than zero, then no **^CO** command is needed. If the value of (F) is greater than zero, use the integer portion in the **^CO** command.

**Example •**

| | |
|---|---|
| Available RAM (A) | = 71478 BYTES |
| Print Width (B) | = 832 DOTS |
| Label Length (C) | = 1000 DOTS |
| Max Labels Queued (D) | = 2 |

Then —

The label queue memory required (E) =

(B x C x D)/8 = 208000 BYTES

And —

The **^CO** command memory required (F) =

(71478-208000)/1024)-5=489.87 KBYTES

Therefore, the correct **^CO** command string to add to the label format would be:

```
^XA^COY,489^XZ
```

This command string will cause 489 KBYTES to be set aside as Font Memory and make it unavailable as label format memory. The memory remaining will only allow two labels to be formatted at one time, and the time and date will be more precise for those two labels.

**Note •** For the 170*PAX*2 print engine, you must disable the Reprint Function for the Time Now Mode to function properly.

# ZPL II Samples

The ZPL II scripts shown on this page establish the initial settings for the date and time clock. The script below then references these settings to provide the output shown in Figure 72 on page 818.

Setting the date and time for the Real Time Clock only needs to be done once. The date and time are maintained by an on-board battery when the printer is reset or the printer is turned Off (**O**).

To set the date and time to April 23, 2005 at 2:30pm, the following command string should be sent to the printer:

```
^XA
   ^ST04,23,2005,02,30,0,P^FS
^XZ
```

To initialize the Real Time Clock and set up two offset values (offset #2 set to 3 months and 1 hour in the future, offset #3 set to 1 year in the past), the following command sequence should be sent to the printer:

```
^XA
   ^SL
   ^SO2,3,0,0,1,0,0^FS
   ^SO3,0,0,-1,0,0,0^FS
^XZ
```

The above ZPL II scripts initialize the RTC date and time and must be sent to a printer to provide proper date and time parameters for the ZPL II script below.

The following ZPL II script illustrates the various methods of printing the date and time initialized in the script above within separate fields on continuous media. Figure 72 on page 818 illustrates the printout of this script on a label.

For the below example, the **^FC** command delimiters are:

% Primary clock indicator
{ Secondary clock indicator
# Third clock indicator

```
^XA
   ^LL175
   ^FO10,025^AD^FC%,{,#^FD1: Mil: %H:%M:%S Civ: %I:%M:%S
   %p^FS
   ^FO10,050^AD^FC%,{,#^FD2: Mil: {H:{M:{S Civ: {I:{M:{S
   {p^FS
   ^FO10,075^AD^FC%,{,#^FD3: Mil: #H:#M:#S Civ: #I:#M:#S
   #p^FS
   ^FO10,100^AD^FC%,{,#^FD1: On %A, %B %d
   , %Y (%a, %m/%d/%y, %d %b %Y).^FS
   ^FO10,125^AD^FC%,{,#^FD2: On {A, {B {d, {Y (
    {a, {m/{d/{y, {d {b {Y).^FS
   ^FO10,150^AD^FC%,{,#^FD3: On #A, #B #d, #Y (
   #a, #m/#d/#y, #d #b #Y).^FS
^XZ
```

**Figure 72 • Printed Result of the Above ZPL II Script**

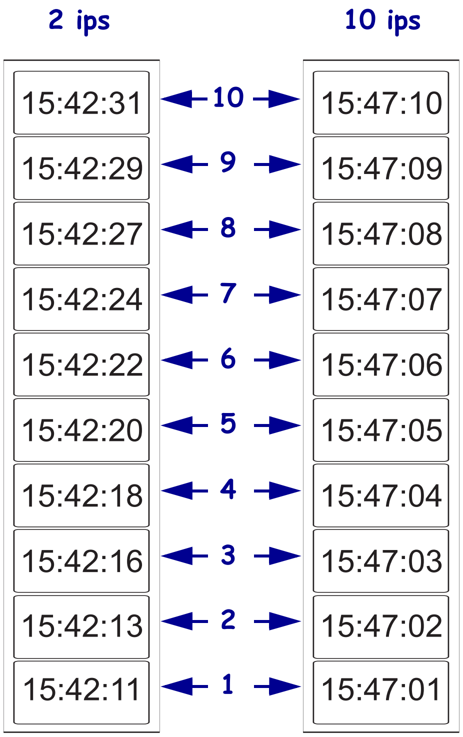
```
1: Mil: 14:30:00 Civ: 02:30:00 PM
2: Mil: 15:30:00 Civ: 03:30:00 PM
3: Mil: 14:30:00 Civ: 02:30:00 PM
1: On Wed, April 23, 2005 (Fri, 04/23/05, 23 Apr 2005)
2: On Saturday, July 23, 2005 (Fri, 07/23/05, 23 Jul 2005)
3: On Friday, April 23, 2004 (Fri, 04/23/04, 23 Apr 2004)
```

The following are examples of the time stamp using the **^SL1** and **^SL5** at 2 ips and 10 ips for the Enhanced Real Time Clock (V60.13.0.10 and later).

**Note •** They show the variation of time due to print speed and label complexity.

```
^XA
   ^SL1^FS
   ^FO187,184^A0N,101,121^FC%^FD%H:%M:%S^FS
   ^PQ10
^XZ
```

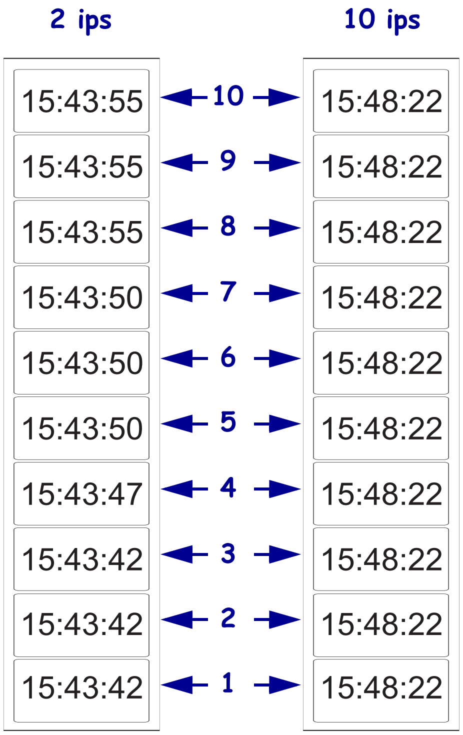
**Figure 73 • Example of ^SL1, 2 ips and 10 ips**



| | | | |
|---|---|---|---|
| **1** | Label 1 | **6** | Label 6 |
| **2** | Label 2 | **7** | Label 7 |
| **3** | Label 3 | **8** | Label 8 |
| **4** | Label 4 | **9** | Label 9 |
| **5** | Label 5 | **10** | Label 10 |

```
^XA
   ^SL5^FS
   ^FO187,184^A0N,101,121^FC%^FD%H:%M:%S^FS
   ^PQ10
^XZ
```

**Figure 74 • Example of ^SL5, 2 ips and 10 ips**



| | | | |
|---|---|---|---|
| 1 | Label 1 | 6 | Label 6 |
| 2 | Label 2 | 7 | Label 7 |
| 3 | Label 3 | 8 | Label 8 |
| 4 | Label 4 | 9 | Label 9 |
| 5 | Label 5 | 10 | Label 10 |

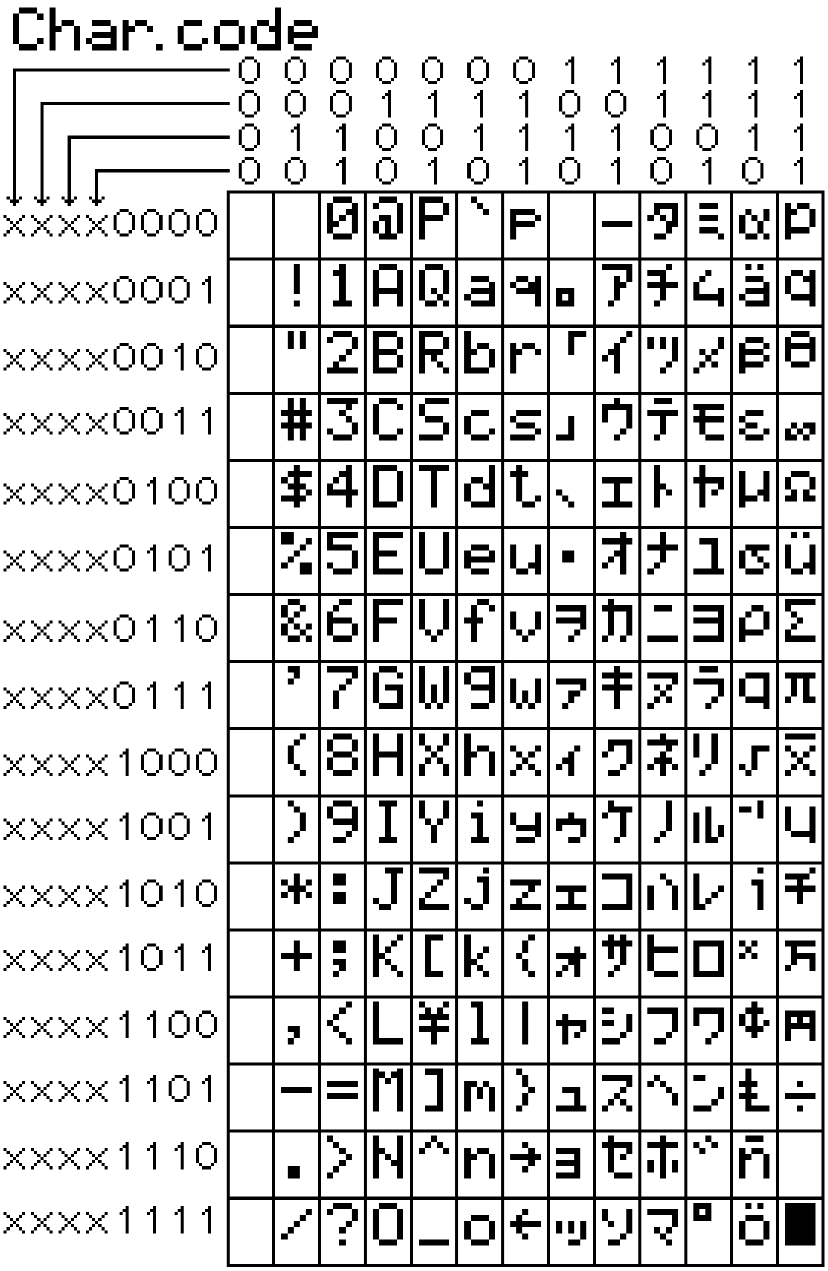
# A

# ZBI Character Set

This section provides you with the set of characters that are supported on the front panel of the following Zebra printers with ZBI 2.0: *Xi*III*Plus*, 105*SL*, Z4Mplus/Z6Mplus, ZM400, ZM600, PAX*4* and S4M when v60.16.0 or v53.16.0, or later firmware are loaded. These characters can be used in ZBI programs to display content on the LCD.

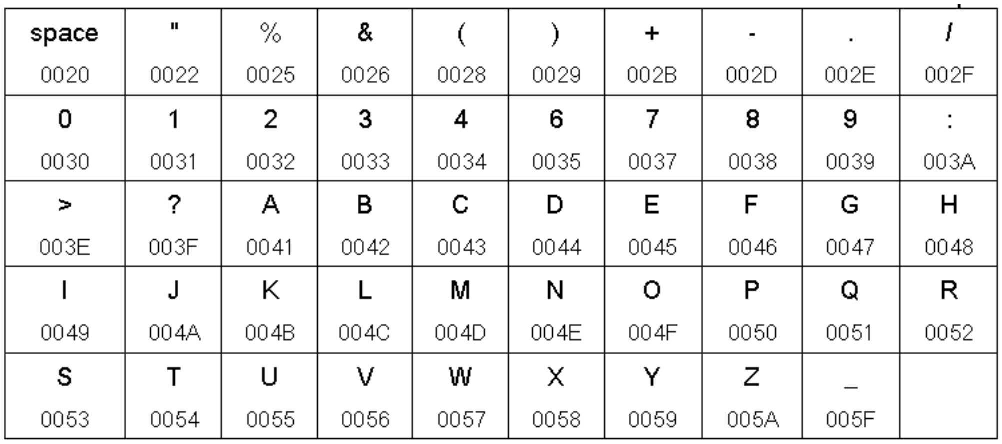
# Character Set

These are the supported characters for these Zebra printers: *Xi*III*Plus*, 105*SL*, Z4Mplus/Z6Mplus, PAX*4*, and S4M:



| Char.code | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| xxxx0000 | | | 0 | @ | P | ` | p | | ー | タ | ミ | α | p |
| xxxx0001 | | ! | 1 | A | Q | a | q | 。 | ア | チ | ム | ä | q |
| xxxx0010 | | " | 2 | B | R | b | r | 「 | イ | ツ | メ | β | θ |
| xxxx0011 | | # | 3 | C | S | c | s | 」 | ウ | テ | モ | ε | ∞ |
| xxxx0100 | | $ | 4 | D | T | d | t | 、 | エ | ト | ヤ | μ | Ω |
| xxxx0101 | | % | 5 | E | U | e | u | ・ | オ | ナ | ユ | σ | ü |
| xxxx0110 | | & | 6 | F | V | f | v | ヲ | カ | ニ | ヨ | ρ | Σ |
| xxxx0111 | | ' | 7 | G | W | g | w | ァ | キ | ヌ | ラ | g | π |
| xxxx1000 | | ( | 8 | H | X | h | x | ィ | ク | ネ | リ | √ | x̄ |
| xxxx1001 | | ) | 9 | I | Y | i | y | ゥ | ケ | ノ | ル | ⁻¹ | y |
| xxxx1010 | | * | : | J | Z | j | z | ェ | コ | ハ | レ | j | 千 |
| xxxx1011 | | + | ; | K | [ | k | { | ォ | サ | ヒ | ロ | ˣ | 万 |
| xxxx1100 | | , | < | L | ¥ | l | \| | ャ | シ | フ | ワ | ¢ | 円 |
| xxxx1101 | | - | = | M | ] | m | } | ュ | ス | ヘ | ン | £ | ÷ |
| xxxx1110 | | . | > | N | ^ | n | → | ョ | セ | ホ | ゛ | ñ | |
| xxxx1111 | | / | ? | O | _ | o | ← | ッ | ソ | マ | ゜ | ö | █ |

These are the supported characters for these Zebra printers: ZM400 and ZM600:



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| space<br>0020 | "<br>0022 | %<br>0025 | &<br>0026 | (<br>0028 | )<br>0029 | +<br>002B | -<br>002D | .<br>002E | /<br>002F |
| 0<br>0030 | 1<br>0031 | 2<br>0032 | 3<br>0033 | 4<br>0034 | 6<br>0035 | 7<br>0037 | 8<br>0038 | 9<br>0039 | :<br>003A |
| ><br>003E | ?<br>003F | A<br>0041 | B<br>0042 | C<br>0043 | D<br>0044 | E<br>0045 | F<br>0046 | G<br>0047 | H<br>0048 |
| I<br>0049 | J<br>004A | K<br>004B | L<br>004C | M<br>004D | N<br>004E | O<br>004F | P<br>0050 | Q<br>0051 | R<br>0052 |
| S<br>0053 | T<br>0054 | U<br>0055 | V<br>0056 | W<br>0057 | X<br>0058 | Y<br>0059 | Z<br>005A | _<br>005F | |

# B

# SGD Command Support

This appendix provides you with details identifying which SGD commands can be used with different printers and firmware versions.

# Printer and Firmware Compatibility

This section provides supported printer models and minumum firmware versions for all SGD commands. In order to set and get configurations, the SGD commands can be used through the Ethernet, serial, parallel, and USB interfaces.

**Note •** The printer responds with the printer setting of "?" if the printer setting:

- does not exist
- has not been configured yet

## Printer Type

If you know the printer type that you currently have, answer this question:

**What type of printer do you have?**

| If you have a … | Then… |
|---|---|
| Standard Printer | Go to Table 28 on page 826. |
| RFID printer | Go to Table 29 on page 832. |

### Standard Printer

**Important •** All the firmware versions noted in Table 28 refer to the minimum firmware version required. For RFID printer support, see Table 29.

**Table 28 • SGD Standard Printer and Firmware Compatibility**

| SGD Commands | XiIIIPlus<br>105SL<br>PAX4<br>Z4MPlus<br>Z6MPlus | S4M | ZM400<br>ZM600 |
|---|---|---|---|
| *appl.bootblock* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *appl.name* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *card.inserted* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *card.mac_addr* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *device.languages* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *device.unique_id* | V60.16.x | V53.16.x | V53.16.x |
| *device.xml.enable* | V60.15.8Z | V53.15.8Z | V53.15.8Z |
| *external_wired.ip.addr* | V60.15.8Z | ** V53.15.5Z | ** V53.15.5Z |
| *external_wired.ip.arp_interval* | V60.15.8Z | V53.15.5Z | V53.15.5Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 28 • SGD Standard Printer and Firmware Compatibility (Continued)**

| SGD Commands | XiIIIPlus<br>105SL<br>PAX4<br>Z4MPlus<br>Z6MPlus | S4M | ZM400<br>ZM600 |
|---|---|---|---|
| *external_wired.ip.default_addr.enable* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.ip.dhcp.cid_all* | V60.15.8Z | ** V53.15.5Z | ** V53.15.5Z |
| *external_wired.ip.dhcp.cid_enable* | V60.15.8Z | ** V53.15.5Z | ** V53.15.5Z |
| *external_wired.ip.dhcp.cid_prefix* | V60.15.8Z | ** V53.15.5Z | ** V53.15.5Z |
| *external_wired.ip.dhcp.cid_suffix* | V60.15.8Z | ** V53.15.5Z | ** V53.15.5Z |
| *external_wired.ip.dhcp.cid_type* | V60.15.8Z | V53.15.5Z | ** V53.15.5Z |
| *external_wired.ip.gateway* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.ip.netmask* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.ip.port* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.ip.protocol* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.ip.timeout.enable* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.ip.timeout.value* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *external_wired.mac_addr* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *internal_wired.ip.addr* | | | * V53.15.5Z |
| *internal_wired.ip.arp_interval* | | | * V53.15.5Z |
| *internal_wired.ip.default_addr.enable* | | | * V53.15.5Z |
| *internal_wired.ip.dhcp.cid_all* | | | * V53.15.5Z |
| *internal_wired.ip.dhcp.cid_enable* | | | * V53.15.5Z |
| *internal_wired.ip.dhcp.cid_prefix* | | | * V53.15.5Z |
| *internal_wired.ip.dhcp.cid_suffix* | | | * V53.15.5Z |
| *internal_wired.ip.dhcp.cid_type* | | | * V53.15.5Z |
| *internal_wired.ip.gateway* | | | * V53.15.5Z |
| *internal_wired.ip.netmask* | | | * V53.15.5Z |
| *internal_wired.ip.port* | | | V53.15.5Z |
| *internal_wired.ip.protocol* | | | * V53.15.5Z |
| *internal_wired.ip.timeout.enable* | | | * V53.15.5Z |
| *internal_wired.ip.timeout.value* | | | * V53.15.5Z |
| *internal_wired.mac_addr* | | | * V53.15.5Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 28 • SGD Standard Printer and Firmware Compatibility (Continued)**

| SGD Commands | XiIIIPlus<br>105SL<br>PAX4<br>Z4MPlus<br>Z6MPlus | S4M | ZM400<br>ZM600 |
|---|---|---|---|
| *ip.active_network* | V60.15.8Z | | V53.15.5Z |
| *ip.addr* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.arp_interval* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.bootp.enable* | V60.15.2Z | V53.15.5Z<br>V50.15.2Z | V53.15.5Z |
| *ip.dhcp.cid_all* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.dhcp.cid_enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.dhcp.cid_prefix* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.dhcp.cid_suffix* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.dhcp.cid_type* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.dhcp.enable* | V60.15.2Z | V53.15.5Z<br>V50.15.2Z | V53.15.5Z |
| *ip.ftp.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.gateway* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.http.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.lpd.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.netmask* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.pop3.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.pop3.password* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.pop3.poll* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.pop3.server_addr* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.pop3.username* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.port* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.primary_network* | V53.15.5Z | V53.15.5Z | V53.15.5Z |
| *ip.smtp.domain* | V60.15.2Z | V53.15.5Z<br>V50.15.2Z | V53.15.5Z |
| *ip.smtp.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.smtp.server_addr* | V60.15.2Z | V53.15.5Z<br>V50.15.2Z | V53.15.5Z |
| *ip.snmp.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 28 • SGD Standard Printer and Firmware Compatibility (Continued)**

| SGD Commands | XiIIIPlus<br>105SL<br>PAX4<br>Z4MPlus<br>Z6MPlus | S4M | ZM400<br>ZM600 |
|---|---|---|---|
| *ip.snmp.get_community_name* | V60.15.2Z | V53.15.5Z<br>V50.15.2Z | V53.15.5Z |
| *ip.snmp.set_community_name* | V60.15.2Z | V53.15.5Z<br>V50.15.2Z | V53.15.5Z |
| *ip.tcp.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.telnet.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *ip.udp.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *media.printmode* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *odometer.headclean* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *odometer.headnew* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *odometer.label_dot_length* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *odometer.media_marker_count1* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *odometer.media_marker_count2* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *odometer.total_print_length* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.adhocautomode* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.adhocchannel* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.associated* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.channel_mask* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.essid* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.firmware_version* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.ip.addr* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.arp_interval* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.default_addr.enable* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.dhcp.cid_all* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.dhcp.cid_enable* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.dhcp.cid_prefix* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.dhcp.cid_suffix* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.dhcp.cid_type* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.gateway* | V60.15.8Z | V53.15.5Z | V53.15.5Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

Table 28 • SGD Standard Printer and Firmware Compatibility (Continued)

| SGD Commands | XiIIIPlus<br>105SL<br>PAX4<br>Z4MPlus<br>Z6MPlus | S4M | ZM400<br>ZM600 |
|---|---|---|---|
| *wlan.ip.netmask* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.port* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.protocol* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.timeout.enable* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.ip.timeout.value* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.keep_alive.enable* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.keep_alive.timeout* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.kerberos.kdc* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.kerberos.password* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.kerberos.realm* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.kerberos.username* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.mac_addr* | V60.15.8Z | V53.15.5Z | V53.15.5Z |
| *wlan.operating_mode* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.password* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.preamble* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.private_key_password* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.roam.interval* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.roam.signal* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.security* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.signal_noise* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.signal_quality* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.signal_strength* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.station_name* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.tx_power* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.tx_rate* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.username* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wep.auth_type* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wep.index* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wep.key_format* | V60.15.2Z | V50.15.2Z | V53.15.5Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

Table 28 • SGD Standard Printer and Firmware Compatibility (Continued)

| SGD Commands | XiIIIPlus<br>105SL<br>PAX4<br>Z4MPlus<br>Z6MPlus | S4M | ZM400<br>ZM600 |
|---|---|---|---|
| *wlan.wep.key1* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wep.key2* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wep.key3* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wep.key4* | V60.15.2Z | V50.15.2Z | V53.15.5Z |
| *wlan.wpa.psk* | V60.15.2Z | V50.15.2Z | V53.15.5Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

## RFID Printers

**Important •** All the firmware versions noted in Table 29, refer to minimum firmware version required. For non-RFID printers, see Table 28. Once an RFID Ready printer has been reconfigured as a RFID Printer, Table 29 should be used

**Table 29 • SGD RFID Printer and Firmware Compatibility**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *card.inserted* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *card.mac_addr* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.addr* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.arp_interval* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.bootp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.dhcp.cid_all* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.dhcp.cid_enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *ip.dhcp.cid_prefix* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.dhcp.cid_suffix* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.dhcp.cid_type* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.dhcp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.ftp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.gateway* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.http.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.lpd.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *ip.netmask* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.pop3.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.pop3.password* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.pop3.poll* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.pop3.server_addr* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.pop3.username* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.port* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.primary_network* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *ip.smtp.domain* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.smtp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.smtp.server_addr* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.snmp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.snmp.get_community_name* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.snmp.set_community_name* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.tcp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *ip.telnet.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *ip.udp.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *media.printmode* | | | | |
| *rfid.error.response* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *rfid.position.program* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *rfid.reader_1.antenna_port* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *rfid.reader_1.power.read* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *rfid.reader_1.power.single_power* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *rfid.reader_1.power.write* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.adhocautomode* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *wlan.adhocchannel* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.associated* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.channel_mask* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.essid* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.firmware_version* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.keep_alive.enable* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.keep_alive.timeout* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.kerberos.kdc* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *wlan.kerberos.password* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.kerberos.realm* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.kerberos.username* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.operating_mode* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.password* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.preamble* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.private_key_password* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.roam.interval* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *wlan.roam.signal* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.security* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.signal_noise* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.signal_quality* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.signal_strength* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.station_name* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.tx_power* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.tx_rate* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *wlan.username* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.auth_type* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.index* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.key_format* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.key1* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.key2* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.key3* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |
| *wlan.wep.key4* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.
** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

**Table 29 • SGD RFID Printer and Firmware Compatibility (Continued)**

| SGD Commands | R110Xi (UHF) and R170Xi | R110PAX4 | R4Mplus | R110Xi HF |
|---|---|---|---|---|
| *wlan.wpa.psk* | R60.15.8Z | R62.15.8Z<br>R63.15.8Z | SP994P<br>SP999F<br>SP1027F<br>SP1056E<br>SP1082F | R65.15.8Z |

* On these printers with ZebraNet™ 10/100 Internal Print Server.

** On these printers with ZebraNet™ 10/100 External Print Server, firmware version 1.1.5

# C

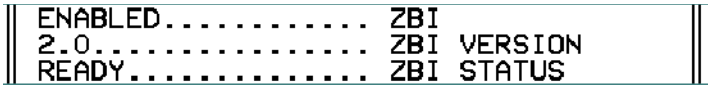
# Features

This appendix covers features added to major firmware releases.

# Firmware x.16

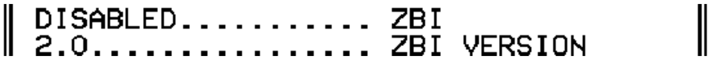
The following is an overview of the new and enhanced features available in firmware version V53.16.x and V60.16.x, and later; it is ZBI 2.0-Ready. These include:

- ZBI 2.0 can be enabled by placing a ZBI 2.0 key on the printer via the ZBI Key Manager & Downloader utility. Printers can be ordered from the factory with the ZBI 2.0 option enabled. Printers can be ZBI-Enabled in the field by purchasing and using a ZBI Key Kit. Printers can be ZBI-Enabled in the field by purchasing a key at www.zebrasoftware.com.
- Printers which have been ZBI-Enabled will not display a "Z" at the end of the firmware version string. For example, a printer which has been ZBI-Enabled will display the firmware version as "V53.16.1", while a printer which has not been ZBI-Enabled will display the firmware version as "V53.16.1Z"
- The printer configuration label will display the ZBI status for the printer:
  - ZBI-Enabled



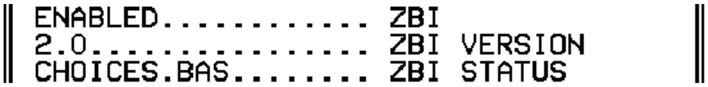
```
ENABLED............ ZBI
2.0................ ZBI VERSION
READY.............. ZBI STATUS
```

  - Not ZBI-Enabled



```
DISABLED........... ZBI
2.0................ ZBI VERSION
```

  - The printer configuration label will list which ZBI program is running.



```
ENABLED............ ZBI
2.0................ ZBI VERSION
CHOICES.BAS........ ZBI STATUS
```

- ZBI 2.0 is backwards compatible with previous versions of ZBI. Any code which was specifically written to handle a maximum string length of 255 characters will need to be reviewed to ensure it works with unlimited string lengths.
- Other ZBI 2.0 Features:
  - List ZBI programs from the front panel
  - Start/Stop ZBI programs from the front panel
  - Button presses on front panel can be registered as events in ZBI programs.
  - Applicator port control
  - Support for longer strings, the length of the string dependent on available memory.
  - Support for NULL values in Strings and String operations
  - SNMP & Set/Get/Do (SGD) Control of ZBI
  - On-printer Debugging (via ZBI-Developer)
  - ZBI 2.0 Program Encryption
  - ZBI 2.0 programs can be made hidden and/or persistent

- New ZBI 2.0 Commands:

| | |
|---|---|
| ACCEPT | INTTOHEX$ |
| ADDBREAK | READ |
| AUXPORT_GETPIN | REGISTEREVENTS |
| AUXPORT_RELEASEPIN | SERVERSOCKET |
| AUXPORT_SETPIN | SPLIT |
| AUXPORT_STEALPIN | SPLITCOUNT |
| CLIENTSOCKET | SUB |
| CLOSE ALL | TCPX |
| DELBREAK | TRIGGEREVENT |
| HANDLEEVENT | UNREGISTEREVENTS |
| HEXTOINT | WRITE |

# Firmware x.15

.15↑ Identifies features that are available in printers with firmware version V60.15.x, V50.15.x, or later.

The following is an overview of the new and enhanced features available in firmware version V60.15.x, V50.15.x, or later. These include:

- Additional wireless securities
- New and updated ZPL commands (including wireless commands)
- Extended SNMP features, providing SNMP based control over commonly-needed printer settings.
- Support for Set / Get / Do (SGD) commands

## Wireless Securities

Firmware V60.15.x and V50.15.x offer support for a wider range of wireless securities. These are the supported wireless securities:

- WEP-40-BIT
- WEP-128-BIT
- EAP-TLS
- EAP-TTLS
- EAP-FAST
- PEAP
- LEAP
- WPA-PSK
- WPA EAP-TLS
- WPA EAP-TTLS
- WPA EAP-FAST
- WPA PEAP
- WPA LEAP
- KERBEROS*

* Use of any given wireless security is dependent on the RF card being used.

## ZPL and SGD Commands

Table 30 identifies the new commands and updates to existing commands in firmware version V60.15.x, V50.15.x, or later. The bolded items are either new commands or new enhancements to existing commands.

**Table 30 • x.14 Features in Detail**

| Command | Details |
|---|---|
| **^KC** | The ^KC command is a new command with firmware version V60.15.x, V50.15.x, or later. It allows wireless print servers to have their own client identifier (CID). When the print server is active is uses the CID on the printer. When both print servers are active they have the option to use the CID on the printer, or their own CID. |
| ~DY | Firmware version V60.15.x, V50.15.x, or later supports .NRD (non readable file) files and .PAC files (protected access credential). |
| ~WS | Firmware version V60.15.x, V50.15.x, or later added these new parameters:<br>• wireless pulse—adds a pulse to the network traffic generated by the printer. To keep the printer online, a pulse is necessary with some network configurations.<br>• wireless pulse interval—when the wireless pulse feature is enabled this sets the interval at which the wireless pulse is sent.<br>• channel mask—for commonly used channel masks.<br>• international mode—disables or enables International mode |
| **^WX** | The ^WX command configures the wireless security settings for printers using the wireless print server. |

## SNMP

Firmware V60.15.x, V50.15.x, or later feature support for an extended Management Information Base (MIB) file. The extended support now covers many of the printer settings, such as darkness, media type, and other printer specific settings. The MIB file can be downloaded from www.zebra.com for use with SNMP management systems.

## Set / Get / Do Support

Printers with firmware V60.15.x and V50.15.x support a new set of commands known as Set / Get / Do (SGD) commands. These commands allow you to configure and get status on the wireless settings in the printer. For details on the supported commands, see *SGD Printer Setting Commands* on page 587.

## XML-Enabled Printing

Printers with firmware V60.15.8Z, V53.15.8Z, or later support XML-Enabled printing. For details, go to http://www.zebra.com/xml. This new feature does not alter the ZPL capabilities of the printer.

# Firmware x.14

.14↑

Identifies features that are available in printers with firmware version V60.14.x, V50.14.x, or later.

Table 31 identifies the new commands and enhancements to existing commands in firmware V60.14.x, V50.14.x, or later. The bolded items are either new commands or new enhancements to existing commands.

**Table 31 • Features in Detail**

| Command | Details |
|---|---|
| `^CI` | The `^CI` command selects the encoding and character set. To identify the encoding, include a `^CI` in the ZPL script. These encodings are now supported with the `^CI` command:<br>These are new variables that were added to the desired character set or `a` parameter of the existing `^CI` command:<br>• **Big 5 HKSCS (`^CI26`) with `BIGHK.DAT`.** This supports the Hong Kong supplementary character set of the Big 5 character set and encoding. You can download the Big 5 HKSCS DAT table from www.zebra.com.<br>• **Code Page 1252 (`^CI27`).** The `^CI27` command supports code page 1252.<br>• **GB 18030 (`^CI26`) with `GB18030.DAT`.** This supports the GB 18030 character set and encoding standard.<br>• **Unicode Support.** These new values were added to the `^CI` command:<br>`28` = Unicode (UTF-8 encoding)<br>`29` = Unicode (UTF-16 Big-Endian encoding)<br>`30` = Unicode (UTF-16 Little-Endian encoding) |
| `~DY` | The `~DY` command downloads fonts to the printer. Firmware version V60.14.x, V50.14.x, or later improves support for TrueType fonts and adds support for TrueType Extension fonts. When OpenType fonts can be downloaded as a TrueType font they are supported. |
| `^FH` | The `^FH` command allows you to enter the hexadecimal value for any character directly into the `^FD` statement. It has been updated to function with Unicode encodings. |
| **`^FL`** | The `^FL` command provides the ability to link any TrueType font, including private character fonts to associated fonts, such that if the base font does not have a glyph for the required character, the printer looks to the linked fonts for the glyph. The font links are user-definable. |
| `^FO`, `^FT`, `^FW` | In firmware version earlier than V60.15.x, V50.15.x or later, the `^FO` and `^FT` commands were left-justified. In firmware version V60.14.x, V50.14.x, or later, a new parameter supports right- and auto-justification. Using the `^FW` command allows you to set justification options. |
| **`^HT`** | Over a communication port, the `^HT` command receives the complete list of the font links. |

Table 31 • Features in Detail

| Command | Details |
|---|---|
| **^LF** | The ^LF command prints out a list of the linked fonts. |
| **^PA** | The Advanced Text Layout Options command (^PA) is new in firmware version V60.14.x, V50.14.x, or later.<br>Advanced text layout, such as bidirectional text layout, character shaping, and OpenType support, can be activated with the ^PA command. The glyph displayed when the character is missing from a font (default glyph) can be changed from a space character to the default glyph of a font, which is often a square box. |
| ^SL | A new parameter was added to the ^SL command to support the Japanese language in the Real Time Clock feature set. |
| **^TB** | The text block (^TB) command is a new command in firmware version V60.14.x, V50.14.x, or later. The ^FB command allows you to print text into a defined block type format; it does not support complex text layout. In contrast, the ^TB command supports a text block with complex text. |

## Global Printing Solution

The Global Printing solution greatly simplifies international character label printing by supporting Unicode compatible fonts and encoding (UTF-8, UTF-16BE and UTF-16LE) directly in its printers.

These are new and enhanced features available in firmware version V60.14.x, v50,14.x, or later:

- Advanced text layout options
- Big 5 HKSCS
- GB 18030
- Unicode support (UTF-8 and UTF-16)
- Code Page 1252
- Field hexadecimal
- Field origin justification
- Font linking
- Improved font support
- Real-time clock – Japanese support
- Text block

For details on these new features, see Table 31 on page 848.

Zebra firware V60.14.x, V50.14.x, or later continues to support locale-specific encoding formats. These formats include:

- Code Page 850
- Shift JIS
- GB
- Unified Hangul Code
- Big 5

## What Is Unicode?

Unicode is a universal code page (which converts numeric codes into characters) that can be used with many computer platforms and software applications. While ASCII and other traditional code page encoding systems support 256 characters or less, Unicode can support almost 100,000 characters for all major languages. The languages include complex non-Western languages that can be difficult to print.

Unicode encoding and supporting fonts allow the printer to seamlessly output in any language. As a result, you do not have to select the language, font, code page, or configure or adjust the printer. Zebra's printer-resident capabilities provide fast label output and seamless multi-language printing.

You can create private libraries of logos and special characters and include them in labels. The ability to create custom characters is valuable for creating shipping labels for Asia, as many Asian fonts don't support characters for names, street names, and other proper nouns. Firmware V60.14.x, V50.14.x, or later offers features that support bidirectional printing or complex text layout, including:

- Arabic
- Hindi
- Thai
- Vietnamese
- Other languages

# Glossary

This is a glossary of terms.

# Terms

**ASCII** American Standard Code for Information Interchange. A 7-bit character set that includes Latin characters, as well as control and punctuation characters.

**bidirectional text layout** The arrangement of characters with mixed directionality on a single line. For example, English and Arabic.

**big-endian** In the encoding, the most significant byte is stored first.

**byte order mark** BOM; indicates big-endian (BE) or little-endian (LE).

**character** The smallest component of a writing system that has understanding, refers to the abstract meaning not the specific shape.

**character code** Another term for code point.

**character set** A collection of characters.

**character shaping** Characters assume different glyphic forms depending on the context.They can be used with a script-based language.

**code point** An integral reference number assigned to a character.

**coded character set** An ordered collection of characters that are assigned an integral reference number.

**combining semantic cluster** Consists of an atomic character, a combining character sequence consisting of a base character plus one or more nonspacing marks, enclosing marks, combining word joiner, such as an Indic virama, or a sequence of Hangul jamos equivalent to a Hangual syllable. .

**diacritic** A mark that is added to a letter or other character to change its value or meaning.

**encoding** The mapping of a characters code points to a sequence of bytes used to represent the data.

**font** An electronic collection of glyphs used for the visual representation of characters.

**GB18030** A standard required by the People’s Republic of China for operating systems of non-handheld computers.

**GB 2312** A Chinese character set and encoding.

**glyph** The visual representation of a character, such as a shape or image.

**grapheme cluster** Consists of an atomic character, a combining character sequence consisting of a base character plus one or more nonspacing marks or enclosing marks, or a sequence of Hangul jamos equivalent to a Hangul syllable.

**ISO 10646** An international standard that defines the Universal Character Set (UCS) and a character encoding. The UCS matches Unicode.

**ISO 8859-1** An encoding standard for representing Western European languages using the Latin Alphabet.

**language** A system of sounds and scripts used to represent and communicate concepts, ideas, meanings, and thoughts.

**ligature** A glyph representing a combination of two or more characters.

**little-endian** In the encoding, the least significant byte is stored first.

**open type** A file format for scalable font files that extends the existing TrueType font file format used by Microsoft Windows and Apple Macintosh operating systems.OpenType tables support advanced layout features.

**presentation form** A pre-combined character, ligature or variant glyph that has a separate code point; used for compatibility.

**script** A collection of symbols used to represent textual information in one or more writing systems.

**Shift-JIS** A shifted encoding of the Japanese character encoding standard, JIS X 0208, heavily deployed in PCs.

**True type** An outline font format that is scalable without quality loss.

**Unicode** The universal character set and encoding maintained by the Unicode Consortium.

**UTF-8** The Unicode encoding that assigns each character code point to a sequence of one to four bytes.

**UTF-16** A Unicode encoding form that represents Unicode code point values in the BMP with 16-bit code units and Unicode code point values in the supplementary planes with pairs of 16-bit code units.

**UTF-16BE** A Unicode encoding scheme based on UTF-16 that serializes the bytes in each code unit in big-endian order.

**UTF-16LE** A Unicode encoding scheme based on UTF-16 that serializes the bytes in each code unit in little-endian order.

**Notes •** ___________________________________________

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