

ZPL II 语言编程基础

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ZPL II 语言概述



- ZPL语言是一种script语言,分为ZPL语言和ZPL II 语言
- ■Zebra打印机支持最广泛的一种语言
- ZPL II语言支持复杂标签格式,如文字, 图片,条形码,序列号打印等等
- ZPL II文件可以通过以下两种方式实现
 - » 纯文本编辑器
 - »标签设计软件,如Zebra Designer

ZPL II与ZPL的区别



- ZPL II 不是100% 兼容ZPL
- ■主要差别
 - »对于ZPLII,当指令被接收时,就会立刻被执行,对于ZPL,只有当打印机接收到^XZ (End Format)时,才执行接收的所有指令
 - »一些ZPL中的指令,在ZPL II中被增强或扩展
 - » ZPL II 支持小写、大写或大小写混合输入的 指令
 - »增加了一些新的命令

ZPL II 语言功能



- ■打印各种标签格式
 - » 文本
 - »图形
 - »条形码
- ■设置打印机参数
- ■获取打印机配置及状态信息

ZPL II 语言相关概念



■域(field)

- ■ZPL对象
 - »图片
 - »标签格式文件

打印机设备名称



- ■打印机存储设备
 - » 指定 ZPL II 的目标对象 (图像,标签格式,字体) 到不同的存储区域
- 存储设备名称:
 - R: Printer DRAM library (read/write)内存
 - B: Optional memory: 等可选配的存储器PCMCIA卡
 - E: Flash memory (read/write)闪存
 - Z: Internal ZPL II stored object library (read only)

A: CF卡(可读写)

默认存储器为DRAM

■ 调用对象时,搜索的优先顺序:

DRAM, RAM, extra EPROM, internal ZPL II (R:, B:, E:, Z:, * or ? (AII))

指令种类



- ■格式指令(format commands)
 - »以^开始
 - »用于设定标签格式与数据
 - » 多条格式指令按顺序执行
- ■控制指令(control commands)
 - »以~开始
 - » 迫使打印机立即执行某一个指定的操作
 - »可以中断打印机数据缓冲器中的格式指令

格式指令



格式指令有以下分类

- 格式框架指令-format bracket commands
- 标签定义指令-label definition commands
- 字段定义指令-field definition commands
- 字段默认指令-field default commands
- 格式默认指令-format default commands
- 格式旋转指令-format rotation commands
- 打印机控制指令-printer control commands
- 文字数字字段指令-alphanumeric field commands
- 条形码字段指令-bar code field commands
- 图像指令-graphic image commands

更改指令前缀符



- 符号(^) 是 ASCII 字符,等于 5E HEX, 94 Decimal
- 符号(~) 是 ASCII 字符, 等于 7E HEX, 126 Decimal
- ■格式指令和控制指令的前缀符可以通过 ZPLII指令进行更改
 - ^CT or ~CT (change tilde ~)
 - ^CC or ~CC (change caret ^)

简单的ZPLII实例

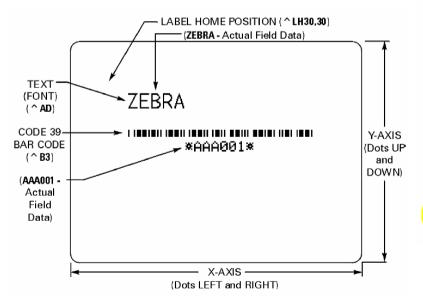


^XA

^LH30,30

^FO20,10^AD^FDZEBRA^FS ^FO20,60^B3^FDAAA001^FS

^XZ



^XA

[^XA indicates start of label format.]

^LH30,30

[^LH sets label home position 30 dots to the right and 30 dots down from the top edge of the label.]

^FO20,10^AD^FDZEBRA^FS

[^FO20, 10 sets the field origin 20 dots to the right and 10 dots down from the home position defined by the ^LH command.]

[^AD - Select font "D."]

[^FD - Start of field data.]

[ZEBRA - Actual field data.]

[^FS - End of field data.]

^F020,60^B3^FDAAA001^FS

[^FO20, 60 - Set field origin 20 dots to the right and 60 dots down from the home position defined by the ^LH command.]

[^B3 - Select Code 39 bar code.]

[^FD - Start of field data for the bar code.]

[AAA001 - Actual field data.]

[^FS - End of field data.]

^XZ

[^XZ - Indicates end of label format.]

ZPLII 指令格式



■ ZPL II指令由字首,指令代码和参数组成。



- ■很多ZPL II指令都是有参数,参数之间用间隔符","分开
- ■如果默认参数可以满足要求,可以不用指定这个参数的 参数值

^AA,,60

指令的参数和默认值



格式: ^Af,o,h,w

举例说明默认参数的用法: ^AA,,60

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

标签格式文件



■标签格式以^XA开始

■标签格式以^XZ结束

■各个域之间以^FS进行分隔

ZPLII语言程序书写方法



■多行:

^XA^FO100,75^BY3 ^B3N,N,100,Y,N ^FD123ABC^XZ

■一行:

^XA^FO100,75^BY3^B3N,N,100,Y,N^FD123ABC^XZ

■ 使用默认参数:

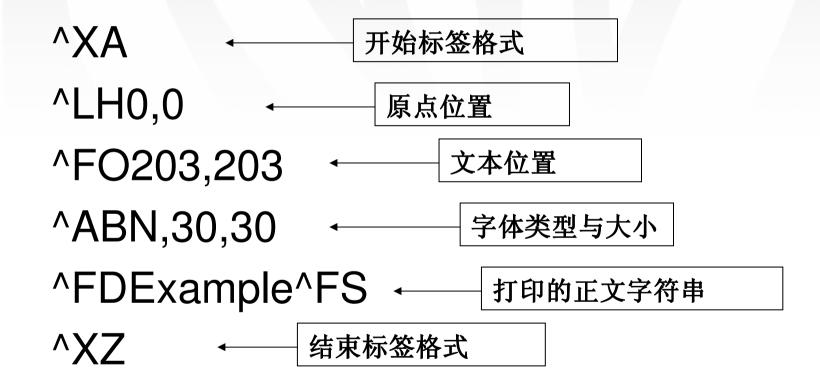
^XA^FO100,75^BY3^B3,,100^FD123ABC^XZ



文本打印

打印文本





ZEBRA内置字体



内置15种位图字体, 和一个矢量字体

FONT A -- ABCDWXyz 12345

FONT B -- ABCDWXYZ 12345

FONT D -- ABCDwxyz 12345

FONT E -- (OCR-B) ABCDwxyz 12345

FONT F -- ABCDwxyz 12345

FONT G -- Az 4

FONT H -- (OCR-A) UPPER CASE ONLY

FONT 0 -- (Scalable) ABCDwxyz 12345

FONT GS -- ® ©

FONT P-- ABCDWXYZ 12345

FONT Q-- ABCDWXYZ 12345

FONT R-- ABCDwxyz12345

FONTS-- ABCD wxyz 12345

FONT T- ABCDWxyz 12345

FONTU- ABCDWxyz 12345

FONT V-- ABCDwxyz 12345

位图字体



- 位图字体有固定的长宽比,单位Dots
- 位图字体只能以整数倍放大,放大倍数2-10倍
- 字符的宽度和高度可以独立设定

Intercharacter Gap and Baseline Parameters

Font	H x W (in dots)	Туре	Intercharacter Gap (in dots)	Baseline (in dots)
A	9 x 5	U-L-D	1	7
В	11 x 7	U	2	11
C,D	18 x 10	U-L-D	2	14
Е	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
Н	21 x 13	OCR-A	6	21
GS	24 x 24	SYMBOL	PROPORTIONAL	3 x HEIGHT/4
0	DEFAULT: 15 x 12		PROPORTIONAL	3 x HEIGHT/4

矢量字体



- Scalable font: 可伸缩字体,可连续缩小与放大。字体高度与宽度取值范围为20 32000点。
- ■后缀可以是.FNT, .TTF, .TTE
- ■通过打印机平滑伸缩算法实现

更改字体



■ 定义打印机默认字体^CFf,h,w ^XA^CF0,80^FO100,100^FD Default Font^FS ^ABN,55,35^FO100,200^FD Font B^FS

^FO100,400^FD Font Size ?^FS
^XZ

使用外置字体一字体下载



●使用ZUD下载

■ 使用Zebra Designer下载

■使用~DY命令下载

使用~DY命令下载字体



- ■命令形式:
 - ~DYd:f,b,x,t,w,data
- ■举例
 - ~DYE:FONTFILE.TTF,B,T,SIZE,,
- ■SIZE指文件字节数
- ■可以分两次发送到打印机

外置字体使用



■ 定义字体名称 ^CWa,d:o.x

^XA

^CW1,B:ARIAL.FNT^FS

^CI0^FO100,600

^A1N,100,100^FDZebra^FS

^XZ

符号字体



FONT GS - - ® © ™ **(L)**

- B = (Copyright)
- C = TM (Trade Mark)
- $D = (U_L)$ (Underwriters Laboratories approval)
- E = (SP) (Canadian Standards Association approval)

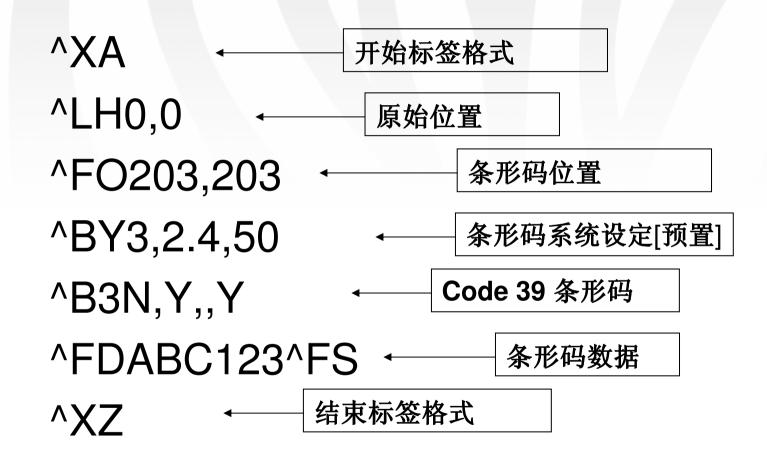
^XA ^FO100,500 ^GSN,60,60^FDB^FS ^XZ

©

打印样张

打印条形码







ZPL II 图形图像打印

打印方框和线条



^GB Graphic Box

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 Default Value: value used for thickness (t) or 1	w = 宽度
h = box height (in dots)	Accepted Values: value of t to 32000 Default Value: value used for thickness (t) or 1	h = 高度
t = border thickness (in dots)	Accepted Values: 1 to 32000 Default Value: 1	t = 边框厚度 c = 颜色
c = line color	Accepted Values: B (black) or W (white) Default Value: B	r = 制圆的度数
r = degree of corner-rounding	Accepted Values: 0 (no rounding) to 8 (heaviest round Default Value: 0	ing)

打印圆形图案



^GC Graphic Circle

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)
	Default Value: 3
t = border thickness (in dots)	Accepted Values: 2 to 4095 Default Value: 1
c = line color	Accepted Values: B (black) or W (white) Default Value: B

图像打印



- 图像文件名: *.GRF
- ■图像必须是单色





BABY. GRF

图像制作方法

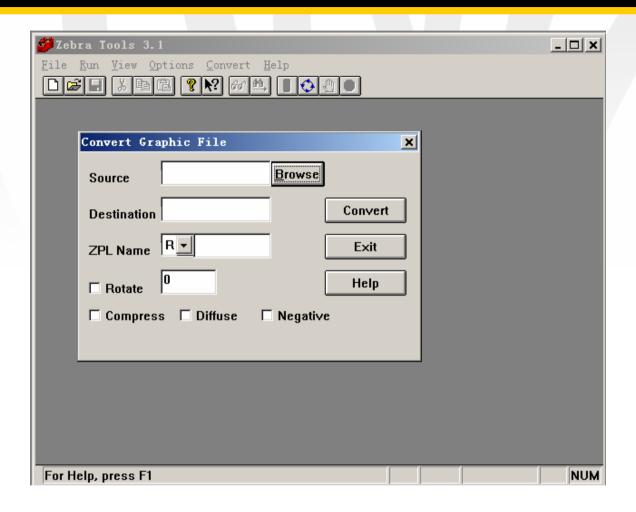


■使用Ztools制作图象

■ 使用Zebra Designer制作图象

使用ZTool工具转换图片文件为ZPL格式





- ■原图片必须是单色图片
- 原图片格式必须是PCX,或是TIF



使用Zebra Designer制作图像



- 在Zebra Designer中选择正确的打印机 型号
- ■制作带有需打印的图像标签
- ■将该标签打印至文件
- ■在标签文件中删除标签格式信息
- ■指定图像文件下载的目标驱动器
- ■保存文件后缀名为.GRF

图像打印指令



■下载图形

~DGR:SMILE.GRF,12012,39

■ 调用图形 ^XG

^XA

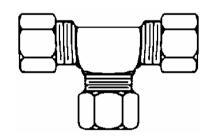
^FO50,50^XGR:SMILE.GRF,1,1^FS

^XZ

■删除图形文件

^XA^IDB:SCREW.GRF^XZ





打印图片注意点



- ■固定图片保存位置
- ■经常更新的图片保存位置



序列号打印

序列号打印



^XA
^LH30,30
^FO20,10^AF^FDZEBRA^FS
^FO20,60^B3,,40,,^FDAA001^FS
^FO20,180^AF^SNSERIAL NUMBER 00000000111,1,Y^FS

ZEBRA



SERIAL NUMBER 0000000111

^PQ10 ^XZ

250 ZPL Commands

^SF

Serialization Field (with a Standard ^FD String)

Description The ^SF command allows you to serialize a standard ^FD string. Fields serialized with this command are right-justified or end with the last character of the string. The increment string is aligned with the mask, starting with the right-most position. The maximum size of the mask and increment string is 3K combined.

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 characters in the current "FI string to be serialized. The mask is aligned to the characters in the "FI string starting with the right-most position. Mask for the placeholders: D or d - Decimal numeric 0-9 H or h - Hexadecimal 0-9 plus a-f or A-F O or o - Octal O-7 A or a - Alphabetic a-z or A-Z
	N or n – Alphanumeric 0–9 plus a–z or A–Z
	% – Ignore character or skip
b = increment string	The increment string is the value to be added to the field on such label. The default value is equivalent to a decimal value of one. The string is composed of any characters defined in the serial string. Invalid characters are assumed to be equal to a value of zero in that character position. The increment value for alphabetic strings start with "k" or "a" as the zero placeholder. This means to increment an alphabetic character 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

7FBRA



SERIAL NUMBER 0000000120

打印序列号 ^SN



^SN Serialization Data

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
	Default Value: 1
n = increment or decrement value	Accepted Values: 12-digit maximum
	Default Value: 1
	To indicate a decrement value, precede the value with a minus (-) sign.
z = add leading zeros (if needed)	Accepted Values: Y (yes) or N (no)
	Default Value: N

打印序列号 ^SN



ZPL ■ CODE

^XA

^F0260,110

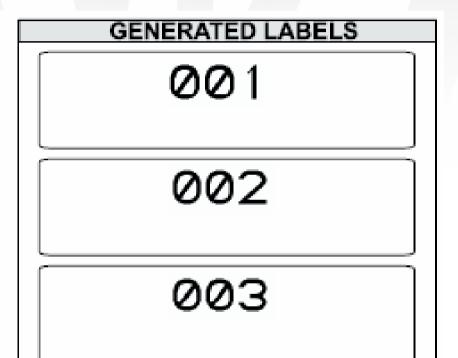
^CFG

^SN001,1,Y^FS

^PQ3

^XZ

Note: The ZPL II code above will generate three separate labels, seen to the right.





^SFSerialization Field (with a Standard **^FD** String)

Format ^SFa,b

Parameters	Details	
a = mask string	The mask string sets the serialization scheme. The length of the string mask defines the number of characters in the current ^FD string to be serialized. The mask is aligned to the characters in the ^FD string starting with the right-most position.	
	Mask String placeholders:	
	D or d – Decimal numeric 0–9	
	H or h – Hexadecimal 0–9 plus a-f or A-F	
	0 or 0 – Octal 0–7	
	A or a – Alphabetic a–z or A–Z	
	N or n – Alphanumeric 0–9 plus a–z or A–Z	
	% - 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 characters defined in the serial string. Invalid characters are assumed to be equal to a value of zero in that character position.	
	The increment value for alphabetic strings start with 'A' or 'a' as the zero placeholder. This means to increment an alphabetic character by one, a value of 'B' or 'b' must be in the increment string.	



ZPL II CODE

 $^{\wedge}XA$

^F0100,100

^CF0,100

^FD12A^SFnnA,F^FS

^PQ3

^XZ

Note: The ZPL II code above will generate three separate labels, seen to the right.

GENERATED LABELS

12A

12F

12K



模板打印

保存标签模板 'IS



^IS Image Save

功能:将标签格式以图形方式保存在打印机内存中,方便以后调用,和需要的可变信息组合为内容不同的标签格式

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: Default Value: R:	
o = object name	Accepted Values: 1 to 8 alphanumeric characters Default Value: if a name is not specified, UNKNOWN is used	
x = extension	Accepted Values: .GRF or .PNG Default Value: .GRF	
p = print image after storing	Accepted Values: Y (yes) or N (no) Default Value: Y	

保存标签模板 ^IS



^XA^MD12

^LH30,30^BY3,3,85^CFD,36

^GB800,1200,4^FS

^FO230,100^AO,70,60

^FDZEBRA^FS

^FO80,200^AO,40,30

^FDTECHNOLOGIES

CORP^FS

^FO200,600

^FDPRINTED BY:^FS

^ISR:SAMPLE1.GRF,Y

^XZ

ZEBRA

TECHNOLOGIES CORP

PRINTED BY:

调用保存的标签模板 ^IL



^IL Image Load

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: Default Value: R:	
o = object name	Accepted Values: 1 to 8 alphanumeric characters Default Value: if a name is not specified, UNKNOWN is used	
x = extension	Fixed Value: .GRF	

功能: 调用已保存的标签格式

调用保存的标签模板 ^IL



^XA

^ILR:SAMPLE1.GRF^FS

^CF0,72,60

^FO200,700

^FD SHIRLEY DING^FS

^XZ

ZEBRA

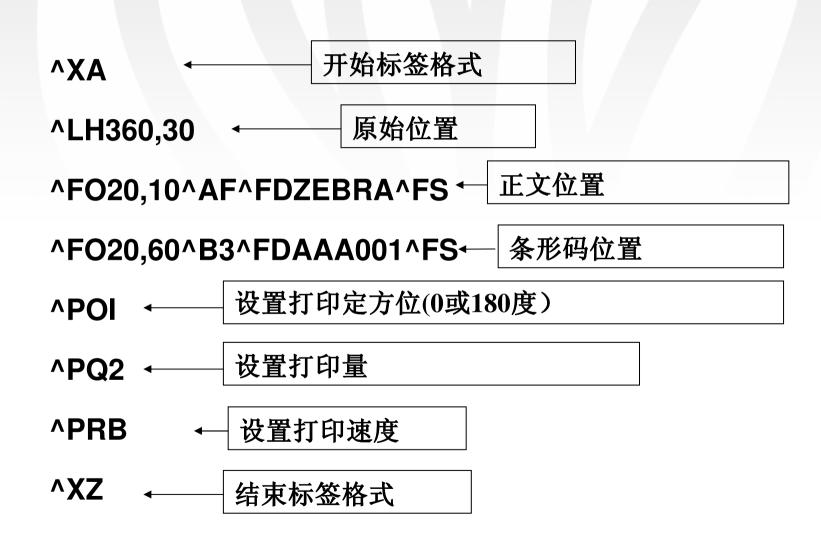
TECHNOLOGIES CORP

PRINTED BY:

SHIRLEY DING

设置打印量,打印比率和打印定方位







格式标签打印

保存标签格式



^DF Download Format

将ZPL指令<mark>保存为文本格式</mark>,以 便今后用其它数据替换

使用^XF 指令调用文本格式

使用^FN标识数据

^FN 需要和^FD配合使用

Format ^DFd:o.x

This table identifies the parameters for this format:

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

调用标签格式



^XF Recall Format

Format ^xFd:o.x

This table identifies the parameters for this format:

Parameters	Details	
	Accepted Values: R:, E:, B:, and A: Default Value: search priority (R:, E:, B:, and A:)	
o = name of stored image	Accepted Values: 1 to 8 alphanumeric characters Default Value: if a name is not specified, UNKNOWN is used	
x = extension l	Fixed Value: . ZPL	

调用保存的格式, 变量打印



下载格式

^XA

^DFR:FORMAT^FS

^LH30,30

^FO100,100^AF<mark>^FN1</mark>^FS

^FO100,250^B3,,60,,**^FN2**^FS

 $^{\Lambda}XZ$

下载时打印机Data灯会闪,但不会有什么动作

调用格式

^XA

^XFR:FORMAT^FS

^FN1^FDZEBRA^FS

^FN2^FDAAA001^FS

 $^{\Lambda}XZ$

^XA

^XFR:FORMAT^FS

^FN1^FDBEARS^FS

^FN2^FDZZZ999^FS

 $^{\Lambda}XZ$

ZEBRA



AAA001

BEARS



ZZZ999



特殊效果打印

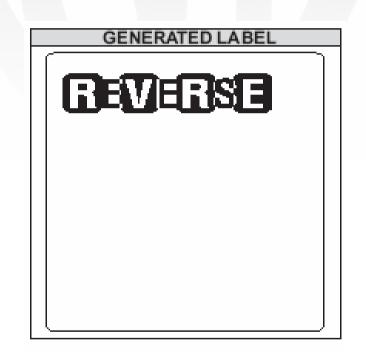


- ■域(field)反色打印
- ■标签反色打印
- ■镜像打印
- ■旋转打印
- 变量打印



■打印区域的反色打印: ^FR

```
^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
^{\Lambda}XZ
```



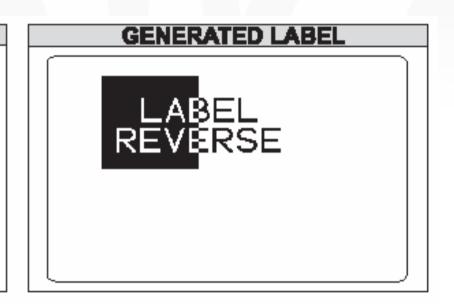
必须与^GB指令结合使用 每次使用反色打印,必须都要使用一次^FR



■标签的反色打印: ^LR

ZPL II CODE

- ^XA^LRY
- ^F0100,50
- ^GB195,203,195^FS
- ^F0180,110^CFG
- ^FDLABEL^FS
- ^F0130,170
- ^FDREVERSE^FS
- ^XZ

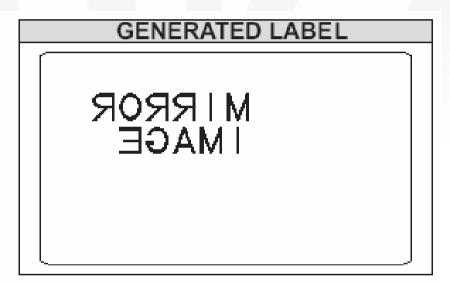


必须与^GB指令结合使用 直到接收到^LRN,反转打印才失效



■镜像打印: ^PM

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



直到接收到^PMN,镜像打印才失效



- ■标签180°方向旋转打印
- ^PO { N (normal) or I (invert) }

ZPL II CODE

- ^XA^CFD
- ^POI
- ^LH330,10
- ^F050,50
- ^FDZEBRA TECHNOLOGIES^FS
- ^FO50,75
- ^FDVernon Hills, IL^FS
- ^XZ

GENERATED LABEL

ZEBRA TECHNOLOGIES Vernon Hills, IL

如果一个格式里面有多个^PO指令,只有最后一个才有效。 只有接收到下一个^PO指令时,前一个^PO指令才失效

变量打印 ^FV ^MC



^XA

^FO40,40

^GB300,203,8^FS

^FO55,60^CF0,25

^FVVARIABLE DATA #1^FS

^FO80,150

^FDFIXED DATA^FS

^MCN

 $^{\Lambda}XZ$

^XA

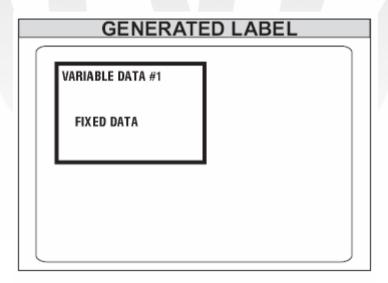
^FO55,60^CF0,25

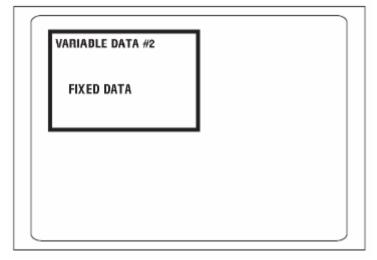
^FVVARIABLE DATA #2^FS

^MCY

 $^{\text{XZ}}$

^MC 必须和^FV结合使用





^FV		
Field	l Variable	
	Description ^FV repla variable.	sees the $^{\sim}\mathbb{PD}$ (field data) command in a label format when the field is
	Format ~FVa	
	This table identifies the p	arrameters for this format:
	Parameters	Details
	a = variable field data to be printed	Accepted Foliaes: 0 to 3072 character string Default Foliae: if no data is entered, the command is ignored
\rightarrow	Example • This is an er	sample of how to use the "MC and "FV command:
	"2040,40 "2040,40 "GB300,203 "2055,60°C	F0,25 E DATA #1°PS
	PROSS, 60 CO PROVARIABLE PMCY PXE	F0, 25 E DATA #2°FS GAMERI MIL'72 ROSE EATS

45541L-002 Rev. A

ZPL Programming Guide Volume Or



打印机控制命令

初始化和删除指令



- ^JB 初始化 Flash Memory
 - » ^XA^JBE^XZ
 - » ^XA^JBB^XZ
 - » ^XA^JBA^XZ

警告:不要使用~EF和~EG

- ^ID 删除指定存储器内的目标文件:
 - » ^XA^IDE:*.FNT^FS^XZ 删除字体挡案
 - ^XA^IDB:*.GRF^FS^XZ 删除图形挡案
 - » ^XA^IDR:*.ZPL^FS^XZ 删除标签格式

打印机控制指令



- ~WC 打印打印机配置参数
- ^HH 返回打印机配置参数
- ~HS 返回打印机状态
- ^XA^WD*:*.*^XZ 打印各驱动器内的内容
- ^HW (^XA^HWR:*.*^XZ) 返回各驱动器的内容

更改打印机设置



■ ~SD: 设置打印颜色深度

■ ~JD: 设置通讯诊断模式

■ ~TA: 设置tear off模式位置调整值

■ ^JUS: 保存当前设置值

自动执行文件-AUTOEXEC.ZPL



- 打印机在启动的时候,会自动搜索AUTOEXEC.ZPL,如果找到就自动执行
- 可以用于开机自动设置一些参数,比如:打印速度、 纸张长度等等
- 必须保存在EPROM、FLASH、PCMCIA卡中

```
^XA^DFE:AUTOEXEC.ZPL^FS
^LH30,30
^BY2,3,100
^FO120,100^CFD ^FDAUTOEXEC LABEL^FS
^FO120,160^B3^SNAB0001,1,Y^FS
^PQ10
^XZ
```

ZPL II 文件结构



- ■第一部分设定打印机参数
- 第二部分 标签参数及标签数据
 - »标签开始 ^XA
 - »标签参数设定
 - »标签各个打印域格式与数据
 - »标签结束 ^XZ
 - »标签使用数据清除





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问题提交内容



- ■打印机序列号
- ■打印机配置标签及各驱动器内容
- ■客户使用的标签设计软件
- ■客户使用标签文件数据
- ■打印正确的标签样本
- ■打印错误的标签样本

Question?





TEST 1



习题1:

要求保存标签格式到打印机内存中,然后调用格式并打印如下内容。其中红色为可变信息。

Zebra Training 2006



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Zebra Training 2006



Name: Lijun Chen

TEST 2



^SF 练习: 请写出以下编码的打印结果

```
^XA^MD12
```

^LH300,200

^AON,60,60

^FDZZZV^SFNN%A,F%C^FS

^PQ5

^XZ

A: ZZZV, 0EZX, 0TZZ, 19ZB, 10ZD

TEST 3



^SN 练习: 请写出以下编码的打印结果

^XA^MD12 ^LH200,400 ^AON,60,60

^SN00ABA000,2^FS

^PQ2

 $^{\Lambda}XZ$

A: 00ABA 0, 00ABA 2, 00ABA 4