Cognitive
SOLUTIONS INC.

Cognitive Programming Language (CPL)

Programmer's Guide

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To contact Cognitive:

Cognitive Solutions, Inc.
4403 Table Mountain Drive
Suite A
Golden, CO 80403

E-Mail: info@cognitive.com

Telephone: +1.800.525.2785

Fax: +1.303.273.1414

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Chapter

1

Introduction

Bar code printers are programmable devices. Most Cognitive Solutions printers use the same command language, which has become an industry standard.

> **NOTE:** Pinnacle printers are an exception. The information in this file is not applicable to Pinnacle. If you are programming a Pinnacle printer, contact our Sales Department and order a copy of the *Pinnacle Programmer's Guide*, CSI P/N 10-00-0133.

In typical label printing applications, you will use simple ASCII commands to control the printer. You will write these commands in files called label formats. When sent to the printer, each label format tells the printer how to produce one or more labels.

One label format can print many similar labels. Label formats may be sent to the printer individually or in batches, in multiple file uploads. You may combine several different ASCII label formats in a single file, with each format capable of producing a different label.

This document describes the ASCII and graphics commands used to create label formats, stored objects, and menus, as well as the VARIABLE commands used to configure the printer.

> **IMPORTANT:** If you are using Microsoft Windows and preparing and printing label formats directly from Notepad or another Windows-based program, be aware that most Windows printer drivers will not work with Cognitive printers. The "generic ASCII" printer driver (supplied with Windows) will pass ASCII label formats to the printer without interference. Please install and use this driver when sending ASCII label formats to the printer from the Windows environment. Do not use the Cognitive Windows Driver when sending ASCII formats to the printer. The Cognitive Windows Driver converts Windows documents to ASCII label formats; thus, your label formats will print as they appear in the text editor rather than directly control the printer as intended.

Label Format Organization

With a few exceptions that are noted in the command descriptions, every label format contains:

- A header line, which defines the overall label characteristics.
- One or more printer commands.
- An END statement, which tells the printer that it has received all required data.

Here is a typical label format:

```
! 0 100 190 3
PITCH 100
BARCODE UPCA+ 20 75 70 19112610203
END
```

This label format would print a UPCA bar code on a label.

Command Syntax

Cognitive printers will accept most commands in either an explicit (long) or implicit (abbreviated) form. Both command forms, where supported, are shown in the command descriptions. The command descriptions use the following format:

Command

Function	The purpose of the command is described here.
Explicit Form	`Command parameters.`
Implicit Form	`Command parameters.`
Parameters	Any *optional* or **required** command parameters are described here.
Comments	Any additional comments relating to use of the command are noted here.

Example

```
Sample program code is included here showing
proper use of the command.
```

NOTE: The sample code shown does not always include all the lines in the label format that produced the sample label. Header lines, END statements and the like are often omitted to save space.

Also, the label images shown only illustrate the features or command under discussion. They are not to scale. The labels your printer produces using the sample code will differ considerably from the label images in this document.

Important Programming Rules

Use blank spaces exactly as shown in the command descriptions. Blank spaces are the delimiters between parameters. Omitting a necessary space may cause incorrect label printing.

Do not send extraneous control characters to the printer.

End every command line with a line feed or a carriage return and line feed. If you create labels using a word processor, confirm that your system uses "hard" carriage returns (inserts ASCII characters 10 and 13 at the end of each line).

Begin every label format with a header line. End every format with an END statement, unless otherwise noted in the command descriptions. (A few commands are "stand alone" and should not be followed by an END statement or any other commands.)

Not all printers support all commands, and there may be some variation in command use depending on the printer model. Review your printer's *User's Guide* and the compatibility information in Tables 1, 2, and 3 before you begin writing label formats or software.

Related Publications

Every printer has a *User's Guide*, which covers hardware issues like installation, setup, and troubleshooting. We strongly recommend that you familiarize yourself with your User's Guide before attempting to program the printer.

We also recommend the following books for readers desiring more information about bar code technology in general:

- *The Bar Code Book* by Roger C. Palmer (Helmers Publishing, Inc., 174 Concord Street, Peterborough, NH 03458)
- *Reading Between the Lines* by Craig Harmon and Russ Adams (Helmers Publishing, Inc., 174 Concord Street, Peterborough, NH 03458)

Chapter

2

Printer Command Compatibility

All commands, bar codes, and fonts do not work with all printers. Commands are added with the introduction of new printers and new firmware releases. Command usage can also vary, depending on the printer's firmware. The tables following provide some general command compatibility guidelines. **Y** indicates that the command is supported in the current firmware version for the listed printer.

Printer Models

Printer models in the tables are designated as follows:

RD: Code Ranger Printers, all models

PW/PT42: Code Courier printers, models PW422003 and PT422003

BD/BT02: Barcode Blaster LS printers, models BD242002, BD422002, BT242002, BT422002, and early Barcode Blaster SR printers

BD/BT05: Barcode Blaster high speed printers, models BD242005, BD422005, BT242004, BT422004

BL4202: Barcode Blaster CL, model BL422003 and BL423002

ADVANTAGE: Barcode Blaster Advantage series, models BD242003, BD422003, BT242003, BT422003, current Barcode Blaster SR model BT423002, and Advantage LX model LBT and LBD.

SOLUS: Solus printer series, models SD4TI and ST4TI

DEL SOL: Del Sol LX model LDT and LDD.

CI: C Series, model Ci

CXI: C Series, model Cxi

Compatibility Tables

Use the tables to determine command and functional compatibilities.

Table 1. Printer Command Compatibility

Table 2. Printer Bar Code Support

Table 3. Printer Font Support

Table 1. Printer Command Compatibility

The following table summarizes commands that are compatible with each printer model.

COMMAND NAME	PRINTER SUPPORT / NOTES									
	CODE COURIER	BD/BT	BD/BT	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
ADJUST	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
variable parameter for above	-	-	-	Y	Y	Y	Y	Y		
ADJUST_DUP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AREA_CLEAR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
BARCODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
BARCODE PDF417	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
BARCODE UPS	Y	-	Y	-	Y	Y	Y	Y	Y	Y
BARCODE_FONT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
COMMENT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DELIMIT	-	-	-	Y	Y	Y	Y	Y	Y	Y
DEFINE_VAR	-	-	-	Y	Y	Y	Y	Y	Y	Y
DOUBLE	-	-	-	-	Y	Y	Y	Y	Y	Y
DRAW_BOX	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
END	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
FILL_BOX	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
GRAPHIC	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
Graphics mode	Y	Y	Y	Y	Y	Y	Y	Y	-	-

COMMAND NAME	PRINTER SUPPORT / NOTES									
	CODE COURIER	BD/BT	BD/BT	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
Background graphics	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
HALT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Header line	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
variable dot time	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
!A automatic header line	-	-	-	Y	Y	Y	Y	Y	Y	Y
INDEX	Y	Y	Y	don't use	Y	Y	Y	Y	Y	Y
JUSTIFY	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
LOGO mode	Y	Y	Y	Y	Y	Y	Y	Y	-	-
MULTIPLE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NOINDEX	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PITCH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
QUANTITY	-	-	-	Y	Y	Y	Y	Y	Y	Y
QUERY FIRMWARE REVISION	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
QUERY PRINTER STATUS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
R90, R180, R270	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TIME SET				Y	Y	Y	Y	Y	Y	Y
TIME ADD				Y	Y	Y	Y	Y	Y	Y
TIME GET				Y	Y	Y	Y	Y	Y	Y
TIME QUERY				Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Universal clear	Y	Y	Y	Y	Y	Y	Y	Y	-	-
Wake-up string	Y	no effect	no effect	no effect	no effect	no effect	no effect	no effect	no effect	no effect
WIDTH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Data storage commands:										
Delete Stored Object	-	-	-	Y	Y	Y	Y	Y	Y	Y
Recall Format	-	-	-	Y	Y	Y	Y	Y	Y	Y
Store Format	-	-	-	Y	Y	Y	Y	Y	Y	Y
Store Enhanced Format	-	-	-	Y	Y	Y	Y	Y	Y	Y

COMMAND NAME	PRINTER SUPPORT / NOTES									
	CODE COURIER	BD/BT	BD/BT	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
Store Graphic	-	-	-	Y	Y	Y	Y	Y	Y	Y
Recall Graphic	-	-	-	Y	Y	Y	Y	Y	Y	Y
Graphic		Y	Y	Y	Y	Y	Y	Y	Y	Y
Initialize Storage	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
List Stored Objects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Recall Menu	-	-	-	Y	Y	Y	Y	Y	Y	Y
Recall Variable	-	-	-	Y	Y	Y	Y	Y	-	Y
HEADER commands:										
Standard Header Line	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Reuse Header Line	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Automatic Header					Y	Y	Y	Y	Y	Y
Background Header					Y	Y	Y	Y	Y	Y
Clear Background Header					Y	Y	Y	Y	Y	Y
MENU commands:										
MENU START					Y	Y	Y	Y	Y	Y
MENU END					Y	Y	Y	Y	Y	Y
MENU EXIT					Y	Y	Y	Y	Y	Y
MENU CONTROL					Y	Y	Y	Y	Y	Y
MENU ACTION					Y	Y	Y	Y	Y	Y
MENU ITEM					Y	Y	Y	Y	Y	Y
MENU MESSAGE					Y	Y	Y	Y	Y	Y
OBJECT MAINTENANCE commands:										
Delete Object	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Delete All Objects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Print Object List	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Object List out Serial Port/USB	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE commands:										
Recall Variable					Y		Y		Y	Y
Prompts					Y		Y		Y	Y
DataSkip					Y		Y		Y	Y
VARIABLE ALLOCATE	-	-	-	Y	Y	Y	Y	Y	-	-

COMMAND NAME	PRINTER SUPPORT / NOTES									
	CODE COURIER	BD/BT	BD/BT	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
VARIABLE AUTOCUT	-	-	-	Y	-	Y	-	Y	Y	Y
VARIABLE AUXPOWER								Y	Y	Y
VARIABLE BACKLIGHT									Y	Y
VARIABLE BEEPER									Y	Y
VARIABLE BUFFER_TIMED_RESET	Y	Y	Y	Y	-	-	-	Y	Y	Y
VARIABLE COMM	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE COMPATIBLE									Y	Y
VARIABLE CONTRAST									Y	Y
VARIABLE DARKNESS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE ENERGY									Y	Y
VARIABLE ETHERNET FIRMWARE									Y	Y
VARIABLE ETHERNET DHCP									Y	Y
VARIABLE ETHERNET DHCP_CRIT									Y	Y
VARIABLE ETHERNET DHCP_OFFERS									Y	Y
VARIABLE ETHERNET LPD									Y	Y
VARIABLE ETHERNET JOBSOKINERROR									Y	Y
VARIABLE ETHERNET TELNET									Y	Y
VARIABLE ETHERNET RTEL									Y	Y
VARIABLE ETHERNET RTEL PORT									Y	Y

COMMAND NAME	PRINTER SUPPORT / NOTES									
	CODE COURIER	BD/BT	BD/BT	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
VARIABLE ETHERNET RTEL TIMEOUT									Y	Y
VARIABLE ETHERNET BOOTP	Y	Y	Y	Y	Y	Y	Y	Y		
VARIABLE ETHERNET IP									Y	Y
VARIABLE ETHERNET NETMASK									Y	Y
VARIABLE ETHERNET GATEWAY									Y	Y
VARIABLE ETHERNET RESET					Y		Y		Y	Y
VARIABLE ETHERNET RESET COMMUNITY					Y		Y		Y	Y
VARIABLE ETHERNET SERVER									Y	Y
VARIABLE ETHERNET TXTBFR					Y		Y		Y	Y
VARIABLE FEED									Y	Y
VARIABLE FEED_TYPE	Y	Y	Y	don't use	Y	Y	Y	Y	Y	Y
VARIABLE HIGHSPEED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE INDEX SETTING	-	Y	Y	Y	Y	Y	Y	Y	-	-
VARIABLE INDEX SETTING CALIBRATE					Y		Y	Y	Y	Y
VARIABLE INDEX		Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE IRDA								Y	-	-
VARIABLE IRDA PROTOCOL								Y	-	-
VARIABLE IRDA COMM								Y	-	-
VARIABLE LOWSPEED	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE LOW_BATTERY	Y	-	-	-	-	-	-	-	-	-

COMMAND NAME	PRINTER SUPPORT / NOTES									
	CODE COURIER	BD/BT	BD/BT	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
VARIABLE MEDIA _ADJUST	-	-	-	Y	Y	Y	Y	Y	-	-
VARIABLE MODE	-	-	Y	-	Y	Y	Y	Y	-	-
VARIABLE NO_MEDIA	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE NORMAL	Y	Y	Y	-	Y	Y	Y	Y	Y	Y
VARIABLE OFF_AFTER								Y	-	-
VARIABLES ON/OFF	-	Y	Y	Y	Y	Y	Y	-	-	-
VARIABLE PITCH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE POSITION	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE PRESENTLABEL					Y	Y	Y	Y	Y	Y
VARIABLE PRINT_MODE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE READ	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE RECALIBRATE	-	-	-	-	Y	-	Y	-	Y	Y
VARIABLE REPORT_LEVEL	-	-	-	-	Y	Y	Y	Y	Y	Y
VARIABLE RESET	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE SHIFT_LEFT	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE SLEEP_AFTER	Y	-	-	-	-	-	-	Y	-	-
VARIABLE TEXT BUFFER	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE USER_FEEDBACK	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE WIDTH	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
VARIABLE WRITE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

NOTE: On the Del Sol, the `WIDTH` command is mandatory or errors will occur.

Table 2. Printer Bar Code Support

The following table summarizes bar codes supported by each printer model.

BAR CODE SYMBOLOGY	SUPPORTED IN PRINTERS									
	PW/PT 42	BD/BT 02	BD/BT 04/05	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
ADD2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ADD5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE16K	Y	-	Y	-	-	-	-	-	-	-
CODE39	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE93	-	-	-	Y	Y	Y	Y	Y	Y	Y
CODE128A	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE128B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE128C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODABAR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EAN8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EAN13	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EAN128	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MAXICODE	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
MSI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MSI1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PDF417	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PLESSEY	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
POSTNET	-	-	-	Y	Y	Y	Y	Y	Y	Y
UPCA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UPCE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UPCE1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UPCA+	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
I2OF5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
D2OF5	-	-	-	Y	Y	Y	Y	Y	Y	Y
S2OF5	-	-	-	Y	Y	Y	Y	Y	Y	Y

BAR CODE SYMBOLOGY	SUPPORTED IN PRINTERS									
	PW/PT 42	BD/BT 02	BD/BT 04/05	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
ADD2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ADD5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE16K	Y	-	Y	-	-	-	-	-	-	-
CODE39	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE93	-	-	-	Y	Y	Y	Y	Y	Y	Y
CODE128A	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE128B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODE128C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CODABAR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EAN8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EAN13	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EAN128	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MAXICODE	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
MSI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MSI1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PDF417	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
PLESSEY	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
POSTNET	-	-	-	Y	Y	Y	Y	Y	Y	Y
UPCA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UPCE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UPCE1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UPCA+	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
I2OF5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
D2OF5	-	-	-	Y	Y	Y	Y	Y	Y	Y
S2OF5	-	-	-	Y	Y	Y	Y	Y	Y	Y

Table 3. Printer Font Support

The following table summarizes the fonts supported by each printer model.

FONT OR FEATURE	SUPPORTED IN PRINTERS									
	PW/PT 42	BD/BT 02	BD/BT 04/05	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
STRING 3X5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 5X7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 8X8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 9X12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 12X16	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 18X23	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 24X31	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT A	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT C	Y	-	Y	-	Y	Y	Y	Y	Y	Y
TEXT 0	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 1	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 2	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 3	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 4	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 5	-	-	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 6	-	-	Y	Y	Y	Y	Y	Y	Y	Y
BARCODE_FONTS	-	-	-	Y	Y	Y	Y	Y	Y	Y
STORED FONTS	-	-	-	Y	Y	Y	Y	Y	Y	Y
DOUBLE byte (Kanji) fonts	-	-	-	-	Y	Y	Y	Y	Y	Y

FONT OR FEATURE	SUPPORTED IN PRINTERS									
	PW/PT 42	BD/BT 02	BD/BT 04/05	BL42	ADVANTAGE/LX	SOLUS	DEL SOL/LX	CODE RANGER	CI	CXI
STRING 3X5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 5X7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 8X8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 9X12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 12X16	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 18X23	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STRING 24X31	Y	-	Y	Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT A	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ULTRA_FONT C	Y	-	Y	-	Y	Y	Y	Y	Y	Y
TEXT 0	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 1	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 2	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 3	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 4	-	Y	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 5	-	-	Y	Y	Y	Y	Y	Y	Y	Y
TEXT 6	-	-	Y	Y	Y	Y	Y	Y	Y	Y
TEXT and ULTRA_FONT										
BARCODE_FONTS	-	-	-	Y	Y	Y	Y	Y	Y	Y
STORED FONTS	-	-	-	Y	Y	Y	Y	Y	Y	Y
DOUBLE byte (Kanji) fonts	-	-	-	-	Y	Y	Y	Y	Y	Y

Chapter

3

Standard Printer Commands

This chapter describes standard printer commands.

Standard Printer Command List

The following is a list of standard printer commands.

ADJUST
ADJUST_DUP
AREA_CLEAR
BARCODE
BARCODE PDF417
BARCODE UPS
BARCODE_FONT
COMMENT
DEFINE_VAR
DELIMIT
DOUBLE
DRAW_BOX
END
FILL_BOX
GRAPHIC
Graphics mode
HALT
Header line
INDEX
JUSTIFY
LOGO mode
MULTIPLE
NOINDEX
PITCH
QUANTITY
QUERY REVISION
QUERY STATUS
ROTATE R90, R180, R270
STRING
TEXT
TIME
ULTRA_FONT
Universal clear
Wake-up string
WIDTH

ADJUST

Function — Increments or decrements a variable value or numeric data on the preceding command line.

Explicit Form — **ADJUST** *variable* **nnn**

Implicit Form — **A** *variable* **nnn**

Parameters

variable — The name of the variable to be adjusted, as specified in its DEFINE_VAR command. The variable value is adjusted wherever it is called before the ADJUST command in the label format. This is an optional parameter, and is not supported in all printers. If no variable is specified, the printer will adjust the data on the command line immediately preceding the ADJUST command.

> **NOTE**: Do not confuse variable values (as used to represent data) with VARIABLE commands (which control the printer). Also, only printers that support the DEFINE_VAR command will support variable values. Refer to Table 1, Printer command compatibility for more information.

nnnn — The incrementing or decrementing step size. Positive or negative numbers are accepted.

Comments — Using ADJUST to increment or decrement alpha data can produce unexpected results.

> **NOTE:** ADJUST will not work properly with the !+ header line parameter

See also — ADJUST_DUP

Example

```
! 0 100 200 3
BARCODE CODE39 150 30 30 TEST20
ADJUST -01
STRING 12X16 150 65 ADJUST20
ADJUST 01
END
```

ADJUST_DUP

Function — Used with the ADJUST command to print non-incremented duplicates of incremented labels.

Explicit Form — **ADJUST_DUP nnn**

Implicit Form — **AP nnn**

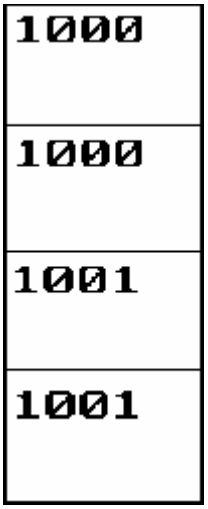
Parameters — **n** The number of duplicate labels printed for each increment specified with the ADJUST command.

> **NOTE:** Only one ADJUST_DUP command is allowed in each label format. Do not use ADJUST_DUP with the HALT command

See also — ADJUST

Example

```
! 0 100 50 2
STRING 8X8 0 0 1000
ADJUST 0001
ADJUST_DUP 2
END
```



AREA_CLEAR

Function — Clears an area of a label for replotting. AREA_CLEAR may be used in a normal label format, or with the !+ header mode to combine ASCII and graphics.

Explicit Form — **AREA_CLEAR x y w h**

Implicit Form — **AR x y w h**

Parameters

x	Upper left X coordinate of the cleared area
y	Upper left Y coordinate of the cleared area
w	Width of the cleared area
h	Height of the cleared area

See also — Header line

Example

```
! 0 100 560 1
PITCH 200
JUSTIFY CENTER
ULTRA_FONT A100 (20,3,0) 425 20 COGNITIVE
AREA_CLEAR 288 55 260 27
STRING 18X23 310 60 PRINTERS
END
```

BARCODE

Function — Prints a bar code, specifying type, position, height, and characters to be coded.

Explicit Form — **BARCODE[Rnnn] type** *modifiers* **x y h characters**

Implicit Form — **B[Rnnn] type** *modifiers* **x y h characters**

Parameters

[Rnnn] — Prints bar codes that are rotated 0, 90, 180, or 270 degrees clockwise from horizontal.

type — Bar code type. Accepted types are:

```
UPCA    UPCE    UPCE1   UPCA+
EAN8    EAN13   EAN8+   EAN13+
EAN128  ADD2    ADD5    CODE39
I2OF5   S2OF5   D2OF5   CODE128A
CODE128B        CODE128C        CODABAR
        PLESSEY
MSI     MSI1    CODE93  POSTNET
CODE16K         MAXICODE        PDF417
```

modifiers — Optional characters that change the bar code appearance. Modifiers must directly follow the bar code type with no intervening spaces. Multiple modifiers are accepted, and their order does not matter. Available modifiers are:

- `-` — Prints the bar code without uncoded subtext (not used with CODE16K, since it never has uncoded subtext).
- *+* — Adds a modulo 43 check digit to CODE39, or when used with S2OF5 or D2OF5, causes the intercharacter spacing to be equal to the width of the wide bar.

	(n:w)	Specifications for the narrow (*n*) and wide (*w*) bars. Place these modifiers within parentheses. Allowable range is 1 to 9 for both *n* and *w*. For UPC, EAN, ADD2, ADD5, and CODE128 (A, B, and C), *n* specifies an integral multiplier for the bar code width. For all other codes, this option specifies the width in dots of the narrow and wide bars. The value of *w* must always be greater than *n*.
	W	Increases the width ratio of wide to narrow bars (use only with CODE39).
	X	Doubles the width of all bars and spaces in the bar code (use only with CODE39).
x y		Starting position of printed bar code. This is the lower left corner of the bar code block. Extender bars and bar code subtext are below this position.
h		Height of bar code in dots. Allowable range is 1 to 256. This does not include the height of the bar code subtext or extender bars (if any).
Characters		ASCII characters to be bar coded.

NOTE: Not all printers support bar codes. Refer to Table 2. Printer Bar Code Support for more information.

Comments

Unless modified by a BARCODE_FONT command, all codes except UPCA+, EAN8+, EAN13+, and UPCE use an 8x8 font for bar code subtext. The excepted codes use a 5x7 font, to allow space for extender bars. Bar code subtext begins two dots below the bar code block.

All bar codes are positioned independently. This includes ADD2 and ADD5, which are normally used as add-ons for UPC and EAN codes. The programmer is responsible for the proper placement of all codes, including add-ons.

MAXICODE and PDF417 codes differ considerably from other bar codes. See BARCODE UPS and BARCODE PDF417 for programming information.

See also

BARCODE_FONT

IMPORTANT!
Follow the rules of the bar code in use. For example, UPCA and several other codes do not support characters A-Z. Attempting to print unsupported characters will produce bar codes that will not scan. Incorrect bar width ratios can also produce unscannable bar codes. Please refer to Chapter 10 - Bar Code information.

Character darkness and pitch also affect the reliability of the bar codes. Avoid printing bar codes having bar widths of less than 10 mils. Rotated bar codes should not be printed with bar widths of less than 15 mils.

Example 1

```
! 0 100 90 1
PITCH 100
BARCODE I2OF5 1 20 20 0123456789
BARCODE CODE39W- 1 50 20 34A
END
```

Example 2

```
BARCODE UPCA+ 20 75 70 19112610203
```

Example 3

```
BARCODE CODABAR(2:5) 10 30 20 A0123B
```

Example 4

```
BARCODE CODE16K 10 10 15 ab0123456789
```

Example 5

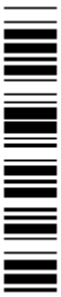
```
! 0 100 120 1
PITCH 100
BARCODE UPCA+ 10 95 70 04644200395
BARCODE_FONT 8X8(00,-73,1,1,1,1)
BARCODE ADD5 120 100 61 34028
STRING 8X8 10 5 ISBN 0-395-34028-4
END
```

Example 6

The following label formats print the same bar code using different dot times and bar width ratios. (Please note, though, that these formats use variable dot time. This feature is not supported in all printers.)

```
! 0 100 190 1
PITCH 100
BARCODER CODE39(2:6)- 10 0 30 1A2
END
```

```
! 0 100 90 1
PITCH 100
BARCODER CODE39(1:3)- 10 0 30 1A2
END
```



BARCODE_FONT

Function — Allows selection of the font type, size, and position of the human-readable characters printed below the bar-coded information.

Explicit Form — **BARCODE_FONT type**

Implicit Form — **BT type**

Parameters

type — Font type. Most printers can use any resident font except Ultra Font C. STRING is the default font type and will work with any printer. If you use a STRING font you only need to specify the font size and modifiers. For all other fonts you must spell out the font command name, font size, and modifiers; for example, ULTRA_FONT A20 (5,3,0) or TEXT 3.

> **NOTE:** Not all printers will accept all font types for bar code subtext. Refer to Table 3. Printer Font Support for more information.

You may use any font modifiers except for font rotation modifiers (bar code subtext automatically rotates with the bar code). When using STRING fonts, two more optional modifiers are available:

horadj — Offsets the printed text horizontally. Must be two digits; add leading zeros as required. May be positive or negative. If negative, the subtext is moved to the left.

vertadj Offsets the printed text vertically. Must be two digits; add leading zeros as required. May be positive or negative. Positive values move the subtext down, negative values move it up.

> **NOTE:** If you use the *horadj* or *vertadj* modifiers, you must specify values for all modifiers as described for the STRING command.

See the STRING, TEXT, and ULTRA_FONT commands for other parameter details.

Comments

The default subtext font for all bar codes except UPCA+, EAN8+, EAN13+, and UPCE is an 8x8 string font. The excepted codes use a 5x7 string font, to allow extra space for extender bars. Unless modified using the *horadj* and *vertadj* modifiers, the bar code subtext is placed two dot rows below the bar code block.

See also

BARCODE

> **NOTE:** This command modifies all bar codes following it in the label format up to the next BARCODE_FONT command.
>
> If you use multiple BARCODE_FONT commands in a label format and specify optional font modifiers for one or more of the commands, you must specify optional font modifiers for all of the BARCODE_FONT commands within the label format.

Example 1

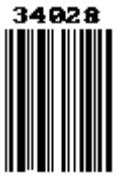
```
BARCODE_FONT 12X16
BARCODE CODE39 5 55 15 ABC
```

Example 2

```
BARCODE_FONT 9x12(00,05,1,1,1,2)
BARCODE UPCAX+ 35 50 50 72773740001
```

Example 3

```
! 0 100 95 1
PITCH 100
BARCODE_FONT 8X8(00,-73,1,1,1,1)
BARCODE ADD5 20 90 61 34028
END
```



BARCODE PDF417

Function — Prints a two-dimensional bar code on a label, using the PDF417 symbology.

Explicit Form — **BARCODE PDF417 x y w:h ec% rows:cols bytes** *T M* **data**

Implicit Form — **BARCODE 7 x y w:h ec% rows:cols bytes** *T M* **data**

Parameters

R	Optional. Indicates rotated code
x y	X and Y starting position for bar code block.
w	Width (x dimension) of the narrowest element (bar or space) in the bar code.
h	Height (y dimension) of the shortest element (bar or space) in the bar code.
:	Optional. When used, indicates that w and h define aspect ratio rather than absolute size in dots.
ec	Error correction level; 0 through 8.
%	Optional; indicates the error correction level is expressed as the percentage of code words in the bar code that are devoted to error correction.
rows	Number of bar code rows, from 3 to 90. Entering 0 will cause the printer to calculate the number of rows.
:	Optional. When used, indicates that **rows** and **cols** define the overall symbol aspect ratio rather than absolute number of rows or columns.
cols	Number of bar code columns, from 1 to 30. Entering 0 will cause the printer to calculate the number of columns.

bytes Number of encoded data bytes, including carriage returns and line feeds. Macro PDF functions are invoked if this value exceeds 3072 (see comments).

T Optional; produces a truncated bar code (the right row indicator and stop bar are replaced by a single width bar).

M Optional; enables Macro PDF functions (see comments).

data Data to be encoded.

NOTE: The number of bytes specified must exactly equal the number of bytes in the data that follows. The printer may not execute other commands following the BARCODE PDF417 command if the byte value is incorrect.

Comments

PDF417 bar codes never have human-readable subtext.

All dimensions specified in the command are in dots. The starting position of the bar code block is normally its upper left corner, but the JUSTIFY command can right justify or center justify PDF417 codes. Place the proper JUSTIFY command before the BARCODE PDF417 or BARCODER PDF417 command that plots the bar code you wish to justify.

Macro PDF functions provide command enhancements useful for handling large amounts of data. Macro PDF can create a distributed representation of files that are too large for a single PDF417 bar code block. An M before the data will invoke macro PDF, or the printer will invoke it automatically if the supplied data will not fit in a single PDF417 symbol. With macro PDF in effect, you may add the following optional parameters before the data:

I	File ID. Enter the desired file identification as a string after the *I* character. If the *I* is not followed by a valid string, the printer will select a random file ID.
N	File name. Enter the desired file name as a string after the *N* character.
B	Block count. The *B* character tells the printer to count the number of PDF417 symbols spanned by the data, and attach this number to the code.
P	Time stamp. Follow the *P* with an eight character string equal to the number of seconds since January 1, 1970, 00:00 GMT.
S	Sender. Place an alphanumeric string after the *S* character to indicate the sender.
A	Addressee. An alphanumeric string after the *A* character identifies the addressee.
F	File size, in bytes. The printer will calculate this value automatically.
C	Checksum. The presence of the *C* character will tell the printer to calculate a 16 bit CRC checksum and append it to the code.

Place double quotes (") around all strings used in the macro commands. To include a double quote within the string, precede it by a backslash (\). To include a backslash within a string, precede it with an extra backslash.

Example

```
PITCH 200
BARCODE PDF417 50 10 2 6 1 0 7 309
NAME:JOHN SMITH
ADDRESS:116 WILBUR
BOHEMIA, NY 11716
PHONE:516-555-4907
PHYSICIAN:DR.HARRY KLINE
STONYBROOK MED CTR
INSURANCE:AETNA
POLICY NO:918-1287345
SPOUSE:JENNIFER SMITH
HT:5'9"
WT:165
HAIR COLOR:BROWN
EYE COLOR:BROWN
ALLERGIES:NONE
DISABILITIES:NONE
BLOOD:A
SS#051-98-2374
DOB:5/24/60
END
```

BARCODE UPS

Function — Prints a two-dimensional bar code on a label, using the MaxiCode symbology. Cognitive printers may implement this bar code two ways, as described below.

Explicit Form — **BARCODE UPS x y mod data**

Implicit Form — **B PS x y mod data**

Alternate Explicit Form — **BARCODE UPS x y mod CrLF data**

Alternate Implicit Form — **B PS x y mod CrLF data**

x y — X and Y starting position for bar code block.

mod — Encoding mode; allowable values are 0 through 6.

CrLF — Carriage return and line feed

data — Data to be encoded. If not preceded by a carriage return and line feed, the data must conform to the following format:

zip plus4 class ccode bytes LMdata

zip – Five digit postal (zip) code, numeric

plus4 – Four digit zip code extension, numeric only

class – Three digit service class, numeric only

ccode – Three digit country code, numeric only

bytes – Number of encoded data bytes in the Low Priority Message. The number of bytes includes all carriage returns and line feeds, and must equal 84.

LMdata – Alphanumeric data to be encoded as the Low Priority Message. Uppercase alpha characters only. If the total number of bytes is less than 84, pad the data with the exclamation point character (!) until there are 84 bytes in the message.

NOTE: Most printers that support MaxiCode will automatically pad the data as required, but some earlier printers may not. Manually placing the correct number of data bytes in the message will help assure that the code prints and scans correctly when using the command with older printers.

The data does not have to follow the above format if it is preceded by a carriage return and line feed, as shown in the alternate explicit and implicit forms above. The presence of the carriage return/line feed tells the printer to encode all the data as it is encountered, regardless of order or content. But the data must conform to ANSI standards if you are using MaxiCode for common carrier shipment identification. For more information, see ANSI MH10.8.3, or Guide to Bar Coding with UPS, published by United Parcel Service, Inc. This booklet contains detailed UPS MaxiCode requirements, plus programming examples for various printers.

Comments — MaxiCodes cannot be rotated, and can never have human-readable subtext.

Example — The following example uses the alternate form, with data coded following the ANSI MH10.8.3 standard.

NOTE: This format will not print if copied directly to the printer. The `BARCODE UPS` command line is broken for Help window readability. Also, the example uses non-displayable control characters, represented as follows:

CrLF = carriage return and line feed

Gs = ASCII 29 (decimal)

Rs = ASCII 30 (decimal)

Eot = ASCII 4 (decimal)

```
! 0 100 570 1
PITCH 200
BARCODE UPS 0 0 2 CrLF[)>Rs01Gs96841706672
Gs001Gs1Z12345675GsUPSNGs12345EGs089GsGs
1/1Gs10.1GsYGsGsGsUTRsEot
END
```

This example codes the following data:

[)>**Rs**	Message Header
01**Gs**96	Transportation Data Format Header

841706672Gs840	Postal Code, Country Code
Gs001Gs1Z12345675	Class of Service, Tracking Number
GsUPSNGs12345EGs089	SCAC, UPS Shipper Number, Julian Day of Pickup
GsGs1/1	Place holder for Shipment ID Number, Package n/x
Gs10.1GsY	Package Weight, Address Validation
Gs	Place holder for Ship To Street Address
Gs	Place holder for Ship To City
GsUT	Ship To State
Rs	End Of Format
Eot	End Of Message

COMMENT

Function — This command is used for documenting label formats. Comment lines do not affect label printing.

Explicit Form — **COMMENT characters**

Implicit Form — **C characters**

Parameters

characters — The non-printing comment. The printer ignores all characters following the COMMENT command, up to the end of the line as indicated by the presence of a line feed character (ASCII character 10).

Comments — This command is primarily for internal documentation of label formats, but you can also use it to temporarily disable commands. Placing a C or the word COMMENT before the command will disable it.

Example — In the label format below, the presence of the C character at the beginning of the third line and the word COMMENT in the fourth line tells the printer to ignore everything that follows up to the next line feed.

```
! 0 100 190 1
STRING 8X8 115 5 THIS COMMENT WILL PRINT
C STRING 8X8 115 15 THIS COMMENT WON'T PRINT
COMMENT this is a comment. It won't print
either.
END
```

DOUBLE

Function

Prints "double byte" text characters from a selected font set. Double byte fonts are used for characters that require greater resolution than can be provided in a single byte (specifically, Kanji characters).

Explicit Form

DOUBLE
font*(eximage,exspace,xmult,ymult)* **x y**
mtid characters

Parameters

font Specifies the text font. There are two double byte fonts available at present:

16 = 16x16 dot Kanji

24 = 24x24 dot Kanji

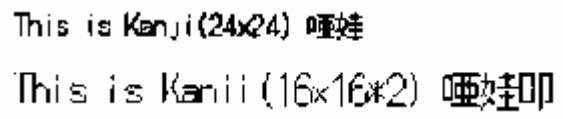
mtid Specifies a font mapping table; must be 1 (specifies mapping table SHIFTJIS). More mapping tables may be added in future firmware releases.

See the STRING command for other parameter details.

Example

The following label format will print text using the double byte characters. The Kanji characters are mapped above ASCII 128, so may not display correctly on your terminal.

```
! 0 100 210 1
DOUBLE 24 0 0 1 This is Kanji(24x24) ^ ^¡
DOUBLE 16(0,0,2,2) 0 50 1 This is
Kanji(16x16*2) ^ ^¡'@
END
```



DRAW_BOX

Function — Draws a hollow rectangle on the label.

Explicit Form — **DRAW_BOX x y w h** *t*

Implicit Form — **D x y w h** *t*

Parameters

x	X coordinate of upper left corner of box
y	Y coordinate of upper left corner of box
w	Box width, measured in dot columns. Must be greater than zero.
h	Box height, measured in dot rows. Must be greater than zero.
t	Optional; specifies line thickness in dots. The default is 1. If *t* is greater than 1, the **x**, **y**, **w**, and **h** parameters refer to the box outside dimensions.

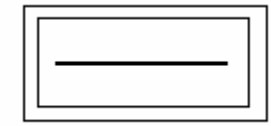
Comments — DRAW_BOX can draw horizontal and vertical lines on labels if you set *t* and **h** or **w** equal to 1, but the lines are two dots wide. Boxes drawn with this command may not print well at 200 DPI or higher resolution unless the *t* parameter is 2 or more. Some early printers do not support the t parameter, in which case we suggest using multiple FILL_BOX commands to create boxes with thicker lines.

See also — FILL_BOX

NOTE: Avoid drawing boxes around bar codes. Vertical lines near the bar code edge may be confused by scanners as being part of the code.

Example

```
DRAW_BOX 5 5 100 50
DRAW_BOX 10 10 90 40
DRAW_BOX 20 30 70 1
```



END

Function	Signals the end of a label format
Explicit Form	**END**
Implicit Form	**E**
Parameters	None
Comments	The END command tells the printer that all data required for the current label format has been sent. When the END command reaches the printer, the label format is processed and printing begins. Printing normally continues until all the labels specified in the label format have printed, but it may be temporarily paused with the HALT command (or by enabling label taken mode in printers so equipped).
See also	HALT

IMPORTANT!
Place an END statement at the end of every ASCII label format unless otherwise noted in specific command instructions. The printer will not print the label format until it receives an END command.

FILL_BOX

Function

This command inverts every dot in the specified rectangular area. Where the existing field is white, the FILL_BOX command fills it in black, while areas already black are flipped to white.

Explicit Form

FILL_BOX x y w h

Implicit Form

F x y w h

Parameters

x	X coordinate of upper left corner of box
y	Y coordinate of upper left corner of box
w	Box width, measured in dot columns. Must be greater than zero.
h	Box height, measured in dot rows. Must be greater than zero.

Comments

The FILL_BOX command can produce many useful effects. Overlaying multiple filled boxes can produce wide or multiple-line borders. Overlaying filled boxes can also produce shadow effects or one-dot-wide lines. The following examples show some possible uses of the command.

See also

DRAW_BOX

IMPORTANT!
You can print black labels with white text on them using the FILL_BOX command, but this is **not recommended**. Printing large dark areas causes excessive heat buildup and is very hard on the print head. Long horizontal boxes are most strenuous to print. They may adversely affect print quality, and also place considerable drain on a portable printer's battery.

Example 1

```
! 0 100 180 1
PITCH 200
FILL_BOX 50 50 750 85
FILL_BOX 50 50 725 60
FILL_BOX 25 25 750 85
FILL_BOX 27 27 750 85
END
```

Example 2

```
! 0 100 90 1
PITCH 100
ULTRA_FONT B25 (6,0,0) 70 5 SHELL 1
FILL_BOX 65 1 130 20
ULTRA_FONT B25 (4,2,0) 71 6 SHELL 1
FILL_BOX 65 1 130 30
ULTRA_FONT B25 (6,0,0) 70 40 SHELL 2
FILL_BOX 65 36 130 20
ULTRA_FONT B25 (4,2,0) 71 40 SHELL 2
END
```

GRAPHIC

Function

Initializes the printer to receive graphics data, and positions the received graphic on a label. This ASCII command allows you to send standard PCX or BMP format graphics directly from a file.

> **NOTE:** GRAPHIC must be the last command in its label format. Do not follow it with an END command. The printer waits for graphics data and a following printable label file after receiving this command.

Explicit Form

```
GRAPHIC type x y
```

Implicit Form

```
G type x y
```

Parameters

type	Graphic file type. Allowable types are PCX and BMP.
x y	Starting position of the printed graphic; normally the upper-left corner unless changed by a JUSTIFY command.

Comments

After the printer receives the GRAPHIC command it waits for the arrival of graphics data. The data is then mapped in the printer's memory. To print the graphic, send another label format using a !+ header line to the printer.

The printer only prints bi-level (black and white) graphics. Do not try to print color or grayscale graphics. Also, graphics are printed full scale, with each image dot corresponding to one printed dot. The printer will not scale graphics to fit.

Example

The following two label formats will print a PCX graphic with its upper left corner at location 416, 14 if the appropriate PCX file is sent to the printer following the first label format.

Format 1

```
! 0 100 600 0
JUSTIFY RIGHT
GRAPHIC PCX 416 14
```

- (Send the graphics file here. The printer will print after it receives the label format below.)

Format 2

```
!+ 0 100 590 1
END
```

Graphics mode

Function

Initializes the printer to receive binary data for printing bitmapped graphics. Unlike most commands, this command is not sent as ASCII text. Send all graphics data, including the header line, to the printer in a continuous binary data stream.

Explicit Form

mode dottime dotrows numlbls data

Parameters

mode — The graphics command. Use **@** for foreground graphics printing, **#** for background graphics printing. The mode parameter is sent as a one byte binary representation of the ASCII character.

dottime — Determines the Y dimension of each dot. Dot time is a one byte binary number with a decimal value between 1 and 255.

dotrows — Number of dot rows required for the image, sent as a two byte binary value with a minimum of 1 and a maximum limited by label size and available printer memory.

numlbls — Number of duplicate labels to print, sent as a two byte binary number having a decimal value between 0 and 65535. Set this value to 0 when preparing background graphics.

data — Binary data defining the bitmapped image. The image is coded as a raster scan, with binary 1's representing black dots and binary 0's representing white dots.

IMPORTANT!
Dot time values that result in aspect ratios less than 0.8 are not recommended, as poor print quality can result.

Comments

When programming in graphics mode, you control every dot on the print head separately. All the dots on the finished label can be either dark or light, depending on the setting for each bit in the graphics file.

Send all data to the printer in a continuous binary stream. Enough data must reach the printer to control all the dots for the specified number of dot rows over the print width. That may be quite a lot of data, since each square inch of label when printed at 200 DPI can have 40,000 dots. If your graphics image is much smaller than the print head width, we recommend using `LOGO` mode programming if possible. If you cannot use `LOGO` mode, reducing the width with a `WIDTH` statement in a normal ASCII label format will help reduce the data requirement.

You cannot use a typical word processor to create binary files. This is because word processors enter every character as an ASCII code. Typing the number zero, for example, produces ASCII 48. This character leaves the computer as binary code 00110000, which is not the same as sending binary 00000000 (true binary zero).

ASCII commands cannot be mixed in the binary graphics file. If you want to print predefined objects (such as bar codes or text) on the same label with binary bitmapped graphics, you have four possible approaches:

1. Program either the graphics or the ASCII components in the background, and put the other components in the foreground.

2. Use the !+ header line mode with AREA_CLEAR to overlay existing data with new data (typically, you send the bitmap to the printer first, then use !+ to put the ASCII components over the bitmap).

3. Use LOGO mode to place graphics where you want them, then use !+ to send ASCII components to the printer.

4. Use the GRAPHIC command to send the graphics to the printer as a BMP or PCX file, and then follow it with an ASCII label format containing the predefined objects.

See also — Header line, LOGO mode, AREA_CLEAR, and GRAPHIC

Example — Here is the beginning of a typical foreground graphic in ASCII form, hexadecimal form, and binary. The segment shown covers the graphics header and the beginning of the bitmap. Spaces have been added to the ASCII and hexadecimal forms for clarity. The printer will only accept the binary form.

ASCII: @ 100 100 1 0000000000...

Hex: 40 64 0064 1 000000000...

Binary:
00101000010000000000000010000000000000000000100000…

HALT

Function — Pauses the printer after it prints one label. If there are more labels left to print in the current batch, pressing the printer's feed switch will signal the printer to print the next label. The HALT command also activates the label cutter in printers so equipped.

Explicit Form — **HALT**

Implicit Form — **H**

Parameters — None

Comments — This feature is intended for situations that require many similar labels, presented one at a time. For example, tagging a large quantity of boxes on a warehouse floor might call for labels that are identical except for a serial number. You could write the label format using the ADJUST command to change the serial number, and use the HALT command to put printing "on hold." Only one label prints when you upload the label format to the printer. If using a portable printer, you could even disconnect the printer from the host and carry it to the warehouse with the labels ready to print as needed, without any other equipment.

Printers that have an integral cutter and label taken sensor will stream labels without cutting them unless there is a HALT command in the label format, or VARIABLE AUTOCUT is ON.

See also — VARIABLE AUTOCUT

NOTE: Place the HALT command before the END command but after all commands that map components on the label (such as STRING or BARCODE).

Header line

Function — Initializes the printer to receive a label format.

Explicit Form — **mode x dottime maxY numlbls**

Parameters

mode — Sets the encoding mode for the label format. Valid characters are:

- **!** — Standard header line. ASCII mode: The printer treats all incoming data as ASCII commands in this mode.
- **@** — Graphics mode: All incoming data is treated as binary graphics. (See Graphics mode for further details.)
- **!#** — Background header line. ASCII background mode: Same as **!** mode, except does not immediately print labels (see below).
- **#** — Graphics background mode: Same as graphics mode, except does not immediately print labels.
- **!*** — Clear background header line. (ASCII or GRAPHICS): Turns off background mode, recombining the foreground and background memory buffers. Does not clear memory.
- **!+** — Reuse header line. New start sequence - plots a label over an existing label without erasing the

previous label. (See also AREA_CLEAR command.)

!A Automatic header line. Same as **!**, except remaining header line parameters are not required. The printer sets **x** to zero, **dottime** to 100, calculates **MaxY**, and sets **numlbls** to zero. **MaxY** is calculated based on the location of the last plotted row in the image buffer. Use this header line with the QUANTITY command or in stored label formats. This header can be used for labels up to 6 inches long. The actual label length is calculated based on the position of the last plotted row in the image buffer.

x X starting position for label. Older printers used this parameter to position labels horizontally so two labels could be printed side-by-side. Always set **x** equal to zero in any printers that support the MULTIPLE command. High speed Barcode Blaster printers automatically limit their print speed to 3 IPS when **x** is nonzero.

dottime Determines how long the printhead dots stay hot, thereby changing the dot length. Values can range from 0 to 255, but values less than 30 are treated as 30. The dot time will increment in steps of 10 when operating in linear dot time mode (see the VARIABLE MODE

command). The specified dot time is rounded down to the nearest step.

> **NOTE:** Dot time values that result in aspect ratios less than 0.8 may cause poor print quality. Dot times under 100 automatically disable high speed printing. Some printers only support dot time 100. Refer to Table 1. Printer Command Compatibility for more information.

maxY — Specifies how many dot rows are memory-mapped for each label **maxY** must be large enough to map all label components, but not so large that it causes memory overflow or label skipping.

numlbls — Sets the quantity of labels to be printed by the label format. The allowable range is 0 to 65535.

Comments

The ASCII background and graphics background modes do not print labels immediately. Background mode splits the printer memory into two segments: the foreground and background memory buffers. Data sent via background mode resides in the background buffer and prints when the next label format containing foreground data reaches the printer. Background data stays in memory until intentionally cleared.

All label formats require a header line. The header line precedes all other commands in the label format, with the exception of the printer wake-up string (if used).

> **NOTE:** A few ASCII commands, such as the QUERY STATUS command, replace the normal header line. These cases are noted in their command descriptions.

Header line parameters are critical for proper printing. For most ASCII label formats you can

"rough-in" header line values as follows:

Use **!** for ASCII foreground printing.

Use 0 for the X starting position.

Use a dot time of 100 for an aspect ratio of 1:1 in linear dot time mode.

Determine an approximate **maxY** value by multiplying the label length (or desired label length, for cutter equipped printers) by the print pitch and then reducing the value by 10%. For dot times other than 100, divide the result by the aspect ratio (dot time divided by 100).

See also Graphics mode, LOGO mode, Wake-up string

Example

```
! 0 100 60 13
COMMENT ASCII FOREGROUND, X START=0,
COMMENT DOTTIME=100, MAX Y=60, 13 LABELS
```

INDEX

Function

Enables automatic label indexing. When printing is finished the printer feeds the label stock until the next label's first dot row is positioned under the printhead burn line (based on the position of the label's indexing cue; i.e., the black bar or gap location). This is the default operating mode. Label indexing remains on unless disabled with a NOINDEX command.

> **IMPORTANT!**
> Do not use this command when using continuous-form media. Continuous-form media has no indexing cues and will feed continuously if automatic label indexing is enabled.

Explicit Form

INDEX

Implicit Form

I

Parameters

None

> **NOTE:** Because INDEX positions the first dot row of the next label at the burn line, with butt-cut label stock the label perforation may be under the edge of the print head.
> The exact index position may vary slightly from printer to printer due to calibration differences. The VARIABLE POSITION command can adjust the index position.

See also

NOINDEX, VARIABLE POSITION

Example

```
! 0 0 0 0
C This format will turn indexing on and feed a
label
INDEX
END
```

JUSTIFY

Function

Positions Ultra Font and TEXT printing, PDF417 and MAXICODE bar codes, and GRAPHIC command images either left, right, or center of their horizontal coordinate (X coordinate for non-rotated text and bar codes, Y coordinate for rotated text and bar codes). Once invoked, the justification remains in effect for the rest of the label format or until changed by another JUSTIFY command

Explicit Form

JUSTIFY alignment

Implicit Form

J alignment

Parameters

alignment	**LEFT** or **L**	Aligns the component's left edge with its specified horizontal coordinate. (Default)
	RIGHT or **R**	Aligns the component's right edge with the specified horizontal coordinate.
	CENTER or **C**	Centers the text on the specified horizontal coordinate.

See also

ULTRA_FONT, TEXT, BARCODE(R) PDF417, BARCODE UPS, GRAPHIC

Example 1

```
JUSTIFY LEFT
ULTRA_FONT A40 (5,0,0) 400 10 LEFT JUSTIFY
JUSTIFY RIGHT
ULTRA_FONT A40 (5,0,0) 400 50 RIGHT JUSTIFY
JUSTIFY CENTER
ULTRA_FONT A40 (5,0,0) 400 90 CENTER JUSTIFY
END
```

Example 2

```
JUSTIFY LEFT
ULTRA_FONT A40 (5,0,90) 150 120 LEFT
JUSTIFY RIGHT
ULTRA_FONT A40 (5,0,90) 100 120 RIGHT
JUSTIFY CENTER
ULTRA_FONT A40 (5,0,90) 50 120 CENTER
END
```

LOGO mode

Function — Allows placement of bitmapped graphics in specific label areas, or windows. You specify the window sizes and locations individually. Any number of graphics windows is allowed, providing they do not overlap.

> **NOTE:** Unlike most commands, you cannot enter the logo mode command in ASCII form. The printer will only accept it as pure binary data with no extraneous characters.

Explicit Form — `mode 0 x y w h data`

Parameters

`mode 0`	Logo mode identifier. Send the 0 as one byte (hexadecimal zero). For foreground graphics, mode is the @ sign, or hexadecimal 40. For background graphics, mode is the # sign, or hexadecimal 23.
`x`	Graphics window starting point X coordinate, sent as two bytes. The X coordinate equals the dot-column of the desired starting point divided by 8.
`y`	Graphics window starting point Y coordinate (dot-row), sent as two bytes.
`w`	Graphics window width, sent as two bytes. The width equals the window width in dot-columns divided by 8.
`h`	Graphics window height in dots, sent in two bytes.
`Data`	Binary graphics data. Always send enough data to specify the condition of every dot in the window area. Darkened dots are programmed with a binary 1; light dots are binary 0. Program the graphics image as a raster-scan.

Comments

In background mode, the maximum programmable label size is cut in half. Consider using foreground LOGO mode with the !+ header line when printing combined ASCII and graphics.

When sending the **x**, **y**, **w**, and **h** parameters, send the most significant byte first.

Clear memory by sending a dummy label format to the printer before and after using LOGO mode. This keeps residual data from spoiling the finished label.

See also

Graphics mode, Header line, GRAPHIC

MULTIPLE

Function — Causes the printer to print duplicate labels side-by-side.

Explicit Form — **MULTIPLE nnn**

Implicit Form — **M nnn**

Parameters — **n** is the number of duplicate labels to print side-by-side. The acceptable range is 2 to 9.

The labels printed side-by-side must actually fit in the available space; otherwise they are truncated on the right side.

> **NOTE:** Avoid using this command with high speed Barcode Blaster printers. Barcode Blaster will automatically reduce its print speed to 3 IPS when it encounters this command, due to the increased processing requirements.

Comments — Using this command when printing many small labels can save considerable amounts of label stock. The command is also useful for printing split labels.

The total number of labels printed is the same as the quantity specified in the header line.

You may use the MULTIPLE command with the ADJUST command to print labels side-by-side with changing numeric data. However, the adjusted values will only change when the printer feeds the next label, so each set of side-by-side labels are identical.

> **NOTE:** Place the MULTIPLE command after the header line but before any commands that map components on the label, such as STRING or BARCODE.

Example

```
! 0 130 70 2
PITCH 100
WIDTH 224
MULTIPLE 2
STRING 8X8 7 0 ADIDAS  4446
STRING 8X8 7 10 JOGGING
STRING 8X8 7 20 SHORTS
STRING 8X8 37 30 $14.00
BARCODE I2OF5- 17 60 20 3445478940
END
```

NOINDEX

Function	Disables index detection. The printer will stop feeding the label after printing the last dot row. With most printers, this command remains in effect until you turn the printer off or issue an INDEX command. Portable printers are an exception: in these printers, NOINDEX shuts off when the printer goes to sleep.
Explicit Form	**NOINDEX**
Implicit Form	**N**
Parameters	None
Comments	Use NOINDEX when printing on paper without gaps or index bars, or when you want the printer to print multiple small labels on large label stock. You can allow space between labels by increasing max Y in the header line or by sending a dummy label format having the required number of dot rows.
Example	`! 0 100 60 1` `NOINDEX`

NOTE: Do not use the INDEX and NOINDEX commands in the same label format.

PITCH

Function — Sets the print density in dots per inch.

Explicit Form — **PITCH nnn**

Implicit Form — **P nnn**

Parameters — **nnn** is equal to print pitch in dots per inch (DPI). Allowable values depend on the printhead density:

PH Density	Default Pitch	Alternate Pitch
300	300	150
203	200	100
150	150	75

NOTE: The default pitch changes to the lowest available print pitch if Blazer emulation is enabled. See the VARIABLE MODE command for more information.

Comments — Decreasing the print density (decreasing **nnn** above) increases the size of each printed dot by a corresponding amount. This increases the size of the entire label. For example, a 100 dot-wide box printed at 200 pitch is 0.5" wide, but the same box printed at 100 pitch is 1" wide. Both boxes use the same amount of memory, and occupy the same number of dot rows.

Do not use PITCH more than once in any label format. Multiple PITCH commands may produce unusual effects.

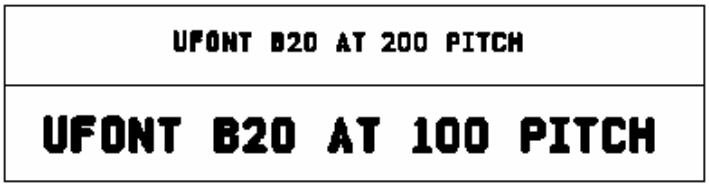
NOTE: Place the PITCH command after the header line but before any commands that locate label components, such as STRING or BARCODE.

Portable printers will always default to their highest pitch with each new label format unless explicitly set to a lower pitch.

See also VARIABLE PITCH

Example

```
! 0 100 90 1
PITCH 200
JUSTIFY CENTER
ULTRA_FONT B20 (5,0,0) 400 10 UFONT B20 AT
200 PITCH
END
! 0 100 45 1
PITCH 100
JUSTIFY CENTER
ULTRA_FONT B20 (5,0,0) 200 10 UFONT B20 AT
100 PITCH
END
```



QUANTITY

Function — Sets the quantity of labels to be printed by the label format.

Explicit Form — **QUANTITY numlabels**

Implicit Form — **QY numlabels**

Parameters — **numlabels** is equal to the number of labels printed by the label format. The allowable range is 0 to 65535.

Comments — Using this command is functionally identical to specifying the number of labels in the header line, but offers the programmer some added flexibility since **numlabels** can be a variable. The QUANTITY command also lets the programmer specify the number of labels to print when using the automatic header line (!A) feature.

> **NOTE:** The number of labels printed is the last quantity specified; therefore, the quantity specified by QUANTITY takes precedence over the quantity specified in the header line.

See also — DEFINE_VAR, Header Line

Example — The following example will print three identical labels:

```
! 0 100 90 1
PITCH 100
BARCODE I2OF5 1 20 20 0123456789
BARCODE CODE39W- 1 50 20 34A
QUANTITY 3
END
```

QUERY FIRMWARE REVISION

Function	Causes the printer to send firmware revision information to the host computer. The printer sends its firmware part number, revision, revision time, and revision date in response to this command. Such information is useful when developing software that must control several different printers.
Explicit Form	**!QR**
Parameters	None
Comments	This command does not require a header line, but must be followed by a line feed (or carriage return and line feed) and an END statement. Do not use any other commands with QUERY REVISION.
See also	QUERY STATUS, VARIABLE USER_FEEDBACK
Example	!QR END

IMPORTANT!
Use this command exactly as shown in the example. Do not use other commands (except the END command) with the QUERY REVISION command.

QUERY PRINTER STATUS

Function	Causes the printer to send a status message to the host computer. The status message indicates the current printer condition, such as ready, printing, low battery, out of paper, and so on. Such information is useful when controlling the printer from a remote site. However, the host computer must be programmed to properly interpret the incoming data.
Explicit Form	`!QS`
Parameters	None

Comments

This command replaces the normal header line. Follow the command with a line feed (or carriage return and line feed) and an END statement. Do not use any other commands with QUERY STATUS.

Status Query Response Messages

Status Type	Prog Guide	Advantage	Genesis	Code Ranger
Ready	R	R	R	R
Printhead Hot	H	H	H	H
Head Up	U	U	U	U
Motor Hot		M		H
Parse Error		A	A	e
Paper Out	O	O	O	O
Ribbon Out	o	o	o	o
Programming			F	F
Halted	W	W	W	W
Hex dump			X	X
Printing (printing in process, or printer paused during batch mode processing)	P	P	P	P
Background image is present	B	B		
Low Battery	L	L		L
EEPROM Error	E	e		E*
Error (only upon a checksum error)		E**		
Charging	C	C*		C
Cutter Error	c	c		c*
Serial Error	S	S*		S*
Integrity Error	I	I*		
Download Error	D	D		D*
Sleep				z
Off				Z

The printer can send the following status messages to the host computer when it is queried:

B Background. This is the status if there is a valid image in the background memory buffer and no print tasks are pending.

C Charging (applicable only to portable printers). The printer battery is charging and no print tasks are pending. The printer sends this message once per second if USER_FEEDBACK is ON.

R Ready. The printer has no pending print tasks, is not charging, and the background buffer is empty.

The printer can send many other status messages to the host in response to error conditions, but the printer communications port will go busy in the event of a printer error. Therefore, the printer will send the following error messages but will not respond to the QUERY STATUS command if these errors occur:

c (lowercase letter C) Cutter error (applicable only to cutter equipped printers). The label cutter is jammed or not working correctly.

D Download error. An error has occurred while attempting to load new firmware.

E EEPROM error. This error will occur when printer is first turned on if the EEPROM checksum is invalid.

H Hot printhead. This error will occur if the printhead thermal cycles.

I Nonvolatile memory failure.

L Low battery. The printer sends this message eight times per second if it detects a low power condition and USER_FEEDBACK is ON. The printer will send this message once regardless of the USER_FEEDBACK state if the power drops below the normal operating voltage level (for example, when the power is switched off).

O Out of paper. The printer sends this message eight times per second if it runs out of paper and USER_FEEDBACK is ON.

o	(lowercase letter O) Out of ribbon or ribbon stalled. (Only reported by TT printers capable of detecting a stalled ribbon.) The printer sends this message eight times per second if it runs out of ribbon and USER_FEEDBACK is ON.
P	Printing in process, or printer paused during batch mode processing.
S	Serial port communications error.
U	Printhead Up. The printhead is not fully closed.
W	Waiting. The printer is paused during a batch printing operation.

The printer sends a five digit number after each letter. If the leading letter is a **C** (indicating the battery is charging), the number following the **C** is proportional to the battery charge state. If the leading letter is an E (indicating an EEPROM error), the number following the **E** is the EEPROM checksum. In all other cases, the five digit number shows the quantity of unprinted labels in the current batch.

E messages have two parts. The first part begins with an **E** and is followed by the calculated checksum. The second part begins with an **E** and is followed by the stored checksum.

NOTE: If the printer detects an EEPROM error, it will automatically load the nonvolatile RAM with default values. The printer may work, but print quality may be degraded. Contact your service technician when an EEPROM error occurs.

See also VARIABLE USER_FEEDBACK

Example

```
!QS
END
```

IMPORTANT!
Use this command exactly as shown in the example. Do not use other commands (except the END command) with the QUERY STATUS command.

ROTATE R90, R180, R270

Function

Prints STRING text on the label, rotated clockwise in three orientations:

R90 – Prints text rotated 90 degrees clockwise from horizontal.

R180 – Prints text rotated 180 degrees clockwise from horizontal (upside-down).

R270 – Prints text rotated 270 degrees clockwise from horizontal.

Explicit Form

R90 type*(eximage,exspace,xmultiplier, ymultiplyer)* **x y characters**

R180 type*(eximage,exspace,xmultiplier, ymultiplyer)* **x y characters**

R270 type*(eximage,exspace,xmultiplier, ymultiplyer)* **x y characters**

Implicit Form

R9 type*(eximage,exspace,xmultiplier, ymultiplyer)* **x y characters**

R1 type*(eximage,exspace,xmultiplier, ymultiplyer)* **x y characters**

R2 type*(eximage,exspace,xmultiplier, ymultiplyer)* **x y characters**

Parameters

See the STRING command for parameter details. Note, however, that the X and Y starting coordinates for the string refer to different positions on the text block depending on rotation:

For **R90** and **R180**, the X and Y starting position of the string is in the lower left corner of the text block.

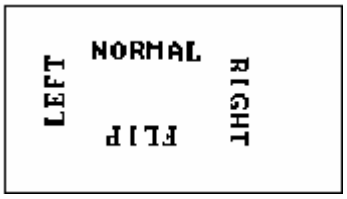
For **R270**, the X and Y starting position for the string is in the upper left corner of the text block.

NOTE: The parameters in parentheses are optional. There are no spaces after the commas.

See also STRING, ULTRA_FONT

Example

```
! 0 100 100 1
STRING 9X12 32 10 NORMAL
R90 9X12 97 16 RIGHT
R180 9X12 77 50 FLIP
R270 9X12 10 55 LEFT
END
```



STRING

Function

Prints text (ASCII characters) on a label using CSI fonts. These are non-proportional, non-compressed bitmapped fonts.

Explicit Form

STRING type*(eximage,exspace,xmult,ymult)* **x y characters**

Implicit Form

S type*(eximage,exspace,xmult,ymult)* **x y characters**

Parameters

type Specifies the basic font size, in dots. There are seven font sizes: 3X5, 5X7, 8X8, 9X12, 12X16, 18X23, and 24X31.

The number preceding the X is the approximate character width. The number following the X is the character height. You can specify the font type just by height, if you wish.

Not all printers support all fonts. Refer to Table 3, Printer Font Support for more information.

NOTE: The 3X5 and 24X31 fonts are uppercase only.

x y Horizontal and vertical starting position for the upper left corner of the first character in a string.

characters ASCII string to be printed.

The following parameters are contained in parentheses and are optional:

eximage Produces bolder forms of all character sets by printing the character the number of times specified, offset by one dot column

each time. When using this modifier you must specify values for *exspace*, *xmult*, and *ymult*. The allowable range is 1 to 9. For normal boldness, use a value of 1.

exspace — Modifies the spacing between characters. Specify values for *xmult* and *ymult* when using *exspace*. The allowable range is 1 to 9. For normal spacing, use a value of 1.

xmult — Independently expands the width of any font. The allowable range is 0 to 9 (0 multiplies by 10), except for the 18X23 and 24X31 fonts, which have ranges of 1 to 8. When using this modifier you must also specify a value for *ymult*. For normal font width, use a value of 1.

ymult — Independently expands the height of any font. Range 0 to 9 (0 multiplies by 10) except for the 18X23 and 24X31 fonts, which have ranges of 1 to 8. When using this option you must specify a value for *xmult*. For normal font height, use a value of 1.

Comments

Text printed with the STRING command is always horizontal on the label. To print rotated text, use the R90, R180, R270, TEXT, or ULTRA_FONT commands.

Some string font characters use slightly more space on the printer's memory grid than the font dimensions indicate. The space occupied by each character is called a cell. The table below shows the cell size for each font type.

Font Type	Cell Size
3X5	4X5
5X7	6X7
8X8	8X8
9X12	9X12
12X16	13X16
18X23	19X23
24X31	25X31

When programming label formats, you can calculate the exact amount of space required by text blocks using the cell sizes shown.

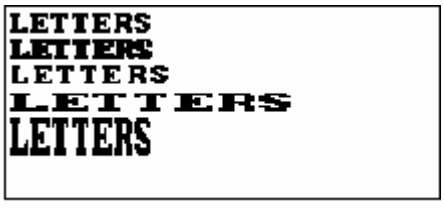
NOTE: Use of the *eximage*, *exspace*, *xmultiplier*, or *ymultiplier* string modifiers will change the font cell size.

STRING fonts are stored in user-accessible memory in many printers, and are handled as stored objects. This means they may be deleted or replaced in the field, so the actual resident fonts may differ from those delivered in the printer. Take this into account when using the STRING command.

See also ROTATE, TEXT, ULTRA_FONT

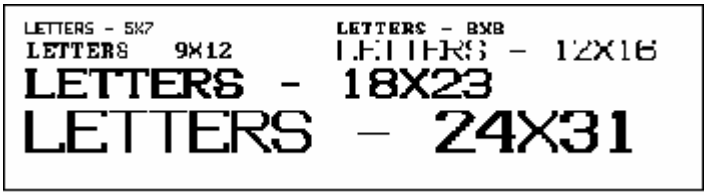
Example 1

```
! 0 100 100 1
PITCH 100
STRING 8X8 10 0 LETTERS
STRING 8X8(2,1,1,1) 10 10 LETTERS
STRING 8X8(1,2,1,1) 10 20 LETTERS
STRING 8X8(1,1,2,1) 10 30 LETTERS
STRING 8X8(1,1,1,2) 10 40 LETTERS
END
```



Example 2

```
! 0 100 100 1
PITCH 100
STRING 5X7 10 0 LETTERS - 5X7
STRING 8X8 200 0 LETTERS - 8X8
STRING 9X12 10 10 LETTERS - 9X12
STRING 12X16 200 10 LETTERS - 12X16
STRING 18X23 10 28 LETTERS - 18X23
STRING 24X31 10 53 LETTERS - 24X31
END
```



TEXT

Function

Prints text on a label using compressed bitmapped fonts.

Explicit Form

TEXT
fontID*(spacing,rotation,xmult,ymult)* **x y characters**

Implicit Form

T fontID*(spacing,rotation,xmult,ymult)* **x y characters**

Parameters

fontID Specifies the font family and size. The font family loaded in most printers at present is CG Triumvirate, with font sizes as follows:

fontID	Size (points)
0	6
1	8
2	10
3	16
4	24
5	36
6	48

NOTE: Not all printers support all fonts. Refer to Table 3, Printer Font Support for more information.

x y Starting position of the character string. The point on the text block referenced by **x y** varies with rotation and justification. For left-justified text rotated 0 and 270 degrees, the reference point is the upper left corner of the text block. For left justified text rotated 90 and 180 degrees, the reference point is the lower left corner of the text block.

characters ASCII text to be printed.

The following parameters are contained in parentheses and are optional:

spacing	Sets the spacing between characters. Valid entries are 0 to 255, and set the number of dots between proportionally spaced characters. If a negative sign is placed before the spacing value, the type is spaced non-proportionally and the spacing value will set the character cell width.
rotation	Clockwise rotation of the printed character string. Valid entries are 0, 90, 180, and 270, with a default of 0.
xmult	Expands the font width. Valid entries are 0 to 4, with a default of 1. When using this parameter, you must also specify a value for *ymult*.
ymult	Expands the font height. Valid entries are 0 to 4, with a default of 1.

Comments

The JUSTIFY command can left, center, or right justify text printed by the TEXT command.

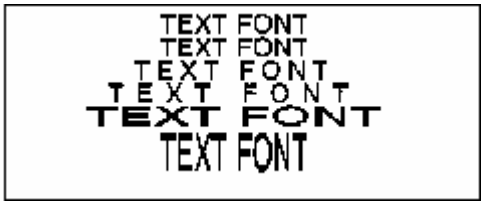
TEXT fonts are stored in user-accessible memory in many printers, and are handled as stored objects. This means they may be deleted or replaced in the field, so the actual resident fonts may differ from those delivered in the printer. Take this into account when using the TEXT command.

See also

STRING, R90, R180, R270, JUSTIFY, ULTRA_FONT

Example

```
JUSTIFY CENTER
TEXT 3 410 0 TEXT FONT
TEXT 3(0,0,1,1) 410 40 TEXT FONT
TEXT 3(10,0,1,1) 410 80 TEXT FONT
TEXT 3(20,0,1,1) 410 120 TEXT FONT
TEXT 3(0,0,2,1) 410 160 TEXT FONT
TEXT 3(0,0,1,2) 410 200 TEXT FONT
```



TIME

Function

Sets or gets data from the real-time clock in printers so equipped. Data derived from the clock resides in the system variable TIME.

Explicit Form

TIME action

Implicit Form

TE action

Parameters

action

Clock operation. Allowable operations are **SET**, **GET**, and **ADD**, used as follows:

TIME SET

TE SET

Sets the clock to the numeric time value following the command. Specify the new clock time in the format YYYY MM DD hh mm ss, where:

- **YYYY** Desired year. Allowable values are 1970 to 2069.
- **MM** Desired month. Allowable values are 01 to 12.
- **DD** Desired day within the month. Allowable values are 01 to 31, as appropriate for the specified month (for example, a DD value of 31 is valid for month 07 but not month 06).
- **hh** Desired hour. Allowable values are 00 to 23.
- **mm** Desired minute. Allowable values are 00 to 59.
- **ss** Desired second. Allowable values are 00 to 59.

TIME GET

TE GET

Returns the current clock time, placing it in a system variable called TIME.

TIME ADD

TE ADD

Adds the specified interval to the last time read by **TIME GET** (that is, to the value currently stored in the variable TIME). The specified time interval must be in the form described under **TIME SET**, and you must specify all six parameters. Added intervals can be negative or positive. Addition starts at the seconds field, and added values arithmetically carry or borrow when a field over- or underflows.

TIME ?

TE ?

This command causes the current time to be sent as a formatted string back through the communications port. For example, "Friday 12/9/2005 12:56:51".

IMPORTANT!
Not all printers support the **TIME** command, and not all printers that support the command have a real-time clock (this is a hardware option). Without a real-time clock, the TIME variable will remain at zero or in an undefined state. **TIME ADD** will change the value stored in TIME, but the results are unpredictable if there is no installed clock.

Comments

You access the data provided by the clock using the system variable TIME. This variable has formatting parameters, allowing you to extract time data in a variety of forms. Format the variable output by placing a format string after the variable name and bounding the variable and its format string with the variable delimiter (see DELIMIT).

NOTE: TIME will not return a value unless it is followed by formatting characters and bounded by the variable delimiter.

Here are the allowable formatting characters you can place after the TIME variable:

Parameter	Returns
%%	% character

%a	Abbreviated weekday name (Sun, Mon, Tue)
%A	Full weekday name (Sunday, Monday, Tuesday)
%b	Month name (Jan, Feb, Mar)
%B	Full month name (January, February, March)
%c	Date and time using a two-digit year (mm/dd/yy hh:mm:ss; for example, 09/25/98 15:35:20)
%C	Date and time using a four-digit year (mm/dd/yyyy hh:mm:ss; for example, 09/25/1998 15:35:20)
%d	Two digit day of month (1-31)
%H	Two digit hour, 24 hour clock (0 - 23)
%I	Two digit hour, 12 hour clock (0 - 12)
%j	Three digit day of year (001 - 366)
%m	Two digit month (1 - 12)
%M	Two digit minute (00 - 59)
%p	AM or PM
%S	Two digit second (00 - 59)
%U	Two digit week number, where Sunday is the first day of the week (00 - 53)
%w	Weekday where 0 is Sunday (0 - 6)
%W	Digit week number, where Monday is the first day of the week (00 - 53)
%x	Date, with two-digit year (mm/dd/yy; for

example, 05/21/98)

%X	Time (hh:mm:ss; for example, 21:45:30)
%y	Two-digit year without century (00 to 99)
%Y	Year with century

You can use multiple formatting characters and mix printable characters with the formatting characters, to present the time or date in unusual ways.

See also DELIMIT

Example 1 The following example will set the printer's clock to June 17, 2001, 3:30:00 PM:

```
! 0 0 0 0
TIME SET 2001 06 17 15 30 00
END
```

Example 2 The following label format will read the current time from the clock, placing the value in the variable TIME. It will then print a label showing that time, add 4 days, 6 hours, and 17 minutes to it, and print the result:

```
! 0 100 500 1
DELIMIT ~
TIME GET
TEXT 2 20 50 The current date and time are
~TIME %c~
TIME ADD 0000 00 04 06 17 00
TEXT 2 20 100 In 4 days, 6 hours, 17 minutes it
will be ~TIME %c~
END
```


Example 3

The following command line will print the current date as stored in the TIME variable, in the form mm/dd/yy:

```
TEXT 2 20 100 The date is: ~TIME %m/%d/%y~
```

Example 4

```
The following command line …
FUNCID=TIMEQUERYID=69
NOBUFFER
ImpTimeQuery
```


Universal Clear

Function	Resets the printer to its initial power on state, effectively the same as cycling printer power.
Explicit Form (ASCII)	23 23 23 23 23 67 76 69 65 82 23 23 23 23 23
Parameters	None
Comments	Unlike other commands, you cannot send the `Universal Clear` command to the printer as a printable ASCII string of letters and/or numbers. Most computer keyboards do not have a character corresponding to ASCII 23. Although you cannot type the command directly, the host computer can send the command if it is programmed in a high-level language. For example, you could send `Universal Clear` to the printer using the following BASIC code: `LPRINT CHR$(23); CHR$(23);CHR$(23); CHR$(23); CHR$(23); "CLEAR"; CHR$(23); CHR$(23); CHR$(23); CHR$(23); CHR$(23); CHR$(13); CHR$(10)` `Universal Clear` only clears unprocessed data from memory. It will not affect a label format that is currently being printed.

ULTRA_FONT

Function

Prints text on a label, using Ultra Fonts (stroke fonts). Unlike STRING fonts, Ultra Fonts maintain their shape in any size and boldness. Font modifiers can change character bolding, spacing, and rotation. Font type C may also be italicized and "grayed."

Explicit Form

ULTRA_FONT Tnnn *IGz(bold,space,rot)* **x y char**

Implicit Form

U Tnnn *IGz(bold,space,rot)* **x y char**

Parameters

T

Font type, A, B, or C. Type A characters have rounded corners. Type B characters have angled corners. Type C resembles Helvetica print.

IMPORTANT!
Always use uppercase characters (A, B, or C, *not* a, b, or c) when specifying the font type.

NOTE: Not all printers support all fonts. See Table 3, Printer Font Support for more information.

nnn

Font size, in dots. This immediately follows the font type, and may specify both X and Y dimensions (A25X50, for example), or just the Y dimension, in which case X is approximately one-half Y (as in A50). For font types **A** and **B**, X and Y can range from 1 to 65535. Font C size can range from 40 to 700.

x y	Starting position of the printed character string. The reference point on the text block varies with character rotation. For 0 and 270 degree rotation, the X and Y starting position of the text block is in the upper left corner of the block. For 90 and 180 degree rotation, the X and Y starting position of the string is in the lower left corner of the text block.
char	ASCII characters to be printed.

The following parameters are contained in parentheses and are optional:

I	Specifies italic type (use only with font type **C**).
G	Specifies gray scale mode, and is followed immediately by the *z* modifier. The *z* modifier specifies the gray scale screen, and may be 0, 1, or 2, with 0 the lightest gray and 2 the darkest. The default screen is 2. These modifiers only work with font type **C**.
bold	Printed character boldness (width of character strokes) in dots. Allowable range is 1 (minimum stroke width) to 255 (maximum stroke width), with a default value of 2. A boldness of 50 at 200 DPI pitch will give a line thickness of 50/200, or 1/4". For font types **A** and **B**, boldness specifies thickness for all strokes. Font type **C** only bolds horizontally.

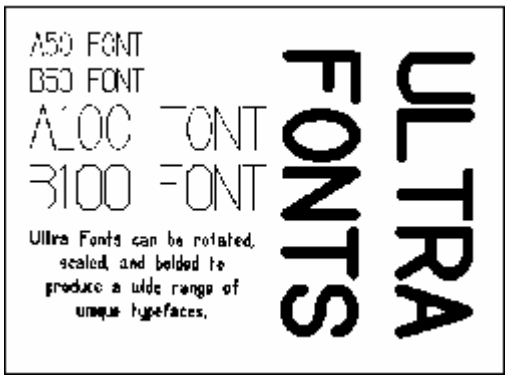
space — Number of dots between each printed character. Valid entries are 0 to 255 and **N**, with a default of 1. **N** sets non-proportional character spacing; that is, each character has the same width. Font type **C** does not support non-proportional spacing.

rot — Clockwise rotation of the printed characters. Valid entries are 0, 90, 180, and 270. The default is 0.

See also JUSTIFY, STRING, ROTATE

Example

```
JUSTIFY CENTER
ULTRA_FONT A70X160 (20,5,90) 620 300 ULTRA
ULTRA_FONT A70X160 (20,5,90) 420 300 FONTS
JUSTIFY LEFT
ULTRA_FONT A50 20 30 A50 FONT
ULTRA_FONT B50 20 90 B50 FONT
ULTRA_FONT A100 20 150 A100 FONT
ULTRA_FONT B100 20 250 B100 FONT
JUSTIFY CENTER
U A30 (4,0,0) 220 360 Ultra fonts can be
rotated,
U A30 (4,0,0) 220 400 scaled, and bolded to
U A30 (4,0,0) 220 440 produce a wide range of
U A30 (4,0,0) 220 480 unique typefaces.
```



Wake-up string

Function — Switches the printer from idle to active mode in preparation for incoming data.

Explicit Form — `ccccccccccccccccccccccccccccccccccccccccc`

Parameters — None

Comments — The 4.25" portable printers use an energy-saving "sleep mode" to save battery power during periods of inactivity. These printers won't accept data when they are asleep.

Code Courier printers go to sleep immediately after finishing the current task. Pressing the FEED button will feed a label, after which the printer will fall asleep again. Therefore, the wake-up string must precede every label format.

The minimum wake-up string length depends on the serial port baud rate and printer handshaking. When using RTS/CTS handshaking, use 40 uppercase C's. When using XON/XOFF handshaking, use a wake-up string at least as long as shown in the following table.

Wake-up string length vs. baud rate

Baud Rate	String Length
600	5
1200	10
2400	20
4800	40
9600	80
14400	120
19200	155
38400	310
57600	470

NOTE: Aside from a very small amount of added data transmission time, the presence of a wake-up string

does not adversely affect the behavior of printers that do not require one. You may want to send a wake-up string to every printer prior to sending your label formats, to help assure compatibility with all printers.

See also Header line

WIDTH

Function — Sets the width of the printed label. Typically, this command is for printing on label stock that is narrower than the printhead.

Explicit Form — `WIDTH` **`nnn`**

Parameters

`W nnn` — Approximate print width in hundredths of an inch.

Comments

Since data is handled in whole words, any value specified for the `WIDTH` results in an actual print width that can be expressed in 16 bits. The printer will round up any width value to the nearest whole word. This means that when using a print pitch of 200, the width value is rounded up to the nearest number that is evenly divisible by 8. When using a print pitch of 100, the width value is rounded up to the nearest number evenly divisible by 16.

If you do not use the `WIDTH` command, the printer will default to its maximum print width unless the default width has been changed by a `VARIABLE WIDTH` command.

Reducing width lets you program longer labels in a given memory area. It can also simplify graphics programming by reducing the number of dot columns you need to program.

When reducing width, Code Courier printers move the label against the left edge of the label stock as it exits the printer. Barcode Blaster, Blaster Advantage, and Solus printers move the label against the right edge of the label as it exits the printer.

NOTE: The WIDTH command is necessary with the Del Sol to correctly position the printing image. The WIDTH command line must precede any command that maps label components on the printer's memory grid, such as STRING or BARCODE.

High speed Barcode Blasters automatically disable high speed printing when they encounter this command in a label format.

See also

VARIABLE WIDTH

Example

```
! 0 100 100 1
STRING 8X8 0 0 THIS IS
STRING 8X8 0 10 WITHOUT
STRING 8X8 0 20 THE WIDTH
STRING 8X8 0 30 COMMAND
END

! 0 100 100 1
WIDTH 80
STRING 8X8 0 0 THIS IS
STRING 8X8 0 10 WITH
STRING 8X8 0 20 THE WIDTH
STRING 8X8 0 30 COMMAND
END
```


Chapter

4

Storing Data in the Printer Memory

Commands discussed in this section allow you to store label formats and graphics in the printer's memory for later use. Internal data storage can help improve label throughput and may also simplify programming in some applications.

NOTE: Internal data storage capability is an optional feature. Not all printers accept these commands, and due to hardware limitations, some printers that accept the commands may not successfully store data. Refer to Table 1, Printer Command Compatibility for more information.

Before Using Data Storage Commands

Before using internal data storage, please note that:

- Changing the Text or Overflow Buffer sizes will delete objects stored in the image buffer. This will not affect normal stored formats or graphics, but will affect enhanced stored formats.
- Storing objects will leave unknown images in memory. Normal label printing will clear these images, but if you use background mode or the `!+` header line mode you must clear the spurious images from memory first. (See Header line.)
- Storage commands let you specify what memory area will receive the stored object. The memory area is specified as parameter `xx`, with the following memory areas available:

Memory Area	
0	Volatile RAM
1	Reserved for future firmware releases
2	Expanded Memory
3	Nonvolatile RAM

NOTE: Cognitive does not recommend using volatile RAM for stored objects, since objects stored in volatile RAM is lost when the printer is turned off.

However, you may want to use volatile RAM to store variables or objects that will change frequently.

- When using volatile RAM for object storage, you must allocate space for that purpose. Refer to the VARIABLE ALLOCATE command for more information.
- You must assign an alphanumeric identifier to every stored object. The identifier can be from one to eight characters long, using any combination of letters and numbers (no punctuation). If an object in memory already uses the specified identifier, the printer deletes the existing object before storing the new one, even if the two objects would reside in different memory areas.

Also notice that some of these commands are used in place of the normal label format header line, rather than as ASCII commands within a label format. Commands starting with an exclamation point (!) should be treated as header line replacements.

Data Storage Commands

Data storage commands discussed in this guide include:

```
Delete Stored Object          List Stored Objects
Format Recall                 DELIMIT
Format Store                  DEFINE VARIABLE
GRAPHIC                       Recall Menu
GRAPHIC STORE
RECALL GRAPHIC                Recall Variable
Initialize Storage
```


Delete Stored Object

Function — Deletes a stored object from memory.

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command.

Explicit Form — **!D identifier**

Parameters

identifier — Stored object identifier assigned when the object was first stored.

Comments — None

Example — The following command will search all available memory areas for a stored object named FORM_1, and then delete the object from memory.

```
!D FORM_1
```

Format Recall

Function

Recalls a stored format from memory, merges any incoming variable data with the stored data, and prints labels as required.

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command.

Explicit Form

!R t identifier x 100 maxY numlabels

Parameters

t Data types. Use F for standard ASCII format files and E for enhanced format files.

> **NOTE:** When recalling stored formats, use the same value for t as was used when the format was stored. Specifying the wrong data type when recalling a stored format may cause the label to print incorrectly.

identifier Object identifier assigned when the object was stored.

Comments

If variable data is needed to print the finished label, the printer will expect the required data to follow the Format Recall command. A carriage return or carriage return and line feed must precede the variable data.

See also

Header line

Example

The following example assumes that the label format FORM_1 shown in the Format Store example is already stored in the printer.

```
!R F FORM_1 0 100 170 1
MEN'S DRESS SHIRT
$17.85
SHIRT/$17.85
```

Format Store

Function

Stores a label format in a specified memory area. The stored format can be recalled and printed with the `Format Recall` command.

There are two general types of stored formats: standard and enhanced. The printer stores standard formats as ASCII data only. Enhanced stored formats are stored as fully mapped images in the image buffer, as well as ASCII data in the specified memory area. This improves label throughput if the stored data plots a very complex label.

Explicit Form

`!Sd xx tnnn Identifier`

Parameters

`d` Variable field delimiter.

This can be any printable character except a carriage return or line feed. Within the label format that follows, the data between the delimiter character and the end of the line will not be printed with the rest of the label. Instead, it is sent to the printer's serial port to prompt the user for input when the label is recalled with the `Format Recall` command.

If user input is not desired, the data used to fill the fields delimited by d can be supplied with the `Format Recall` command. The printer fills the fields with the data as it is received.

Placing two variable field delimiters in a row creates a repeating field; i.e., will cause the printer to use the variable data from the previous variable field in the current field. This feature may be useful if you want to print the same data using two different fonts, or want to print the data as a rotated bar code and non-rotated text.

NOTE: Do try to make the first field in a stored format a repeating field (since there is no data to repeat). Do not place any text after the variable field delimiter when creating a repeating field.

When using enhanced format storage, the variable field delimiter also separates the fixed data commands from the variable data commands. Put all commands that define variable fields at the end of the data file. Precede all of these commands with a single line that only contains the variable field delimiter.

xx Numeric identifier for the desired memory storage area.

t Data type. F indicates standard ASCII format files. **E** indicates enhanced format files. If storing an enhanced format, the **E** must be followed by the **nnn** parameter.

nnn Number of dot rows the stored format will plot. Only use this parameter when programming an enhanced stored format; that is, with the E data type.

NOTE: Determine nnn using the number of dot rows actually occupied by the stored object, rather than from the number of dot rows available on the physical label. Memory space reserved by nnn is unavailable for other uses. Specifying too large a value wastes image buffer space.

Storing multiple enhanced formats can quickly use up the image buffer. Enhanced formats will not be stored if the total space occupied by all enhanced stored objects exceeds the total image buffer space.

`identifier` Alphanumeric identifier for the stored data. Must be eight or fewer printable characters with no spaces.

Comments

This command replaces the normal label format header line. Normal header line parameters, like dot time, dot rows, and number of labels, are provided with the `Format Recall` command. The `Format Recall` command cannot have any other commands with it, so almost everything necessary to define the label must accompany the `Format Store` command.

The `RECALL GRAPHIC` command is allowed within stored formats. You can put stored graphics within stored ASCII formats (normal or enhanced) by using `GRAPHIC STORE` to store the graphic in the usual manner, then using `RECALL GRAPHIC` within the stored format.

Use comments sparingly or not at all within stored formats, since comments use one byte of memory space per character and do not affect label printing.

See also

Format Recall

Example 1

The following commands store the format that prints the label in the Format Recall example. Data is still needed for the description, price, and combined item/price. The printer will send prompts for this data to the serial port at print time. This is a standard stored format; notice that commands that define fixed data are freely mixed with commands that define variable data.

```
!S~ 3 F FORM_1
WIDTH 224
JUSTIFY CENTER
ULTRA_FONT A24 (3,2,0) 224 0 ~DESCRIPTION>
STRING 18X23 29 30 SALE PRICE:
JUSTIFY LEFT
ULTRA_FONT A50 (5,2,0) 240 30 ~PRICE>
BARCODE CODE39X 20 150 60 ~ITEM/PRICE>
END
```

Example 2

This file stores the same label using enhanced format storage. Notice that all commands specifying variable data are grouped at the end of the file and separated from the fixed data commands by the delimiter character (the \ character in this case). Do not send prompts to the printer when using enhanced format storage.

```
!S\ 3 E220 EFORM_1
WIDTH 224
JUSTIFY CENTER
STRING 18X23 29 30 SALE PRICE:
\
ULTRA_FONT A24 (3,2,0) 224 0 \
JUSTIFY LEFT
ULTRA_FONT A50 (5,2,0) 240 30 \
BARCODE CODE39X 20 150 60 \
END
```


GRAPHIC STORE

Function

Stores the graphics file following the command in the specified memory area

> **NOTE:** Use this command with a dummy header line, and do not use an END command or any other commands with it. The graphics data to be stored must immediately follow the GRAPHIC STORE command.

Explicit Form

GRAPHIC STORE Type xx Identifier

Parameters

Type	Graphic file type. Allowable types are PCX, BMP, and LOGO (proprietary CSI graphics format).
xx	Numeric identifier for the desired memory storage area.
identifier	Stored object identifier assigned when the object was first stored.

Comments

The printer waits for graphics data after it receives the GRAPHIC STORE command. Incoming data following the GRAPHIC STORE command is stored in the specified memory area. The printer automatically reverts to normal data input processing when it sees the end of the graphics file.

Use the RECALL GRAPHIC command to recall and print the graphic on labels. The printer only prints black-and-white graphics. Also, graphics are printed full-scale, with each image dot corresponding to one printed dot.

See also

RECALL GRAPHIC

Example

The following commands will store following graphics data in nonvolatile RAM as IMAGE_1.

```
! 0 0 0 0
GRAPHIC STORE BMP 3 IMAGE_1
```

RECALL GRAPHIC

Function

Recalls a stored graphic from memory and prints labels as required.

> **NOTE:** Use this command with a dummy header line, and do not use an END command or any other commands with it. The graphics data to be stored must immediately follow the GRAPHIC STORE command.

Explicit Form

RECALL GRAPHIC Identifier x y

Parameters

identifier	Stored object identifier assigned when the object was first stored.
x y	Starting position of the printed graphic; normally its upper-left corner. (The JUSTIFY command can position the graphic right, left, or center of the specified coordinates.)

Comments

None

See also

GRAPHIC STORE

Example

The following label format will print a graphic stored as IMAGE_1 at location 30, 10:

```
! 0 100 500 1
RECALL GRAPHIC IMAGE_1 30 10
END
```

Initialize Storage

Function — Clears all stored objects from the specified memory area in preparation for new data.

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command.

Explicit Form — **!I xx**

Parameters

xx	Numeric identifier for the memory area to be cleared.

Comments — None

Example — The following command will clear nonvolatile RAM of all stored objects:

```
!I 3
```

> **NOTE:** STRING fonts and TEXT fonts are stored objects in most printers that use flash memory (that is, most printers that actually support stored objects). As shipped from the factory, these fonts are stored in memory area 3 (nonvolatile RAM). Initializing memory area 3 will remove STRING fonts and TEXT fonts from memory.

List Stored Objects

Function — Scans all memory areas for stored objects (label formats and graphics), then prints a list of all the objects, their size in bytes, their memory location, and the amount of available memory in each memory area.

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command.

Explicit Form — **!L**

Parameters

!LS	Lists the stored objects and prints them to the serial/USB port.

Comments — None

Example

```
!L
```


DELIMIT

Function — Specifies the delimiter used to isolate variables within command lines.

Explicit Form — **DELIMIT C**

Parameters

C	Delimiter character. This is a single ASCII character, and must have an ASCII value greater than decimal 32, that is, no control characters or spaces are allowed. You must declare the delimiter if you use variables. There is no default delimiter character.

Comments — Define the delimiter character before using any variables in a label format. The delimiter character must precede and follow every variable and its associated parameters.

> **NOTE:** Choose the delimiter character carefully. Avoid using a character that you will need for other purposes within the label format. Especially avoid using the percent sign (%) as a delimiter. It is used within some system variables, making its use as a delimiter inconvenient in many applications.

See also — DEFINE_VAR

Example — The following label format declares the @ sign as the variable delimiter, then uses the system variable TIME to print the current time:

```
! 0 100 590 1
DELIMIT @
TIME GET
TEXT 2 20 The time is @TIME %X@
END
```


DEFINE VARIABLE

Function

Defines a variable for use within printer commands in a label format. When the printer encounters a variable in a command line, it replaces the variable name with entered or stored data. It can also (optionally) send a prompt for data to the user via the serial port.

Explicit Form

DEFINE_VAR location id length type range align*pad* **"prompt" "initial"**

Implicit Form

DR location id length type range align*pad* **"prompt" "initial"**

Parameters

location

Memory location to store the defined variable. The following memory areas are available:

Location	Memory Area
0	Volatile RAM
1	Reserved
2	Expanded Memory
3	Nonvolatile RAM

NOTE: Use the VARIABLE ALLOCATE command to reserve space in memory area 0 (volatile RAM).

id

The variable name. This must be eight or fewer ASCII alphanumeric characters, with the first character an uppercase or lowercase letter (A - Z or a - z)

NOTE: The printer has several predefined variables. You may not use these variable names when defining variables.

length The maximum number of characters that are accepted as variable data. Allowable values are 1 to 32767, but available printer memory may impose a lower practical limit on this parameter. The DEFINE_VAR command also has a maximum line length of 254 characters, which will limit the variable length if it must be initialized.

type Variable type. Available types are:

- **P** Protected. The printer will not prompt the user to change the variable value. The value can only be changed by a Recall Variable command.
- **C** Counter. A protected variable that can be changed by the ADJUST command. Store counter variables in memory areas 2 or 3 only.
- **D** Dynamic. The printer will prompt the user for a value at print time, and will retain the entered value for future use. Store dynamic variables in memory area 0 only.
- **T** Temporary. The printer will prompt the user for a value at print time and erase the value after printing the label format. Store temporary variables in memory area 0 only.

range Input range specifier. Available specifiers are:

A	Only allows alphabetic characters
N	Only allows alphabetic and numeric characters (no punctuation)
X	Allows any character
#	Allows signed or unsigned whole numbers (no decimal point)

You can specify a range for alphabetic or numeric variables by adding minimum and maximum values within double quotes. For example, **#** *"100" "199"* allows numeric values between 100 and 199 inclusive. The range specifier **A** *"BOB" "DUN"* will allow BOG, DUD, or COG, but will not allow JAG. The range specifiers must both have the same number of digits or characters. Range checking is character-by-character, based on each character's ASCII value.

align Specifies the position of the variable data within the specified **length**. Allowable values are:

L	Places the data at the left end of the space specified by **length** parameter, filling the remaining space to the right with the character specified by *pad*.

R	Places the data at the right end of the space specified by **length** parameter, filling the remaining space to the left with the character specified by *pad*.
C	Places the data in the center of the space specified by **length** parameter, filling the remaining space on both sides with the character specified by *pad*.
N	Tells the printer to ignore the **length** parameter so the variable data only occupies the space it actually needs.

pad — Specifies the character that is used to fill any space allocated by the **length** parameter that is not occupied by actual variable data. This is an optional parameter, and immediately follows the **align** parameter with no intervening spaces. If *pad* is omitted, the pad character is the space character (ASCII 20).

"prompt"	ASCII text that the printer sends to the serial port when ready to receive data for the defined variable. Enclose the prompt text with quotation marks ("). If no prompt is desired, enter two quotation marks ("") with no characters between them. To include quotation marks within the prompt, precede the internal quotation mark with a backslash (\). Use two consecutive backslashes (\\) to include a backslash within the prompt.
"initial"	Starting value for the defined variable. Enclose the starting value with quotation marks (") as described for **"prompt"** above.

Comments

Replacing a fixed value in a printer command with a variable tells the printer to plot the label element using data entered or recalled at print time, rather than data written in the label format when it was programmed.

When using a variable name within a label format, you must enclose it with the delimiter character defined by the DELIMIT command

See also

Recall Variable, DELIMIT

Example

The following command defines a dynamic variable called customer, with a maximum length of 20, alphabetic type, no alignment, no initial value:

```
DEFINE_VAR 0 customer 20 A N "Enter customer:"
""
```

Recall Menu

Function — Recalls a stored menu from memory and initiates its execution.

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command. Also, take care that no extraneous control characters follow the command; the printer may interpret them as menu control characters.

Explicit Form — **!R M menuname**

Parameters

menuname — Alphanumeric identifier under which the menu was originally stored. This identifier can be up to eight characters long.

Comments — Called menus remain active until the user manually cancels their action or until the printer processes a MENU EXIT command.

See also — MENU START, MENU EXIT, MENU CONTROL

Example — The following label format will start execution of a menu called MAIN:

```
!R M MAIN
```


Recall Variable

Function — Recalls a stored variable for user input. The printer will send the associated prompt to the serial port and await user input when it encounters this command.

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command.

Explicit Form — **!R V identity**

Parameters

identity — Alphanumeric identifier under which the variable was originally stored.

Comments — Use this command within menus to change the value of protected variables.

> Note: You must define a prompt for the variable in the DEFINE VARIABLE command in order for a prompt to appear when executing the Recall Variable command.

See also — DEFINE VARIABLE, DELIMIT

Example — The following command will prompt the user to enter a value for a variable called **password**:

```
!R V password
```

Chapter

5

Menu Commands

A menu lets the user control the printer at print time through a set of predefined choices. Menus are typically used when the printer is connected to a simple controlling device, such as a keyboard/display unit.

IMPORTANT!
Menu programming is inherently complex, and is only useful if the user must control the printer with a non-programmable device (such as a dumb terminal or keyboard). As a general rule, Cognitive does not recommend programming menus in the printer if there is processing power available in the host.

Menus are stored objects. Familiarize yourself with the proper use of stored objects before attempting to program menus.

Menu Operation

During menu execution, the printer sends text descriptions associated with menu items ("prompts") to the printer serial port and waits for user input. The user responds to the menu by making a selection, which the controller then sends back to the printer by way of the serial port. Choose a menu using one of the following methods:

Scroll to the item and selecting it using keys as defined by the `MENU CONTROL` command.

Enter the number of a menu item. All menu items have a single-digit number associated with them. The printer assigns this number automatically, based upon the menu item location within the menu. Menu items that do not have a visible prompt are still selectable by item number.

The printer executes printer commands contained in the menu definition based on the user's selection. Each menu item can have one or many standard printer commands associated with it; thus, the printer can perform complex tasks in response to a menu selection. They can even call printer commands without any user-selectable menu items,

behaving much like stored label formats. Menus can call other menus, and can also recall and print stored objects or data.

Menu Programming

Menus generally conform to the following structure:

```
! 0 0 0 0
MENU CONTROL cn nx pr sl
MENU START x menuname
MENU ITEM "item1"
MENU ACTION command parameters
MENU ACTION command parameters
MENU EXIT
MENU ITEM "item2"
MENU ACTION command parameters
MENU ITEM "item3"
MENU ACTION command parameters
...
MENU END
END
```

MENU CONTROL is an optional command that defines the four keyboard keys that scroll the menu, select menu items, and exit the menu. If used, it must appear before the MENU START command. MENU START signals the beginning of the menu, and MENU END signals the end of the menu. All commands bounded by MENU START and MENU END define menu prompts and actions.

MENU ACTIONs generally follow MENU ITEMs. If no MENU ITEMs are present, the menu will simply execute the MENU ACTIONs in sequence without input from the operator. The effect is similar to using a stored label format.

MENU EXIT commands will terminate execution of the current menu, at which time the printer will continue executing the remaining commands in the label format that called the menu.

Menus cannot be nested within other menus, but they can call other menus.

Menus are stored objects. They must be stored in memory before they are called by the Recall Menu command. They follow all of the usual rules for stored objects.

Menu Command List

```
MENU ACTION
MENU CONTROL
MENU END
MENU EXIT
MENU ITEM
MENU MESSAGE
MENU START
Recall Menu
```

NOTE: There is no underscore between `MENU` and the sub-command name. For example, `MENU ACTION` is correct; `MENU_ACTION` is incorrect.

Several other commands are especially useful when programming menus. These commands include the following:

```
DELIMIT
DEFINE VARIABLE
VARIABLE ALLOCATE
QUANTITY
Recall Variable
List Stored Objects
```

For further information about these menu commands, refer to Standard Printer Commands.

MENU ACTION

Function

Specifies one or more commands that the printer will execute when the user selects the associated MENU ITEM. Any legitimate printer commands are allowed (including the Recall Menu command). The printer commands and associated parameters embedded within the MENU ACTION command must be bounded by quotation marks.

Explicit Form

MENU ACTION "command parameters

Implicit Form

MU ACTION "command parameters"

Parameters

command Any legitimate printer command

parameters Parameters required by command

Comments

Quotation marks (**"**) must precede and follow the command and its parameters. If you want to include quoted text within the command, precede each quotation mark within the command with a backslash (\). To include a backslash within the command, use two backslashes (\\). Indicate the end of the command line with **\n**. This is the character substitution for line feed. To send a carriage return without line feed, use **\r**.

You can place any number of MENU ACTION commands after one MENU ITEM command. The printer will process all MENU ACTIONs that follow the selected MENU ITEM until it encounters the next MENU ITEM. Thus, the printer can execute complex operations using multiple MENU ACTIONs, but the most common use of the command is to call another menu or recall a stored label format.

If the printer finds a format header line within a MENU ACTION, it will expect all commands associated with that header line, up to and including the END command, to immediately follow within the same MENU ACTION command. You cannot split a label format over multiple MENU ACTION commands.

Menus can contain MENU ACTION commands without any MENU ITEM commands. The printer will execute commands within such menus without operator intervention.

See also MENU ITEM, Recall Menu, Date Storage commands

Example 1 The following line will call a menu named MAIN when the user selects its associated menu item. When the printer finishes MAIN, control returns to the next menu command in the calling menu:

```
MENU ACTION "!R M MAIN \n"
```

Example 2 The following line will recall and print one copy of a stored label format called LBL_ONE when the user selects its associated menu item:

```
MENU ACTION "!R F LBL_ONE 0 100 570 1\n"
```


Example 3

The following label format will store a menu called MENU_ONE. Each MENU ACTION command will print a different label:

```
! 0 0 0 0
MENU START 3 MENU_ONE
MENU ITEM "Print label 1 \r"
MENU ACTION "! 100 90 1\nW 224\n U A24 20 20
Label 1\nE\n"
MENU ITEM "Print label 2 \r"
MENU ACTION "! 100 90 1\nW 224\n U A24 20 20
Label 2\nE\n"
MENU ITEM "Print label 3 \r"
MENU ACTION "! 100 90 1\nW 224\n U A24 20 20
Label 3\nE\n"
MENU END
END
```

MENU CONTROL

Function

Specifies the characters used to exit, "scroll," or select an item from a menu. In most applications, these characters are chosen by pressing the four keys on the external keyboard that correspond to keyboard functions "cancel," next," "previous," and "select."

Explicit Form

MENU CONTROL cn nx pr se

Implicit Form

MU CONTROL cn nx pr se

Parameters

cn The decimal ASCII value of the character used to cancel the current action. The default value for **cn** is 27 (the ESC key).

nx The decimal ASCII value of the character used to scroll to the next menu item. The default value for **nx** is 78 (the N key).

pr The decimal ASCII value of the character used to scroll to the previous menu item. The default value for **pr** is 80 (the P key).

se The decimal ASCII value of the character used to select the current menu item. The default value for **se** is 13 (the ENTER key).

Comments

Menu items will only appear on the display if you specify a prompt string in the `MENU ITEM` command.

The printer stores the control characters specified by the `MENU CONTROL` command in a menu called `_MENUC_`.

See also

`MENU ITEM`

Example

The following command tells the printer to use the "q", period, comma, and "a" keys for the cancel, next, previous, and select functions:

```
MENU CONTROL 113 46 44 97
```

MENU END

Function — Signals the end of the menu definition. The printer will store the menu defined by the commands between MENU START and MENU END under the identifier specified in MENU START.

> **NOTE:** This command does not terminate menu execution. Use MENU EXIT for that.

Explicit Form — **MENU END**

Implicit Form — **MU END**

Parameters — None

Comments — The printer interprets all commands between MENU START and MENU END as part of the menu.

See also — MENU START, MENU ITEM, MENU EXIT, MENU ACTION

Example

```
MENU END
```

MENU EXIT

Function	Signals the printer to terminate menu processing. The printer then processes any remaining commands in the label format that called the menu.
Explicit Form	**MENU EXIT**
Implicit Form	**MU EXIT**
Parameters	None
Comments	The printer only interprets MENU EXIT if the command is placed between the MENU START and MENU END commands.
See also	MENU START, MENU END, Recall Menu
Example	MENU EXIT

MENU ITEM

Function

Marks the beginning of a sequence of commands that will execute when the user selects the item from a programmed printer menu, and (optionally) defines text the printer will display when offering the menu to the user. The printer will send this text to the serial port when processing the stored menu, allowing the user to select the item either by item number or by menu scrolling.

Explicit Form

MENU ITEM "prompt"

Implicit Form

MU ITEM "prompt"

Parameters

"prompt" is ASCII text that the printer will send to the serial port when the printer encounters the MENU ITEM command. Any printable ASCII character is allowed. Begin and end the text with quotation marks ("). If you wish to include quoted text within the prompt, precede each quotation mark within the prompt with a backslash (\). To include a backslash within the prompt, use two backslashes (\\).

If no prompt is desired, enter two sets of quotation marks ("") with no text or spaces between them. The menu item will still exist and may be called by number (see below), but no prompt or space will appear for the item when the printer processes the MENU ITEM command.

Comments

MENU ITEM commands are only allowed between MENU START and MENU END commands (that is, only within menus). Up to ten menu items are allowed in each menu. The printer assigns a number to every menu item, with item 1 being the first item in the menu, item 2 the second item, etc. The tenth item is item 0.

One or more MENU ACTION commands must follow every MENU ITEM command. MENU ACTION commands program the printer to perform specific actions when the user chooses the menu item. The printer will process the MENU ACTIONs that follow the selected MENU ITEM up to the next MENU ITEM. The printer will then wait for further user input.

See also

MENU START, MENU ACTION, MENU END

Example

The following commands define a simple menu called PRT_LBL to select and print one of two stored label formats:

```
! 0 0 0 0
MENU START 3 PRT_LBL
MENU ITEM "print return address label"
MENU ACTION "!R F RTNLBL 0 100 570 1\n"
MENU ITEM "print shipping label"
MENU ACTION "!R F SHPLBL 0 100 570 1\n"
MENU END
END
```


MENU MESSAGE

Function — This causes text to be output to the serial port. It can be used to provide instructions to the user.

Explicit Form — **MENU MESSAGE "...."**

Implicit Form — **MU MESSAGE "...."**

Parameters — None

Comments

See also

Example

```
cpTextData "..."

FUNCID=MENUMESSAGEFUNCID=17
STDBUFFERSIZE
ImpMenuMessage
```


MENU START

Function

Signals the beginning of a menu definition and specifies the menu storage location and identifier.

> **NOTE:** This command does **not** execute the menu; the command only prepares the printer to receive the menu for storage. Use `Recall Menu` to execute stored menus.

Explicit Form

`MENU START x menuname`

Implicit Form

`MU START x menuname`

Parameters

`x`

Storage location. You can store menus in the following memory areas:

`x`	Location
`0`	Volatile RAM
`1`	Reserved
`2`	Expanded Memory
`3`	Nonvolatile RAM

`menuname`

The menu identifier can be up to eight alphanumeric characters. The first character must be an uppercase or lowercase letter (A-Z or a-z).

The menu name `__BOOT__` (the word BOOT preceded and followed by two underscore characters) is reserved for an autostart routine. Use this menu name only if you want the printer to execute the menu automatically on power-up. The printer will always try to execute `__BOOT__` when it is powered on or reset, provided that

the printhead is closed.

> **NOTE:** To circumvent a programmed __BOOT__ menu, reset or apply power to the printer with the printhead open.

The menu name _MENUC_ is reserved for storage of the MENU CONTROL characters. Do not use this name for your own menu.

Comments

The printer interprets all commands between MENU START and MENU END as part of the menu.

See also

Recall Menu, MENU END

Example

The following command marks the beginning of a menu called MAIN, which is stored in nonvolatile RAM (memory area 3):

```
MENU START 3 MAIN
```

Recall Menu

Function — Recalls a stored menu from memory and initiates its execution

Explicit Form — **!R M menuname**

> **NOTE:** This command replaces the normal header line. Do not use any other commands, including the END command, with this command. Also, take care that no extraneous control characters follow the command. The printer may interpret them as menu control characters.

Parameters — **menuname** is the alphanumeric identifier under which the menu was originally stored. This identifier can be up to eight characters long.

Comments — Called menus remain active until the user manually cancels their action or until the printer processes a MENU EXIT command.

See also — MENU START, MENU EXIT, MENU CONTROL

Example — The following label format will start execution of a menu called MAIN:

```
!R M MAIN
```


Chapter

6

Printer Setup (VARIABLE) Commands

VARIABLE commands let you change some of the printer's characteristics. These changes stay in effect until the printer is turned off or until they are changed by another VARIABLE command.

NOTE: Do not confuse VARIABLE commands that control the printer with variable values which are used to represent data.

Variable Command Rules

It is important to follow a few fundamental rules when using the VARIABLE commands:

- Enter all VARIABLE commands in upper case letters.
- Place any VARIABLE commands immediately after the header line in the label format.
- Enter all VARIABLE commands exactly as shown in the command descriptions. VARIABLE may be abbreviated as V, but do not use any other abbreviations unless specifically allowed in the command description.
- As a general rule, avoid using VARIABLE commands in stored label formats. A few VARIABLE commands that control label appearance (for example, VARIABLE DARKNESS) are permissible in stored formats, but there is little advantage to using them there. It is better to use conventional label formats for printer setup.
- Use VARIABLE WRITE and VARIABLE COMM only in non-printing label formats. Some other VARIABLE commands will not work well except in non-printing formats. These cases are noted in the command descriptions.

- If you add **?** at the end of any variable command, the printer will respond at the serial or USB port and return the current setting.

NOTE: All VARIABLE commands, and especially the `VARIABLE WRITE` command, should be used with care since they can change the data in the printer's nonvolatile RAM.

You will probably need to use a few VARIABLE commands as a matter of routine, to set the printer up for various types of print media or print methods. We have prepared some sample label formats to cover these common requirements.

Variable Command List

The printer VARIABLE commands are listed below.

```
VARIABLE ALLOCATE                VARIABLE OFF AFTER
                                 VARIABLES ON/OFF
VARIABLE AUTOCUT                 VARIABLE PITCH
VARIABLE_AUXPOWER                VARIABLE POSITION
VARIABLE BACKLIGHT
VARIABLE BEEPER
VARIABLE BUFFER_TIMED_RESET
VARIABLE COMM                    VARIABLE PRESENTLABEL
VARIABLE CONTRAST
VARIABLE DARKNESS                VARIABLE PRINT_MODE
VARIABLE ENERGY
VARIABLE FEED_TYPE               VARIABLE READ
                                 VARIABLE RECALIBRATE
VARIABLE HIGHSPEED               VARIABLE REPORT_LEVEL
VARIABLE INDEX                   VARIABLE RESET
VARIABLE IRDA
VARIABLE IRDA COMM
VARIABLE IRDA PROTOCOL
VARIABLE INDEX SETTINGS
                                 VARIABLE SLEEP_AFTER
VARIABLE LOWSPEED                VARIABLE SHIFT LEFT
VARIABLE MEDIA_ADJUST            VARIABLE TEXT BUFFER
VARIABLE MODE                    VARIABLE USER_FEEDBACK
VARIABLE NO_MEDIA                VARIABLE WIDTH
VARIABLE NORMAL                  VARIABLE WRITE
```

Several other commands are especially useful when using the VARIABLE commands These commands include the following:

```
PROMPTS
DATASKIP
```


VARIABLE ALLOCATE

Function — Reserves space in the image buffer for stored objects.

Explicit Form — **VARIABLE ALLOCATE nnn.**

Implicit Form — **V ALLOCATE nnn.**

Parameters

nnn	Amount of memory reserved for stored objects, in whole kilobytes. The allowable range is 0 to 128.

Comments — Flash RAM normally holds all stored objects (graphics and stored formats). The printer reserves all available standard RAM for the text buffer and image buffer. This may not be the best use of standard RAM in some applications. VARIABLE ALLOCATE lets the programmer to put stored objects in part of the image buffer.

When using this command, send it to the printer with VARIABLE WRITE in a nonprinting label format. Do not use this command in stored label formats.

NOTE: Changing the memory allocation in the image buffer or text buffer will delete any objects stored in those areas.

Example — The label format below will reserve 4 kilobytes (kb) in the image buffer for object storage:

```
! 0 0 0 0
VARIABLE ALLOCATE 4
VARIABLE WRITE
END
```

VARIABLE AUTOCUT

Function

Enables or disables automatic label cutting in printers so equipped. With automatic label cutting enabled, the printer will cut the label after printing the last dot row. With automatic label cutting disabled, the printer will not cut the label unless there is a HALT command in the label format.

Explicit Form

VARIABLE AUTOCUT status

Implicit Form

V AUTOCUT status

Parameters

status Automatic cutter status. **ON** enables automatic label cutting; **OFF** disables label cutting.

Comments

When enabled, automatic label cutting has the same effect as placing a HALT command in every label format. The printer will cut and pause after printing each label in a batch. Removing the cut label or pressing the FEED button will signal the printer to print the next label in the batch.

When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.

See also

HALT

Example

The format below will enable automatic label cutting:

```
! 0 0 0 0
VARIABLE AUTOCUT ON
VARIABLE WRITE
END
```


VARIABLE AUXPOWER

Function

This command turns is used to control the 5 volt power applied to pin 9 of the serial port connector. This voltage can supply up to 400 milliamps at 5 volts to equipment attached to the serial port connector such as a scanner or keyboard.

Explicit Form

VARIABLE AUXPOWER on/off/?

Implicit Form

V AUXPOWER on/off/?

Parameters

Comments

-

Example

```
cpEnumStack[0] on/off/? (OnOffStat)

FUNCID=VARAUXPOWERID=114
NOBUFFER
ImpAuxPower
```

VARIABLE BACKLIGHT

Function

This command indicates whether the LCD backlight should come on when a button is pressed or the display text changes. If enabled, the backlight only stays on for 3 seconds.

Explicit Form

VARIABLE BACKLIGHT on/off/?

Implicit Form

V BACKLIGHT on/off/?

Parameters

Comments

-

Example

```
cpEnumStack[0] on/off/? (OnOffStat)

FUNCID=VARBACKLIGHTID=166
NOBUFFER
ImpVarBacklight
```


VARIABLE BEEPER

Function

This command sets the volume and duration of the beeper.

Explicit Form

VARIABLE BEEPER on/off/? [volume] [duration]

Implicit Form

V BEEPER on/off/? [volume] [duration]

Parameters

duration	Duration is in 10ths of a second.

Comments

-

Example

```
lLongStackCount 0, 1 or 2
lEnumStackCount 1

lpLongStack[0] volume (BeeperVolumeRange)
lpLongStack[1] duration (BeeperDurationRange)
cpEnumStack[0] on/off/? (OnOffStat)

FUNCID=VARBEEPERID=164
NOBUFFER
ImpVarBeeper
```

VARIABLE BUFFER_TIMED_RESET

Function — Enables or disables the memory reset timer.

Explicit Form — **VARIABLE BUFFER_TIMED_RESET duration**

Parameters

duration — Timer duration in 0.1 second intervals. The minimum value is 2 (0.2 seconds), maximum is 59990 (about one hour and forty minutes). The default value varies by printer type:

Code Courier – The default value is 5 (0.5 seconds). You can also specify the value as **ON** or **OFF**. **ON** will set the timer to 8 seconds, and **OFF** will set it to 512 seconds.

Barcode Blaster – The default value is 6000 (ten minutes).

Comments

The printer expects incoming data to arrive in a timely manner. It will clear memory if it receives the beginning of a line of data and fails to receive the accompanying end-of-line termination (carriage return or line feed) within the time set by BUFFER_TIMED_RESET. Code Courier will also go to sleep at that time. This keeps the printer from waiting indefinitely for incoming data that was lost due to a communications error. The timer value may need adjustment if the printer must communicate with a system that has unusual data transmission timing.

When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.

Example

```
! 0 0 0 0
VARIABLE BUFFER_TIMED_RESET OFF
VARIABLE WRITE
END
```


VARIABLE COMM

IMPORTANT!
Do not experiment with this command! Improper use can cause a loss of serial communication with the printer.

Function — Sets new serial port parameters.

Explicit Form

```
VARIABLE COMM speed,parity,length,stop,
R
```

Implicit Form

```
V COMM speed,parity,length,stop, R
```

NOTE: Notice that commas are used as delimiters between parameters, and there are no spaces. If you are uncertain of the printer's current serial port parameters, try 9600,N,8,2.

Parameters

speed	Baud rate. Acceptable values are printer dependent, but are among the following: 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, and 57600. Consult your printer *User's Guide* for details.
parity	O (Odd), E (Even), or N (None)
length	Data word length. Can be 7 or 8
stop	Number of stop bits. Can be 1 or 2
ROBUST or R	Enables robust XON/XOFF handshaking (see comments).
N	Turns software handshaking off.

NOTE: Not all personal computers support all baud rates. Make certain that your host system will support your `VARIABLE COMM` parameters. Setting the printer for a baud rate that your host will not support will cause a break in communication that may be difficult to remedy.

Cognitive printers will not support all possible parity,

word length, and stop bit combinations. The acceptable combinations are: N,8,1 or N,8,2 or O,7,1or O,8,1 or E,7,1 or E,8,1.

Comments

When enabled, robust XON/XOFF handshaking causes the printer to send an XON character once per second while it is ready to receive data. The printer will send an XOFF character for every character that overflows the printer's input buffer. Enabling robust XON/XOFF handshaking also enables double-buffered input, which allows simultaneous label processing and data reception. However, the double-buffered input reduces the image buffer size by 4 KB, thus slightly reducing the maximum label length. Also, you cannot print PDF417 bar codes with double buffering enabled.

This feature is normally disabled. A lowercase "r" character will print on the printer confidence label if robust XON/XOFF is enabled.

For printers having both serial and parallel ports, connect the host computer to the printer's parallel port when using the `VARIABLE COMM` command. You can use the printer's serial port if the printer or host does not have a parallel port, but the host will lose communication with the printer when the serial port parameters change. Set the new parameters in the host after you change the printer parameters.

Do not send any other data to the printer when changing serial port parameters. Do not use this command in stored label formats.

Example

```
! 0 0 0 0
VARIABLE COMM 9600,N,8,2
VARIABLE WRITE
END
```

VARIABLE CONTRAST

Function

This command sets the contrast level on the LCD display.

Explicit Form

VARIABLE CONTRAST level/?

Implicit Form

V CONTRAST level/?

Parameters

Comments

-

Example

```
lLongStackCount 1 or 0 (query form)
lpLongStack[0] level (ContrastLevelRange)

FUNCID=VARCONTRASTID=165
NOBUFFER
ImpVarBeeper
```

VARIABLE DARKNESS

Function

This command changes the printhead heat, thereby adjusting the darkness at which labels are printed. Always use the lightest acceptable VARIABLE DARKNESS setting to extend the life of the printhead.

Explicit Form

VARIABLE DARKNESS n

Implicit Form

V D n

Parameters

n Darkness value. The allowable range varies by printer:

Barcode Blaster: -205 to +50

Solus, Blaster Advantage, and Code Courier: -200 to +813

Lower numbers decrease print darkness, higher numbers increase it.

Blaster Advantage TT printers store separate darkness values for DT and TT mode, selecting the appropriate darkness value depending on the print mode as set by the VARIABLE PRINT_MODE command.

Comments

Darkness is set at the factory for optimum printing with typical Cognitive print media. It should not need adjustment under normal circumstances. You may need to adjust darkness if you change print speed or use unusual media.

When using thermal transfer printing, you may observe the print darkness decreasing as you increase the VARIABLE DARKNESS setting. This is caused by excessive heat melting the ribbon dye back onto the ribbon instead of depositing it on the paper, and indicates that the darkness setting is far too high. You may need to experiment with VARIABLE DARKNESS for optimum results with

some thermal transfer media.

Example

```
VARIABLE DARKNESS -25
```

NOTE: Always print labels at the lightest acceptable setting, to extend the life of the printhead.

VARIABLE ENERGY

Function

The printer maintains a fixed energy density of 200 mJoules independent of print speed. This command adjusts the energy density (in units of mJoules). It is intended to be used to compensate for media that requires more or less energy to create images of the proper optical density. VARIABLE DARKNESS may be used by the customer, but this command is intended to be an easier to use, more precise optical density control command for the C-series printer.

Explicit Form

VARIABLE ENERGY energylevel/?

Implicit Form

V energylevel/?

Parameters

Comments

-

Example

```
lLongStackCount 0 (query form) or 1

lpLongStack[0] energylevel (EnergyRange)

FUNCID=VARENERGYID=170
NOBUFFER
ImpUserEnergy
```

VARIABLE FEED_TYPE

Function — Selects black bar or gap indexing.

Explicit Form — **VARIABLE FEED_TYPE mode**

Implicit Form — **V F mode**

Parameters

mode	Index mode – **GAP** selects gap indexing and **BAR** selects black bar indexing.

Comments

When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.

The FEED_TYPE setting has no effect unless automatic label indexing is enabled. Use the INDEX command to enable automatic label indexing if desired, but do not enable automatic label indexing when using continuous form media.

The factory setup for some thermal transfer printers restricts the allowable indexing method when a ribbon is installed. Consult the applicable printer *User's Guide* for more information.

Example — The following label format enables gap indexing:

```
! 0 0 0 0
VARIABLE FEED_TYPE GAP
VARIABLE WRITE
END
```

VARIABLE HIGHSPEED

Function	Changes the print speed to its highest available setting. The maximum print speed varies among printer models; consult your printer's *User's Guide* for more information.
Explicit Form	**VARIABLE HIGHSPEED**
Implicit Form	**V HIGHSPEED**
Parameters	None
Comments	Code Courier automatically adjusts its speed in response to ambient temperature and battery condition. Refer to the Code Courier *User's Guide* for details. Barcode Blaster automatically disables high speed printing whenever it encounters the following commands or command parameters in a label format: `Header line X` parameter `Header line` dot time values other than 100 `MULTIPLE` command `OFFSET` command `WIDTH` command On some printers, the starting print location may move vertically slightly if the print speed changes. Usually the change in location is negligible, but you can correct the starting location with the `VARIABLE POSITION` command if desired.
See also	`VARIABLE LOWSPEED`, `VARIABLE NORMAL`

Example

```
VARIABLE HIGHSPEED
```

NOTE: Print speed can affect bar code scanning reliability, especially when printing rotated bar codes. For best results, use print speeds of 2 IPS or less when printing rotated bar codes.

VARIABLE INDEX

Function — This command turns indexing on or off.

Explicit Form — **VARIABLE INDEX on/off/?**

Implicit Form — **V INDEX on/off/?**

Parameters

Comments

-

Example

```
cpEnumStack[0] on/off/? (OnOffStat)

FUNCID=INDEXONOFFID=48
NOBUFFER
ImpVarIndexOnOff
```


VARIABLE INDEX SETTING

Function

Adjusts the index detector for optimum gap detection through a wide range of ribbon and label densities. The command is primarily for use with thermal transfer printers in gap indexing mode. There is no need to use this command when using black bar indexing. The C Series printers use the CALIBRATE parameter, but not any of the other parameters.

Explicit Form

VARIABLE INDEX SETTING mode

Implicit Form

V INDEX SETTING nnn

NOTE: Observe that this command consists of three words, separated by spaces.

Parameters

mode Desired indexing mode. Allowable values are **0**, **1**, **2**, **3**, and **CALIBRATE**, as follows:

- **0** Automatic mode: Sets the printer index sensitivity to mode 1 or 2 values as the print mode changes in response to the VARIABLE PRINT_MODE command.
- **1** Sets the printer to use direct thermal indexing values. This setting is calibrated at the factory for best gap indexing performance with no ribbon installed.
- **2** Sets the printer to use thermal transfer indexing values; factory calibrated for best performance with wax ribbon installed.
- **3** Same as mode **2**, except factory calibrated for best

indexing performance with a resin-based ribbon installed. The sensitivity of this mode is adjustable with the **CALIBRATE** mode.

CALIBRATE Runs an index calibration, and then replaces the index data currently stored for mode 3 with the new data. The C Series printer uses only this parameter, not any of the other parameters.

> **NOTE:** Confirm that the correct print media is loaded before starting the calibration.

Comments

When using the VARIABLE INDEX SETTING modes 0, 1, or 2, send the command to the printer with VARIABLE WRITE in a non-printing label format. The use of VARIABLE WRITE is optional when using the VARIABLE INDEX SETTING CALIBRATE command. VARIABLE INDEX SETTING CALIBRATE always writes its data to nonvolatile RAM, with or without the use of VARIABLE WRITE.

Do not use this command in stored label formats.

The CALIBRATE mode runs an automatic calibration routine that measures the opacity of the currently loaded ribbon, labels, and backing, then uses these values to set the index detector sensitivity. This takes about 15 seconds in most printers. The printer's READY light flashes during calibration. The ready light will glow green if the calibration is successful and red if the calibration is unsuccessful. Following a successful calibration, the printer automatically writes the new index calibration to nonvolatile RAM.

Example 1 The following label format will set the automatic indexing mode:

```
! 0 0 0 0
VARIABLE INDEX SETTING 0
VARIABLE WRITE
END
```

Example 2 The following label format will calibrate the index detector:

```
! 0 0 0 0
VARIABLE INDEX SETTING CALIBRATE
END
```

VARIABLE IRDA

Function

This command turns the IrDa communications on or off.

Explicit Form

VARIABLE IRDA on/off/?

Implicit Form

V IRDA on/off/?

Parameters

Comments

-

Example

```
cpEnumStack[0] on/off/? (OnOffStat)

FUNCID=IRDAENABLEID=103
NOBUFFER
dummyFunc
```

VARIABLE IRDA COMM

Function — This command chooses the IrDa baud rate.

Explicit Form — **VARIABLE IRDA COMM baud**

Implicit Form — **V IRDA COMM baud**

Parameters

Comments

-

Example

```
cpEnumStack[0] baud (BaudRange)

FUNCID=IRDACOMMSETTINGID=104
NOBUFFER
dummyFunc
```

VARIABLE IRDA PROTOCOL

Function

This command chooses between the two available IrDa communications protocols: Lite or Denso.

Explicit Form

VARIABLE IRDA PROTOCOL protocol

Implicit Form

V IRDA PROTOCOL protocol

Parameters

Comments

-

Example

```
cpEnumStack[0] protocol (IrDAProtocolEnumSet)

FUNCID=IRDAPROTOCOLID=102
NOBUFFER
dummyFunc
```

VARIABLE LOWSPEED

Function	Changes the printer speed to its lowest allowable value.
Explicit Form	**VARIABLE LOWSPEED**
Implicit Form	**V LOWSPEED**
Parameters	None
Comments	Code Courier automatically adjusts its speed in response to ambient temperature and battery condition. Refer to the printer's User's Guide for details.
See also	VARIABLE HIGHSPEED, VARIABLE NORMAL
Example	The following command will set the printer speed to its lowest value:

```
VARIABLE LOWSPEED
```

NOTE: Do not use this command when programming the thermal transfer Code Courier (model PT422003).

VARIABLE MEDIA_ADJUST

Function

Adjusts print contrast on object leading edges for optimum print quality. Adjustment of this parameter is not normally required, but may improve rotated bar code reliability in some circumstances. Printers that support this command employ an advanced "dot history" algorithm, which tracks the activity of each printhead dot from one dot row to the next. If a given dot was off prior to being commanded on, the printer will apply a little extra energy to the dot to force it to come up to full temperature faster. This can significantly improve the reliability of rotated bar codes. This setting is independent of the VARIABLE DARKNESS setting, and only affects the first dot row of each object (or for rotated bar codes, the leading edge of each bar in the code).

NOTE: This feature is only active when printing at 2 IPS with 200 DPI print pitch.

Explicit Form

VARIABLE MEDIA_ADJUST n

Implicit Form

V MEDIA_ADJUST n

Parameters

n Media adjust value. The allowable range is **-3000** to **+3000**. Fast media – media that prints well with low VARIABLE DARKNESS values – will generally print better with high MEDIA_ADJUST values. Slow media will generally need lower settings.

Optimum values for MEDIA_ADJUST may be found by experimentation. Refer to comments below.

Thermal transfer printers store separate values for MEDIA_ADJUST in DT and TT mode, selecting the appropriate value depending on the current print mode.

Comments

Optimum MEDIA_ADJUST values depend on the

currently loaded media (for TT printers, both paper and ribbon). Cognitive suggests the following procedure for experimentally finding the optimum MEDIA_ADJUST value for your media.

1. Prepare the following label format:

```
! 0 100 190 1

PITCH 200

VARIABLE DARKNESS -70

VARIABLE MEDIA_ADJUST 3000

BARCODER CODABAR(2:4)- 20 10 200 0123456

BARCODER CODABAR(2:4)- 220 10 200 3456789

END
```

   The MEDIA_ADJUST 3000 command in the above label format will effectively turn off MEDIA_ADJUST. The darkness value should be whatever you think will print a readable label on your printer.

2. Send the label format to the printer.

3. Examine the printed bar codes carefully using a magnifying glass or jeweler's loupe. Ideally, the wide bars should show some breakup between dot rows and the narrow bars should be only one dot row wide. This setting is probably lighter than you would normally want.

4. Adjust the darkness value experimentally until you achieve the results described in step 3.

5. Reduce the MEDIA_ADJUST value to 2500. Do not change the DARKNESS value.

6. Print the label format again, and examine the bar codes. You may begin to see some darkening of the narrow bars, although no

change may appear until you have changed the MEDIA_ADJUST value significantly; results vary with media sensitivity. Ideally, the narrow bars should be two dots wide. The leading edge of the wide bars should also darken until they are solid all the way across.

7. Vary the MEDIA_ADJUST value in large increments (about 500) and print the test label until the printed bar code approaches the appearance described in step 6. Change MEDIA_ADJUST in smaller increments as you begin to see improvement in the print results.

After achieving satisfactory visual results, you may want to scan the bar codes with a bar code verifier. No further adjustment is required if the bar codes scan satisfactorily. The experimentally derived value will work with all media that has the same temperature response. You may send the new MEDIA_ADJUST value to the printer with VARIABLE WRITE as shown in the example below, or simply note the value for future reference.

NOTE: This method should provide optimum rotated bar code reliability, but may not produce visually pleasing labels. Labels that "look good" are often too dark for good bar code performance. You may want to increase the print darkness for attractive text and graphics.

Do not change MEDIA_ADJUST if you adjust the print darkness. The optimum value for MEDIA_ADJUST is independent of print darkness, and depends solely on the media sensitivity.

See also VARIABLE DARKNESS

Example

```
! 0 0 0 0
VARIABLE MEDIA_ADJUST 1000
VARIABLE WRITE
END
```

VARIABLE MODE

Function

Selects Blazer Emulation Mode in printers that support variable dot time, or sets the default print pitch in all other printers except the Code Courier and the C Series printers which do not support the command.

Explicit Form

VARIABLE MODE n scale

Implicit Form

V MODE n scale

Parameters

n Mode type. Acceptable values are **0**, **1**, and **2**.

In printers that do not support variable dot time, VARIABLE MODE 0 sets the default print pitch to its highest value. VARIABLE MODE 1 and VARIABLE MODE 2 set the default pitch to its lowest value. In printers that support variable dot time, the three modes control Blazer Emulation. Printers operating in mode 0 emulate Enhanced Barcode Blazers with linear dot time enabled. Printers operating in mode 1 emulate typical non-enhanced Barcode Blazers. Printers operating in mode 2 also emulate non-enhanced Blazers, except this mode supports an additional parameter (scale).

scale Scaling factor for mode 2 emulation. This is a required parameter when using mode 2 but is ignored when using modes 0 or 1. Valid values are 1 to 255, and set the scaled print length as a percentage of the original print length.

NOTE: Blazer emulation is normally disabled. Only use Blazer emulation if you are replacing a non-enhanced Barcode Blazer or a Blazer that has unusual dot time or speed characteristics.

Comments

When using this command, send it to the printer with `VARIABLE WRITE` in a non-printing label format. Do not use this command in stored label formats.

See also

`VARIABLE PITCH`

Example

```
! 0 0 0 0
VARIABLE MODE 1
VARIABLE WRITE
END
```

VARIABLE NO_MEDIA

Function

Specifies how long the printer will run without detecting a label before assuming that it is out of media. This only applies to gap indexing mode

Explicit Form

VARIABLE NO_MEDIA nn

Implicit Form

V NO_MEDIA nn

Parameters

nn Number of label inches that the printer will try to feed before assuming it is out of media. Allowable values are **0** to **12**, with a default of **1**.

A value of **0** disables this feature.

Comments

When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.

This feature works by measuring label gap length. If the printer detects a gap that is longer than nn, it assumes that there are no more labels and stops feeding. You will need to change this setting if your label media has gaps greater than 1".

The printer always assumes it is empty if it does not detect a label after feeding 12" of media, regardless of the VARIABLE NO_MEDIA setting. (In black bar mode, the printer always stops running after feeding 12" of media without detecting an index mark.)

Example

```
! 0 0 0 0
VARIABLE NO_MEDIA 3
VARIABLE WRITE
END
```


VARIABLE NORMAL

Function	Changes the printer speed to a speed approximately halfway between the LOWSPEED and HIGHSPEED settings, or in printers with only two allowable speeds, sets the printer to the lowest speed. Your printer's *User's Guide* lists available print speeds.
Explicit Form	**VARIABLE NORMAL**
Implicit Form	**V NORMAL**
Parameters	None
Comments	Code Courier automatically adjusts its speed in response to ambient temperature and battery condition. Refer to the *Code Courier User's Guide* for details.
See also	VARIABLE LOWSPEED, VARIABLE HIGHSPEED
Example	The following command will set the printer speed to its "normal" value:

```
VARIABLE NORMAL
```


VARIABLE OFF AFTER

Function

Explicit Form **VARIABLE OFF_AFTER time/?**

Implicit Form **V OFF_AFTER time/?**

Parameters

Comments

-

Example

```
lLongStackCount 0 (query form) or 1
lpLongStack[0] time (SleepRange)

FUNCID=OFFAFTERID=71
NOBUFFER
ImpOff (not functional)
```


VARIABLES ON/OFF

Function — Enables and disables access to certain protected VARIABLE values.

Explicit Form — **VARIABLES status**

Parameters

status — Protection status. **ON** allows access to the protected VARIABLE settings. **OFF** prohibits access to the protected VARIABLE settings.

The default is **ON**.

Comments — Do not use this command in stored label formats.

This command acts as a "write-protect" feature for certain VARIABLE commands, preventing the user from inadvertently disabling or enabling them. The only protected VARIABLE command at present is VARIABLE MODE. Future firmware revisions may extend this protection to other setup parameters.

Example

```
! 0 0 0 0
VARIABLES OFF
VARIABLE WRITE
END
```


VARIABLE PITCH

Function — Selects the default print pitch.

Explicit Form — **VARIABLE PITCH n**

Implicit Form — **V PITCH n**

Parameters

n — Default print pitch. Allowable values are as used in the PITCH command.

Comments — When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.

See also — PITCH

Example

```
! 0 0 0 0
VARIABLE PITCH 100
VARIABLE WRITE
END
```

VARIABLE POSITION

Function

Moves the first printed dot row on the label up or down with respect to its last position.

Explicit Form

VARIABLE POSITION distance

Implicit Form

V POSITION distance

Parameters

distance Distance between the original starting location and the new location, in thousandths of an inch. Positive numbers move the first dot row down; negative numbers move the first dot row up.

NOTE: The first dot row must always be at least 3/16" from the top edge of the label when using black bar indexing. Trying to print too near to the top edge by using the VARIABLE POSITION command causes label skipping.

Comments

Use this command with `VARIABLE WRITE` in a non-printing label format. After sending the file to the printer, press the FEED button once to set the new index position.

Do not use this command in stored label formats.

The position set with this command only applies to the current indexing method (black bar or gap).

Example

```
! 0 0 0 0
VARIABLE POSITION -10
VARIABLE WRITE
END
```


VARIABLE PRESENTLABEL

Function

Controls the dispensing of labels for application. `VARIABLE PRESENTLABEL` ensures a second set of labels is not printed before the operator is ready, and enables the user to change the distance fed forward and backward after printing.

Explicit Form

`VARIABLE PRESENTLABEL Active` *`Advance_Distance Retract_Distance Time_Delay`*

`VARIABLE PRESENTLABEL Action`

Implicit Form

`V PRESENTLABEL Action`

Parameters

`Active`	Valid values are **`ON`** and **`OFF`**. When no parameters are specified, the printer uses the last stored settings to set the *`Advance_Distance`* or *`Retract_Distance`*. When **`OFF`**, parameters are ignored.
`Advance_Distance`	Distance the label is advanced in hundredths of an inch. Refer to Table 4, Variable Present Label Limitations for the maximum acceptable values for each printer.
`Retract_Distance`	Distance the label is retracted in hundredths of an inch. Refer to Table 4, Variable Present Label Limitations for the maximum acceptable values for each printer.
`Time_Delay`	Time in seconds before the printer retracts and is ready to print. If not specified, the printer retracts before printing the next job. Set *`Time_Delay`* to 0 to remove the delay.

Comments

When printing, the printer will first retract the media as specified by *Retract_Distance*. When the label is printed, the printer advances the media as specified by *Advance_Distance*. When printing a batch of labels, only the first label is retracted and the last label advanced. When using the HALT command, each label is presented using the *Advance* and *Retract* values.

Exceeding the recommended limitations may damage the printer.

- The *RETRACT* distance must be equal to or less than the *ADVANCE* distance or the media may come off the drive roller and out of paper detection may not report correctly.
- Thermal transfer printers are incapable of rewinding the ribbon. Exceeding the recommended limitations may result in poor print quality.
- The reverse distance for Solus and Del Sol thermal transfer printers is mechanically limited. Exceeding the recommended limitations may result in poor print quality.
- All direct thermal printers have recommended limited travel distances, as explained in the following table. Exceeding the recommended limitations may result in poor print quality and jamming of the print mechanism.

Example

The following example sets the *Advance_Distance* to 1.06 inches, the *Retract_Distance* to 1.00 inches and the *Time_Delay* to 10 seconds. All of the parameters must be present for the others to work. If only the *Advance_Distance* parameter is present, the *Retract_Distance* is set equal.

Advance_Distance and *Retract_Distance* must be specified to enable the *Time_Delay* parameter.

```
! 0 0 0 0
VARIABLE PRESENTLABEL ON 106 100 10
VARIABLE WRITE
END
```

Table 4. Variable Present Label Limitations

Mode	Barcode Blaster		Blaster Advantage		Solus/Del Sol	
TYPE	DT	TT	DT	TT	DT	TT
Forward distance (inches)	N/A	N/A	2	2	2	2
Reverse distance (inches)	N/A	N/A	2	0	2	.75

VARIABLE PRINT_MODE

Function	Sets the printer up for direct thermal or thermal transfer printing. The command adjusts print darkness and gap indexing parameters and enables or disables the ribbon-out detector as needed for the selected print method.		
Explicit Form	**VARIABLE PRINT_MODE method**		
Implicit Form	**V PRINT_MODE method**		
Parameters	**method**	**DT**	Direct thermal printing
		TT	Thermal transfer printing
		AUTO	Printer checks for the presence of a ribbon when it is turned on or when the printhead is lowered. If a ribbon is detected, the printer sets itself for **TT** mode. Otherwise, the printer will automatically select **DT** mode.
Comments	Send this command to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.		
Example	! 0 0 0 0 VARIABLE PRINT_MODE TT VARIABLE WRITE END		

VARIABLE READ

Function	Reads the last saved variable values in permanent storage and uses them as the current values. The effect is the same as turning the printer off and then on again.
Explicit Form	**VARIABLE READ**
Implicit Form	**V READ**
Parameters	None
Comments	Do not use this command in stored label formats.
See also	VARIABLE WRITE

VARIABLE RECALIBRATE

Function	Turns automatic index calibration on or off. If enabled, automatic index calibration causes the printer to enter a recalibrate sequence when an indexing error is detected.
Explicit Form	**VARIABLE RECALIBRATE on/off/?**
Implicit Form	**V RECALIBRATE on/off/?**
Parameters	
Comments	•

Example	`cpEnumStack[0] on/off/? (OnOffStat)`
	
	`FUNCID=VARRECALID=141`
	`NOBUFFER`
	`ImpVarRecalibrate`

VARIABLE REPORT_LEVEL

Function	Sets the manner in which the printer reports recoverable errors.
Explicit Form	**VARIABLE REPORT_LEVEL n**
Implicit Form	**V REPORT_LEVEL n**

Parameters

n	**0**	No error reporting. This is the default error level in most printers.
	1	Error messages are sent to the serial port.
	2	Error messages are sent to the serial port and printed on the label.

Comments

Send this command to the printer with VARIABLE WRITE in a non-printing label format.

Do not use this command in stored label formats.

Example

The label format below will tell the printer to send an error message to the printer serial port and print an error label when it encounters a recoverable error:

```
! 0 0 0 0
VARIABLE REPORT_LEVEL 2
VARIABLE WRITE
END
```

VARIABLE RESET

Function	Returns user-accessible VARIABLE parameters to known values. Affected parameters and their default values vary among printer models. The command writes the known values to nonvolatile RAM.
Explicit Form	**VARIABLE RESET**
Implicit Form	**V RESET**
Parameters	None
Comments	Do not use this command in stored label formats.

NOTE: VARIABLES RESET immediately writes the new values to nonvolatile RAM without using VARIABLE WRITE.

Example

```
! 0 0 0 0
VARIABLES RESET
END
```


VARIABLE SLEEP_AFTER

Function — Sets the amount of time a portable printer will stay awake after completing a print job.

Explicit Form — **VARIABLE SLEEP_AFTER duration**

Implicit Form — **V SLEEP_AFTER duration**

Parameters

duration — Length of time the printer will stay awake, in seconds. The allowable range is **0** to **255**, with a default of one second.

Setting duration to **0** will keep the printer awake continuously.

Comments — When using this command, send it to the printer with VARIABLE WRITE in a nonprinting label format. Do not use this command in stored label formats.

> **NOTE:** Cognitive does not recommend setting a long SLEEP_AFTER duration unless the printer is powered from an external source. Keeping the printer awake for long periods will substantially reduce battery charge life.

See also — VARIABLE ON_TIME

Example — The following label format tells the printer to stay awake for 30 seconds after each print job:

```
! 0 0 0 0
VARIABLE SLEEP_AFTER 30
VARIABLE WRITE
END
```


VARIABLE SHIFT LEFT

Function	Shifts the printed image of all labels a specified distance to the left from the normal 0, 0 origin.
Explicit Form	**VARIABLE SHIFT LEFT n**
Implicit Form	**V SHIFT LEFT n**
Parameters	**n** The distance the image is shifted to the left, in hundredths of an inch.
Comments	When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats
Example	The following command will shift the label image 1.28" to the left of its normal position: VARIABLE SHIFT LEFT 128

VARIABLE TEXT BUFFER

Function

This command sets the size of the text buffer and the text overflow buffer.

Explicit Form

VARIABLE TXTBFR txt *ovf*

Implicit Form

V TXTBFR txt *ovf*

Parameters

txt Size of the text buffer, in bytes. The allowable range is **4096** to **65535**, with a default of **4096**.

ovf Optional; specifies the size of the overflow buffer, in bytes. The allowable range is **0** to (**txt - 1024**).

NOTE: Turn the printer OFF and back ON again just before you send this command to the printer. Some printers may ignore the TXTBFR command if printer power is not cycled first.

Comments

When using this command, send it to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats.

The text buffer holds incoming ASCII data before it is processed. The overflow buffer is part of the text buffer. It begins filling after the rest of the text buffer is full, at which time the printer will signal the host to stop sending data.

Data sent via the serial port cannot overflow the text buffer, providing hardware or software flow control is enabled. Data sent via the parallel port will overflow the text buffer if the size of the ASCII label format is larger than (txt-ovf). Overflowing the text buffer in Code Courier or Barcode Blaster will cause the printer to lock up. Blaster Advantage and Solus will print an error label if the text buffer overflows.

Increasing the text buffer size will decrease the size

of the image buffer.
Total memory size = text buffer + image buffer

NOTE: Changing the text or overflow buffer sizes will delete any objects stored in the image buffer.

See also VARIABLE ALLOCATE

Example The following label format sets the text buffer size to 4 kilobytes:

```
! 0 0 0 0
VARIABLE TXTBFR 4096
VARIABLE WRITE
END
```

VARIABLE USER_FEEDBACK

Function — Enables or disables the transmission of certain status messages to the host computer. With this feature enabled, the printer regularly sends some status messages via the serial port. The printer will not send messages if the host computer is busy, (as indicated by the condition of its serial port CTS line.

Explicit Form — **VARIABLE USER_FEEDBACK status**

Implicit Form — **V USER_FEEDBACK status**

Parameters

status — Condition of the user feedback function. **ON** enables this feature; **OFF** disables it.

Comments — Send this command to the printer with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats

See also — QUERY STATUS

Example — The following label format will enable user feedback:

```
! 0 0 0 0
VARIABLE USER_FEEDBACK ON
VARIABLE WRITE
END
```

VARIABLE WIDTH

Function	Sets the default print width.
Explicit Form	**VARIABLE WIDTH n**
Implicit Form	**V WIDTH n**
Parameters	**n** Print width, in hundredths of an inch.
Comments	Use this command with VARIABLE WRITE in a non-printing label format. Do not use this command in stored label formats. This command is functionally identical to the WIDTH command, except that it can set the new print width in nonvolatile RAM. Used with VARIABLE WRITE, VARIABLE WIDTH can eliminate the need to include WIDTH commands in label formats designed for narrow printers. It is still good programming practice, though, to include a WIDTH command in every new label format. This helps assure compatibility with other printers that may not support VARIABLE WIDTH.
See also	WIDTH
Example	The following command sets the print width to 2.24": `VARIABLE WIDTH 224`

VARIABLE WRITE

Function — Writes the current variable values to nonvolatile storage. Values in effect when VARIABLE WRITE is executed are retained in memory while the printer power is off.

Explicit Form — **VARIABLE WRITE**

Implicit Form — **V WRITE**

Parameters — None

Comments — You do not need to use this command every time you want to permanently change a VARIABLE value. The printer retains VARIABLE values as long as its power is on, and a single VARIABLE WRITE will permanently store the entire set of VARIABLE values. Excessive use of VARIABLE WRITE increases label processing time and may also increase the risk of nonvolatile RAM failure in some early printers.

NOTE: Follow these rules with respect to VARIABLE WRITE:

- Use the VARIABLE WRITE command only in dummy (non-printing) label formats.
- Do not use this command in stored label formats.
- Only use the VARIABLE WRITE command with other VARIABLE commands. Mixing normal commands with VARIABLE WRITE can corrupt the contents of the nonvolatile RAM in some printers.

Example

The example below shows how to set a VARIABLE value in one label format with VARIABLE WRITE. But you must remember that this label format is also writing all other current VARIABLE values to nonvolatile RAM at the same time.

```
! 0 0 0 0
VARIABLE HIGHSPEED
VARIABLE WRITE
END
```


PROMPTS

Function

Explicit Form **PROMPTS ON/OFF/?**

Implicit Form

Parameters

Comments

-

Example

```
cpEnumStack[0] ON,OFF,? (OnOffStat)

FUNCID=PROMPTSFUNCID=9
NOBUFFER
ImpPrompts
```


DATASKIP

Function

Explicit Form **DATASKIP count**

DATASKIP UNTIL char [repeat]

Implicit Form

Parameters

Comments

-

Example

```
lpLongStack[0] = count
lpLongStack[0] = repeat
cpCharStack[0] = char

FUNCID=DATASKIPID=131
NOBUFFER
dummyFunc
```


Chapter

7

Using VARIABLE Commands

Printer configuration must be handled through VARIABLE commands. The sample label formats in this section are provided for your convenience, to help you set the printer up for some common configurations. To use these label formats, copy the format to Windows Notepad or a similar ASCII text editor, edit the label format as required, and then print the label format.

NOTE: If you are printing the files directly from Notepad or another Windows-based program, be aware that most Windows printer drivers will not work with Cognitive printers.

The "generic ASCII" printer driver supplied with Windows will pass the label format to the printer without interference. Please install and use this driver when sending these sample formats to the printer.

Do not use the Cognitive Windows driver when sending these formats to the printer from Windows. The Cognitive Windows driver converts Windows documents to ASCII label formats; thus, your label formats will print as they appear in the text editor rather than directly control the printer as intended.

Most of these sample formats use the `VARIABLE WRITE` command. Familiarize yourself with this command before using the samples.

Blazer Compatibility

As shipped, Barcode Blaster, Solus, and Blaster Advantage printers are not compatible with older Barcode Blazers, or with enhanced Blazers operating in nonlinear dot time mode. High speed Blasters can closely emulate Barcode Blazers. Solus and Advantage printers are more limited in their Blazer emulation.

As a rule, only use Blazer emulation mode if you are replacing an older Barcode Blazer and must avoid modifying any label formats or software. Do not use Blazer emulation mode if you can print successfully without it.

Blazer emulation mode is controlled by the `VARIABLE MODE` command. `VARIABLES ON/OFF` controls access to `VARIABLE MODE`. Please refer to these command descriptions before using the label formats.

The following label format sets up any Barcode Blaster to emulate an enhanced Barcode Blazer operating in linear dot time mode:

```
! 0 0 0 0
VARIABLE MODE 1
VARIABLE WRITE
END
```

The following label format will set up a high speed Blaster to emulate a non-enhanced Blazer or an enhanced Blazer operating in nonlinear dot time mode. Adjust the second parameter in the `VARIABLE MODE` command to compensate for the speed of the Blazer that you are replacing. The value shown (70) will vertically scale all labels to 70% of their normal height.

```
! 0 0 0 0
VARIABLE MODE 2 70
VARIABLE WRITE
END
```


The following label format disables Blazer emulation mode and returns the printer to normal operation:

```
! 0 0 0 0
VARIABLE MODE 0
VARIABLE WRITE
END
```

There are many aspects to printer compatibility. You may want to request a copy of Technical Bulletin 10-00-0131, which covers Blazer/Blaster compatibility in detail. Contact our Technical Support Organization for more information.

Setting DT or TT Print Method

Thermal transfer Barcode Blasters can print in direct thermal or thermal transfer mode, but you must set the printer for the correct media type. After loading the appropriate media, set the printer for the correct media type using the `VARIABLE PRINT_MODE` command.

Use one of the following label formats to set the print method:

For thermal transfer printing:

```
! 0 0 0 0
VARIABLE PRINT_MODE TT
VARIABLE WRITE
END
```

For direct thermal printing:

```
! 0 0 0 0
VARIABLE PRINT_MODE DT
VARIABLE WRITE
END
```


Setting Bar or Gap Index Type

All currently manufactured Cognitive printers support black bar and gap indexing, and are shipped from the factory set for gap indexing. The VARIABLE FEED_TYPE command controls the index method. Use one of the following label formats to change the index type.

For black bar indexing:

```
! 0 0 0 0
VARIABLE FEED_TYPE BAR
VARIABLE WRITE
END
```

For gap indexing:

```
! 0 0 0 0
VARIABLE FEED_TYPE GAP
VARIABLE WRITE
END
```

Optimizing Index Detection

NOTE: This information is not applicable to Code Courier.

When using gap indexing in thermal transfer mode, the index detector must "see" through the ribbon and detect the difference in opacity between the label and the label backing. Variations in print media may necessitate index detector adjustment in some cases. The VARIABLE INDEX SETTING command controls the index detector sensitivity.

Direct Thermal Printing

The following label format will set the index detector for optimum sensitivity when using direct thermal printing (that is, with no ribbon installed):

```
! 0 0 0 0
VARIABLE INDEX SETTING 1
VARIABLE WRITE
END
```


Thermal Transfer Printing with Standard Wax Ribbon

The following label format will set the index detector for thermal transfer printing using Cognitive's standard wax ribbon:

```
! 0 0 0 0
VARIABLE INDEX SETTING 2
VARIABLE WRITE
END
```

Thermal Transfer Printing with Resin Ribbon

The following label format will set the index detector for thermal transfer printing with typical resin-based ribbon installed:

```
! 0 0 0 0
VARIABLE INDEX SETTING 3
VARIABLE WRITE
END
```

Automatic Detect

The following label format causes the printer to automatically set the index detector to mode 1 or 2 in response to the current print method (DT or TT) as set by the `VARIABLE PRINT_MODE` command. This is the default setting:

```
! 0 0 0 0
VARIABLE INDEX SETTING 0
VARIABLE WRITE
END
```


Calibrate the Index

The following label format runs an index detector calibration routine, and then stores the new index detector sensitivity setting in nonvolatile RAM under index sensitivity 3. After calibration, the routine will set the printer in index mode 3:

```
! 0 0 0 0
VARIABLE INDEX SETTING CALIBRATE
END
```

NOTE: You do not need to use VARIABLE WRITE when using the CALIBRATE mode. CALIBRATE automatically writes its data to nonvolatile RAM.

NOTE: The C Series printers use only the CALIBRATE parameter and not any of the other parameters.

Setting Print Width

You can set the print width in any label format using the WIDTH command, but if you plan to consistently use narrow print media, for example, when using an optional wristband tray, you may want to change the default print width. The VARIABLE WIDTH command lets you do this.

Use the following format to change the default print width. Replace the 224 following the VARIABLE WIDTH command with the desired print width, measured in hundredths of an inch:

```
! 0 0 0 0
VARIABLE WIDTH 224
VARIABLE WRITE
END
```


Chapter

8

RFID Commands

Specific RFID commands have been added to the CPL language to support the RFID functionality of the Advantage RFID Thermal Printer.

Programming Overview

Most Cognitive printers use the same command language, which has become an industry standard. RFID commands are broken into three types:

- RFID Standard Commands – Standard commands that are inserted into a label format
- RFID Variable Commands – Variables used with other commands and inserted into a label format

  The format for creating a printer variable is:
  `<Delimiter>RF_VAR<Delimiter>`

  `<Delimiter>` is defined according to Cognitive's CPL command language.

NOTE: In this document, the dollar sign ($) character is used as the delimiter character.

- RFID Setup/Debug Commands – Commands used with a serial interface to the printer and sent individually for setup or debug information

Programming Rules

Use blank spaces exactly as shown in the command descriptions, examples, and syntax. Blank spaces are the delimiters between parameters. Omitting a necessary space may result in incorrect programming or a failure to recognize commands.

In CPL-RFID programming, the RFID specific directives **are** case-sensitive and **must** be fully spelled-out.

Certain CPL-RFID commands operate outside of the standard label formatting. The commands that start with the `!RFID` command verb need not be placed between a header line and an `END` command. For example, the `!RFID CONFIRM` command may be stored in a label format as long as it precedes the header line.

RFID Command Name Structure

RFID commands described in this chapter will use the following conventions:

RFID Command Name

Function	Purpose of the command
Explicit Form	Proper sequence for using the command and its parameters
Parameters	Variables or conditions that may be required or used with the command
Command Type	Category of the RFID command

RFID Command Structure Example

The following listing is an example of RFID command usage.

```
!RFID CONFIRM ON
! 0 100 1200 1
DELIMIT $
RF VAR_CLEAR
WT 0 "COGNITIVE SOLUTIONS RFID xxxxxx"
WT 16 "PATIENT ID:xxxxxx"
RF HOST "RFID TAG WRITTEN"
RF ID_GET
RT 0 10 "A" 11
RT 16 31 "A" 21
RF HOST "$RF_IDNUM$"
RF HOST "$RF 11$"
RF HOST "$RF 21$"
END
```


RFID Commands

Use the following commands to program RFID features of the Advantage RDIF printers.

Standard Commands	Variable Definitions	Setup/Debug Commands
RF ID_GET	RF_TYPE	!RFID ?
RF HOST	RF_IDNUM	!RFID CONFIRM
RF VAR_CLEAR	RF_BLKSZ	!RFID HOST
RT	RF LOCATION	!RFID LEDFLSH
WT		!RFID LEDTIME
WTLOCK		!RFID MARK
		!RFID RDAFTWT
		!RFID RETRY
		!RFID SSONCMD
		!RFID TAGTYPE
		!RFID TIMEOUT
		!RFID TXAFTER
		!RFID VOID

RF ID_GET

Function — This command is defined as "RFID Function", ID GET. This command retrieves the current RFID tag's unique identification number and returns it to the host.

Explicit Form — **RF ID_GET**

Parameters — None

Response — This command will automatically transmit the detected 'Tag_ID's numeric value to the Host Machine via the printer's serial port.

Command Type — RFID Standard Command

Example — To Printer:

```
! 0 0 0 0
DELIMIT $
RF ID_GET
RF HOST "Here the Variables:"
RF HOST "$RF_TYPE$"
RF HOST "$RF_IDNUM$"
RF HOST "$RF_BLKSZ$"
END
```

From Printer:

```
TAG_ID: E0:07:00:00:01:F3:06:10
Here the Variables:
[ISO15693]
[E0:07:00:00:01:F3:06:10]
[4]
```

RF HOST

Function — This command instructs the Printer to transmit the specified ASCII string to the Host Machine using the serial port. When used in conjunction with the printer "Delimit" command in a label format, certain variable values can also be returned to the host.

Explicit Form — **RF HOST "ASCII-string-to-send-to-host"**

Parameters — The data placed inside the " " can be either a variable such as RF TYPE or other ASCII data.

Response — The Static or Derived Variable valued string is transmitted to the Host Machine via the printer's serial port.

Command Type — RFID Standard Command

Example — To Printer:

```
! 0 0 0 0
DELIMIT $
RF ID_GET
RF HOST "Here the Variables:"
RF HOST "$RF_TYPE$"
RF HOST "$RF_IDNUM$"
RF HOST "$RF_BLKSZ$"
END
```

From Printer:

```
TAG_ID: E0:07:00:00:01:F3:06:10
Here the Variables:
[ISO15693]
[E0:07:00:00:01:F3:06:10]
[4]
```


RF VAR_CLEAR

Function	This command instructs the Printer to clear and reset all of the internal RFID Read-Tag Data-Handler Variables. After executing this command, no 'RF nn' Variables are defined
Explicit Form	**RF VAR_CLEAR**
Parameters	None
Response	None
Command Type	RFID Standard Command
Example	To Printer:

```
! 0 0 0 0
DELIMIT $
RF VAR_CLEAR
RT 0 3 "A" 33
RF HOST "$RF 33$"
END
```

From Printer:

```
123-1234-123
```

NOTE: By using this command in the example above the result sent to the Host Machine is guaranteed to be that from the 'RT …33' command within the label and not from a previous 'RT …. 33' processed earlier.

RT

Function	Read Tag. This command retrieves RFID-tag data from the tag currently positioned over RFID Reader/Writer H/W.
Explicit Form	**RT ss ee "fmt" vv**
Parameters	**ss** Starting block to begin reading octets (bytes) **ee** Ending block. Stop on this block after reading the contents. **"fmt"** Format of the data being read. Use **A** for ASCII. **vv** Storage index number used for subsequent retrieval action (0-99)
Response	No specific response
Command Type	RFID Standard Command
Example	To Printer:

```
! 0 0 0 0
DELIMIT $
RF VAR_CLEAR
RT 0 3 "A" 33
RF HOST "$RF 33$"
END
```

From Printer:

```
123-1234-123
```


WT

Function	Write Tag. This command stores the quoted data to the RFID-Tag currently positioned over RFID Reader/Writer H/W. The data begins storage at the **ss** Tag-block and extends to and zero pads any unused bytes within the ending block.
Explicit Form	**WT ss "data"**
Parameters	**ss** Starting block to begin reading octets (bytes) **"data"** Collection of data octets to be written to the RFID tag. The size of **"data"** must be in the range of 1-255 octets.
Response	No specific response
Command Type	RFID Standard Command
Example	To Printer:

```
! 0 100 800 0
DELIMIT $
WT 0 "123-1234-123"
WT 4 "John Q. Public"
WT 10 "Cardiac Care Unit"
RT 0 3 "A" 33
RF HOST "$RF 33$"
END
```

From Printer:

```
123-1234-123
```

NOTE: In this initial Adv-LX RFID Printer, the Skyetek-M1 Reader/Writer Module limits individual Read or Write transfers to/from the RFID-Tags to 64-bytes maximum (63 characters terminated in a null character). CPL command lines are naturally limited to 256-bytes. Therefore, 4 separate 64-byte WT commands must be executed to fill a 256-byte RFID-Tag,

WTLOCK

Function

Write and Lock Tag. The command permanently writes data to a tag. As with the `WT` command, the user is responsible for maintaining the 63 byte requirement. Refer to the note in the Example section.

Approximately 15 seconds, with no retries, is required to write lock a full blank tag.

> **NOTE:** This command will overwrite any non-locked portion of a tag. Attempting to overwrite a locked portion of the tag will result in a failure.

Explicit Form

`WTLOCK ss "data"`

Parameters

`ss` Starting block to begin reading octets (bytes)

`"data"` Collection of data octets to be written to the RFID tag. The size of "data" must be in the range of 1-255 octets.

> **EXCEPTION:** **`data`**="**`<null>`**" locks the specified starting block (**`nn`**).

Command Type

RFID Standard Command

Example

To Printer:

```
! 0 100 800 0
DELIMIT $
WTLOCK 0 "123-1234-123"
WT 4 "John Q. Public"
WT 10 "Medical Information"
RT 0 3 "A" 33
RF HOST "$RF 33$"
END
```

From Printer:

```
123-1234-123
```

NOTE: Individual Read or Write transfers to/from the RFID-Tags are limited to 64 bytes maximum (63 characters terminated in a null character). CPL command lines are naturally limited to 256 bytes. Therefore, 4 separate 64-byte WT commands must be executed to fill a 256-byte RFID-Tag,

RF_TYPE

Function	This is an RFID reserved and internal variable contains the last RFID-Tag's Type. This variable is often used in conjunction with the RF HOST command.
Explicit Form	**RF_TYPE**
Parameters	None
Response	The printer's parser will replace any Static or Derived Variables with valued string associated with variable and then attempt to execute the CPL or CPL-RFID command
Command Type	RFID Standard Command
See also	RF HOST
Example	To Printer:

```
! 0 0 0 0
DELIMIT $
RF ID_GET
RF HOST "Here the Variables:"
RF HOST "$RF_TYPE$"
RF HOST "$RF_IDNUM$"
RF HOST "$RF_BLKSZ$"
END
```

From Printer:

```
TAG_ID: E0:07:00:00:01:F3:06:10
Here the Variables:
[ISO15693]
[E0:07:00:00:01:F3:06:10]
[4]
```


RF_IDNUM

Function	This command is defined as "Reference Find" ID Number. This command returns the unique tag identification number and is often used in conjunction with the RF HOST command.
Explicit Form	**RF_IDNUM**
Parameters	None
Response	The Printer's parser will replace any Static or Derived Variables with valued string associated with variable and then attempt to execute the CPL or CPL-RFID command.
Command Type	RFID Standard Command
See also	RF HOST
Example	To Printer:

```
! 0 0 0 0
DELIMIT $
RF ID_GET
RF HOST "Here the Variables:"
RF HOST "$RF_TYPE$"
RF HOST "$RF_IDNUM$"
RF HOST "$RF_BLKSZ$"
END
```

From Printer:

```
TAG_ID: E0:07:00:00:01:F3:06:10
Here the Variables:
[ISO15693]
[E0:07:00:00:01:F3:06:10]
[4]
```

RF_BLKSZ

Function — This command is defined as "Reference Find", Block Size. The command returns the block size for a specific tag type. This variable is often used in conjunction with the RF HOST command to return the tag block size to the host.

Explicit Form — **RF_BLKSZ**

Parameters — None

Response — The printer's parser will replace any Static or Derived Variables with valued string associated with variable and then attempt to execute the CPL or CPL-RFID command.

Command Type — RFID Variable Command

See also — RF HOST

Example — To Printer:

```
! 0 0 0 0
DELIMIT $
RF ID_GET
RF HOST "Here the Variables:"
RF HOST "$RF_TYPE$"
RF HOST "$RF_IDNUM$"
RF HOST "$RF_BLKSZ$"
END
```

From Printer:

```
TAG_ID: E0:07:00:00:01:F3:06:10
Here the Variables:
[ISO15693]
[E0:07:00:00:01:F3:06:10]
[4]
```


RF LOCATION

Function	This command is defined as "Reference Find", Variable at Location #. The command returns the value that was stored in a printer variable with the **RT** command where **nn** is an argument to be specified.	
Explicit Form	**$RF nn$**	
Parameters	**nn**	Range of 0 through 99. A maximum of 32 locations may be in use at any one time. Each location can store a maximum of 63 characters.
Response	The printer's parser will replace any Static or Derived Variables with valued string associated with variable and then attempt to execute the CPL or CPL-RFID command.	
Command Type	RFID Variable Command	
Example	To Printer:	

```
! 0 0 0 0
DELIMIT $
RF VAR_CLEAR
RT 0 3 "A" 33
RF HOST "$RF 33$"
END
```

From Printer:

```
123-1234-123
```

!RFID ?

Function — This command queries the printer for a summary of the existing printer settings for RFID functionality.

Explicit Form — `!RFID ?`

Parameters — None

Response — See example below.

Command Type — RFID Setup/Debug Command

Example — From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
  Mark/OverRide State: OFF
  VOID Stamp Message:  <NoStampMsg>
  LED Flash Control:   ON
  LED Flash Duration:  250 MSecs
  SelecTag before Cmd: ON
  TxPowerRF after Cmd: ON
  ReadTag after Write: ON
  Confirm Commands:    OFF
  Retry Command:       2 Times
  Base Cmd Timeout:    10 MSecs
  Select Tag Timeout:  70 MSecs
  Read Tag Timeout:    16 MSecs
  Write Tag Timeout:   32 MSecs
  Lock Tag Timeout:    26 MSecs
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

CPL-RFID Configuration-Setup Commands may precede a standard CPL label format.

!RFID CONFIRM

Function	Controls the transmission of a 'Success' or 'Failure' indication at the very end of any CPL-RFID command's execution.
Explicit Form	**!RFID CONFIRM on/off**
Parameters	**ON** — When the setting is **ON**, the printer will return `RFID:SUCCESS` or `RFID:FAILURE` for every command issued to the printer. **OFF** — When set to **OFF**, no messages are sent to the host.
Response	In the case of transitioning to the `CONFIRM ON` state, the Printer will respond by transmitting a command, `Success`, to the Host Machine. Conversely, in the case of transitioning to the `CONFIRM OFF` state, the Printer will have no specific response resulting from the execution of this command.
Command Type	RFID Setup/Debug Command

Example	To Printer:
	`!RFID CONFIRM ON`
	From Printer:
	`[RFID:SUCCESS]`

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID HOST

Function	This command instructs the Printer to transmit the specified ASCII string to the Host Machine using the serial port. When used in conjunction with the printer "Delimit" command in a label format, certain variable values can also be returned to the host.
Explicit Form	**RF HOST "ASCII-string-to-send-to-host"**
Parameters	The data placed inside the " " must be ASCII data. Data length must be between 0 and 240 characters.
Response	The static string is transmitted to the Host Machine by way of the printer's serial port.
Command Type	RFID Standard Command
Example	To Printer:

```
!RFID HOST "Setting RFID Power-Up Defaults"
!RFID CONFIRM OFF
```

From Printer:

```
Setting RFID Power-Up Defaults
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result in being completely and unabashedly ignored without indication.

Additionally, only static valued strings will print with this command. Delimited variable substitution is an intra-label-format function only. For example, variables such as "RF_IDNUM" may not be used.

!RFID LEDFLSH

Function	Controls the transmission of a 'Success' or 'Failure' indication to the LED display during and at the very end of any CPL-RFID command's execution.
Explicit Form	**!RFID LEDFLSH ON/OFF/ACCUM**
Parameters	**ON** Flashes LED (Green for Success) or (Red for Failure) after any CPL-RFID command completion
	OFF Does NOT flash any LED after CPL-RFID command completions. The LED normally remains OFF during a label-format execution until the printer is ready for the next label or command where LED is set Green
	ACCUM Does NOT flash any LED until after the entire label- format has completed execution. If all CPL- RFID commands completed successfully, the LED is flashed GREEN and OFF three times. If any CPL-RFID command failed, the LED is flashed RED and OFF three times.
Response	No specific response
Command Type	RFID Setup/Debug Command
Example	To Printer:

```
!RFID LEDFLSH OFF
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID LEDTIME

Function — Regulates the interval of LED illumination and LED OFF time used in generation of an LED Flash on 'Success' or 'Failure'.

Explicit Form — **!RFID LEDTIME nn**

Parameters — **nn** Determines the LED illumination interval. Range is 0 to 5000.

Response — No specific response

Command Type — RFID Setup/Debug Command

Example — To Printer:

```
!RFID LEDTIME 100
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
  Mark/OverRide State: OFF
  VOID Stamp Message:  <NoStampMsg>
  LED Flash Control:   ON
  LED Flash Duration:  250 MSecs
  SelecTag before Cmd: ON
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID MARK

Function	This command sets whether or not to print a defined mark on a label that fails to write expected data to an RFID tag.
Explicit Form	**!RFID MARK ON/OFF**
Parameters	**ON** When the setting is **ON**, the printer will mark a label that fails a RT, WT, or WTLOCK command.
Response	No specific response
Command Type	RFID Setup/Debug Command
Example	To Printer: !RFID MARK OFF

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID RDAFTWT

Function — This command initiates an integrity test following a WT command. Data is read and undergoes a byte-by-byte comparison with the initial data. The comparison occurs before the WT command is returned as successful or failed.

Explicit Form — **!RFID RDAFTWT ON/OFF**

Parameters

ON	Byte-by-byte comparison with initial data is performed.
OFF	No comparison is performed.

Response — No specific response

Command Type — RFID Setup/Debug Command

Example — To Printer:

```
!RFID RDAFTWT OFF
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID RETRY

Function — This command sets the number of retries that the printer will perform on a RT, WT, or WTLOCK command. To enter the retry loop, the printer must fail a specific command after reading the tag identification and type.

Explicit Form — **!RFID RETRY nn**

Parameters — **nn** Number of retries allowed. A maximum of 50 retries is permitted.

Response — No specific response

Command Type — RFID Setup/Debug Command

Example — To Printer:

```
!RFID RETRY 1
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
      |     |     |
  Confirm Commands:    OFF
  Retry Command:       1 Times
  Base Cmd Timeout:    10 MSecs
  Select Tag Timeout:  70 MSecs
  Read Tag Timeout:    16 MSecs
  Write Tag Timeout:   32 MSecs
  Lock Tag Timeout:    26 MSecs
```

!RFID SSONCMD

Function — This command controls the automatic execution of a Select-Tag command prior to the Host Command to RT, WT, or WTLOCK an RFID tag.

Explicit Form — **!RFID SSONCMD ON/OFF**

Parameters

ON — Causes automatic Select-Tag command executions before any RT, WT or WTLOCK command.

OFF — Select-Tag command occurs on the first RT, WT, or WTLOCK command of a label format and does not reoccur prior to the END command.

Response — No specific response

Command Type — RFID Setup/Debug Command

Example — To Printer:

```
!RFID SSONCMD OFF
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
      |     |     |
  LED Flash Duration:  250 MSecs
  SelecTag before Cmd: ON
  TxPowerRF after Cmd: ON
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID TAGTYPE

Function	This command verifies a tag type. Enter the tag type and verify the change with the `!RFID ?` command.
Explicit Form	**`!RFID TAGTYPE ISO/TI/PHILPS`**
Parameters	**`ISO`** Sets the industry standard ISO-15693 tag type **`TI`** Sets Texas-Instrument's 'Tag-it HF' tag type. **`PHILPS`** Sets Philips 'I-Code1 (SL1)' tag type.
Response	No specific response
Command Type	RFID Setup/Debug Command

Example

To Printer:

```
!RFID TAGTYPE ISO
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
  Mark/OverRide State: OFF
  VOID Stamp Message:  <NoStampMsg>
  LED Flash Control:   ON
      |     |     |
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID TIMEOUT

Function — This command sets the time delay, in milliseconds, to wait before considering a command a failure.

> **NOTE:** The parameters are part of a calculation and do not translate into exact execution time differences.

Explicit Form — `!RFID TIMEOUT bb,ss,rr,ww,ll`

Parameters

`bb`	Base Time Out – Specifies the time delay in milliseconds. The range of this parameter is 0 through 5000.
`ss`	Base Time Out – Specifies the time delay in milliseconds. The range of this parameter is 0 through 5000.
`rr`	Read Time Out – Specifies the time delay in milliseconds. The range of this parameter is 0 through 5000.
`ww`	Write Time Out – Specifies the time delay in milliseconds. The range of this parameter is 0 through 5000.
`ll`	Lock Time Out – Specifies the time delay in milliseconds. The range of this parameter is 0 through 5000.

Command Type — RFID Setup/Debug Command

Example

To Printer:

```
!RFID 20,,,,50
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
      |     |     |
Base Cmd Timeout:    20 Msecs
Select Tag Timeout:  70 Msecs
Read Tag Timeout:    16 MSecs
Write Tag Timeout:   32 MSecs
Lock Tag Timeout:    50 Msecs
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID TXAFTER

Function — This command controls the state of the hardware's RF carrier transmission after any Host Command to read, write or write and lock an RFID-Tag

Explicit Form — **!RFID TXAFTER ON/OFF**

Parameters

ON — Causes hardware to keep RF carrier transmission **ON** after CPL-RFID Tag-Interface command completion.

OFF — Causes hardware to turn RF carrier transmission **OFF** after CPL-RFID Tag-Interface command completion

Response — No specific response

Command Type — RFID Setup/Debug Command

Example — To Printer:

```
!RFID TXAFTER OFF
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
      |     |     |
  LED Flash Duration:  250 MSecs
  SelecTag before Cmd: ON
  TxPowerRF after Cmd: OFF
      |     |     |
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

!RFID VOID

Function	This command instructs the printer to use this specified ASCII string to stamp or print on failing RFID-Tags if and only if `!RFID MARK ON` is selected.
Explicit Form	**`!RFID VOID "ASCII-String-to-Stamp-Bad-Tags"`**
Parameters	**`"ASCII-String-to-Stamp-Bad-Tags"`** — Text string to stamp or print on failed tags. String must be 0 to 22 characters in length.
Command Type	RFID Setup/Debug Command
Example	To Printer:

```
!RFID VOID "<<<BAD RFID TAG>>>"
!RFID MARK ON
!RFID ?
```

From Printer:

```
Setup/Config Parameters:
  Assigned Tag Type:   ISO15693
  Mark/OverRide State: ON
  VOID Stamp Message:  <<<BAD RFID TAG>>>
  LED Flash Control:   ON
  LED Flash Duration:  250 MSecs
  SelecTag before Cmd: ON
      |     |     |
```

NOTE: All CPL-RFID Configuration-Setup Commands are processed outside the context of a standard CPL Label-Format, that is, CPL beginning with a header-line '! 0 100 nnn 1' and ending with 'END'. Attempts to use CPL-RFID Configuration-Setup Commands within a Label-Format result are ignored without indication.

Chapter

9

Ethernet Printer Information

Ethernet printers are full-featured bar code label and tag printers designed to interface directly with the Ethernet network. The printer works with any TCP/IP system. Additionally, it has a Centronics parallel interface for connection to a standalone computer or terminal. Many models also have a serial port or USB port.

Note: A special cable is necessary for the C Series parallel and serial ports.

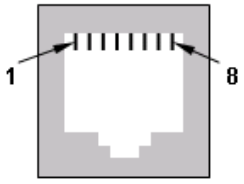
Ethernet Interface

Ethernet Link Indicator

A green LED on the printer rear panel illuminates when there is a proper Ethernet connection to the hub.

Ethernet Connector

The printer is physically attached to the network by Ethernet cabling, using a 10Base-T (twisted pair) connection. The Ethernet connector is a type RJ45 on the printer rear panel. Its pinout is shown below.



Pin #	Description
1	TXD +
2	TXD –
3	RXD +
6	RXD –

FIG 1 – Ethernet Connector Wiring

Physical Address

The physical address (MAC address) of each printer is assigned at the factory, and cannot be changed. Each printer's physical address is indicated on a label affixed to the bottom of the printer.

Network Protocols

The printer will work with any system having TCP/IP support. It will not work with Netware IPX, Microsoft NetBEUI protocol, Appletalk, LAN Manager, or Microsoft Windows Network.

Network Applications

Cognitive Ethernet equipped printers utilize TCP/IP for their communications protocol. The printer acts as a remote host, providing the following application level interfaces:

LPD

The printer acts as an LPD (Line Printer Daemon) to accept print jobs, and will accept one connection at a time for incoming data. A second connection is available for status checks. This is the recommended method for sending print jobs to the printer.

You must use TCP port 515 to connect to the printer using LPR.

TFTP

A TFTP (Trivial File Transfer Protocol) daemon implemented on top of the UDP (User Datagram Protocol) provides a fast way to upload new code and objects to the printer. You can use TFTP in conjunction with bootp/DHCP to automatically update the printer firmware or stored objects.

Connect to the printer using UDP port 69 for TFTP operations.

RTEL

An RTEL (Reverse Telnet) daemon is implemented on top of TCP. This is a user definable TCP port, allowing a direct socket connection to the TCP port without data processing. Connection via RTEL is effectively the same as sending data directly to the printer's serial or parallel port.

The default RTEL port is 9100.

TELNET

A Telnet daemon is implemented on top of TCP, and can be used to monitor the printer. The printer will not accept print jobs using the Telnet port.

Use TCP port 23 for Telnet connection to the printer. the port supports the following commands:

Telnet commands

Command	Function
Config	Set printer options (password is required; default is PASS)
Help	Displays available commands
Label	Prints a test label
List	List stored objects
Status	Display printer status
Reset	Reset the printer
QUIT	End Telnet session

BOOTP

Bootp (Boot protocol) is provided to enable dynamic IP address assignment. Bootp requests are broadcast via UDP port 67. Port 68 will listen for a response. When Bootp is enabled it will cause a 5 second delay at turn-on. The printer supports the following Bootptab variables; all other variables are ignored.

Bootptab variables

Variable	Function	Notes
`ip`	IP address specifier	Required
`ha`	Printer hardware address	Required
`sm`	Subnet mask	Optional
`gw`	Gateway address	Optional
`bf`	Boot file	Optional
`ht`	Hardware type	Required - must be `ether`
`to`	Time offset	Optional

DHCP

Dynamic Host Configuration Protocol (DHCP) provides a more flexible dynamic IP address assignment than BOOTP. DHCP requests are broadcast via UDP port 67, and responses listened for on UDP port 68. When DHCP is enabled it will cause a slight delay at turn-on (configurable via the "VARIABLES ETHERNET DHCP_OFFERS" command) as the printer gets offers of IP addresses and decides which to use. The printer will request the following DHCP options:

OPTION	Name	Notes
1	Subnet Mask	required
3	Router	required
67	Boot file name	optional

Printer Configuration

The printer supports several print methods. Select the print method appropriate for your application.

In most cases, LPD is the recommended method. The printer appears as a remote host with a remote print queue when using this method.

An alternate method is via a direct socket connection using RTEL in the printer. Using this method, all data sent is dumped directly into the printer's text buffer. This approach may be appropriate when developing an application in C or another high level language that can make direct socket calls.

Configuration Options

You must configure the printer for your network environment before using it. Your network administrator should be involved in the process.

If your network supports the DHCP protocol, you may enable DHCP, then cycle power on the printer with the Ethernet cable plugged in and the printer will automatically setup by the DHCP server on the network. If DHCP is disabled, you must select and set the printers' IP address, Subnet Mask and Gateway IP address. You may also set the default Server address if FTP or TFTP transfers will be made to the printer.

Manual Configuration

To send configuration data to the printer manually:

Connect the printer to a PC or terminal via a USB cable, or use the optional cables to connect to a RS-232 or Centronics parallel port.

Send a configuration file containing the appropriate VARIABLE commands to the printer.

You may disconnect the USB, serial, or parallel port and connect the printer to your network after sending the configuration data to the printer. A sample configuration file follows:

```
! 0 0 0 0
V ETHERNET IP 130.10.50.105
V ETHERNET NETMASK 255.255.0.0
V ETHERNET GATEWAY 130.10.250.1
V WRITE
V ETHERNET RESET
END
```

The new configuration settings will not take effect until you reset the printer. In the above example, the VARIABLE ETHERNET RESET command resets the printer. Turning the printer off and on will also reset the printer and enable the new settings.

Operation

Printer operation and use is as described in the user's guide, except for the Ethernet Link Indicator described on page 227 and the printer self test.

Self Test

To print a printer selftest label, press and hold in the FEED button while turning the printer on. The printer should print a label showing the NVRAM settings, including the Ethernet configuration and physical address (MAC address) as in the following format:

Parameter	**Data Format**
MAC Address	xx:xx:xx:xx:xx:xx (hexadecimal)
IP Address	ddd.ddd.ddd.ddd (decimal)

The label will show “Ethernet not Communicating” to indicate that the printer is not operational over the network. The settings printed may change after a DHCP initialization allows the printer to start communicating over the network. Changing the settings manually via SNMP or by downloading a format containing “VARIABLE

ETHERNET" commands will change the settings printed, but the printer will not use these new settings until it has been power-cycled.

Note: Turn the printer off and back on again to clear Hex Dump mode and resume normal operation.

Variable Commands

Several VARIABLE commands support configuration of the Ethernet printer. Most of these commands execute simple on-off functions, and accept ON or OFF as their associated parameters. Follow these rules when using the VARIABLE commands:

Do not use these commands in label formats that print labels.

Enter all commands as shown. You may abbreviate VARIABLE as V, but do not use any other abbreviations.

You must reset the printer for the commands to take effect. The VARIABLE ETHERNET RESET command allows you to easily reset the printer from a remote location via the Ethernet bus.

Ethernet Variable Commands

Use the following variable commands to program Ethernet features of Ethernet printers.

VARIABLE ETHERNET BOOTP

VARIABLE ETHERNET DHCP

VARIABLE ETHERNET DHCP_CRIT

VARIABLE ETHERNET DHCP_OFFERS

VARIABLE ETHERNET FIRMWARE

VARIABLE ETHERNET GATEWAY

VARIABLE ETHERNET JOBSOKINERROR

VARIABLE ETHERNET LPD

VARIABLE ETHERNET SERVER

VARIABLE ETHERNET TELNET

VARIABLE ETHERNET IP ADDRESS

VARIABLE ETHERNET RESET

VARIABLE ETHERNET RESET COMMUNITY

VARIABLE ETHERNET RTEL

VARIABLE ETHERNET RTEL PORT

V_ETHERNET_RTEL_TIMEOUT

VARIABLE ETHERNET TEXT BUFFER

VARIABLE ETHERNET NETMASK

VARIABLE ETHERNET BOOTP

Function	Starts up the printer by reading configuration information from the server.
Explicit Form	**VARIABLE ETHERNET BOOTP status**
Implicit Form	**V ETHERNET BOOTP status**
Parameters	**status** = Bootp enabled or disabled; ON or OFF. The default is ON.
Example	`VARIABLE ETHERNET BOOTP ON`

Note: The Advantage LX and Del Sol models uses this command to control its DHCP protocol. All other printer models that have this command when BOOTP is enabled (ON) will use the BOOTP protocol to configure the printer's Ethernet settings after a power-cycle.

VARIABLE ETHERNET DHCP

Function	Turns DHCP on or off.
Explicit Form	**VARIABLE ETHERNET DHCP On/Off/?**
Implicit Form	**V ETHERNET DHCP On/Off/?**
Parameters	**status**=DHCP enabled or disabled; ON or OFF. The default is ON.
Example	`VARIABLE ETHERNET DHCP ON`

VARIABLE ETHERNET DHCP_CRIT

Function — The criteria by which the printer chooses among multiple DHCP IP address assignment offers.

Explicit Form — **VARIABLE ETHERNET DHCP_CRIT d**

Implicit Form — **V ETHERNET DHCP_CRIT d**

Parameters

d	The number indicating the criteria
0=FIRST	First DHCP offer received by the printer.
1=LONGEST	Longest Lease Time DHCP offer received by the printer.
2=BOOT	First DHCP offer with a Boot File specified received by the printer.
3=SHORTEST	Shortest Lease Time DHCP offer received by the printer.

Example

```
VARIABLE ETHERNET DHCP_CRIT 0
```

VARIABLE ETHERNET DHCP_OFFERS

Function — This is the number of seconds that the printer is willing to wait for DHCP offers before failing the DHCP process if no acceptable offers were received or picking amongst the acceptable ones.

Explicit Form — **VARIABLE ETHERNET DHCP_OFFERS seconds**

Implicit Form — **V ETHERNET DHCP_OFFERS seconds**

Parameters — **seconds**= the number of seconds for the printer to wait before deciding which DHCP offer to accept. The default is 5.

Example — `VARIABLE ETHERNET DHCP_OFFERS 3`

NOTE: The Advantage LX and DelSol LX printers the number specified by the command is NOT the number of seconds to wait, but the number of offers to wait for before deciding which offer to accept. These printers will wait for five (5) seconds, or until the number of offers received reaches the specified number. The range of valid numbers is 1 – 3.

VARIABLE ETHERNET FIRMWARE

Function	The printer compares the pn, rev, and build with the currently loaded firmware and if the specified firmware is newer the printer contacts the indicated TFTP server (server) and requests the file (fname) be sent to the printer using the TFTP protocol.
Explicit Form	**VARIABLE ETHERNET FIRMWARE pn rev build fname [server]**
Implicit Form	**V ETHERNET FIRMWARE pn rev build fname [server]**
Parameters	The pn (part number), rev (firmware revision), and build will be specified by the provider of the new firmware being loaded into the printer.
Example	`VARIABLE ETHERNET FIRMWARE 195-170-110 1.10 01 firmware.110 10.0.0.2`

VARIABLE ETHERNET GATEWAY

Function	Sets the gateway.
Explicit Form	**VARIABLE ETHERNET GATEWAY ddd.ddd.ddd.ddd**
Implicit Form	**V ETHERNET GATEWAY ddd.ddd.ddd.ddd**
Parameters	**ddd.ddd.ddd.ddd** is the IP address of the subnet's router.
Example	`VARIABLE ETHERNET GATEWAY 10.0.0.1`

VARIABLE ETHERNET JOBSOKINERROR

Function	Determines whether the printer accepts LPD print jobs if the printer is in an error condition.
Explicit Form	**VARIABLE ETHERNET JOBSOKINERROR On/Off/?**
Implicit Form	**V ETHERNET JOBSOKINERROR On/Off/?**
Parameters	**status=** JOBSOKINERROR enabled or disabled; ON or OFF. The default is OFF.
Example	`VARIABLE ETHERNET JOBSOKINERROR OFF`

VARIABLE ETHERNET LPD

Function	Turns LPD on or off.
Explicit Form	**VARIABLE ETHERNET LPD status**
Implicit Form	**V ETHERNET LPD status**
Parameters	**status** = LPD enabled or disabled; ON or OFF. The default is ON.
Example	`VARIABLE ETHERNET LPD ON`

VARIABLE ETHERNET TELNET

Function	Enables or disables the Telnet communication protocol services in the printer.
Explicit Form	**VARIABLE ETHERNET TELNET status**
Implicit Form	**V ETHERNET TELNET status**
Parameters	**status** = Telnet enabled or disabled; **ON** or **OFF**. The default is **ON**.
Example	VARIABLE ETHERNET TELNET ON

VARIABLE ETHERNET IP

Function	Sets the static Ethernet IP address. This is used if DHCP is not in use..
Explicit Form	**VARIABLE ETHERNET IP ddd.ddd.ddd.ddd**
Implicit Form	**V ETHERNET IP ddd.ddd.ddd.ddd**
Parameters	**ddd.ddd.ddd.ddd** is the IP address of the printer. The default is **000.000.000.000**, which is an INVALID IP address.
Example	`VARIABLE ETHERNET IP 10.0.0.3`

Note: In printers that support bootp; this command will not work if bootp is enabled.

VARIABLE ETHERNET RESET

Function	Resets the printer.
Explicit Form	**VARIABLE ETHERNET RESET**
Implicit Form	**V ETHERNET RESET**
Parameters	None
Example	`VARIABLE ETHERNET RESET`

VARIABLE ETHERNET RESET COMMUNITY

Function	Reset the SNMP COMMUNITY name.
Explicit Form	**VARIABLE ETHERNET RESET COMMUNITY**
Implicit Form	**V ETHERNET RESET COMMUNITY**
Parameters	None
Example	`VARIABLE ETHERNET RESET COMMUNITY`

NOTE: The reset SNMP community name will be "public".

VARIABLE ETHERNET RTEL

Function	Enables or disables reverse telnet communication (RTEL) with the printer.
Explicit Form	**VARIABLE ETHERNET RTEL status**
Implicit Form	**V ETHERNET RTEL status**
Parameters	**status** = RTEL enabled or disabled; ON or OFF. The default is OFF.
Example	`VARIABLE ETHERNET RTEL ON`

VARIABLE ETHERNET RTEL PORT

Function	Sets the reverse telnet (RTEL) port address.
Explicit Form	**VARIABLE ETHERNET RTEL PORT ddddd**
Implicit Form	**V ETHERNET RTEL PORT ddddd**
Parameters	**ddddd** = Reverse telnet port address. The default is `9100`.
Example	`VARIABLE ETHERNET RTEL PORT 9100`

VARIABLE ETHERNET RTEL TIMEOUT

Function	The time the printer keeps the connection open when the port is inactive before closing the connection.
Explicit Form	**VARIABLE ETHERNET RTEL TIMEOUT seconds**
Implicit Form	**V ETHERNET RTEL TIMEOUT seconds**
Parameters	**seconds=** the number of seconds without receiving a data packet before the printer closes the connection.
Example	`VARIABLE ETHERNET RTEL TIMEOUT 30`

VARIABLE ETHERNET TEXT BUFFER

Function — Sets the size of the Ethernet buffer.

Explicit Form — **VARIABLE ETHERNET TXTBFR bfr_size[,ovrflw_size]**

Implicit Form — **V ETHERNET TXTBFR bfr_size[,ovrflw_size]**

Parameters

bfr size=	Total size of the memory buffer used for Ethernet communications.
ovrflw size=	Number of free bytes in the memory buffer when the printer declares itself busy.

NOTE: The **ovrflw** size parameter is optional, it does not have to be specified.

Example — `VARIABLE ETHERNET TXTBFR 32768,4192`

VARIABLE ETHERNET NETMASK

Function	Sets Ethernet Subnet Mask.
Explicit Form	**VARIABLE ETHERNET NETMASK ddd.ddd.ddd.ddd**
Implicit Form	**V ETHERNET NETMASK ddd.ddd.ddd.ddd**
Parameters	**ddd.ddd.ddd.ddd** is the Subnet Mask of the local network where the printer is connected.
Example	`VARIABLE ETHERNET NETMASK 255.255.255.0`

VARIABLE ETHERNET SERVER

Function	Sets the default DHCP/TFTP server address.
Explicit Form	**VARIABLE ETHERNET SERVER ddd.ddd.ddd.ddd**
Implicit Form	**V ETHERNET SERVER ddd.ddd.ddd.ddd**
Parameters	**ddd.ddd.ddd.ddd** = the IP address of the selected DHCP/TFTP server.
Example	`VARIABLE ETHERNET SERVER 10.0.0.2`

Chapter

10

Bar Code Information

All rules of bar code symbologies must be followed when creating bar code commands. Some of the rules for the most commonly used bar code symbologies are listed below. For more information on bar codes as supported in Cognitive printers, refer to the BARCODE command description and Table 2, Printer bar code support.

Uniform Product Code (UPC)

The Uniform Product Code (UPC) family of codes are typically used for product identification, and include UPCA, UPCA+, UPCE, and UPCE1. These are numeric codes only, supporting the characters 0 through 9. All UPC codes start with a number system digit that identifies the type of product being coded, and end with a checksum digit.

UPCA consists of a number system digit, ten numbers for the product identification, and a checksum digit. All Cognitive printers automatically calculate the checksum. The checksum is not printed in the bar code subtext.

UPCA+ is like UPCA except that extender bars are printed as per UPCA specification, and the checksum is printed in the bar code subtext. If a minus sign modifier is specified, the bar code is the same but the checksum is removed from the bar code subtext.

UPCE is a six-digit variation of the UPC symbology. It always uses number system zero. You must enter the six numbers of the bar code, but not the number system digit or the checksum. The printer calculates the checksum automatically. The bar code is printed with extender bars and bar code subtext. The bar code subtext shows the system number, the six digits of the bar code, and the checksum digit. Using the minus sign bar code modifier removes the checksum from the bar code subtext.

UPCE1 is the same as UPCE, except that it always uses number system one.

I2OF5 AND D2OF5

I2OF5 (Interleaved 2 of 5) is an interleaved code, used mainly in the distribution industry. It supports numbers 0-9 only. It can use a checksum digit, but the user must calculate and enter the checksum manually as part of the code. I2OF5 uses start and stop characters, which the printer generates automatically. Because of the interleaved pattern, an even number of digits (including the checksum, if used) must be placed in the bar code string. For example, 0123 is valid, while 123 is not valid.

D2OF5 (Discrete 2 of 5) is a numeric code, often used for envelope identification and airline ticketing. Data is encoded by bar widths only, with the spaces between bars only serving to separate the individual bars. Five binary bits (three 0 and two 1) encode each character. The binary bits are bar coded in sequential sets of five bars. The code uses start and stop characters, which the printer automatically adds to the printed code.

CODE39 and CODE39+

CODE39 is a widely used alphanumeric code that supports numbers and characters 0- 9, A-Z, ".", space, "$", "/", "+" and "%". It does not support lowercase characters. Code 39 is self-checking, and does not normally use a check digit. An asterisk is used as a start and stop character, and the printer automatically adds it to the bar code. The asterisk does not normally print as part of the bar code subtext. If you put an asterisk before and after the bar code data, it will appear with the bar code subtext but will not be added to the code.

CODE39+ is the HIBC (Health Industry Bar Code) standard symbology. It is similar to normal Code 39, except it uses an automatically generated check digit. The check digit does not appear in the bar code subtext.

CODE93

CODE93 is similar to Code 39. It can encode 48 different characters, and with the use of control characters, typically encodes the entire 128 ASCII characters. Each encoded character in a Code 93 symbol is represented by three variable width bars and spaces.

The characters represented by Code 39 are represented in Code 93 as single bar code characters, but all other Code 93 characters are represented by a control character plus another character. You must take this into account when estimating bar code length.

EAN, EAN8, and EAN13

EAN (European Article Numbering) codes are an extension of the UPC system. A bar code scanner set to read EAN can read UPC; however, a scanner set for UPC may not read EAN. The EAN codes use a checksum character, which the printer automatically calculates. EAN codes are available in two versions: EAN13, which codes 13 digits, and EAN8, which codes 8 digits.

EAN13 has the same number of bars as UPCA. It encodes a number system character, eleven data digits, and a checksum. You must enter a number system character and eleven data digits. The printer calculates and adds the check digit, but the check digit does not print in the bar code subtext. EAN13+ is the same code printed with extender bars and with the check digit in the bar code subtext.

EAN8 encodes a number system character, six data digits, and a checksum. The printer calculates and adds the check digit, but the check digit does not print in the bar code subtext. EAN8+ prints the same code with extender bars and with the check digit in the bar code subtext.

ADD2, ADD5

ADD2 is a two digit add-on for UPC and EAN. ADD5 is a five digit add-on for UPC and EAN.

NOTE: Although ADD2 and ADD5 are add-ons to UPC and EAN, they must be entered in label formats as separate bar codes. Placement and size of ADD2 and ADD5 is independent of the UPC or EAN code.

CODABAR

CODABAR supports numbers 0-9 and the special characters ":", ".", "$", "+" and "-". It requires you to frame the numeric data with valid start/stop character pairs; for example, A0123B, where A is the start and B is the stop character. The valid start characters are designated A, B, C, and D. The valid stop characters are designated T, N, *, and E.

Since you may use any of the four start/stop characters on either end of the symbol, there are 16 possible combinations. These combinations can identify the product type or other information.

PLESSEY AND MSI1

PLESSEY code supports numerals 0-9, plus six additional characters (typically A-F). PLESSEY uses a check digit, but the check digit may be calculated several different ways. To allow the user some flexibility the printer does not calculate or print the check digit. You must calculate and enter the check digit manually, according to the requirements of your bar code system.

MSI is a modified PLESSEY code that uses two check digits. The printer automatically calculates and adds the check digits. The check digits are not printed in the bar code subtext.

MSI1 is another modified PLESSEY code that uses one check digit. Again, the printer will automatically calculate and add the check digit. The check digits are not printed in the bar code subtext.

MAXICODE

MAXICODE is a fixed-size, two-dimensional bar code symbology consisting of a matrix of hexagonal elements arranged around a bull's-eye "finder pattern." MaxiCode uses five code sets (designated A through E) to encode all 256 characters of the extended ASCII character set. Cognitive's implementation of MaxiCode only supports code set A at present. This code set can represent the uppercase characters A - Z, numerals 0 - 9, most common punctuation marks, and a few special symbols.

PDF417

PDF417 (an abbreviation for Portable Data File 417), originally developed by Symbol Technologies, Inc., is a two-dimensional stacked bar code symbology. It is a highly compact medium for encoding any data representable by the 256 characters of the International Character Set.

The codeword is the basic unit of a PDF417 bar code. All data encoded using PDF417 is first converted to a decimal value between 0 and 928 inclusive, since there are 928 discrete symbols that can be represented

by the allowable pattern of bars and spaces in each codeword. The printer converts the raw data to a series of numeric values following rules that provide optimum data compression. PDF417 provides several different rule sets, or modes, for optimum data compression.

PDF417 provides error detection and correction within the bar code block. The thoroughness of the automatic error checking is called the security level of the code. There are eight security levels, numbered 0-8, as shown below.

Security Level	Error Limit
0	0
1	2
2	6
3	14
4	30
5	62
6	126
7	254
8	510

As long as the number of unreadable or missing code words in the bar code block is less than the number indicated for the applicable security level, the code may be read without error.

A high security level provides very reliable data encoding. However, the bar code block gets bigger with increasing security, since more codewords are needed to provide the necessary error checking data. Processing speed also increases significantly with increasing security, since more error checking calculations are performed.

Cognitive printers automatically handle most of the decisions and tasks associated with printing PDF417 bar codes. They select the best mode for the data, encode it, and do all calculations associated with start and stop characters and error-checking.

POSTNET

POSTNET is designed for use with the nine digit ZIP + 4 postal code. Each character to be encoded is represented by five bar code elements, with each element being either a short or tall bar followed by a space. The bar and space widths are constant.

Postnet uses a start and stop bar and a modulo 10 check digit. Cognitive printers automatically calculate and add this digit to the code.

CODE128 A, B, C

CODE128 uses 106 unique characters in three character sets to represent the numerals 0 through 9, the English alphabet in both upper and lowercase, some punctuation, and some special characters. Cognitive Solutions printers automatically calculate and add the checksum character, as well as any required start and stop characters. CODE128A, CODE128B, and CODE128C are the three character sets of the CODE128 symbology.

CODE128A can encode punctuation, the digits 0 through 9, the English alphabet in uppercase only, the standard ASCII control codes, and the special characters shown in Table 2.

CODE128B can encode punctuation, digits 0 through 9, the English alphabet in both upper and lowercase, and the special characters in the table following.

CODE128C is numeric only, and encodes numbers 00 through 99 plus the special characters shown in the table. It encodes numbers more efficiently than CODE128A or CODE128B, since the numbers are encoded as double digits.

Cognitive printers can handle special characters like the bell character that are contained in the CODE128 specification by using the caret (^) character followed by the two digit number of the character to be printed. The caret character works only with numbers between 0 and 38. The first 32 characters (0 to 31) will print the character represented by its ASCII number; for instance, ^07 will print the BELL character and ^13 will print the carriage return character. The two digit numbers from 32 to 38 will print the special characters shown below.

2 Digit Code	CODE128A	CODE128B	CODE128C	CODE128 auto
32	FNC3	FNC3	invalid	FNC3
33	FNC2	FNC2	invalid	FNC2
34	SHIFT	SHIFT	invalid	invalid
35	CODE C	CODE C	invalid	invalid
36	CODE B	FNC4	CODE B	FNC4
37	FNC4	CODE A	CODE A	FNC4
38	FNC1	FNC1	FNC1	FNC1

If you want a caret to actually appear on the label, place a caret before every caret you want printed. For example, ^^ prints one caret, and ^^^^ prints two carets.

When the version of CODE128 is selected in the printer command file, the printer takes care of inserting the correct start character and stop character for the version of CODE128 selected. Only visible characters are centered and printed under the bar code.

Specifying CODE128 without the A, B, or C modifier will cause the printer to automatically select and shift among the three symbology versions for optimum data compression, resulting in the smallest possible bar code.

Example 1 — Print the CODE128A bar code ABCD followed by a BELL character and a carriage return character.

```
! 0 120 115 1
BARCODE CODE128A 152 62 20 ABCD^07^13
STRING 12X16 149 12 CODE 128A
END
```

Example 2 — Print the CODE128B bar code ABCD1234. To keep the bar code width as small as possible without automatic mode switching, use ^35 to switch to code C right before the 1234 part of the string.

```
! 0 120 115 1
BARCODE CODE128B 132 62 20 ABCD^351234
STRING 12X16 132 12 CODE128B
END
```


Example 3 Print the CODE128C bar code 1234567. CODE128C is a double digit bar code, printing the same bar code number in half the width as CODE128A. Because it is a double digit bar code, it will accept an even number of digits only.

```
! 0 120 115 1
BARCODE CODE128C 152 66 20 12345678
STRING 12 X 16 140 22 CODE 128C
END
```

CODE16K

CODE16K is a multi-row symbology based on CODE128. It offers the features of CODE128 with the added density of a two-dimensional bar code. Each CODE16K symbol consists of from two to sixteen rows. Each row consists of a leading quiet zone, a start character, a guard bar, five symbol characters, a stop character, and a trailing quiet zone. Rows are separated from each other by a separator bar, and there are separator bars at the top and bottom of the symbol as well.

As with CODE128, CODE16K has three unique character sets as shown in table 4. But unlike CODE128, Cognitive printers automatically select the best character set for the encoded data when using CODE16K. The user does not need to specify the character set when programming CODE16K bar codes.

You can encode special characters, such as the bell, using the caret character as with CODE128. The special character assignments for some characters differ slightly, as shown below.

2 Digit Code	Function
33	FNC3
34	FNC3
35	N/A
36	N/A
37	FNC4
38	FNC4
39	FNC1

Chapter

11

Media Tips and Tricks

Labels are available in a large variety of types and sizes. Some label characteristics must be taken into account when programming the printer.

Media characteristics that can affect printer programming and printer performance are:

Label/tag size and shape	Relates to the WIDTH, VARIABLE WIDTH and VARIABLE SHIFT LEFT commands.
Adhesive type	Can affect printer peelback performance.
Print method	Relates to the VARIABLE PRINT_MODE command.
Cut type	Relates to the VARIABLE FEED_TYPE, VARIABLE NO_MEDIA, INDEX, and NOINDEX commands.
Media sensitivity	Relates to the VARIABLE DARKNESS and VARIABLE MEDIA_ADJUST commands.

Label/tag Size and Shape

Label and tag stock is available in an almost infinite variety of sizes and shapes. If an existing style does not fit your requirement, custom stock can usually be created. Your application will determine the design. The only absolute limitation on label size is the printer's maximum print width.

When printing on media that is narrower than the printer's maximum print width, you may have to adjust the width and print position with the WIDTH or VARIABLE WIDTH commands or the VARIABLE SHIFT LEFT command.

Adhesives

Labels can come without adhesive (e.g. tag or receipt stock), or with many different types of adhesive, including:

- Standard adhesives, used for normal applications
- Removable adhesives for labels to be used, then removed
- Special adhesives for use under extreme conditions, such as high or low temperatures and humidity
- Spot adhesives (adhesive applied to selected label areas)

When using a new adhesive type, test samples of labels having the new adhesive before applying them in large quantities.

The type of adhesive used can affect the performance of peeler-equipped printers when using peel back mode. Labels can sometimes cling too tightly to their backing to peel cleanly. Consult your Cognitive Solutions dealer or the factory for peel back mode compatibility information.

Print Method (Direct Thermal or Thermal Transfer)

Thermal printers use either direct thermal or thermal transfer printing. Direct thermal printing creates the printed image by changing the color of the label media with applied heat, while thermal transfer printing creates the printed image by transferring ink from a ribbon to the label media with applied heat. Direct thermal media is suitable for many indoor applications where environmental conditions are mild and labels are not expected to be in place for long periods. Use thermal transfer media when preparing labels for use in more demanding environments.

Cognitive Thermal transfer printers can operate in thermal transfer or direct thermal mode, but must be set for the proper mode with the `VARIABLE PRINT_MODE` command.

Cut Type (Butt Cut, Gap Cut, or Continuous Form)

Butt cut labels are separated from each other by a simple cut, leaving square edges. Gap cut labels are separated by a gap. Labels may be made in many shapes for special purposes such as the "butterfly" shape used for jewelry and eyeglass labels. Continuous form media has no perforation, gap, or bar and is typically used with cutter-equipped printers like the Blaster CL.

The cut type may affect label indexing:

- Butt-cut labels have no gap, and so must have black bars preprinted on the label backing in order for them to index properly. When using butt-cut labels in your Cognitive printer, set the index type to `BAR` using the `VARIABLE FEED_TYPE` command.
- Gap cut labels may or may not actually have a detectable gap, depending on the die design. If the gap cut labels have at least 1/8" gap between them, you may use gap indexing. If the gap is less than 1/8", you must use black bar indexing.

Most printers will assume they are out of media if they are operating in gap indexing mode and do not detect the next label after feeding 1" of media. This behavior is controlled by the `VARIABLE NO_MEDIA` command. You may have to adjust this parameter when using media that has an unusually long gap between labels.

Continuous form media is typically used with tearbar or cutter-equipped printers. Cutter printers will cut the media after reaching the last dot row as defined by the `Max Y` value in the `Header Line`, providing there is an `INDEX` command in the label format or `VARIABLE AUTOCUT` is `ON`.

NOTE: Cutter-equipped printers like the Barcode Blaster CL have very stringent media requirements. Using any media other than that specifically approved for use in the printer may cause serious damage.

Media Sensitivity

Different media types exhibit different heat sensitivity. The VARIABLE_DARKNESS command controls the amount of printhead heat.

Different media types can also exhibit different response times. The media is in motion while the printhead dots are heating and cooling, so areas of the label that theoretically should stay white are subjected to temperatures close to their darkening temperature. This can result in some bleeding of dark areas into light areas. This can adversely affect the reliability of rotated bar codes. Increasing print speed and print darkness tend to increase bleeding, so speed and darkness can interact to affect the reliability of rotated bar codes.

Some Cognitive printers support the VARIABLE MEDIA_ADJUST command, which can reduce print bleeding in some cases. Printers that support this command employ an advanced "dot history" algorithm, which tracks the activity of each printhead dot from one dot row to the next. If a given dot was off prior to being commanded on, the printer will apply a little extra energy to the dot to force it to come up to full temperature faster, thus improving the contrast on the leading edges of objects. This can significantly improve the reliability of rotated bar codes.

Chapter

12

Troubleshooting

Most programming problems quickly resolve themselves with careful examination of the offending label format or program code. When you cannot solve a problem by simply reviewing your work, your best approach is to start troubleshooting using the information in your *User's Guide*.

NOTE: Some programming problems can masquerade as hardware problems. If your printer seems to be broken but the information in the User's Guide does not point to a solution, review "Common problems and their solutions" below.

If you know or suspect that you have a hardware problem, refer to your *User's Guide*. If you aren't sure, try these preliminary tests to help isolate the problem:

8. Run a printer self-test.

   If the printer will not print a self-test label, follow the procedures in the User's Guide to resolve that problem first. The printer will not respond to incoming data if it will not print a self-test label.

9. Print a proven label format.

   If you have a known-good label format, try printing it before troubleshooting new label formats. If the proven format will not print, look for a communication problem. If the proven format does print, you will have eliminated most of the possible hardware-related problems.

10. Try printing a label format written on your system.

    Sometimes the host operating system or text editor produces data that is incompatible with the printer. Creating a simple label format using the host system and sending the format to the printer helps isolate this problem. Something like this will do:

    ```
    CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
    ! 0 100 20 1
    ```



```
STRING 8X8 10 10 HELLO
END
```

If the printer will not print this label but does print labels that were prepared on another system, your system may not be compatible with the printer. The most common cause of this is improper end-of-line termination.

NOTE: Hex dump mode allows you to see every character that reaches the printer. Use of hex dump mode can help resolve some programming problems.

11. Check the label format header line.

    When a particular label format will not print or is cut off at the bottom, the trouble is frequently in the header line. Check the header line before continuing. Especially check that the header line begins with the proper mode character and specifies the correct number of dot rows. When programming portable printers, the header line should be preceded by the wake-up string.

12. "Comment out" portions of the nonworking label format until your results improve.

    You can usually isolate a bad printer command by placing a "C" before selected command lines. Begin by commenting out the most complex lines, then try printing the format again. If the problem persists, try commenting out every line between the header line and the END statement, then add lines one at a time to see which lines are at fault.

    After you have isolated the portion of the format that does not work, examine it for errors or test it by itself in a simpler format.

NOTE: When examining label formats, look for instances where the letters "O" or "I" have been incorrectly entered for the numbers 0 and 1. These are very common typographical errors.

Common Issues

This section describes printing issues that you may encounter and suggestions for resolving them.

Printer does not respond to incoming data.

13. Cause: The label format does not terminate with a proper END command.

    Cure: Terminate all label formats with an END command, unless specifically instructed otherwise by a particular command description. Terminate every format line with a carriage return and line feed.

14. Cause: The host system is not sending pure ASCII data.

    Cure: Check your system documentation to confirm that the host is sending ASCII data. Some software uses formatting that is incompatible with ASCII driven devices.

15. Cause: The label format contains an incompatible command. Some commands will only work with certain printers.

    Cure: Rewrite the label format as required, removing incompatible commands.

16. Cause: The label format contains extraneous control characters, such as "@" or "#."

    Cure: Be careful when using reserved characters in label formats. You can print the @ sign and other reserved characters, but if you use such characters at the beginning of a line the printer may "hang."

17. Cause: If you are sending data to a 4.25" portable printer it may be asleep.

    Cure: Precede every label format sent to a 4.25" portable with the proper wake-up string.

Printer prints the label format text rather than the intended label.

Cause: You are sending the label format to the printer from Microsoft Windows, and the current printer driver is converting the label format to ASCII commands. For example, you are using the Cognitive Windows driver or a similar printer driver.

Cure: Use the "generic ASCII" driver when sending label formats to the printer from Windows.

Cure: Instead of printing the files from Windows, invoke MS-DOS and copy the files to the printer port using the `DOS COPY` command.

Printer prints one label, then stops.

18. Cause: The label format contains a `HALT` command.

    Cure: Remove the `HALT` command, or press the printer's feed button to print the next label.

19. Cause: The printer's Label Taken mode is enabled, in printers so equipped.

    Cure: Remove each label from the printer as it is finished.

Printed labels are blank.

20. Cause: Possible hardware problem.

    Cure: Refer to the printer *User's Guide*.

21. Cause: The print width is too narrow for the label format design.

    Cure: Correct the print width setting with a `WIDTH` or `VARIABLE WIDTH` command.

22. Cause: The label image has been shifted out of the printable area with a `VARIABLE SHIFT LEFT` command.

    Cure: Send another `VARIABLE SHIFT LEFT` command to correct the label position.

Printer prints labels, but print quality is poor.

23. Cause: Possible hardware problem.

    Cure: Refer to the printer *User's Guide*.

24. Cause: Incorrect print media, for example, using direct thermal paper while printing in thermal transfer mode.

    Cure: Load the correct print media for your printer and application. Confirm that the software is setting the printer for the correct print method.

25. Cause: Using Value Grade media in a printer set up for standard media.

    Cure: Either switch to standard media, or set the printer up for Value Grade media.

26. Cause: Incorrect parameter in a `VARIABLE DARKNESS` command. This can happen when using a different printer than the one for which the format was originally written. Some older printers use a different value range for `VARIABLE DARKNESS` than currently-manufactured printers.

    Cure: Experiment with the `VARIABLE DARKNESS` command to find the best setting for your printer and print media.

27. Cause: Printer speed setting is too high. Some print media do not print well at high speed.

    Cure: Use the appropriate `VARIABLE` command to reduce printer speed, or try different media.

Print is stretched or shrunk vertically.

28. Cause: Dot time in header line is incorrect.

29. Cause: Label format was written for a different (typically, an earlier or later model) printer.

    Cure: Try another value for dot time. If designing a turnkey software package, provide for user adjustment of dot time. Allow for printer limitations in this regard. For example, Barcode Blaster LS and Blaster Advantage printers only support dot time 100.

30. Cause: If programming a high speed Barcode Blaster, Blazer Emulation Mode may be enabled.

    Cure: Disable Blazer Emulation Mode unless your application strictly requires it.

Printer does not index properly.

31. Cause: The printer received a NOINDEX command. NOINDEX remains in effect until the printer is turned off or receives an INDEX command.

    Cure: Send the printer an INDEX command. Confirm that your label format does not contain an unwanted NOINDEX.

32. Cause: For printers that can use both black bar and gap indexing, the printer may be set for the wrong index type.

    Cure: Change print media or set the printer up for the proper indexing mode. See the sample printer configuration files for more information.

33. Cause: The printer index detector needs calibration.

    Cure: If you are using a Code Courier printer, calibrate the index detector according to the instructions in your *User's Guide*. If using a Barcode Blaster or Blaster Advantage, refer to the VARIABLE INDEX SETTING command for index calibration information.

34. Cause: Butt-cut label stock is loaded. The printer may be indexing properly, but with butt-cut stock the labels may not index to the label perforation, depending on the black bar position.

    Cure: None. This is a normal condition. Use gap stock if this behavior is unacceptable.

NOTE: The Del Sol's lower index sensor must be in the center position for Gap indexing.

Printer skips labels during printing.

35. Cause: Max Y value in Header line is too large.

    Cure: Recalculate Max Y value.

36. Cause: Dot time in header line is too large.

    Cure: Reduce dot time.

37. Cause: Label format was designed for a different printer model or for a printer with different dot time behavior.

    Cure: Adjust the label format accordingly.

Printer prints the wrong number of labels.

Cause: The header line specifies the wrong number of labels.

Cure: Correct the header line. Remember that when using the `MULTIPLE` command, the number of labels specified in the header line is the total quantity, counting side-by-side duplicates, not the number of vertical forms fed.

Label processing stops unexpectedly.

38. Cause: The printer has stopped processing due to a hardware problem.

    Cure: Consult your printer's *User's Guide*.

39. Cause: The printer has encountered a bad label format in a series of formats within one file.

    Cure: Isolate the bad label format by copying each format to a different file and testing it individually. After isolating the bad format, troubleshoot as usual. Reassemble the whole file and try it again after the bad format is working.

Printer will not print at high speed.

40. Cause: The printer has received a `VARIABLE LOWSPEED` or `VARIABLE NORMAL` command.

    Cure: Send the printer a `VARIABLE HIGHSPEED` command.

41. Cause: If you are using a high speed Barcode Blaster, the printer may have received one of the following commands or command parameters:

    `MULTIPLE`

    `OFFSET`

    `WIDTH`

    `VARIABLE MODE 1` or `VARIABLE MODE 2`

    Nonzero `header line X` parameter

    These will cause the printer to reduce speed while printing.

    Cure: Rewrite your label format to avoid these commands.

Cutter-equipped printer does not cut labels.

Cause: `VARIABLE AUTOCUT` is `OFF`, and the label formats do not contain a `HALT` command.

Cure: Send the printer a `VARIABLE AUTOCUT ON` command, or place a `HALT` command in each label format.

Random dots on label, or printed labels are truncated at the bottom.

Cause: The label format exceeds printer memory limits.

Cure: Rewrite the format to use less memory.

Printed label is greatly elongated and is "grayed".

Cause: The label format contains more than one `PITCH` command.

Cure: Remove any extraneous `PITCH` commands.

Numeric values do not increment properly in response to the ADJUST command.

42. Cause: The numeric value you wish to adjust has more digits than the parameter specified in the ADJUST command.

    Cure: Pad the ADJUST parameter with leading zeros as required.

43. Cause: You are trying to adjust a numeric value to a number with more digits than the original value.

    Cure: Pad the original value with leading zeros as required.

44. Cause: You are using a MULTIPLE command with ADJUST.

    Cure: This is acceptable, but remember: ADJUST will only increment the adjusted numeric value when the printer feeds a label. Duplicate labels printed side-by-side will always be identical.

45. Cause: You are trying to increment numeric data that does not appear at the end of a command line.

    Cure: This may be acceptable, but the ADJUST command can only increment numeric data. If alpha characters follow the numeric data, you must follow the ADJUST parameter with enough zeros to pad the increment value away from the alpha characters.

Bar code or string positioning is incorrect.

Cause: A required space was left out or an extra space was inserted somewhere in the BARCODE or STRING command, causing the printer to interpret the parameters incorrectly.

Cure: Use blank spaces as shown in the command descriptions.

Ultra Font or TEXT font positioning is incorrect.

Cause: The label format has a JUSTIFY command in it that you have not accounted for.

Cure: Each JUSTIFY command in a format will remain in effect for the rest of the format or up to the next JUSTIFY. Insert new JUSTIFY commands where required.

STRING or TEXT fonts do not work.

Cause: The memory area containing the STRING or TEXT fonts has been unintentionally initialized, erasing the fonts. See the INITIALIZE STORAGE command for more information.

Cure: You will have to reload the fonts into nonvolatile RAM. Contact the factory for assistance.

Printed bar codes will not scan.

46. Cause: The bar code block is located too near the label edge, or too close to another label component.

    Cure: Redesign the label for better component positioning.

47. Cause: You are trying to encode characters that the selected bar code type will not support.

    Cure: Use the information here and in the printer's *User's Guide* to assure that you are following the rules of the selected bar code symbology.

FILL_BOX does not produce reversed (black to white) text as expected.

Cause: The order of commands in the label format is incorrect.

Cure: Rearrange the order of commands in the label format as required. FILL_BOX must follow the commands that define the label component you want to reverse.

The printer ignores some commands in the label format.

48. Cause: There is an illegitimate command in the label format. Some printers interpret unknown commands as END commands.

    Cure: Check the label format syntax, especially that of the first ignored command.

49. Cause: The label format was written for a different printer model or firmware revision, and the ignored commands are not supported by your printer.

    Cure: Rewrite the label format as required.

Graphics Programming Issues

Graphics programming is inherently more complex than ASCII programming, but is subject to the same problems. Resolve any ASCII programming problems before spending too much time troubleshooting graphics files.

If you can successfully print ASCII format files, try printing a proven graphics label format file. If a proven graphics file will not print, suspect a printer/host communications problem. Continue troubleshooting using the information below if a proven graphics file prints satisfactorily.

Printer does not print graphics.

50. Cause: You are not sending pure binary data to the printer.

    Cure: Do not try to send graphics data to the printer using a text editor or word processor. Text editors format their output as printable characters rather than pure binary. Program graphics using software that is designed to handle pure binary data.

51. Cause: the graphics file does not start with the proper character.

    Cure: Always start foreground graphics files with the @ character (ASCII 64). Start background graphics files with the # character (ASCII 35). Labels programmed in the background do not print immediately. They remain in memory and print with a foreground label format.

52. Cause: Your graphics file does not contain enough data to fill the specified number of dot rows.

    Cure: Always send exactly enough data to fill the number of rows specified in the format header line. Consider reducing print width or use the `LOGO` command when printing small graphics.

Printer prints a random pattern instead of the expected bitmap.

53. Cause: The printer is set for a different pitch or width than the graphics file was designed for.

    Cure: Before sending graphics to the printer, send a dummy label format consisting of a `header line`, `WIDTH` command, `PITCH` command, and `END` statement. This assures that the printer is set properly before sending the graphics data.

54. Cause: The graphics file is too large for the available memory space.

    Cure: Calculate available printer memory and confirm that your graphics file will fit. Remember that the available memory is cut in half when using background graphics mode. If you are near the memory limits, you may have to rewrite the graphics file.

Random dots or lines appear on the finished label.

55. Cause: The host system is appending unwanted end-of-line terminators to the graphics data.

    Cure: Print your graphics format to a file and then upload the file to the printer instead of sending the data directly to the printer.

    Cure: Check your development platform's documentation to see how you can control end-of-line termination.

56. Cause: The graphics file is too large for the available memory space.

    Cure: Rewrite the file as required.

Part of the graphics image is garbled or blank.

Cause: The graphics file is too large for the available memory space.

Cure: Rewrite the file as required.

Graphics labels print, but are reversed.

Cause: Bitmap was mapped backwards. Recently-manufactured printers map the printhead from right to left. Some older printers map the printhead from left to right. Graphics files designed for older printers may print backwards when sent to a newer printer.

Cure: When manually designing graphics files, calculate the data based on a mirror image of the original design. If you are designing a turnkey software package, take the possibility of bitmap reversal into account in your design.

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