HP Hybrid POS Printer with MICR II

Programming Guide

Contents

Chapter 1: About this Guide

How to use this Guide

This guide provides programming information on the HP Hybrid POS Printer with MICR II, which is referred to in this guide as the A776II printer. It is written for tech-savvy users who are interested in customizing or adjusting printer functionality and is meant to be used with the **User Guide**.

If you experience any difficulties during the programming process or feel unsure of adjustments you have made, contact your HP representative for further assistance.

Where to find the basics

If you are looking for information on setup or basic operation, refer to the **User Guide**. This guide assumes that you have the **User Guide** handy for reference or are already familiar with the printer.

Where to find advanced technical information

This guide contains the most complete information available on programming the printer. If you cannot find what you need here or would like further guidance on how to program the printer, contact a HP representative for assistance.

Support

For more advanced procedures and troubleshooting, you may need to refer to the printer's service guide or speak to a HP technical professional. Your representative is able to provide you with necessary information.

For online service, refer to http://www.hp.com/support.

Chapter 2: Printer Status and Indicators

The printer performs a number of diagnostics that provide useful information about the operating status of the printer. The following diagnostic tests are available.

- Startup diagnostics, performed during startup cycle.

- Runtime diagnostics, performed during normal printer operation.

- Remote diagnostics, run during normal operation and reported in the print test.

The printer can be configured with the following settings and functions through the configuration menu that is printed on the receipt. To learn more see the section called "Configuring the Printer" in the User Guide.

> Communication interfaces (except Ethernet)
>
> Diagnostic modes
>
> RS-232C settings
>
> Printer emulations/software options
>
> Hardware options
>
> Paper Type
>
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Startup Diagnostics

When the printer receives power or performs a hardware reset, it automatically performs the startup diagnostics (also known as level 0 diagnostics) during the startup cycle. The following diagnostics are performed:

- Turn off motors and solenoids

- Perform boot CRC check of the firmware ROM and test main program CRC

  Failure causes Startup Diagnostics to stop; the printer beeps and the light flashes a set number of times, indicating the nature of the failure. The table in the "Indicators" section (page 4) describes the specific tone and light sequences.

- Check if paper is present

- Return the knife to the home position

  Failure causes a fault condition. The table in the "Indicators" section (page 4) describes the specific tone and light sequences.

- Check if receipt cover is closed

  Failure does not interrupt the startup cycle.

At power up, if the LED blinks twice, every four seconds, the object storage areas are being initialized. This process could take up to two minutes. Once the object storage area initialization is complete the printer will continue with its normal startup procedure and operation. DO NOT RESET THE PRINTER UNTIL THIS PROCESS IS COMPLETE.

When the start-up diagnostics are complete, the printer makes a two-tone beep (low then high frequency), the paper feed button is enabled, and the printer is ready for normal operation.

If the printer has not been turned on before, or a new EEPROM has been installed, the default values for the printer functions will be loaded into the EEPROM during start-up diagnostics, and the printer will make a quick four-tone beep (high then low frequency, twice).

Runtime Diagnostics

Runtime diagnostics (sometimes called level 2 diagnostics) run during normal printer operation. When the following conditions occur, the printer automatically turns off the appropriate motors and disables printing to prevent damage to the printer:

- Paper out
- Receipt cover open
- Printhead too hot
- Voltages out of range
- Knife unable to home

The light on the operator panel will signal when these conditions occur as well as indicate what state or mode the printer is in.

Remote Diagnostics

Remote diagnostics (sometimes called level 3 diagnostics) keeps track of the following tallies and prints them on the receipt during the print test. These tallies can be used to determine the printer's state of health.

- Model number
- Serial number
- CRC number
- Number of lines printed
- Number of knife cuts
- Number of hours the printer has been on
- Number of flash cycles
- Number of cutter jams
- Number of times the cover is opened
- Number of barcodes printed
- Number of receipt characters printed
- Number of printer faults
- Maximum temperature reached
- Number of dots printed
- Number of dots printed on current printhead
- Number of printhead changes
- Number of receipt mechanism changes
- Number of knife mechanism changes
- Number of black mark errors
- Number of thermistor errors
- Number of low voltage errors
- Number of high voltage errors
- Number of firmware starts
- Number of EEPROM updates

```
*** A776II - Diagnostics Form ***

Model number          :  A776-0000-0000
Serial number         :  0000000000

Loader Firmware
   P/N                :  PN#: 189-776L116
   Date               :  Jul  6  2016
Flash Firmware
   Revision           :  V1.42
   CRC                :  C0F4
   P/N                :  189-776A142A

H/W parameters
   Flash Memory Size  :  8 Mbytes
   Flash Logos/Fonts  :  1600 kbytes
   Flash User Storage :  576 kbytes
   Flash Perm'nt Fonts:  2240 kbytes
   Flash Journal Size :  640 kbytes
   SRAM Size          :  512 kbytes
   Head settting      :  H
   Motor ID           :  1
   Paper Type Setting :  Type 0, Monochrome
   Color Density Adj  :  n/a
   Print Density, Mono:  100%
   Max Speed          :  300 mm/sec
   Paper Width        :  80 mm
   Max Power          :  Level 1
   Knife              :  Enabled
   Partial Cut        :  135 steps
   Paper Low Sensor   :  Enabled
   No Paper Low Extension

Comm. Interface
   Interface          :  USB
   RX Buffer Size     :  4096
   USB Driver Type    :  Printer Class
   Interface          :  RS232
   RX Buffer Size     :  4096
   Parameters
      Baud Rate       :  115200
      Data Bits       :  8
      Stop Bit        :  1
      Parity          :  NONE
      Flow Control    :  DTR/DSR
      Reception Errors:  Ignore

Resident Code Pages   :  437, 720, 737, 775, 850
                         852, 857, 858, 860, 862...
```

```
***To Enter Printer Config Menu***
      Press Feed Button Within the
           Next Two Seconds
```

For more information about	See this section
Accessing the remote diagnostic tallies	"Command descriptions" in *Chapter 5: Programming commands* (Status commands: Transmit printer ID, remote diagnostics extension, Hexadecimal 1D 49 40 *n*)

Indicators

The printer communicates various conditions both visually, with two green lights or audibly, with a series of tones or beeps. The following table lists these indicators.

Green on-line, paper status, error light (to the rear of the paper feed button)

Indicator	Sequence	Condition
Light	Continuous, blinking on	Paper out Cover open Knife unable to home
Light	Continuous, blinking off	Paper is low Printhead too hot Voltages low/high
Light	Continuous, Double LED flash	Write to permanent memory in progress
Light	Continuous, quick blinking (on power up)	Invalid firmware
Light	Continuous, slow blinking	Power supply and max power setting don't match
Tone	Two-tone beep (low frequency, high frequency)	Start-up diagnostics completed successfully
Light and Tone	Two-Tone beep (high frequency, low frequency) Continuous, quick blinking of LED	When entering flash download mode*

Green slip-in light (in front of the paper feed button)

Indicator	Sequence	Condition
Light	Off	No check or form inserted or is incorrectly inserted
Light	On (continuous)	Check or form properly inserted

For more information about	See this section	
Error conditions and correcting them	Troubleshooting	

The printer is also able to communicate its status to the host application if the application has been programmed to receive this information.

Chapter 3: Emulation

A776II Emulation Commands

Set Printer ID Mode
<u>Code (Hexadecimal)</u>
1F 03 0C n

This command is ignored.

Set A776II Printer ID
<u>Code (Hexadecimal)</u>
1F 03 25 0F n

This command sets the printer ID response to the Printer ID command (1D 49 01)

<u>n</u>	<u>Printer ID</u>
00	A776II
01	A760

A776II Configuration Commands

Select Slip Lines per Inch
<u>Code (Hexadecimal)</u>
1F 03 25 04 n

This command sets the slip station lines per inch setting.

<u>n</u>	<u>Line spacing</u>
00	7.2 LPI
01	6.0 LPI

Select Number of Lines of Validation
<u>Code (Hexadecimal)</u>
1F 03 25 06 n

This command sets the number of lines of validation that can be printed.

<u>n</u>	<u>Number of validation lines</u>
00	15
01-04	4 (default)
05-0F	actual number (5 - 15 decimal)

Select A776II Narrow Slip Configuration Option to Ignore n Leading Spaces

Code (Hexadecimal)

1F 03 25 08 n

This command is available so A760 applications can ignore n leading spaces in a 42-column line of text.

Range of n

0x00 < n < 0x20 hexadecimal

0 < n < 3 2 decimal

- n = 24 decimal is equivalent to printing the rightmost 42 columns of the A760 printzone (24 + 42 = 66).
- The first non-space in columns 1-n will stop ignoring leading spaces.
- Text over 42 columns will wrap to the next line.
- Tab (0x09), set column (0x1B 0x14 n), set absolute position (0x1b 0x24 nL nH), and set relative position (0x1B 0x5C nL nH) commands are handled within the range of ignored leading spaces.

Select A776II Narrow Slip Configuration Option to Ignore n Leading Spaces

Code (Hexadecimal)

1F 03 25 09 n

This command is available so A760 applications can ignore n leading spaces in a 51-column line of compressed text.

   Range of n

   0x00 < n < 0x20 hexadecimal

   0 < n < 32 decimal

- n = 29 decimal is equivalent to printing the rightmost 51 compressed columns of the A760 printzone
  (29 + 51 = 80).
- The first non-space in columns 1-n will stop ignoring leading spaces.
- Text over 51 columns will wrap to the next line.
- Tab (0x09), set column (0x1B 0x14 n), set absolute position (0x1b 0x24 nL nH), and set relative position
  (0x1B 0x5C nL nH) commands are handled within the range of ignored leading spaces.

Select A776II Narrow Slip 51-column Compressed Print Option

Code (Hexadecimal)

1F 03 25 0A n

When enabled, all normal text is printed in 51-column compressed print.

- This accommodates existing applications printing up to 51 columns on the slip station.
- The format will not match the A760 exactly.
- This will not affect rotated print mode (see below).

n	51-column compressed print option
00	Disable (default)
01	Enable

Select A776II Delete Slip Trailing Spaces Option

Code (Hexadecimal)
1F 03 25 0B n

When enabled, all trailing spaces on the slip will be deleted.

- This accommodates existing applications that send trailing spaces to the slip by not wrapping the blank text to the next line.
- The format will match the A760 exactly, but a narrower form will be required.
- This command will not work for an application that relies on wrapping text to print a line. A print command is required.

n	Delete slip trailing spaces option
00	Disable (default)
01	Enable

Select A776II (21 and 25-line) Rotated Slip Print Options

Code (Hexadecimal)
1F 03 25 0C n

- 21-line rotated text print accommodates existing applications, which print 21 or fewer rotated lines (as read). The format will match the A760 exactly.
- 25-line rotated text print accommodates existing applications, which print between 22 and 25 rotated lines (as read). The format will not match the A760 exactly.
- An A760 can print up to 33 rotated lines (as read), so those printing 26 or higher rotated lines, cannot be emulated on the A776II printer.

n	Rotated Print Options
00	21-line (default)
01	25-line

Select A776II First Line of Print Option in Text and Page Mode

Code (Hexadecimal)
1F 03 25 0D n

- The A760 mechanism has a positive slip stop for positioning a form at its top right corner. Some applica- tions rely on a form inserted to this slip stop in order to print on specific areas of the form. When the top right corner of the form is po-sitioned at the slip stop, the first print line is 0.7" below the top of form. Some applications rely on the operator manually positioning a form in order to print on specific areas of the form. The A760 firmware does not automatically reposition an inserted form.
- The A776II slip stop distance option is triggered at the slip selection command (0x1B 0x63 0x30 0x04) and positions an inserted form prior to print so that the first line of print will match an A760.
- There is a temporary run time command to override this configuration option:

1F 7E 01 00	operator positioning for first print line
1F 7E 01 01	position form to A760 slip stop distance for first print line
1F 7E 01 02	position form to top of form for first print line

n	First Line of Text	Beginning of Page Mode Print	
00	Operator position	Top of form	
01	A760 Slip stop	Top of form	(default)
02	Top of form	Top of form	
03	A760 Slip stop	A760 Slip stop	

Select Cover Open Option
Code (Hexadecimal)
1F 03 25 11 n

*   When the cassette cover open option is enabled and the operator opens the cassette cover, the printer will stop printing and enter an error state.
*   When the option is disabled, the printer will ignore the state of the cassette cover.

n   Cassette Cover Option
00   Disabled
01   Enabled (default)

Set Page Mode Margin Mechanical Adjustment
Code (Hexadecimal)
1F 03 25 16 n

*   This command is primarily implemented for printers replacing existing A721 printers to match cashier check printing.
*   Default is 0.
*   Value is printed on the second diagnostic page.
*   Ranges for margin configurations:

Margin Setting	Maximum mechanical adjustment
.5"	30 half dots
.3"	56 half dots
.1"	84 half dots

*   Mechanical adjustment does not apply when page size is defined to be greater than the default of 200 full dots wide.

Select A776II Slip Eject Option
Code (Hexadecimal)
1F 03 25 17 n

n   Slip Eject
00   disabled
01   enabled (default)

*   When enabled, the A776II will eject slip and validation transactions out the top of the printer. The slip LED will blink to remove the form.
*   Option can be disabled for applications that rely on the A760 slip eject out the bottom front position.

Select 45/60 Column Slip Option
Code (Hexadecimal)
1F 03 25 18 n

n   45/60 Column Slip Option
00   disabled (default)
01   enabled

Set Page Mode Option to Trim Full Dots
Code (Hexadecimal)
1F 03 2F n

> **n < 128** # of full dots trimmed from right side
> **n = 255** compress to fit in 3.024"

- This command is primarily implemented for applications specifying a page size greater than 242 full dots wide.
- Default is no trim.
- Maximum width that can be compressed to fit in 3.024" is 270 full dots.
- Value is printed on second diagnostic page.

A776II Configurable Slip Commands

A776II Double High Slip Character Print

Code (Hexadecimal)	Command
1F 03 26 01 n	Enables or disables the 1B 21 10 command

n	Double high slip character print command (1B 21 10)
00	Disabled
01	Enabled

A776II Slip Character Spacing

Code (Hexadecimal)	Command
1F 03 26 02 n	Enables or disables the 1B 20 n command

n	Slip character right side spacing command (1B 20 n)
00	Disabled
01	Enabled

A776II Slip Minimum Units

Code (Hexadecimal)	Command
1F 03 26 03 n	Enables or disables the 1D 50 x y command

n	Set minimum units for the slip station command (1D 50 x y)
00	Disabled
01	Enabled

A776II Slip Left Margin and Print Width

Code (Hexadecimal)	Command
1F 03 26 04 n	Enables or disables the 1D 4C nL nH and 1D 57 nL nH commands

n	Set left margin(1D 4C nL nH) and print width(1D 57 nL nH) on the slip station commands
00	Disabled
01	Enabled

A776II Slip Print Justification

Code (Hexadecimal)	Command
1F 03 26 05 n	Enables or disables the 1B 61 n command

n	Print justification on the slip station command(1B 61 n)
00	Disabled
01	Enabled

Chapter 4: Programming the Printer

Overview of Printing Characteristics

Commands control all operations and functions of the printer. This includes selecting the size and placement of characters and graphics on the receipt or the slip and feeding and cutting the paper. The programming commands have been organized, in order of hexadecimal code within functional groups. For this reason, "related" commands may not be listed adjacent to one another.

The A776II standard command set allows it to work with software written for HP or other POS compliant printers.

Any of the commands may be used in any combination to program a host computer to communicate with the printer (unless otherwise noted).

Some commands listed and described here may not be implemented and are identified as "not implemented." If received, they are ignored and not sent to the print buffer as data.

Any non-legal commands have their parameter sent to the print buffer as data.

Character Appearance

The appearance of text can be changed using the following print modes:

- Standard
- Compressed
- Double-high
- Double-wide
- Upside-down
- Rotated

- Underlined
- Bold
- Reverse
- Italic
- Strike-through
- Scaled
- Shading

Receipt character specification

Standard

- Characters per inch: 15.6
- Characters per line: 44
- Cell size: 13 x 24 dots (default font)

   13 x 27 dots (Tall and ColorPOS fonts)

   13 x 18 dots (paper-saving font)

Compressed

- Characters per inch: 20.3
- Characters per line: 56
- Cell Size: 10 x 24 dots (default font)

   10 x 27 dots (Tall and ColorPOS fonts)

   10 x 18 dots (paper-saving font)

Print Zones

Print zones for receipt station 80 mm paper

Specifications of print zone for receipt station 80 mm paper:

- 576 dots (addressable) @ 8 dots/mm, centered on 80 mm

- Minimum margins for standard print: 2.0 mm (.079 inches)

- Top margin to manual tear-off: 17.8 mm (0.70 inches)

- Top margin to knife cut: 19.0 mm (0.75 inches)

Note: *The application centers 44 standard character cells (13 × 24 dots), or 56 compressed character cells (10 × 24 dots), or 576 addressable bits of graphics across an 80 mm wide receipt. Minimum print line height is 24 dots for text or graphics. Standard print line spacing is 27 dots (i.e., 3 extra row dots).*

The A776II adds a 27 dot high font, so standard print spacing is 30 dots.

The A776II paper-saving feature adds a 18 dot high font and reduces extra dot rows to 2, so standard print spacing is 20

```
          |◄───────── Paper width = 80 mm (3.15 ) ─────────►|
              |◄──── Printable zone, 576 dots = 72 mm (2.835 ) ────►|
          →|  |◄──── Nominal margins, 4 mm (0.157 ) ────►|  |◄
                                  Cut edge
          ┌──────────────────────────────────────────────┐ ◄── Cut edge
          │             ▲                                 │
          │             │  Top margin, 17.8 mm (.70 ) minimum
          │             ▼                                 │
          │ ABCDE................................67890     │
          │ ABCDE................................67890     │
          │ ABCDE................................67890     │
          │ ABCDE................................67890     │
          │                                               │
          │  ◄──── 44 standard columns = 71.5 mm (2.815 ) ────►│
          │        56 compressed columns = 70 mm (2.756 )     │
          └───∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨∨───┘
```
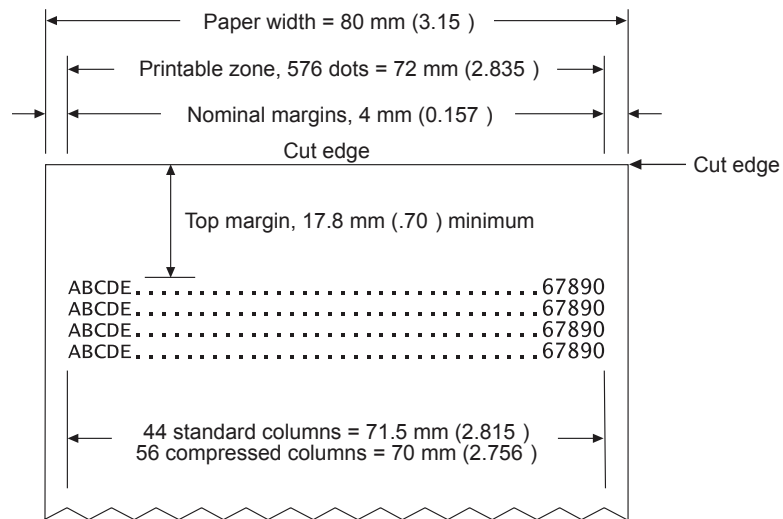
Print Zones for Slip Station

The slip station prints characters (standard and compressed pitch) and graphics in a print zone of 77mm (3.0") wide on a slip or form.

- Standard pitch: 42 characters (columns) per line
- Compressed pitch: 51 characters (columns) per line
- 21 rotated characters
- 210 adjacent bits of graphics
- 420 addressable positions

The print line height of 7x7 dot characters is 2.46mm (.097"). With three-dot spacing, the print line height is 3.53mm (.139"). See the following illustration (not to scale). To print as close to the bottom of the slip as possible without the slip leaving the feed rollers, use the "Print and feed *n* lines" (1B 64 *n*) command, with *n* = 0.

Print Line Width
3 in. Max.

Right Margin
0.1 in. Min.

5 mm
(0.20 in.)
Min.

Bottom Margin Min.

15.5 mm
(0.6 in.)
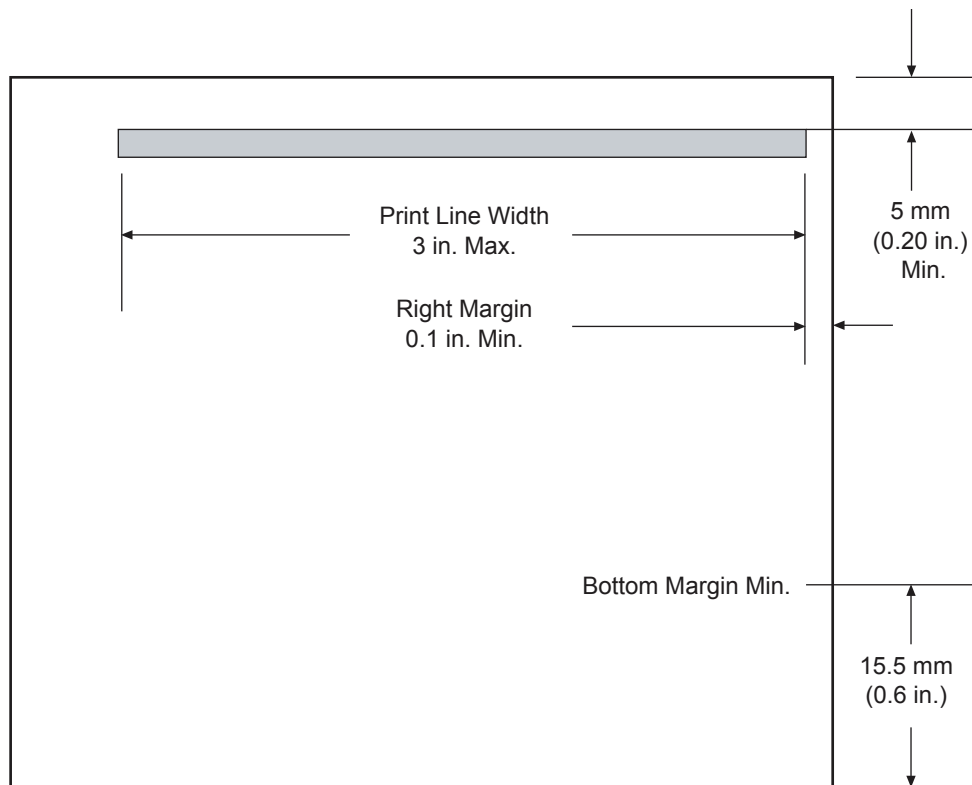
**Slip Print
Zone**

Print Zones for Slip, Validation
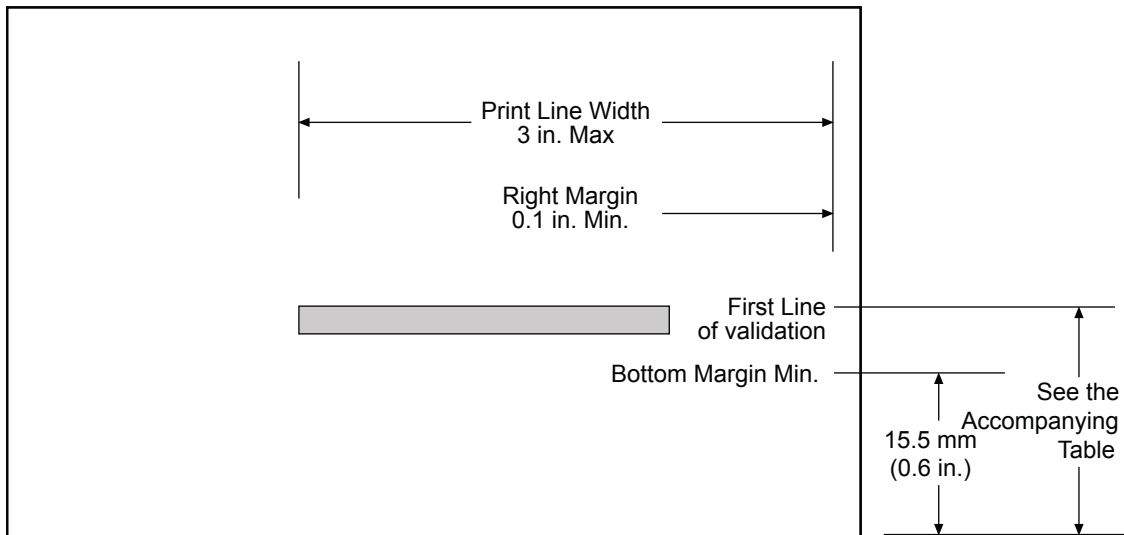
Validation Format

The A776 has drop validation printing. The location of the first line of validation varies based on the table below:

Number of lines of validation @ 7.2 lpi	Distance from bottom of form to top of first print line
14 lines	2.7 inches
10 lines	2.0 inches
6 lines	1.5 inches
4 lines	1.2 inches

Rotated Printing Commands

Three commands control the rotation of printing. The table shows the combinations of set/cancel upside down print, set/cancel rotated print (clockwise), and rotated print (counterclockwise).

Rotated clockwise and *rotated counterclockwise* print commands are mutually exclusive: the setting of the last received command is effective. Unintended consequences may result when *rotated clockwise* is mixed with other commands.

The samples of the print show only the normal-size characters. Double-wide and double-high characters are printed in the same orientation. They may also be mixed on the same line.

Upside down (1B 7B *n*)	Rotated CW (1B 56 *n*)	Rotated CCW (1B 12)	Resulting output
Canceled	Canceled	Cleared	A B C
Canceled	Set	X	∀ ᙠ ∩
Set	Canceled	X	Ɐ Ɓ Ɔ
Set	Set	X	∪ ᙠ ∀
X	X	Set	∀ ᙠ ∪

Note: *The following print modes cannot be mixed on the same line:*

• Right-side up and upside-down

Chapter 5: Programming Commands

Commands Listed by Function

Printer actions

Code (hexadecimal)	Command	Page
10	Clear printer	23
11	Close form	23
18	Open form	24
1A	Perform partial knife cut (or code 1B 6D)	24
1B 07	Generate tone	24
1B 3C	Return home	24
1B 3D *n*	Select peripheral device (for multi-drop)	25
1B 40	Initialize printer	25
1B 43 *n*	Set slip paper eject length	25
1B 55 *n*	Set unidirectional print on impact station	26
1B 63 30 *n*	Select receipt or slip for printing; slip for MICR read	26
1B 63 31 *n*	Select receipt or slip for setting line spacing	26
1B 63 34 *n*	Select sensors to stop printing	27
1B 63 35 *n*	Enable or disable panel button	27
1B 66 *m n*	Set slip paper waiting time	37
1B 6D	Perform partial knife cut (or code 1A)	24
1B 70 *n p*1 *p*2	Generate pulse to open cash drawer	28
1B 71	Release paper	28
1B 72 *m*	Set current color	28
1C	Select slip station	29
1F 03 3C *ll hh*	Set timeout value for low-power idle state	31
1F 70	Set printer into low-power idle state	31
1D 56 *m*	Select cut mode and cut paper (or code 1D 56 *m n*)	29
1D 56 *m n*	Select cut mode and cut paper (or code 1D 56 *m*)	29
1D 81 *m n*	Set paper type (for two-color printing)	30
1E	Select receipt station	30
1F 03 16 05 *n*	Set interpretation of "Set current color" command	30
1F 03 4E *n1 n2*	Port Idle Timeout	31
1F 74	Print test form	31

Print and paper feed

Code (hexadecimal)	Command	Page
0A	Print and feed paper one line	32
0C	Print and eject slip	32
0D	Print and carriage return	32
14n	Feed *n* print lines	32
15 *n*	Feed *n* dot rows	33
16 *n*	Add *n* extra dot rows	33
17	Print	34
1B 4A *n*	Print and feed paper	34
1B 4B *n*	Print and reverse feed paper	34
1B 64 *n*	Print and feed *n* lines	34
1B 65 *n*	Print and reverse feed *n* lines	35
1D 14 *n*	Reverse feed *n* lines	35
1D 15 *n*	Reverse feed *n* dots	35

Vertical and horizontal positioning

Code (hexadecimal)	Command	Page
09	Horizontal tab	36
1B 14 n	Set column	36
1B 24 *n*L *n*H	Set absolute starting position	37
1B 32	Set vertical line spacing to 1/6 inch	37
1B 33 *n*	Set vertical line spacing	37
1B 44 *n1...nk* 00	Set horizontal tab positions	38
1B 5C *n*1 *n*2	Set relative print position	39
1B 61 *n*	Select justification	40
1D 4C *n*L *n*H	Set left margin	40
1D 50 *x y*	Set horizontal and vertical minimum motion units	36
1D 57 *n*L *n*H	Set printing area width	41

Text characteristics

Code (hexadecimal)	Command	Page
12	Select double-wide characters	42
13	Select single-wide characters	42
1B 12	Select 90 degree counter-clockwise rotated print	42
1B 16 *n*	Select pitch (column width)	42
1B 20 *n*	Set right-side character spacing	43
1B 21 *n*	Select print mode	44
1B 25 *n*	Select or cancel user-defined character set	44
1B 26 *s c1 c2*	Define user-defined character set	46

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Command Conventions

The following information describes how each command is organized:

Name:	Name of command.

ASCII:	The ASCII control code.
Hexadecimal:	The hexadecimal control code.
Decimal:	The decimal control code.

Value:	A description of the command operands.
Range:	The upper and lower limits of the command operand.
Default:	The command operand default after printer reset.

Description:	Brief description and summary of the command.

Formulas:	Any formulas used for this command.
Exceptions:	Describes any exceptions to this command; for example, incompatible commands.
Related information:	Describes related information for this command; for example, bit information.

Command Descriptions

Printer actions

The printer function commands control the following basic printer functions and are described in order of their hexadecimal codes:

- Resetting the printer
- Cutting the paper
- Opening the cash drawers

Clear printer

ASCII	DLE
Hexadecimal	10
Decimal	16

Clears the print line buffer without printing and sets the printer to the following condition:

- Receipt station is selected
- Double-wide command (0x12) is canceled
- Line spacing, pitch, and user-defined character sets are maintained at current selections (RAM is not affected
- Single-wide, single-high, non-rotated, and left-aligned characters are set
- Printing position is set to column one
- Slip platen is opened
- Slip printhead is homed

Related Information

This command followed by a 04 or 05 is interpreted as a "Real Time Command"

Close form

ASCII:	DC1
Hexadecimal:	11
Decimal:	17

Closes the feed roller and platen (forms compensation arm assembly). If the printer is reset or the Clear (0x10) is received, the feed roller and platen are opened.

This command executes if the platen is already closed. This command is processed regardless of which station is selected.

Open form

ASCII: CAN
Hexadecimal   18
Decimal: 24

Opens the feed roller and platen (forms compensation arm assembly) so that a form may be inserted (default position).

This command has the same code as the Cancel print data in page mode command, which is only executed in page mode.

This command executes if the platen is already open. This command is processed regardless of which station is selected.

Perform partial knife cut

ASCII   SUB   ESC m
Hexadecimal   1A   1B 6D
Decimal   26   27 109

Partially cuts the receipt. The default setting leaves 5mm (0.20 inch) of paper on the left edge. (See setting partial cut distance in diagnostics.)

There are two codes (Hex 1A or 1B 6D) for this command and both codes perform the same function.

Formulas

The cut edge is 144 dot rows or 18 mm (0.71 inch) above the print station.

Exceptions

Line feed is executed first, if the buffer is not empty.

This command is processed regardless of which station is selected.

Generate tone

ASCII   ESC BEL
Hexadecimal   1B 07
Decimal   27 7

Generates an audible tone. Performed by the printer to signal certain conditions.

Return home

ASCII   ESC <
Hexadecimal   1B 3C
Decimal   27 60

Moves the impact printhead (unless already there) to the home position.

Related Information

The printer is able to detect carriage motor jams, eliminating the need to home the printhead after each slip transaction.

Select peripheral device (for multi-drop)

ASCII	ESC = *n*
Hexadecimal	1B 3D *n*
Decimal	27 61 *n*

Value of *n*:	0 (bit 0), device not selected
	1 (bit 0), device selected

Default:	1 (bit 0), device selected

Selects the device to which the host computer sends data.

Related information

Other bits of *n* (1–7) are undefined and ignored.

When the printer is disabled by this command, it ignores transmitted data until the printer is re-enabled by the same command.

Initialize printer

ASCII	ESC @
Hexadecimal	1B 40
Decimal	27 64

Default:	Character pitch:	15.6 CPI
	Column width:	44 characters
	Extra dot rows:	3
	Character set:	Code Page 437
	Printing position:	Column One

Clears the print line buffer and resets the printer to the default settings for the start-up configuration (refer to Default settings above). Data in the receive buffer is not cleared, and printing position moves to the beginning of the line.

Single-wide, single-high, non-rotated, and left-aligned characters are set, and user-defined characters or logo graphics are cleared. (Flash memory and macros are not affected.) Tabs reset to default. Receipt selection state is selected. Barcode settings reset. Page mode settings are cleared and printer is set to standard mode. ASB is switched off.

A776II:	Slip set to 42 column pitch

Set slip paper eject length

ASCII	ESC C *n*
Hexadecimal	1B 43 *n*
Decimal	27 67 *n*

Value of *n*:	0 to 255

Exception

This command is ignored.

Set unidirectional print on impact station

ASCII	ESC U *n*
Hexadecimal	1B 55 *n*
Decimal	27 85 *n*

Value of n:	Only the lowest bit of *n* is used	
	0	Unidirectional printing is turned off
	1	Unidirectional printing is turned on
Default of n:	0	For text printing
	1	For Page Mode printing

Select receipt or slip for printing; slip for MICR read

ASCII	ESC c 0 *n*
Hexadecimal	1B 63 30 *n*
Decimal	27 99 48 *n*

Value of n:	1, 2, 3	Receipt selected
	4	Slip selected
	8	Validation station selected
Default of n:	1	

Selects the station for printing. When slip is selected, the printer waits for the paper to be inserted. When slip has already been selected and the selection is changed, the form is opened.

If the station has already been selected and it is re-selected, no action takes place.

Slip waiting time is configurable using the configuration menu and the wait time appears on the Diagnostic menu printout

Exceptions

Receiving the command discards unprinted data in the buffer, forcing a "beginning of line" state.

When *n* is out of range this command is ignored.

Select receipt or slip for setting line spacing

ASCII	ESC c 1 *n*
Hexadecimal	1B 63 31 *n*
Decimal	27 99 49 *n*

Value of n:	1, 2, 3	Select receipt
	4	Select Slip
	8	Select validation
Default of n:	1	

Selects which station receives the effects of the following commands:

1. Select Default Line Spacing (1B 32)
2. Set Line Spacing (1B 33)
3. Add *n* extra dot rows (16 *n*)

Exceptions

This command is ignored if *n* is out of range

Select sensors to stop printing

ASCII	ESC c 4 *n*
Hexadecimal	1B 63 34 *n*
Decimal	27 99 52 *n*

Value of *n*:   Sensor status

		Sensor Status	
Bit	**Sensor**	**0**	**1**
0	Receipt paper near-end	Disabled	Enabled
1	Receipt paper near-end	Disabled	Enabled
2–3	Undefined		
4	Slip trailing edge uncovered		
5	Slip leading edge uncovered		
6	Undefined		

Default: 0

Determines which sensor stops printing on the respective station. The command does not affect the paper out status on the receipt station, which will automatically stop the printer when the paper is depleted.

Enable or disable panel button

ASCII	ESC c 5 *n*
Hexadecimal	1B 63 35 *n*
Decimal	27 99 53 *n*

Value of *n*:   0 = Enable
1 = Disable

Default: 0 (Enable)

Enables or disables the paper feed button. If the last bit is 0, the paper feed button is enabled. If the last bit is 1, the paper feed button is disabled.

Exceptions

Functions that require the paper feed button (except for the execute macro [1D 5E] command) cannot be used when it has been disabled with this command.

Set slip paper waiting time

ASCII	ESC f *m n*
Hexadecimal	1B 66 *m n*
Decimal	27 102 *m n*

Value of m: Not used
Value of n: Tenths of seconds

The time that the printer waits for a slip to be inserted is set using the configuration menu. The default is forever, but it can be set to 1, 3, or 5 minutes.

The value "n" sets the time (*n* x 0.1 seconds) that the printer waits to close the platen and start printing after the slip has been inserted. The printer reads that a slip is inserted when the leading edge and trailing edge sensors are covered. The slip-in light is lit (green) when both sensors are covered.

If a slip is not inserted in the time specified, the receipt station is selected for the next function.

Generate pulse to open cash drawer

ASCII	ESC p *n* *p*1 *p*2
Hexadecimal	1B 70 *n* *p*1 *p*2
Decimal	27 112 *n* *p*1 *p*2

Value of *n*:	00, 48 (Decimal) = Drawer 1; 01, 49 (Decimal) = Drawer 2

Value of *p1*: 0–255

Value of *p2*: 0–255

Sends a pulse to open the cash drawer.

Formulas

The value for either *p1* or *p2* is the hexadecimal number multiplied by 2 msec to equal the total time.

- On-time = *p1* (Hex) x 2 msec
- Off-time = *p2* (Hex) x 2 msec

Related information

Off-time is the delay before the printer performs the next operation. Refer to cash drawer specifications for required on and off-time. If p2 < p1, the off-time is equal to the on-time.

Release Paper

ASCII	ESC *q*
Hexadecimal	1B 71
Decimal	27 113

Description

Releases the slip paper as follows:

If receipt paper was selected, this command opens the platen to allow slip removal.

If the slip was selected, the printer enters the paper removal waiting state after releasing the paper. After 2 seconds, it enters receipt paper mode.

Set current color

ASCII	ESC r *m*
Hexadecimal	1B 72 *m*
Decimal	27 114 *m*

Default of *m*: 0 (monochrome)

This command will set the current color to the *color m* for all character data that may follow this command and all graphic objects (bit images) that have not been explicitly loaded as two-color.

m = 0 (monochrome) is the initial value
m = 1 (two-color paper "primary color", usually black)
m = 2 (second color available from two-color paper)

The *m* values 0 and 1 will not have a distinguishable effect; 0 is the initial value and provides parameter value consistency with other commands.

Description

When the monochrome paper type command (0 0) is set, this command is recognized and retained, but has no effect. The monochrome paper selection (usually black) controls the output.

When two-color paper is loaded and the two-colors paper type command set, this command will designate which of the two colors will be used for everything not specified as having an explicit color parameter(s), such as color logos, side bars, surround graphics, background watermarks or color raster graphics. The effect mimics shifting a two-color ribbon in a printer or typewriter to type the color of the lower half of the ribbon.

Exceptions

After a power loss or reset the default value $m = 0$ is reset.

Select slip station

ASCII	FS
Hexadecimal	1C
Decimal	28

Selects the slip station for printing or MICR. This command must be disabled via 1F 03 38 00 to use the 1C 70 / 1C 71 logo command sequences.

Select cut mode and cut paper

ASCII	GS V m	GS V m n
Hexadecimal	1D 56 m	1D 56 m n
Decimal	29 86 m	29 86 m n

Value of m: Selects the mode as shown in the table.

Value of n: Determines cutting position only if m is 65 or 66.

m	Feed and cut mode
0, 48	Full cut (no extra feed). Partial cut on the A776II.
1, 49	Partial cut (no extra feed)
65	Feeds paper to cutting position + (n times vertical motion unit), and cuts the paper
66	Feeds paper to cutting position + (n times vertical motion unit), and performs a partial cut

Range of m: 0, 48; 1, 49
65, 66 (when used with n)

Range of n: 0 – 255

Default of m, n: 0

Selects a mode for cutting paper and cuts the paper. There are two formats for this command, one requiring one parameter m, the other requiring two parameters m and n. The format is indicated by the parameter m.

Formulas

n times the vertical motion unit is used to determine the cutting position to which the paper is fed. Set n to 0 to cut below the last printed line.

Set paper type (ColorPOS®)

ASCII	GS 0x81 *m n*
Hexadecimal	1D 81 *m n*
Decimal	29 129 *m n*

Value of *m*:	0 = monochrome (black) paper
	2 = monochrome (black) paper (Koehler KT55F20)
	4 = two-color (blue/black) papers
	5 = two-color (red/black or green/black) papers

Default:	0 (monochrome paper)

This command will set the optimum parameter values in the thermal print engine control hardware for defined monochrome or two-color paper chemistry. The *m n* parameters select paper category and formulation version, respectively.

(*m n* = 0 0) defines the default monochrome (black category, initial version) paper, out-of-box printers will also have factory preset descriptions for customer selected color types; initial release consists of three defined color types: (*m n*= 4 0) blue/black paper, or *(m n* = 5 0) red/black paper or green/black paper. Other valid values of *m n* may be present if the download paper type description command has been executed defining additional types.

When issuing this command a value of *n* = 0xFF can always be used; that is interpreted as requesting the setting of the highest version defined in the printer of that category. This is a safe way for an application to always select the latest of a manufacturer's paper category, thus choosing "latest standard red/black".

An incorrect setting of m n for a two-color paper or non-standard monochrome paper, or failure to set m n when a color paper is inserted will result in poor print quality. n should always either be 0 or 0xFF.

The last set paper type choice is stored in non-volatile memory and is retained after a power loss and across reset commands.

Related information

An incorrect setting of *n* for a two-color paper or failure to set *n* when a two-color paper is loaded will result in poor output quality.

Select receipt station

ASCII	RS
Hexadecimal	1E
Decimal	30

Selects the receipt slip station for all functions. The receipt station is default setting after the printer is initialized or the clear printer (0x10) command is received.

Set interpretation of "Set current color" command

ASCII	US ETX SYN ENQ *n*
Hexadecimal	1F 03 16 05 *n*
Decimal	31 03 22 05 *n*

Value of *n*:	0-FF (Hex)
	n = 01 will cause 1B 72 01 to print red. Any other value for 1B 72 will print black.
	n = 00 will cause 1B 72 00 to print red and all other values to print black.

This command defines how to interpret the 1B 72 command for legacy environments. It provides a method to resolve any differences in the definition of command 1B 72 between the Native mode and earlier implementations in other printers.

In Native mode, the standard "Set current color" command should be used.

Related information

The 1F 03 16 00 command disables this and all other LogoEZ® features.

To disable one LogoEZ® feature when multiple LogoEZ® features are set, first disable all LogoEZ® features and then re-enable only those you desire.

Set timeout value for low-power idle state

ASCII	US ETX ' *ll hh*
Hexadecimal	1F 03 3C *ll hh*
Decimal	31 03 60 *ll hh*

Value of ll:	low byte of time in seconds
Value of hh:	high byte of time in seconds

This command sets the timeout value in seconds. If the printer has not received data for that amount of seconds, it will shutdown to the low-power (1 watt) state. A value of *ll hh* = 00 00 disables this feature. To bring the printer out of the low-power idle state, press the paper feed button. Note: shutdown mode (1F 03 54 00 n) must be enabled for this to work.

Set printer into low-power idle state

ASCII	US p
Hexadecimal	1F 70
Decimal	31 112

This command puts the printer in the low-power (1 watt) state immediately. To bring the printer out of the low-power idle state, press the paper feed button. Note: shutdown mode (1F 03 54 00 n) must be enabled for this to work.

Print test form

ASCII	US t
Hexadecimal	1F 74
Decimal	31 116

Prints the current printer configuration settings on the receipt.

Disabled in page mode.

Port Idle Timeout

ASCII	US ETX 0x4E *n1 n2*
Hexadecimal	1F 03 4E *n1 n2*
Decimal	31 03 78 *n1 n2*

Value of *n:*	*n1*: low order byte of seconds
	n2: high order byte of seconds
Default*:*	disabled

Sets an idle time after which switching between communication ports can be done without a power cycle. Setting seconds to 0 disables port idle timeout.

Print and paper feed

The print and feed commands control printing on the receipt and paper feed by the printer.

Print and feed paper one line

ASCII	LF
Hexadecimal	0A
Decimal	10

Prints one line from the buffer and feeds paper one line.

Carriage return/line feed pair prints and feeds only one line.

Print and eject slip

ASCII	FF
Hexadecimal	0C
Decimal	12

Prints data from the buffer to the slip station and if the paper sensor is covered, reverses the slip out the front of the printer far enough to be accessible to the operator. The impact station opens the platen in all cases.

This command has the same code as the print and return to standard mode command, which is executed only when the printer is in page mode. When the printer is not in page mode this command executes the print and eject slip function.

Exception

This command is ignored if the receipt station is the current station.

Print and carriage return

ASCII	CR
Hexadecimal	0D
Decimal	13

Prints one line from the buffer and feeds paper one line. The printer can be set through the configuration menu to ignore or use this command. Some applications expect the command to be ignored while others use it as print command.

Related information

See ignoring/using the carriage return in *Diagnostics* for more information.

Carriage return/line feed pair prints and feeds only one line.

Feed n print lines

ASCII	DC4 *n*
Hexadecimal	14 *n*
Decimal	20 *n*

Value of *n*:	The number of lines to feed at current line height setting.
Range of *n*:	0–255 in Native mode 0–127 in A756 emulation

Feeds the paper n lines at the current line height without printing. Ignored on receipt if current line is not empty.

Feed n dot rows

ASCII   NAK *n*
Hexadecimal   15 *n*
Decimal   21 *n*

Value of *n*:   Receipt: *n*/203 inch

                     Slip: n/72 inch

Range of *n*:   0–255

Feeds the paper *n* dot rows without printing. Receipt moves *n* rows if the print buffer is empty.

Add n extra dot rows

ASCII   SYN *n*
Hexadecimal   16 *n*
Decimal   22 *n*

Value of *n*:   Receipt: *n*/203 inch
                     Slip: n/72 inch

Range of *n*:   0–16

Default: Receipt: 3 extra dot rows

                     Slip: 3 extra dot rows

Adds *n* extra dot rows to the character height to increase space between print lines or decrease the number of lines per inch.

Formulas

The following table shows the relationship between the number of lines per inch and each extra dot row added:

RECEIPT STATION			SLIP STATION		
Extra rows	**Lines per inch**	**Dot rows**	**Extra rows**	**Lines per inch**	**Dot rows**
0	8.5	24	0	10.3	7
1	8.1	25	1	9.0	8
2	7.8	26	2	8.0	9
3	7.5	27	3	7.2	10
4	7.2	28	4	6.6	11
5	7.0	29	5	6.0	12
6	6.77	30	6	5.5	13
7	6.5	31	7	5.1	14
8	6.3	32	8	4.8	15
9	6.1	33	9	4.5	16
10	6.0	34	10	4.2	17
11	5.8	35	11	4.0	18
12	5.6	36	12	3.79	19
13	5.5	37			
14	5.3	38			
15	5.2	39			
16	5.1	40			

Print

ASCII	ETB
Hexadecimal	17
Decimal	23

Prints one line from the buffer and feeds paper one line. Executes LF on receipt.

Print and feed paper

ASCII	ESC J *n*
Hexadecimal	1B 4A *n*
Decimal	27 74 *n*

Value of *n*:	Receipt:	*n*/203 inch
	Slip:	*n*/144 inch

Range of *n*:   0–255

Prints one line from the buffer and feeds the paper. On the receipt statin, the line height equals the character height when n is too small. This does not apply to the slip station. Use n = 0 to print a line without feeding the paper. This allows the printer to print on the last line of the slip (at 0.59 inch from trailing edge) and still retain the slip in the feed rollers for reverse feeding the paper back out of the slip station.

If the set horizontal and vertical minimum motion units command (1D 50) is used to change the horizontal and vertical minimum motion units, the parameters of this command (print and feed paper) will be interpreted accordingly.

Related information

For more information, see the description of the set horizontal and vertical minimum motion units command in this document.

Print and reverse feed paper

ASCII	ESC K *n*
Hexadecimal	1B 4B *n*
Decimal	27 75 *n*

Value of *n*:   Slip - *n*/144 of an inch

Range of *n*:   0–255

Prints one line from the buffer and reverse feeds the paper n/144 of an inch on the slip station.

Exceptions

The receipt station cannot be reverse fed.

Print and feed *n* lines

ASCII	ESC d *n*
Hexadecimal	1B 64 *n*
Decimal	27 100 *n*

Range of *n*:   1–255 (0 is interpreted as 1 on the receipt station)

Prints one line from the buffer and feeds paper n lines at the current line height.

Print and reverse feed n lines

ASCII	ESC e *n*
Hexadecimal	1B 65 *n*
Decimal	27 101 *n*

Value of *n*:	The number of lines on the slip station to be reverse fed.

Range of *n*:	0 – 255

Prints one line from the buffer and reverse feeds the paper n lines on the slip station. The receipt station cannot be reverse fed.

Reverse feed *n* lines

ASCII	GS DC4 *n*
Hexadecimal	1D 14 *n*
Decimal	29 20 *n*

Range of *n*:	0 – 255

Reverses the paper feed in the slip station by n lines at the current spacing. The next character feed command returns the paper feed back to the normal feed direction. This command is ignored if slip is not the selected station. Current spacing is not a factor.

Reverse feed n dots

ASCII	GS NAK *n*
Hexadecimal	1D 15 *n*
Decimal	29 21 *n*

Value of *n*:	*n* dots at 1/72 inch

Range of *n*:	0 – 255	A776 native mode

Reverses the paper feed in the slip station by n dots at 1/72 inch. This command is ignored if receipt station is selected.

Vertical and horizontal positioning

The horizontal positioning commands control the horizontal print positions of characters on the receipt and slip.

Horizontal tab

ASCII	HT
Hexadecimal	09
Decimal	9

Moves the print position to the next tab position set by the set horizontal tab positions (1B 44 n1 n2 ... 00) command. The print position is reset to column one after each line.

Tab treats the left margin as column one, therefore changes to the left margin will move the tab positions.

When no tabs are defined to the right of the current position, or if the next tab is past the right margin, line feed is executed. HT has no effect in page mode. If underline is set, tab spaces skipped by this command are not underlined.

Print initialization sets 32 tabs at column 8, 16, 24…

Set horizontal and vertical minimum motion units

ASCII	GS P x y
Hexadecimal	1D 50 x y
Decimal	29 80 x y

Value of x:	Horizontal	**Range of x:**	0 – 255	**Default of x:**	Receipt: 203 Slip: 140
Value of y:	Vertical	**Range of y:**	0 – 255	**Default of y:**	Receipt: 203 Slip: 144

Sets the horizontal and vertical motion units to 1/x inch and 1/y inch respectively, until the printer is initialized, reset, or powered off.

When x or y is set to 0, the default setting for that motion unit is used.

This command can be enabled or disabled for the slip. Default is disabled for the slip on A776II.

When combined with other commands, the calculated result is truncated to the minimum value of the mechanical pitch.

Mode	Commands using x	Commands using y
Standard	1B 20, 1B 24, 1B 5C, 1D 4C, 1D 57	1B 33, 1B 4A, 1B 4B, 1D 56
Page (upper left or lower right)	1B 20, 1B 24, 1B 57, 1B 5C, [1C 53]	1B 33, 1B 4A, 1B 4B, 1B 57, 1D 24, 1D 56, 1D 5C
Page (upper right or lower left)	1B 33, 1B 4A, 1B 4B, 1B 57, 1D 24, 1D 5C	1B 20, 1B 24, 1B 57, 1B 5C, [1C 53], 1D 56

Set column

ASCII	ESC DC4 n
Hexadecimal	1B 14 n
Decimal	27 20 n

Value of n:	Receipt:	1 – 44 = Standard pitch
		1 – 56 = Compressed pitch
	Slip:	1 – 66 = Standard pitch
		1 – 80 = Compressed pitch

Default of n: 1

Prints the first character of the next print line in column n. It must be sent for each line not printed at column one. The value of n is set to one after each line.

Exceptions

This command cannot be used with single- or double-density graphics.

Set absolute starting position

ASCII	ESC $ *n*L *n*H
Hexadecimal	1B 24 *n*L *n*H
Decimal	27 36 *n*L *n*H

Value of *n*:	*n* =	Number of dots to be moved from the beginning of the line.
	*n*L =	Remainder after dividing *n* by 256.
	*n*H =	Integer after dividing *n* by 256.

The values for *n*L and *n*H are two bytes in low byte, high byte word orientation.

Sets the print starting position to the specified number of dots (up to the right margin) from the beginning of the line. The print starting position is reset to the first column after each line.

Formulas

Determine the value of n by multiplying the column for the absolute starting position by 10 (slip, or receipt standard pitch) or 8 (receipt compressed pitch). The example shows how to calculate 280 dots as the absolute starting position.

28 x 10 =	280 dots (beginning of column 29)
280/256 =	1, remainder of 24
*n*L = 24 *n*H =	1

Related information

If the set horizontal and vertical motion units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of the set relative print position command will be interpreted accordingly. For more information, see the description of the command set horizontal and vertical minimum motion units command (1D 50) in this document.

Set vertical line spacing to 1/6 inch

ASCII	ESC 2
Hexadecimal	1B 32
Decimal	27 50

Default:	3.33 mm (0.13 inch)

Sets the default line spacing to 4.25 mm (1/6 of an inch).

Line spacing is set for the station or stations selected by the command 1B 63 31 n.

This is set independently of the vertical motion unit (see 1D 50 x y).

Set vertical line spacing

ASCII	ESC 3 *n*
Hexadecimal	1B 33 *n*
Decimal	27 51 *n*

Value of *n*:	Receipt:	*n*/406 inch
	Slip:	*n*/144 inch

Range of *n*:	0-255

Default:	Receipt:	0.13 inch (3.37mm or 7.52 lines per inch, 3 extra dot rows)
	Slip:	0.14 inch (7.20 lines per inch, 3 extra dot rows)

Sets the line spacing for the receipt and for the slip. For the receipt, the space is set to n/406 inches. For the slip, the line spacing is set to n/144 inches. Note: sending 1B 32 will overwrite this setting.

Line spacing is set for the station or stations selected by the command 1B 63 31 n.

The line spacing equals the character height when n is too small.

If the set horizontal and vertical minimum motion units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (set line spacing) will be interpreted accordingly.

Related information

For more information, see the description of the set horizontal and vertical minimum motion units command in this document.

In addition, see "Configure line spacing" (1F 03 46 *n*).

Set horizontal tab positions

ASCII	ESC D *n1…nk* NUL
Hexadecimal	1B 44 *n1…nk* 00
Decimal	27 68 *n1…nk* 0

Value of *n*: 1 - number of columns in selected pitch (typically 44 for standard, 56 for compressed, but this is affected by paper width, fonts and margins)

Value of *k*: 0 - 32 (decimal)

Default: n = 8, 16, 24, 32, ... (Every eight characters for the default font set)

Sets a horizontal tab to *n* columns from the beginning of the line, where k indicates the number of horizontal tab positions to be set.

The horizontal tab position is stored as a value of [character width x *n*], measured from the beginning of the line. The character width should be set before using this command. The setting of the horizontal tab positions will not be changed if the character width is changed after sending this command.

A maximum of 32 horizontal tab positions can be set. Data exceeding 32 horizontal tab positions are processed as normal data.

This command cancels any previous horizontal tab settings.

n1-nk should be listed in ascending order, followed by a 00. 1b 44 00 changes all horizontal tab positions back to their default positions.

Horizontal tab position settings are effective until the printer is reset, the power is turned off, or a 1b 40 command is sent.

Print position advances to the next tab position on receipt by a 09h.

The horizontal tab position is affected by changes to the left margin.

Set relative print position

ASCII	ESC \ *n1 n2*
Hexadecimal	1B 5C *n1 n2*
Decimal	27 92 *n1 n2*

Value of *n:*

To move the relative starting position right of the current position:

n =   Number of dots to be moved right of the current position
n1 = Remainder after dividing *n* by 256
n2 = Integer after dividing *n* by 256

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

To move the relative starting position left of the current position:

n =   Number of dots to be moved left of the current position
n1 = Remainder after dividing (65,536-*n*) by 256
n2 = Integer after dividing (65,536-*n*) by 256

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

Moves the print starting position the specified number of dots either right (up to the right margin) or left (up to the left margin) of the current position. The print starting position is reset to the first column after each line.

Formulas

To move to the left:

Determine the value of *n* by multiplying the number of columns to move left of the current position by 10 (slip or receipt standard) or 8 (receipt compressed) pitch. The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the left of the current position.

2 x 10 = 20 dots (two columns to be moved left of the current position)
65,536–20 = 65516
65,516/256 = 255, remainder of 236
n1 = 236, *n2* = 255

To move to the right:

Determine the value of *n* by multiplying the number of columns to move right of the current position by 10 (slip or receipt standard) or 8 (receipt compressed) pitch. The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the right of the current position.

2 x 10 = 20 dots (two columns to be moved left of the current position)
20/256 = 0, remainder of 20
n1 = 20, *n2* = 0

Related information

If the set horizontal and vertical minimum motion units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (set relative print position) will be interpreted accordingly. In page mode, upper left or lower right uses the horizontal motion unit, and upper right or lower left uses the vertical motion unit. For more information, see the description of the set horizontal and vertical minimum motion units command (1D 50) in this document.

If underline is set, spaces skipped by this command are not underlined.

Select justification

ASCII	ESC a *n*
Hexadecimal	1B 61 *n*
Decimal	27 97 *n*

Value of *n*:	0, 48 = Left aligned
	1, 49 = Center aligned
	2, 50 = Right aligned

Range of *n*:	0–2, 48–50

Default:	0 (Left aligned)

Specifies the alignment of characters, graphics, logos, and bar codes on the receipt station in the print area specified by 1D 4C and 1D 57 according to the above table, until the printer is initialized, reset, or powered off. This justifies an entire line.

This command can be enabled or disabled for the slip. Default is disabled for the slip on A776II.

Set left margin

ASCII	GS L *nL nH*
Hexadecimal	1D 4C *nL nH*
Decimal	29 76 *nL nH*

Range of *nL*:	0–255

Range of *nH*:	0–255

Default:	576 dots (the maximum printable area)

This command can be enabled or disabled for the slip. Default is disabled for the slip on A776II.

Formulas

Sets the left margin of the printing area until the printer is initialized, reset, or powered off. The left margin is set to ((nH X 256) + nL) times horizontal motion unit) inches. The horizontal motion units are set by the set horizontal and vertical minimum motion units command (1D 50), described in this manual. If the horizontal motion unit is changed after changing left margin, the left margin setting is not changed.

The width of the printing area is set by the set printing area width command (1D 57), which follows this command. See the set printing area width command in this document for a description of that command.

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots on the receipt and 420 dots on the slip.

To set the Receipt left margin to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

> **GS L 203 0**

Or, to set the left margin to two inches at the default horizontal motion unit of 1/203 units per inch, send the four-byte string:

> **GS L 150 1**

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.

To set the Slip left margin to one inch at the default horizontal motion unit of 1/140 inches, send the four-byte string:

> **GS L 140 0**

Or, to set the left margin to two inches at the default horizontal motion unit of 1/40 units per inch, send the four-byte string:

> **GS L 24 1**

Exceptions:

The command is effective only at the beginning of a line. This command is ignored if the line buffer is not empty.

If this command is processed in page mode, left margin is not changed until the printer is returned to standard mode.

Set printing area width

ASCII	GS W *nL nH*
Hexadecimal	1D 57 *nL nH*
Decimal	29 87 *nL nH*

Range of *nL*:   0–255

Range of *nH*:   0–255

Default: 576 dots (the maximum printable area)

Sets the width of the printing area until the printer is initialized, reset, or powered off. If the setting exceeds the printable area, the maximum value of the printable area is used. If the left margin and printing area set the width to less than the width of a single character, the width is extended ot accommodate the character for the line. The width of the printing area is set to ((nH X 256) + nL) times horizontal motion unit) inches. The horizontal motion units are set by the set horizontal and vertical minimum motion units command (1D 50). If the horizontal motion unit is changed after changing printing area width, the printing area width setting is not changed.

The width of the printing area follows the set left margin command (1D 4C). See the set left margin command (10 4C …) earlier in this document for a description.

This command can be enabled or disabled for the slip. Default is disabled for the slip on A776II.

Formulas

To set the width of the receipt printing area to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

> **GS W 203 0**

Or, to set the width of the printing area to two inches at the default horizontal motion unit of 1/203 units per inch, send the four-byte string:

> **GS W 150 1**

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.

Exceptions

This command is effective only at the beginning of a line.

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots on the receipt and 420 dots on the slip. See the illustration.

If this command is processed in page mode, printing area width is not changed until the printer is returned to standard mode.

Receipt Station

Printable Area 576 Dots

Left Margin   Printing Area Width

Slip Station

Printable Area 420 Dots

Left Margin   Printing Area Width
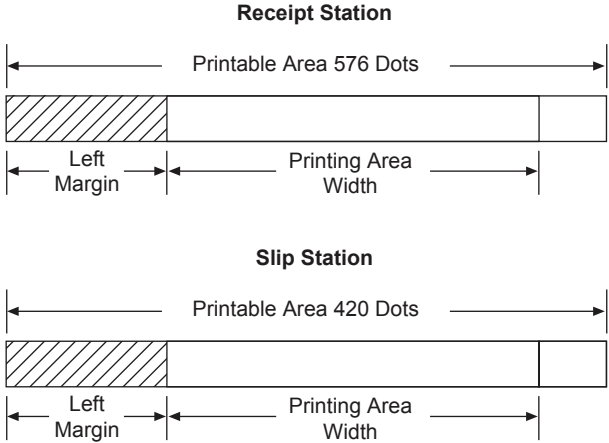
Text characteristics commands

These commands control what the printed information looks like, selection of character sets, definition of custom-defined characters, and setting of margins. The commands are described in order of their hexadecimal codes.

Select double-wide characters

ASCII	DC2
Hexadecimal	12
Decimal	18

Prints double-wide characters. The printer is reset to single-wide mode after a line has been printed or the clear printer (0x10) command is received. Double-wide characters may be used in the same line with single-wide characters.

Exceptions

Double-wide characters may not be used in the same line with single or double-density graphics.

Select single-wide characters

ASCII	DC3
Hexadecimal	13
Decimal	19

Prints single-wide characters. Single-wide characters may be used in the same line with double-wide characters.

Exceptions

Single-wide characters may not be used in the same line with single or double-density graphics.

Select 90 degree counter-clockwise rotated print

ASCII	ESC DC2
Hexadecimal	1B 12
Decimal	27 18

Rotates characters 90 degrees counter-clockwise. The command remains in effect until the printer is reset or until a clear printer (0x10), select or cancel upside down print (1b 7b) or cancel rotated print (1b 56) command is received.

Exceptions

This command is valid only at the beginning of a line.

Rotated print and non-rotated print characters cannot be used together in the same line.

Related information

See "Summary of rotated printing" in this document.

Select pitch (column width)

ASCII	ESC SYN *n*
Hexadecimal	1B 16 *n*
Decimal	27 22 *n*

Value of *n:*	0 = Standard pitch
	1 = Compressed pitch

Default:	0 (Standard pitch)

Selects the character pitch for a print line.

Formulas

The following table provides the print characteristics for both pitches on the receipt station.

Pitch	Receipt Columns	Receipt CPI	Slip Columns	Slip CPI
Standard	44	15.6	42	13.9
Compressed	56	20.3	51	17.1

Related information

Look in Chapter 4: Programming the Printer, "Character appearance" for a description of both pitches.

This command and the select print modes command (1B 21 *n*) affect pitch selection.

Set right-side character spacing

ASCII	ESC SP *n*
Hexadecimal	1B 20 *n*
Decimal	27 32 *n*

Range of *n:*	0 – 32 (decimal)

Default:	0

The units of horizontal and vertical motion are specified by the set horizontal and vertical minimum motion units (1D 50 …) command. Changes in the horizontal or vertical units do not affect the current right side character spacing. When the horizontal or vertical motion unit is changed by the set horizontal and vertical minimum motion units (1D 50 …) command the value must be in even units and not less than the minimum amount of horizontal movement.

In standard mode the horizontal motion unit is used.

In page mode the horizontal or vertical motion unit differs and depends on the starting position of the printable area. When the starting printing position is the upper left or lower right of the printable area (set by select print direction in page mode, 1B 54 n) the horizontal motion unit (x) is used. When the starting printing position is the upper right or lower left of the printable area (set by select print direction in page mode, 1B 54 n) the vertical motion unit (y) is used.

This command can be set independently in standard mode and in page mode.

When characters are enlarged, the right-side character spacing is a multiple of its normal value (ex. spacing for double-width mode is twice the normal value).

This command can be enabled or disabled for the slip. Default is disabled for the slip on A776II.

Related information

This command does not affect HRI characters.

Select or cancel user-defined character set

ASCII	ESC % *n*
Hexadecimal	1B 25 *n*
Decimal	27 37 *n*

Value of *n*:	0 = Code Page 437
	1 = User Defined (RAM)
	2 = Code Page 850

Range of *n*:	0–2

Default:	0 (Code Page 437)

Selects the character set until the printer is initialized, reset, or powered off. When an undefined RAM character is selected, the current active ROM code page character is used. Look in Chapter 4: Programming the Printer, "Character appearance" for the character sets.

Exception:

The character sets cannot be used together on the same line.

Select print mode

ASCII	ESC ! *n*
Hexadecimal	1B 21 *n*
Decimal	27 33 *n*

Value of *n*:	Pitch selection (standard, compressed, double high, or double wide.)

Value of *n*

Bit[1]	Function	0	1
Bit 0	Pitch[2] (See chart below)	Standard pitch	Compressed pitch
Bit 3	Emphasized mode	Canceled	Set
Bit 4	Double-high	Canceled	Set
Bit 5	Double-wide	Canceled	Set
Bit 7	Underlined mode	Canceled	Set

[1]Bits 1, 2 and 6 are not used.
[2]Standard and compressed pitch cannot be used together in the same line.

Slip Default is standard pitch on A776II.

Default:	0 (for bits 0, 3, 4, 5, 7)

This command and select pitch (column width) command (1B 16 *n*) affect pitch selection.

Pitch	Receipt Columns	Receipt CPI	Slip Columns	Slip CPI
Standard	44	15.6	42	13.9
Compressed	56	20.3	51	17.1

Selects the print mode: standard, compressed, emphasized, underlined, double-high, or double-wide until the printer is initialized, reset, or powered off.

When double-height mode is enabled for some charactes on a line, all characters are aligned on the baseline. When double-width mode is enabled, characters are enlarged to the right, starting from the left side of the character.

Exceptions

Refer to the table in other column for exceptions.

This command does not affect HRI characters.

Related information

In standard mode, when double-height mode is selected, the character is enlarged in the paper feed direction, and when double-width mode is selected it is enlarged perpendicular to the paper feed direction. In 90° clockwise-rotated mode, the relationship between double-height and double-width is reversed. In page mode, double-height and double-width are on the character orientation. Double-high can be enabled or disabled for the slip. Default is disabled for the slip on A776II.

Look in Chapter 4: Programming the Printer, "Character appearance" for a description of standard and compressed character pitches.

The bits in this command perform the same function as the stand-alone functions:

1B 16 *n*	Select pitch
1B 45 *n*	Emphasized
1B 47 *n*	Double-strike
12	Double-wide
13	Single-wide
1B 2D *n*	Underline

Define user-defined character set

ASCII	ESC & *s c1 c2 [character 1 data] ... [character k data]*
Hexadecimal	1B 26 *s c1 c2 [character 1 data] ... [character k data]*
Decimal	27 38 *s c1 c2 [character 1 data] ... [character k data]*

Values and ranges:

s = 3, the number of bytes (vertically) in the character cell

c = the ASCII codes of the first *(c1)* and last *(c2)* characters respectively

*c*1 = Hex 20–FF (20 is always printed as a space)
*c*2 = Hex 20–FF (20 is always printed as a space)

To define only one character, use the same code for both *c*1 and *c*2

k = *c2 – c1 + 1* = the number of characters to be defined in this command string
[character i data] = [ni d1 ... d(3 x ni)] for *1 ≤ i ≤ k*

ni = the number of dot columns for the ith character, *1 ≤ ni ≤ 16*

d = the dot data for the characters

The number of bytes for the ith character cell is *3 x ni.*
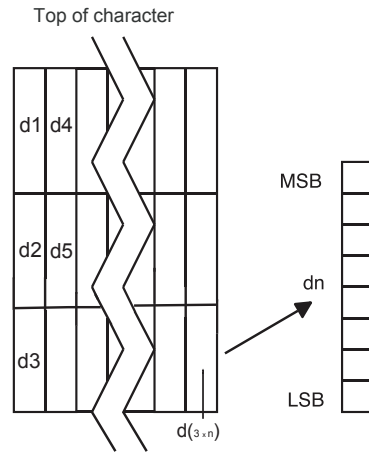
The bytes are printed down and across each cell.

Receipt characters (1B 26 3)

Defines and enters downloaded characters into RAM. The command may be used to overwrite single characters. User-defined characters are available until power is turned off or the initialize printer command (1B 40) is received.

Any invalid byte (*s*, *c*1, *c*2, *n*1) aborts the command.

Slip:

s =   0

c =   the ASCII codes of the first (c1) and last (c2) characters respectively

   c1 = Hex 20-FF
   c2 = Hex 20-FF

   To define only one character, use the same code for both c1 and c2

Slip characters (1B 26 0)

d =   the column data for the nth character as specified by d1 ... d2

Each character is defined by 12 bytes (only bytes 2-11 are printed.)

Each byte is one column (full- or half-dot column.)

Overlapped dots are not printed.

The data must contain [(c2 - c1 +1) x 12] bytes (See illustration.)
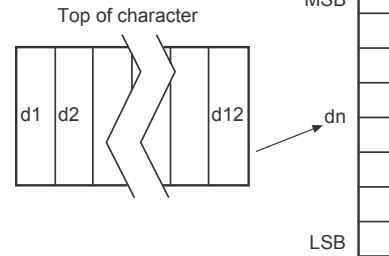
Defines and enters downloaded characters into RAM or flash. The command may be used to overwrite single characters. User-defined characters are available until power is turned off or the initialize printer command (1B 40) is received.

Any invalid byte (s, c1, c2, n1) aborts the command.

User-defined character sets for both slip and receipt may be used at the same time.

Related information

See 1D 22 *n* (select memory type) to save user-defined characters.

Define extended user-defined character set

ASCII	US & *s c1 c2 [character 1 data] ... [character k data]*
Hexadecimal	1F 26 *s c1 c2 [character 1 data] ... [character k data]*
Decimal	31 38 *s c1 c2 [character 1 data] ... [character k data]*

Values and ranges:

s = the number of dot rows in the character cell (maximum 64)

c = the ASCII codes of the first ($c1$) and last ($c2$) characters respectively

> $c1$ = Hex 20–FF (20 is always printed as a space)
> $c2$ = Hex 20–FF (20 is always printed as a space)

> To define only one character, use the same code for both $c1$ and $c2$

$j = s/8$ = the number of bytes (vertically) in the character cell

$k = c2 - c1 + 1$ = the number of characters to be defined in this command string
$[character\ i\ data] = [ni\ d1 ... d(j\ x\ ni)]$ for $1 \le i \le k$

ni = the number of dot columns for the ith character, $1 \le ni \le 16$

d = the dot data for the characters (bit gets printed to 1 and not printed to 0)

The number of bytes for the ith character cell is $j\ x\ ni$.

The bytes are printed down and across each cell starting from the left side.

Defines and enters downloaded characters into RAM. The command may be used to overwrite single characters. User-defined characters are available until power is turned off or the Initialize Printer command (1B 40) is received.

Any invalid byte (s, $c1$, $c2$, $n1$, $n2$) aborts the command.

Related information

User-defined characters can be set for each pitch independently by selecting the pitch using the 1B 21 command.

See ID 22 n (select memory type) to save user-defined characters.
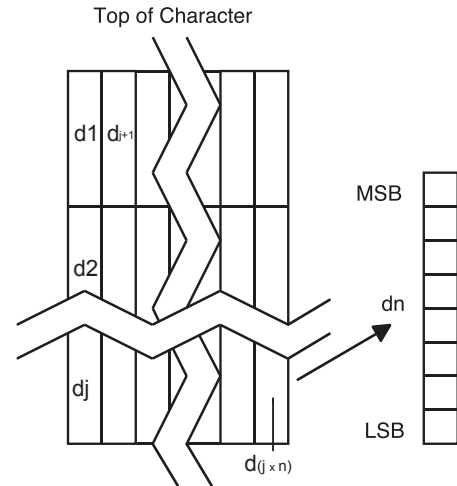
Select or cancel underline mode

ASCII	ESC - *n*
Hexadecimal	1B 2D *n*
Decimal	27 45 *n*

Value of *n*:

Decimal	Hex		
0, 48	30	=	Cancel underline mode
1, 49	31	=	Select underline mode
2, 50	32	=	Select double thickness underline mode

Default: 0 (Cancel underline mode)

Turns underline mode on or off until the printer is initialized, reset, or powered off. Underlines cannot be printed for spaces set by the horizontal tab, set absolute start position, or set relative print position commands. Underline thickness grows as the vertical size of the character grows.

This command and the Select Print Mode(s) command (1B 21) turn underline on and off in the same way.

Exceptions

This command is ignored if *n* is out of the specified range.

This command does not affect HRI characters.

Copy character set from ROM to RAM

ASCII   ESC : 0 0 0
Hexadecimal   1B 3A 30 30 30
Decimal   27 58 0 0 0

Default: Current active ROM code page

Copies characters in the active ROM set to RAM. Use this command to re-initialize the user-defined character set. Code page 437 is copied by default at initialization.

This command is ignored if current font is the user font. This command only works on the slip station.

Related information

To modify characters in one of the character set variations, such as rotated print, select one of the rotated print commands, copy to RAM, then use the define user-defined character set command (1B 26).

Cancel user-defined character

ASCII   ESC ? n
Hexadecimal   1B 3F n
Decimal   27 63 n

Value of n: Specified character code.

Range of n: 32–255

Cancels the pattern defined for the character code specified by n. After the user-defined character is canceled, the corresponding pattern from current active ROM code page is printed.

User-defined characters can be cancelled for each pitch independently by selecting the pitch using the 1B 21 command.

Exceptions

This command is ignored if n is out of range or if the user-defined character is not defined.

Select or cancel emphasized mode

ASCII   ESC E n
Hexadecimal   1B 45 n
Decimal   27 69 n

Value of n: 0 (bit 0) not selected
                   1 (bit 0) selected

                   (When 0 and 1 are the least
                   significant bit, LSB)

Range of n: 0-255

Default: 0 (Off)

Starts or stops emphasized printing on the slip and receipt until the printer is initialized, reset, or powered off. The printer is reset to the standard print mode after a clear printer (0x10) command is received.

In emphasized mode on the slip, each line is printed twice to improve penetration of multi-part forms and increase print contrast. The second pass is printed the same direction as the first to ensure accuracy of the overprint. Printing speed decreases due to the second printing pass.

Exceptions

Only the lowest bit of n is effective. Emphasized printing cannot be used with bit-images or downloaded bit-images.

This command does not affect HRI characters.

Related information

This command and the select print mode(s) command (1B 21) function identically. They should have the same setting when used together.

Select or cancel double-strike

ASCII	ESC G *n*
Hexadecimal	1B 47 *n*
Decimal	27 71 *n*

Value of *n*:	0 = Off
	1 = On
	(When 0 and 1 are the least significant bit, LSB)
Default:	0 (Off)

Turns double-strike mode on or off until the printer is initialized, reset, or powered off. Identical to emphasized mode. The printer is reset to the standard print mode after a clear printer (0x10) command is received.

Exceptions

Only the lowest bit of *n* is effective. The settings do not apply in page mode. However they can be set or cleared in page mode.

Double-strike printing cannot be used with bit-images or downloaded bit-images.

This command does not affect HRI characters.

Related information

This command and the select print mode(s) command (1B 21) function identically. They should have the same setting when used together.

Select or cancel italic print

ASCII	ESC I *n*
Hexadecimal	1B 49 *n*
Decimal	27 73 *n*

Value of *n*:	0 = Off
	1 = On
	(When 0 and 1 are the least significant bit, LSB)
Default:	0 (Off)

Turns italic print mode on or off. The printer is reset to the standard print mode after a clear printer (0x10) command is received.

Exceptions

This command only works on the receipt station.

Only the lowest bit of *n* is valid.

Select international character code

ASCII	ESC R *n*
Hexadecimal	1B 52 *n*
Decimal	27 82 *n*

Value of *n*:

0 = Code Page 437

1 = Code Page 850

2 = Code Page 852

3 = Code Page 860

4 = Code Page 863

5 = Code Page 865

6 = Code Page 858

7 = Code Page 866

8 = Code Page 1252

9 = Code Page 862

0A = Code Page 737

0B = Code Page 874

0C = Code Page 857

0D = Code Page 1251

0E = Code Page 1255

0F = Code Page KZ_1048

10 = Code Page 1256

11 = Code Page 1250

12 = Code Page 28591

13 = Code Page 28592

14 = Code Page 28599

15 = Code Page 28605

16 = Code Page 864

17 = Code Page 720

18 = Code Page 1254

19 = Code Page 28596

1A = KATAKANA

1B = Code Page 775

1C = Code Page 1257

1D = Code Page 28594

FD = UTF-8 with bidrectional support *takes longer to process, use as needed

FE = UTF-8 left-to-right only

Default: 0 (Code Page 437)

Selects the character set to be used until the printer is initialized, reset, or powered off. Look in "Appendix B: Resident Character Sets" in this programming guide for the character sets. The alphanumeric characters (0x20-0x7F) are the same for each set.

There are two codes for this command (see select international character set, 1B 74 n). Both codes perform the same function.

Select or cancel 90 degree clockwise rotated print

ASCII	ESC V *n*
Hexadecimal	1B 56 *n*
Decimal	27 86 *n*

Value of *n*:	0 = Cancel
	1 = Set

Default:	0 (Cancel)

Rotates characters 90 degrees clockwise. The command remains in effect until the printer is initialized, reset, powered off, or until a clear printer (0x10) or rotated print (1B 12) command is received. See summary of rotated printing in this document.

This command does not affect HRI characters.

Select international character set

ASCII:	ESC t *n*
Hexadecimal:	1B 74 *n*
Decimal:	27 116 *n*

Value of *n*:

0 = Code Page 437

1 = Code Page 850

2 = Code Page 852

3 = Code Page 860

4 = Code Page 863

5 = Code Page 865

6 = Code Page 858

7 = Code Page 866

8 = Code Page 1252

9 = Code Page 862

0A = Code Page 737

0B = Code Page 874

0C = Code Page 857

0D = Code Page 1251

0E = Code Page 1255

0F = Code Page KZ_1048

10 = Code Page 1256

11 = Code Page 1250

12 = Code Page 28591

13 = Code Page 28592

14 = Code Page 28599
15 = Code Page 28605
16= Code Page 864
17 = Code Page 720
18 = Code Page 1254
19 = Code Page 28596
1A = KATAKANA
1B = Code Page 775
1C = Code Page 1257
1D = Code Page 28594
FD = UTF-8 with bidrectional support *takes longer to process, use as needed
FE = UTF-8 left-to-right only

Default: 0 (Code Page 437)

Selects the character set to be used until the printer is initialized, reset, or powered off. Look in "Appendix B: Resident Character Sets" in this programming guide for the character sets. The alphanumeric characters (0x20-0x7F) are the same for each set.

There are two codes for this command (See "Select international character code", 1B 52 n.) Both codes perform the same function.

Select or cancel upside-down print mode

ASCII   ESC { *n*
Hexadecimal   1B 7B *n*
Decimal   27 123 *n*

Value of *n*:   0 = Cancel
                    1 = Set

Default: 0 (Cancel)

Prints upside-down characters until the printer is initialized, reset, or powered off. The command may be combined with clockwise rotated print (1B 56) or counter-clockwise rotated print (1B 12). The character order is inverted in the buffer so text is readable. Only bit 0 is used. Bits 1-7 are not used. See summary of rotated printing in this document for more information.

Exceptions

The command is valid only at the beginning of a line. It cannot be used with right side up characters on the same line.

Select character size

ASCII	GS ! *n*
Hexadecimal	1D 21 *n*
Decimal	29 33 *n*

Value of *n*: 1–8 = vertical number of times active font
1–8 = horizontal number of times active font

Range of *n*: 00–07, 10–17, ...70–77

Default of *n*: 11 hexadecimal

Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 6, as follows:
With smoothing enabled, maximum value of 0 + *n* is 66.

Character width selection

Hex	Decimal	Width
00	0	1 (normal)
10	16	2 (two times width)
20	32	3 (three times width)
30	48	4 (four times width)
40	64	5 (five times width)
50	80	6 (six times width)
60	96	7 (seven times width)
70	112	8 (eight times width)

Character height selection

Hex	Decimal	Height
00	0	1 (normal)
01	1	2 (two times height)
02	2	3 (three times height
03	3	4 (four times height)
04	4	5 (five times height)
05	5	6 (six times height)
06	6	7 (seven times height)
07	7	8 (eight times height)

This command is effective for all characters (except for HRI characters) and is effecitve until the printer is initialized, reset, or powered off.

In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90 degree clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.

In page mode, vertical and horizontal directions are based on the character orientation. When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline. When characters are englarged width-wise, the characters are enlarged to the right, starting from the left side of the character.

The select print mode (1B 21 *n*) command can also select or cancel double-width and double-height modes. However, the setting of the last received command is effective.

Exceptions

If *n* is out of the defined range, this command is ignored. This command is only valid for the receipt station.

In native mode, the vertical direction is limited to 7 (seven times height) when Tall or ColorPOS® font is selected. If 8 (eight times height) is selected, the results are unspecified.

Select or cancel white/black reverse print mode

ASCII	GS B *n*
Hexadecimal	1D 42 *n*
Decimal	29 66 *n*

Value of *n:* 0 = Off
1 = On

(When 0 and 1 are the least significant bit, LSB)

Range of *n*: 0–255

Default: 0 (Off)

Turns on white/black reverse print mode. In white/black reverse print mode, print dots and non-print dots are reversed, which means that white characters are printed on a black background. When the white/black reverse print mode is selected it is also applied to character spacing which is set by right-side character spacing (1B 20).

This command can be used with built-in characters and user-defined characters, but does not affect the space between lines.

White/black reverse print mode does not affect bit image, downloaded bit image, bar code, HRI characters, and spacing skipped by horizontal tab (09), set absolute starting position (1B 24 …), and set relative print position (1B 5C).

White/black reverse print mode has a higher priority than underline mode. When underline mode is on and white/black reverse print mode is selected, underline mode is disabled, but not canceled.

Bar codes, logos, and bit images are not affected by this command.

Exceptions

Only the lowest bit of *n* is valid. This command is only valid for the receipt station.

Related information

If the current color is not black and two-color paper is loaded, no visible effect takes place.

Set smoothing

ASCII	GS b *n*
Hexadecimal	1D 62 *n*
Decimal	29 98 *n*

Value of *n*: 0 = smoothing off
1 = smoothing on

Default: 0 (Off)

Turns smoothing mode on or off for the quadruple or larger sizes of characters.

Reverse color text mode (ColorPOS®)

ASCII	GS 0x85 *m n*
Hexadecimal	1D 85 *m n*
Decimal	29 133 *m n*

Value of *m:*   0 = white
1 = black
2 = paper color

Value of *n:*   0 = white
1 = black
2 = paper color

Default: *m* = 0 (off)

Sets a mode for reverse printing effects on text. The background color is specified by m, while the text color is specified by n. Setting m = 0 turns off the mode.

If *m = n* but not zero, the printer produces solid printing in the given color. This tactic can be used to minimize the firmware busy work.

The value of current color and white/black reserve print mode is superceded by the value of *n* whenever this mode is on (*m*>0).

Bar codes, logos, and bit images are not affected by this command.

Text strike-through mode (ColorPOS®)

ASCII	GS 0x8D *n m*
Hexadecimal	1D 8D *n m*
Decimal	29 141 *n m*

Value of *m:*   0 = retain same color as the character itself
1 = black
2 = paper color

Value of *n:*   standard cell height

Default: *n* = 0 (off)

Prints a strike-through over characters. If the strike-through is as wide as the cell height, this will produce a cell that will be printed as a solid current color.

When characters are greater than normal size, such as double-high, the number of character rows claimed by *n* also increases proportionally, such as doubling for double-high cells. Location of the strike-through on a cell is on a cell-by-cell basis, so mixing cell sizes on the same print row will give uneven results.

Select superscript or subscript modes

ASCII	US ENQ *n*
Hexadecimal	1F 05 *n*
Decimal	31 05 *n*

Value of *n:*   0 = Normal character size
1 = Select subscript size
2 = Select superscript size

Default: 0 (normal size)

Turns superscript or subscript modes on or off. This attribute may be combined with other characters size settings commands (12, 13, 1B 21 *n*, 1D 21 *n*,…)

Exceptions

This command is only available on the receipt station.
This command is ignored if *n* is out of the specified range.

Select active user-defined character set

Selects user-defined character set number for download or printing. The default at power on is 0.

ASCII	US *i n*
Hexadecimal	1F 69 *n*
Decimal	31 105 *n*

n = 0 - 127

Set high order bit of *n* to configure user-defined character set number as the default. To configure the printer to print from the user-defined character set at power, send 1F 03 0F 01 and reset the printer. Information will print on the first diagnostic page.

Download font list

ASCII	GS 0xF0 0xC0
Hexadecimal	1D F0 C0
Decimal	29 240 192

Print downloaded font information.

Configure use of font set

ASCII	US ETX 0x45 FSID
Hexadecimal	1F 03 45 FSID
Decimal	31 03 69 FSID

Value of FSID: font ID

00 = 24 high

01 = Tall font

02 = Color POS font

03 = paper-saving font (18 high)

04 - 0xFF = user configurable

This command configures a font set to be used all of the time (over power cycles).

Configure line spacing

ASCII	US ETX 0x46 *n*
Hexadecimal	1F 03 46 *n*
Decimal	31 03 70 *n*

Value of *n*:   1-byte #dot rows per print line

1 = 6 dpi

2 = 6.77 dpi

3 = 7.52 dpi

4 = 8.13 dpi

5 -FF = reserved

This command configures the line spacing for resident and downloaded font sets.

Double-byte fonts

Five double-byte fonts are available for use on the A776II Series printer: Simplified Chinese, Traditional Chinese, Kanji, Korean and Thai.

The Thai font (Code Page 874) is already available as a resident code page.

The commands needed for downloading the fonts are described below in the order of use. Before downloading Simplified Chinese, Traditional Chinese, Kanji, or Korean , the expanded flash memory allocation must be set up to expand the size of the permanent font space. For Simplified Chinese, 2.2 Meg of space is required. Traditional Chinese requires 1.3 Meg. Kanji requires 1 Meg, and Korean requires of 1 Meg of space in the permanent font area.

If the A776II is set to Unicode, the Vietnamese character set is available.

Lock permanent font flash area

ASCII	GS 0xF0 0x10 *n*
Hexadecimal	1D F0 10 *n*
Decimal	29 240 16 *n*

Value of n:	*n* = 0x00	lock permanent font flash (default)
	n = 0x01	unlock permanent font flash to erase or delete

This command allows or prevents the permanent font area to be erased.

Note: *This only affects the 1D 40 33 commands and downloading a font to permanent font area when a font already exists with the same ID.*

Erase user flash sector

ASCII	GS @ *n*
Hexadecimal	1D 40 *n*
Decimal	29 64 *n*

Value of *n*:   51

_n_ = 49 (ASCII _n_ = 1) HEX 31

This command erases all 64K Flash Memory sectors allocated to user-defined character and logos storage in Flash.
Those sectors should be erased only in one situation: when the logo definition area is full and an application is attempting to define new logos. In both cases, all logos and character set definitions are erased and must be redefined.

_n_ = 50 (ASCII _n_ = 2) HEX 32

This command erases all sectors available for user data storage.

_n_ = 51 (ASCII _n_ = 3) HEX 33

This command erases all sectors available for permanent fonts. The area must be unlocked first using the 1D F0 10 01 command above.

Erases a page of flash memory and sends a carriage return when the operation is complete, or a NAK if erase fails.

Related information

See command "Flash memory user sectors allocation" (1D 22 55 n1 n2).
See also command "Expanded flash memory allocation" (1D 22 80...) and "Select flash area" (1D 22 81 n).

Important: *While erasing flash memory, the printer disables all interrupts, including communications. To provide feedback to the application, the printer responds to the application when the erase is complete with a 0D (Hex). After sending the erase user flash sector (1D 40 n) command, an application should wait for the response from the printer before sending data. Otherwise, data will be lost. If an application is unable to receive data, it should wait a minimum of ten seconds after sending the erase user flash sector (1D 40 n) command before sending data.*

Select font ID number

ASCII   GS 0xF0 0x01 *n*
Hexadecimal   1D F0 01 *n*
Decimal   29 240 1 *n*
Value of n: 128 - 255

Select font ID number for downloaded font.

This command is sent before downloading the map file for a specific font. Each font ID has one map file to download.

This command is also sent to select a downloaded font at run time.

Font ID	Font
C3 (hex)	Traditional Chinese
D3 (hex)	Simplified Chinese
CB (hex)	Kanji
CE (hex)	Korean

Select font style number

ASCII   GS 0xF0 0x02 *n*
Hexadecimal   1D F0 02 *n*
Decimal   29 240 2 *n*

Value of n: 0 - 255

Select font style number for downloaded font. After selecting font style number, set the horizontal and vertical character spacing for the characters.

This command is sent before downloading the map file for a specific font. Each font ID can have multiple styles. For example, two different styles could be 16 x 16 Gothic and 24 x 24 Gothic, or three different styles could be 16 x 16 Gothic, 16 x 16 Ariel, and 16 x 16 Courier. Each style number within a font has one character definition file.

This command is also sent to select a downloaded font style at run time.

Save font ID number as default font at power up

ASCII   GS 0xF0 0x03
Hexadecimal   1D F0 03
Decimal   29 240 3

Save current font ID number as default font at power up. All characters will be printed from the downloaded font.

Get double-byte font CRC (font ID)

ASCII   GS 0xF0 0x20 *nn*
Hexadecimal   1D F0 20 *nn*
Decimal   29 240 32 *nn*

This command queries the double-byte font CRC where *nn* is the fontset ID. The printer transmits ACK (0x06) followed by the two-byte CRC; otherwise, returns a NAK (0x15) followed by two bytes of zero (0x00).

Get double-byte font CRC (font ID and font style)

ASCII   GS 0xF0 0x20 *nn mm*
Hexadecimal   1D F0 21 *nn mm*
Decimal   29 240 33 *nn mm*

This command quires the double-byte font CRC where *nn* is the font ID and *mm* is the font style. The printer transmits ACK (0x06) followed by the two-byte CRC; otherwise, returns a NAK (0x15) followed by two bytes of zero (0x00).

Download font

ASCII	GS 0xF0 0x80 followed by file
Hexadecimal	1D F0 80
Decimal	29 240 128

This command is the sequence introducer for downloading existing files.

The downloaded font is always stored in the permanent font area of flash. If there is not enough memory in the permanent font area to store the file the printer returns NACK.

When the file is downloaded the printer returns ACK.

If the file contents are incorrect the printer returns NACK. File format to be described in appendix.

So the full sequence for downloading files as font ID CB would be:

```
1D F0 01 CB
1D F0 80          followed by map file shftjis.chr
1D F0 02 01
1B 20 n           for horizontal character spacing
1B 33 n           for vertical character spacing
1D F0 80          followed by character definition file shftj16.chr
1D F0 02 02
1B 20 n           for horizontal character spacing
1B 33 n           for vertical character spacing
1D F0 80          followed by character definition file shftj24.chr
```

Graphics

These commands are used to enter and print graphics data and are described in order of their hexadecimal codes, unless otherwise noted.

Download BMP logo

ASCII:	ESC (+*.BMP file)
Hexadecimal:	1B (+*.BMP file)
Decimal:	27 66 77(+*.BMP file)

Value:	Maximum width = 576
	Maximum height = 512

Enters a downloaded BMP logo into RAM or flash.

The downloaded BMP logo can be printed by using the print downloaded bit image (1D 2F m) command.

To downloaded BMP file to save it as a logo, send the hexadecimal code 1B followed by the whole BMP file.

The printer decodes the BMP file header and will save the image data after checking important parameters, such as:

- Width
- Height
- Number of colors (only monochrome images are accepted)

BMPs and bit images continue to be definable only for the receipt station. However, there is no longer an automatic erasure whenever the user downloads a character set (as happened previously) as well as in the case where the current logo was never set > 0, (the automatic erasure if user flash memory had filled up with inactive logo 0 definitions upon next power cycle). Warnings about the effect of running out of defined logo space during a download apply (i.e. the command is ignored). The application is required to manage user data space, downloaded font space, and logo space.

After downloading a logo to the printer, wait 100ms to allow the printer time to write the logo to flash.

Exceptions

This command is valid only for the receipt station.

BMP file images that are not monochrome are put into the print buffer.

Related information

Microsoft BMP bitmap file format.

Select bit image mode

ASCII	ESC * *m n*1 *n*2 *d*1 ... *d*n
Hexadecimal	1B 2A *m n*1 *n*2 *d*1 ... *d*n
Decimal	27 42 *m n*1 *n*2 *d*1 ... *d*n

Value of *m*:

RECEIPT STATION

Value of *m*	Mode	No. of dots (vertical)	No. of dots (horizontal)	No. of dots/line
0	8-dot single-density	8 (68 DPI)	0–288 (101 DPI)	8 x 288
1	8-dot double-density	8 (68 DPI)	0–576 (203 DPI)	8 x 576
32	24-dot single-density	24 (203 DPI)	0–288 (101 DPI)	24 x 288
33	24-dot double-density	24 (203 DPI)	0–576 (203 DPI)	24 x 576
49	Line Graphics			

SLIP STATION

Value of *m*	Mode	No. of dots (vertical)	No. of dots (horizontal)
0	8-dot single-density	8 (72 DPI)	210 (70 DPI)
1	8-dot double-density	8 (72 DPI)	420 (140 DPI)

Value of *n:*

Value of *n* (8-dot single/Line Graphics)	Value of *n* (24-dot single)	Value of *d*
n1 + (256 x n2)	3 x [n1 + (256 x n2)]	Number of bytes of data*

*Printed left to right (8-dot mode); printed down then across (24-dot mode), bit gets printed to 1 and not printed to 0

Formulas

8-dot single-density= *n*1 + (256 X *n*2)
24-dot single-density= 3 X [*n*1+ (256 X *n*2)]
Line Graphics= *n*1 + (256 X *n*2)

Sets the print resolution and enters one line of graphics data into the print buffer. Excess data is accepted but ignored. Any print command is required to print the data, after which the printer returns to normal processing mode.

The bit image is not affected by emphasize, double-strike, underline, character size, reverse printing, or 90 rotation, but is affected by upside-down printing mode.

In page mode, a starting position of upper right or lower left results in rotated bit-image data printing.
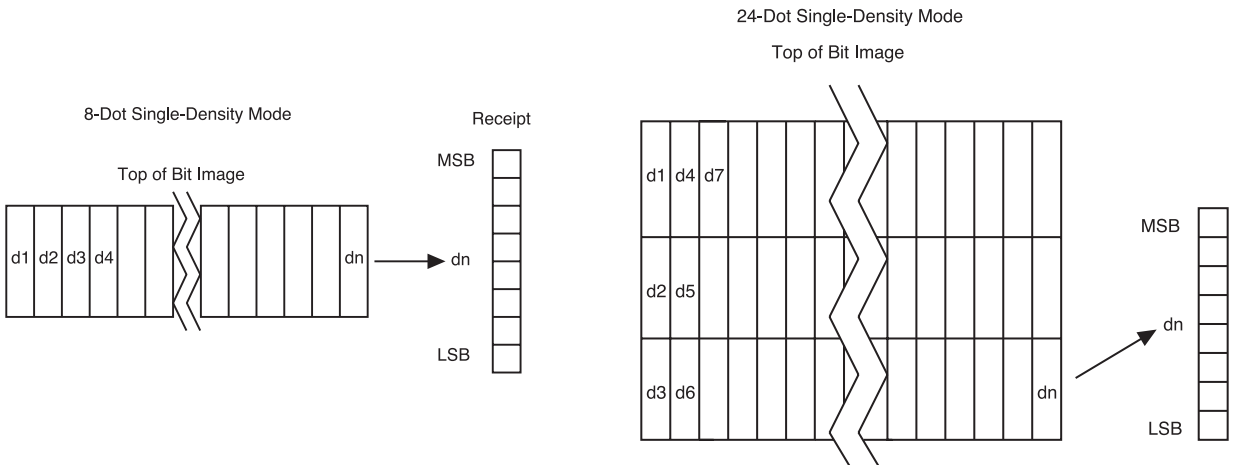
Turn on/off TIFF compression

ASCII	ESC * b m *n*
Hexadecimal	1B 2A 62 6D *n*
Decimal	27 42 98 109 *n*

Range of *n*:   0, 2, 48, 50

Turns the TIFF compression on (n = 2, 50), or off (n = 0, 48). Default off (n = 0).

Print advanced raster graphics

ASCII	ESC . *m n rL rH d1 … dn*
Hexadecimal	1B 2E *m n rL rH d1 … dn*
Decimal	27 46 *m n rL rH d1 … dn*

Value of *m:*   horizontal offset from left margin = 8 x *m* dots

Value of n*:*   number of data bytes that compose the raster

Value of r*:*   number of times the raster has to be printed =256 x *rH* + *rL*

d1 … dn: data bytes

Range: $0 <= m <= 72$
$0 <= n <= 72$
$0 <= r <= 65535$
$0 <= d1 … dn <= 255$

Prints a horizontal raster of graphics data one or multiple times. Horizontal offset and number of data bytes are variable and specified by parameters.

Exceptions

Advanced raster graphics is not available in page mode.

Select single-density graphics

ASCII	ESC K *n*1 *n*2 *d*1 ... *d*n
Hexadecimal	1B 4B *n*1 *n*2 *d*1 ... *d*n
Decimal	27 75 *n*1 *n*2 *d*1 ... *d*n

Value of *n:*

Value of *n* (8-dot single-density mode)	Value of *d*
n1 + (256 x n2)	Number of bytes of data (printed down, then across)

Enters one line of 8-dot single-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. Single-density mode allows 0–288 dot columns. The number of bytes sent is represented by the formulas in the table.

Each bit corresponds to two horizontal dots. Compare to set bit image mode (1B 2A, m = 0) earlier in this document.

Select double-density graphics

ASCII   ESC Y *n*1 *n*2 *d*1 ... *d*n
Hexadecimal   1B 59 *n*1 *n*2 *d*1 ... *d*n
Decimal   27 89 *n*1 *n*2 *d*1 ... *d*n

Value of *n:*

Value of *n* (8-dot single-density mode)	Value of *d*
n1 + (256 x n2)	Number of bytes of data (printed down, then across)

Enters one line of 8-dot double-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. Double-density mode allows 0–576 dot columns. The number of bytes sent is represented by the formulas in the table.

Each bit corresponds to one horizontal dot. Compare to set bit image mode (1B 2A, m=1) earlier in this document.

Select the current logo (downloaded bit image)

ASCII   GS # *n*
Hexadecimal   1D 23 *n*
Decimal   29 35 *n*

Range of *n:*   0 – 255

Default: 0

Selects a color or monochrome logo to be defined or printed. The active logo *n* remains in use until this command is sent again with a different logo *n*.

When this command precedes a logo definition, that definition is stored in flash or RAM memory as logo *n*. If there is already a different definition in flash memory for logo *n*, the first is inactivated and the new definition is used. The inactive definition is not erased from flash and continues to take up space in flash memory.

When this command precedes a logo print command and *n* is different from the previously active logo selected, the printer retrieves the logo definition for *n* from flash or RAM memory and prints it. If there is no definition for logo *n*, then no logo is printed.

In the case of a previously existing application that expects only one possible logo, the printer will not receive the select current logo (1D 23 *n*) command. In this case, the printer assigns 0 as the active logo identifier. It automatically stores any new logo definition in flash memory as logo 0, inactivating any previous logo 0 definition. If the flash memory space available for logos fills up with inactive logo 0 definitions, the firmware erases the old definitions at the next power cycle. This is the only case in which the printer erases flash memory without an application command.

In the case of a new application using multiple logos, the select current logo (1D 23 *n*) command is used. After that, the printer no longer automatically erases the logo definition flash memory page when it fills with multiple definitions. A new application using multiple logos, writing a user-defined character set into flash memory, or both, is responsible for erasing the logo and user-defined character set flash memory page when the logo area is full or before a new character set is defined.

Exception

This command is only valid for the receipt station. However, it will be processed correctly, regardless of whether the receipt station is currently selected.

Define downloaded bit image

ASCII   GS * $n1$ $n2$ $d1$ ... dn]
Hexadecimal   1D 2A $n1$ $n2$ $d1$ ... dn]
Decimal   29 42 $n1$ $n2$ $d1$ ... dn]

Value of n:

Value of $n1$	Value of $n2$	Value of d
1–72 (8 x n1 = number of horizontal dot columns)	1–64 (number of vertical bytes)	Bytes of data (printed down, then across) bit gets printed to 1 and not printed to 0

[1]The number of bytes sent is represented by the following formula:
$n = 8 \times n1 \times n2$ ($n1 \times n2$ must be less than or equal to 4608).

Enters a downloaded bit image (such as a logo) into RAM or flash with the number of dots specified by $n1$ and $n2$. If in RAM, the downloaded bit image is available until power is turned off or reset, another bit image is defined, or initialize printer (1B 40) command is received. This bit image will be saved as a monochrome logo indexed by current value that was last set by the select current logo command or 0 is a select current logo command had not yet been given.

The dowloaded bit image can be printed using the 1D 2F command.

See the illustration below for a graphic representation of the downloaded bit image.
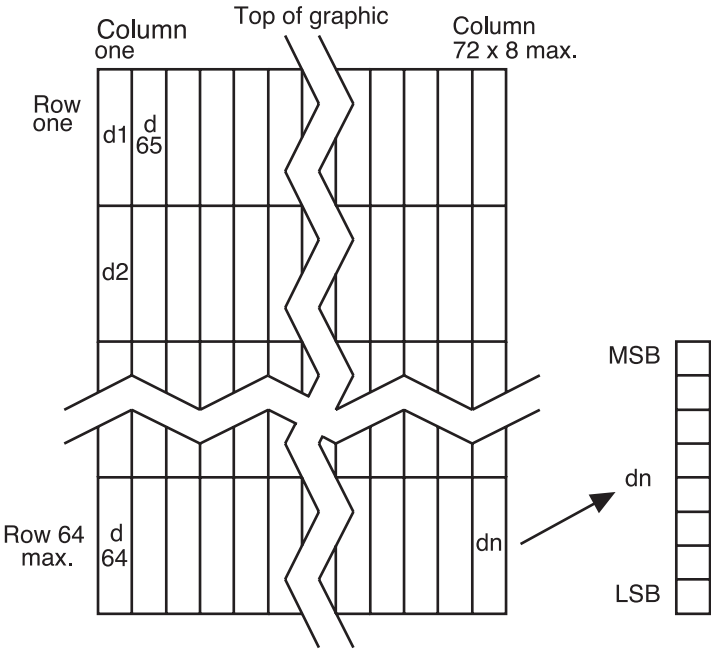
Print downloaded bit image

ASCII	GS / *m*
Hexadecimal	1D 2F *m*
Decimal	29 47 *m*

Value and range of *m*:

This command is used to print a previously stored monochrome or color logo (defined by 1D 2A) from printer memory on the receipt station. The logo is identified as the one indicated by the most recent select current logo command or 0 if a select current logo command has not yet been given. Parameter m is interpreted as follows:

Value of *m*	Print mode	Vertical DPI	Horizontal DPI
0	Normal	203	203
1	Double wide	203	101
2	Double high	101	203
3	Double wide/ Double high	101	101

The indexed downloaded bit image from RAM or flash will be printed on the receipt station at a size specified by *m*. If the bit image is a monochrome one, it is printed in the current color; otherwise it is printed as a two-color image. If doubling or quadrupling exceeds the print paper width maximums (576 or 640 with 82.5mm paper) the left side of the image is printed and the bits to the right of the maximum column are discarded. If the available width is greater than the bit image, its printing will adhere to any currently set right, left, or center justification. This command is ignored if the index refers to an undefined logo/ bit image.

Print raster graphics

This command is used to enter and print graphics data.

ASCII	DC1 n1 . . . n1
Hexadecimal	11 n1 . . . n72
Decimal	17 n1 . . . n1r

Value and range of *n*:   *n1* to *n72* /*n80* corresponds to one dot row data for a thermal receipt printer.

Each bit defines whether or not a dot of the current color will be printed. This command is used for printing a monochrome graphic in real-time. Offsets, page and any other modes or overlays, including watermark do <u>not</u> apply and are overridden by this command. A complete rendering of the intended final image should have been done by the application before sending the dot rows. If two-color paper is indicated by the set paper type command, then the raster will be printed in the color that is defined by the set current color command.

Print raster monochrome graphics (ColorPOS®)

ASCII	GS 0x82 *n1…..n72* (576 dots) for 80 mm paper
Hexadecimal	1D 82 *n1…..n72* (576 dots) for 80 mm paper
Decimal	29 130 *n1…..n72* (576 dots) for 80 mm paper

ASCII	DC1 *n1…..n72* (576 dots) for 80 mm paper
Hexadecimal	11 *n1…..n72* (576 dots) for 80 mm paper
Decimal	17 *n1…..n72* (576 dots) for 80 mm paper

Value and range of *n:* *n1* to *n72* corresponds to one dot row data for a thermal receipt printer.

Each bit defines whether or not a dot of the current color will be printed. This command is used for printing a monochrome graphic in real-time. Offsets, page and any other modes or overlays, including watermark do <u>not</u> apply and are overridden by this command. A complete rendering of the intended final image should have been done by the application before sending the dot rows. If two-color paper is indicated by the set paper type command, then the raster will be printed in the color that is defined by the set current color command.
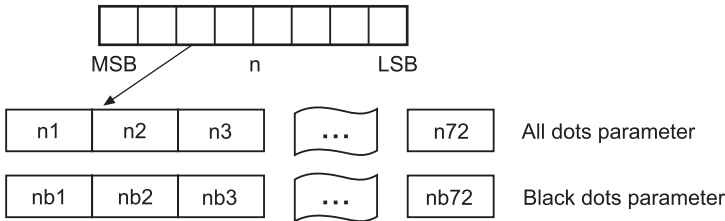
Print raster color graphics (ColorPOS®)

ASCII	GS 0x83 *n1…..n144* (576 dots 80mm paper)
Hexadecimal	1D 83 *n1…..n144* (576 dots 80mm paper)
Decimal	29 13 *n1…..n144* (576 dots 80mm paper)

Value and range of *n:* *n1* to *n144* corresponds to one dot row data.

For each printed dot row starting at the top left, two-part bit strings are used to define (in the first half), all dots that are of either color (i.e. not white). The second half string defines only the dots where the color = black. Thus all dots which are on in the first half string but not on in the second half string, select the secondary color. The parameter of this command is thus a string of bytes for one dot row with the same structure as defined for the thermal color format file given in the download color logo command.

This command is used for printing a single raster of color graphics in real-time. Offsets, page and any other modes or overlays, including watermark, and current color do not apply to this command. A complete rendering of the intended final image has to be done by the application before sending the dot rows.

Download logo image (ColorPOS®)

ASCII   GS 0x84 *m n1 n2 d1…..dx* , *x* = (n1 * n2*8) * m
Hexadecimal   1D 84 *m n1 n2 d1…..dx* , *x* = (n1 * n2*8) * m
Decimal   29 132 *m n1 n2 d1…..dx* , *x* = (n1 * n2*8) * m

Value of *m*:   1 = monochrome
                       2 = two-color

Max *n1* =   576/8 for 80mm paper

The latest value from the set current logo command will be the logo index to be used to store the downloaded graphic.

m identifies whether the image is monochrome (which requires one parameter bit row description) or two-color, which requires a pairing of bit descriptions for each row.

*n1 * n2* define a rectangular image *n1 bytes* wide and *n2 bytes* long. *n1*8* specifies the number of dot columns, and *n2*8* the number of dot rows. That is, each row is defined by an integral number of bytes and the number of rows is also an integral number of bytes. Note that *n2* can be any length, subject to memory space availability.

For each color dot row starting at the top left, a two part parameter byte string is used to define first, all dots that are not white, and the second half defines all dots where the color = black. Thus all dots that are on (=1) in the first half but not on in the second half select the paper-color. A sequence of these raster row strings is used to specify the complete logo. In the monochrome case, only one bit is needed per row. This is the same structure as used for the definitions of print raster monochrome graphics and print raster color graphics.

This command is used for storing a logo of *n1* by *n2* size indexed by the current logo value.

After downloading a logo to the printer, wait 100ms to allow the printer time to write the logo to flash.

Print Flash Logo

ASCII   FS p *n m*
Hexadecimal   1C 70 *n m*
Decimal   28 112 *n m*

Print flash logo ID n using mode m. See command 1D 2F m for description of mode m. See command 1C 71 for description of n. The select slip command x/C must be disabled via 1F 03 38 00 to use this logo command.

Define Flash Logos

ASCII   FS *q n* [xL xH yL yH d1 …dk]1…[xL xH yL yH d1 …dk]*n*
Hexadecimal   1C 71 *n* [xL xH yL yH d1 …dk]1…[xL xH yL yH d1 …dk]*n*
Decimal   28 113 *n* [xL xH yL yH d1 …dk]1…[xL xH yL yH d1 …dk]*n*

Define *n* flash logos specified by IDs 1 through *n*. Maximum size of logos is determined by amount of flash allocated to logos. See command 1D 22 80… for flash allocation. The select slip command x/C must be disabled via 1F 03 38 00 to use this logo command.

0 < xH:xL < 1024   max printable xH:xL = 72 = 576 dots wide

0 < yH:yL < 256

For each logo definition: xH:xL times 8 dots in the horizontal direction, yH:yL times 8 dots in the vertical direction. Total data definition bytes k = xH:xL times yH:yL times 8 bytes. See command 1D 2A x y … for description of data definition bytes arrangement.

During execution of this command printer turns off USM and Real Time status processing.
The printer goes busy when writing to flash. At the end of this command the printer resets.

Apply shading to logo (ColorPOS®)

ASCII   GS Ox8B *n m o*
Hexadecimal   1D 8B *n m o*
Decimal   29 139 *n m o*

This command will apply shading effect *m* to logo *n* and store it at index *o*, also extending width to full horizontal size if logo n is not at full paper width.

n must be the index value of an existing logo

0 <= *m* <= 100, possibly resulting in a logo suitable for background watermark mode use

o can be any value, and the logo will be placed according to the current setting of user storage into RAM or flash memory.

An application might use a high value of *m* to shade out the logo if the original image has a significant number of "on" dots to allow for future foreground print readability.

Note: The old logo size and current justification mode are used to create a new logo image at full paper width size by filling in white space at either or both sides if needed. This new logo will provide for minimal performance impacts when it is selected for use in watermark mode.

After sending the shading command, wait 5 seconds to allow the printer to apply the shading and write the results to flash.

Merge watermark mode (ColorPOS®)

ASCII   GS Ox8C *n m*
Hexadecimal   1D 8C *n m*
Decimal   29 140 *n m*

Default   0 (off)

This command will insert the logo *m* as a repeated background image, similar to printing a visible watermark, into the print stream. The space between repetitions of this usually shaded logo will be every *n*8* dot rows.

n >0 = number of dot rows x8 to skip before repeating the merge action

m specifies the index value of the logo. If no logo has been defined with this index then the command is ignored.

Note: Horizontal placement of a watermark logo was fixed at the time the logo was Shaded or when it was downloaded as a full width logo for watermark use. This command will be ignored if the current logo is not at full paper width size (see the apply shading to logo command for preparing logos for watermark use).

The merge process is performed after all other image formation and takes whatever print raster data is ready to be put on paper. It "adds" (computer logic OR) the mono or color bits to the print row. Generally, if the print dot was to be white or same color as the watermark dot, the print dot will be the color of the watermark; otherwise it will be black.

Monochrome shade mode (ColorPOS®)

ASCII	GS 0x86 *m*
Hexadecimal	1D 86 *m*
Decimal	29 134 *m*

This applies a selected shade density to all monochrome objects such as text and monochrome logos. The parameter m specifies the shading effect and has an initial value of 0 which signifies no effect.

m specifies the percentage of shading, $0 <= m <= 100$.

m = 0 is the initial value and turns this mode off.

Note: *Only a few gradations will be perceptible, so large increments of m, such as 20, should be used. If a reverse print mode is on, the shade effect will be applied to the* <u>background only</u>.

When the current color mode is set to black, increasing values of *m* relate to the relative amount of (white) paper that replaces black dots. Analogously, when the paper-color is the current color, *m* defines the relative amount of color dots being "erased" by white originals of the paper.

Both text and monochrome graphics are affected by this command.

Turning monochrome shade mode on, turns color shade mode off.

Color shade mode (ColorPOS®)

ASCII	GS 0x87 *m*
Hexadecimal	1D 87 *m*
Decimal	29 135 *m*

This applies a mixing of color into any monochrome objects such as text and monochrome logos. Rather than fading away, this mode transitions a character or logo from the current color in which it would normally be printed to the other color. The parameter *m* specifies the shading effect and has an initial value of 0 which signifies no effect. *m* specifies the percentage of shading, $0 <= m <= 100$.

m specifies the percentage of shading, $0 <= m <= 100$.

m = 0 is the initial value and turns this mode off.

Note: *Only a few gradations will be perceptible, so large increments of m, such as 20, should be used. If a reverse print mode is on, the shade effect will be applied to the* <u>background only</u>.

When the current color mode is set to black, increasing values of *m* relate to the relative amount of paper-color that replaces black dots. Analogously, when the paper-color is the current color, *m* defines the relative amount of black color dots replacing the paper-color ones.

Both text and monochrome graphics are affected by this command.

Turning color shade mode on, turns monochrome shade mode off.

Logo print with color plane swap (ColorPOS®)

ASCII	GS 0x89 *n m*
Hexadecimal	1D 89 *n m*
Decimal	29 137 *n m*

This command will print logo *n*. The command is ignored if a logo with index *n* has not been defined. If *m* = 0 the color(s) as defined in the logo are used; if *m* = 1 and if the logo is a color one, then the two color planes (black and paper-color) in the logo are swapped.

Form and merge real time surround graphic (ColorPOS®)

ASCII	GS 0x90 *m x y o p q*
Hexadecimal	1D 90 *m x y o p q*
Decimal	29 144 *m x y o p q*

This command will print a real-time graphic style designated by *m*. *m* = 0 rectangle, *m* =1 oval, *m* =2 ellipse (if printed in a square area the ellipse becomes a circle), *m* = 3 is a 5 point star, *m* = 4 is a free hand underline, *m* = 5 is a free hand ellipse and other values of *m* reserved for future styles. This graphic is formed into a RAM based graphics buffer, and the buffer state is set to "graphic merge pending".

Whenever the buffer is in the pending merge state and print output is started, the state will be changed to frozen and a merge process started (logically OR-ed graphic data) into the print lines that follow. The application determines how close the graphic is to any printed character data by subsequent printing of blank lines or blank dot rows. The merge process stops when the buffer is exhausted or its state changed (by a save graphics buffer as logo or new form and merge real time surround graphics command). The form and merge real time surround graphics command can be given multiple consecutive times, allowing the application to set up a multi-polygon background before starting its printout with placed text or logo.

The geometric location points for this graphic are defined by a rectangular area start position of *x* bytes from the left edge and *y* bytes from the top of the new line and times *o* bytes wide times *p* bytes in length. For the case of *m* =3 (star), the value passed for *o* is also used as the implicit *p* value (passed *value* is ignored), i.e. a square area. The thickness of the graphic is defined by *q* dots. This will form a bit image in a RAM graphics buffer. Subsequent surround graphic commands can be added into (logical OR process) with expanded size if needed) the graphics buffer until an output action is issued.
It is expected that area left white will then be (usually) filled in with text or other data that is to be printed. Printing starts as soon as the first line of data or other printout arrives. After this printing is started, any new surround graphics commands will set the graphics buffer to a merge pending state. Example: *Create different size stars and an ellipse around a block of text.*

The graphics buffer is at a frozen state at printer initialization or reset, with blank data in it.

Each the time this command is given, the current color and shade mode values (if any) are used for the surround graphic, and may be changed before any subsequent surround graphics and/or printing output. This command may be used in page mode.

Save graphics buffer as logo (ColorPOS®)

ASCII	GS 0x91 *n*
Hexadecimal	1D 91 *n*
Decimal	29 145 *n*

This command will save all the raster data that is in the working graphics buffer (where surround graphics are formed) as a logo with index value *n*. This logo can then be used repeatedly for inserting different text. See the background logo print command.

There is one working graphics buffer in the printer; its size (and that of the saved logo) is of maximum print width size, and of sufficient length to store the largest of the surround graphic styles defined since the last buffer "freeze" event. This command is ignored if the graphics buffer is not in a "merge pending" state. The graphics buffer state will be set to "frozen" by this command.

Related information

This command is ignored in page mode.

Background logo print mode (ColorPOS®)

ASCII	GS 0x92 *n*
Hexadecimal	1D 92 *n*
Decimal	29 146 *n*

This command will place into the graphics buffer the logo designated by *n*. As soon as there is a print action command (such as text output) the graphics buffer will be merged (logical OR process) with print output.

This command sets the graphics buffer state to "merge pending", functioning and performing the save as in the form and merge real time surround graphics command.

Related information

This command is ignored in page mode.

Apply margin message mode (ColorPOS®)

ASCII	GS 0x99 *l m n o*
Hexadecimal:	1D 99 *l m n o*
Decimal:	29 155 *l m n o*

Value of *l*:   *l* is a binary switch:

> *l* = 0   disables margin message merging
> *l* = 1   enable left margin message merging
> *l* = 2   enable right margin message merging
> *l* > 2   ignore command

Value of *m*:   *m* is the ID (index) of the logo to be used in the merging. If a logo with index *m* does not exist or is wider than the print raster width then this command is ignored.

Value of *n*:   *n* is the number of raster rows to be empty (skipped) before repeating the designated margin message merge

Value of *o*:   *o* is a right – left toggle switch:

> *o* = 0 no toggling of the margin message merge
> *o* = 1 enable toggling, starting with a left margin message first
> *o* = 2 enable toggling, starting with a right margin message first
> *o* > 2 ignore entire command

This command performs a dynamic merge of a designated logo/margin message (or logo/margin message pair, which can be the same) into each raster line to be printed after the character data has been placed and in conjunction with any other active merge modes. The parameter *l* specifies whether merging should take place from the left side or the right side. A left side merge followed by a right side merge (or vice-versa) must be issued, with the latter side merge command setting the toggle switch = 1 or 2 will create the desired left – right printing effect. Each merge side retains its *n* value of raster rows to be skipped. If toggling is not selected when both sides are defined, then if the *n* skip row values are different, or the logo height sizes are different, the side logos will not line up as printing progresses. If toggling is selected then both left and right sides merge message(graphic) must be defined; otherwise toggling is ignored.

Each side logo can be > ½ of the raster print line. In that case the printing process is additive in the overlap region. This command with the first parameter *l* = 0 turns all margin message merging to off.

Shade and store logo (ColorPOS®)

ASCII	GS 0x9A *n m o*
Hexadecimal	1D 9A *n m o*
Decimal	29 154 *n m o*

Value of *n*:   *n* is ID (logo index value) of an existing logo in either flash or RAM memory

Value of *m*:   *m* is the % of shading to be applied to the logo, $0 <= m <= 100$.

Value of *o*:   *o* is the new ID (logo index value) to be used to store the shaded result, according to the current setting of user storage into flash or RAM.

This command applies shading to an existing logo of any size, storing the result in a new logo at index o. The new logo is thus better suited for use in a merging mode. The % of shading will have only a few perceptible gradations, so large increments (20 is suggested) should be used to achieve visibly distinct effects.

Logo print with knife cut

ASCII	GS 0x9B *m n*
Hexadecimal	1D 9B *m n*
Decimal	29 155 *m n*

Values of *m*:   0 = Standard size
1 = Double wide
2 = Double high
3 = Double high/wide

Value of *n*:   01 - FF (Hex)
# dot rows = n x 24
n = 5 is the recommended setting

Because the printhead and cutting knife are physically separated, it is necessary to advance the printed area of a receipt past the knife to avoid the last of the printing from being cut off. This advance of paper however, causes a blank space at the start of the next receipt that could be used. To utilize this space and reduce paper usage, this command starts to print a logo for the next receipt before initiating the cut at the end of the current receipt. At a set location during the printing of the logo, the corresponding paper advance is stopped and a paper cut performed.

The formula "n x 24" is used to determine the number of dot rows to move the paper from the start of the logo to the position of the cut.

If n x 24 is greater than the height of the logo, the logo height is used to determine the cut position. If n = 0 the cut is eliminated.

In order for this command to function properly, all commands used by legacy applications to move the end of the current receipt past the knife should be removed.

The command is available only in Native mode.

Related information

See "Print downloaded bit image" command.

Set temporary max target speed

ASCII	GS 0xA0 *nl nh*
Hexadecimal	1D A0 *nl nh*
Decimal	29

Values:	15 00 - 5E 01 monochrome
	15 00 - 96 00 color
	Max value is limited by the max speed setting of the printer

Default:	0 - normal speed

This command sets a specific speed for an operation, allowing the user more control of the print environment. The speed is maintained as long as it is less than the speed automatically set by power management. A parameter of zero (0) restores the normal max speed.

Set LogoEZ® colorization

ASCII	US ETX SYN *f s p/t t*
Hexadecimal	1F 03 16 *f s p/t t*
Decimal	31 03 22 *f s p/t t*

Value of *f:*	0 =	turn off all LogoEZ® colorization features
	1 =	link print logo after knife cut
	2 =	link watermark printing
	3 =	link margin message printing
	4 =	link logo print before cut

Default:	0	(Off)

This command configures into EEPROM (permanent configuration switch setting) a set of features that allows placement of a color logo in the header, full-time margin message printing, watermarking in the middle of the receipt and printing of a trailer color logo. These commands are triggered by any knife cut command (partial or full: 19, 1A, 1B 69, 1B 6D, 1D 56 *m n*). The printer when powered-up will (if set) activate the header, watermark, and margin message features and will be ready to print the body of a receipt. For selected features to print however, logos with defined index values of F0, F1, F2, F3 respectively must be saved in the flash memory.

The command is available only in Native mode. Once logos have been loaded and enabled they can be used in any emulation mode. Skip distances remain constant. Native mode must be used to turn the feature off.

Value descriptions:

f = function selector and defines which parameters are used :

    s = dot row space before object distance
    p = dot row past an object
    r = repetition space distance in mm
    t = margin message toggle mode

f = 0 turn off all LogoEZ® colorization functions (default). No other parameters are required.

f = 1 link print logo after knife cut – equivalent to printing a transaction header graphic.

    Example:
    Print logo (#F0) after a knife-cut with "*s*" dot row spacing before the logo and "*a*" dot row spacing after the logo
    (1F 03 16 01 *s p*).

    After executing a knife-cut command, if *s* > 0, execute the following:

    •   stop background merging (1D 9B 1 command)

    •   skip *s* (feed paper) dot rows (15 *s* command) – adds spacing in addition to any set by the application around a knife cut command

Continued . . .

- set centered justification (1B 61 1 command), saving the previous justification
- if the logo at F0h is currently defined, print logo by sending print downloaded bit image, normal size (1D 2F 0 command) without changing the value of current logo
- reset justification to previous value (1B 61 [previous value])
- skip (feed paper) "*p*" dot rows after logo (15 *p* command)

Since the normal space on the receipt paper after a knife cut is 18 mm (144 rows), no extra space is usually needed above the logo. The default value is *s* = 0 and turns off the *f* = 1 logo after knife-cut link.

_f_ = 2 link watermark printing

Example:
Activate watermark printing using logo #F1 (1F 03 16 02 *s r*) with "*s*" being the skip distance in dot rows before activation and "*r*" is the distance in mm between watermark repetitions.

After executing a knife-cut command and the *f* = 1 steps, if *s* > 0, execute the following:

- skip "*s*" (feed paper) dot rows (15 *s* command)
- set watermark printing to "on" using logo F1 (execute merge watermark mode -1D 8C *r* F1 command). Logo must be defined for F1 and comply with watermark mode requirements in order for this happen.
- stop background merging mode (1D 9B 1 command). Clears background for logos, barcodes, and captured images.

The watermarks feature is now activated (following an optional F0 logo) to start after each knife cut. Note that when printing graphic objects, merging is turned off by each knife cut. The default value is *s* = 0 and turns off the *f* = 2 watermark link.

No correlation exists (when both are set) between watermark and logo skip distances.

If the *f* = 4 logo link is undefined, you should set a null trailer logo with *s* = 1 and *p* = 144 (1F 03 16 04 1 90, no logo at index F3). This will turn off watermarks at the position of a knife cut and leave a clear space at the top of the next receipt.

_f_ = 3 link margin message printing

Example:
Activate margin message printing using logo #F2 (1F 03 16 03 *s r t*) with "*s*" being the skip distance, "*r*" the distance between repetitions and "*t*" the toggle mode.

Toggle mode values for *t*:
   0 = both left and right side
   1 = toggle sides, starting with left side
   2 = right side margin message only
   3 = left side margin message only

After executing a knife cut command and the *f*=1 steps, if *s* > 0, execute the following:

- skip "*s*" dot rows (=15 *s* command). When both watermark and margin message merging are defined, the respective "*s*" values are treated independently. The same value should be used to start watermark and margin message at the same place.
- Use the toggle mode values listed above to apply margin message for the left and/or right side. For margin messages on both sides, enter the 1D 99 1 F2 *p* 0 command followed by the 1D 99 *t'* F2 *r t'* (apply margin message) command with the message at index F2 defined.
- suspend background merging mode (=1D 9B 1 command), so any logos, barcodes, and captured images will print in the clear.

The margin message printing feature is activated after the header logo after a restart at each knife-cut. Note that when printing graphic objects, merging is turned off by each knife cut. No correlation exists (when both are set) between watermark and logo skip distances.

If the *f* = 4 logo link is undefined, you should set a null trailer logo with *s* = 1 and *p* = 144 (1F 03 16 04 1 90, no logo at index F3). This will turn off margin message at the position of a knife cut and leave a clear space at the top of the next receipt.

Continued . . .

***f* = 4**   link logo print before cut

Prints a logo after the skip distance of "*s*" before a logo and "*p*" past a logo and performs a knife cut
(1F 03 16 04 *s p*).

Immediately <u>before</u> executing a knife-cut command, if *s* > 0, execute the following:

* skip (feed paper) "*s*" dot rows (15 *s* command)
* stop background merging (1D 9B 1 command). Save previous background merging value, so logo prints in the clear
* set centered justification (1B 61 1 command), saving the previous justification
* if a logo at index F3h is currently defined, print the logo by sending print downloaded bit image, normal size
(1D 2F 0 command), without changing the value of current logo.
* reset justification to previous value (1B 61 [previous value])
* skip (feed paper) "*p*" dot rows (15 *p* command) a minimum value of 90h, to ensure knife cut occurs after the logo
* restore background merge suspension (1D 9B [previous value])

Related information

This command is utilized in the LogoEZ® utility. The utility can be used to pre-configure new printers with a default colorization setup without requiring any application changes. The default setup was designed to provide a general level of colorization features that would not affect the printer operation. You can expand beyond the default features of the utility by modifying the application at the host. However, do not attempt to modify the settings within the utility.

LogoEZ® utility default settings:

f = 1: *s* = 1H
          a = 30H

f = 2: *s* = 32H
          r = 19H

f = 3: *s* = 1H
          r = 7H
          t = 1H

f = 4: *s* = 30H
          a = A0H

Set LogoEZ® attribute mapping

ASCII	US ETX ETB *a m s*
Hexadecimal	1F 03 17 *a m s*
Decimal	31 03 23 *a m s*

Values:	*a* =	attribute map selector
	a , *m, s* = 0, 0, 0	turn off attribute mapping (all 3 bytes required)
	a = 1	selects first attribute mapping definition (of two available)
	a = 2	selects second attribute mapping definition
	a = 1 or 2, if *m* = 0	mapping 1 or 2, respectively, is turned off

A word (2 bytes) is used to identify the attribute mapping, with "*m*" bits 0 – 6 identifying which original attributes should be mapped:

Original attribute mapped table

m bit on	attribute mapped
0	Bold
1	Italic
2	Reverse
3	Underline
4	Double high
5	Double wide
6	Compressed print

The following *"s"* bits and "*m*" bit 7 set the attributes that substitute for the mapped set:

Attributes substituted table

m bit on	attributes substituted
7	Bold substituted
s bit on	**attributes substituted**
0	Italic
1	Reverse
2	Underline
3	Double high
4	Double wide
5	Compressed print
6	Alternate color
7	Color reverse

This command configures into EEPROM (permanent configuration switch setting) one or two combinations of character attribute mappings, including substitute attribute settings for color effects. The attributes of the character code are used to form the desired pixel character when the code is placed into the raster print buffer. An "*m*" bit value set to on in the "original attribute mapped table" above will have its attributes set to the corresponding bit value of "*s*" in the "attributes substituted table". If *m* = 0 then no substitution takes place.

Continued . . .

The command is available only in Native mode. Once attributes have been defined and enabled they can be used in any emulation mode. Native mode must be used to turn the feature off.

The operational theory of this command is that if (input character attributes) AND (original) = (original); then (output character attributes) = ([original] XOR [input character attributes]) OR (substituted). The input character's original attributes are mapped to the substituted attributes, but any attributes not specified for mapping are unchanged.

In the tables you will see that there are 7 input attributes and 9 outputs. It is expected that the alternate color attribute will be used most. For example, when the alternate color attribute is combined with the reverse substitution attribute, the result is white characters on a color background. The color reverse attribute without alternate color will print black text on a color background.

Any mappings utilizing compressed and/or double-wide attributes will effect the length of a line and could cause unintended line wraps. Mappings containing double-high attributes could cause unintended receipt lengths.

When both attribute mappings are set, processing is perform in order sequence. When two text attribute substitutions contain conflicting dependent remappings, the result is <u>undefined</u>.

Related information

This command is utilized in the LogoEZ® utility. The utility can be used to pre-configure new printers with a default colorization setup without requiring any application changes. The default setup was designed to provide a general level of colorization features that would not affect the printer operation. You can expand beyond the default features of the utility by modifying the application at the host. However, do not attempt to modify the settings within the utility.

$f = 1$: $s = 1H$
$a = 30H$

$f = 2$: $s = 32H$
$r = 19H$

$f = 3$: $s = 1H$
$r = 7H$
$t = 1H$

$f = 4$: $s = 30H$
$a = A0H$

Convert 6-dots/mm bitmap to 8-dots/mm bitmap

ASCII	US EOT n
Hexadecimal	1F 04 n
Decimal	31 04 n

Value:	0 = Off
	1 = On
	(When 0 and 1 are the LSB)
Default:	0 (Off)

Selects or cancels 6-dot/mm emulation mode.

When the 6-dot/mm emulation is selected, logos and graphics are expanded horizontally and vertically during download to emulate their size on a 6-dot/mm printer. The horizontal positioning commands also emulate positioning on a 6-dot/mm printer.

Enable constant speed logos

ASCII	US { *n*
Hexadecimal	1F 7B *n*
Decimal	31 123 *n*

Value: 0 = disable
          1 = enable

This command allows the firmware to determine the optimal speed to print a logo. It is set prior to downloading the logo and reset after the logo has been downloaded.

In general, "Set max target speed (1D A0 nl nh)" is the preferred command.

Status

Status command introduction

The A776II has three methods of providing status to the application. These methods are through batch status commands, real time status commands and unsolicited status mode. An application may use one or more of these methods to understand the current status of the printer. A brief description of each of these methods follows.

Batch status commands – These commands are sent to the printer and stored in the printer's buffer. Once the printer has processed all the previous commands these commands are processed and the proper status is returned to the application. In the event a condition causes the printer to go BUSY, it stops processing commands from the printer buffer. If a batch status command remained in the buffer during this busy condition, it would not be processed. In fact, no batch commands are processed while the printer is in this state.

Real-time commands – These commands are sent to the printer buffer. Periodically, when the printer has time, it scans the input buffer looking for these commands. When found by the printer, these commands are processed immediately. This gives the application the ability to query the printer when it is in a busy state in order to correct whatever fault has occurred.

Automatic status back or Unsolicited status mode– This mechanism allows the application developer to program the printer to automatically respond with a four byte status when certain conditions in the printer change.

Please see the subsequent sections for a more detailed description of these status commands. At the end of this status commands section is a page entitled "Recognizing data from the printer". This describes how to interpret what command or setting (in the case of unsolicited status mode) triggered a response from the printer.

Batch mode

For RS-232C printers, these commands enable the printer to communicate with the host computer following the selected handshaking protocol, either DTR/DSR or XON/XOFF. They are stored in the printer's data buffer as they are received, and are handled by the firmware in the order in which they are received.

When a fault occurs, the printer will go busy at the RS-232C interface and not respond to any of the batch mode printer status commands. If the fault causing the busy condition can be cleared, such as by loading paper, or letting the thermal printhead cool down, the printer will resume processing the data in its receive buffer.

Transmit peripheral device status (RS-232C printers only)

ASCII	ESC u 0
Hexadecimal	1B 75 0
Decimal	27 117 0

Value of returned byte:

Bit 0	Bit 1
1 = Drawer 1 Closed	1 = Drawer 2 Closed
0 = Drawer 1 Open	0 = Drawer 2 Open

Bits 2–7 are not used.

Transmits current status of the cash drawers. One byte is sent to the host computer. In DTR/DSR protocol, the printer waits for DSR = SPACE. If a drawer is not connected, the status will indicate it is closed.

Exceptions

The A776II has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

Transmit paper sensor status

ASCII	ESC v
Hexadecimal	1B 76
Decimal	27 118

Values:

Bit	Function	0 Signifies	1 Signifies
	Status Byte (RS-232C) - A776II		
0	Paper low	Not low	Low (only if paper low sensor is enabled)
1	Receipt cover	Closed	Open
2	Receipt paper	Present	Out
3	Knife position	Home position	Not home position
4	Not used	Fixed to zero	Fixed to zero
5	Slip leading	Not covered	Covered edge sensor
6	Slip trailing	Not covered	Covered edge sensor
7	Voltage/Temp	No error	Error

Sends status data to the host computer. The printer sends one byte to the host computer when it is not busy or in a fault condition. In DTS/DSR protocol, the printer waits for DSR = SPACE.

Related information

See busy line and fault conditions in the real time commands section of this document for details about fault condition reporting.

Transmit printer ID

ASCII	GS I *n*
Hexadecimal	1D 49 *n*
Decimal	29 73 *n*

Value of *n*:   1, 49 = Printer model ID
2, 50 = Type ID
3, 51 = ROM version ID
4, 52 = Logo Definition

Transmits the printer ID specified by *n* as follows:

n	Printer ID	Specification	ID (Hexadecimal)
1, 49	Printer model ID	A776II	0x2B
2, 50	Type ID	Installed options	Refer to below
3, 51	ROM version ID	ROM version	0x00
4, 52	Logo definition	Logo definition	Refer to next page

***n* = 2 or 50: Type ID**

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	No two-byte character code installed.
	On	01	1	Two-byte character code installed.
1	Off	00	0	No knife installed.
	On	02	2	Knife installed.
2	–	–	–	Undefined.
3	Off	00	0	No MICR installed.
	On	08	8	MICR installed.
4	Off	00	0	Not used. Fixed to Off.
5	–	–	–	Undefined
6	–	–	–	Undefined
7	Off	00	0	Not used. Fixed to Off.

***n* = 4 or 52: Logo Definition**

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	No logo downloaded (SRAM or Flash)
	On	01	1	Logo downloaded (SRAM or Flash)
1–7	Off	00	0	Not Used. Fixed to Off.

Transmits the printer ID specified by *n*. This command is a batch mode command; that is, the response is transmitted after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

Transmit printer ID, remote diagnostics extension

ASCII	GS I @ *n*
Hexadecimal	1D 49 40 *n*
Decimal	29 73 64 *n*

Values of *n*:   Refer to table

Range of *n*:   32–255 (not all defined, but reserved)

Twenty-eight remote diagnostic items are defined in the following table: five printer ID items and twenty-three printer tally items. A group of four remote diagnostic functions is assigned to each diagnostic item. Most of the diagnostic items are maintained in non-volatile memory (NVRAM), but some are maintained in read-only memory (ROM).

The first item group in the table includes an example of data to send and to receive. Data sent from the host to write to NVRAM must contain all digits required by the remote diagnostic item. All data must be ASCII. The printer returns all ASCII data. It is preceded by the parameter n to identify the diagnostic item and is followed by a carriage return (0D) to signify the end of the data.

Each returned message is defined as: n + data + <CR>

The command performs the remote diagnostic function specified by n as described in the following table.

Value of *n*

Hex	Dec	Remote diagnostic item	Function
20	32	Serial #, 10 digit ASCII	Write to NVRAM Example, send 14 bytes to printer: GS I @ 0x20 1234567890
21	33	Serial #	Write to NVRAM, and print on receipt to verify Example, send 14 bytes to printer: GS I @ ! 1234567890 This will print on receipt: Serial # written: 1234567890
23	35	Serial #	Return Serial #, preceded by *n* to identify Printer returns 12 bytes in above example: #1234567890<CR>
24	36	Class/model #, 15 digit ASCII	Write to NVRAM
25	37	Class/model #	Write to NVRAM, and print on receipt to verify
27	39	Class/model #	Return Class/model #, returns 17 bytes
33	51	Flash firmware part #, 12 digit ASCII	Return Flash firmware part #, returns 14 bytes
37	55	Flash firmware CRC, 4 digit ASCII	Return Flash firmware CRC, returns 6 bytes
80	128	Receipt lines tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM Example, send 12 bytes to printer: GS I @ Ç00010000 To set receipt lines tally to 10,000
81	129	Receipt lines tally	Write to NVRAM, and print on receipt to verify Example, send 12 bytes to printer: GS I @ ü00010000 This will print on receipt: Receipt tally written: 10,000
82	130	Receipt lines tally	Clear receipt lines tally to 0
83	131	Receipt lines tally	Return receipt lines tally, preceded by *n* to identify Printer returns 10 bytes in above example: â00010000<CR>
84	132	Knife cut tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
85	133	Knife cut tally	Write to NVRAM, and print on receipt to verify
86	134	Knife cut tally	Clear knife cut tally to 0
87	135	Knife cut tally	Return knife cut tally, returns 10 bytes

Continued . . .

Value of *n*			
Hex	**Dec**	**Remote diagnostic item**	**Function**
88	136	Slip Character tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
89	137	Slip character tally	Write to NVRAM, and print on receipt to verify
8A	138	Slip character tally	Clear slip character tally to 0
8B	139	Slip character tally	Return slip character tally, returns 10 bytes
8C	140	MICR read tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
8D	141	MICR read tally	Write to NVRAM, and print on receipt to verify
8E	142	MICR read tally	Clear MICR read tally to 0
8F	143	MICR read tally	Return MICR read tally, returns 10 bytes
90	144	Hours on tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
91	145	Hours on tally	Write to NVRAM, and print on receipt to verify
92	146	Hours on tally	Clear Hours on tally to 0
93	147	Hours on tally	Return hours on tally, returns 10 bytes
A3	163	Flash firmware version	Return flash firmware version, returns 6 bytes
A4	164	Flash cycles tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
A5	165	Flash cycles tally	Write to NVRAM, and print on receipt to verify
A6	166	Flash cycles tally	Clear flash cycles cut tally to 0
A7	167	Flash cycles tally	Return flash cycles cut tally, returns 10 bytes
A8	168	Knife jams tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
A9	169	Knife jams tally	Write to NVRAM, and print on receipt to verify
AA	170	Knife jams tally	Clear knife jams tally to 0
AB	171	Knife jams tally	Return knife jams tally, returns 10 bytes
AC	172	Cover openings tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
AD	173	Cover openings tally	Write to NVRAM, and print on receipt to verify
AE	174	Cover openings tally	Clear cover openings tally to 0
AF	175	Cover openings tally	Return cover openings tally, returns 10 bytes
B2	178	Max temperature tally	Reset max temperature reached value
B3	179	Max temperature tally	Return max temperature reached since it was reset, returns 10 bytes
B4	180	Slip lines tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
B5	181	Slip lines tally	Write to NVRAM, and print on receipt to verify
B6	182	Slip lines tally	Clear slip lines tally to 0
B7	183	Slip lines tally	Return slip lines tally, returns 10 bytes
B8	184	Barcodes Printed	Write to NVRAM

Continued . . .

Value of *n*

Hex	Dec	Remote diagnostic item	Function
B9	185	Barcodes Printed	Write to NVRAM, and print on receipt to verify
BA	186	Barcodes Printed	Clear Barcodes Printed tally to 0
BB	187	Barcodes Printed	Return Barcodes Printed tally, returns 10 bytes
BC	188	Receipt Characters Printed	Write to NVRAM
BD	189	Receipt Characters Printed	Write to NVRAM, and print on receipt to verify
BE	190	Receipt Characters Printed	Clear Receipt Characters Printed tally to 0
BF	191	Receipt Characters Printed	Return Receipt Characters Printed tally, returns 10 bytes
C0	192	Printer Faults	Write to NVRAM
C1	193	Printer Faults	Write to NVRAM, and print on receipt to verify
C2	194	Printer Faults	Clear Printer Faults tally to 0
C3	195	Printer Faults	Return Printer Faults tally, returns 10 bytes
C4	196	Dots Printed*	Write to NVRAM
C5	197	Dots Printed*	Write to NVRAM, and print on receipt to verify
C6	198	Dots Printed*	Clear Dots Printed tally to 0
C7	199	Dots Printed*	Return Dots Printed tally, returns 10 bytes
C8	200	Dots Printed on Current Printhead*	Write to NVRAM
C9	201	Dots Printed on Current Printhead*	Write to NVRAM, and print on receipt to verify
CA	202	Dots Printed on Current Printhead*	Clear Dots Printed on Current Printhead tally to 0
CB	203	Dots Printed on Current Printhead*	Return Dots Printed on Current Printhead tally, returns 10 bytes
CC	204	Printhead Changes	Write to NVRAM
CD	205	Printhead Changes	Write to NVRAM, and print on receipt to verify
CE	206	Printhead Changes	Clear Printhead Changes tally to 0
CF	207	Printhead Changes	Return Printhead Changes tally, returns 10 bytes
D0	208	Receipt Mechanism Changes	Write to NVRAM
D1	209	Receipt Mechanism Changes	Write to NVRAM, and print on receipt to verify
D2	210	Receipt Mechanism Changes	Clear Receipt Mechanism Changes tally to 0
D3	211	Receipt Mechanism Changes	Return Receipt Mechanism Changes, returns 10 bytes
D4	212	Knife Mechanism Changes	Write to NVRAM
D5	213	Knife Mechanism Changes	Write to NVRAM, and print on receipt to verify
D6	214	Knife Mechanism Changes	Clear Knife Mechanism Changes tally to 0
D7	215	Knife Mechanism Changes	Return Knife Mechanism Changes, returns 10 bytes
DC	220	Thermistor Error	Write to NVRAM
DD	221	Thermistor Error	Write to NVRAM, and print on receipt to verify
DE	222	Thermistor Error	Clear Thermistor Error tally to 0
DF	223	Thermistor Error	Return Thermistor Error tally, returns 10 bytes
E0	224	Low Voltage Error	Write to NVRAM

Continued . . .

Value of *n*

Hex	Dec	Remote diagnostic item	Function
E1	225	Low Voltage Error	Write to NVRAM, and print on receipt to verify
E2	226	Low Voltage Error	Clear Low Voltage Error tally to 0
E3	227	Low Voltage Error	Return Low Voltage Error tally, returns 10 bytes
E4	228	High Voltage Error	Write to NVRAM
E5	229	High Voltage Error	Write to NVRAM, and print on receipt to verify
E6	230	High Voltage Error	Clear High Voltage Error tally to 0
E7	231	High Voltage Error	Return High Voltage Error tally, returns 10 bytes
E8	232	Power Cycles	Write to NVRAM
E9	233	Power Cycles	Write to NVRAM, and print on receipt to verify
EA	234	Power Cycles	Clear Power Cycles tally to 0
EB	235	Power Cycles	Return Power Cycles tally, returns 10 bytes
EC	236	EEPROM Updates	Write to NVRAM
ED	237	EEPROM Updates	Write to NVRAM, and print on receipt to verify
EE	238	EEPROM Updates	Clear EEPROM Updates tally to 0
EF	239	EEPROM Updates	Return EEPROM Updates tally, returns 10 bytes

* Tallies involving dots are the actual tallies divided by 1000.

Transmit status

ASCII	GS r *n*
Hexadecimal	1D 72 *n*
Decimal	29 114 *n*

Value of *n*:   1, 49 = printer status
2, 50 = cash drawer status
3, 51 = slip paper status
4, 52 = Flash memory user sector status

Transmits the status specified by *n*. This is a batch mode command which transmits the response after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

When DTR/DSR RS-232C communications handshaking control is selected, the printer transmits the one byte response only when the host signal DSR indicates it is ready to receive data.

When XON/XOFF RS232C communications handshaking control is selected, the printer transmits the one byte response regardless of the host signal DSR.

The status bytes to be transmitted are described in the three tables below and on the next page.

Exceptions

The A776II has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

Printer status (n = 1 or n = 49)

Bit	Off/On	Hex	Decimal	Status for transmit status
0	Off	00	0	Paper present.
	On	01	1	Paper exhausted.
1	Off	00	0	Cover closed.
	On	02	2	Cover open.
2	Off	00	0	Paper present.
	On	04	4	Paper exhausted.
3	–	–	–	Undefined.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present.
	On	20	32	Slip leading edge sensor: no paper.
6	Off	00	0	Slip trailing edge sensor: paper present.
	On	40	64	Slip trailing edge sensor: no paper
7	Off	00	0	Not used. Fixed to off.

Cash drawer status (n = 2 or n = 50)

Bit	Off/On	Hex	Decimal	Status for transmit status
0	Off	00	0	One or both cash drawers open.
	On	01	1	Both cash drawers closed.
1	Off	00	0	One or both cash drawers open.
	On	02	2	Both cash drawers closed.
2	–	–	–	Undefined
3	–	–	–	Undefined
4	Off	00	0	Not used. Fixed to off.
5	–	–	–	Undefined.
6	–	–	–	Undefined.
7	Off	00	0	Not used. Fixed to off.

Slip paper status (n = 3 or n = 51)

Value	Slip status
0	There is no more printing space on the current slip, or the slip paper is not selected
1-8	Remaining print area on the current slip, in numbre of lines, at the currently set line spacing, when the trailing edge sensor has become uncovered. Until the trailing edge sensor becomes uncovered the value reported will be 6, because there are at least 9 lines remaining.

Flash memory user sector status (*n* = 4 or *n* = 52)

Bit	Off/On	Hex	Decimal	Status for transmit status
0	–	–	–	Undefined. Fixed to off.
1	–	–	–	Undefined. Fixed to off.
2	Off	00	0	User data storage write successful
	On	04	4	User data storage write failed, specified area not erased.
3	Off	00	0	Flash logo area adequate, definition stored
	On	08	8	Flash logo area not adequate
4	Off	00	0	Not used. Fixed to off.
5	Off	00	00	No thermal user-defined characters written to flash.
	On	20	32	Thermal user-defined characters written to flash.
6	Off	00	0	Not used. Fixed to off.
7	–	–	–	Undefined.

Notes

If the data transmitted from the printer after outputting this command to the printer is "0xx1xx10"(x = 0 or 1), process the data as a normal status.

Exceptions

When *n* is out of the specified range, the command is ignored.

Send printer software version

ASCII	US V
Hexadecimal	1F 56
Decimal	31 86

The printer returns 8 bytes containing the loader and flash software version. The first 4 bytes returned are an ASCII string for the loader version.

The second 4 bytes are an ASCII string for the flash version. Example: For 1.234.56 (8 bytes), the loader version is 1.23 and the flash version is 4.56.

Real time commands

The real time commands provide an application interface to the printer even when the printer is not handling other commands (RS-232C communication interface only):

- Real time status transmission: GS (Hex 1D) sequence and DLE (Hex 10) sequence
- Real time request to printer: GS (Hex 1D) sequence and DLE (Hex 10) sequence
- Real time printer status transmission

The batch mode printer status commands are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they were received. If the paper exhausts while printing data that was in the buffer ahead of the status command, the printer goes busy at the RS-232C interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, thermal printhead overheat, etc. In addition, there is no way to restart the printer after a paper jam or other error, when using batch mode status commands.

The real time commands are implemented in two ways in order to overcome the limitations of batch mode status commands. Both implementations offer the same functionality; which one you choose depends on the current usage of your application.

Preferred implementation

For a new application the GS (1D) sequences are recommended to avoid possible misinterpretation of a DLE (0x10) sequence as a clear printer (0x10 0, ASCII DLE NUL) command.

An application using these GS (1D) sequences, does not need to distinguish for the printer between the new real time commands and the clear printer command. This implementation is ideal for an existing application that already uses the clear printer command or for a new application being developed.

Alternate implementation

The alternate implementation uses the DLE (0x10) sequences as implemented on other printers. An application using these DLE (0x10) sequences and the original clear printer command (0x10) must distinguish for the printer between the new real time commands and the clear printer command by adding a NUL (0x00) to the clear printer command.

An application using these DLE (0x10) sequences must also send the second byte of the sequence within 100 milliseconds of the first, to prevent the first byte being mistaken for a clear printer command.

Rules for using real time commands

Three situations must be understood when using real time commands.

First, the printer executes the real time command within a few msec of detecting it in the input buffer and will transmit status regardless of the condition of the DSR signal.

Second, the printer transmits status whenever it recognizes a real time status transmission command sequence, even if that sequence happens to occur naturally within the data of another command, such as graphics data.

In this case the sequence will also be handled correctly as the graphics data it is intended to be when the graphics command is executed from the buffer.

Third, care must be taken not to insert a real time command into the data sequence of another command that consists of two or more bytes.

In this case the printer will use the real time command sequence bytes instead of the other command's parameter bytes when finally executing that other command from the buffer; the other command will NOT be executed correctly.

These three situations generally preclude use of standard DOS drivers for the serial communication ports when using real time commands.

Moving data through the buffer

Applications should not let the buffer fill up with real time commands when the printer is busy at the RS-232C interface. A busy condition at the RS-232C interface can be determined by bit 3 of the response to 1D 05, or 1D 04 1, or 10 04 1. The reason for a particular busy condition can be determined by other responses to 1D 04 *n* or 10 04 *n*.

Although the printer responds to real time commands when it is busy, it will place them into the buffer behind any other data there, and flush them out in the order in which they were received. When the printer is busy due simply to buffer full (that is, it can't print data as fast as it can receive it), then data continues to be processed out of the buffer at approximately print speed and the real time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed to the buffer until the condition clears one way or another. In either case, but more quickly in the case of an error condition, the buffer can fill with real time commands.

When the DLE (0x10) sequences are being used, the last byte stored when the buffer fills up could be the DLE (0x10) code, with no room for the subsequent EOT or ENQ. When this lone DLE (0x10) byte is finally processed out of the buffer it will be interpreted as a clear printer command.

Similarly, when the GS (1D) sequences are being used, the last byte stored when the buffer fills up could be the GS (1D) code, with no room for the subsequent EOT or ETX or ENQ. When this lone GS (1D) byte is finally processed out of the buffer it will use the next byte, whatever it is, as the second byte in its GS (1D) sequence.

To guard against this situation, the application must determine the cause of a busy condition and take appropriate action or pace the real time commands to avoid filling the buffer. There is a minimum of 256 bytes available in the printer's buffer when it goes busy.

Busy line and fault conditions

If the printer is in error condition (cover is open, paper is exhausted…), the printer will still accept data, respond to the batch mode status commands (1B 76 and 1B 75 0), handle the cash drawer commands, and not go busy until it actually tries to execute a print command. Then it will stay busy and stop processing data out of the receive buffer until the condition clears. It will respond to the real time commands as described below.

Real time status transmission

	GS sequence	DLE sequence
ASCII	GS EOT *n*	DLE EOT *n*
Hexadecimal	1D 04 *n*	10 04 *n*
Decimal	29 4 *n*	16 4 *n*

Value of *n*:	GS/DLE sequence

1 = Transmit printer status
2 = Transmit RS-232C busy status
3 = Transmit error status
4 = Transmit receipt paper status
5 = Slip paper status
6 = Validation paper status

Transmits the selected one byte printer status specified by *n* in real time according to the following parameters. This command includes two sequences: GS (1D) and DLE (0x10). This command can be disabled using 1F 7A.

Exceptions

The command is ignored if *n* is out of range.

An application using DLE (0x10) sequence must send EOT within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a clear printer command. Avoid this possibility by using the ID 04 *n* sequence, which is handled exactly the same as 10 04 *n*.

The A776II has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

Related information

1 = Transmit printer status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off.
1	On	02	2	Fixed to On.
2	Off	00	0	One or both cash drawers open.
	On	04	4	Both cash drawers closed.
3	Off	00	0	Not busy at the RS-232C interface.
	On	08	8	Printer is busy at the RS-232C interface.
4	On	10	16	Fixed to on.
5				Undefined.
6				Undefined.
7	Off	00	0	Fixed to off.

2 = Transmit RS-232C Busy Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to off.
1	On	02	2	Fixed to on.
2	Off	00	0	Receipt and cassette cover closed.
	On	04	4	Receipt and cassette cover open.
3	Off	00	0	Paper feed button is not pressed.
	On	08	8	Paper feed button is pressed.
4	On	10	16	Fixed to on.
5	Off	00	0	Printing not stopped due to paper condition.
	On	20	32	Printing stopped due to paper condition.
6	Off	00	0	No error condition.
	On	40	64	Error condition exists in the printer.
7	Off	00	0	Fixed to off.

3 = Transmit error status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to off.
1	On	02	2	Fixed to on.
2	Off	00	0	Carriage or slip jam.
3	Off	00	0	No knife error.
	On	08	8	Knife error occurred.
4	On	10	16	Fixed to on.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	Thermal printhead temp. and power supply voltage are in range.
	On	40	64	Thermal print head temp. or power supply voltage are out of range.
7	Off	00	0	Fixed to off

4 = Transmit receipt paper status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to off
1	On	02	2	Fixed to on
2	Off	00	0	Paper adequate
	On	04	4	Paper low (if paper low sensor enabled)
3	Off	00	0	Paper adequate
	On	08	8	Paper low (if paper low sensor enabled)
4	On	10	16	Fixed to on
5	Off	00	0	Paper present
	On	20	32	Paper exhausted
6	Off	00	0	Paper present
	On	40	64	Paper exhausted
7	Off	00	0	Fixed to off

5 = Transmit slip paper status and 6 = Transmit validation paper status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to off
1	On	02	2	Fixed to on
2	Off	00	0	Slip paper selected
	On	04	4	Slip not selected
3	Off	00	0	Not waiting for slip
	On	08	8	Waiting for slip
4	On	10	16	Fixed to on
5	Off	00	0	Slip leading edge sensor: paper present
	On	20	32	Slip leading edge sensor: no paper
6	Off	00	0	Slip trailing edge sensor: paper present
	On	40	64	Slip trailing edge sensor: no paper
7	Off	00	0	Fixed to off

Real time request to printer

	GS sequence	DLE sequence
ASCII	GS ETX n	DLE ENQ n
Hexadecimal	1D 03 n	10 05 n
	29 3 n	16 5 n

Value of *n*:   1 = recover and restart
2 = recover and clear buffers
3 = cancel slip wait

The printer responds to a request from the host specified by n. This command includes two sequences: GS and DLE. This command can be disabled using 1F 7A. If in page mode, the printer is set back to standard mode, causing values set by 1B 57 to be changed back to default. The operations performed depend on the value of n, according to the following parameters.

n = 1

Restarts printing from the beginning of the line where an error occurred, after recovering from the error. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

This command will attempt recovery from a knife error. Other errors associated with the receipt, such as paper out or printhead overheating, can be recovered from only by clearing the specific condition, such as loading paper or letting the printhead cool down.

n = 2

Recovers from an error after clearing the receive and print buffers. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

The same error recovery possibilities exist as for n = 1.

n = 3

Cancels the slip waiting status. This sequence is ignored except when the printer is waiting for a slip to be inserted. When slip waiting is canceled, the receive and print buffers are cleared and the receipt is selected. When printing on the slip is to continue, the slip must be selected again.

Exceptions

The command is ignored if *n* is out of range.

An application using DLE (0x10) sequence must send ENQ within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a clear printer command. Avoid this possibility by using the ID 03 *n* sequence, that is handled exactly the same as 10 05 *n*.

Real time printer status transmission

ASCII	GS ENQ
Hexadecimal	1D 05
Decimal	29 5

Transmits one byte status of the printer in real time.

Value of byte:

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Paper adequate.
	On	01	1	Paper low (if paper low sensor enabled).
1	Off	00	0	Paper adequate.
	On	02	2	Paper low (if paper low sensor enabled).
2	Off	00	0	Both receipt and cassette cover closed.
	On	04	4	Receipt or cassette cover open.
3	Off	00	0	Not busy at the RS-232C interface.
	On	08	8	Printer is busy at the RS-232C interface.
4	Off	00	0	One or both cash drawers open.
	On	10	16	Both cash drawers closed.
5	Off	00	0	Paper present at both slip sensors.
	On	20	32	Paper not present at one or both sensors.
6	Off	00	0	No error condition.
	On	40	64	Error condition exists in the printer.*
7	On	80	128	Fixed to on.

* Errors include cover open, paper out, black mark error, cutter error, thermistor error, high or low voltage error, where at hermistor error is unrecoverable, and a high or low voltage error automatically recover

Exceptions

The A776II has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

Real time commands disabled

ASCII	US z *n*
Hexadecimal	1F 7A *n*
Decimal	31 122 *n*

Value of *n*:	0 = enable
	1 = disable

This command is used to disable real time commands. They are disabled prior to sending graphic or other data to the printer that may contain embedded real time commands.

The command is a batch command and processed in the order received.

Automatic Status Back

Enable/disable Automatic Status Back (ASB)

ASCII: GS a *n*
Hexadecimal: 1D 61 *n*
Decimal: 29 97 *n*

Range of *n*:   0 - 255

Default: 0 (ASB disabled)

Enables or disables automatic status back (ASB) and specifies the status items. This command is a batch mode command; that is, it is processed after all prior data in the input buffer has been processed. There may be a time lag between the printer receiving this command and changing the ASB response, depending on the receive buffer contents.

If any of the status items listed are selected, ASB is enabled and the printer automatically transmits 4 status bytes whenever the selected status changes. If no status is selected, ASB is disabled. All four status bytes are transmitted without checking DSR

If the error status is enabled, a change in the following conditions will trigger the ASB:

- Cash Drawer
- Receipt Cover
- Knife Error
- Out-of-Range Printhead Temperature
- Out-of-Range Voltage
- Paper Exhaust Status
- Slip Paper

The bits of n are defined in the table.

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Cash drawer status disabled.
	On	01	1	Cash drawer status enabled.
1	Off	00	0	RS-232C Busy status disabled.
	On	02	2	RS-232C Busy status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Receipt paper roll status disabled.
	On	08	8	Receipt paper roll status enabled.
4	Off	00	0	Undefined
5	Off	00	0	Undefined
6	Off	00	0	Undefined
7	Off	00	0	Undefined

Exceptions

If n = 0, ASB is disabled

Related information

When Automatic Status Back (ASB) is enabled using this command, the status transmitted by other commands and the ASB status are differentiated according to the information found in Recognizing Data from the printer, (in the Real Time Commands section in this chapter). The status bytes to be transmitted are described in the following four tables.

Byte 1 = printer information
Byte 2 = error information
Byte 3 = paper sensor information
Byte 4 = paper sensor information

First Byte (Printer Information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to off.
1	Off	00	0	Not used. Fixed to off.
2	Off	00	0	One or both cash drawers open.
	On	04	4	Both cash drawers closed.
3	Off	00	0	Not busy at the RS232C interface.
	On	08	8	Printer is busy at the RS232C interface.
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Receipt and cassette covers closed.
	On	20	32	Receipt or cassette cover open.
6	Off	00	0	Paper feed button is not pressed.
	On	40	64	Paper feed button is pressed.
7	Off	00	0	Not used. Fixed to off.

Second byte (error information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	–	–	–	Undefined
1	–	–	–	Undefined
2	Off	00	0	No mechanical error
	On	04	4	Mechanical error occurred
3	Off	00	0	No knife error.
	On	08	8	Knife error occurred.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No recoverable error.
	On	40	64	Recoverable error: Cover open, paper out, temperature or voltage error is out of range.
7	Off	00	0	Not used. Fixed to off.

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low (if paper low sensor enabled)
1	Off	00	0	Receipt paper present
	On	02	2	Receipt paper low (if paper low sensor enabled)
2	Off	00	0	Receipt paper present.
	On	04	4	Receipt paper exhausted.
3	Off	00	0	Receipt paper present.
	On	08	8	Receipt paper exhausted.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present
	On	20	32	Slip leading edge sensor: no paper
6	Off	00	0	Slip trailing edge sensor: paper present
	On	40	64	Slip trailing edge sensor: no paper
7	Off	00	0	Not used. Fixed to off.

Fourth byte (paper sensor information) - A776II

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Slip paper selected
	On	01	1	Receipt paper selected
1	Off	00	0	Possible to print on slip
	On	02	2	Not possible to print on slip because no form has been inserted
2	–	–	–	Undefined
3	–	–	–	Undefined
4	Off	00	0	Not used. Fixed to off.
5	–	–	–	Undefined
6	–	–	–	Undefined
7	Off	00	0	Not used. Fixed to off.

Unsolicited status mode

Select or cancel unsolicited status mode (USM)

ASCII: GS a *n*
Hexadecimal: 1D 61 *n*
Decimal: 29 97 *n*

Value of *n*:   0 turns mode off; any non-zero value turns mode on

Default: 0 (USM disabled)

Enables or disables automatic return of 4 status bytes whenever one or more of the listed changes occurs. This command is a batch mode command; that is, it is processed after all prior data in the input buffer has been processed. There may be a time lag between the printer receiving this command and enabling unsolicited status mode (USM), depending on the pending input buffer contents.

If an immediate return of printer status is desired, then any of the other status commands should be issued following this command. Once this mode is activated, the printer automatically transmits 4 status bytes whenever any of the conditions change. If an RS-232C connection with hardware flow control is used, all four status bytes will be transmitted without checking DSR.

This command is a POS version of general printer unsolicited status functions; it uses the same command code as older versions of the POS command, "automatic status back (ASB)" but has the following differences:

- The parameter *n* is an on/off switch; it does not select trigger subset

- There is no immediate return when this mode is turned on

- All 4 status bytes are always returned

A change in any of the following conditions will trigger the USM response:

- Cash Drawer

- Receipt Cover

- Knife Error

- Out-of-Range Printhead Temperature

- Out-of-Range Voltage

- Paper Exhaust Status

- Slip paper

Related information

When Unsolicited Status Mode is enabled using this command, the status transmitted by other commands and the USM status are differentiated according to the information found in Recognizing Data from the printer, which follows the USM return description.

The status bytes to be transmitted are described in the following four tables.

Byte 1 = printer information
Byte 2 = error information
Byte 3 = paper sensor information
Byte 4 = paper sensor information

First Byte (Printer Information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to off.
1	Off	00	0	Not used. Fixed to off.
2	Off	00	0	One or both cash drawers open.
	On	04	4	Both cash drawers closed.
3	Off	00	0	Not busy at the RS232C interface.
	On	08	8	Printer is busy at the RS232C interface.
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Receipt and cassette covers closed.
	On	20	32	Receipt or cassette cover open.
6	Off	00	0	Paper feed button is not pressed.
	On	40	64	Paper feed button is pressed.
7	Off	00	0	Not used. Fixed to off.

Second byte (error information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	–	–	–	Undefined
1	–	–	–	Undefined
2	Off	00	0	No mechanical error
	On	04	4	Mechanical error occurred
3	Off	00	0	No knife error.
	On	08	8	Knife error occurred.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No recoverable error.
	On	40	64	Recoverable error: Cover open, paper out, temperature or voltage error is out of range.
7	Off	00	0	Not used. Fixed to off.

Third byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low (if paper low sensor enabled)
1	Off	00	0	Receipt paper present
	On	02	2	Receipt paper low (if paper low sensor enabled)
2	Off	00	0	Receipt paper present.
	On	04	4	Receipt paper exhausted.
3	Off	00	0	Receipt paper present.
	On	08	8	Receipt paper exhausted.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present
	On	20	32	Slip leading edge sensor: no paper
6	Off	00	0	Slip trailing edge sensor: paper present
	On	40	64	Slip trailing edge sensor: no paper
7	Off	00	0	Not used. Fixed to off.

Fourth byte (paper sensor information) - A776II

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Slip paper selected
	On	01	1	Receipt paper selected
1	Off	00	0	Possible to print on slip
	On	02	2	Not possible to print on slip because no form has been inserted
2	–	–	–	Undefined
3	–	–	–	Undefined
4	Off	00	0	Not used. Fixed to off.
5	–	–	–	Undefined
6	–	–	–	Undefined
7	Off	00	0	Not used. Fixed to off.

Recognizing data from the printer

An application sending various real time and non-real time commands to which the printer responds can determine which command a response belongs to by the table below.

Responses to transmit peripheral device status (1B 75) and transmit paper sensor status (1B 76) are non-real time responses and will arrive in the order in which they were solicited.

Batch mode response		Response recognized by:									
ASCII	HEX										
ECS u 0	1B 75 0	0	0	0	0	0	0	x	x	Binary
ESC v	1B 76	0	x	x	0	0	x	x	x	Binary
GS I *n*	1D 49 *n*	0	x	x	0	x	x	x	x	Binary
GS r *n*	1D 72 *n*	0	x	x	0	x	x	x	x	Binary
Real time response		**Response recognized by:**								
ASCII	HEX									
GS EOT *n*	1D 04 *n*	0	x	x	1	x	x	1	0	Binary
DLE EOT *n*	10 04 *n*	0	x	x	1	x	x	1	0	Binary
GS ENQ	1D 05	1	x	x	x	x	x	x	x	Binary
XON		0	0	0	1	0	0	0	1	Binary
XOFF		0	0	0	1	0	0	1	1	Binary
Unsolicited status mode (USM)		**Response recognized by:**								
USM Byte 1		0	x	x	1	x	x	0	0	Binary
USM Byte 2-4		0	x	x	0	x	x	x	x	Binary

Bar codes

These commands format and print bar codes and are described in order of their hexadecimal codes, with the exception of the QR code overview, which is described in the order of use in creating two-dimensional QR codes.

QR code Overview

QR code is a 2-dimensional matrix symbology consisting of an array of nominally square modules arranged in an overall square pattern using the QR symbology. A unique pattern at three of the symbol's four corners assists in determining the bar code size, position, and rotation.

A series of seven commands are required to create and print QR codes.

1. Select model for QR code	1D 28 6B 04 00 31 41 n1 n2
2. Set the size for QR module	1D 28 6B 03 00 31 43 n
3. Set data parsing mode	1D 28 6B 03 00 31 44 m
4. Select error correction level	1D 28 6B 03 00 31 45 n
5. Store symbol data	1D 28 6B qL qH 31 50 30 f1…fk
6. Print symbol data	1D 28 6B 03 00 31 51 30
7. Transmit QR code print size	1D 28 6B 03 00 31 52 30

The details of each command are described below.

Note: The settings for model, size of module, and error correction level are effective until the printer is reset, or the power is turned off.

Select model for QR code

ASCII   GS (k EOT NUL 1 A n1 n2
Hexadecimal   1D 28 6B 04 00 31 41 n1 n2
Decimal   29 40 107 4 0 49 65 n1 n2

Value of n1:   31h = Selects model 1
                    32h = Selects model 2 (default)

Value of n2:   00h (default)

This command specifies the original version (m = 1), or the enhanced form of the symbology (m = 2).
Model 2 is the recommended model.

Set size for QR code module

ASCII   GS (k ETX NUL 1 C n
Hexadecimal   1D 28 6B 03 00 31 43 n
Decimal   29 40 107 3 49 67 n

Value of n: **01h ≤ n ≤ 10h**

Default: 03h

This command sets the size of the QR module to *n* dots.

Set data parsing mode for QR Code

ASCII   GS (k ETX NUL 1 D m
Hexadecimal   1D 28 6B 03 00 31 44 m
Decimal   29 40 107 3 49 68 m

Value of m: 30h = Manual Mode
                   31h = Auto Mode (default)

This command specifies which method of data parsing to use. Auto mode will try to determine the best encoding scheme to use to encode the data based off of the values in the buffer. This mode may not encode the data as desired (data intended to be encoded as one type may be encoded as another due to overlap between the two).

Manual mode allows for more control, as the data can be broken into blocks (up to 200) that are each assigned a type using a leading byte, with each block separated by a comma (0x2C). See store symbol data for QR Code for more details.

Select error correction level for QR Code

ASCII   GS (k ETX NUL 1 E n
Hexadecimal   1D 28 6B 03 00 31 45 n
Decimal   29 40 107 03 00 49 69 n

Value of n:	Function	Recovery Capacity%
30h	Selects Error correction level L	7
31h	Selects Error correction level M	15
32h	Selects Error correction level Q	25
33h	Selects Error correction level H	30

Note: QR code employs Reed-Solomon error correction to generate a series of error correction code words.

Store symbol data for QR Code

ASCII   GS (k qL qH 1 P 0 f1 . . . fk
Hexadecimal   1D 28 6B qL qH 31 50 30 f1….fk
Decimal   29 40 107 qL qH 49 80 48 f1 . . . fk

This command stores the QR code symbol data (f1... fk) in the symbol storage area, which is located in RAM in font memory (command is ignored if no memory is free).

> qL and qH: $04h < (qL+ qH \times 100h) < 1BB4;$ $0h < qL < FF;$ $0h < qH < 1B$
>
> f: $0h < f < FF$
>
> $k = (qL + qH \times 100h) – 03h$

Note:

- k bytes of f1…fk are processed as symbol data.

- when using manual mode, data size must also account for the leading type byte, the delimiters (0x2C), and any headers (if using binary blocks)

- It is possible to encode to a QR code as follows. Be sure not to include anything except the following in the f1…fk data:

Category of data	Characters it is possible to specify	Type byte (Manual mode)
Numerical Mode data	"0" ~ "9"	'N' (0x4E)
Alphanumeric Mode data	"0"~"9", "A"~ "Z", SP, $, %, *, +, -, ., /, :	'A' (0x41)
Kanji Mode data	Shift JIS value (Shift value from JISX0208)	'K' (0x4B)
8-bit Byte Mode data	00h ~ FFh	'B' (0x42)*

  *Binary data require a 4-byte field following the type byte to specify length of data block

Continued ...

Sample Auto Mode Data:

1D 28 6B 03 00 31 44 31	' Set auto parsing
1D 28 6B 0D 00 31 50 30	' Set data size
53 54 31 2D 35 36 37 38 39 30	' Data (letters, symbols, numbers)

Sample Manual Mode Data:

1D 28 6B 03 00 31 44 30	' Set manual parsing
1D 28 6B 31 00 31 50 30	' Set data size
41	' Set alpha-numeric type
54 45 53 54 31 2D 2E 2F 3A	' Alpha-Numeric Data
2C	' Delimiter
4E	' Set numeric type
31 32 33 34 35 36 37 38 39 30	' Numeric Data
2C	' Delimiter
4B	' Set Kanji
9B 97 82 71 9B 95 82 92	' Kanji Data
2C	' Delimiter
42 30 30 30 38	' Set binary and block length (0 0 0 8 = 0x00 0x08 = 8 bytes)
54 2C 45 2C 53 2C 54 2C	' Binary Data (0x2Cs are valid data, not delimiters)

Print symbol data for QR code

ASCII	GS (k ETX NUL 1 Q 0
Hexadecimal	1D 28 6B 03 00 31 51 30
Decimal	29 40 107 03 00 49 81 48

This command encodes and prints the QR code symbol data in the symbol storage area, based on the settings in the previous four commands.

In standard mode, use this function when printer is "at the beginning of a line," or "there is no data in the print buffer."

The symbol size that exceeds the print area cannot be printed.

If there is no data in storage, or if the data in the storage area is more than the data allowed by specified model and data compaction mode, the QR code cannot be printed.

The following data are added automatically by the encode processing.

Position Detection Patterns
Separators for Position Detection Patterns
Timing Patterns
Format Information
Version Information
Error Correction code words (employs the Reed-Solomon Error Detection and Correction algorithm)
Pad codeword
Number of bits in Character Count Indicator
Mode Indicator
Terminator
Alignment Patterns (when model 2 is selected)
Extension Patterns (when model 1 is selected)

Printing of symbol is not affected by print mode (emphasized, double-strike, underline, white/black reverse printing, or 90° clockwise-rotated), except for character size and upside-down print mode.

Continued ...

In standard mode, this command executes paper feeding for the amount needed for printing the symbol, regardless of the paper feed amount set by the paper feed setting command, The print position returns to the left side of the printable area after printing the symbol, and printer is in the status "beginning of the line," or "there is no data in the print buffer."

In page mode, the printer stores the symbol data in the print buffer without executing actual printing. The printer moves print position to the next dot of the last data of the symbol.

A quiet zone of four times the size of one module is required on all sides of the QR code symbol, but it is not included in the printing data. Be sure to add a quiet zone when using this function.

Transmit QR code print size

ASCII	GS (k ETX NUL 1 R 0
Hexadecimal	1D 28 6B 03 00 31 52 30
Decimal	29 40 107 03 00 49 82 48

Transmits the size information for printing the QR symbol data stored by the store data command in the symbol storage area.

The size information for each data is as follows:

Send data	Hex	Decimal	Number of bytes
Header	37H	55	1 byte
Identifier	59H	89	1 byte
Horizontal size (1)	30H – 39H	48 – 57	3 byte
Separator	1FH	31	1 byte
Vertical size (1)	30H – 39H	48 – 57	3 byte
Separator	1FH	31	1 byte
Fixed value	31H	49	1 byte
Separator	1FH	31	1 byte
Other information (2)	30H or 31H	48 or 49	1 byte
Error information (3)	30H – 39H	48 – 57	4 byte
NUL	00H	0	1 byte

1. Barcode Size

"Horizontal size" and "vertical size" indicate the number of dots of the symbol. The decimal value of the vertical size and horizontal size is converted to text data and sent starting from the high order end.

(ex: When horizontal size is 120 dots, horizontal size is "120" (in hexadecimal: 31H, 32H, and 30H / in decimal: 49, 50, and 48), which is 3 bytes of data.)

2. Other Information

"Other information" indicates whether printing of the data in the symbol storage area is possible or impossible. The "Other information" is the following.

Hex	Decimal	Condition
30H	48	Printing is possible
31H	49	Printing is impossible

3. Error Information

"Error information" indicates mainly detailed information when "Other information" is Unprintable.

Error information	Error content	Solution
"0000". (0x30 30 30 30)	No error (printing is possible)	
"1001". (0x31 30 30 31)	Encoded data cannot be within one symbol.	Check the amount of encoded data.
"1002". (0x31 30 30 32)	Encode processing failed.	Check the encoded data.
"2001". (0x32 30 30 31)	No barcode data in the symbol storage area.	Put data in the print buffer.
"2002". (0x32 30 30 32)	The symbol size is bigger than the current printing area.	
"3001". (0x33 30 30 31)	Too much data.	The data being sent is larger than the print buffer.
"3002". (0x33 30 30 32)	Invalid Data Packet.	Error receiving QR Code data.
"3003". (0x33 30 30 33)	Memory Allocation Error	Failed to allocate memory for plotting.
"9999" (0x39 39 39 39)	Internal Error	Power Cycle Printer.

Notes

The symbol is bigger than the printing area:

> Make the module size smaller.
>
> Change the printing layout (printing area, printing position, etc.)
>
> Size information indicates size of symbol that is printed with Encode Command.
>
> The quiet zone is included in the calculation for the maximum size allowed.

This function does not print.

Select printing position of HRI characters

ASCII	GS H n
Hexadecimal	1D 48 n
Decimal	29 72 n

Value of n:	Printing position
	0 = Not printed
	1 = Above the bar code
	2 = Below the bar code
	3 = Both above and below the bar code

Default: 0 (Not printed)

Prints HRI (human readable interface) characters above or below the bar code using the pitch specified by 1D 66. Setting is effective until the printer is initialized, reset, or powered off.

Select pitch of HRI characters

ASCII	GS f *n*
Hexadecimal	1D 66 *n*
Decimal	29 102 *n*

Value of *n*:	0, 48 = Standard Pitch at 15 CPI
	1, 49 = Compressed Pitch at 20 CPI

Default:	0 (Standard Pitch at 15 CPI)

Selects standard and compressed font for printing bar code characters using 1D 48 n (see above). When slip is selected as the interface, HRI is always compressed

Select bar code height

ASCII	GS h *n*
Hexadecimal	1D 68 *n*
Decimal	29 104 *n*

Value of *n*:	Number of dots
Range of *n*:	1–255
Default:	216

Sets the bar code height to (*n*/154 inch) for receipt and (*n*/172 inch) for slip.

Print bar code

	First Variation	Second Variation
ASCII	GS k *m d1…dk* NUL	GS k *m n d1…dn*
Hexadecimal	1D 6B *m d1…dk* 00	1D 6B *m n d1…dn*
Decimal	29 107 *m d1 dk* 0	29 107 *m n d1…dn*

(0 = End of command)

Selects the bar code type and prints a bar code for the ASCII characters entered. If the width of the bar code exceeds one line, the bar code is not printed.

There are two variations to this command. The first variation uses a NUL character to terminate the string; the second uses a length byte at the beginning of the string to compensate for the code 128 bar code, which can accept a NUL character as part of the data. With the second variation, the length of byte is specified at the beginning of the string.

Bar codes can be aligned left, center, or right using the align positions command (1B 61).

The check digit is calculated for UPC and JAN (EAN) codes if it is not sent from the host computer. Six-character zero-suppressed UPC-E tags are generated from full 11 or 12 characters sent from the host computer according to standard UPC-E rules. Start/stop characters are added for code 39 if they are not included.

Rotated barcodes set with small modules (select bar code width command 1D 77 n , with n=1 or 2) and PDF 417 barcodes in any orientation are printed at low speed, for better readability.

Exceptions

The command is only valid at the beginning of a line.

Illegal data cancels the command.

Continued ...

Values:

First variation: String terminated with NUL character. Length *k* is not specified in command string; it depends on the bar code being printed.

m	Bar code	*d1…dk*	length
0	UPC-A	48–57 (ASCII numerals)	Fixed length: 11, 12
1	UPC-E	48–57	Fixed length: 11, 12
2	JAN13 (EAN)	48–57	Fixed length: 12, 13
3	JAN8 (EAN)	48–57	Fixed length: 7, 8
4	Code 39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) $d1 = dk = 42$ (start/stop code is supplied by printer if necessary)	Variable length
5	Interleaved 2 of 5	48–57	Variable length (even number)
6	Codabar	65–68, start code 48–57, 36, 43, 45, 46, 47, 58	Variable length
10	PDF 417	32–255	Variable length, maximum 1000 characters

Second variation: Length *n* specified at beginning of string. Except as noted, $0 < n < 256$.

m	Bar code	*d1…dn*	length
65	UPC-A	48–57 (ASCII numerals)	Fixed length: 11, 12
66	UPC-E	48–57	Fixed length: 11, 12
67	JAN13 (EAN)	48–57	Fixed length: 12, 13
68	JAN8 (EAN)	48–57	Fixed length: 7, 8
69	CODE39	48–57, 65–90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) $d1 = dk = 42$ (start/stop code is supplied by printer if necessary)	Variable length
70	Interleaved 2 of 5 (ITF)	48–57	Variable length (even number)
71	CODABAR (NW-7)	65–68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable length
72	Code 93	00–127	Variable length
73	Code 128	0–105 $d1 = 103\text{-}105$ (must be a start code) $d2 = 0\text{–}102$ (data bytes) (Stop code is provided by the printer)	Variable length
74	Code 128 auto compress	00–255 00–FF	Variable length
75	PDF 417	0–255 00–FF	Variable length
78	Code EAN 128 auto compress	0–255 00–FF	Variable length
79	PDF 417	0–255 00–FF data length specified via integer $n = n\text{H}:n\text{L}$ *1D 6B m nL nH d1 . . . dn*	Variable length $0 < n < 2800$

Continued …

The value of *m* selects the bar code system as described in the table.

The variable *d* indicates the character code to be encoded into the specified bar code system. If character code *d* cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

Exceptions

Code 93 and PDF 417 are only available in Native mode. PDF417 format cannot be printed on the slip.

Print multiple barcodes

ASCII	GS k
Hexadecimal	1D 6B FF n
Decimal	29 108 255

All the individual barcode strings start with 1D 6B m, where m is the type of barcode. Use the same command to do multiple barcodes on one line.

1D 6B FF 01   begin multiple barcodes one line

1D 6B FF 00   end multiple barcodes one line, print the barcodes

- Multiple barcodes can be aligned right, left, center same as single line barcodes
- All barcodes on one line printed at same alignment, height, width, and HRI as the first one
- Parameters for alignment, height, width, and HRI can be set before or after 1D 6B FF 01 command
- No height restriction change from single line barcodes
- Quiet zone between barcodes = 10 * module width
- No text in between barcodes (results undefined)
- Upright, picket fence barcodes only, no upside down or ladder. Extended barcode printing for upside down and ladder barcodes can be done in page mode if required.
- Slip/validation selection disabled in multiple barcodes command string
- Multiple barcodes command string disabled when slip/validation selected
- Page mode disabled in multiple barcodes command string
- Multiple barcodes command string disabled in page mode
- Page mode parameters initialized at end of multiple barcodes command string

Sample multiple barcodes command string:

1B 40	Initialize
1D 6B FF 01	Begin multiple barcodes one line
1B 61 01	Center align
1D 68 40	Barcode height
1D 77 02	Barcode width
1D 48 02	Print HRI below
1D 6B 49 06 67 27 2d 2e 2d 2e	Barcode 1, code 128
1D 6B 49 07 67 04 05 06 07 08 09	Barcode 2, code 128
1D 6B 49 04 67 01 02 03	Barcode 3, code 128
1D 6B FF 00	End multiple barcodes, print

Print GS1 DataBar, null terminated

ASCII	GS k n d1... 00
Hexadecimal	1D 6B n d1... 00
Decimal	29 107 n d1... 00

n	**Type**
51	GS1 DataBar
52	GS1 DataBar truncated
53	GS1 DataBar stacked
54	GS1 DataBar stacked omni-directional
55	GS1 DataBar limited
56	GS1 DataBar expanded and expanded stacked
57	UPC-A
58	UPC-E
59	EAN-13
5A	EAN-8
5B	UCC/EAN-128 with CC-A or CC-B
5C	UCC/EAN-128 with CC-C

Note: Null terminated, data length 1 to 2436

Print GS1 DataBar, data length specified

ASCII	GS k m nL nH d1... dn
Hexadecimal	1D 6B m nL nH d1... dn
Decimal	29 107 m nL nH d1... dn

m	**Type**
61	GS1 DataBar
62	GS1 DataBar truncated
63	GS1 DataBar stacked
64	GS1 DataBar stacked omni-directional
65	GS1 DataBar limited
66	GS1 DataBar expanded and expanded stacked
67	UPC-A
68	UPC-E
69	EAN-13
6A	EAN-8
6B	UCC/EAN-128 with CC-A or CC-B
6C	UCC/EAN-128 with CC-C

Note: Data length specified 1 to 2436 via integer nH : nL.

Set GS1 DataBar parameters

Setting of parameters for GS! DataBar

ASCII	GS q a b c d e fL fH
Hexadecimal	1D 71 a b c d e fL fH
Decimal	29 113 a b c d e fL fH

a	byte	pixels per minimum unit, default 3, minimum 2, maximum 6 (value a applies to parameters b, c, d)
b	byte	X undercut, default 0, can be set 0 to a-1
c	byte	Y undercut, default 0, can be set 0 to a-1
d	byte	separator height, default a, can be set a to a*2
e	byte	segment width, used only by GS1 DataBar Expanded, default 22, must be even number 2 to 22
f	word	line height, used only by UCC128, default 25, can be set 1 to 500

Note: For GS1 DataBar commands, consult ISO/IEC 24721. For further information, visit www.gs1.org.

Select PDF 417 parameters

ASCII	GS p a b c d e f
Hexadecimal	1D 70 a b c d e f
Decimal	29 112 a b c d e f

Value and Ranges:

Value:		Ranges:	Description:
a, b =			The ratio of bar height to symbol length.
a =	height	limit 1 to 10	
b =	width	limit 1 to 100	
c =	rows	limit 3 to 90	Number of rows in the matrix of code words.
d =	columns	limit 7 to 30	Number of columns in the matrix of code words.
e =	x dimension	limit 1 to 7	Width of a single module in dots.
f =	y dimension	limit 2 to 25	Height of the code word in dots.

Defaults:	a = 1
	b = 2
	c = 58
	d = 7
	e = 3
	f = 10

PDF 417 is a multi-row, continuous, variable length symbology which has high data capacity. Each symbol has between 3 and 90 rows, with each row containing a start pattern, a left row indicator, 1 to 30 data characters, a right row indicator and a stop pattern. The number and length of the rows are selectable, which allows the aspect ratio to be adjusted to particular labeling applications. There are no separator bars between rows.

Each character has four bars and four spaces within 17 modules, and is assigned a value between 0 and 928. For this symbology, it is common to refer to these character values as "code words."

There are three mutually exclusive sets of symbol patterns, or clusters, each having 929 distinct patterns. Because different clusters are used for adjacent rows, it is possible for the decoder to tell if the scanning path is crossing row boundaries without the use of separator bars.

Sample symbol description:

Each PDF 417 symbol consists of 3 to 90 stacked rows surrounded on all four sides by a quiet zone. Each row contains:

1 Leading quiet zone

2 Start pattern

3 Left row indicator characters (code words)

4 One to thirty data characters (code words)

5 Right row indicator character (code words)

6 Stop pattern

7 Trailing quiet zone
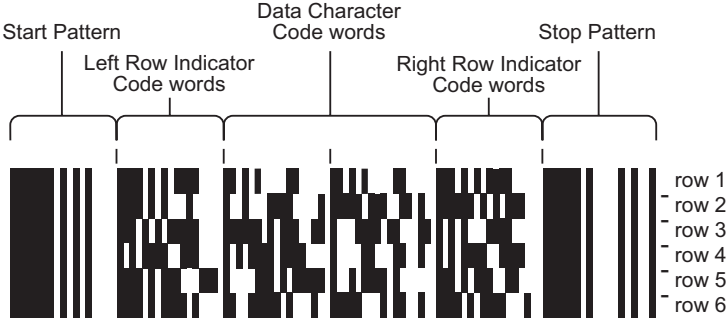
The number of characters in a row and number of rows can be adjusted to vary the symbol's overall aspect ratio to best fit an available space.

Each row has a left and right row indicator with a data region between. The left-most character in the top row of the data region is the total number of characters in the data region, excluding error correction characters. Characters within the data region are designed to be read from left to right, starting on the top row, immediately after the length-defining character. The maximum characters in the data region are 928.

Related Information:

The "Set bar code width" command (1D 77 n) affects the x dimension and row height for PDF 417. See chart below.

n value	x dimension	row height
2	2	7
3	3	10
4	4	13
5	5	17
6	6	20

Select bar code width

ASCII	GS w *n*
Hexadecimal	1D 77 *n*
Decimal	29 119 *n*

Value of *n*:   2, 3, 4, 5, 6

Default: n=3 for receipt, n=2 for slip.

Sets the bar code width to *n* dots until the printer is initialized, reset, or powered off. If the barcode is too wide for the printing area, the barcode will not print.

Formulas

n/8mm (*n*/203 inch) for receipt.
n/5.7mm (*n*/144 inch) for slip.

Set DataMatrix parameters

ASCII	GS (k pL pH cn fn m d1 d2
Hexadecimal	1D 28 6B 05 00 36 42 m d1 d2
Decimal	29 40 107 5 0 54 66 m d1 d2

Value and Ranges:

Value:	Ranges:
(pL + pH x 256)	5
cn	54
fn	66
m	0, 1, 48, 49
d1, d2 (when m = 0, 48), 36),	(0, 0), (10, 10), (12, 12), (14, 14), (16, 16), (18, 18), (20,20), (22, 22), (24, 24), (26, 26), (32, 32), (36, 36),
	(40, 40), (44, 44), (48, 48), (52, 52), (64, 64), (72, 72), (80, 80), (88, 88), (96, 96), (104, 104), (120, 120), (132, 132), (144, 144)
d1, d2 (when m = 1, 49)	(8, 0), (8, 18), (8, 32), (12, 0), (12, 26), (12, 36), (16, 0), (16, 36), (16, 48)

Defaults:	m = 0
	d1, d2 = (0, 0)

This command sets the symbol type, number of rows (d1), and number of columns (d2)

Module (minimum unit of symbol)   d1 / d2
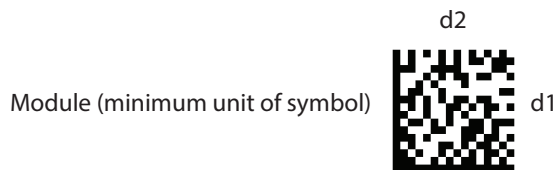
m	*d1, d2*	symbol type	number of rows, columns
0, 48	(0, 0)	Square (ECC200)	Sets automatic processing for the number of rows and columns of the symbol.
0, 48	Other than (0, 0)	Square (ECC200)	Sets the number of rows of the symbol to d1, the number of columns to d2.
1, 49	(8, 0), (12, 0), (16, 0)	Rectangle (ECC200)	Sets the rows of the symbol to d1, the number of columns to automatic processing.
1, 49	Other than (8, 0), (12, 0), (16, 0)	Rectangle (ECC200)	Sets the number of rows of the symbol to d1, the number of columns to d2.

Notes

This command is ignored if any of m, d1, or d2 is outside its range.

Settings of this command are in effect until 1b 40 is executed, the printer is reset, or the power is turned off.

Settings of this command affect the encode processing for DataMatrix. Changing the symbol type affects the horizontal and vertical sizes of the symbol.

Set DataMatrix module size

ASCII	GS (k pL pH cn fn n
Hexadecimal	1D 28 6B 03 00 36 43 n
Decimal	29 40 107 3 0 54 67 n

Value and Ranges:

Value:	Ranges:
(pL + pH x 256)	3
cn	54
fn	67
n	2-16

Defaults: n = 3

This command sets the width of one module of DataMatrix to n dots.

Notes

n = width of a module = height of a module (because the DataMatrix modules are square).

If n is outside its range, this command is ignored.

Settings of this command are in effect until 1b 40 is executed, the printer is reset, or the power is turned off.

Settings of this command affect the encode processing for DataMatrix. Changing the symbol type affects the horizontal and vertical sizes of the symbol.

Store DataMatrix data in symbol storage area

ASCII	GS (k pL pH cn fn m d1...dk
Hexadecimal	1D 28 6B pL pH 36 50 30 d1...dk
Decimal	29 40 107 pL pH 54 80 48 d1...dk

Value and Ranges:

Value:	Ranges:
(pL + pH x 256)	4-3119
cn	54
fn	80
m	48
d	0-255
k	(pL + pH x 256) - 3

This command stores the DataMatrix symbol data (d1...dk) in the symbol storage area. k bytes of d1...dk are processed as the symbol data.

Notes

The symbol data saved in the symbol storage area by this command is encoded by printing and transmission of this command. After printing and transmission are executed, the symbol data in the symbol storage area is kept.

FNC1 character must be specified as ESC (Hex = 1BH / Decimal = 27) + "1" (Hex = 31H / Decimal = 49).

ESC itself must be specified as ESC + ESC.

The symbol data saved in the symbol storage area by this command is kept until the following processing is performed:
> This function is executed
> 1b 40 is executed
> The printer is reset or the power is turned off

Print DataMatrix symbol data in the symbol storage area

ASCII	GS (k pL pH cn fn m
Hexadecimal	1D 28 6B 03 00 36 54 30
Decimal	29 40 107 3 0 54 84 48

Value and Ranges:

Value:	Ranges:
(pL + pH x 256)	3
cn	54
fn	81
m	48

This command encodes and prints the DataMatrix symbol data stored in the symbol storage area.

Notes

Use this command when the printer is at the beginning of a line, or there is no data in the print buffer.

If the symbol size exceeds the print area, the printer feeds the paper as much as the symbol's height, without printing the symbol.

The quiet zone (the space at the top, bottom, right, and left of the symbols, which is specified by the DataMatrix standard) is not included in the printing data. Be sure to include the quiet zone when using this function.

If there is any of the errors described below in the data of the symbol storage area, the barcode will not be printed.

- There is no data.
- When there is a problem with the amount of data saved in the symbol storage area.
- When the data saved in the symbol storage area includes data outside the domain.

Printing of symbol is not affected by print mode (emphasized, double-strike, underline, or font size), except for upside-down print mode.

The following functions are not supported:
        Structured Append Symbols
        Macro Character
        Reader Programming Character
        ECI: Extended Channel Interpretation

Error correction version is ECC 200. Versions ECC 000 – 140 cannot be used.
        For ECC 200, the Reed-Solomon Error Detection and Correction algorithm is used for the error correction codewords.
        In the Reed-Solomon Error Detection and Correction algorithm, the error correction level (%) is automatically determined based on the symbol size.

The data sequence: ESC (Hex = 1BH / Decimal = 27) + "1" (Hex = 31H / Decimal = 49) is encoded to FNC1 character.

The data sequence: ESC + ESC is encoded to ESC.

This command executes paper feeding for the amount needed for printing the symbol, regardless of the paper feed amount set by the paper feed setting command. After the symbol printing, the print postion is moved to left side of the printable area. Also, the printer is in the status "beginning of the line".

In Page mode, the printer stores the symbol data in the print buffer without executing actual printing. The printer moves print position to the next dot of the last data of the symbol.

Page mode

Page mode is one of two modes that the A776II printer uses to operate. Standard mode is typical of how most printers operate by printing data as it is received and feeding paper as the various paper feed commands are received. Page mode is different in that it processes or prepares the data as a "page" in memory before it prints it. Think of this as a virtual page. The page can be any area within certain parameters that you define. The page is printed using either the FF (0C) or the ESC FF (1B 0C) command.

The select page mode command (1B 4C) puts the printer into page mode. Any commands that are received are interpreted as page mode commands. Several commands react differently when in standard mode and page mode. The descriptions of these individual commands in this chapter indicate the differences in how they operate in the two modes.

Slip page mode considerations

Suggested command sequence to print bank check

1B 40	reset to power-on parameters	1B 63 30 04
select the slip		1B 4C
select Page Mode	1B 54 03	select printing
direction	1B 57 00 00 00 00 90 01 80 05	select page size (not necessary for
default size)	Text and print commands as required	
0C	print the page and exit Page Mode	1B 63 30 01
eject the check and select receipt		

When switching between Page Mode print on the receipt and Page Mode print on the slip, 1B 40 should precede the station selection command to ensure the correct Page Mode defaults are restored for each station.

Page size

The default page size is 200 full dots wide by 704 full dots long. (2.5" wide by 9.7" long.)

On the A776II, the right side margin is .1", and provides a maximum width of 242 full dots.

The maximum length can be set to any size, but is limited by available memory. Width and length other than default are set by command 1B 57…, with parameters specified in half dots. The length controls how much paper is fed.

For applications specifying a page size greater than 242 full dots wide, there is a configuration option for trimming blank areas. The command is 1F 03 2F n.

Some examples of setting page size:

1B 57 00 00 00 00 90 01 80 05   0x190 = 400 half dots = 200 full dots wide
          0x580 = 1408 half dots = 704 full dots long

1B 57 00 00 00 00 E4 01 F0 03   0x1E4 = 484 half dots = 242 full dots wide = 3.024"
          0x3F0 = 1008 half dots = 504 full dots long = 7"

Character Size

It is best to use the Select Print Mode command (1B 21 n) to set character size. The Select Character Size command (1D 21 n) can be used to set double wide and double high, but impact characters are not increased any further. When using the legacy command 0x12 to set double wide, you must use the corresponding command 0x13 to turn off double wide.

Exceptions

The Print and Reverse Feed commands (1B 4B n and 1B 65 n) are not applicable to Page Mode.

Avoid bi-directional print. Uni-directional print is the default in Page Mode.

Page mode configurations

The original implementation of Page Mode on the slip station mapped thermal dots to impact dots, and sometimes produced output that was not acceptable to customers. Improvements have been made, and the improved impact Page Mode is the default configuration. It is printed out on the second diagnostic page, printed via 1F 74 1F 74 double command, or by holding down the paper feed button at power on until the second page starts to print.

What prints:
>   Slip Application Command Options
>   **Slip Page Mode   : Improved**

To re-configure the original Page Mode on the slip station, send 1F 03 26 06 00 or use the configuration menu.
What will print:
>   Slip Application Command Options
>   **Slip Page Mode   : Enabled**

To disable Page Mode on the slip station, send 1F 03 21 00 or use the configuration menu. What will print:
>   Slip Application Command Options
>   **Slip Page Mode   : Disabled**

Print and return to standard mode

ASCII   FF
Hexadecimal   0C
Decimal   12

When printing is completed, values for select print direction in page mode (1B 54n) and set print area in page mode (1B 57 n1, n2, …n8) and the position for buffering character data are set. Buffered data is not deleted from the printer.

The processed data is printed and the printer returns to standard mode. The developed data is deleted after being printed. For more information see page mode in this document.

Exceptions

This command is enabled only in page mode. This command has the same ocde as the print and eject slip command, which is executed when the printer is not in page mode.

Cancel print data in page mode

ASCII   CAN
Hexadecimal   18
Decimal   24

Deletes all the data to be printed in the "page" area. Any data from the previously selected "page" area that is also part of the current data to be printed is deleted.

Exceptions

This command is only used in page mode. This command has the same code as the open form command, which is executed when the printer is not in page mode.

Print data in page mode

ASCII	ESC FF
Hexadecimal	1B 0C
Decimal	27 12

Collectively prints all buffered data in the printing area.

After printing, the printer does not clear the buffered data and sets values for select print direction in page mode (1B 54 *n*) and set print area in page mode (1B 57 …), and sets the position for buffering character data.

Printer returns to standard mode through use of 0C, 1B 53, or initialization (which cancels all settings).

Exceptions

This command is enabled only in page mode.

Select page mode

ASCII	ESC L
Hexadecimal	1B 4C
Decimal	27 76

Switches from standard mode to page mode. After printing has been completed either by the print and return to standard mode (FF) command or select standard mode (1B 53) the printer returns to standard mode. The developed data is deleted after being printed. For more information see page mode in this document.

This command sets the position where data is buffered to the position specified by select print direction in page mode (1B 54) within the printing area defined by set print area in page mode (1B 57).

This command switches the settings for the following commands (which values can be set independently in standard mode and page mode) to those for page mode.

- Set right-side character spacing (1B 20)
- Select 1/6-inch line spacing (1B 32)
- Set line spacing (1B 33)

It is possible only to set values for the following commands in page mode. These commands are not executed.

- Select or cancel 90 degree clockwise rotation (1B 56)
- Set counter-clockwise rotation (1B 12)
- Select justification (1B 61)
- Select or cancel upside-down printing (1B 7B)
- Set left margin (1D 4C)
- Set print area width (1D 57)

The table below shows the difference in memory allocation in page mode when using monochrome and two-color paper. Two-color paper mode requires extra memory in order to differentiate between non-black and black.

Paper type	Total memory allocated (kBytes)	Area of construction (mm)
Monochrome paper	40.5	72 wide x 72 high
Two-color (dots) paper	81.0	72 wide x 72 high 72 wide x 72 high (energy)
Slip paper	20	200 wide x 704 high (full dots)

Printer returns to standard mode through use of 0C, 1B 53, or initialization (which cancels all settings).

Exceptions

The command is enabled only when input at the beginning of a line.

The command has no effect if page mode has previously been selected.

For the A756 emulation mode, this command has a different definition. The select page mode function is not available in the A756 emulation mode.

Select standard mode

ASCII	ESC S
Hexadecimal	1B 53
Decimal	27 83

Switches from page mode to standard mode. In switching from page mode to standard mode, data buffered in page mode are cleared, the printing area set by set print area in page mode (1B 57) is initialized and the print position is set to the beginning of the line.

This command switches the settings for the following commands (the values for these commands can be set independently in standard mode and page mode) to those for standard mode:

- Set right-side character spacing (1B 20)
- Select 1/6 inch line spacing (1B 32)
- Set line spacing (1B 33)

Standard mode is automatically selected when power is turned on, the printer is reset, or the initialize printer command (1B 40) is used.

18, 1B 0C, 1D 24, and 1D 5C commands are ignored in standard mode.

Exceptions

This command is effective only in page mode.

Select print direction in page mode

ASCII	ESC T *n*
Hexadecimal	1B 54 *n*
Decimal	27 84 *n*

Value of *n*:	Start position
	0 = Upper left corner proceeding across page to the right [A]
	1 = Lower left corner proceeding up the page [B]
	2 = Lower right corner proceeding across page to the left (upside down) [C]
	3 = Upper right corner proceeding down page [D]

| **Default:** | 0 |

Selects the printing direction and start position in page mode. See the illustration below.

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed using the print page mode commands (0C or 1B 0C).
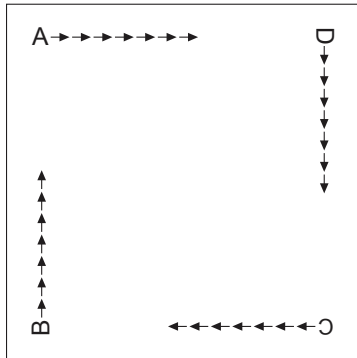
Starting Position	Commands Using Motion Unit
Upper Left/Lower Right	1B 20, 1B 24, 1B 5C (horizontal motion unit) 1B 33, 1B 4A, 1D 24, 1D 5C (vertical motion unit)
Upper Right/Lower Left	1B 33, 1B 4A, 1D 24, 1D 5C (horizontal motion unit) 1B 20, 1B 24, 1B 5C (vertical motion unit)

Exceptions

The command is valid only in page mode.

The command is ignored if the value of *n* is out of the specified range.

If this command is processed in standard mode, print direction is not changed until the printer is set to page mode.

Set print area in page mode

ASCII   ESC W *n1, n2 ...n8*
Hexadecimal   1B 57 *n1, n2 ...n8*
Decimal   27 87 *n1, n2 ...n8*

Range of *n*:   0-255

Default:

	Receipt	Slip
n1-4 =	0	0
n5 =	64	144
n6 =	2	1
n7 =	64	128
n8 =	2	5
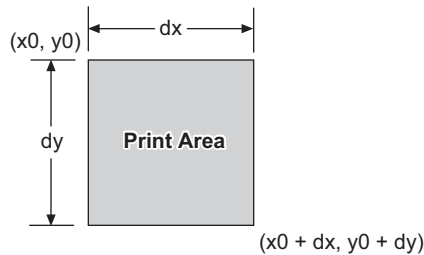
Sets the position and size of the printing area in page mode until the printer is initialized, reset, or powered off, or a 0C command is sent.

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed using the print page mode commands (0C or B 0C).

Formulas

The starting position of the print area is the upper left of the area to be printed (x0, y0). The length of the area to be printed in the y direction is set to dy inches. The length of the area to be printed in the x direction is set to dx inches. Use the equations to determine the Value of x0, y0, dx, and dy.

- x0 = [(*n1* + *n2* x 256) x (horizontal direction of the fundamental calculation pitch)]
- y0 = [(*n3* + *n4* x 256) x (vertical direction of the fundamental calculation pitch)]
- dx = [(*n5* + *n6* x 256) x (horizontal direction of the fundamental calculation pitch)]
- dy = [(*n7* + *n8* x 256) x (vertical direction of the fundamental calculation pitch)]

Default Values: Receipt   Slip
     x0 =   0   0
     y0 =   0   0
     dx =   576   200
            2.8in.   2.5in.
     dy =   576   705
            2.8in.   9.7in.

Keep the following notes in mind for this command.

- The fundamental calculation pitch depends on the vertical or horizontal direction.

- Receipt: The maximum printable area in the x direction is 576/203 inches.
  Slip: The maximum printable area in the x direction is 3.024 inches. This can be set using dx = 484 half dots, for example 1B 57 00 00 00 00 E4 01 80 05.

- Receipt: The maximum printable area in the y direction is 576/203 inches.
  Slip: The maximum printable area in the y direction depends on available memory.

See the illustration for a graphic representation of the printing area. For more information about the fundamental calculation pitch, see the set horizontal and vertical motion units command (1D 50).

Maximum area specification in page mode

Maximizing the possible area in page mode consumes almost all of the free RAM. Without any free RAM, bitmap rotations and enlargements cannot be performed. Use the User Storage Status command (1D 97 *m n*) to determine the amount of free memory.

Exceptions

The command is effective only in page mode. If [x0 + dx] is greater than the printable area, the printing area width is set to [horizontal printable area – x0]. If [y0 + yx] is greater than the printable area, the printing area height is set to [vertical printable area – y0].

Set absolute vertical print position in page mode

ASCII   GS $ *nL nH*
Hexadecimal   1D 24 *nL nH*
Decimal   29 36 *nL nH*

Sets the absolute vertical print starting position for buffer character data in page mode. The absolute print position is set to [(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] inches.

The vertical or horizontal motion unit for the paper roll is used and the horizontal starting buffer position does not move.

The reference starting position is set by select print direction in page mode (1B 54). This sets the absolute position in the vertical direction when the starting position is set to the upper left or lower right; and sets the absolute position in the horizontal when the starting position is set to the upper right or lower left. The horizontal and vertical motion unit are specified by the set horizontal and vertical minimum motion units (1D 50) command.

The set horizontal and vertical minimum motion units (1D 50) command can be used to change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

Formulas

[(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] inches.

Exceptions

This command is effective only in page mode.

If the [(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] exceeds the specified printing area, this command is ignored.

Set relative vertical print position in page mode

ASCII GS \ *nL nH*
Hexadecimal 1D 5C *nL nH*
Decimal 29 92 *nL nH*

Value

The value for the horizontal and vertical movement cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.

Sets the relative vertical print starting position from the current position. This command can also change the horizontal and vertical motion unit. The unit of horizontal and vertical motion is specified by this command.

This command functions as follows, depending on the print starting position set by select print direction in page mode (1B 54):

When the starting position is set to the upper right or lower left of the printing area, the vertical motion unit (y) is used.
When the starting position is set to the upper left or lower right of the printing area, the horizontal motion unit (x) is used.

Formulas

The distance from the current position is set to [(nL + nH x 256) x vertical or horizontal motion unit] inches. The amount of movement is calculated only for the paper roll.

When pitch n is specified to the movement downward: nL + nH x 256 = n

When pitch n is specified to the movement upward (the negative direction), use the complement of 65536.

When pitch n is specified to the movement upward: nL + nH x 256 – 65536 – N

Exceptions

This command is used only in page mode, otherwise it is ignored.

Any setting that exceeds the specified printing area is ignored.

Macros

These commands are used to select and perform a user-defined sequence of printer operations.

Select or cancel macro definition

ASCII   GS :
Hexadecimal   1D 3A
Decimal   29 58

Starts or ends macro definition. Macro definition begins when this command is received during normal operation and ends when this command is received during macro definition. The macro definition is cleared, during definition of the macro when the execute macro (1D 5E) command is received.

Normal printing occurs while the macro is defined. When the power is turned on the macro is not defined.

The defined contents of the macro are not cleared by the initialize printer (1B 40), thus, the initialize printer (1B 40) command may be used as part of the macro definition.

If the printer receives a second select or cancel macro definition (1D 3A) command immediately after previously receiving a select or cancel macro definition (1D 3A) the printer remains in the macro undefined state.

Formulas

The contents of the macro can be defined up to 2048 bytes.

Exceptions

If the macro definition exceeds 2048 bytes, excess data is not stored.

Execute macro

ASCII   GS ^ r t m
Hexadecimal   1D 5E r t m
Decimal   29 94 r t m

Value of r: The number of times to execute the macro.

Value of t: The waiting time for executing the macro.

Executes a macro. After waiting for a specified period the printer waits for the paper feed button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats this operation the number of specified times.

When the macro is executed by pressing the paper feed button ($m = 1$), paper cannot be fed by using the paper feed button.

Formulas

The waiting time is t x 100 ms for every macro execution.

m specifies macro executing mode when the LSB (least significant bit) $m = 0$

The macro executes r times continuously at the interval specified by t when the LSB (least significant bit) of $m = 1$.

Exceptions

If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.

If the macro is not defined or if r is 0, nothing is executed.

MICR commands

MICR reading

These commands control the Magnetic Ink Character Recognition (MICR) check reader, including how it parses the character strings on checks.

The section, MICR parsing, describes how to create a parsing format and how to create and maintain an exceptions table.

Read MICR data and transmit

ASCII	ESC w 1		
Hexadecimal	1B 77 01	A776II:	1B 77 01 = read & transmit MICR, position for endorsement
Decimal	27 119 1		
Default:	All data returned		

Reads and transmits the MICR data and adds a carriage return (0x0D). One status byte precedes the MICR characters.

If no parsing format is selected with either of the define parsing format commands (see below), all data will be returned, which is the default.

Status	Status byte value
Good read, data follows	0x00
Bad read, data follows	0x01
No check present, no data	0x02
Paper jam, no data	0x03
No MICR characters, no data	0x04

MICR characters	ASCII	Hexadecimal
Numerics	0 ... 9	0x30 ... 0x39
Unrecognized character	?	0x3F
Space		0x20
Amount symbol	&	0x26
Dash symbol	'	0x27
"on us" symbol	(	0x28
Transit symbol	)	0x29

Transmit last MICR read

ASCII:	ESC w R
Hexadecimal:	1B 77 52
Decimal:	27 119 82

Resends the previously decoded MICR data (as if the parsing has not been defined) to the host. The return data is defined in the "Read MICR data and transmit" command (1B 77 01) without parsing and presents the data from the last MICR read since power-up or reset or indicates in the status that no read has yet occurred.

MICR parsing

This section describes MICR parsing in detail and includes several examples of useful parsing variations. It also describes how to create a parsing format and how to create and maintain an exception table.

Define parsing format, save in NVRAM

ASCII: ESC w P *d1 d2 … dn CR*
Hexadecimal: 1B 77 50 *d1 d2 … dn 0D*
Decimal: 27 119 80 *d1 d2 … dn 13*

Defines and saves parsing format. See parsing parameter string options in this document. Send with this command the parse data that is to be the default parse string at printer power-up. If no parameters are selected, parsing is not performed.

*d*1 through *dn* are the parse string. The string must be CR terminated. If the string has invalid characters in it or is too long, the printer will store a null string, and unparsed MICR data will be returned.

Define parsing format, do not save permanently

ASCII   ESC w p
Hexadecimal   1B 77 70
Decimal   27 119 112

Defines, but does not save parsing format. See parsing parameter string options in this document. Send as often as desired to change the previous parse format string.

If no parameters are selected, parsing is not performed.

Same parameters as 1B 77 50....

Parsing parameter string options

Variable length fields

Variable length field name	Selector	Comments
Transit number	T	Full 9-digit routing/transit number
Bank number	B	Digits 4–8 of transit number
Check digit	D	Digit 9 of transit number
Account number	A	
Check serial number	C	Separate from account number
Amount	$	This field may not be present or readable

Variable length field optional modifiers	Selector	Comments
Zero fill to length	0	ASCII zero preceding maximum length
Maximum length	nn	1- or 2-digit ASCII number
Remove space/dash	X	
Replace space/dash with 0	x	

Examples of variable length field format specifications

Account #, all characters in the field, keep spaces and dashes	A
Account #, all characters in the field, replace spaces and dashes	xA
Account #, maximum 12 characters, keep spaces and dashes	12A
Account #, always 12 characters zero filled, remove spaces and dashes	012XA

Other parameters

Error number	E	One digit returned
	0	Read OK
	1	Read error: bad character, empty field invalid length, check digit invalid

Status	S	Two digits returned
	01	No MICR data
	09	Mexican check
	08	Canadian check
	05	Error in transit number
	07	Error in account number
	04	Error in check serial number
	10	Business or commercial check
	11	Amount field present
	00	No error

Field separator		'x
		Field separator preceded by a single quote, so a field separator of the letter A would be sent as 'A (0x27 0x41).
		If a carriage return is specified as a separator (0x27 0x0D), a final carriage return must still terminate the parsing parameter string.

Country code	Un	One digit returned
	n	Returned if US check
	nothing	Returned if not US check

Country code	Km	One digit returned
	m	Returned if Canadian check
	nothing	Returned if not Canadian check

Check type	L	One digit returned
	1	Personal check
	2	Business or commercial check

Sample parsing formats

The following strings show various sample formats that you can use assuming they meet your parsing format needs. Included with the sample format is a description of the data that is returned to the application.

ESC w p 18 A <CR>

- Maximum 18 characters in the account number
- Final carriage return

ESC w p 18 X A <CR>

- Maximum 18 characters in the account number with spaces and dashes removed
- Final Carriage Return

ESC w p 18 x A <CR>

- Maximum 18 characters in the account number with spaces and dashes replaced with 0
- Final carriage return

ESC w p 018 A <CR>

- Always 18 characters in the account number (high order zero-filled if necessary)
- Final carriage return

ESC w p 018 X A <CR>

- Always 18 characters in the account number with spaces and dashes removed
- Final carriage return

ESC w p 018 x A <CR>

- Always 18 characters in the account number with spaces and dashes replaced with 0
- Final Carriage Return

ESC w p T 18 X A 04C <CR>

- All characters in the transit number
- All characters in the account number (up to 18) with spaces and dashes removed
- Always four characters in the check number (zero-filled if check number is only three characters long)
- Final carriage return

ESC w p K9 X T 18 X A 04C <CR>

- U.S. check: all nine characters in the transit number (because there are no dashes)
- Canadian check: dash in transit number removed; "9" inserted at beginning, resulting in a fully numeric nine character transit number
- All characters in the account number (up to 18) with spaces and dashes removed
- Always four characters in the check number (zero-filled if check number is only three characters long)
- Final carriage return

ESC w p T '/ A '/ C '/ S <CR>

- All characters in the transit number
- Field separator: /
- All characters in the account number
- Field separator: /
- All characters in the check number
- Field separator: /
- Two-digit status
- Final carriage return

Notes:

All parameters are ASCII characters, i.e. greater than or equal to 0x20, with the exception of a non-ASCII character enclosed in single quotes as a field separator. This applies both to parameter specifications sent from application to printer, and to MICR data returned from printer to application.

Parameters are positional; their order in the parameter string is the order in which the parsed MICR data will be returned. Unrecognized parameters will be ignored, and processing of the parsing parameters will stop. Any data remaining after the unrecognized parameter will be treated as normal input data.

If parameters are not defined (for example, 1B 77 50 <CR> or 1B 77 70 <CR>) parsing is not selected. One status byte followed by all decoded MICR characters will be returned. The chart on the next page is the default parsing format if no other is selected:

Status	Status byte value
Good read, data follows	0x00
Bad read, data follows	0x01
No check present, no data	0x02
Paper jam, no data	0x03
No MICR characters, no data	0x04

MICR characters	ASCII	Hexadecimal
Numerics	0 ... 9	0x30 ... 0x39
Unrecognized character	?	0x3F
Space		0x20
Amount symbol	&	0x26
Dash symbol	'	0x27
"on us" symbol	(	0x28
Transit symbol	)	0x29

Once a parsing format is specified, the following values are returned:

MICR characters	ASCII	Hexadecimal
Numerics	0 ... 9	0x30 ... 0x30
Space		0x20
Dash	-	0x2D
Field separator*		
Country code*		

*As specified in the parsing parameter string

Check serial number

Parsing the check serial number

Most banks print the check serial number in three easily recognizable spots. The printer firmware will look for the number in these spots, using the following ordered algorithm. The examples use letters to represent symbols on the check:

t   Transit symbol
o   "on us" symbol
$ Amount symbol
-         Dash
c   Check serial number
x   Any other number

A number bracketed by "on us" symbols in the auxiliary "on us" field is the check serial number.

      occcccco txxxxxxxxxt xxxxxxxxo

Otherwise, a three or more digit number to the right of the rightmost "on us" symbol, and to the left of the leftmost amount symbol if an amount field is present, is the check serial number.

      txxxxxxxxxt xxxxxxxxo cccc
      txxxxxxxxxt xxxxxxxxo cccc $xxxxxx$

If both of these searches fail to produce the check serial number, extract the whole account number field from between the rightmost transit symbol and the rightmost "on us" symbol. A three, four, or five-digit number to the right of the rightmost transit symbol, separated by a space or a dash from the rest of the account number is the check serial number.

      txxxxxxxxxt cccc xxxxxxxxo
      txxxxxxxxxt cccc-xxxxxxxxo
      txxxxxxxxxt cccc xxxxxxxxo xx

If all of these searches fail to produce the distinct check serial number, and the check serial number field has been specified in the parsing parameter string options, no check serial number will be returned. If it is imbedded within the account number field, it will be returned as part of that variable length field.

Exceptions

Some banks print the check serial number in a location that cannot be electronically distinguished without specific exception information, although it can be visually distinguished because it is repeated in the upper right corner of the check. For these cases, the printer can hold up to nine exceptions for specific banks in its non-volatile memory (NVRAM), which is accessed by the read and write NVRAM commands. The specific bank is picked out by its transit number, and the firmware will look in the exception table for a transit number match before looking in the normal check serial number locations.

In this example, without an exception table entry, the firmware would always pick the rightmost four-digit number as the check serial number following rule two above. The bank with the three digit check serial number and the four digit extension after the "on us" symbol would need to be exceptionally recognized:

      txxxxxxxxxt ccc-xxxxxxxxxxxoxxxx
      txxxxxxxxxt xxx-xxxxxxxxxxocccc

In this example, without an exception table entry, the firmware would not be able to pick out the check serial number because it is not separated from the rest of the account number:

      txxxxxxxxxt ccccxxxxxxxxxxo

In this example, without an exception table entry, the firmware would not be able to pick out the check serial number correctly, because it is imbedded within the rest of the account number:

      txxxxxxxxxt xxx-ccc-xxxxxxxxxxo

Loading the exception table

The exception table begins at word 20 in NVRAM. Each entry takes five words. There is room for eight exceptions.
An application can load local exceptions into the printer using the write NVRAM command:

>   0x1B 0x73 n1 n2 k

which writes the two byte word n1:n2 to word k in NVRAM.

Exception table entry format

Each exception table entry consists of five words. The first two words contain the first eight characters of the transit number by packing the low order nibble of the numeric transit number characters. For Canadian checks, eliminate the dash and store the eight numerics.

The next three words are used as six individual bytes to tell the firmware how to interpret the MICR characters that fall to the right of the rightmost transit symbol. Each of the six bytes is positional and consists of two parts: character type and number.

The three high order bits of each byte mark the character type. The characters can be marked in three ways: check serial # character, account # character, or "skip this character or symbol."

The five low order bits of each byte contain the number of characters of that type to extract. Most exceptions will not need to use all six bytes; in that case clear the unused bytes to zero.

Bits within byte	7	6	5	4	3	2	1	0
Check serial # character string	0	0	1	n	n	n	n	n
Account # character string	0	1	0	n	n	n	n	n
Character string to ignore	1	0	0	n	n	n	n	n

Example 1

t123456780t12349876543210o

>   1234 is the check serial #
>   9876543210 is the account #

To load the second table entry, which starts at word 25, the transit number 123456780 would be stored in the first two words of its table entry using this string of commands:

>   0x1B 0x73 0x12 0x34 25
>   0x1B 0x73 0x56 0x78 26

After the right transit symbol are immediately the four characters of the check serial #, followed immediately by the ten characters of the account number. These would be bitwise encoded as:

>   0 0 1   0 0 1 0 0   (check #, four characters)
> and 0 1 0   0 1 0 1 0   (account #, 10 characters)

then stored in the other three words of the table entry using:

>   0x1B 0x73 0x24 0x4A 27
>   0x1B 0x73 0x00 0x00 28
>   0x1B 0x73 0x00 0x00 29

Example 2

t22137–632t001 6042202o927540

> 2754 is the check serial #
> 6042202 is the account #

To load the third table entry, which starts at word 30, the transit number 2137–632 would be stored in the first two words of its table entry using this string of commands:

> 0x1B 0x73 0x22 0x13 30
> 0x1B 0x73 0x76 0x32 31

After the right transit symbol are four characters to skip, a seven digit account number, two characters to skip, and finally a four digit check serial #. The final character to skip need not be encoded. These would be bitwise encoded as:

> 1 0 0 0 0 1 0 0   (skip four characters)
> 0 1 0 0 0 1 1 1   (account #, seven characters)
> 1 0 0 0 0 0 1 0   (skip two characters)
> 0 0 1 0 0 1 0 0   (check #, four characters)

then stored in the other three words of the table entry using:

> 0x1B 0x73 0x84 0x47 32
> 0x1B 0x73 0x82 0x24 33
> 0x1B 0x73 0x00 0x00 34

Maintaining the exception table

Present contents of the exception table can be examined using the read NVRAM command:

> 0x1B 0x6A k

which reads and returns word k in NVRAM. When the exception table is full, a new entry can replace an older, less frequently used entry, by merely rewriting the words for that table entry.

User data storage

Write to user data storage

ASCII   ESC ' *m a0 a1 a2 d1 ... dm*
Hexadecimal 1B 27 *m a0 a1 a2 d1 ... dm*
Decimal   27 39 *m a0 a1 a2 d1 ... dm*

Value of *m*:   0 – 255

Writes *m* bytes of data to the user data storage flash page at the address specified. The printer waits for *m* bytes of data following the 3-byte address, *addr*.

If any of the memory locations addressed by this command are not currently erased, the command is not executed.

Related information

Result of this write is returned in bit 2 of response to transmit status command 1D 72, *n* = 4.

Read from user data storage

ASCII   ESC 4 *m a0 a1 a2*
Hexadecimal 1B 34 *m a0 a1 a2*
Decimal   27 52 *m a0 a1 a2*

Value of *m*:   0 – 255

Reads *m* bytes of data from the user data storage flash page at the address specified. Returns m bytes to the application, followed by a carriage return (0x0D). If the range of requested data exceeds the sector boundary, the printer will only send the data up to the sector boundary.

Select memory type (SRAM/flash) where to save logos or user-defined fonts

ASCII   GS " *n*
Hexadecimal 1D 22 *n*
Decimal   29 34 *n*

Value of *n*:   48 – 53

_n_ = 48 (ASCII *n* = 0) HEX 30

Loads active logo to RAM only. This is used to print a special logo but not have it take up flash memory. A logo defined following this command is not preserved over a power cycle. The printer disables interrupts while writing to flash. Any command that cause data to be written to flash should be followed by a 50 Msec delay to allow significant time for the write operation.

_n_ = 49 (ASCII *n* = 1) HEX 31

Loads active logo to flash memory. This is the default condition for logo flash storage. A logo defined following this command is stored in flash memory.

_n_ = 50 (ASCII *n* = 2) HEX 32

Loads user-defined characters to RAM only. This is the default condition for user-defined character storage. Any user-defined characters defined following this command are not preserved over a power cycle.

_n_ = 51 (ASCII *n* = 3) HEX 33

Loads user-defined characters to flash memory. An application must use this command to store user-defined characters in flash memory. Any user-defined characters defined following this command are stored in flash memory. A user-defined character cannot be redefined in flash memory. The flash memory page must be erased by an application before redefining user-defined characters. For more information, see the erase user flash sector (1D 40 *n*) command.

Specifies whether to load the logos or user-defined characters to logo/font flash memory or to RAM (volatile memory). The selection remains in effect until it is changed via this command or until the power cycles. To specify permanent font flash, also send 1D 22 81 01.

Flash memory user sectors allocation

ASCII　　　　 GS " U *n1 n*
Hexadecimal　 1D 22 55 *n1 n2*
Decimal　　　 29 34 85 *n1 n2*

Default Value of *n1*:　　　　1 (see below)

Default Value of *n2*:　　　　1 (see below)

*n*1 is the number of 64k sectors used for logos and user-defined characters.

*n*2 is the number of 64k sectors used for user data storage.

$n1 + n2 <= 6$ (dec) (1M)
$n1 + n2 <= 22$ (dec) 16 (hex) (2M)

If *n*1 + *n*2 is greater than the maximum number of sectors available, the command is ignored. The printer returns NACK.

Issuing this command with parameters different from current parameters will erase all sectors. The printer returns ACK.

Issuing this command with parameters the same as current parameters will do nothing. The printer returns ACK.

Note: Flash memory is made up of user and program code. Therefore, the available flash memory space will vary with the amount of program code utilized.

Flash object area pack

ASCII　　　　 GS " ` *n1*
Hexadecimal　 1D 22 60 *n1*
Decimal　　　 29 34 96 *n1*

Value of *n1*:　　*n1* specifies

n1 = 0　　　　　 pack the permanent font area

n1 = 1　　　　　 pack the logo and user-defined character area

Issuing this command will pack the objects currently stored in flash memory. Objects that are no longer valid will be removed. This will provide the user the maximum amount of storage in this area for new objects.

Note: Flash memory is made up of user and program code. Therefore, the available flash memory space will vary with the amount of program code utilized.

Flash object delete

ASCII　　　　 GS " ` *n1 n2 (n3)*
Hexadecimal　 1D 22 61 *n1 n2 (n3)*
Decimal　　　 29 34 97 *n1 n2 (n3)*

Value of *n1*:　　*n1* specifies

n1 = 01　　　　 user-defined character set where *n2* is the ID of the user-defined character set to delete. This will delete all characters found that are part of the specified set.

n1 = 02　　　　 logo where *n2* is the ID of the logo to delete

n1 = 0C　　　　 double-byte font where *n2* is the font ID and *n3* is the font style of the font to delete. This will delete the double-byte font of the specified ID and style. If no other fonts of the same ID are found, the double-byte table that corresponds to this ID will be deleted as well.

n1 = 0D　　　　 POS fontset where *n2* is the ID of the fontset to delete. This will delete both fonts specified by the fontset, if they are not used in any other fontset.

n1 = 0F　　　　 demo script, which takes no following n parameters. Erases all scripts found, not individual scripts.

Issuing this command will delete an individual object or group of objects from flash memory. The parameter *n3* is not used for all types. To reuse the space that these objects occupied in flash memory, a flash area pack must be performed after deleting the object(s).

Note: Flash memory is made up of user and program code. Therefore, the available flash memory space will vary with the amount of program code utilized.

Expanded flash memory allocation

ASCII	GS " 0x80
Hexadecimal	1D 22 80
Decimal	29 34 128

This sequence of commands is used to specify the number of flash sectors to be used for different applications. The begin and end sequence commands must be sent. All areas do not need to have flash sectors specified.

The command to request the number of user sectors is optional.

If more sectors are specified than are available the command sequence is ignored and the printer returns NACK.

If the sectors are available, and different from current parameters, all sectors are erased and the printer returns ACK.

If the sectors specified are the same as current parameters, nothing is erased and the printer returns ACK.

1D 22 80 00	request number of user sectors available, printer returns nL nH
1D 22 80 30	begin expanded flash memory allocation sequence
1D 22 80 31 nL nH	n sectors to logo/font area
1D 22 80 32 nL nH	n sectors to user data storage area
1D 22 80 33 nL nH	n sectors to permanent font area
1D 22 80 34 nL nH	n sectors to electronic journal area
1D 22 80 40	end expanded flash memory allocation sequence

n = 0xFFFF means allocate all remaining sectors to this area; only one area can specify this parameter value.

Select flash area for storing logos and user-defined characters

ASCII	GS" 0x81
Hexadecimal	1D 22 81 *n*
Decimal	29 34 129 *n*

Value of *n*:	*n* specifies
n = 0	select logo/font flash
n = 1	select permanent font flash
n > 1	reserved

Logos and user-defined characters can be stored in either flash area.

Return flash area size

ASCII	GS" 0x90
Hexadecimal	1D 22 90 *n*
Decimal	29 34 144 *n*

Value of *n*:	*n* specifies
n = 0	select logo/font flash
n = 1	select permanent font flash
n > 1	reserved

Returns the size for the selected flash area.

Erase user flash sector

ASCII   GS @ *n*
Hexadecimal   1D 40 *n*
Decimal   29 64 *n*

Value of *n*:   49 – 51

_n_ = 49 (ASCII _n_ = 1) HEX 31

This command erases all 64K flash memory sectors allocated to user-defined character and logos storage. Those sectors should be erased in two situations: when the logo definition area is full and an application is attempting to define new logos, and when an application wants to replace one user-defined character set with another. In both cases, all logos and character set definitions are erased and must be redefined.

_n_ = 50 (ASCII _n_ = 2) HEX 32

This command erases all sectors available for user data storage.

_n_ = 51 (ASCII _n_ = 3) HEX 33

This command erases all sectors available for permanent fonts.

Erases a page of flash memory and sends a carriage return when the operation is complete.

Related information

See command "Flash memory user sectors allocation" (1D 22 55 n1 n2).
See also command "Expanded flash memory allocation" (1D 22 80) and "Select flash area" (1D 22 81 n).

Important: While erasing flash memory, the printer disables all interrupts, including communications. To provide feedback to the application, the printer responds to the application when the erase is complete with a 0D (Hex). After sending the erase user flash sector (1D 40 n) command, an application should wait for the response from the printer before sending data. Otherwise, data will be lost. If an application is unable to receive data, it should wait a minimum of ten seconds after sending the erase user flash sector (1D 40 n) command before sending data.

User storage status (ColorPOS®)

ASCII   GS 0x97 *m n*
Hexadecimal   1D 97 *m n*
Decimal   29 151 *m n*

Value of m: *m* specifies the type of stored object to be reported:

m = 0   return the kilobytes (1024) of free user RAM,
           n = 0 gets largest free block size
           n = 1 gets the total size free

m = 1   return the kilobytes of free character & logo flash memory, *n* = 0

m = 3   return the CRC of a logo indexed by *n*

m = 5   return the CRC of a macro that has been stored, *n* = 0

m = 6   return the number of LEGACY trigger slots open

m = 7   return the kilobytes of free permanent flash, *n* = 0

For *m* =   0 the value of n selects a return of either the largest free block or total free size, since contiguous allocation cannot be assumed as this area is completely under user control through address parameters.

n = 0   if only one instance of an object type is allowed (macro, user data, user defined characters).

n   is the item index when more than one object of type *m* is possible

n <= FE, see the comments about logo indexes

n = FF : return a list describing all the existing items of type *m*

Note: When a specific item request is made, a returned CRC value of 0 0 indicates that no item is stored at that index. There is a practically negligible possibility that a valid object will have a 0 0 CRC; if this is of concern, applications should check the object downloaded byte sequence to verify that this is not the case (as well as store the CRC as an "ID" for the object if needed later for return value comparisons).

This command returns the state of occupancy of available flash storage and user RAM. The printer response for each item is a 4 byte header, 0x1D 0x97 nL nH (number of bytes that follow in the response) and for each item a 4 byte structure: 1st m (type) byte, 2nd n index byte followed by a 2 byte CRC in Lo Hi order of the data string in that storage space.

The return for $m = 0–2$ is the header and one 4-byte item giving remaining storage space in the CRC position in Lo Hi order: 1D 97 4 0 m 0 fL fH, where f is the kBytes of storage remaining. Note that RAM storage space is not content typed, while available flash is statically divided into logo, character set, and user data types. Change of the divisions is possible via flash erasure and flash allocation commands.

Lock permanent font flash area

ASCII	GS 0xF0 0x10 n
Hexadecimal	1D F0 10 n
Decimal	29 240 16 n

Value of n:	$n = 0x00$	lock permanent font flash (default)
	$n = 0x01$	unlock permanent font flash to erase or delete

This command allows or prevents the permanent font area to be erased.

Note: This only affects the 1D 40 33 commands and downloading a font to permanet font area when a font already exists with the same ID.

Flash download

These commands are used to load firmware into the printer.

The commands are listed in numerical order according to their hexadecimal codes. Each command is described and the hexadecimal, decimal, and ASCII codes are listed.

There are two ways to enter the download mode.

1. While the printer is running normally, send the command, "Switch to flash download mode" (1B 5B 7D) to leave normal operation and enter the download mode.

2. If the flash if found corrupted during level 0 diagnostics the download mode is automatically entered after the printer has reset.

The printer never goes directly from the download mode to normal printer operation. To return to normal printer operation either the operator must turn the power off and then on to reboot or the application must send a command to cancel download mode and reboot.

When each flash download command is received, the printer returns either ACK or NAK to the host computer when each command is received:

- ACK (hexadecimal 06)
  Sent when the printer has received a host transmission and has completed the request successfully.

- NAK (hexadecimal 15)
  Sent when a request is unsuccessful.

Communicates to the printer information downloaded from applications. Data is downloaded to flash memory to query the state of the firmware, calculate the firmware CRC and other functions.

Switch to flash download mode

ASCII   ESC [}
Hexadecimal   1B 5B 7D
Decimal   27 91 125

Puts the printer in flash download mode in preparation to receive commands controlling the downloading of objects into flash memory. When this command is received, the printer leaves normal operation and can no longer print transactions until the reboot the printer command (1D FF) is received or the printer is rebooted.

This command does not affect the current communication parameters. Once the printer is in flash download mode, this command is no longer available.

Related information

See entering flash download mode elsewhere in this book to put the printer in flash download mode using the configuration menu.

Erase all flash contents except boot sector

ASCII   GS SO
Hexadecimal   1D 0E
Decimal   29 14

Causes the entire flash memory to be erased.

The printer returns ACK if the command is successful; NAK if it is unsuccessful.

Exceptions

Available only in download mode.

Return main program flash CRC

ASCII   GS SI
Hexadecimal   1D 0F
Decimal   29 15

Returns the CRC calculated over the flash firmware code space.

The format of the response is ACK <low byte> <high byte>.

Download application

ASCII   GS DC1 NUL NUL NUL NUL *d1… dn*
Hexadecimal   1D 11 00 00 00 00 *d1… dn*
Decimal   29 17 0 0 0 0 *d1… dn*

Value of *d:*   data bytes, 0–255

Sending this command followed by an application will download the application to the printer. This will reprogram the flash.

Related information

Available only in download mode.

For more information, contact your service representative.

Reset firmware

ASCII	GS (SPACE)
Hexadecimal	1D FF
Decimal	29 255

Ends the load process and reboots the printer. Before executing this command, the printer should have firmware loaded and external switches set to the runtime settings. Application software for downloading should prompt the user to set the external switches and confirm before sending this command. If the downloading was started from a diagnostic, the reboot will cause the printer to re-enter download state unless the external switches are changed.

Settings commands

The following commands enable the user to save and restore printer settings.

Save current settings

ASCII	US HT SOH ACK
Hexadecimal	1F 09 01 06
Decimal	31 09 01 06

Saves all current settings as factory settings.

Restore factory settings

ASCII	US HT SOH BEL
Hexadecimal	1F 09 01 07
Decimal	31 09 01 07

Clears active settings and restores factory settings.

Upload current settings

ASCII	US HT SOH BS
Hexadecimal	1F 09 01 08
Decimal	31 09 01 08

Uploads current settings to the current communications port.

Upload factory settings

ASCII	US HT SOH TAB
Hexadecimal	1F 09 01 09
Decimal	31 09 01 09

Uploads factory settings to the current communications port.

Download settings

ASCII	US HT SOH LF
Hexadecimal	1F 09 01 0A
Decimal	31 09 01 10

Downloads and merges settings into factory settings and makes these the new settings.

Miscellaneous configuration commands

Set diagnostics mode

ASCII   US EXT NUL *n*
Hexadecimal   1F 03 00 *n*
Decimal   31 03 00 *n*

Value of n: 0 = Normal operation/diagnostics mode off
                  1 = DataScope mode (without graphics)
                  2 = Receipt test mode
                  6 = DataScope mode (with graphics)

Default: 0 (Normal operation)

Sets the diagnostics mode to DataScope mode (with or without graphics) or receipt test mode, or sets the printer back to normal operation. See "Diagnostics modes" in chapter two for more information.

Enable or disable knife

ASCII   US EXT STX *n*
Hexadecimal   1F 03 02 *n*
Decimal   31 03 02 *n*

Value of n: 0 = Disable
                  1 = Enable

Default: 1 (Enable)

Enables or disables the knife.

Enable or disable paper low sensor

ASCII   US EXT EXT *n*
Hexadecimal   1F 03 03 *n*
Decimal   31 03 03 *n*

Value of n: 0 = Disable
                  1 = Enable

Default: 1 (Enable)

Enables or disables the paper low sensor. The printer will not be able to sense when the paper roll is low if this is set to disabled.

Set max power

ASCII   US EXT EOT *n*
Hexadecimal   1F 03 04 *n*
Decimal   31 03 04 *n*

Value of n: 0 = Auto
                  1 = Level I (55W)
                  2 = Level II (75W)
                  3 = Level III (90W)

Default: 0 (Auto)

Sets the max power to match the power supply of the printer.

Set printer emulation

ASCII	US EXT BEL *n*
Hexadecimal	1F 03 07 *n*
Decimal	31 03 07 *n*

Value of n:	0 = Native mode
	1 = A756

Default:	0 (Native mode)

Sets the printer emulation. See "Printer emulations" in chapter two for more information.

Reset settings to default values

ASCII	US EXT TAB
Hexadecimal	1F 03 09
Decimal	31 03 09

Defaults:	Diagnostics mode = Normal operation
	Carriage return = Use as command
	Knife = Enabled
	Paper low sensor = Enabled
	Max power = Auto
	Printer emulation = Native
	Paper width = 80mm

Resets the previously mentioned configuration commands to their default values.

Set partial cut distance

ASCII	US EXT LF *n*
Hexadecimal	1F 03 0A *n*
Decimal	31 03 10 *n*

Value of n:	00h = 125 steps	05h = 110 steps
	01h = 130 steps	06h = 115 steps
	02h = 135 steps	07h = 120 steps
	03h = 140 steps	08h = 150 steps
	04h = 145 steps	09h = 155 steps
		0Ah = 160 steps

Sets the distance that the knife will cut across a receipt in 5 step increments between 110-160.

Set default font

ASCII	US EXT SI *n*
Hexadecimal	1F 03 0F *n*
Decimal	31 03 15 *n*

Value of n:	0 = Standard 13x24
	1 = User defined
	2 = Compressed 10x24

Sets the default font for monochrome and two-color, and emulations.

Set font size

ASCII	US EXT DLE *n*
Hexadecimal	1F 03 10 *n*
Decimal	31 03 16 *n*

Value of n:	0 = Standard 24 high
	1 = Tall font
	2 = ColorPOS font
	3 = Paper-Savings font

Sets font size for the emulation being used.

Set color density

ASCII	US EXT EM *n*
Hexadecimal	1F 03 19 *n*
Decimal	31 03 25 *n*

Value of n:	Percentage (between 70 and 120%)

Default:	64h (100%)

Adjusts printhead energy level to darken color printing or adjust for paper variations. When printer prints highdensity color print lines (text or graphics), it automatically slows down.

WARNING: Choose a color density setting no higher than necessary to achieve acceptable color print density. Failure to observe this rule may result in a printer service call and may void the printer warranty. Running at a higher energy level will reduce the printhead life. Consult your HP technical support specialist if you have questions.

Enable or disable Code 128 check digit calculation

ASCII	US EXT ESC *n*
Hexadecimal	1F 03 1B *n*
Decimal	31 03 27 *n*

Value of n:	0 = Disable
	1 = Enable

Default:	1 (Enable)

Enables or disables the calculation of the Code 128 check digit.

Enable or disable barcode ITF leading zero

ASCII	US EXT GS *n*
Hexadecimal	1F 03 1D *n*
Decimal	31 03 29 *n*

Value of n:	0 = Disable
	1 = Enable

Default:	1 (Enable)

Enables or disables the leading zero for barcode ITF. If enabled, a zero is provided to even out an odd number of input characters.

Enable or disable barcode string terminator

ASCII	US EXT RS *n*
Hexadecimal	1F 03 1E *n*
Decimal	31 03 30 *n*

Value of n:	0 = Disable
	1 = Enable

Default:	0 (Disable)

Enables or disables the barcode string terminator. If disabled, the string terminator will not be looked for when the length is specified.

Set paper low threshold extension

ASCII	US EXT US *n*
Hexadecimal	1F 03 1F *n*
Decimal	31 03 31 *n*

Value of n:	0 = Zero
	1 = 5 feet
	2 = 10 feet
	3 = 15 feet
	4 = 20 feet
	5 = -5 feet
	6 = -10 feet

Default:	0 (Zero)

Sets the amount of footage for the extension in 5 foot increments between 0 and 20 feet.

Enable or disable USM canned status

ASCII	US EXT 0x28 *n*
Hexadecimal	1F 03 28 *n*
Decimal	31 03 40 *n*

Value of n:	0 = Disable
	1 = Enable

Default:	0 (Disable)

Enables or disables the USM canned status feature.

Send diagnostic pages to comm port

ASCII	US EXT 0x2C *n*
Hexadecimal	1F 03 2C *n*
Decimal	31 03 44 *n*

Value of n:	0 = Disabled
	1 = Enabled

Sends the diagnostic pages to the comm port if enabled.

Enable or disable EJ action via operator control

ASCII	US EXT 0x2E *n*
Hexadecimal	1F 03 2E *n*
Decimal	31 03 46 *n*

Value of n:	0 = Disable
	1 = Enable

Enables or disables the need for operator control for electronic journaling.

Set fine adjustment of partial cut steps

ASCII	US EXT 0x31 *n*
Hexadecimal	1F 03 31 *n*
Decimal	31 03 49 *n*

Value of n:	number of extra steps

Sets the amount of extra steps the knife will cut across a receipt.

Set printer ID mode

ASCII	US EXT 0x32 *n*
Hexadecimal	1F 03 32 *n*
Decimal	31 03 50 *n*

Value of n:	0 = Native or Emulated printer ID
	0x01-0xFE = User-defined printer ID

This function is used to determine what printer ID value is returned in response to a Transmit printer ID command (1D 49 n). If n > 0, the printer ID will transmit whaver value of n is selected. If n = 0, the printer can be configured to send back the ID of the A776II, or A756 using the confiuration menu.

Set default code page at power on

ASCII	US EXT 0x33 *n*
Hexadecimal	1F 03 33 *n*
Decimal	31 03 51 *n*

Value of n:	code page value

Default:	00 (Code page 437)

Changes the default code page used at power up. See "Select international character set" command for more information on code page values.

Set Asian ASCII characters to narrow

ASCII	US EXT 0x3D *n*
Hexadecimal	1F 03 3D *n*
Decimal	31 03 61 *n*

Value of n:	0 = Normal
	1 = Narrow

Changes the width of the ASCII characters of the Asian fonts.

Set vertical white space

ASCII	US EXT 0x47 *n*
Hexadecimal	1F 03 47 *n*
Decimal	31 03 71 *n*

Value of n:	number of dot rows
	0 = Reduced white space on
	FF = Normal spacing

When this command is sent, the amount of white space on the printed receipt is *n* dot rows.

Set printer tone

ASCII	US EXT 0x52 *n fL fH dL dH*
Hexadecimal	1F 03 52 *n fL fH dL dH*
Decimal	31 03 82 *n fL fH dL dH*

Value of n:	1 = runtime configuration
	2 = write to EEPROM (requires a reset)

Value of fL:	low byte of frequency
Value of fH:	high byte of frequency

Value of dL:	low byte of duration
Value of dH:	high byte of duration

Sets the duration and frequency of the printer tone. Setting *f* or *d* to 0 will set the original tone.

Enable or disable shutdown mode

ASCII	US EXT 0x54 NUL *n*
Hexadecimal	1F 03 54 00 *n*
Decimal	31 03 84 00 *n*

Value of n:	0 = Disable
	2 = Enable

Enables or disables shutdown mode. To restore printer to normal function after shutdown, press feed switch.

Set shutdown mode timeout

ASCII	US EXT 0x54 SOH *ll hh*
Hexadecimal	1F 03 54 01 *ll hh*
Decimal	31 03 84 01 *ll hh*

Value of ll:	low byte of time in seconds
Value of hh:	high byte of time in seconds

Sets the number of seconds the printer will wait in idle mode before shutting down. A value of *ll hh* = 00 00 disables this feature. To restore printer to normal function after shutdown, press feed switch. Note: shutdown mode (1F 03 54 00 n) must be enabled for this to work.

Appendix A:
Commands Listed by Hexadecimal Code

Code (hexadecimal)	Command	Page
09	Horizontal tab	36
0A	Print and feed paper one line	32
0C	Print and return to standard mode	115
0C	Print and eject slip	32
0D	Print and carriage return	32
10	Clear printer	23
10 04 *n*	Real time status transmission (DLE sequence)	88
10 05 *n*	Real time request to printer (DLE sequence)	90
11	Close form	23
11 *n1 . . . n72*	Print raster graphics	64
12	Select double-wide characters	42
13	Select single-wide characters	42
14 *n*	Feed *n* print lines	32
15 *n*	Feed *n* dot rows	33
16 *n*	Add *n* extra dot rows	33
17	Print	34
18	Cancel print data in page mode	115
18	Open form	24
1A	Perform partial knife cut (or code 1B 6D)	24
1B (+*.BMP)	Download BMP logo (where +*.BMP is the data from the file, not the filename.)	59
1B 07	Generate tone	24
1B 0C	Print data in page mode	116
1B 12	Select 90 degree counter-clockwise rotated print	42
1B 14 *n*	Set column	36
1B 16 *n*	Select pitch (column width)	43
1B 20 *n*	Set right-side character spacing	43
1B 21 *n*	Select print mode	44
1B 24 *n*L *n*H	Set absolute starting position	37
1B 25 *n*	Select or cancel user-defined character set	44
1B 26 *s c1 c2*	Define user-defined character set	46
1B 27 *m a0 a1 a2 d1 … dm*	Write to user data storage	130
1B 2A *m n1 n2 d1...dn*	Select bit image mode	60
1B 2A 62 6d *n*	Turn on/off TIFF compression	61

Code (hexadecimal)	Command	Page
1B 2D *n*	Select or cancel underline mode	47
1B 2E *m n rL rH d1 … dn*	Print advanced raster graphics	61
1B 32	Set vertical line spacing to 1/6 inch	37
1B 33 *n*	Set vertical line spacing	37
1B 34 *m a0 a1 a2*	Read from user data storage	130
1B 3A 30 30 30	Copy character set from ROM to RAM	48
1B 3C	Return home	24
1B 3D *n*	Select peripheral device (for multi-drop)	25
1B 3F *n*	Cancel user-defined character	48
1B 40	Initialize printer	25
1B 43 *n*	Set slip paper eject length	25
1B 44 *n1...nk* 00	Set horizontal tab positions	38
1B 45 *n*	Select or cancel emphasized mode	48
1B 47 *n*	Select or cancel double-strike	49
1B 49 *n*	Select or cancel italic print	49
1B 4A *n*	Print and feed paper	34
1B 4B *n*	Print and reverse feed paper	34
1B 4B *n1 n2 d1...dn*	Select single-density graphics	61
1B 4C	Select page mode	116
1B 52 *n*	Select international character code	50
1B 53	Select standard mode	117
1B 54 n	Select print direction in page mode	117
1B 55 *n*	Set unidirectional print on impact station	26
1B 56 *n*	Select or cancel 90 degree clockwise rotated print	51
1B 57 *n1, n2...n8*	Set print area in page mode	118
1B 59 *n1 n2 d1...dn*	Select double-density graphics	62
1B 5B 7D	Switch to flash download mode	135
1B 5C *n1 n2*	Set relative print position	39
1B 61 *n*	Select justification	40
1B 63 30 *n*	Select receipt or slip for printing; slip for MICR read	26
1B 63 31 *n*	Select receipt or slip for setting line spacing	26
1B 63 34 *n*	Select sensors to stop printing	27
1B 63 35 *n*	Enable or disable panel button	27
1B 64 *n*	Print and feed *n* lines	34
1B 65 *n*	Print and reverse feed *n* lines	35
1B 66 *m n*	Set slip paper waiting time	27
1B 6D	Perform partial knife cut (or code 1A)	24

Code (hexadecimal)	Command	Page
1B 70 *n p1 p2*	Generate pulse to open cash drawer	28
1B 71	Release paper	28
1B 72 m	Set current color	28
1B 74 *n*	Select international character set	51
1B 75 0	Transmit peripheral device status (RS-232C printers only)	78
1B 76	Transmit paper sensor status	78
1B 77 01	Read MICR data and transmit	122
1B 77 52	Transmit last MICR read	122
1B 77 50	Define parsing format, save in NVRAM	123
1B 77 70	Define parsing format, do not save permanently	123
1B 7B *n*	Select or cancel upside-down print mode	52
1C	Select slip station	29
1C 70 *m n*	Print flash logo	66
1C 71 *n* ...	Define flash logos	66
1D 03 n	Real time request to printer (GS sequence)	90
1D 04 *n*	Real time status transmission (GS sequence)	88
1D 05	Real time printer status transmission	91
1D 0E	Erase all flash contents except boot sector	135
1D 0F	Return main program flash CRC	135
1D 11 00 00 00 00 *d1…dn*	Download Application	135
1D 14 *n*	Reverse feed *n* lines	35
1D 15 *n*	Reverse feed *n* dots	35
1D 21 *n*	Select character size	53
1D 22 *n*	Select memory type (SRAM/Flash) where to save logos or user-defined fonts	130
1D 22 55 *n1 n2*	Flash memory user sectors allocation	131
1D 22 60 n1	Flash object area pack	131
1D 22 61 n1 n2 (n3)	Flash object delete	131
1D 22 80	Expanded flash memory allocation	132
1D 22 81 *n*	Select flash area for storing logos and user-defined characters	132
1D 22 90 *n*	Return flash area size	132
1D 23 *n*	Select the current logo (downloaded bit image)	62
1D 24 *nL nH*	Set absolute vertical print position in page mode	119
1D 28 6B 03 00 31 43 n	Set size of module for QR Code	99
1D 28 6B 03 00 31 44 m	Set data parsing mode for QR Code	100
1D 28 6B 03 00 31 45 n	Select error correction level for QR Code	100
1D 28 6B 03 00 31 51 30	Print symbol data for QR Code	101
1D 28 6B 03 00 31 52 30	Transmit QR code print size	102

Code (hexadecimal)	Command	Page
1D 28 6B 03 00 36 54 30	Print DataMatrix symbol data in the symbol storage area	113
1D 28 6B 04 00 00 31 41 n1 n2	Select model for QR Code	99
1D 28 6B 05 00 36 42 *m d1 d1*	Set DataMatrix parameters	110
1D 28 6B 05 00 36 43 *n*	Set DataMatrix module size	111
1D 28 6B *pL pH* 36 50 30 *d1...dk*	Store DataMatrix data in symbol storage area	112
1D 28 6B qL qH 31 50 30 f1 ... fk	Store symbol data for QR Code	100
1D 2A *n1 n2 d1...dn*]	Define downloaded bit image	63
1D 2F *m*	Print downloaded bit image	64
1D 3A	Select or cancel macro definition	121
1D 40 *n*	Erase user flash sector	57, 133
1D 42 *n*	Select or cancel white/black reverse print mode	54
1D 48 *n*	Select printing position of HRI characters	103
1D 49 *n*	Transmit printer ID	79
1D 49 40 *n*	Transmit printer ID, remote diagnostics extension	80
1D 4C *nL nH*	Set left margin	40
1D 50 *x y*	Set horizontal and vertical minimum motion units	36
1D 56 *m*	Select cut mode and cut paper (or code 1D 56 *m n*)	29
1D 56 *m n*	Select cut mode and cut paper (or code 1D 56 m)	29
1D 57 *nL nH*	Set printing area width	41
1D 5C *nL nH*	Set relative vertical print position in page mode	120
1D 5E *r t m*	Execute macro	121
1D 61 *n*	Enable/disable Automatic Status Back (ASB)	92
1D 61 *n*	Select or cancel unsolicited status mode (USM)	95
1D 62 *n*	Set smoothing	54
1D 66 *n*	Select pitch of HRI characters	104
1D 68 *n*	Select bar code height	104
1D 6B *m d1...dk* 00 or 1D 6B *m n d1...dn*	Print bar code	104
1D 6B *n d1...* 00	Print GS1 Databar (RSS barcode), null terminated	107
1D 6B *m n*L *nH d1... dn*	Print GS1 DataBar (RSS barcode), data length specified	107
1D 6B FF *n*	Print Multiple Barcodes	106
1D 70 *a b c d e f*	Select PDF 417 parameters	108
1D 71 *a b c d e f*L *f*H	Set GS1 Databar (RSS) parameters	108
1D 72 *n*	Transmit status	83

Code (hexadecimal)	Command	Page
1D 77 *n*	Select bar code width	109
1D 81 *m n*	Set paper type (ColorPOS®)	30
1D 82 *n*1…*n*72/*n*80	Print raster monochrome graphics (ColorPOS®)	65
1D 83 *n*1…*n*144/*n*160	Print raster color graphics (ColorPOS®)	65
1D 84 *m n*1 *n*2 *d*1...*dx*	Download logo image (ColorPOS®)	66
1D 85 *m n*	Reverse color text mode (ColorPOS®)	55
1D 86 *m*	Monochrome shade mode (ColorPOS®)	68
1D 87 *m*	Color shade mode (ColorPOS®)	68
1D 89 *n m*	Logo print with color plane swap (ColorPOS®)	68
1D 8B *n m o*	Apply shading to logo (ColorPOS®)	67
1D 8C *n m*	Merge watermark mode (ColorPOS®)	67
1D 8D *n m*	Text strike-through mode (ColorPOS®)	55
1D 90 *m x y o p q*	Form and merge real time surround graphic (ColorPOS®)	69
1D 91 *n*	Save graphics buffer as logo (ColorPOS®)	69
1D 92 *n*	Background logo print mode (ColorPOS®)	70
1D 97 *m n*	User storage status (ColorPOS®)	133
1D 99 *l m n o*	Apply margin message mode (ColorPOS®)	70
1D 9A *n m o*	Shade and store logo (ColorPOS®)	71
1D 9B *m n*	Logo print with knife cut	71
1D A0 *nl nh*	Set temporary maximum target speed	72
1D F0 01 *n*	Select font ID number	58
1D F0 02 *n*	Select font style number	58
1D F0 03	Save font ID number as default font at power up	58
1D F0 10 *n*	Lock permanent font flash area	57, 134
1D F0 20 nn	Get double-byte font CRC (font ID)	58
1D F0 21 nn mm	Get double-byte font CRC (font ID and font style)	58
1D F0 80	Download font	59
1D F0 C0 02	Download font list	56
1D FF	Reset firmware	135
1E	Select receipt station	30
1F 03 00 *n*	Set diagnostics mode	137
1F 03 02 *n*	Enable or disable knife	137
1F 03 03 *n*	Enable or disable paper low sensor	137
1F 03 04 *n*	Set max power	137
1F 03 07 *n*	Set printer emulation	138
1F 03 09	Reset settings to default values	138
1F 03 0A *n*	Set partial cut distance	138

Code (hexadecimal)	Command	Page
1F 03 0F *n*	Set default font	139
1F 03 10 *n*	Set font size	141
1F 03 16 *f s p/t t*	Set LogoEZ® colorization	72
1F 03 16 05 *n*	Set interpretation of "Set current color" command	30
1F 03 17 *a m s*	Set LogoEZ® attribute mapping	75
1F 03 19 *n*	Set color density	139
1F 03 1B *n*	Enable or disable Code 128 check digit calculation	139
1F 03 1D *n*	Enable or disable barcode ITF leading zero	139
1F 03 1E *n*	Enable or disable barcode string terminator	140
1F 03 1F *n*	Set paper low threshold extension	140
1F 03 28 *n*	Enable or disable USM canned status	140
1F 03 2C *n*	Send diagnostic page to comm port	140
1F 03 2E *n*	Enable or disable EJ action via operator control	141
1F 03 31 *n*	Set fine adjustment of partial cut steps	141
1F 03 32 *n*	Set printer ID mode	141
1F 03 33 *n*	Set default code page at power on	141
1F 03 3C *ll hh*	Set timeout value for low-power idle state	31
1F 03 3D *n*	Set Asian ASCII characters to narrow	141
1F 03 45 FSID	Configure use of font set	56
1F 03 46 *n*	Configure line spacing	56
1F 03 47 *n*	Set vertical white space	142
1F 03 4E *n1 n2*	Port idle timeout	31
1F 03 52 *n fL fH dL dH*	Set printer tone	142
1F 03 54 00 *n*	Enable or disable shutdown mode	142
1F 03 54 01 *ll hh*	Set shutdown mode timeout	142
1F 04 *n*	Convert 6-dots/mm bitmap to 8-dots/mm bitmap	76
1F 05 *n*	Select superscript or subscript modes	55
1F 09 01 06	Save current settings	136
1F 09 01 07	Restore factory settings	136
1F 09 01 08	Upload current settings	136
1F 09 01 09	Upload factory settings	136
1F 09 01 0A	Download settings	136
1F 26 *s c1 c2*	Define extended user-defined character set	47

Code (hexadecimal)	Command	Page
1F 56	Send printer software version	86
1F 69 *n*	Select active user-defined character set	56
1F 70	Set printer into low-power idle state	31
1F 74	Print test form	31
1F 7A	Real time commands disable	91
1F 7B n	Enable constant speed logos	77

Appendix B:
Resident Character Sets

Character code table Page 0 (PC437: USA, Standard Europe):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	¢	£	¥	Pt	ƒ
A0	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	NBSP

Character code table Page 1 (PC850: Multilingual Latin I):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	×	ƒ
A0	á	í	ó	ú	ñ	Ñ	ª	º	¿	®	¬	½	¼	¡	«	»
B0	░	▒	▓	│	┤	Á	Â	À	©	╣	║	╗	╝	¢	¥	┐
C0	└	┴	┬	├	─	┼	ã	Ã	╚	╔	╩	╦	╠	═	╬	¤
D0	ð	Ð	Ê	Ë	È	ı	Í	Î	Ï	┘	┌	█	▄	¦	Ì	▀
E0	Ó	ß	Ô	Ò	õ	Õ	µ	þ	Þ	Ú	Û	Ù	ý	Ý	¯	´
F0	−	±	‗	¾	¶	§	÷	¸	°	¨	·	¹	³	²	■	NBSP

Character code table Page 2 (PC852: Latin II):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80	Ç	ü	é	â	ä	ů	ć	ç	ł	ë	Ő	ő	î	Ź	Ä	Ć
90	É	Ĺ	Í	ô	ö	Ľ	ľ	Ś	ś	Ö	Ü	Ť	ť	Ł	×	č
A0	á	í	ó	ú	Ą	ą	Ž	ž	Ę	ę	¬	ź	Č	ş	«	»
B0	░	▒	▓	│	┤	Á	Â	Ě	Ş	╣	║	╗	╝	Ż	ż	┐
C0	└	┴	┬	├	─	┼	Ă	ă	╚	╔	╩	╦	╠	═	╬	¤
D0	đ	Đ	Ď	Ë	ď	Ň	Í	Î	ě	┘	┌	█	▄	Ţ	Ů	▀
E0	Ó	ß	Ô	Ń	ń	ň	Š	š	Ŕ	Ú	ŕ	Ű	ý	Ý	ţ	´
F0	−	˝	˛	ˇ	˘	§	÷	¸	°	¨	·	ű	Ř	ř	■	NBSP

Character code table Page 3 (PC860: Portuguese):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ç	ü	é	â	ã	à	Á	ç	ê	Ê	è	Í	Ô	ì	Ã	Â
90	É	À	È	ô	õ	ò	Ú	ù	Ì	Õ	Ü	¢	£	Ù	Pt	Ó
A0	á	í	ó	ú	ñ	Ñ	ª	º	¿	Ò	¬	½	¼	¡	«	»
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	NBSP

Character code table Page 4 (PC863: Canadian French):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ç	ü	é	â	Â	à	¶	ç	ê	ë	è	ï	î	_	À	§
90	É	È	Ê	ô	Ë	Ï	û	ù	¤	Ô	Ü	¢	£	Ù	Û	ƒ
A0	¦	´	ó	ú	¨	¸	³	¯	Î	⌐	¬	½	¼	¾	«	»
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	=	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	NBSP

Character code table Page 5 (PC865: Nordic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	Pt	ƒ
A0	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	¤
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0	≡	±	≥	≤	⌠	⌡	÷	≈	°	·	·	√	ⁿ	²	■	NBSP

Character code table Page 6 (PC858: Multilingual I + Euro):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	×	ƒ
A0	á	í	ó	ú	ñ	Ñ	ª	º	¿	®	¬	½	¼	¡	«	»
B0	░	▒	▓	│	┤	Á	Â	À	©	╣	║	╗	╝	¢	¥	┐
C0	└	┴	┬	├	─	┼	ã	Ã	╚	╔	╩	╦	╠	═	╬	¤
D0	ð	Ð	Ê	Ë	È	€	Í	Î	Ï	┘	┌	█	▄	¦	Ì	▀
E0	Ó	ß	Ô	Ò	õ	Õ	µ	þ	Þ	Ú	Û	Ù	ý	Ý	¯	´
F0	–	±	=	¾	¶	§	÷	¸	°	¨	·	¹	³	²	■	NBSP

Character code table Page 7 (PC866: Russian):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
90	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
A0	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я
F0	Ё	ё	Є	є	Ї	ї	Ў	ў	°	∙	·	√	№	¤	■	NBSP

Character code table Page 8 (WPC1252: Latin I):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	€	₹	‚	ƒ	„	…	†	‡	ˆ	‰	Š	‹	Œ		Ž	
90		`	'	"	"	•	–	—	~	™	š	›	œ		ž	Ÿ
A0	NBSP	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	–	®	¯
B0	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
C0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D0	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
E0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F0	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

Character code table Page 9 (PC862: Hebrew):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	א	ב	ג	ד	ה	ו	ז	ח	ט	י	ך	כ	ל	ם	מ	ן
90	נ	ס	ע	ף	פ	ץ	צ	ק	ר	ש	ת	¢	£	¥	Pt	ƒ
A0	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	NBSP

Character code table Page 10 (PC737: Greek):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο	Π
90	Ρ	Σ	Τ	Υ	Φ	Χ	Ψ	Ω	α	β	γ	δ	ε	ζ	η	θ
A0	ι	κ	λ	μ	ν	ξ	ο	π	ρ	σ	ς	τ	υ	φ	χ	ψ
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	ω	ά	έ	ή	ϊ	ί	ό	ύ	ϋ	ώ	Ά	Έ	Ή	Ί	Ό	Ύ
F0	Ώ	±	≥	≤	Ϊ	Ϋ	÷	≈	°	·	·	√	ⁿ	²	■	NBSP

Character code table Page 11 (PC874: Thai):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	€					…										
90		`	'	"	"	•	–	—								
A0	NBSP	ก	ข	ฃ	ค	ฅ	ฆ	ง	จ	ฉ	ช	ซ	ฌ	ญ	ฎ	ฏ
B0	ฐ	ฑ	ฒ	ณ	ด	ต	ถ	ท	ธ	น	บ	ป	ผ	ฝ	พ	ฟ
C0	ภ	ม	ย	ร	ฤ	ล	ฦ	ว	ศ	ษ	ส	ห	ฬ	อ	ฮ	ๆ
D0	็	่	า	ำ	ิ	ี	ึ	ื	ุ	ู	ฺ					฿
E0	เ	แ	โ	ใ	ไ	ๅ	ๆ	็	่	้	๊	๋	์	ํ	๎	๏
F0	๐	๑	๒	๓	๔	๕	๖	๗	๘	๙	๚	๛				

Character code table Page 12 (PC857: Turkish):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ı	Ä	Å
90	É	æ	Æ	ô	ö	ò	û	ù	İ	Ö	Ü	ø	£	Ø	Ş	ş
A0	á	í	ó	ú	ñ	Ñ	Ğ	ğ	¿	®	¬	½	¼	¡	«	»
B0	░	▒	▓	│	┤	Á	Â	À	©	╣	║	╗	╝	¢	¥	┐
C0	└	┴	┬	├	─	┼	ã	Ã	╚	╔	╩	╦	╠	=	╬	¤
D0	°	ª	Ê	Ë	È		Í	Î	Ï	┘	┌	█	▄	¦	Ì	■
E0	Ó	ß	Ô	Ò	õ	Õ	µ		×	Ú	Û	Ù	ì	ÿ	─	´
F0		±		¾	¶	§	÷	¸	°	¨	·	¹	³	²	■	NBSP

Character code table Page 13 (WPC1251: Cyrillic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ђ	Ѓ	‚	ѓ	„	…	†	‡	€	‰	Љ	‹	Њ	Ќ	Ћ	Џ
90	ђ	'	'	"	"	•	–	—		™	љ	›	њ	ќ	ћ	џ
A0	NBSP	Ў	ў	Ј	¤	Ґ	¦	§	Ё	©	Є	«	¬	–	®	Ї
B0	°	±	І	і	ґ	µ	¶	·	ё	№	є	»	ј	Ѕ	ѕ	ї
C0	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
D0	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
E0	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
F0	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я

Character code table Page 14 (WPC1255: Hebrew):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	€		‚	ƒ	„	…	†	‡	^	‰		‹				
90		`	'	"	"	•	–	—	~	™		›				
A0	NBSP	¡	¢	£	₪	¥	¦	§	¨	©	×	«	¬	–	®	¯
B0	°	±	²	³	´	µ	¶	·	¸	¹	÷	»	¼	½	¾	¿
C0	◌	◌	◌	◌	◌	◌	◌	◌	◌	◌		◌	◌	◌	–	◌
D0	׀	◌	◌	׃	װ	ױ	ײ	׳	״							
E0	א	ב	ג	ד	ה	ו	ז	ח	ט	י	ך	כ	ל	מ	ם	נ
F0	ן	ס	ע	ף	פ	ץ	צ	ק	ר	ש	ת			LRM	RLM	

Character code table Page 15 (KZ_1048: Kazakh):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ђ	Ѓ	‚	ѓ	„	…	†	‡	€	‰	Љ	‹	Њ	Қ	һ	Џ
90	ђ	'	'	"	"	•	–	—		™	љ	›	њ	қ	h	џ
A0		¥	ұ	Ә	¤	Ө	¦	§	Ё	©	Ғ	«	¬	–	®	Ү
B0	°	±	І	і	ө	µ	¶	·	ё	№	ғ	»	ә	Ң	ң	ү
C0	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
D0	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
E0	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
F0	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я

Character code table Page 16 (WPC1256: Arabic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80	€	پ	‚	ƒ	„	…	†	‡	^	‰	ٹ	‹	Œ	چ	ژ	ڈ
90	گ	‘	’	"	"	•	–	—	ک	™	ڑ	›	œ	ZWNJ	ZWJ	ں
A0	NBSP	،	¢	£	¤	¥	¦	§	¨	©	ه	«	¬		®	¯
B0	°	±	²	³	´	µ	¶	·	‍	¹	؛	»	¼	½	¾	؟
C0	ﮧ	ء	آ	أ	ؤ	إ	ئ	ا	ب	ة	ت	ث	ج	ح	خ	د
D0	ذ	ر	ز	س	ش	ص	ض	×	ط	ظ	ع	غ		ف	ق	ك
E0	à	ل	â	م	ن	ه‍	و	ç	è	é	ê	ë	ى	ي	î	ï
F0	ﮎ	ﮐ	ﹶ	ﮒ	ô	ﹸ	ﹺ	÷	ﹾ	ù	ﱞ	û	ü	LRM	RLM	ﭒ

Character code table Page 17 (WPC1250: Central Europe):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	€		‚		„	…	†	‡		‰	Š	‹	Ś	Ť	Ž	Ź
90		`	'	"	"	•	–	—		™	š	›	ś	ť	ž	ź
A0	NBSP	ˇ	˘	Ł	¤	Ą	¦	§	¨	©	Ş	«	¬	–	®	Ż
B0	°	±	˛	ł	´	µ	¶	·	¸	ą	ş	»	Ľ	˝	ľ	ż
C0	Ŕ	Á	Â	Ă	Ä	Ĺ	Ć	Ç	Č	É	Ę	Ë	Ě	Í	Î	Ď
D0	Đ	Ń	Ň	Ó	Ô	Ő	Ö	×	Ř	Ů	Ú	Ű	Ü	Ý	Ţ	ß
E0	ŕ	á	â	ă	ä	ĺ	ć	ç	č	é	ę	ë	ě	í	î	ď
F0	đ	ń	ň	ó	ô	ő	ö	÷	ř	ů	ú	ű	ü	ý	ţ	˙

Character code table Page 18 (WPC28591: Latin 1):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80																
90																
A0	NBSP	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	−	®	¯
B0	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
C0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D0	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
E0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F0	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

Character code table Page 19 (WPC28592: Latin 2):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80																
90																
A0	NBSP	Ą	˘	Ł	¤	Ľ	Ś	Ş	¨	Š	Ş	Ť	Ź	–	Ž	Ż
B0	°	ą	˛	ł	´	ľ	ś	ˇ	¸	š	ş	ť	ź	˝	ž	ż
C0	Ŕ	Á	Â	Ă	Ä	Ĺ	Ć	Ç	Č	É	Ę	Ë	Ě	Í	Î	Ď
D0	Đ	Ń	Ň	Ó	Ô	Ő	Ö	×	Ř	Ů	Ú	Ű	Ü	Ý	Ţ	ß
E0	ŕ	á	â	ă	ä	ĺ	ć	ç	č	é	ę	ë	ě	í	î	ď
F0	đ	ń	ň	ó	ô	ő	ö	÷	ř	ů	ú	ű	ü	ý	ţ	˙

Character code table Page 20 (WPC28599: Turkish):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80																
90																
A0	NBSP	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	–	®	‾
B0	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
C0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D0	Ğ	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	İ	Ş	ß
E0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F0	ğ	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ı	ş	ÿ

Character code table Page 21 (WPC28605: Latin 9):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80																
90																
A0	NBSP	¡	¢	£	€	¥	Š	§	š	©	ª	«	¬	–	®	‾
B0	°	±	²	³	Ž	µ	¶	·	ž	¹	º	»	Œ	œ	Ÿ	¿
C0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D0	Đ	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
E0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F0	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

Character code table Page 22 (PC864: Arabic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	°	·	·	√	▒	─	│	┼	┤	┬	├	┴	┐	┌	└	┘
90	β	∞	φ	±	½	¼	≈	«	»	أ	لأ			لا	لا	
A0	NBSP	−	آ	£	¤	أ			ل	ب	ت	ث	،	ج	ح	خ
B0	٠	١	٢	٣	٤	٥	٦	٧	٨	٩	ف	؛	س	ش	ص	؟
C0	¢	ء	آ	أ	ؤ	ع	ئ	ا	ب	ة	ت	ث	ج	ح	خ	د
D0	ذ	ر	ز	س	ش	ص	ض	ط	ظ	ع	غ	¦	¬	÷	×	ع
E0	_	ف	ق	ك	ل	م	ن	ه	و	ى	ي	ض	ع	غ	غ	م
F0	ّ	َ	ن	ه	هـ	ى	ي	غ	ق	لآ	لآ	ل	ك	ي	■	

Character code table Page 23 (PC720: Arabic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80			é	â		à		ç	ê	ë	è	ï	î			
90		_́	_̊	ô	¤	_	û	ù	ء	آ	أ	ؤ	£	إ	ئ	ا
A0	ب	ة	ت	ث	ج	ح	خ	د	ذ	ر	ز	س	ش	ص	«	»
B0	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0	ض	ط	ظ	ع	غ	ف	µ	ق	ك	ل	م	ن	ه‍	و	ى	ي
F0	≡	_̧	_̓	_̦	_̔	_̒	≈	°	•	·	√	ⁿ	²	■	NBSP

Character code table Page 24 (WPC1254: Turkish):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80	€		‚	ƒ	„	…	†	‡	ˆ	‰	Š	‹	Œ			
90		`	'	"	"	•	–	—	~	™	š	›	œ			Ÿ
A0	NBSP	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	–	®	¯
B0	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
C0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D0	Ğ	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	İ	Ş	ß
E0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F0	ğ	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ı	ş	ÿ

Character code table Page 25 (WPC28596: Arabic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{			}	~	⌂
80																
90																
A0	NBSP				¤									،	‑	
B0												؛				؟
C0		ء	آ	أ	ؤ	إ	ئ	ا	ب	ة	ت	ث	ج	ح	خ	د
D0	ذ	ر	ز	س	ش	ص	ض	ط	ظ	ع	غ					
E0	ـ	ف	ق	ك	ل	م	ن	ه	و	ى	ي	ً	ٌ	ٍ	َ	ُ
F0	ِ	ّ	ْ													

Character code table Page 26 (KATAKANA: Asia):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	─	▬	▪	■	▮	▮	▮	▮	│	│	▌	▌	▌	▌	▌	┼
90	⊥	┬	┤	├	‒	─	│	│	┌	┐	└	┘	⌐	⌐	⌐	⌐
A0		｡	｢	｣	､	･	ヲ	ァ	ィ	ゥ	ェ	ォ	ャ	ュ	ョ	ッ
B0	ｰ	ア	イ	ウ	エ	オ	カ	キ	ク	ケ	コ	サ	シ	ス	セ	ソ
C0	タ	チ	ツ	テ	ト	ナ	ニ	ヌ	ネ	ノ	ハ	ヒ	フ	ヘ	ホ	マ
D0	ミ	ム	メ	モ	ヤ	ユ	ヨ	ラ	リ	ル	レ	ロ	ワ	ン	ﾞ	ﾟ
E0	=	╫	╪	╡	◢	◣	◤	◥	♠	♥	♦	♣	●	○	／	＼
F0	╳	円	年	月	日	時	分	秒	〒	市	区	町	村	人	▓	

Character code table Page 27 (PC775: Baltic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	Ć	ü	é	ā	ä	ġ	å	ć	ł	ē	Ŗ	ŗ	ī	Ź	Ä	Å
90	É	æ	Æ	ō	ö	Ģ	¢	Ś	ś	Ö	Ü	ø	£	Ø	×	¤
A0	Ā	Ī	ó	Ż	ż	ź	"	¦	©	®	¬	½	¼	Ł	«	»
B0	░	▒	▓	│	┤	Ą	Č	Ę	Ė	╣	║	╗	╝	Į	Š	┐
C0	└	┴	┬	├	─	┼	Ų	Ū	╚	╔	╩	╦	╠	═	╬	Ž
D0	ą	č	ę	ė	į	š	ų	ū	ž	┘	┌	█	▄	▌	▐	▀
E0	Ó	ß	Ō	Ń	õ	Õ	µ	ń	Ķ	ķ	Ļ	ļ	ņ	Ē	Ņ	'
F0	–	±	"	¾	¶	§	÷	„	°	∙	·	¹	³	²	■	NBSP

Character code table Page 28 (WPC1257: Baltic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	–	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80	€		‚		„	…	†	‡		‰		‹			¨	ˇ	¸
90		'	'	"	"	•	–	—		™		›		—	¸	
A0	NBSP		¢	£	¤		¦	§	Ø	©	Ŗ	«	¬	–	®	Æ
B0	°	±	²	³	´	µ	¶	·	ø	¹	ŗ	»	¼	½	¾	æ
C0	Ą	Į	Ā	Ć	Ä	Å	Ę	Ē	Č	É	Ź	Ė	Ģ	Ķ	Ī	Ļ
D0	Š	Ń	Ņ	Ó	Ō	Õ	Ö	×	Ų	Ł	Ś	Ū	Ü	Ż	Ž	ß
E0	ą	į	ā	ć	ä	å	ę	ē	č	é	ź	ė	ģ	ķ	ī	ļ
F0	š	ń	ņ	ó	ō	õ	ö	÷	ų	ł	ś	ū	ü	ż	ž	˙

Character code table Page 29 (WP28594: Baltic):

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	NUL	STX	SOT	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
10	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
20	SP	!	"	#	$	%	&	'	(	)	*	+	,	−	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	⌂
80																
90																
A0	NBSP	Ą	ĸ	Ŗ	¤	Ĩ	Ļ	Ş	¨	Š	Ē	Ģ	Ŧ	–	Ž	―
B0	°	ą	˛	ŗ	´	ĩ	ļ	ˇ	¸	š	ē	ģ	ŧ	ŋ	ž	ŋ
C0	Ā	Á	Â	Ã	Ä	Å	Æ	Į	Č	É	Ę	Ë	Ė	Í	Î	Ī
D0	Đ	Ņ	Ō	Ķ	Ô	Õ	Ö	×	Ø	Ų	Ú	Û	Ü	Ũ	Ū	ß
E0	ā	á	â	ã	ä	å	æ	į	č	é	ę	ë	ė	í	î	ī
F0	đ	ņ	ō	ķ	ô	õ	ö	÷	ø	ų	ú	û	ü	ũ	ū	˙

Appendix C: Electronic Journal

The Electronic Journal feature is for use with an application that does not support electronic journal. The printer can be used to store a variety of transactions.

Electronic Journal Storage

There are two methods for activating Electronic Journal:

1F 03 18 01 n   Auto Journal Mode via Configuration Command:

Value of n	_Data saved in journal_
_1_	_Receipt_
_2_	_Slip_
_3_	_Validation_
_4_	_Receipt and slip_
_5_	_Receipt and validation_
_6_	_Slip and validation_
_7_	_Receipt, slip, and validation_

- The printer can be configured to power up in Auto Journal Mode using command 1F 03 18 01 n. Any combination of print stations can be configured. This configuration is saved over power cycle. The electronic journal configuration information is printed on the second diagnostic page.

- Most commands and data printed are saved in the journal flash buffer.

- Logos and graphics printed on the receipt are **not** saved in the journal flash buffer.

- Multiple line feeds are not saved in the journal flash buffer.

- A knife cut sent to the receipt is saved in the journal flash buffer as two print commands: 0x0A 0x0A.

Auto Journal Mode via Runtime Command:

1F 0A C1 - Enable

1F 0A C2 - Disable

Commands and data printed on the _receipt only_ are stored in the Journal flash buffer.

Journal RAM buffer

Journal data is temporarily buffered in RAM until the printer is triggered to write it to flash. At power up 4K bytes of RAM will be dynamically allocated. In the unlikely event that 4K bytes are not available, 2K will be allocated. If for some reason 2K bytes are not available, the electronic journal feature cannot be used. Allocation success or failure information is available to the interface via commands described below.

Loss of power results in loss of any data currently in the journal RAM buffer.

Triggers that cause the journal data in RAM to be written to flash are:

- Knife Cut command

- Write Journal RAM Data to Flash command (described below)

- Printer is idle for 10 seconds

- Reset Printer command (0x1D 0xFF)

- Print To Journal command (described below)

- RAM becomes filled before one of these other triggers occurs.

The printer goes busy at the communication interface while writing to the journal flash buffer.

Journal Flash buffer

A portion of flash memory is available for the journal flash buffer. By using the Flash Memory User Sectors Allocation command (0x1D 0x22 0x 55 **n1 n2**), the user can allocate the number of 64Kbyte sectors used for logos, user storage, and journal flash buffer.

If there are **X** sectors available, the Flash Memory User Sectors Allocation command will allocate **n1** sectors to logos, **n2** sectors to user storage, and **(X – n1 – n2)** sectors for the journal flash buffer. If all available sectors are allocated for logos and user storage, there is no flash available for the journal.

The firmware default allocation is 1 sector for logos, 1 sector for user storage, and the rest for journal, but this may be changed at printer build time. Journal flash allocation and flash usage information is available via commands described below, and is printed on the diagnostics form.

Before erasing flash, check to see if there is journal data stored, and print it out if necessary.

Triggers that cause the journal flash buffer to be cleared are:

- Clear Journal command (described on the next page)

- Flash Memory User Sectors Allocation command (0x1D 0x22 0x 55 **n1 n2**) reallocates flash memory.

- New Flash firmware is downloaded to the printer

Exception Conditions in Auto Journal Mode

When there isn't enough memory available in the journal flash buffer, the printer beeps at each receipt to signal the flash full condition. The printer will print a duplicate receipt and cut after it, instead of writing it to flash, and clear out the RAM buffer. When the trigger for writing to flash is a knife cut (which would be the usual case in Auto Journal Mode) the customer receipt is easily detached from the duplicate receipt by the operator.

If a receipt is over 4Kbytes in size, and there are less than 4Kbytes available in the journal flash buffer, the printer will **not** print a portion of the duplicate receipt in the middle of the original receipt. This portion of the duplicate receipt is lost.

Printing and Erasing the Journal Flash Buffer:

Operator Activation of Journal Print and Erase

Enabled via 1F 03 2E 01. Disabled via 1F 03 2E 00. Enabled and disabled also via the config menu under the Emulation/ Software Options sub-menu. Default is disabled. Option prints on diagnostic Form II:

>   Journal print via Command Only   (when disabled)

>   Journal print via Operator   (when enabled)

Printing Journal via Operator (when enabled):

1) Open the receipt cover.

2) Press the paper feed button three times quickly, about a half second each. A short tone will sound each time. If you press the feed button too long, or wait too long between depressions, a longer tone will sound and the sequence is aborted; you have to start over.

3) Close the receipt cover.

If there is nothing in the journal, the message "No Flash journal" prints out on the receipt. If there is something in the journal, it prints on the receipt, followed by a query to the operator printed on the receipt:

>   Erase journal?

>>   Yes --> Long click
>>   No --> Short click

1F 0A C3   Clear Journal

Erases the journal flash buffer. Printer goes busy at the communication interface while the flash is being erased. Application should not send any further data or commands until printer goes not busy at the communication interface. Printer returns a 0x0D when the erase is complete. At this point the application can resume sending data to the printer.

1F 0A C4   Print Journal

Prints contents of journal data saved in flash. Printer goes busy at the communication interface. Application should not send any further data or commands until printer goes not busy at the communication interface. If paper runs out, printing will pause until a new roll is loaded, then resume where it left off.

Points to note when printing the journal:

*   Receipt character attributes and bar code attributes are set to their default values before and after printing the journal.

*   Receipt station is selected.

*   Macro definitions are not cleared.

*   If the macro execution command is in the journal, the macro definition should be in the journal also. If not, the printed journal might look OK before a power cycle when the macro definition is still in memory. After a power cycle the macro definition will be gone.

*   If User Defined characters are printed, their definitions (0x1B 0x26 ….) should be stored in flash (via 0x1D 0x22 0x33) and their selection command (0x1B 0x25 0x01) should be in the journal buffer.

1F 0A C5   Return Journal Status

Returns one byte of status.

> **bit 0 = 0 >> Write to flash successful**
> **bit 0 = 1 >> Write to flash fail**
>
> **bit 1 = 0 >> RAM allocation for journal data successful**
> **bit 1 = 1 >> RAM allocation for journal data fail**
>
> **bit 2 = 0 >> Auto Journal Disabled**
> **bit 2 = 1 >> Auto Journal Enabled**

1F 0A C6   Return Journal Flash Size

Returns two 3-byte counts in hexadecimal notation, as **n1 n2 n3** and **m1 m2 m3**.

Journal flash buffer total size	= (**n1** * 0x10000 + **n2** * 0x100 + **n3**)
	= (**n1** * 65,536 + **n2** * 256 + **n3**) decimal
Journal flash buffer used	= (**m1** * 0x10000 + **m2** * 0x100 + **m3**)
	= (**m1** * 65,536 + **m2** * 256 + **m3**) decimal

Journal flash buffer total size corresponds directly to this line on the diagnostics form:

Flash Journal Size   : nnnn kbytes

Journal flash buffer used corresponds inversely to this line on the diagnostics form:

Journal Unused   : mmmm kbytes

1F 0A C7   Write Journal RAM Data to Flash

Writes the journal data in RAM to Flash and marks it as a complete journal entry with two print commands: 0x0A 0x0A. Printer goes busy at the communication interface while the flash is being written. Application should not send any further data or commands until printer goes not busy at the communication interface.