User Guide
Programming Supplement

Axiohm ™

Federal Communications Commission (FCC) Radio Frequency Interference Statement Warning

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Information to the User

This equipment must be installed and used in strict accordance with the manufacturer's instructions. However, there is no guarantee that interference to radio communications will not occur in a particular commercial installation. If this equipment does cause interference, which can be determined by turning the equipment off and on, the user is encouraged to contact Axiohm immediately.

The Axiohm company is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Axiohm. The correction of interferences caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

In order to ensure compliance with the Product Safety, FCC and CE marking requirements, you must use the power supply, power cord, and interface cable which are sold for use with this product or which meet the following parameters:

Power Supply

UL Listed (QQGQ), Class 2 power supply with SELV (Secondary Extra Low Voltage), non-energy hazard output, limited energy source, input rated 100-240 Vac, 1.5/0.8 A, 50/60 Hz, output rated 24 Vdc, 2.3 A.

Use of this product with a power supply other than the Axiohm power supply will require you to test the power supply and Axiohm printer for FCC and CE mark certification.

Communication Interface Cable

A shielded (360 degree) interface cable must be used with this product. The shield must be connected to the frame or earth ground connection or earth ground reference at EACH end of the cable.

Use of a cable other than described here will require that you test the cable with the Axiohm printer and your system for FCC and CE mark certification.

Power Cord

A UL listed, detachable power cord must be used. For applications where the power supply module may be mounted on the floor, a power cord with Type SJT marking must be used. For applications outside the US, power cords which meet the particular country's certification and application requirements should be used.

Use of a power cord other than described here may result in a violation of safety certifications which are in force in the country of use.

Industry Canada (IC) Radio Frequency Interference Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Voluntary Control Council for Interference (VCCI) Radio Frequency Interference Statement

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

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Patents:

Patents Pending

Web Site

http://www.axiohm.com

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Chapter 1: About this Supplement

How to use this supplement

This is a supplemental guide providing programming information on Axiohm's A795 printer. It is written for tech-savvy users who are interested in customizing or adjusting printer functionality and is meant to be used in conjunction with the **A795 ColorPOS™ Two-Color Thermal Receipt Printer: User Guide**.

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

Where to find the basics

If you are looking for information on set-up or basic operation, refer to the **A795 ColorPOS™ User Guide**. This supplemental guide assumes that you have the **A795 ColorPOS™ 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 an Axiohm representative for assistance.

If you are having problems with the physical operation of the printer, the **A795 ColorPOS™ Service Guide**, provides in-depth information on diagnostics and service. The **A795 ColorPOS™ Service Guide** is available
to qualified service technicians who have been certified by Axiohm to perform advanced procedures.

Support

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

For on-line service, refer to the web site at www.Axiohm.com or e-mail to: support@axiohm.com.

Chapter 2: Diagnostics and Configuration

The A795 printer performs a number of diagnostics which provide useful information about the operating status of the printer. The following diagnostic tests are available. See the sections that follow for more information.

- Startup diagnostics
  Performed during the printer's startup cycle.

- Runtime diagnostics
  Performed during normal printer operation.

- Remote diagnostics
  Maintained 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. For more information on configuring the printer, see the "Printer Configuration" section which follows in this chapter.

- Communication interfaces
- RS-232C settings
- Printer emulations
- Printhead resistance
- Datascope mode

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
- Perform boot CRC check of the firmware ROM, test external SRAM, test EEPROM, and test main program CRC

  Failure causes Startup Diagnostics to stop; the printer beeps and the LED flashes a set number of times, indicating the nature of the failure. The table in the "Indicators" section later in this chapter describes the specific tone and LED sequences.

- Check if paper is present
- Return the knife to the home position

  Failure causes a fault condition. The table in the "Indicators" section later in this chapter describes the specific tone and LED sequences.

- Check if receipt cover is closed

  Failure does not interrupt the startup cycle.

When the startup 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 startup diagnostics.

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

- Knife unable to home

- Printhead too hot

- Voltages out of range

The LED 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. See the sample test printout on the next page. 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

- Maximum temperature reached

(See tallies note on the following page.)

```
*** A795 – Diagnostics Form ***

Model number          : A795–2119
Serial number         : A014905324

Boot Firmware
  Revision            : V3.07
  CRC                 : DF0D
  P/N                 : 189–1075274A
Flash Firmware
  Revision            : V3.08
  CRC                 : ACE2
  P/N                 : 189–1075274A

H/W parameters
  Flash Memory Size   : 1 Mbyte
  Flash Logos/Fonts   : 384 kbytes
  Flash User Storage  : 0 kbytes
  SRAM                : 256 kbytes
  Head Setting        : D
  Paper Type          : Kanzaki Red P–310RB
  Paper Type Header   : 1.0aD
  Print Density (Mono): 100 %
  Max Speed           : 100 mm/sec
  Paper Width         : 80 mm
  Max Power           : 55 W
  Knife               : Enabled
  Partial Cut         : 155 steps
  Paper Low Sensor    : Enabled

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

Resident Code Pages   : 437, 850, 852, 858
                        860, 863, 865, 866
                        1252, 862, 737
Available Paper Types : 0.0aD 1.0aD 5.0aD
```

```
To enter Printer Config Menu  :
  1) Flip DIP switch #1 down
  2) Reset the printer, while holding
     the Paper Feed button down
```

```
********* MAIN MENU **********
******************************

Select a sub-menu :
  – EXIT                          –> 1 click
  – Print Current Configuration   –> 2 clicks
  – Set Communication Interface   –> 3 clicks
  – Set Diagnostics Modes         –> 4 clicks
  – Set Emulation/Software Options –> 5 clicks
  – Set Hardware Options          –> 9 clicks

Enter code, than hold Button DOWN
at least 1 second to validate
```

Current Printer tallies are printed after the Diagnostic information and will vary per printer use.

Print test and configuration menu samples will vary per model or printer configuration. (Shown approximately 60% of size.)

For more information about	See this section
Accessing the remote diagnostic tallies	"Command descriptions" in *Chapter 4: Programming Commands* (Status commands: Transmit printer ID, remote diagnostics extension, Hexadecimal 1D 49 40 *n*)

Indicators

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

Indicator	Sequence	Condition
LED	Continuous, flashing quickly	Paper out Cover off Knife unable to home
LED	Continuous, flashing slowly	Paper is low (if paper low sensor is installed) Printhead too hot Voltages out of range
Tone	Two-tone beep (low frequency, high frequency)	Startup diagnostics completed successfully
LED and Tone	Single beep Single LED flash	Boot CRC test failure
LED and Tone	Double beep Double LED flash	SRAM test failure
LED and Tone	Triple beep Triple LED flash	EEPROM test failure
LED and Tone	Four beeps Four LED flash	Dynamic memory initialization failure
LED and Tone	Two-Tone beep (high frequency, low frequency) Continuous flashing of LED	Main program CRC test failure Or DIP switch is in on position indicating flash download mode

For more information about	See this section
Error conditions and correcting them	" Troubleshooting the printer" in *Chapter 4: Using thr Printer*, in the **A795 User Guide**

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

For more information about	See this section
Communication of printer status to host application	"Command descriptions" in *Chapter 4: Programming* (commands section)

Printer configuration

Printers are shipped with all the functions and parameters pre-set at the factory. Settings for various printer parameters can be changed. This menu is printed on the receipt and scrolls through instructions for selecting and changing any of the functions or parameters.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

The following functions and parameters can be changed in the scrolling configuration menu (except as noted):

- Communication Interface
    - RS-232C seral interface (9-pin)
    - RS-232C serial interface (25-pin)
    - Universal serial bus (USB)
- RS-232C serial interface settings
    - Baud rate
    - Data bits (can not be changed)
    - Stop bits (can not be changed)
    - Parity (can not be changed)
    - Hardware (DTR/DSR) or software (XON/XOFF) flow control
    - Data reception errors

- Printer Emulations
    - A795 native mode
    - A794 emulation
    - Axiohm A793
    - Epson TM-T88
- Printer settings and functions
    - Default lines per inch
    - Carriage return usage
    - Data scope mode
    - Power supply wattage
    - Knife options
    - Paper low sensor
    - Printhead resistance setting

For more information about	See this section
Using the configuration menu to configure the printer	"Configuring the Printer" on the next page.

Configuring the printer

The configuration menu allows you to select functions or change various settings for the printer. Instructions printed on the receipt guide you through the processes.

Caution: *Be extremely careful changing any of the printer settings to avoid changing other settings that might affect the performance of the printer.*

Switch 1 & 2 are shown in the normal OFF position

Off
On

DIP Switches

Connector Cover Open
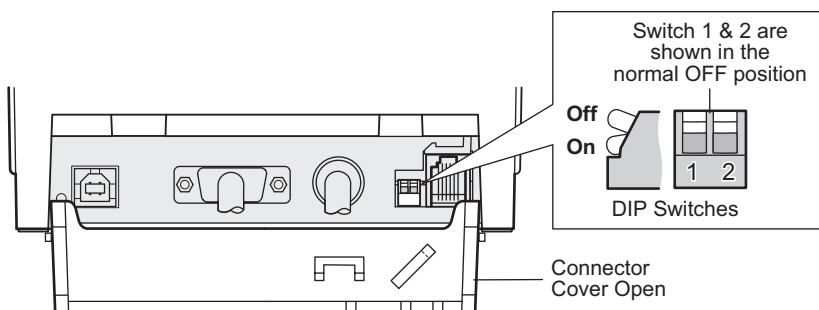
1 Open the connector cover.

2 Set DIP Switch 1 to ON position (down). DIP Switch 2 should be in the OFF position (up).

Receipt Cover
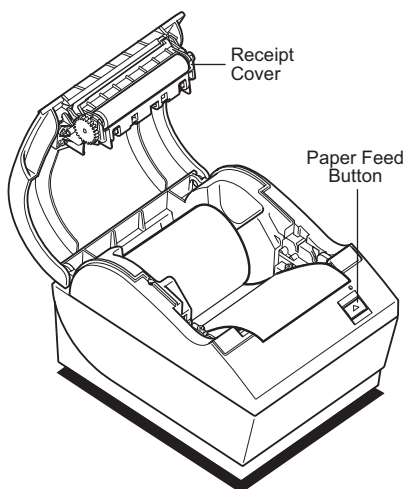
Paper Feed Button

3 Make sure receipt paper is loaded in the printer before proceeding. (For loading instrrctions, see the *A795 User Guide*.)

4 Cycle DIP switch 2 down (reset ON position), then up (normal OFF position).

- or -

Press and hold the paper feed button while closing the receipt cover, continually holding the paper feed button until the configuration printout begins.

• The printer beeps, prints the diagnostics form and the configuration main menu.

• The printer pauses and waits for a main menu selection to be made (see sample printout).

```
*********  MAIN MENU  **********
*******************************

Select a sub-menu :
  – EXIT                          –>  1 click
  – Print Current Configuration   –>  2 clicks
  – Set Communication Interface   –>  3 clicks
  – Set Diagnostics Modes         –>  4 clicks
  – Set Emulation/Software Options –> 5 clicks
  – Set Hardware Options          –>  9 clicks

Enter code, than hold Button DOWN
at least 1 second to validate
```

5 To communicate with the printer, you will press the paper feed button using either short or long clicks. Use a long click (more than one second) for "yes" and a short click for a "no." Follow the printed instuctions to make selections.

6 Continue through your menu selections until you are asked, "Save New Parameters?". Select "Yes" or "No."

a If you wish to save, select "Yes," then return DIP switch 1 to the OFF Postion (up).

b. Open the receipt cover.

Press and hold the paper feed button while closing the receipt cover.

• The diagnostic printout verifies your new settings.

7 If you would like to continue configuring the printer, select "No." The printer then returns to the configuration menu, where you can set parameters again.

Communication interface

To change the communication interface settings, enter the configuration menu, select "Set Communication Interface" from the main menu and answer "Yes" to "SET INTERFACE TYPE?" printed on the receipt.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed to select the communication interface you want.

- Communication interface
  - RS-232C interface: 1 click
  - USB: Auto when no RS-232C activity

RS-232C serial interface settings

To change the RS-232C serial interface settings, enter the configuration menu, select "Set Communication Interface" from the main menu and answer "No" to "SET INTERFACE TYPE?" printed on the receipt. This will take you to the instructions for selecting the RS-232C settings.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed on the configuration menu to select the RS-232C settings you want to change.

- Baud rate
  - 115200 baud: 1 click
  - 57600 baud: 2 clicks
  - 38400 baud: 3 clicks
  - 19200 baud: 4 clicks
  - 9600 baud: 5 clicks
  - 4800 baud: 6 clicks
  - 2400 baud: 7 clicks
  - 1200 baud: 8 clicks

- Number of data bits
  - 8 Data Bits: can not be changed
- Stop bits
  - 1 Stop Bit: can not be changed
- Parity
  - Disabled: Short click
- Hardware flow control
  - Software (XON/XOFF): long click
  - Hardware (DTR/DSR): short click
- Data reception errors
  - Ignore errors: long click
  - Print "?": short click

Note: *Press the paper feed button for at least one second to validate the selection.*

For more information about	See this section
Setting the RS-232C Serial interface settings	"Configuring the Printer" on previous page.

Printer emulations

To change the printer emulations settings, enter the configuration menu, select "Emulation/ Software Options" from the main menu and answer "Yes" to "SET THE PRINTER EMULATIONS?" printed on the receipt. This will take you to the instructions for setting the printer emulation.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed to select the printer emulation you want.

- A795 native mode: 1 click
- A794 emulation: 2 clicks
- Axiohm A793:   3 clicks
- Epson TM-T88:   4 clicks

Note: *Press the paper feed button for at least one second to validate the selection.*

For more information about	See this section
Setting the printer emulation	"Configuring the Printer"

Printer settings and functions

To change the printer settings and functions, enter the configuration menu, select the sub-menu from the main menu and answer the questions printed on the receipt until you come to the instructions for selecting the printer settings.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed to select the printer settings you want.

Select the emulation/software options sub-menu to set:

- Default lines per inch

  This function allows you to set the default for lines per inch to either 8.13, 7.52, 6.77, or 6.00.

  - 8.13 lines per inch: 1 click
  - 7.52 lines per inch: 2 clicks
  - 6.77 lines per inch: 3 clicks
  - 6.00 lines per inch: 4 clicks

- Carriage return usage

  This function allows the printer to ignore or use the *carriage return* (hexadecimal 0D) command depending on the application. Some applications expect the command to be ignored while others use the command as a print command.

  - Ignore carriage return: long click
  - Use carriage return as print command: short click

Select the diagnostic modes sub-menu to set:

- Data scope mode

  For more information, see "Enable or disable data scope mode" section later in this chapter.

Select the hardware options sub-menu to set: (monochrome papers only)

- Print density

  - 100%   1 click
  - 110%   2 clicks
  - 120%   3 clicks

WARNING: Choose a print density setting no higher than necessary to achieve acceptable print density. Failure to observe this rule may result in a printer service call. Failure to observe this rule may void the printer warranty. Consult your Axiohm technical support specialist if you have questions.

- Power supply wattage

  You can choose between a 55-Watt or 75-Watt power supply.

  - 55-Watt power supply: 1 clicks
  - 75-Watt power supply: 2 clicks

- Knife option

  - Knife enabled: long click
  - Knife disabled: short click

- Paper low sensor

  - Paper low sensor enabled: long click
  - Paper low sensor disabled: short click

- Printhead resistance setting

  For more information on this setting, see "Printhead resistance" section later in this chapter.

Note: *Press the paper feed button for at least one second to validate the selection.*

For more information about	See this section
Setting the printer functions and settings	"Configuring the Printer"

Enable or disable data scope mode

The data scope mode test prints a hexadecimal dump of all data sent to the printer: "1" prints as hexadecimal 31, "A" as hexadecimal 41 and so on. This helps troubleshoot communication problems and runs during a normal application (after being enabled through printer configuration).

Note: *Data scope mode is usually considered a level 1 diagnostic test.*

Data scope mode is enabled and disabled by selecting the "Diagnostic Modes" sub-menu of the configuration menu.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed on the "Diagnostic Modes Menu" to enable or disable the data scope mode test.

- Off, normal mode
  (Data scope mode disabled):   1 click
- Data scope mode (enabled):   2 clicks
- Receipt test mode: 3 clicks

Note: *Press the paper feed button for at least one second to validate the selection.*

To run the data scope mode:

1 After you have enabled the data scope mode, exit the configuration menu.

2 Run a transaction from the host computer.

All commands and data sent from the host computer will be printed as hexadecimal characters as shown in the illustration.

```
20 54 68 65 72 6D 61 6C    :  Thermal
20 50 72 69 6E 74 20 54    :  Print T
65 63 68 6E 6F 6C 6F 67    : echnolog
79 0D 0A 20 20 20 20 20    : y
20 20 20 20 20 20 20 20    :
```

To exit the data scope mode:

1 Enter the configuration menu again.

   See "Configuring the printer."

2 Disable the data scope mode.

3 Exit the configuration menu.

   The printer is on-line and can communicate normally with the host computer.

For more information about	See this section
Enabling the Data Scope Mode	"Configuring the Printer"

Printhead resistance

The printhead resistance settings are set by entering the configuration menu, selecting "Set Hardware Options" and answering "No" to the questions printed on the receipt until you come to "SET PRINTHEAD SETTING?".

The printhead resistance setting must match the character (A or B) marked on the heatsink on the back of the printhead. This is only visible when top cover of the printer is removed, an operation that can only be performed by a trained service representative.

Caution: *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed on the configuration menu to select the printhead resistance setting:

- A Setting: long click
- B Setting: short click

Note: Press the paper feed button for at least one second to validate the selection.

For more information about	See this section
Setting the printhead resistance	"Configuring the Printer"

Chapter 3: Programming the Printer

Overview of commands

Commands control all operations and functions of the printer. This includes selecting the size and placement of characters and graphics on the receipt to 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 operation of various printers may be emulated by the commands, including the following:

- Axiohm A793
- Axiohm A794
- Axiohm A795 native mode
- Epson TM-T88

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. They will be 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.

Comparison to A793

The following table details the list of commands whose behavior differs between the A793, A794, and A795 because of the physical differences of a 6 dots/mm head (A793) versus an 8 dots/mm head (A794 and A795).

Command	Description	Difference between previous product and new product emulation mode.
15 *n*	Feed *n* dot rows	This command will move the paper on the receipt in n/203 inch steps instead of n/152 inch steps.
16 *n*	Add *n* extra dot rows	The dot rows will be measured in n/203 inches versus n/152 inches.
1B 20 *n*	Set right-side character spacing	This command sets the right side spacing to "n" horizontal motion units. By default, these units are in terms of 1/203 inches versus 1/152 inches.
1B 24 *n1 n2*	Set absolute starting position	For graphics commands, the position is scaled to best match A793. In text mode, the equivalent character position is calculated.
1B 26 *s c1 c2 n1 d1...nn dn*]	Define user-defined character set	Since the dots on the A795 printhead are smaller, user defined characters that were used on the previous printers will appear smaller on the A974 printer.
1B 2A *m n1 n2 d1...dn*	Select bit image mode	In A793 emulation mode, graphics are scaled to best match the size of the graphic in the A793 printer.
1B 33 *n*	Set line spacing	This command uses *n* in terms of n/360 inches. Since the A793 had a fundamental step of 1/152 inch and the A795 has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing.

1B 4A *n*	Print and feed paper	This command uses *n* in terms of n/360 inches. Since the A793 had a fundamental step of 1/152 inch and the A795 has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing.
1B 59 *n1 n2 d1...dn*	Select double-density graphics	In A793 emulation mode, the printer scales the graphics to provide the best match.
1B 5C *n1 n2*	Set relative print position	The parameter to this command is in units of dots. However, the command moves and aligns to character positions. In A793 emulation mode, this command calculates how many character positions to move based on the A793 character width in dots (10) versus the A795 (13).
1B 61 *n*	Select justification	This command does true dot resolution alignment for centering versus character-aligned centering.
1D 2A *n1 n2 d1...dn*]	Define downloaded bit image	In A793 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A793.
1D 2F *m*	Print downloaded bit image	In A793 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A793.

Two-color commands (comparison A794 to A795)

The following table details the list of commands which have been added for two-color ColorPOS™ functionality (ColorPOS™ commands 1D 81–1D 97 are in bold) or existing commands which have been altered by the addition of two-color capacity.

Axiohm ColorPOS™ 2-color and color interpreted commands		
1B 72 *m*	ESC r *m*	Set current color
1D 23 *n*	GS # *n*	Select current logo
1D 42 *n*	GS B *n*	Select or cancel white/black reverse print mode
1D 2A *n1 n2 d1 – dm*	GS * *n1 n2 d1 – dm*	Define downloaded bit image
1D 2F *m*	GS / *m*	Print downloaded bit image
1D 81 *m n*	**GS 0x81 *m n***	**Set paper type**
1D 82 *n1- n72/n80*	**GS 0x82 *n1-n72/n80***	**Print raster monochrome graphics**
1D 83 *n1-n144/n160*	**GS 0x83 *n1-n144/n160***	**Print raster color graphics**
1D 84 *n m n1 n2 d1 dx*	**GS 0x84 *n m n1 n2 d1 dx***	**Download logo image**
1D 85 *m n*	**GS 0x85 *m n***	**Reverse color text mode (2-color)**
1D 86 *m*	**GS 0x86 *m***	**Monochrome shade mode**

Axiohm ColorPOS™ 2-color and color interpreted commands continued		
1D 87 *m*	GS 0x87 *m*	**Color shade mode**
1D 89 *n m*	GS 0x89 *n m*	**Logo print with color plane swap**
1D 8B *n m o*	GS 0x8B *n m o*	**Apply shading to logo**
1D 8C *n m*	GS 0x8C *n m*	**Merge watermark mode**
1D 8D *n m*	GS 0x8D *n m*	**Text strike through mode**
1D 8E *m nL nH d1...dn*	GS 0x8E *m nL nH d1...dn*	**Download paper type description**
1D8F *m*	GS 0x8F *m*	**Return paper type description**
1D 90 *m x y o p q*	GS 0x8A *m x y o p q*	**Form and print real time surround graphic**
1D 91 *n*	GS 0x91 *n*	**Save graphics buffer as logo**
1D 92 *n*	GS 0x92 *n*	**Background logo print mode**
1D 97 *m n*	GS 0x87 *m n*	**User storage status**

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

Width specifications

Standard

- Characters per inch: 15.6
- Characters per line: 44
- Cell size: 13 x 24 dots

Compressed

- Characters per inch: 20.3
- Characters per line: 56
- Cell Size: 10 x 24 dots

Print zones

Print zones for 80-mm paper

Specifications of print zone for 80 mm paper:

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

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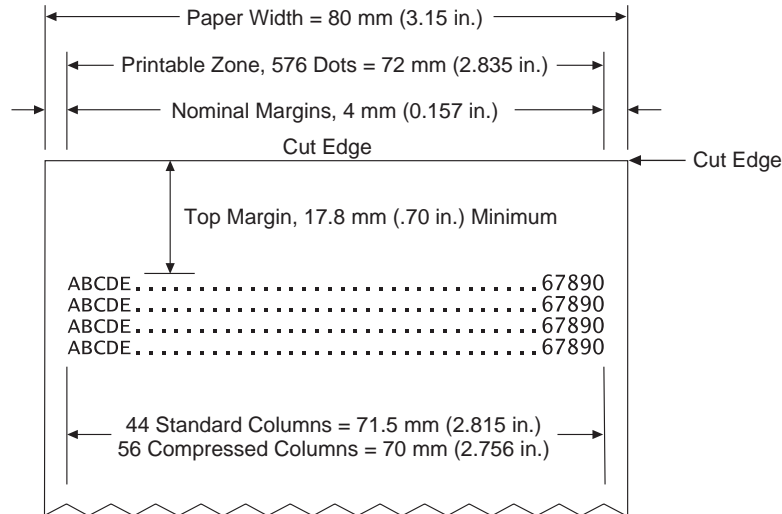
Note: *The application centers 44 standard character cells (13 x 24 dots), or 56 compressed character cells (10 x 24 dots), or 576 addressable bits of graphics across an 80-mm wide receipt. Minimum print line height is 24 dots for text or graphics. Standard print line spacing is 27 dots (i.e. 3 extra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

The A795 adds a 27 dot high font, so standard print spacing is 30 dots.

Print zones for 82.5-mm paper

Specifications of print zone for 82.5 mm paper:

- 640 dots (addressable) @ 8 dots/mm, centered on 82.5 mm

- Standard mode: minimum margins: 1.0 mm (0.040 inches)

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

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

```
              Paper Width = 82.5 mm (3.25 in.)
          Printable Zone, 640 Dots = 80 mm (3.15 in.)
          Nominal Margins (2) = 1.25 mm (0.05 in.)
                        Cut Edge                          Cut Edge

              Top Margin, 17.8 mm (.70 in.) Minimum

    ABCDE................................67890
    ABCDE................................67890
    ABCDE................................67890
    ABCDE................................67890

            48 Standard Columns = 78.0 mm (3.07 in.)
            62 Compressed Columns = 77.5 mm (3.05 in.)
```
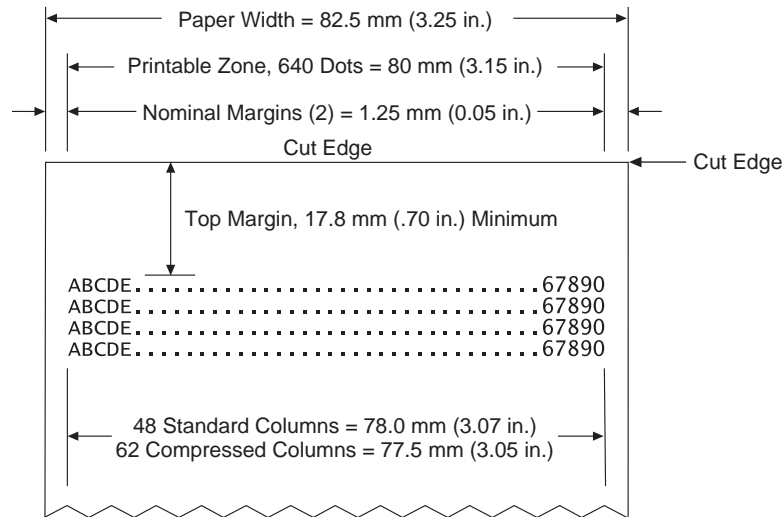
Rotated printing commands

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	ⱯＢＯ
Set	Canceled	X	∀ Ｂ Ɔ
Set	Set	X	ＯＢⱯ
X	X	Set	∀ Ｂ Ɔ

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

- Standard and compressed pitch

- Vertical (normal) and rotated

- Right-side up and upside-down

- Single high (normal) and double-high

Emulation modes

The Axiohm A795 printer may be operated in a number of different emulation modes. However, printing characteristics and defaults may differ, depending on the desired mode. For instance, two-color paper and ColorPOS™ commands and features are available only in A795 native mode.

Print setup in emulation modes

Refer to the chart below for defaults and allowed printing options in each emulation mode.

Emulation mode	LPI options	Font(s) options	Font size	Default LPI	Default EDR	Comments
A795 native	6.00, 6.77, 7.52, 8.13	Standard	13x24	7.52	3	Default setup for monochrome paper
		Tall	13x27	6.77	3	
		ColorPOS™	13x27	6.77	3	Default setup for 2-color paper
A794, A793 emulations	6.00, 7.52, 8.13	Standard	13x24	7.52	3	
Epson emulation	6.00	Tall	13x27	6.00	7	Default setup for Epson emulation
		Standard	13x24	6.00	10	

The following list clarifies how the A795 printer will behave in each emulation mode:

Two-color paper and ColorPOS™ commands and features are supported only in A795 native mode.

- If the paper type is changed using the 0x1D 0x81 command, the font and default lines per inch (LPI) will be setup as in the table above.

- If only the font is changed, the default LPI will automatically be changed as in the table above.

- If emulation is switched to Epson, A794 or A793 emulation(s), the paper type will automatically be changed to monochrome paper, and the font and LPI will be changed as in the table above.

- If emulation is switched from any emulation to A795 native, the font and LPI will remain unchanged because the A795 native mode supports all font and LPI options offered in the emulation modes.

- The "Set Default LPI" option in the configuration menu is not offered in Epson emulation made. The LPI is set at 6.00.

Chapter 4: Programming Commands

Commands listed by function

Commands in bold are ColorPOS™ commands.

Printer actions

Code (hexadecimal)	Command	Page
10	Clear printer	36
19	Perform full knife cut (or code 1B 69)	36
1A	Perform partial knife cut (or code 1B 6D)	37
1B 07	Generate tone	37
1B 3D *n*	Select peripheral device (for multi-drop)	37
1B 40	Initialize printer	37
1B 63 33 *n*	Select paper sensors to output paper end signals (parallel only)	38
1B 63 34 *n*	Select sensors to stop printing	38
1B 63 35 *n*	Enable or disable panel button	39
1B 69	Perform full knife cut (or code 19)	36
1B 6D	Perform partial knife cut (or code 1A)	37
1B 70 *n p*1 *p*2	Generate pulse to open cash drawer	39
1B 72 *m*	Set current color	40
1D 56 *m*	Select cut mode and cut paper (or code 1D 56 *m n*)	40
1D 56 *m n*	Select cut mode and cut paper (or code 1D 56 *m*)	40
1D 81 *m n*	**Set paper type (for 2-color printing)**	**41**
1F 74	Print test form	42

Print and paper feed

Code (hexadecimal)	Command	Page
0A	Print and feed paper one line	43
0D	Print and carriage return	43
14 *n*	Feed *n* print lines	43
15 *n*	Feed *n* dot rows	43
16 *n*	Add *n* extra dot rows	44
17	Print	44
1B 4A *n*	Print and feed paper	45
1B 64 *n*	Print and feed *n* lines	45

Vertical and horizontal positioning

Code (hexadecimal)	Command	Page
09	Horizontal tab	46
1B 14 *n*	Set column	46
1B 24 *n*L *n*H	Set absolute starting position	47
1B 32	Set vertical line spacing to 1/6 inch	47
1B 33 *n*	Set vertical line spacing	48
1B 44 [*n*] *k* 00	Set horizontal tab positions	48
1B 5C *n*1 *n*2	Set relative print position	49
1B 61 *n*	Select justification	50
1D 4C *nL nH*	Set left margin	50
1D 50 *x y*	Set horizontal and vertical minimum motion units	46
1D 57 *nL nH*	Set printing area width	51

Text characteristics

Code (hexadecimal)	Command	Page
12	Select double-wide characters	52
13	Select single-wide characters	52
1B 12	Select 90-degree counter-clockwise rotated print	52
1B 16 *n*	Select pitch (column width)	53
1B 20 *n*	Set right-side character spacing	53
1B 21 *n*	Select print mode	54
1B 25 *n*	Select or cancel user-defined character set	54
1B 26 *s c1 c2 n1 d1…nn dn*	Define user-defined character sets	55
1B 2D *n*	Select or cancel underline mode	55
1B 3A 30 30 30	Copy character set from ROM to RAM	56
1B 3F *n*	Cancel user-defined character	56
1B 45 *n*	Select or cancel emphasized mode	56
1B 47 *n*	Select or cancel double strike	57
1B 49 *n*	Select or cancel italic print	57
1B 52 *n*	Select international character code	58
1B 56 *n*	Select or cancel 90-degree clockwise rotated print	58
1B 74 *n*	Select international character set	59
1B 7B *n*	Select or cancel upside down print mode	59
1D 21 *n*	Select character size	60
1D 42 *n*	Select or cancel white/black reverse print mode	61
1D 62 *n*	Select or cancel smoothing mode	61
1D 85 *m n*	**Reverse color text mode (2-color)**	**61**
1D 8D *n m*	**Text strike-through mode**	**62**
1F 05 *n*	Select superscript or subscript modes	62

Graphics

Code (hexadecimal)	Command	Page
1B (+*.BMP file)	Download BMP logo	63
1B 2A *m n*1 *n*2 *d*1…*d*n	Select bit image mode	64
1B 2E *m n rL rH d1 … dn*	Print advanced raster graphics	65
1B 4B *n*1 *n*2 *d*1…*d*n	Select single-density graphics	65
1B 59 *n*1 *n*2 *d*1…*d*n	Select double-density graphics	66
1D 23 *n*	Select the current logo (downloaded bit image)	66
1D 2A *n*1 *n*2 *d*1…*d*n	Define downloaded bit image	67
1D 2F *m*	Print downloaded bit image	68
1D 82 *n*1…*n*72 or …*n*80	**Print raster monochrome graphics**	**68**
1D 83 *n*1…*n*144 or …*n*160	**Print raster color graphics**	**69**
1D 84 *m n1 n2 d1…dx*	**Download logo image**	**69**
1D 8B *n m o*	**Apply shading to logo**	**70**
1D 8C *n m*	**Merge watermark mode**	**70**
1D 86 *m*	**Monochrome shade mode**	**71**
1D 87 *m*	**Color shade mode**	**71**
1D 89 *n m*	**Logo print with color plane swap**	**71**
1D 90 *m x y o p q*	**Form and merge real time surround graphic**	**72**
1D 91 *n*	**Save graphics buffer as logo**	**72**
1D 92 *n*	**Background logo print mode**	**73**
1F 04 *n*	Convert 6 dots/mm bitmap to 8 dots/mm bitmap	73

Status

Batch mode

Code (hexadecimal)	Command	Page
1B 75 0	Transmit peripheral device status (RS-232C printers only)	75
1B 75 *n*	Request alternate status (A793 emulation only)	75
1B 76	Transmit paper sensor status	76
1D 49 *n*	Transmit printer ID	77
1D 49 40 *n*	Transmit printer ID, remote diagnostics extension	78
1D 72 *n*	Transmit status	80
1F 56	Send printer software version	82

Real time

Code (hexadecimal)	Command	Page
10 04 *n*	Real time status transmission (DLE sequence)	84
10 05 *n*	Real time request to printer (DLE sequence)	85
1D 03 *n*	Real time request to printer (GS sequence)	84
1D 04 *n*	Real time status transmission (GS sequence)	85
1D 05	Real time printer status transmission	86

Unsolicited status mode

Code (hexadecimal)	Command	Page
1D 61 *n*	Select or cancel unsolicited status mode	87

Bar codes

Code (hexadecimal)	Command	Page
1D 48 *n*	Select printing position for HRI characters	90
1D 66 *n*	Select pitch for HRI characters	90
1D 68 *n*	Select bar code height	90
1D 6B *m d1…dk* 00 or 1D 6B *m n d1…dn*	Print bar code	91
1D 70 *a b c d e f*	Select PDF 417 parameters	93
1D 77 *n*	Select bar code width	94

Page mode

Code (hexadecimal)	Command	Page
0C	Print and return to standard mode	95
18	Cancel print data in page mode	95
1B 0C	Print data in page mode	95
1B 4C	Select page mode	96
1B 53	Select standard mode	96
1B 54 *n*	Select print direction in page mode	97
1B 57 *n1, n2…n8*	Set print area in page mode	98
1D 24 *nL nH*	Set absolute vertical print position in page mode	99
1D 5C *nL nH*	Set relative vertical print position in page mode	99

Macros

Code (hexadecimal)	Command	Page
1D 3A	Select or cancel macro definition	100
1D 5E *r t m*	Execute macro	100

User data storage

Code (hexadecimal)	Command	Page
1B 27 *m a0 a1 a2 d1…dm*	Write to user data storage	101
1B 34 *m a0 a1 a2*	Read from user data storage	101
1B 6A *k*	Read from non-volatile memory (NVRAM)	101
1B 73 *n1 n2 k*	Write to non-volatile memory (NVRAM)	101
1D 22 *n*	Select memory type (SRAM/flash) where to save logos or user-defined fonts	102
1D 22 55 *n1 n2*	Flash memory user sectors allocation	102
1D 40 *n*	Erase user flash sector	103
1D 97 *m n*	**User storage status**	**104**

Flash download

Code (hexadecimal)	Command	Page
1B 5B 7D	Switch flash download mode	105
1D 00	Return boot sector firmware part number	106
1D 01	Return segment number status of flash memory	106
1D 02 *nn*	Select flash memory sector to download	106
1D 06	Get firmware CRC	106
1D 07	Return microprocessor CRC	107
1D 0E	Erase all flash contents except boot sector	107
1D 0F	Return main program flash CRC	107
1D 10 *n*	Erase selected flash sector	107
1D 11 *aL aH cL cH d1…dn*	Download to active flash sector	108
1D 8E *m nL nH d1 … dn*	**Download paper type description**	**108**
1D 8F *m*	**Return paper type description**	**109**
1D FF	Reset firmware	109

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:

- 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
- Printer is restarted and error status is cleared in a fault condition
- Printing position is set to column one
- Knife is homed

Exceptions

In printers with the parallel interface, this command also returns paper exhaust to the paper status line if an alternate status has been requested. A DLE command followed by a 04 or 05 is interpreted as a "Real time command." (See real time command.)

Related Information

This command is recognized in A793 emulation and A795 native mode, ignored in TM-T88 emulation.

Perform full knife cut

ASCII	EM	ESC i
Hexadecimal	19	1B 69
Decimal	25	27 105

Cuts the receipt.

There are two codes (Hex 19 or 1B 69) for this command and both perform the same function.

Exceptions

The full cut is replaced by a partial cut in the Axiohm A793 emulation. ASCII EM, (0x19) is ignored in TM-T88 emulation.

Perform partial knife cut

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

Partially cuts the receipt. The default setting leaves 5 mm. (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

The command is valid only at the beginning of a line. ASCII SUB, (0x1A), is ignored in TM-T88 emulation. Line feed is executed first, if the buffer is not empty.

Generate tone

ASCII	ESC BEL
Hexadecimal	1B 07
Decimal	27 7

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

Related information

This command is recognized in A793 emulation and A795 native mode, ignored in TM-T88 emulation.

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 startup configuration (refer to Default settings above).

Single-wide, single-high, non-rotated, and left-aligned characters are set and user-defined characters or logo graphics are cleared. (Flash memory is not affected.) Tabs reset to default. Receipt selection state is selected.

Exceptions

In printers with the parallel interface, this command also returns paper exhaust to the paper status line if an alternate status has been requested.

Select paper sensors to output paper end signals

ASCII   ESC c 3 *n*
Hexadecimal   1B 63 33 *n*
Decimal   27 99 51 *n*

Vaue of *n*:

If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals.

If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.

Bit	Position	Hex	Decimal	Function
0	Off	00	0	Paper roll near-end sensor disabled
	On	01	1	Paper roll near-end sensor enable
1	Off	00	0	Paper roll near end sensor disabled
	On	02	2	Paper roll near end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll end sensor enabled
3	Off	00	0	Paper roll end sensor disable
	On	08	8	Paper roll end sensor enabled
4, 5, 6, 7	-	-	-	Undefined

Range of *n*:   1-255

Default of *n*:   12

Specifies the paper sensor to output a paper end signal. Multiple sensors may be selected to signal when paper has run out. When multiple sensors have been selected, anytime one of the sensors detects a paper end, the paper end signal is output.

When this command is executed a sensor is switched. The paper end signal switching is delayed depending on the receive buffer state.

Exceptions

This command can only be used with a parallel interface.

The command is ignored if it used with a serial interface.

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

Bit	Sensor	Sensor Status	
		0	1
0	Receipt paper near-end	Disabled	Enabled
1	Receipt paper near-end	Disabled	Enabled
2-4	Undefined		
6	Undefined		

Bits 5 and 7 are not used.

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.

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

The off-time is the delay before the printer performs the next operation. Refer to cash drawer specifications for required on and off-time.

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 2-color.

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

If the paper type value from initialization or most recent setting of the set paper type command is 0 0, selecting monochrome paper, then this command will set a parameter that is remembered but has no effect as all output will be in the one default monochrome color (usually black) color.

When 2-color paper is loaded and specified by the set paper type command, the effect of this command is to designate which of the two colors will be used for everything that does not have the explicit color selection parameter(s) that are in commands such as color logos, side bars, surround graphics, background watermarks and color raster graphics. Its effect should mimic what happens on a printer or typewriter loaded with 2-color ribbon when the ribbon is shifted (to use the ribbon's lower half color).

Exceptions

After a power loss or reset the initial value is *m*=0.

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).
1, 49	Partial cut (no extra feed).
65	Feeds paper to cutting position + (*n* times vertical motion unit), and cuts the paper completely.
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 paper type (ColorPOS™)

ASCII	GS Ox81 *m n*
Hexadecimal	1D 81 *m n*
Decimal	29 129 *m n*

Value of *m*:	0 = monochrome (black) paper
	1 = Kansaki KIP-371 RB red/black paper
	5 = Mistubishi XX-TBD blue/black paper
Default:	0 (monochrome paper)

This command will set the optimum parameter values in the thermal print engine control hardware for any defined monochrome or 2-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 pre-set descriptions for customer selected color types; initial release consists of two defined color types: (*m n* = 1 0) Kansaki P-310RB red/black paper and (*m n* = 5 0) Mitsubishi PB770 blue/black paper. Other valid values of *m n* may be present if the download paper type description command had been executed defining additional types.

When issuing this command a value of *n* = OxFF 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 2-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

The last set paper type choice is stored in non-volatile memory and is retained after a power loss and across reset commands. The initial value at first boot after firmware load (or reload) is *m n* =0 0.

Related information

An incorrect setting of *n* for a 2-color paper or failure to set *n* when a 2-color paper is loaded will result in poor output quality.

The following list clarifies how the A795 printer will behave in each emulation mode:

The following list clarifies how the A795 printer will behave in each emulation mode:

Two-color paper and ColorPOS commands and features are supported only in A795 native mode.

- If the paper type is changed using the 0x1D 0x81 command, the font and default lines per inch (LPI) will be setup as in the table below.
- If only the font is changed, the default LPI will automatically be changed as in the table below.
- If emulation is switched to Epson, A794 or A793 emulation(s), the paper type will automatically be changed to monochrome paper, and the font and LPI will be changed as in the table below.
- If emulation is switched from any emulation to A795 native, the font and LPI will remain unchanged because the A795 native mode supports all font and LPI options offered in the emulation modes.
- The "Set Default LPI" option in the configuration menu is not offered in Epson emulation mode. The LPI is set at 6.00.

Font and lines per inch (LPI) setup for different emulations

Emulation Mode	LPI Options	Font(s) Options	Font Size	Default LPI	Default EDR	Comments
A795 native	6.00, 6.77, 7.52, 8.13	Standard	13x24	7.52	3	Default setup for monochrome paper
		Tall	13x27	6.77	3	
		ColorPOS™	13x27	6.77	3	Default setup for 2-color paper
A794, A793 emulation	6.00, 7.52, 8.13	Standard	13x24	7.52	3	
Epson emulation	6.00	Tall	13x27	6.00	7	Default setup for Epson emulation
		Standard	13x24	6.00	10	

Print test form

ASCII	AX t
Hexadecimal	1F 74
Decimal	31 116

Prints the current printer configuration settings on the receipt.

Disabled in page mode.

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 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.

This command is recognized in A793 emulation and A795 native mode, ignored in TM-T88 emulation.

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 A795 native mode 0-127 in A793 emulation

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

Related information

This is ignored in TM-T88 emulation and the parameter byte goes into the print buffer.

Feed *n* dot rows

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

Value of *n*:	*n*/203 inch
Range of *n*:	0-255 in A795 native mode 0-127 in A793 emulation

Feeds the paper *n* dot rows (*n*/8 mm, *n*/203 inch), without printing. Receipt moves *n* rows if the print buffer is empty.

Related information

This is ignored in TM-T88 emulation and the parameter byte goes into the print buffer.

Add *n* extra dot rows

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

Value of *n*:	Number of extra dot rows
Range of *n*:	0-16
Default:	3 extra dot rows

Adds *n* extra dot rows (*n*/8 mm, *n*/203 inch) 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:

Extra rows	Lines per inch	Dot rows
0	8.5	24
1	8.1	25
2	7.8	26
3	7.5	27
4	7.2	28
5	7.0	29
6	6.8	30
7	6.5	31
8	6.3	32

Extra rows	Lines per inch	Dot rows
9	6.1	33
10	6.0	34
11	5.8	35
12	5.6	36
13	5.5	37
14	5.3	38
15	5.2	39
16	5.1	40

Related information

This is ignored in TM-T88 emulation and the parameter byte goes into the print buffer.

Print

ASCII	ETB
Hexadecimal	17
Decimal	23

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

Related information

This command is recognized in A793 emulation and A795 native mode, ignored in TM-T88 emulation.

Print and feed paper

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

Value of *n*:	*n*/203 inch in A795 native mode and TM-T88 emulation mode
	n/360 inch in A793 emulation mode
Range of *n*:	0-255

Prints one line from the buffer and feeds the paper *n*/8 mm (*n*/203 inch). The line height 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 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 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)

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

Vertical and horizontal positioning

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

The commands describe operation for 80 mm paper. If the printer supports 82.5 mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on the 80 mm paper.

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.

Print initialization sets 32 tabs at column 9, 17, 25…

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
Value of y:	Vertical
Range of x:	0 – 255
Range of y:	0 – 255
Default of x:	203
Default of y:	203

Sets the horizontal and vertical motion units to 1/x inch and 1/y inch respectively.

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

Set column

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

Value of n:	1-44= Standard pitch 1-56= 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.

Related information

This is ignored in TM-T88 emulation and the parameter byte goes into the print buffer.

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 *nL* and *nH* 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

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.

Compatibility information (A795 receipt vs. A793 receipt)

There is a difference in the normal behavior of this command in A793 emulation mode as compared to the original A793. The difference exists when the command is used to move to the left. The A793 processes the whole print string prior to putting it in the buffer for the print head. This method of processing allows the A793 to backup in the print string and replace characters and their associated attributes when a "Set relative print position" command instructs the printer to move the print position to the left.

In order to improve the speed of printing, the A795 moves the data into a buffer for the printhead when it receives it. When the "Set relative print position" command contains a move to the left, this causes the new data to overstrike the previous data. This behavior can be used to an application's advantage to provide the ability to create compound characters on the receipt station.

This command also functions differently in the A793 emulation when used in graphics:

n x 2 =	Number of dots to be moved from the beginning of the line when this command is followed by a graphics command.

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).

Set vertical line spacing

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

Value of *n*: *n*/406 inch in A795 native mode
n/360 inch in A793 emulation mode
n/203 inch in TM-T88 emulation mode

Range of *n*: 0-255

Default: 3.37 mm (0.13 inch)

Sets the line spacing to *n*/16 mm (*n*/406 inch).

The minimum line spacing is 8.5 lines per inch. 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.

Set horizontal tab positions

ASCII	ESC D [*n*]…*k* NUL
Hexadecimal	1B 44 [*n*]…*k* 00
Decimal	27 68 [*n*]…*k* 0

Value of *n*: Column number for tab minus one.
(*n* is always less than or equal to the current selected column width)

Value of *k*: 0-32

Default: Every 8 characters from column 1 (9, 17, 25, etc.) for normal print.

Sets up to 32 horizontal tab positions *n* columns from column one, but does not move the print position. See the horizontal tab command (09).

The tab positions remain unchanged if the character widths are changed after the tabs are set. The command ends with hexadecimal 00; hexadecimal 1B 44 00 clears all tabs.

Tabs assumed to be in strictly ascending order. A tab out of order terminates the command string as if it were 00, and remaining tab values are taken as normal data.

Formulas

Set the tab positions in ascending order and put Hex 00 at the end.
Hex 1B 44 00 (number of tabs not specified) clears all tab positions.

Exceptions

The tabs cannot be set higher than the column width of the current pitch:

Standard pitch = 44 columns
Compressed pitch = 56 columns

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 (standard) or 8 (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 (standard) or 8 (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. For more information, see the description of the set horizontal and vertical minimum motion units command (1D 50) in this document.

Compatibility information (A795 receipt vs. A793 receipt)

There is a difference in the normal behavior of this command in A793 emulation mode as compared to the original A793. The difference exists when the command is used to move to the left. The A793 processes the whole print string prior to putting it in the buffer for the print head. This method of processing allows the A793 to backup in the print string and replace characters and their associated attributes when a "Set relative print position" command instructs the printer to move the print position to the left.

In order to improve the speed of printing, the A795 moves the data into a buffer for the printhead when it receives it. When the "Set relative print position" command contains a move to the left, this causes the new data to overstrike the previous data. This behavior can be used to an application's advantage to provide the ability to create compound characters on the receipt station.

This command also functions differently in the A793 emulation when used in graphics:

n x 2 = Number of dots to be moved from the beginning of the line when this command is followed by a graphic command.

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 according to the above table.

Related information

On the Epson TM-T88, this command is valid only at the beginning of a line.

Range of n on A793 is 0-255 using low 2 bits only:

00	left aligned
01	center
10	right aligned
11	center

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)

Formulas

Sets the left margin of the printing area. 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.

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. See the illustration.

To set the 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.
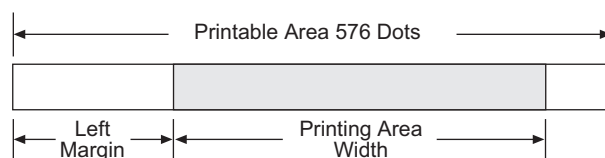
Exceptions:

The command is effective only at the beginning of a line. This command is ignored if the line buffer is not empty, and only effects the receipt interface.

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. If the setting exceeds the printable area, the maximum value of the printable area is used. The width of the printing area is set to $((nH \times 256) + nL)$ times horizontal motion unit) inches. The horizontal motion units are set by the set horizontal and vertical minimum motion units command (1D 50).

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.

Formulas

To set the width of the 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.
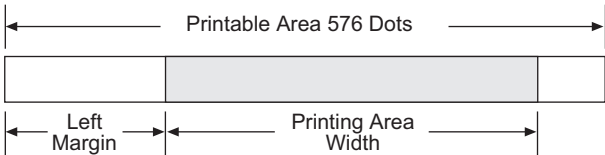
Exceptions

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. See the illustration.

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.

The commands describe operation for 80 mm paper. If the printer supports 82.5 mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on 80 mm paper.

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.

Related information

This command is ignored in TM-T88 emulation.

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.

Related information

This command is ignored in TM-T88 emulation.

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.

This command is ignored in TM-T88 emulation.

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	Columns, 80 mm Paper	Columns, 82.5 mm Paper	CPI
Standard	44	49	15.6
Compressed	56	64	20.3

Related information

Look in Chapter 3: 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.

This is ignored in TM-T88 emulation and the parameter
byte goes into the print buffer.

Set right-side character spacing

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

Range of *n*:   0 – 32

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.

Related information

This is ignored in TM-T88 emulation and the parameter
byte goes into the print buffer. In the A793 emulation, the
command and parameter byte are ignored.

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.)

Valu e 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.

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

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

Pitch	Columns, 80 mm paper	Columns, 82.5 mm paper	CPI
Standard	44	49	15.6
Compressed	56	64	20.3

Selects the print mode: standard, compressed, emphasized, underlined, double high, or double wide.

Exceptions

Refer to the table in other column for exceptions.

Related information

Look in Chapter 3: 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 standalone 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

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. When an undefined RAM character is selected, the current active ROM code page character is used. Look in Chapter 3: Programming the Printer, "Character appearance" for the character sets.

Exception:

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

Related information

In TM-T88 emulation, the low order bit of *n* is used to select the user-defined character set and the current active ROM code page is not affected.

Define user-defined character set

ASCII	ESC *& s c1 c2 n1 d1 ... nn dn]*
Hexadecimal	1B 26 *s c1 c2 n1 d1 ... nn dn]*
Decimal	27 38 *s c1 c2 n1 d1 ... nn dn]*

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

n = the number of dot columns for the nth character as specified by *n*1 ... *n*n

   n = 1-16

d = the column data for the nth character as specified by *d*1 ... *d*n

The number of bytes for a character cell is *s* x *n*1.

The bytes are printed down and across each cell.

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.

Top of Character
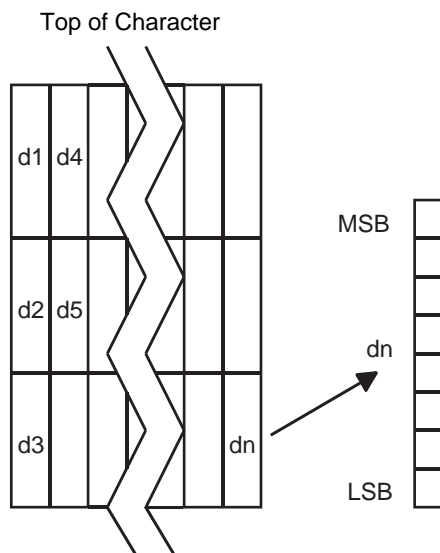
Related information

See 1D 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*:	0, 48 = Cancel underline mode
	1, 49 = Select underline mode
	2, 50 = Select double thickness underline mode
Default:	0 (Cancel underline mode)

Turns underline mode on or off. Underlines cannot be printed for spaces set by the horizontal tab, set absolute start position, or set relative print position commands.

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.

Related information

In A793 emulation, this command is unrecognized and the parameter *n* is put into the print buffer.

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.

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.

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. 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.
Emphasized printing cannot be used with bit-images or downloaded bit-images.

Related information

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

In A793 emulation, this command is unrecognized and the parameter byte is put into the print buffer.

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. 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.

Related information

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

In A793 emulation, this command is unrecognized and the parameter byte is put into the print buffer.

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

Only the lowest bit of *n* is valid.

Related information

This command is recognized only in A795 native mode.

In A793 and TM-T88 emulations, the parameter byte is put into the buffer.

Select international character code

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

Value of *n*:

A795 native mode	A793 emulation	TM-T88 emulation (1B 52 n only)
0 = Code Page 437	0 = Code Page 437	0 = U.S.A.
1 = Code Page 850	Not 0 = Code Page 850	1 = France
2 = Code Page 852		2 = Germany
3 = Code Page 860		3 =-U.K.
4 = Code Page 863		4 = Denmark I
5 = Code Page 865		5 = Sweden
6 = Code Page 858		6 = Italy
7 = Code Page 866		7 = Spain
8 = Code Page 1252		8 = Japan
9 = Code Page 862		9 = Norway

10 = Code Page 737, Greek (only in A795 mative mode)

Default: 0 (Code Page 437)

Selects the character set to be used. Look in "Appendix B: Resident Character Sets" in the *A795 User Guide* for the character sets.

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

Related information

The TM-T88 emulation selection applies only to the command "Select international character set" (1B 52 *n*). The TM-T88 emulation generates the same as A795 native mode for the command "Select character code table" (1B 74 *n*).

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 reset or until a clear printer (0x10) or rotated print (1B 12) command is received. See summary of rotated printing in this document.

Select international character set

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

Value of n:

A795 native mode	A793 emulation	TM-T88 emulation (1B 52 n only)
0 = Code Page 437	0 = Code Page 437	0 = U.S.A.
1 = Code Page 850	Not 0 = Code Page 850	1 = France
2 = Code Page 852		2 = Germany
3 = Code Page 860		3 =-U.K.
4 = Code Page 863		4 = Denmark I
5 = Code Page 865		5 = Sweden
6 = Code Page 858		6 = Italy
7 = Code Page 866		7 = Spain
8 = Code Page 1252		8 = Japan
9 = Code Page 862		9 = Norway

10 = Code Page 737, Greek (only in A795 native mode)

Default: 0 (Code Page 437)

Selects the character set to be used. Look in "Appendix B: Resident Character Sets" in the *A795 User Guide Programming Supplement* for the character sets.

There are two codes for this command. Both codes perform the same function.

Related information

The TM-T88 emulation selection applies only to the command "Select international character set" (1B 52 n). The TM-T88 emulation generates the same as A795 native mode for the command "Select character code table" (1B 74 n).

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. 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).

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.

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.

In standard 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 application will fall back to the setting of 7 (seven times height).

Related information

In A793 emulation, this command is discarded and not put into print buffer.

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.

Related information

If the current color is not black and 2-color paper is loaded, no visible effect takes place.

In A793 emulation, the command is unrecognized and the parameter byte is put into the print buffer.

Select or cancel smoothing mode

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

Value of *n*	Hex. 30 smoothing disabled
Value of *m*	Hex. 31 smoothing enabled

Effects of smoothing are most effective on large charactors, (Select character size command 1D 21 xx.)

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 0x85 *m n*
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	AX 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 ignored if *n* is out of the specified range.

Related information

In A793 emulation, this command is unrecognized and the parameter byte is put into the print buffer.

Graphics

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

These commands describe operation for 80 mm paper. If the printer supports 82.5 mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on 80 mm paper.

Download BMP logo

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

Value: Maximum width = 576 (640 for 82.5 mm paper)
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.

Exceptions

BMP file images that are not monochrome are ignored.

Related information

Microsoft BMP bitmap file format.

This command is recognized only in A795 native mode.

In A793 and TM-T88 emulations, the BMP file bytes are put into the print buffer.

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*:

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

Value of *n*:

Value of *n* (8-dot single density mode)	Value of *n* (24-dot single density mode)	Value of *d*
$n1 + (256 \times n2)$	$3 \times [n1 + (256 \times n2)]$	Number of bytes of data (printed down, then across)

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.

See the illustration for graphic representations of the bit image below.

8-Dot Single-Density Mode

24-Dot Single-Density Mode
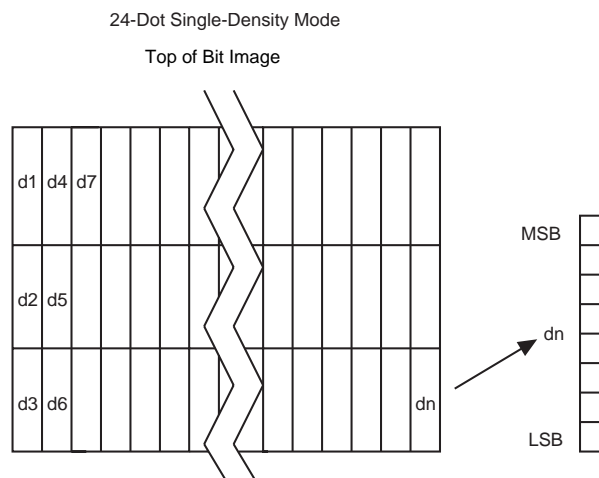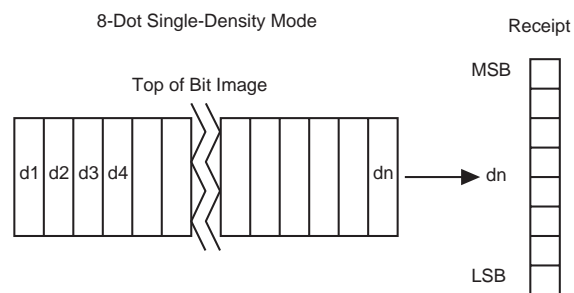
Print advanced raster graphics

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*
*n*1 + (256 x *n*2)	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.

Related information

In TM-T88 emulation, this command is unrecognized and the parameters are put into the print buffer.

Select double-density graphics

ASCII	ESC Y $n1$ $n2$ $d1$ ... dn
Hexadecimal	1B 59 $n1$ $n2$ $d1$ ... dn
Decimal	27 89 $n1$ $n2$ $d1$ ... dn

Value of n:

Value of n (8-dot single density mode)	Value of d
$n1 + (256 \times n2)$	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.

Related information

In TM-T88 emulation, this command is unrecognized and the parameters are put into the print buffer.

Select the current logo

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 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 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.

Related information

This command is recognized only in A795 native mode.

In A793 and TM-T88 emulations, the parameters are put into the print buffer.

Define downloaded bit image

ASCII   GS * *n*1 *n*2 *d*1 ... *d*n]
Hexadecimal 1D 2A *n*1 *n*2 *d*1 ... *d*n]
Decimal   29 42 *n*1 *n*2 *d*1 ... *d*n]

Value of *n*:

Value of *n*1	Value of *n*2	Value of *d*
1-72 (8 x *n*1 = number of horizontal dot columns)	1-64 (number of vertical bytes)[1]	Bytes of data (printed down, then across)

[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 *n*1 and *n*2. The downloaded bit image is available until power is turned off, 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.

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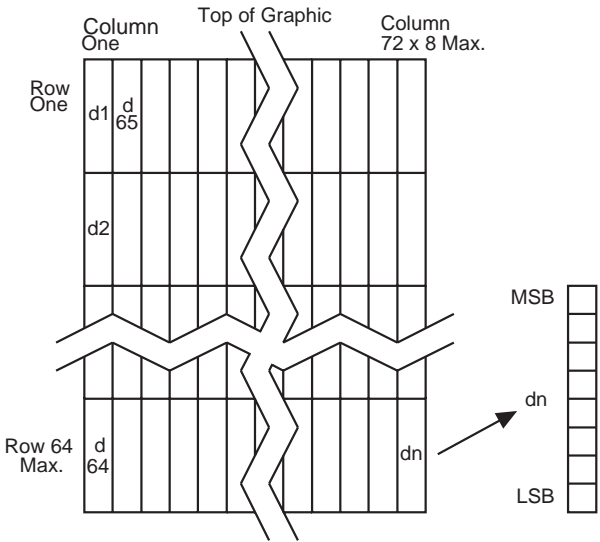
Print downloaded bit image

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 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	Quadruple	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 2-color image. If doubling or quadrupling exceeds the print paper width maximums (576 or 640 with 82.5-mm 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 monochrome graphics (ColorPOS™)

ASCII	GS 0x82 *n1…..n72* (576 dots) for 80 mm paper, or *n80* (640 dots) for 82.5 mm paper
Hexadecimal	1D 82 *n1…..n72* (576 dots) for 80 mm paper, or *n80* (640 dots) for 82.5 mm paper
Decimal	29 130 *n1…..n72* (576 dots) for 80 mm paper, or *n80* (640 dots) for 82.5 mm paper

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 not 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 2-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.
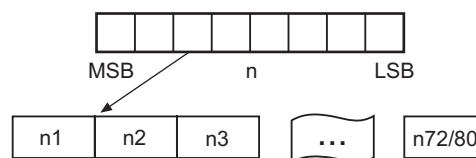
Print raster color graphics (ColorPOS™)

ASCII   GS 0x83 *n1…..n144* (576 dots 80 mm paper) */n160* (640 dots, 82.5 mm paper)
Hexadecimal   1D 83 *n1…..n144* (576 dots 80 mm paper) */n160* (640 dots, 82.5 mm paper)
Decimal   29 13 *n1…..n144* (576 dots 80 mm paper) */n160* (640 dots, 82.5 mm paper)

Value and range of *n:* *n1 to n144 / n160* 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.
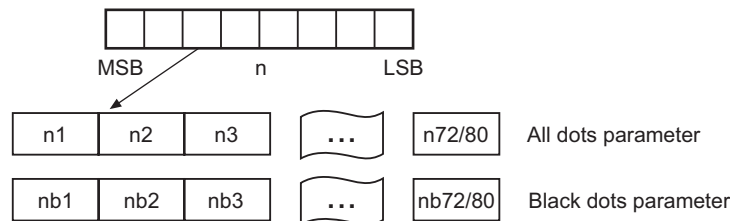
Download logo image (ColorPOS™)

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 = 2-color

Max *n1* =   576/8 for 80 mm paper
                    or 640/8 for 82.5 mm paper

The lastest 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 2-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 <u>color</u> 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 <u>monochrome</u> 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.

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: that 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.

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: that 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, $0 <= m <= 100$. If > 0 then color shade mode is turned off as well.

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

Note: that 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.

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, $0 <= m <= 100$. If > 0 then monochrome shade mode is turned off as well.

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

Note: that 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.

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 give 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.

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

ASCII	AX 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.

Status

Status command introduction

The A795 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 and are NOT stored in the printer's buffer. Instead, they are acted on immediately (regardless of the printer's BUSY status) and their response (if any) is returned to the application. 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.

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

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A795 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

In TM-T88 emulation, this command is ignored.

Request alternate status (A793 emulation only)

ASCII	ESC u *n*
Hexadecimal	1B 75 *n*
Decimal	27 117 *n*

Value and Range of *n*:

Value of *n*	Function	Description
00	Drawer 1 Present	High = Open Low = Closed or Not
01	Drawer 2 Present	High = Open Low = Closed or Not
02	Paper Low (Not Implemented. Interpreted as Paper Out.)	High = Paper Out Low = Paper Present
03	Paper Out (Default)	High = Paper Out Low = Paper Present
>03	Ignored, No Change	Printer Does Not Stay BUSY[1]

[1]PAPER EXHAUST LINE is valid to indicate previously requested status.

This command allows the printer to inform the host when the data in the buffer has been processed. The PAPER EXHAUST line shows the status for the cash drawer or receipt paper as shown in the table.

Status information is limited to what can be sent by the dedicated lines: BUSY, ACK, PAPER EXHAUST, and FAULT.

Transmit paper sensor status

ASCII	ESC v
Hexadecimal	1B 76
Decimal	27 118

Values:

Status Byte (RS-232)

Bit	Function	0 Signifies	1 Signifies
0	Receipt paper	Present	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	Temperature	In valid range	Too hot or too cold
6	Voltage	In valid range	Too high or too low
7	Not used	Fixed to zero	Fixed to zero

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.

In TM-T88 emulation, this command is ignored.

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	Axiohm A795	0x24
2, 50	Type ID	Installed options	Refer to next table
3, 51	ROM version ID	ROM version	0x00
4, 52	Logo definition	Logo definition	Refer to table below

n = 2 or 50: Type ID

Type ID (*n* = 2)

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	-	-	-	Undefined.
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

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

Value of *n*

ASCII	Hex	Dec	Remote diagnostic item	Function
Space	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
+	2B	43	Boot firmware part #, 12 digit ASCII	Return Boot firmware part #, returns 14 bytes
/	2F	47	Boot firmware CRC, 4 digit ASCII	Return Boot firmware CRC, returns 6 bytes
3	33	51	Flash firmware part #, 12 digit ASCII	Return Flash firmware part #, returns 14 bytes
7	37	55	Flash firmware CRC, 4 digit ASCII	Return Flash firmware CRC, returns 6 bytes
Ç	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
ü	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
é	82	130	Receipt lines tally	Clear receipt lines tally to 0
â	83	131	Receipt lines tally	Return receipt lines tally, preceded by *n* to identify Printer returns 10 bytes in above example: â00010000<CR>
ä	84	132	Knife cut tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
à	85	133	Knife cut tally	Write to NVRAM, and print on receipt to verify

Value of *n*				
ASCII	**Hex**	**Dec**	**Remote diagnostic item**	**Function**
à	86	134	Knife cut tally	Clear knife cut tally to 0
ç	87	135	Knife cut tally	Return knife cut tally, returns 10 bytes
É	90	144	Hours on tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
æ	91	145	Hours on tally	Write to NVRAM, and print on receipt to verify
Æ	92	146	Hours on tally	Clear Hours on tally to 0
ô	93	147	Hours on tally	Return hours on tally, returns 10 bytes
ù	97	151	Boot firmware version	Return boot firmware version, returns 6 bytes
ú	A3	163	Flash firmware version	Return flash firmware version, returns 6 bytes
ñ	A4	164	Flash cycles tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
Ñ	A5	165	Flash cycles tally	Write to NVRAM, and print on receipt to verify
ª	A6	166	Flash cycles tally	Clear flash cycles cut tally to 0
º	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
½	AB	171	Knife jams tally	Return knife jams tally, returns 10 bytes
¼	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

Transmit printer ID, remote diagnostics extension continued on the next page.

Performs the remote diagnostic function specified by *n*.

Eighteen remote diagnostic items are defined: eight printer ID items and ten 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 table that follows describes the variables.

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>

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
	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 RS232C 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 on the next page.

Exceptions

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A795 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	-	-	-	Undefined.
6	-	-	-	Undefined.
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.

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.

Exceptions

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

Send printer software version

ASCII	AX V
Hexadecimal	1F 56
Decimal	31 86

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

The second 4 bytes are an ASCII string for the flash version. Example: For 1.234.56 (8 bytes), the boot 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 A756 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 A756 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 upon receiving it 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

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).

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*.

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A795 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	Cover closed.
	On	04	4	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.

Real time status transmission (continued)

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	Fixed to off.
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

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

The printer responds to a request from the host specified by n. This command includes two sequences: GS and DLE. 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 $n = 1$.

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	Cover closed.
	On	04	4	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	Fixed to off.
6	Off	00	0	No error condition.
	On	40	64	Error condition exists in the printer.
7	On	80	128	Fixed to on.

Exceptions

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A795 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.

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 USM
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 cover closed.
	On	20	32	Receipt 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 USM
0	-	-	-	Undefined
1	-	-	-	Undefined
2	Off	00	0	No mechanical error
	On	04	4	Mechnical 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 USM
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	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Fourth byte (paper sensor information)

Bit	Off/On	Hex	Decimal	Status for USM
0	-	-	-	Undefined
1	-	-	-	Undefined
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 satus 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.

These commands describe operation for 80 mm paper. If the printer supports 82.5 mm paper, the dot spacing is the same but there are 640 printable dots rather than the 576 printable dots on 80 mm paper.

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.

Select pitch of HRI characters

ASCII	GS f n
Hexadecimal	1D 66 n
Decimal	29 102 n

Value of n:	0 = Standard Pitch at 15 CPI
	1 = Compressed Pitch at 20 CPI
Default:	0 (Standard Pitch at 15 CPI)

Selects standard and compressed font for printing bar code characters.

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 dots or (n/8 mm , n/203 inch).

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.

Values:

First variation: String terminated with NUL character

m	Bar code	*d1…dk*	*n*, 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

Print bar code (continued)

Second variation length of byte specified at beginning of string.

The value of *m* selects the bar code system as described in the table. When details present in the print buffer, the printer processes the data following *m* as normal data.

The variable *d* indicates the character code to be encoded into the specified bar code system. See the table. 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.

m	Bar code	*d1...dk*	*n*, 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
70	Interleaved 2 of 5 (ITF)	48- 57	Variable (even number)
71	CODABAR (NW-7)	65- 68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable
72	Code 93	00-127	Variable
73	Code 128*	0-105 *d1* = 103-105 (must be a start code) *d2* = 0-102 (data bytes) (Stop code is provided by the printer)	Variable
75	PDF 417	0-255	Variable length

Exceptions

Code 93 and PDF 417 are only available in A795 native mode.

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:
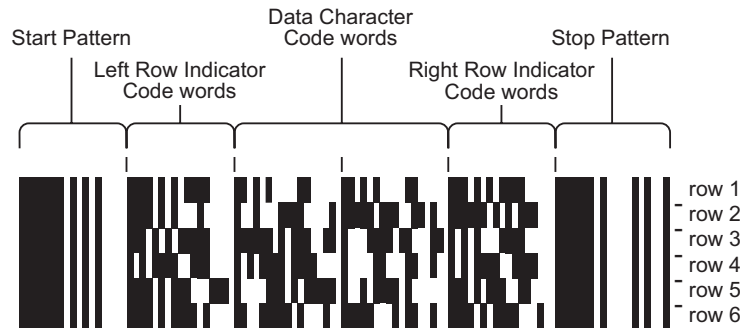
1 Leading quiet zone

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

Sets the bar code width to *n* dots.

Formulas

$n+1/8$ mm ($n+1/203$ inch).

Page mode

Page mode is one of two modes that the A795 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.

These commands describe the operation for 80 mm paper. If the printer supports 82.5 mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on 80 mm paper.

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 54*n*) and set print area in page mode (1B 57 *n*1, *n*2, …*n*8) 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.

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.

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.

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)
Monochome paper	40.5	72 wide x 72 high
Two-color paper	81.0	72 wide x 72 high (dots) 72 wide x 72 high (energy)

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.

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.

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)
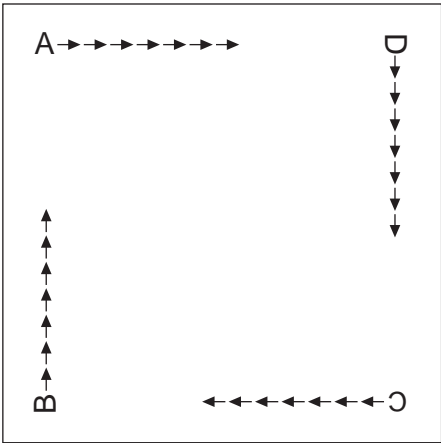
Default: 0

Selects the printing direction and start position in page mode. See the illustration on previous page.

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).

Exceptions

The command is valid only in page mode.

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

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:

n1-4 =	0
n5 =	64
n6 =	2
n7 =	64
n8 =	2

Sets the position and size of the printing area in page mode.

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).

Formulas
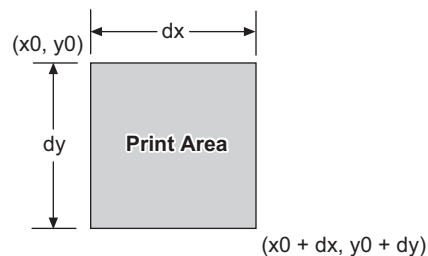
y direction maximum
    monochome = 1800
    two-color =   900

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)]

Keep the following notes in mind for this command.

- The fundamental calculation pitch depends on the vertical or horizontal direction.
- The maximum printable area in the x direction is 576/203 inches.
- The maximum printable area in the y direction is 576/203 inches.

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 127 kBytes of free RAM. Without any free RAM, bitmap rotations and enlargements cannot be performed. The table below shows the maximum area in page mode, limited by free RAM.

Paper type	Total memory allocated (kBytes)	Maximum possible area (mm)
Monochome paper	126.5	72 wide x 225 high
Two-color paper	126.5	72 wide x 112 high (dots) 72 wide x 112 high (energy)

Exceptions

The command is effective only in page mode.

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.

1. This command functions as follows, depending on the print starting position set by select print direction in page mode (1B 54):

2. When the starting position is set to the upper right or lower left of the printing area, the vertical motion unit (*y*) is used.

3. 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.

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.

Read from non-volatile memory

ASCII	ESC j k
Hexadecimal	1B 6A k
Decimal	27 106 k

Range of *k*:   20 – 63 (decimal)

Reads a two-byte word from location *k* in the history EEROM. The printer returns the word at the next available opportunity.

Related information:

This is ignored in TM-T88 emulation and the parameter byte goes into the print buffer.

Write to non-volatile memory (NVRAM)

ASCII	ESC s n1 n2 k
Hexadecimal	1B 73 n1 n2 k
Decimal	27 115 n1 n2 k

Value of *n1*:   1st Byte

Value of *n2*:   2nd Byte

Range of *k*:   20 - 63 (decimal locations)

Writes the two-byte word, *n*1 *n*2, to location *k* in history EEROM.

Related information:

This is ignored in TM-T88 emulation and the parameter bytes go into the print buffer.

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 - 51

n = 48 (ASCII *n* = 0)

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)

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)

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)

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 flash memory or to RAM (volatile memory). The selection remains in effect until it is changed via this command or until the power cycles.

Related information

This command is recognized in A795 native mode. In A793 and TM-T88 emulations, parameter bytes go into the print buffer.

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.

*n*1 + *n*2 <= 6 (dec) (1M)
*n*1 + *n*2 <= 22 (dec) 16 (hex) (2M)

If *n*1 + *n*2 is greater than the maximum number of s ectors available, the command is ignored.

Issuing this command with parameters different from current parameters will erase all sectors.

Erase user flash sector

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

Value of *n*:   49 - 50

n = 49 (ASCII *n* = 1)

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)

This command erases all sectors available for user data storage.

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).

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. 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 five 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 = 2   return the kilobytes of free user data flash memory, *n* = 0

m = 3   return the CRC of a logo indexed by *n*

m = 4   return the CRC of a downloaded character set, selected by *n*

m = 5   return the CRC of a macro that has been stored, *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 and character set 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).

User defined characters' CRC is requested as *m, n* = 4, 0.

Downloaded character sets are identified by integer extending the existing code page selection as enumerated in the select international character set (= select character code table) command. The firmware standard list is incrementally extended each time a new single or double byte set is downloaded.

Single byte downloaded fonts are selected by *m* = 3 and 0x40 <= *n* < 0x80.

Since there are only three double-byte character sets supported, the value 0x80 / 0xA0 / 0xC0 selects the first, second, third downloaded double byte font respectively. In return, each downloaded double byte character band is reported individually as 0xC0, 0xC1, 0xC2 ….for as many bands as have been defined.

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.

If the communication protocol is RS232 – Xon/Xoff, then "X symbol substitution response" should be configured with the setting communications parameters command (US STX , 1F 02).

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 three ways to enter the download mode.

1. Powering the printer up with DIP Switch 1 down.

2. 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.

3. 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. **DIP switch 1 must in UP position during reboot to return to normal printer operation.**

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.

Return boot sector firmware part number

ASCII	GS NULL
Hexadecimal	1D 00
Decimal	29 0

Returns ACK (Hex 06) + 12 bytes ASCII string describing the flash memory boot sector firmware part number.
Ex : 189-1234567A

Exceptions

Available only in download mode.

Return segment number status of flash memory

ASCII	GS SOH
Hexadecimal	1D 01
Decimal	29 1

Returns the size of the flash used. There may be 16 (1 Meg) or 32 (2 Meg) sectors in flash memory. This command assures that the firmware to be downloaded is the appropriate size for flash memory. The value returned is the maximum sector number that can be accepted by the select sector to download (1D 02 *nn*) command.

Exceptions

Available only in download mode.

Select flash memory sector to download

ASCII	GS STX *nn*
Hexadecimal	1D 02 *nn*
Decimal	29 2 *nn*

Value of *n:*	The flash sector to which the next download operation applies
Range of *n:*	0

Selects the flash sector (*nn*) for which the next download operation applies. The values of the possible sector are restricted, depending upon the flash part type. The printer transmits an ACK if the sector number is acceptable or an NAK if the sector number is not acceptable. Sector numbers start at 0.

Exceptions

Available only in download mode.

Get firmware CRC

ASCII	GS ACK
Hexadecimal	1D 06
Decimal	29 6

Causes the printer to calculate the CRC for the currently selected sector and transmits the result. This is performed normally after downloading a sector to verify that the downloaded firmware is correct. The printer also calculates the CRC for each sector during power up and halts the program if any sector is erroneous.

The printer transmits ACK if the calculated CRC is correct for the selected sector; NAK if the CRC is incorrect or if no sector is selected.

Return microprocessor CRC

ASCII	GS BEL
Hexadecimal	1D 07
Decimal	29 7

Returns the CRC calculated over the boot sector code space.

Formulas

ACK <low byte> <high byte>

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>.

Erase selected flash sector

ASCII	GS DLE *n*
Hexadecimal	1D 10 *n*
Decimal	29 16 *n*

Value and range of *n*:
- 0-7 = 512k bytes flash
- 0-15 = 1M bytes flash
- 0-31 = 2M bytes flash

Erases the previously selected sector. The printer transmits ACK when the sector has been erased. If the previous sector is not successfully erased, or if no sector was selected, the printer transmits NAK.

Exceptions

Available only in download mode.

Download to active flash sector

ASCII	GS DC1 *aL aH cL cH d1… dn*
Hexadecimal	1D 11 *aL aH cL cH d1… dn*
Decimal	29 17 *aL aH cL cH d1… dn*

Value of *aL:* low byte of the address

Value of *aH:* high byte of the address

Value of *cL:* low byte of the count

Value of *cH:* high byte of the count

Value of *d:* data bytes, 0-255

Value of *n* (for number of data bytes)	Range of address (*aL aH*)	Range of count (*cL cH*)
((cH * 256) + cL)	0000-FFFF (hexadecimal)	0001-FFFF (hexadecimal)

Range: Addresses run from 0 to 64K.

Contains a start address (aH x 256 + aL) and count (cH x 256 + cL) of binary bytes to load into the selected sector, followed by that many bytes. The start address is relative to the start of the sector. Addresses run from 0 to 64K.

The printer may return one of several responses. ACK means that the data was written correctly and the host should transmit the next block. NAK means that, for some reason, the data was not written correctly. This could mean that communications failed or that the write to flash failed. The alternatives seem to be to retry the block or halt loading and assume a hardware failure.

Related information

Available only in download mode.

Download paper type description (ColorPOS™)

ASCII	GS 0x8E *nL nH d1 … dn*
Hexadecimal	1D 8E *m nL nH d1… dn*
Decimal	29 142 *nL nH d1 … dn*

This command will store in flash memory a paper type description identified by the structure in *d1..dn*, adding the uniquely (by type category and version) identified structure for subsequent use by the set paper type command. *nL+ nH *256* define the number of bytes *x* that follow. These bytes contain the proprietary structure and CRC to operate the thermal print head. This structure contains the hardware parameter values needed to print on formulations of monochrome and 2-color thermal papers. New paper definitions should be obtained from trusted sources such as the Axiohm web site in order to optimize print quality while preventing premature head burnout or other damaging effects.

New definitions do not change any which had already been set. If an immediate effect is desired, follow up this command with a set paper type *m n* (where *m n* are bytes 0 and 1 of the description). Once stored in flash memory, this paper type, selectable by ID *m n*, remains a valid choice by the set paper type command until firmware flash memory is erased.

Restrictions: If the value of *m n* = 0 0, then the command will be ignored. It is thus impossible to overwrite the default monochrome paper setting. This command will be ignored if the head type - carried in the description *(d1…dx)* - is incompatible with the head type in the printer itself or if a description with ID *m n* already exists.

There is room in firmware flash memory for a maximum of 16 paper type descriptions; of these one is reserved for monochrome descriptions, with m n =0 0 description that is always populated, and factory preload of two color descriptions. Thus 13 remaining spaces are free for dynamic use; once these are used up further download paper type descriptions will be ignored, and a firmware reload will be necessary to again free up (except for m n = 0 0) the paper type description space.

Return paper type description (ColorPOS™)

ASCII	GS Ox8F *m*
Hexadecimal	1D 8F *m*
Decimal	29 143 *m*

Value and range of *m*:   *m* is the paper type index, (0< = *m*< = 15)

This command will return from flash memory a paper type description indexed by *m*, (0<=m<=15) sending back the data sequence used in the download paper type description command, i.e. the return is *1D 8F m nL nH (d1…dn)* which was stored in slot *m*; or a value of n = 0 if slot *m* does not have a description stored. *m* = 0 x ff asks for a return of the current paper type. For all valid descriptions, the last two bytes will be a CRC value and the first 24 bytes will be as follows:

# Bytes	Offset	Definition
1	0	Manufacturer paper type category
1	1	Version in type category
1	2	Printhead type
1	3	Structure format type
20	4	Descriptive name as a null terminated ASCII string

Reset firmware

ASCII	GS (SPACE)
Hexadecimal	1D FF
Decimal	29 255

Reboots the printer.

Appendix A:
Commands listed by hexadecimal code

By command code

Note: Bold commands are new two-color, (ColorPOS ™) commands.

Code (hexadecimal)	Command	Page
09	Horizontal tab	46
0A	Print and feed paper one line	43
0C	Print and return to standard mode	95
0D	Print and carriage return	43
10	Clear printer	36
10 04 *n*	Real time status transmission (DLE sequence)	84
10 05 *n*	Real time request to printer (DLE sequence)	85
12	Select double-wide characters	52
13	Select single-wide characters	52
14 *n*	Feed *n* print lines	43
15 *n*	Feed *n* dot rows	43
16 *n*	Add *n* extra dot rows	44
17	Print	44
18	Cancel print data in page mode	95
19	Perform full knife cut (or code 1B 69)	36
1A	Perform partial knife cut (or code 1B 6D)	37
1B (+*.BMP)	Download BMP logo (where +*.BMP is the data from the file, not the filename.)	63
1B 07	Generate tone	37
1B 0C	Print data in page mode	95
1B 12	Select 90 degree counter-clockwise rotated print	52
1B 14 *n*	Set column	46
1B 16 *n*	Select pitch (column width)	53

Appendix A: Commands by hexadecimal code

Code (hexadecimal)	Command	Page
1B 20 *n*	Set right-side character spacing	53
1B 21 *n*	Select print mode	54
1B 24 *n*L *n*H	Set absolute starting position	47
1B 25 *n*	Select or cancel user-defined character set	54
1B 26 *s c1 c2 n1 d1...nn dn*	Define user-defined character set	55
1B 27 *m a0 a1 a2 d1 ... dm*	Write to user data storage	101
1B 2A *m n1 n2 d1...dn*	Select bit image mode	64
1B 2D *n*	Select or cancel underline mode	53
1B 2E *m n rL rH d1 ... dn*	Print advanced raster graphics	65
1B 32	Set vertical line spacing to 1/6 inch	47
1B 33 *n*	Set vertical line spacing	48
1B 34 *m a0 a1 a2*	Read from user data storage	101
1B 3A 30 30 30	Copy character set from ROM to RAM	56
1B 3D *n*	Select peripheral device (for multi-drop)	37
1B 3F *n*	Cancel user-defined character	56
1B 40	Initialize printer	37
1B 44 [*n*] *k* 00	Set horizontal tab positions	48
1B 45 *n*	Select or cancel emphasized mode	56
1B 47 *n*	Select or cancel double strike	57
1B 49 *n*	Select or cancel italic print	57
1B 4A *n*	Print and feed paper	45
1B 4B *n1 n2 d1...dn*	Select single-density graphics	65
1B 4C	Select page mode	96
1B 52 *n*	Select international character code	58
1B 53	Select standard mode	96

Code (hexadecimal)	Command	Page
1B 54 *n*	Select print direction in page mode	97
1B 56 *n*	Select or cancel 90 degree clockwise rotated print	58
1B 57 *n1, n2...n8*	Set print area in page mode	98
1B 59 *n1 n2 d1...dn*	Select double-density graphics	66
1B 5B 7D	Switch to flash download mode	105
1B 5C *n1 n2*	Set relative print position	49
1B 61 *n*	Select justification	50
1B 63 33 *n*	Select paper sensors to output paper end signals (parallel only)	38
1B 63 34 *n*	Select sensors to stop printing	38
1B 63 35 *n*	Enable or disable panel button	39
1B 64 *n*	Print and feed *n* lines	45
1B 69	Perform full knife cut (or code 19)	36
1B 6A *k*	Read from non-volatile memory (NVRAM)	101
1B 6D	Perform partial knife cut (or code 1A)	37
1B 70 *n p1 p2*	Generate pulse to open cash drawer	39
1B 72 m	Set current color	40
1B 73 *n1 n2 k*	Write to non-volatile memory (NVRAM)	101
1B 74 *n*	Select international character set	59
1B 75 0	Transmit peripheral device status (RS-232C printers only)	75
1B 75 *n*	Request alternate status (A793 emulation only)	75
1B 76	Transmit paper sensor status	76
1B 7B *n*	Select or cancel upside down print mode	59
1D 00	Return boot sector firmware part number	106
1D 01	Return segment number status of flash memory	106
1D 02 *nn*	Select flash memory sector to download	106

Appendix A: Commands by hexadecimal code

Code (hexadecimal)	Command	Page
1D 03 *n*	Real time request to printer (GS sequence)	85
1D 04 *n*	Real time status transmission (GS sequence)	84
1D 05	Real time printer status transmission	86
1D 06	Get firmware CRC	106
1D 07	Return micro processor CRC	107
1D 0E	Erase all flash contents except boot sector	107
1D 0F	Return main program flash CRC	107
1D 10 *n*	Erase selected flash sector	107
1D 11 *aL aH cL cH d1...dn*	Download to active flash sector	108
1D 21 *n*	Select character size	60
1D 22 *n*	Select memory type (SRAM/Flash) where to save logos or user-defined fonts	102
1D 22 55 *n1 n2*	Flash memory user sectors allocation	102
1D 23 *n*	Select the current logo (downloaded bit image)	66
1D 24 *nL nH*	Set absolute vertical print position in page mode	99
1D 2A *n1 n2 d1...dn*]	Define downloaded bit image	67
1D 2F *m*	Print downloaded bit image	68
1D 3A	Select or cancel macro definition	100
1D 40 *n*	Erase user flash sector	103
1D 42 *n*	Select or cancel white/black reverse print mode	61
1D 48 *n*	Select printing position of HRI characters	90
1D 49 *n*	Transmit printer ID	77
1D 49 40 *n*	Transmit printer ID, remote diagnostics extension	78
1D 4C *nL nH*	Set left margin	50
1D 50 *x y*	Set horizontal and vertical minimum motion units	46
1D 56 *m*	Select cut mode and cut paper (or code 1D 56 *m n*)	40

Code (hexadecimal)	Command	Page
1D 56 *m n*	Select cut mode and cut paper (or code 1D 56 *m*)	40
1D 57 *nL nH*	Set printing area width	51
1D 5C *nL nH*	Set relative vertical print position in page mode	99
1D 5E *r t m*	Execute macro	100
1D 61 *n*	Select or cancel unsolicited status mode	87
1D 62 *n*	Select or cancel smoothing mode	61
1D 66 *n*	Select pitch of HRI characters	90
1D 68 *n*	Select bar code height	90
1D 6B *m d1...dk* 00 or 1D 6B *m n d1...dn*	Print bar code Print bar code	91
1D 70 *a b c d e f*	Select PDF 417 parameters	93
1D 72 *n*	Transmit status	80
1D 77 *n*	Select bar code width	94
1D 81 m n	**Set paper type (for 2-color printing)**	**41**
1D 82 n1…n72 or … n80	**Print raster monochrome graphics**	**68**
1D 83 n1…n144 or … n160	**Print raster color graphics**	**69**
1D 84 m n1 n2 d1...dx	**Download logo image**	**69**
1D 85 m n	**Reverse color text mode (2-color)**	**61**
1D 86 m	**Monochrome shade mode**	**71**
1D 87 m	**Color shade mode**	**71**
1D 89 n m	**Logo print with color plane swap**	**71**
1D 8B n m o	**Apply shading to logo**	**70**
1D 8C n m	**Merge watermark mode**	**70**
1D 8D n m	**Text strike-through mode**	**62**
1D 8E *nL nH d1 ... dn*	**Download paper type description**	**108**
1D 8F *m*	**Return paper type description**	**109**
1D 90 *m x y o p q*	**Form and merge real time surround graphic**	**72**

Appendix A: Commands by hexadecimal code

Code (hexadecimal)	Command	
1D 91 *n*	**Save graghics buffer as logo**	**72**
1D 92 *n*	**Background logo print mode**	**73**
1D 97 *m n*	**User storage status**	**104**
1D FF	Reset firmware	109
1F 04 *n*	Convert 6 dots/mm bitmap to 8 dots/mm bitmap	73
1F 05 *n*	Select superscript or subscript modes	62
1F 56	Send printer software version	82
1F 74	Print test form	42

Appendix B:
Resident Character Sets

Character sets

Code page 437 (US)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
(0)	(16)	SP (32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	á (160)	▓ (176)	└ (192)	╨ (208)	∝ (224)	≡ (240)
01 (1)	11 (17)	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ü (129)	æ (145)	í (161)	▒ (177)	┴ (193)	╤ (209)	β (225)	± (241)
02 (2)	12 (18)	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	é (130)	Æ (146)	ó (162)	▓ (178)	┬ (194)	╥ (210)	Γ (226)	≥ (242)
03 (3)	13 (19)	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	╙ (211)	π (227)	≤ (243)
04 (4)	14 (20)	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ä (132)	ö (148)	ñ (164)	┤ (180)	─ (196)	╘ (212)	Σ (228)	⌠ (244)
05 (5)	15 (21)	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	à (133)	ò (149)	Ñ (165)	╡ (181)	┼ (197)	╒ (213)	σ (229)	⌡ (245)
06 (6)	16 (22)	& (38)	6 (54)	F (70)	V (86)	f (102)	v (118)	å (134)	û (150)	ª (166)	╢ (182)	╟ (198)	╓ (214)	µ (230)	÷ (246)
07 (7)	17 (23)	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ç (135)	ù (151)	º (167)	╖ (183)	╞ (199)	╫ (215)	τ (231)	≈ (247)
08 (8)	18 (24)	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ê (136)	ÿ (152)	¿ (168)	╕ (184)	╚ (200)	╪ (216)	Φ (232)	° (248)
09 (9)	19 (25)	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	ë (137)	Ö (153)	⌐ (169)	╣ (185)	╔ (201)	┘ (217)	Θ (233)	● (249)
0A (10)	1A (26)	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	è (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Ω (234)	· (250)
0B (11)	1B (27)	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	ï (139)	¢ (155)	½ (171)	╗ (187)	╦ (203)	█ (219)	δ (235)	√ (251)
0C (12)	1C (28)	, (44)	< (60)	L (76)	\ (92)	l (108)	| (124)	î (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	∞ (236)	ⁿ (252)
0D (13)	1D (29)	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	ì (141)	¥ (157)	¡ (173)	╜ (189)	═ (205)	▌ (221)	Ø (237)	² (253)
0E (14)	1E (30)	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	Ä (142)	Pt (158)	« (174)	╛ (190)	╬ (206)	▐ (222)	ε (238)	■ (254)
0F (15)	1F (31)	/ (47)	? (63)	O (79)	_ (95)	o (111)	DEL △ (127)	Å (143)	ƒ (159)	» (175)	┐ (191)	╧ (207)	▀ (223)	∩ (239)	BLANK (255)

Code page 737 (Greek)

00	10	20 SP (32)	30 0 (48)	40 @ (64)	50 P (80)	60 ` (96)	70 p (112)	80 A (128)	90 P (144)	A0 ι (160)	B0 ⠿ (176)	C0 └ (192)	D0 ⊥ (208)	E0 ω (224)	F0 'Ω (240)
01 (1)	11 (17)	21 ! (33)	31 1 (49)	41 A (65)	51 Q (81)	61 a (97)	71 q (113)	81 B (129)	91 Σ (145)	A1 κ (161)	B1 ▒ (177)	C1 ⊥ (193)	D1 ╤ (209)	E1 ä (225)	F1 ± (241)
02 (2)	12 (18)	22 " (34)	32 2 (50)	42 B (66)	52 R (82)	62 b (98)	72 r (114)	82 Γ (130)	92 T (146)	A2 λ (162)	B2 ▓ (178)	C2 ┬ (194)	D2 ╥ (210)	E2 έ (226)	F2 ≥ (242)
03 (3)	13 (19)	23 # (35)	33 3 (51)	43 C (67)	53 S (83)	63 c (99)	73 s (115)	83 Δ (131)	93 Y (147)	A3 μ (163)	B3 │ (179)	C3 ├ (195)	D3 ⊥ (211)	E3 ή (227)	F3 ≤ (243)
04 (4)	14 (20)	24 $ (36)	34 4 (52)	44 D (68)	54 T (84)	64 d (100)	74 t (116)	84 E (132)	94 φ (148)	A4 ν (164)	B4 ┤ (180)	C4 ─ (196)	D4 ⊩ (212)	E4 ϊ (228)	F4 Ϊ (244)
05 (5)	15 (21)	25 % (37)	35 5 (53)	45 E (69)	55 U (85)	65 e (101)	75 u (117)	85 Z (133)	95 X (149)	A5 ξ (165)	B5 ╡ (181)	C5 ┼ (197)	D5 ╒ (213)	E5 ί (229)	F5 Ÿ (245)
06 (6)	16 (22)	26 & (38)	36 6 (54)	46 F (70)	56 V (86)	66 f (103)	76 v (118)	86 H (134)	96 Ψ (150)	A6 o (166)	B6 ╢ (182)	C6 ╞ (198)	D6 ╓ (214)	E6 ό (230)	F6 ÷ (246)
07 (7)	17 (23)	27 ' (39)	37 7 (55)	47 G (71)	57 W (87)	67 g (103)	77 w (119)	87 Θ (135)	97 Ω (151)	A7 π (167)	B7 ╖ (183)	C7 ╟ (199)	D7 ╫ (215)	E7 ύ (231)	F7 ≈ (247)
08 (8)	18 (24)	28 ((40)	38 8 (56)	48 H (72)	58 X (88)	68 h (104)	78 x (120)	88 I (136)	98 ∝ (152)	A8 ρ (168)	B8 ╕ (184)	C8 ╚ (200)	D8 ╪ (216)	E8 ϋ (232)	F8 ° (248)
09 (9)	19 (25)	29) (41)	39 9 (57)	49 I (73)	59 Y (89)	69 i (105)	79 y (121)	89 K (137)	99 β (153)	A9 σ (169)	B9 ╣ (185)	C9 ╔ (201)	D9 ┘ (217)	E9 ώ (233)	F9 • (249)
0A (10)	1A (26)	2A * (42)	3A : (58)	4A J (74)	5A Z (90)	6A j (106)	7A z (122)	8A Λ (138)	9A γ (154)	AA ς (170)	BA ║ (186)	CA ╩ (202)	DA ┌ (218)	EA 'A (234)	FA • (250)
0B (11)	1B (27)	2B + (43)	3B ; (59)	4B K (75)	5B [(91)	6B k (107)	7B { (123)	8B M (139)	9B δ (155)	AB τ (171)	BB ╗ (187)	CB ╦ (203)	DB █ (219)	EB 'E (235)	FB √ (251)
0C (12)	1C (28)	2C , (44)	3C < (60)	4C L (76)	5C \ (92)	6C l (108)	7C	(124)	8C N (140)	9C ε (156)	AC υ (172)	BC ╝ (188)	CC ╠ (204)	DC ▄ (220)	EC 'H (236)	FC ⁿ (252)
0D (13)	1D (29)	2D - (45)	3D = (61)	4D M (77)	5D] (93)	6D m (109)	7D } (125)	8D Ξ (141)	9D ζ (157)	AD φ (173)	BD ╜ (189)	CD ═ (205)	DD ▌ (221)	ED 'I (237)	FD ² (253)
0E (14)	1E (30)	2E . (46)	3E > (62)	4E N (78)	5E ^ (94)	6E n (110)	7E ~ (126)	8E O (142)	9E η (158)	AE X (174)	BE ╛ (190)	CE ╬ (206)	DE ▐ (222)	EE 'O (238)	FE ■ (254)
0F (15)	1F (31)	2F / (47)	3F ? (63)	4F O (79)	5F _ (95)	6F o (111)	7F △ DEL (127)	8F Π (143)	9F θ (159)	AF ψ (175)	BF ┐ (191)	CF ╧ (207)	DF ▀ (223)	EF 'Y (239)	FF BLANK (255)

Code page 850 (Multilingual)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
(0)	(16)	(32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	á (160)	▦ (176)	└ (192)	ð (208)	Ó (224)	– (240)
(1)	(17)	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ü (129)	æ (145)	í (161)	▒ (177)	⊥ (193)	Ð (209)	ß (225)	± (241)
(2)	(18)	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	é (130)	Æ (146)	ó (162)	▓ (178)	┬ (194)	Ê (210)	Ô (226)	= (242)
(3)	(19)	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	Ë (211)	Ò (227)	¾ (243)
(4)	(20)	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ä (132)	ö (148)	ñ (164)	┤ (180)	─ (196)	È (212)	õ (228)	¶ (244)
(5)	(21)	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	à (133)	ò (149)	Ñ (165)	Á (181)	┼ (197)	ı (213)	Õ (229)	§ (245)
(6)	(22)	& (38)	6 (54)	F (70)	V (86)	f (102)	v (118)	å (134)	û (150)	ª (166)	Â (182)	ã (198)	Í (214)	µ (230)	÷ (246)
(7)	(23)	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ç (135)	ù (151)	º (167)	À (183)	Ã (199)	Î (215)	þ (231)	¸ (247)
(8)	(24)	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ê (136)	ÿ (152)	¿ (168)	© (184)	╚ (200)	Ï (216)	Þ (232)	° (248)
(9)	(25)	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	ë (137)	Ö (153)	® (169)	╣ (185)	╔ (201)	┘ (217)	Ú (233)	¨ (249)
(10)	(26)	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	è (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Û (234)	· (250)
(11)	(27)	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	ï (139)	ø (155)	½ (171)	┐ (187)	╦ (203)	█ (219)	Ù (235)	¹ (251)
(12)	(28)	, (44)	< (60)	L (76)	\ (92)	l (108)	| (124)	î (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	ý (236)	³ (252)
(13)	(29)	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	ì (141)	Ø (157)	¡ (173)	¢ (189)	═ (205)	▌ (221)	Ý (237)	² (253)
(14)	(30)	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	Ä (142)	× (158)	« (174)	¥ (190)	╬ (206)	Ì (222)	¯ (238)	■ (254)
(15)	(31)	/ (47)	? (63)	O (79)	_ (95)	o (111)	△ (127)	Å (143)	ƒ (159)	» (175)	┐ (191)	¤ (207)	▀ (223)	´ (239)	(255)

Code page 852 (Slavic)

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	(0)	(16)	(32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	á (160)	░ (176)	└ (192)	ð (208)	Ó (224)	(240)
1	(1)	(17)	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ü (129)	Ĺ (145)	í (161)	▒ (177)	┴ (193)	Đ (209)	ß (225)	˝ (241)
2	(2)	(18)	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	é (130)	Í (146)	ó (162)	▓ (178)	┬ (194)	Ď (210)	Ô (226)	˛ (242)
3	(3)	(19)	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	Ë (211)	Ń (227)	ˇ (243)
4	(4)	(20)	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ä (132)	ö (148)	Ą (164)	┤ (180)	─ (196)	ď (212)	ń (228)	ˆ (244)
5	(5)	(21)	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	ů (133)	Ľ (149)	ą (165)	Á (181)	┼ (197)	Ň (213)	ň (229)	§ (245)
6	(6)	(22)	& (38)	6 (54)	F (70)	V (86)	f (102)	v (118)	ć (134)	ˇ (150)	Ž (166)	Â (182)	Ă (198)	Í (214)	Š (230)	÷ (246)
7	(7)	(23)	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ç (135)	Ś (151)	ž (167)	Ě (183)	ă (199)	Î (215)	š (231)	¸ (247)
8	(8)	(24)	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ł (136)	ś (152)	Ę (168)	Ş (184)	╚ (200)	ě (216)	Ŕ (232)	° (248)
9	(9)	(25)	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	ë (137)	Ö (153)	ę (169)	╣ (185)	╔ (201)	┘ (217)	Ú (233)	¨ (249)
A	(10)	(26)	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	Ő (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	ŕ (234)	· (250)
B	(11)	(27)	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	ő (139)	Ť (155)	ź (171)	╗ (187)	╦ (203)	█ (219)	Ű (235)	ű (251)
C	(12)	(28)	, (44)	< (60)	L (76)	\ (92)	l (108)		(124)	î (140)	ť (156)	Č (172)	╝ (188)	╠ (204)	▄ (220)	ý (236)	Ř (252)
D	(13)	(29)	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	Ź (141)	Ł (157)	ş (173)	Ż (189)	= (205)	Ţ (221)	Ý (237)	ř (253)
E	(14)	(30)	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	Ä (142)	× (158)	« (174)	ż (190)	╬ (206)	Ů (222)	ţ (238)	■ (254)
F	(15)	(31)	/ (47)	? (63)	O (79)	_ (95)	o (111)	△ (127)	Ć (143)	č (159)	» (175)	┐ (191)	¤ (207)	▀ (223)	´ (239)	(255)

Code page 858 (with Eurosymbol)

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	(0)	(16)	(32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	á (160)	░ (176)	└ (192)	ð (208)	Ó (224)	– (240)
1	(1)	(17)	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ü (129)	æ (145)	í (161)	▒ (177)	┴ (193)	Ð (209)	ß (225)	± (241)
2	(2)	(18)	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	é (130)	Æ (146)	ó (162)	▓ (178)	┬ (194)	Ê (210)	Ô (226)	= (242)
3	(3)	(19)	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	Ë (211)	Ò (227)	¾ (243)
4	(4)	(20)	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ä (132)	ö (148)	ñ (164)	┤ (180)	─ (196)	È (212)	õ (228)	¶ (244)
5	(5)	(21)	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	à (133)	ò (149)	Ñ (165)	Á (181)	┼ (197)	€ (213)	Õ (229)	§ (245)
6	(6)	(22)	& (38)	6 (54)	F (70)	V (86)	f (103)	v (118)	å (134)	û (150)	ª (166)	Â (182)	ã (198)	Í (214)	µ (230)	÷ (246)
7	(7)	(23)	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ç (135)	ù (151)	º (167)	À (183)	Ã (199)	Î (215)	þ (231)	¸ (247)
8	(8)	(24)	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ê (136)	ÿ (152)	¿ (168)	© (184)	╚ (200)	Ï (216)	Þ (232)	° (248)
9	(9)	(25)	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	ë (137)	Ö (153)	® (169)	╣ (185)	╔ (201)	┘ (217)	Ú (233)	¨ (249)
A	(10)	(26)	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	è (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Û (234)	· (250)
B	(11)	(27)	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	ï (139)	ø (155)	½ (171)	╗ (187)	╦ (203)	█ (219)	Ù (235)	¹ (251)
C	(12)	(28)	, (44)	< (60)	L (76)	\ (92)	l (108)		(124)	î (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	ý (236)	³ (252)
D	(13)	(29)	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	ì (141)	Ø (157)	¡ (173)	¢ (189)	═ (205)	¦ (221)	Ý (237)	² (253)
E	(14)	(30)	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	Ä (142)	× (158)	« (174)	¥ (190)	╬ (206)	Ì (222)	¯ (238)	■ (254)
F	(15)	(31)	/ (47)	? (63)	O (79)	_ (95)	o (111)	△ (127)	Å (143)	ƒ (159)	» (175)	┐ (191)	¤ (207)	▀ (223)	´ (239)	(255)

Code page 860 (Portuguese)

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	NUL		SP	0	@	P	`	p	Ç	É	á	▦	└	╨	α	≡
1		XON	!	1	A	Q	a	q	ü	À	í	▒	┴	╤	β	±
2			"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥
3		XOFF	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4			$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8			(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	φ	°
9			)	9	I	Y	i	y	Ê	Õ	Ò	╣	╔	┘	Θ	•
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	•
B		ESC	+	;	K	[	k	{	Í	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	|	Ô	£	¼	╝	╠	▄	∞	ⁿ
D	CR	GS	-	=	M	]	m	}	ì	Ù	¡	╜	=	▌	∅	²
E			.	>	N	^	n	~	Ã	Pt	«	╛	╬	▐	ε	■
F			/	?	O	_	o	SP	Â	Ó	»	┐	╧	▀	∩	▪

Code page 862 (Hebrew)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	0 (48)	@ (64)	P (80)	` (96)	p (112)	א (128)	נ (144)	á (160)	░ (176)	└ (192)	⊥ (208)	∝ (224)	≡ (240)
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
1	17	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ב (129)	ס (145)	í (161)	▒ (177)	┴ (193)	╥ (209)	β (225)	± (241)
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	ג (130)	ע (146)	ó (162)	▓ (178)	┬ (194)	╨ (210)	Γ (226)	≥ (242)
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	ד (131)	ף (147)	ú (163)	│ (179)	├ (195)	╙ (211)	π (227)	≤ (243)
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ה (132)	פ (148)	ñ (164)	┤ (180)	─ (196)	╘ (212)	Σ (228)	⌠ (244)
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	ו (133)	ץ (149)	Ñ (165)	╡ (181)	┼ (197)	╒ (213)	σ (229)	⌡ (245)
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	& (38)	6 (54)	F (70)	V (86)	f (103)	v (118)	ז (134)	צ (150)	ª (166)	╢ (182)	╞ (198)	╓ (214)	μ (230)	÷ (246)
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ח (135)	ק (151)	º (167)	╖ (183)	╟ (199)	╫ (215)	τ (231)	≈ (247)
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ט (136)	ר (152)	¿ (168)	╕ (184)	╚ (200)	╪ (216)	Φ (232)	° (248)
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	י (137)	ש (153)	⌐ (169)	╣ (185)	╔ (201)	┘ (217)	Θ (233)	• (249)
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	ך (138)	ת (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Ω (234)	· (250)
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	כ (139)	¢ (155)	½ (171)	╗ (187)	╦ (203)	█ (219)	δ (235)	√ (251)
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	, (44)	< (60)	L (76)	\ (92)	l (108)	| (124)	ל (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	∞ (236)	ⁿ (252)
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	ם (141)	¥ (157)	¡ (173)	╜ (189)	═ (205)	▌ (221)	∅ (237)	² (253)
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	מ (142)	Pt (158)	« (174)	╛ (190)	╬ (206)	▐ (222)	ε (238)	■ (254)
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	/ (47)	? (63)	O (79)	_ (95)	o (111)	△ (127)	ן (143)	ƒ (159)	¤ (175)	┐ (191)	╧ (207)	▀ (223)	∩ (239)	(255)

Code page 863 (French Canadian)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
NUL (0)	(16)	SP (32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	¦ (160)	▓ (176)	└ (192)	⊥ (208)	α (224)	≡ (240)
01	11 XON (17)	21 ! (33)	31 1 (49)	41 A (65)	51 Q (81)	61 a (97)	71 q (113)	81 ü (129)	91 È (145)	A1 ' (161)	B1 ▒ (177)	C1 ⊥ (193)	D1 ╤ (209)	E1 β (225)	F1 ± (241)
02 (2)	12 (18)	22 " (34)	32 2 (50)	42 B (66)	52 R (82)	62 b (98)	72 r (114)	82 é (130)	92 Ê (146)	A2 ó (162)	B2 ▓ (178)	C2 ╤ (194)	D2 ╥ (210)	E2 Γ (226)	F2 ≥ (242)
03 (3)	13 XOFF (19)	23 # (35)	33 3 (51)	43 C (67)	53 S (83)	63 c (99)	73 s (115)	83 â (131)	93 ô (147)	A3 ú (163)	B3 │ (179)	C3 ├ (195)	D3 ╙ (211)	E3 π (227)	F3 ≤ (243)
04 (4)	14 (20)	24 $ (36)	34 4 (52)	44 D (68)	54 T (84)	64 d (100)	74 t (116)	84 Â (132)	94 Ë (148)	A4 ¨ (164)	B4 ┤ (180)	C4 ─ (196)	D4 ╘ (212)	E4 Σ (228)	F4 ⌠ (244)
05 (5)	15 (21)	25 % (37)	35 5 (53)	45 E (69)	55 U (85)	65 e (101)	75 u (117)	85 à (133)	95 Ï (149)	A5 ¸ (165)	B5 ╡ (181)	C5 ┼ (197)	D5 ╒ (213)	E5 σ (229)	F5 ⌡ (245)
06 (6)	16 (22)	26 & (38)	36 6 (54)	46 F (70)	56 V (86)	66 f (103)	76 v (118)	86 ¶ (134)	96 û (150)	A6 ³ (166)	B6 ╢ (182)	C6 ╞ (198)	D6 ╓ (214)	E6 µ (230)	F6 ÷ (246)
07 (7)	17 (23)	27 ' (39)	37 7 (55)	47 G (71)	57 W (87)	67 g (103)	77 w (119)	87 ç (135)	97 ù (151)	A7 ‗ (167)	B7 ╖ (183)	C7 ╟ (199)	D7 ╫ (215)	E7 τ (231)	F7 ≈ (247)
08 (8)	18 (24)	28 ((40)	38 8 (56)	48 H (72)	58 X (88)	68 h (104)	78 x (120)	88 ê (136)	98 ¤ (152)	A8 Î (168)	B8 ╕ (184)	C8 ╚ (200)	D8 ╪ (216)	E8 φ (232)	F8 ° (248)
09 (9)	19 (25)	29) (41)	39 9 (57)	49 I (73)	59 Y (89)	69 i (105)	79 y (121)	89 ë (137)	99 Ô (153)	A9 ⌐ (169)	B9 ╣ (185)	C9 ╔ (201)	D9 ┘ (217)	E9 Θ (233)	F9 • (249)
0A LF (10)	1A (26)	2A * (42)	3A : (58)	4A J (74)	5A Z (90)	6A j (106)	7A z (122)	8A è (138)	9A Ü (154)	AA ¬ (170)	BA ║ (186)	CA ╩ (202)	DA ┌ (218)	EA Ω (234)	FA · (250)
0B (11)	1B ESC (27)	2B + (43)	3B ; (59)	4B K (75)	5B [(91)	6B k (107)	7B { (123)	8B ï (139)	9B ¢ (155)	AB ½ (171)	BB ╗ (187)	CB ╦ (203)	DB █ (219)	EB δ (235)	FB √ (251)
0C (12)	1C (28)	2C , (44)	3C < (60)	4C L (76)	5C \ (92)	6C l (108)	7C	(124)	8C î (140)	9C £ (156)	AC ¼ (172)	BC ╝ (188)	CC ╠ (204)	DC ▄ (220)	EC ∞ (236)	FC n (252)
0D CR (13)	1D GS (29)	2D - (45)	3D = (61)	4D M (77)	5D] (93)	6D m (109)	7D } (125)	8D = (141)	9D ù (157)	AD ¾ (173)	BD ╜ (189)	CD = (205)	DD █ (221)	ED ∅ (237)	FD ² (253)
0E (14)	1E (30)	2E . (46)	3E > (62)	4E N (78)	5E ^ (94)	6E n (110)	7E ~ (126)	8E À (142)	9E Û (158)	AE « (174)	BE ╛ (190)	CE ╬ (206)	DE █ (222)	EE ε (238)	FE ■ (254)
0F (15)	1F (31)	2F / (47)	3F ? (63)	4F O (79)	5F _ (95)	6F o (111)	7F SP (127)	8F § (143)	9F ƒ (159)	AF » (175)	BF ╗ (191)	CF ╧ (207)	DF ▀ (223)	EF ∩ (239)	FF (255)

Code page 865 (Nordic)

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	(0)	(16)	(32)	0 (48)	@ (64)	P (80)	` (96)	p (112)	Ç (128)	É (144)	á (160)	▓ (176)	└ (192)	⊥ (208)	∝ (224)	≡ (240)
1	(1)	(17)	! (33)	1 (49)	A (65)	Q (81)	a (97)	q (113)	ü (129)	æ (145)	í (161)	▒ (177)	⊥ (193)	╤ (209)	β (225)	± (241)
2	(2)	(18)	" (34)	2 (50)	B (66)	R (82)	b (98)	r (114)	é (130)	Æ (146)	ó (162)	▓ (178)	┬ (194)	╥ (210)	Γ (226)	≥ (242)
3	(3)	(19)	# (35)	3 (51)	C (67)	S (83)	c (99)	s (115)	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	╙ (211)	π (227)	≤ (243)
4	(4)	(20)	$ (36)	4 (52)	D (68)	T (84)	d (100)	t (116)	ä (132)	ö (148)	ñ (164)	┤ (180)	─ (196)	╘ (212)	Σ (228)	⌠ (244)
5	(5)	(21)	% (37)	5 (53)	E (69)	U (85)	e (101)	u (117)	à (133)	ò (149)	Ñ (165)	╡ (181)	┼ (197)	╒ (213)	σ (229)	⌡ (245)
6	(6)	(22)	& (38)	6 (54)	F (70)	V (86)	f (103)	v (118)	å (134)	û (150)	ª (166)	╢ (182)	╞ (198)	╓ (214)	µ (230)	÷ (246)
7	(7)	(23)	' (39)	7 (55)	G (71)	W (87)	g (103)	w (119)	ç (135)	ù (151)	º (167)	╖ (183)	╟ (199)	╫ (215)	τ (231)	≈ (247)
8	(8)	(24)	((40)	8 (56)	H (72)	X (88)	h (104)	x (120)	ê (136)	ÿ (152)	¿ (168)	╕ (184)	╚ (200)	╪ (216)	φ (232)	° (248)
9	(9)	(25)	) (41)	9 (57)	I (73)	Y (89)	i (105)	y (121)	ë (137)	Ö (153)	⌐ (169)	╣ (185)	╔ (201)	┘ (217)	Θ (233)	● (249)
A	(10)	(26)	* (42)	: (58)	J (74)	Z (90)	j (106)	z (122)	è (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Ω (234)	· (250)
B	(11)	(27)	+ (43)	; (59)	K (75)	[(91)	k (107)	{ (123)	ï (139)	ø (155)	½ (171)	╗ (187)	╦ (203)	█ (219)	δ (235)	√ (251)
C	(12)	(28)	, (44)	< (60)	L (76)	\ (92)	l (108)	| (124)	î (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	∞ (236)	n (252)
D	(13)	(29)	- (45)	= (61)	M (77)	] (93)	m (109)	} (125)	ì (141)	Ø (157)	¡ (173)	╜ (189)	═ (205)	█ (221)	∅ (237)	² (253)
E	(14)	(30)	. (46)	> (62)	N (78)	^ (94)	n (110)	~ (126)	Ä (142)	Pt (158)	« (174)	╛ (190)	╬ (206)	█ (222)	ε (238)	■ (254)
F	(15)	(31)	/ (47)	? (63)	O (79)	_ (95)	o (111)	△ (127)	Å (143)	ƒ (159)	¤ (175)	┐ (191)	╧ (207)	▀ (223)	∩ (239)	(255)

Appendix B: Resident Character Sets

Code page 866 (Cyrillic)

	00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0				0	@	P	`	p	А	Р	а	░	└	╨	р	Ё
1			!	1	A	Q	a	q	Б	С	б	▒	┴	╤	с	ё
2			"	2	B	R	b	r	В	Т	в	▓	┬	╥	т	Є
3			#	3	C	S	c	s	Г	У	г	│	├	╙	у	є
4			$	4	D	T	d	t	Д	Ф	д	┤	─	╘	ф	Ї
5			%	5	E	U	e	u	Е	Х	е	╡	┼	╒	х	ї
6			&	6	F	V	f	v	Ж	Ц	ж	╢	╞	╓	ц	Ў
7			'	7	G	W	g	w	З	Ч	з	╖	╟	╫	ч	ў
8			(	8	H	X	h	x	И	Ш	и	╕	╚	╪	ш	°
9			)	9	I	Y	i	y	Й	Щ	й	╣	╔	┘	щ	∙
A			*	:	J	Z	j	z	К	Ъ	к	║	╩	┌	ъ	·
B			+	;	K	[	k	{	Л	Ы	л	╗	╦	█	ы	√
C			,	<	L	\	l	|	М	Ь	м	╝	╠	▄	ь	№
D			-	=	M	]	m	}	Н	Э	н	╜	═	▌	э	¤
E			.	>	N	^	n	~	О	Ю	о	╛	╬	▐	ю	■
F			/	?	O	_	o	△	П	Я	п	┐	╧	▀	я	

Decimal values by column (low nibble 0–F):
- 00–0F: 0–15
- 10–1F: 16–31
- 20–2F: 32–47
- 30–3F: 48–63
- 40–4F: 64–79
- 50–5F: 80–95
- 60–6F: 96–111
- 70–7F: 112–127
- 80–8F: 128–143
- 90–9F: 144–159
- A0–AF: 160–175
- B0–BF: 176–191
- C0–CF: 192–207
- D0–DF: 208–223
- E0–EF: 224–239
- F0–FF: 240–255

Code page 1252 (Windows Latin 1)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
00 0	10 16	20 32	30 `0` 48	40 `@` 64	50 `P` 80	60 `` ` `` 96	70 `p` 112	80 `€` 128	90 Not Used 144	A0 NBSP 160	B0 `°` 176	C0 `À` 192	D0 `Ð` 208	E0 `à` 224	F0 `ð` 240
01 1	11 17	21 `!` 33	31 `1` 49	41 `A` 65	51 `Q` 81	61 `a` 97	71 `q` 113	81 Not Used 129	91 `'` 145	A1 `¡` 161	B1 `±` 177	C1 `Á` 193	D1 `Ñ` 209	E1 `á` 225	F1 `ñ` 241
02 2	12 18	22 `"` 34	32 `2` 50	42 `B` 66	52 `R` 82	62 `b` 98	72 `r` 114	82 `‚` 130	92 `'` 146	A2 `¢` 162	B2 `²` 178	C2 `Â` 194	D2 `Ò` 210	E2 `â` 226	F2 `ò` 242
03 3	13 19	23 `#` 35	33 `3` 51	43 `C` 67	53 `S` 83	63 `c` 99	73 `s` 115	83 `ƒ` 131	93 `"` 147	A3 `£` 163	B3 `³` 179	C3 `Ã` 195	D3 `Ó` 211	E3 `ã` 227	F3 `ó` 243
04 4	14 20	24 `$` 36	34 `4` 52	44 `D` 68	54 `T` 84	64 `d` 100	74 `t` 116	84 `„` 132	94 `"` 148	A4 `¤` 164	B4 `´` 180	C4 `Ä` 196	D4 `Ô` 212	E4 `ä` 228	F4 `ô` 244
05 5	15 21	25 `%` 37	35 `5` 53	45 `E` 69	55 `U` 85	65 `e` 101	75 `u` 117	85 `…` 133	95 `•` 149	A5 `¥` 165	B5 `µ` 181	C5 `Å` 197	D5 `Õ` 213	E5 `å` 229	F5 `õ` 245
06 6	16 22	26 `&` 38	36 `6` 54	46 `F` 70	56 `V` 86	66 `f` 102	76 `v` 118	86 `†` 134	96 `–` 150	A6 `¦` 166	B6 `¶` 182	C6 `Æ` 198	D6 `Ö` 214	E6 `æ` 230	F6 `ö` 246
07 7	17 23	27 `'` 39	37 `7` 55	47 `G` 71	57 `W` 87	67 `g` 103	77 `w` 119	87 `‡` 135	97 `—` 151	A7 `§` 167	B7 `·` 183	C7 `Ç` 199	D7 `×` 215	E7 `ç` 231	F7 `÷` 247
08 8	18 24	28 `(` 40	38 `8` 56	48 `H` 72	58 `X` 88	68 `h` 104	78 `x` 120	88 `ˆ` 136	98 `˜` 152	A8 `¨` 168	B8 `¸` 184	C8 `È` 200	D8 `Ø` 216	E8 `è` 232	F8 `ø` 248
09 9	19 25	29 `)` 41	39 `9` 57	49 `I` 73	59 `Y` 89	69 `i` 105	79 `y` 121	89 `‰` 137	99 `™` 153	A9 `©` 169	B9 `¹` 185	C9 `É` 201	D9 `Ù` 217	E9 `é` 233	F9 `ù` 249
0A 10	1A 26	2A `*` 42	3A `:` 58	4A `J` 74	5A `Z` 90	6A `j` 106	7A `z` 122	8A `Š` 138	9A `š` 154	AA `ª` 170	BA `º` 186	CA `Ê` 202	DA `Ú` 218	EA `ê` 234	FA `ú` 250
0B 11	1B 27	2B `+` 43	3B `;` 59	4B `K` 75	5B `[` 91	6B `k` 107	7B `{` 123	8B `‹` 139	9B `›` 155	AB `«` 171	BB `»` 187	CB `Ë` 203	DB `Û` 219	EB `ë` 235	FB `û` 251
0C 12	1C 28	2C `,` 44	3C `<` 60	4C `L` 76	5C `\` 92	6C `l` 108	7C `|` 124	8C `Œ` 140	9C `œ` 156	AC `¬` 172	BC `¼` 188	CC `Ì` 204	DC `Ü` 220	EC `ì` 236	FC `ü` 252
0D 13	1D 29	2D `-` 45	3D `=` 61	4D `M` 77	5D `]` 93	6D `m` 109	7D `}` 125	8D Not Used 141	9D Not Used 157	AD SHY 173	BD `½` 189	CD `Í` 205	DD `Ý` 221	ED `í` 237	FD `ý` 253
0E 14	1E 30	2E `.` 46	3E `>` 62	4E `N` 78	5E `^` 94	6E `n` 110	7E `~` 126	8E `Ž` 142	9E `ž` 158	AE `®` 174	BE `¾` 190	CE `Î` 206	DE `Þ` 222	EE `î` 238	FE `þ` 254
0F 15	1F 31	2F `/` 47	3F `?` 63	4F `O` 79	5F `_` 95	6F `o` 111	7F `△` 127	8F Not Used 143	9F `Ÿ` 159	AF `¯` 175	BF `¿` 191	CF `Ï` 207	DF `ß` 223	EF `ï` 239	FF `ÿ` 255

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