



# A760 Two-Color Thermal/Impact Hybrid Printer



# User Guide

## Programming Supplement



Includes CognitiveTPG LogoEZ®  
colorization information

Revised 01-08-10

Made under one or more of the following U. S. patents: 4886381, 5579043, 5613787, 5651624, 5713678, 5752779, 5789916, 5800080, 5879090, 5887999, 5975776, 6027266, 6085973, 6089450, 6129465, 6155483, 6404452, 6486902, 6504331, 5749277, 6722754, 6739773, 6784909.

COGNITIVE TPG

## **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 CognitiveTPG immediately.

CognitiveTPG 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 CognitiveTPG. 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 for 55 watt unit; 100-240 Vac, 2.0A, 50/60 Hz, output rate 24 Vdc, 3.125 A for 75 watt unit.

Use of this product with a power supply other than the CognitiveTPG power supply will require you to test the power supply and CognitiveTPG 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 CognitiveTPG 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.

### **Disclaimer**

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<http://www.CognitiveTPG.com>

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# Chapter 1: About this Supplement

## How to use this supplement

This is a supplemental guide providing programming information on CognitiveTPG's A760 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 A760 ColorPOS® Two-Color Thermal Receipt/Impact Hybrid Printer: User Guide.

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

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## Where to find the basics

If you are looking for information on setup or basic operation, refer to the A760 ColorPOS® User Guide. This supplemental guide assumes that you have the A760 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 CognitiveTPG representative for assistance.

If you are having problems with the physical operation of the printer, the A760 ColorPOS® Service Guide, provides in-depth information on diagnostics and service. The A760 ColorPOS® Service Guide is available to qualified service technicians who have been certified by CognitiveTPG to perform advanced procedures.

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## Support

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

For on-line service, refer to the Web site at [www.CognitiveTPG.com](http://www.CognitiveTPG.com) or e-mail to: [support@cognitivetpg.com](mailto:support@cognitivetpg.com).



## Chapter 2: Printer Status, Ethernet and Indicators

The A760 printer performs a number of diagnostics that provide useful information about the operating status of the printer. The following diagnostic tests are available. See page 12 and 13 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 A760 User Guide "Printer configuration" page 30
    - Communication interfaces (except Ethernet)
      - Diagnostic modes
      - RS-232C settings
      - Printer emulations/software options
      - Hardware options

### 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 (page 16) 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 (page 16) 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.)

## Chapter 2: Printer Status, Ethernet and Indicators

Paper type can be changed in the configuration menu. Paper types and grades available:

- Type 0 - Monochrome grades  
Kanzaki P-310
- Type 1 - Two-color grades  
Kanzaki P-310 RB
- Type 4 - Two-color grades  
Kanzaki P-310 BB
- Type 5 - Two-color grades  
Kanzaki P-320 RB

See page 48 and Programming guide for more information.

When the printer is configured for USB and the native USB solution driver is used, this location will show either: "USB Driver Type: TPG, Inc." or "USB Driver Type: Printer Class."

If the RS-232C, USB emulation solution driver is used, nothing is printed here. See User Guide, Appendix A.

```

*** A760 – Diagnostics Form ***
Model number       : A760-1125
Serial number      : A012451679

Boot Firmware
Revision           : V1.03
CRC                : FFDE
P/N                : 189-7600118A

Flash Firmware
Revision           : V1.03
CRC                : 7196
P/N                : 189-7600117A

H/W parameters
Flash Memory Size  : 1 Mbyte
Flash Logos/Fonts  : 320 kbytes
Flash User Storage : 0 kbytes
SRAM Size          : 256 kbytes
Head setting       : D
Paper Type setting : Type 1, Version 0
Color Density Adj  : 100%
Print Density (Mono) : 100%
Max Speed          : 100 mm/sec
Max Power          : 55 W
Alternate Reset    : Disabled
Knife              : Enabled
Paper Low Sensor   : Enabled
MICR               : Enabled
MICR Dual Pass    : Disabled
MICR DC offset    : 80
Check Flip        : 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
Alternative DTR/DSR : Disabled
USB Driver Type   : RS232 Emulation

Resident Code Pages : 437, 850, 852, 858
                   : 860, 863, 865, 866
                   : 1252, 862, 737

Available Paper Types : 00.00 01.00 05.00

Logo(s) defined    : YES
User Char(s) defined : NO
  
```

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

## \*\*\* A760 – Printer Config Menu \*\*\*

This config menu allows you to set general printer parameters

Sub-menus are entered and selections are made using the Paper Feed Button

- short click : Feed Button is quickly depressed then released
- long click : Feed button is held down for more than 1 second then released

**CAUTION!!**

The settings are predetermined in factory and should generally not be changed. If you must change the settings do so carefully to avoid changing other functions.

\*\*\*\*\*

## \*\*\*\*\* 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 -> 6 clicks
- Set Paper Type -> 7 clicks

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

Print test and configuration menu sample 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)

---

## Ethernet terminology and default setup

For the printer to operate with Ethernet, a series of commands must be set within the printer. These commands can only be set through the host computer and are not configurable through the printer configuration menu. See page 20 for the Ethernet setup commands list and page 135+ for command descriptions.

Default setup instructions and sample Ethernet diagnostic printout are on the following page. Note the differences between an Ethernet and a standard RS-232C printout.

---

### Ethernet Terminology

Before making command settings, review the following description of terms to fully understand their intended meaning.

- MAC address** a unique hexadecimal serial number assigned to each Ethernet network device to identify it on the network. Each A760 communication board gets a unique number from CognitiveTPG's assigned range of numbers. CognitiveTPG numbers start with: 00:E0:70.
- IP address** a unique number that identifies each node on a network and to specify routing information. Each node must be assigned a unique IP address. The address is made up of two distinct parts: a network ID, which identifies the network; and a host ID, which is typically assigned by the administrator. These addresses are typically represented in dotted-decimal notation, such as 138.58.11.27. The default setting is: 192.0.0.192
- Net mask** a series of bits designed to "mask" certain portions of an IP address and is used primarily for subnetting. The standard netmask for a Class C network is 255.255.255.0, with the last octet (.0) directing the host to look there for the machine number. The rest (225) is the network number. The default setting is 0.0.0.0
- Gateway** a hardware or software set-up that translates between two dissimilar protocols. A gateway, even when the printer is on another subnet, is not always needed. The printer initiates no connection and obtains the gateway address from the host packets. The default setting is 0.0.0.0 (none)
- LP Daemon** an Ethernet protocol. The LP Daemon listens on port 515. Default is LP Daemon disabled.
- Telnet Daemon** a protocol for remote computing on the Internet. It allows a computer to act as a remote terminal on another machine, anywhere on the Internet. This means that when you telnet to a particular host and port, the remote computer (which must have a telnet server) accepts input directly from your computer (which must have a telnet client) and output for your session is directed to your screen. The telnet server listens on port 23. The default setting is enabled.
- Raw TCP/IP Port** enables the printer to listen for raw tcpip communications. Specifying this to zero will disable raw tcpip connections. Default value is 9001 enabled.
- BootP** a TCP/IP network protocol that lets network nodes request configuration information from a BOOTP "server" node. Use BootP to obtain the IP address at power-up. Default setting is disabled.
- DHCP** allows "leasing" of IP address for a limited time. If no IP address is found at start-up, the printer waits for two more minutes. If no address is found after two minutes DHCP will automatically set the default IP address. Default: enabled

## Ethernet Default Setup

To return the printer to the default settings, put the printer in the boot mode and hold down the feed switch until you hear the high-low-high tones (about 10 seconds).

The default settings are:

Boot Disabled  
 DHCP Enabled  
 Default IP 192.0.0.192  
 (in use after 2 minute Bootp time-out)  
 Net mask of 0.0.0.0  
 (causes default mask of selected IP to be used)  
 LP Daemon disabled  
 Telnet Daemon enabled  
 Raw TCPIP Port 9001 active

Whenever the printer is attempting to locate its IP address via Bootp or DNCP, or has the default IP address in use, the IP address can be set by pinging the printer. Do this by using the arp command to set a static MAC to IP mapping on your host. Then ping the printer by using the ping command. This will set the IP address to the address used in the ping command and stored for future use.

The printer can also be configured by letting the Bootp time-out using the default IP address (using the default IP address) when the printer is connected to a host on an isolated network. Setup commands can then be sent to the printer via tcpip port 9001. Refer to the “Ethernet setup commands”, page 20.

*** A760 – Diagnostics Form ***	
Model number	: A760-1125
Serial number	: A012451679
Boot Firmware	
Revision	: V1.03
CRC	: FFDE
PIN	: 189-7600118A
Flash Firmware	
Revision	: V1.03
CRC	: 7196
PIN	: 189-7600117A
HW parameters	
Flash Memory Size	: 1 Mbyte
Flash Logs/Fonts	: 320 kbytes
Flash User Storage	: 0 kbytes
SRAM Size	: 256 kbytes
Head setting	: D
Paper Type setting	: Type 1, Version 0
Color Density Adj	: 100%
Print Density (Mono)	: 100%
Max Speed	: 100 mm/sec
Max Power	: 55 W
Alternate Reset	: Disabled
Knife	: Enabled
Paper Low Sensor	: Enabled
MICR	: Enabled
MICR Dual Pass	: Disabled
MICR DC offset	: 80
Check Flip	: 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
Alternative DTR/DSR	: Disabled
USB Driver Type	: RS232 Emulation
Resident Code Pages	
	: 437, 850, 852, 858
	: 860, 863, 865, 866
	: 1252, 862, 737
Available Paper Types	: 00:00 01:00 05:00
Logo(s) defined	: YES
User Char(s) defined	: NO
To enter Printer Config Menu :	
1) Flip DIP switch #1 up	
2) Reset the printer, while holding the Paper Feed button down	

### \*\*\* A760 – Printer Config Menu \*\*\*

This config menu allows you to set general printer parameters  
 Sub-menus are entered and selections are made using the Paper Feed Button

– short click : Feed Button is quickly depressed then released  
 – long click : Feed button is held down for more than 1 second then released

#### CAUTION!

The settings are predetermined in factory and should generally not be changed.  
 If you must change the settings do so carefully to avoid changing other functions.

### \*\*\*\*\* 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 -> 6 clicks
- Set Paper Type -> 7 clicks

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

### Sample diagnostic printout of an Ethernet printer

Highlighted area shows Ethernet settings.

These settings can not be changed through the configuration menu and must be set by sending commands from the host. See commands, page 20.

## Indicators

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

### Round green on-line, paper status,error LED (next to paper feed button)

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

### Rectangular green slip-in LED (on slip table)

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

#### For more information about See this section

Error conditions and correcting them "Troubleshooting the printer" on page 41, in *Chapter 4: Using the Printer*, in the **A760 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*



## 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 or the slip and feeding and cutting the paper. The programming commands have been organized, in order of hexadecimal code within functional groups. For this reason, “related” commands may not be listed adjacent to one another.

The operation of various printers may be emulated by the commands, including the following:

- A760 native
- A758 emulation
- A756 emulation

The A760’s standard command set allows it to work with software written for CognitiveTPG or other POS compliant printers.

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

For Ethernet use a specific set of commands must be set for the printer to operate properly. These commands are listed together as a chart on page 20 and individually within the master commands listings.

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

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

### Comparison to A756

The following table details the list of commands whose behavior differs among the A756, A758, and A760 because of the physical differences of a 6 dots/mm head (A756) versus an 8 dots/mm head (A758 and A760).

Command	Description	Difference between previous product and new product emulation mode.
15 <i>n</i>	Feed <i>n</i> dot rows	This command will move the paper on the receipt in <i>n</i> /203 inch steps instead of <i>n</i> /152 inch steps.
16 <i>n</i>	Add <i>n</i> extra dot rows	The dot rows will be measured in <i>n</i> /203 inches versus <i>n</i> /152 inches.
1B 20 <i>n</i>	Set right-side character spacing	This command sets the right side spacing to “ <i>n</i> ” horizontal motion units. By default, these units are in terms of 1/203 inches versus 1/152 inches.
1B 24 <i>n1 n2</i>	Set absolute starting position	For graphics commands, the position is scaled to best match A756. In text mode, the equivalent character position is calculated.
1B 26 <i>s c1 c2 n1 d1...nn dn]</i>	Define user-defined character set	Since the dots on the A760 printhead are smaller, user defined characters that were used on the previous printers will appear smaller on the A760 printer.
1B 2A <i>m n1 n2 d1...dn</i>	Select bit image mode	In A756 emulation mode, graphics are scaled to best match the size of the graphic in the A756 printer.

*continued...*

<b>Command</b>	<b>Description</b>	<b>Difference between previous product and new product emulation mode.</b>
1B 33 <i>n</i>	Set line spacing	This command uses <i>n</i> in terms of $n/360$ inches. Since the A756 had a fundamental step of 1/152 inch and the A760 has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing.
1B 4A <i>n</i>	Print and feed paper	This command uses <i>n</i> in terms of $n/360$ inches. Since the A756 had a fundamental step of 1/152 inch and the A760 has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing.
1B 59 <i>n1 n2 d1...dn</i>	Select double-density graphics	In A756 emulation mode, the printer scales the graphics to provide the best match.
1B 5C <i>n1 n2</i>	Set relative print position	The parameter to this command is in units of dots. However, the command moves and aligns to character positions. In A756 emulation mode, this command calculates how many character positions to move based on the A756 character width in dots (10) versus the A760 (13).
1B 61 <i>n</i>	Select justification	This command does true dot resolution alignment for centering versus character-aligned centering.
1D 2A <i>n1 n2 d1...dn]</i>	Define downloaded bit image	In A756 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A756.
1D 2F <i>m</i>	Print downloaded bit image	In A756 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A756.

## Two-color commands (comparison A758 to A760)

The following table details the list of commands that have been added for two-color ColorPOS® functionality (ColorPOS® commands 1D 81–1D 9B are in bold) or existing commands that have been altered by the addition of two-color capacity.

### CognitiveTPG ColorPOS® two-color and color interpreted commands

Hexadecimal	ASCII	Description
1B 72 <i>m</i>	ESC <i>r m</i>	Set current color
1D A0 <i>n</i>	1D GS	Set temporary maximum target speed
1D 23 <i>n</i>	GS # <i>n</i>	Select current logo
1D 42 <i>n</i>	GS B <i>n</i>	Select or cancel white/black reverse print mode
1D 2A <i>n1 n2 d1 – dm</i>	GS * <i>n1 n2 d1 – dm</i>	Define downloaded bit image
1D 2F <i>m</i>	GS / <i>m</i>	Print downloaded bit image
<b>1D 81 <i>m n</i></b>	<b>GS 0x81 <i>m n</i></b>	<b>Set paper type</b>
<b>1D 82 <i>n1–n72/n80</i></b>	<b>GS 0x82 <i>n1–n72/n80</i></b>	<b>Print raster monochrome graphics</b>
<b>1D 83 <i>n1–n144/n160</i></b>	<b>GS 0x83 <i>n1–n144/n160</i></b>	<b>Print raster color graphics</b>
<b>1D 84 <i>n m n1 n2 d1 dx</i></b>	<b>GS 0x84 <i>n m n1 n2 d1 dx</i></b>	<b>Download logo image</b>
<b>1D 85 <i>m n</i></b>	<b>GS 0x85 <i>m n</i></b>	<b>Reverse color text mode (two-color)</b>
<b>1D 86 <i>m</i></b>	<b>GS 0x86 <i>m</i></b>	<b>Monochrome shade mode</b>
<b>1D 87 <i>m</i></b>	<b>GS 0x87 <i>m</i></b>	<b>Color shade mode</b>
<b>1D 89 <i>n m</i></b>	<b>GS 0x89 <i>n m</i></b>	<b>Logo print with color plane swap</b>
<b>1D 8B <i>n m o</i></b>	<b>GS 0x8B <i>n m o</i></b>	<b>Apply shading to logo</b>
<b>1D 8C <i>n m</i></b>	<b>GS 0x8C <i>n m</i></b>	<b>Merge watermark mode</b>
<b>1D 8D <i>n m</i></b>	<b>GS 0x8D <i>n m</i></b>	<b>Text strike through mode</b>
<b>1D 8E <i>m nL nH d1...dn</i></b>	<b>GS 0x8E <i>m nL nH d1...dn</i></b>	<b>Download paper type description</b>
<b>1D8F <i>m</i></b>	<b>GS 0x8F <i>m</i></b>	<b>Return paper type description</b>
<b>1D 90 <i>m x y o p q</i></b>	<b>GS 0x8A <i>m x y o p q</i></b>	<b>Form and print real time surround graphic</b>
<b>1D 91 <i>n</i></b>	<b>GS 0x91 <i>n</i></b>	<b>Save graphics buffer as logo</b>
<b>1D 92 <i>n</i></b>	<b>GS 0x92 <i>n</i></b>	<b>Background logo print mode</b>
<b>1D 97 <i>m n</i></b>	<b>GS 0x87 <i>m n</i></b>	<b>User storage status</b>
<b>1D 9A <i>n m o</i></b>	<b>GS 0x9A <i>n m o</i></b>	<b>Shade and store logo</b>
1D 9B <i>m n</i>	1D GS	Logo print with knife cut
<b>1D 99 <i>l n m o</i></b>	<b>GS 0x9B <i>l n m o</i></b>	<b>Apply margin message mode</b>
1F 03 16 05 <i>n</i>	US	Set interpretation of “Set current color” command

## LogoEZ® colorization commands

Hexadecimal	ASCII	Description
1F 03 16 <i>fmnopq</i>	US ETX SYN	Set LogoEZ® surround graphics
1F 03 16 <i>fs p/r t</i>	US ETX SYN <i>fs p/r t</i>	Set colorization
1F 03 17 <i>ams</i>	US ETX ETB <i>ams</i>	Set attribute mapping

*Note:* The new CognitiveTPG LogoEZ® colorization utility provides you a fast and easy way to get basic two-color and logos on your receipt without having to enter commands. Check out the CognitiveTPG Web site at [www.CognitiveTPG.com](http://www.CognitiveTPG.com).

## Ethernet setup commands

For the printer to operate with the Ethernet interface, a series of commands must be set within the printer. These commands can only be set through the host computer with the printer in flash download (boot) mode and are not configurable through the printer setup configuration menu. See page 15 for default setup or command descriptions on page 134.

Hexadecimal	ASCII	Description
1B 5B 7D	ESC [ ]	Switch to boot mode
1F 08 00	US BS NUL	Restore default settings
1F 08 01 <i>n1 n2 n3 n4</i>	US BS SOH <i>n1 n2 n3 n4</i>	Set IP address
1F 08 02 <i>n1 n2 n3 n4</i>	US BS STX <i>n1 n2 n3 n4</i>	Set net mask
1F 08 03 <i>n1 n2 n3 n4</i>	US BS ETX <i>n1 n2 n3 n4</i>	Set gateway
1F 08 04 <i>n1 n2 n3 n4</i>	US BS EOT <i>n1 n2 n3 n4</i>	Set raw TCPIP port 9001
1F 08 05 <i>n1</i>	US BS ENQ <i>n1</i>	LP Daemon
1F 08 06 <i>n1</i>	US BS ACK <i>n1</i>	Telnet Daemon
1F 08 07 <i>n1</i>	US BS BEL <i>n1</i>	BootIP
1F 08 08 <i>n1</i>	US BS BS <i>n1</i>	DHCP (auto-configuration)
1F 08 09 <i>n1</i>	US BS HT <i>n1</i>	Inactivity time-out
1F 08 0A <i>n1</i>	US BS LF <i>n1</i>	Keep-alive pings (arps)

## 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 × 24 dots

### Compressed

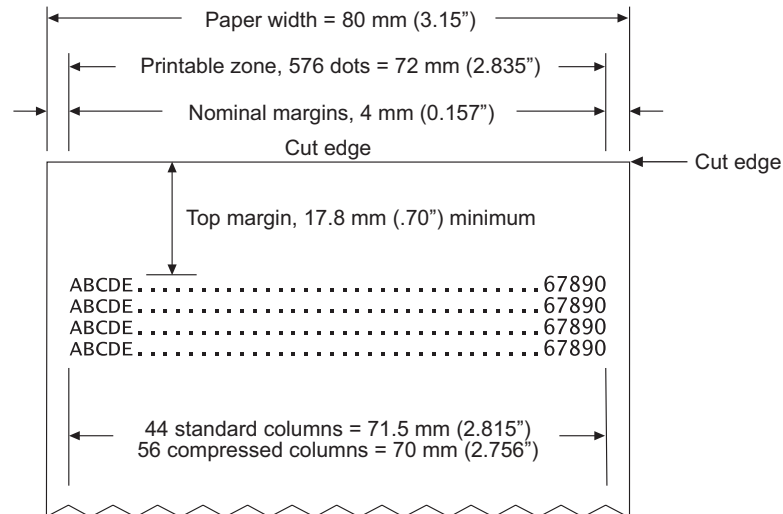
- Characters per inch: 20.3
- Characters per line: 56
- Cell size: 10 × 24 dots

## Print zones

### Print zones for receipt station 80 mm paper

Specifications of print zone for receipt station 80 mm paper:

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



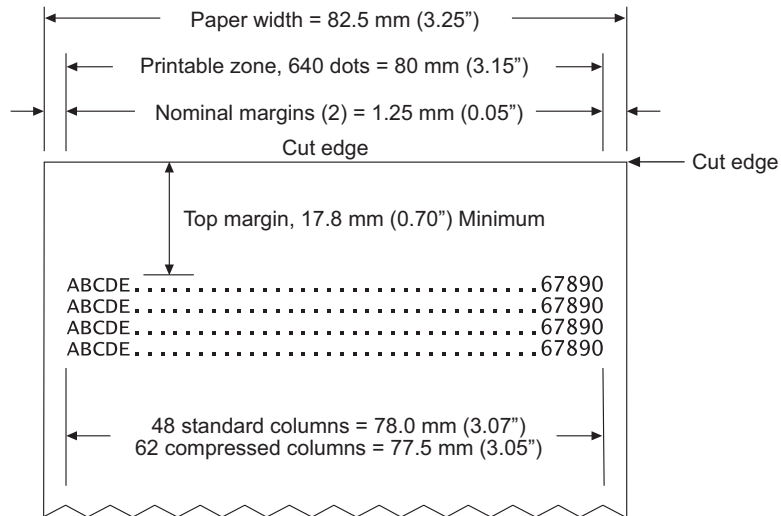
*Note: The application centers 44 standard character cells (13 × 24 dots), or 56 compressed character cells (10 × 24 dots), or 576 addressable bits of graphics across an 80 mm wide receipt. Minimum print line height is 24 dots for text or graphics. Standard print line spacing is 27 dots (i.e., 3 extra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

*The A760 adds a 27 dot high font, so standard print spacing is 30 dots.*

## Print zones for receipt station 82.5 mm paper

Specifications of print zone for receipt station 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 tear-off: 17.8 mm (0.70 inches)
- Top margin to knife cut: 19.0 mm (0.75 inches)

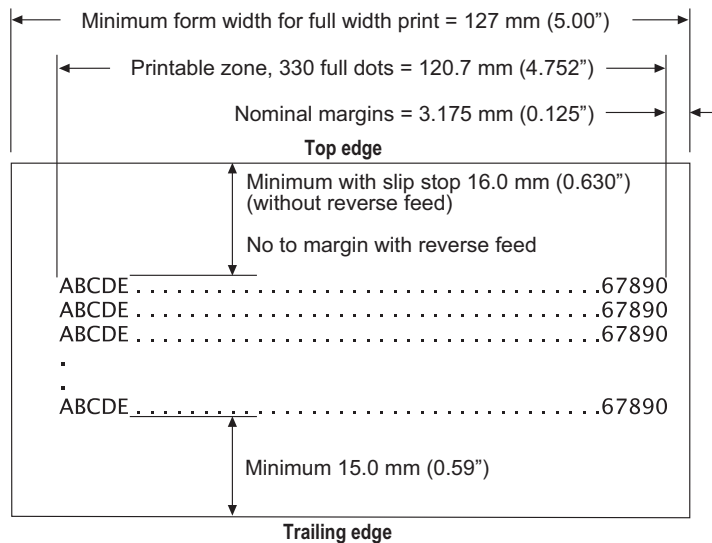


## Print zones for slip station

The slip station prints characters (standard and compressed pitch) and graphics in a print zone of 120.7mm (4.752") wide on a slip or form.

- Standard pitch: 66 characters (columns) per line
- Compressed pitch: 80 characters (columns) per line

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



## 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	∩ B C
Set	Canceled	X	∪ B C
Set	Set	X	∩ B ∩
X	X	Set	∩ B ∪

**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 CognitiveTPG A760 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 A760 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
<b>A760 native</b>	6.00, 6.77, 7.52, 8.13	Standard	13×24	7.52	3	Default setup for monochrome paper
		Tall	13×27	6.77	3	
		ColorPOS®	13×27	6.77	3	Default setup for two-color paper
<b>A758, A756 emulations</b>	6.00, 7.52, 8.13	Standard	13×24	7.52	3	

The following list clarifies how the A760 printer will behave in each emulation mode:

Two-color paper and ColorPOS® commands and features are supported only in A760 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 A758 or A756 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 A760 native, the font and LPI will remain unchanged because the A760 native mode supports all font and LPI options offered in the emulation modes.



## Chapter 4: Programming Commands

### Commands listed by function

Commands in bold are ColorPOS® commands.

#### Printer actions

Code (hexadecimal)	Command	Page
10	Clear printer	33
11	Close form	33
18	Open form	34
1A	Perform partial knife cut (or code 1B 6D)	34
1B 07	Generate tone	34
1B 3C	Return home	34
1B 3D <i>n</i>	Select peripheral device (for multi-drop)	35
1B 40	Initialize printer	35
1B 43 <i>n</i>	Set slip paper eject length	35
1B 63 30 <i>n</i>	Select receipt or slip for printing; slip for MICR read	35
1B 63 31 <i>n</i>	Select receipt or slip for setting line spacing	36
1B 63 33 <i>n</i>	Select paper sensors to output paper end signals (parallel only)	36
1B 63 34 <i>n</i>	Select sensors to stop printing	37
1B 63 35 <i>n</i>	Enable or disable panel button	37
1B 66 <i>m n</i>	Set slip paper waiting time	37
1B 6D	Perform partial knife cut (or code 1A)	34
1B 70 <i>n p1 p2</i>	Generate pulse to open cash drawer	38
1B 72 <i>m</i>	Set current color	38
1C	Select slip station	39
1D 56 <i>m</i>	Select cut mode and cut paper (or code 1D 56 <i>m n</i> )	39
1D 56 <i>m n</i>	Select cut mode and cut paper (or code 1D 56 <i>m</i> )	39
<b>1D 81 <i>m n</i></b>	<b>Set paper type (for two-color printing)</b>	<b>40</b>
<b>1F 03 16 05 <i>n</i></b>	<b>Set interpretation of "Set current color" command</b>	<b>41</b>
1F 74	Print test form	41

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## Print and paper feed

Code (hexadecimal)	Command	Page
0A	Print and feed paper one line	42
0C	Print and eject slip	42
0D	Print and carriage return	42
14 <i>n</i>	Feed <i>n</i> print lines	42
15 <i>n</i>	Feed <i>n</i> dot rows	43
16 <i>n</i>	Add <i>n</i> extra dot rows	43
17	Print	44
1B 4A <i>n</i>	Print and feed paper	44
1B 4B <i>n</i>	Print and reverse feed paper	44
1B 64 <i>n</i>	Print and feed <i>n</i> lines	44
1B 65 <i>n</i>	Print and reverse feed <i>n</i> lines	45
1D 14 <i>n</i>	Reverse feed <i>n</i> lines	45
1D 15 <i>n</i>	Reverse feed <i>n</i> dots	45

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## Vertical and horizontal positioning

Code (hexadecimal)	Command	Page
09	Horizontal tab	46
1B 14 <i>n</i>	Set column	46
1B 24 <i>nL nH</i>	Set absolute starting position	47
1B 32	Set vertical line spacing to 1/6 inch	47
1B 33 <i>n</i>	Set vertical line spacing	47
1B 44 [ <i>n</i> ] <i>k</i> 00	Set horizontal tab positions	48
1B 5C <i>n1 n2</i>	Set relative print position	49
1B 61 <i>n</i>	Select justification	50
1D 4C <i>nL nH</i>	Set left margin	50
1D 50 <i>x y</i>	Set horizontal and vertical minimum motion units	46
1D 57 <i>nL nH</i>	Set printing area width	51

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**Text characteristics**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
12	Select double-wide characters	52
13	Select single-wide characters	52
1B 12	Select 90 degree counter-clockwise rotated print	52
1B 16 <i>n</i>	Select pitch (column width)	52
1B 20 <i>n</i>	Set right-side character spacing	53
1B 21 <i>n</i>	Select print mode	53
1B 25 <i>n</i>	Select or cancel user-defined character set	54
1B 26 <i>s c1 c2</i>	Define user-defined character sets	54
1B 2D <i>n</i>	Select or cancel underline mode	55
1B 3A 30 30 30	Copy character set from ROM to RAM	55
1B 3F <i>n</i>	Cancel user-defined character	56
1B 45 <i>n</i>	Select or cancel emphasized mode	56
1B 47 <i>n</i>	Select double-strike	56
1B 48	Cancel double-strike	57
1B 49 <i>n</i>	Select or cancel italic print	57
1B 52 <i>n</i>	Select international character code	57
1B 56 <i>n</i>	Select or cancel 90 degree clockwise rotated print	58
1B 74 <i>n</i>	Select international character set	57
1B 7B <i>n</i>	Select or cancel upside-down print mode	58
1D 21 <i>n</i>	Select character size	59
1D 42 <i>n</i>	Select or cancel white/black reverse print mode	60
<b>1D 85 m n</b>	<b>Reverse color text mode (two-color)</b>	<b>60</b>
<b>1D 8D n m</b>	<b>Text strike-through mode</b>	<b>61</b>
1F 05 <i>n</i>	Select superscript or subscript modes	61

**Chapter 4: Programming commands****Graphics**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1B (+*.BMP file)	Download BMP logo	62
1B 2A <i>m n1 n2 d1...dn</i>	Select bit image mode	63
1B 4C <i>n1 n2 d1...dn</i>	Select double-density graphics (A756 emulation)	64
1B 59 <i>n1 n2 d1...dn</i>	Select double-density graphics	64
1D 23 <i>n</i>	Select the current logo (downloaded bit image)	65
1D 2A <i>n1 n2 d1...dn</i>	Define downloaded bit image	66
1D 2F <i>m</i>	Print downloaded bit image	67
<b>1D 82 <i>n1...n72</i> or ...<i>n80</i></b>	<b>Print raster monochrome graphics</b>	<b>67</b>
<b>1D 83 <i>n1...n144</i> or ...<i>n160</i></b>	<b>Print raster color graphics</b>	<b>68</b>
<b>1D 84 <i>m n1 n2 d1...dx</i></b>	<b>Download logo image</b>	<b>69</b>
<b>1D 8B <i>n m o</i></b>	<b>Apply shading to logo</b>	<b>69</b>
<b>1D 8C <i>n m</i></b>	<b>Merge watermark mode</b>	<b>70</b>
<b>1D 86 <i>m</i></b>	<b>Monochrome shade mode</b>	<b>70</b>
<b>1D 87 <i>m</i></b>	<b>Color shade mode</b>	<b>71</b>
<b>1D 89 <i>n m</i></b>	<b>Logo print with color plane swap</b>	<b>71</b>
<b>1D 90 <i>m x y o p q</i></b>	<b>Form and merge real-time surround graphic</b>	<b>72</b>
<b>1D 91 <i>n</i></b>	<b>Save graphics buffer as logo</b>	<b>72</b>
<b>1D 92 <i>n</i></b>	<b>Background logo print mode</b>	<b>73</b>
<b>1D 9A <i>n m o</i></b>	<b>Shade and store logo</b>	<b>73</b>
<b>1D 9B <i>m n</i></b>	<b>Logo print with knife cut</b>	<b>73</b>
<b>1D 99 <i>l m n o</i></b>	<b>Apply margin message mode</b>	<b>74</b>
<b>1D A0 <i>nl nh</i></b>	<b>Set temporary max target speed</b>	<b>74</b>
<b>1F 03 16 <i>f s p/r t</i></b>	<b>Set LogoEZ® colorization</b>	<b>75</b>
<b>1F 03 17 <i>a m s</i></b>	<b>Set LogoEZ® attribute mapping</b>	<b>78</b>
1F 04 <i>n</i>	Convert 6-dots/mm bitmap to 8-dots/mm bitmap	80
1F 7B <i>n</i>	Enable constant speed logos	80

**Status****Batch mode**

Code (hexadecimal)	Command	Page
1B 75 0	Transmit peripheral device status (RS-232C printers only)	82
1B 75 <i>n</i>	Request alternate status (A756 emulation only)	82
1B 76	Transmit paper sensor status	83
1D 49 <i>n</i>	Transmit printer ID	84
1D 49 40 <i>n</i>	Transmit printer ID, remote diagnostics extension	85
1D 72 <i>n</i>	Transmit status	88
1F 56	Send printer software version	89

**Real-time**

Code (hexadecimal)	Command	Page
10 04 <i>n</i>	Real-time status transmission (DLE sequence)	92
10 05 <i>n</i>	Real-time request to printer (DLE sequence)	94
1D 03 <i>n</i>	Real-time request to printer (GS sequence)	94
1D 04 <i>n</i>	Real-time status transmission (GS sequence)	92
1D 05	Real-time printer status transmission	95
1F 7A <i>n</i>	Real-time disable	95

**Unsolicited status mode**

Code (hexadecimal)	Command	Page
1D 61 <i>n</i>	Select or cancel unsolicited status mode	96

**Bar codes**

Code (hexadecimal)	Command	Page
1D 48 <i>n</i>	Select printing position for HRI characters	99
1D 66 <i>n</i>	Select pitch for HRI characters	99
1D 68 <i>n</i>	Select bar code height	99
1D 6B <i>m d1...dk 00</i> or 1D 6B <i>m n d1...dn</i>	Print bar code	100
1D 6B <i>m nL nH d1 ... dn</i>	Print GS1 DataBar (RSS), data length specified	102
1D 6B <i>n d1 ... 00</i>	Print GS1 DataBar (RSS), null terminated	132
1D 70 <i>abc def</i>	Select PDF 417 parameters	104
1D 71 <i>abc defL fH</i>	Set GS1 DataBar (RSS) parameters	102
1D 77 <i>n</i>	Select bar code width	105

**Chapter 4: Programming commands****Page mode**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
0C	Print and return to standard mode/print and eject slip	106
18	Cancel print data in page mode	106
1B 0C	Print data in page mode	106
1B 4C	Select page mode	107
1B 53	Select standard mode	108
1B 54 <i>n</i>	Select print direction in page mode	108
1B 57 <i>n1, n2...n8</i>	Set print area in page mode	109
1D 24 <i>nL nH</i>	Set absolute vertical print position in page mode	110
1D 5C <i>nL nH</i>	Set relative vertical print position in page mode	110

**Macros**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1D 3A	Select or cancel macro definition	111
1D 5E <i>r t m</i>	Execute macro	111

**MICR check reader commands****MICR Reading**

<b>Code (Hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1B 77 01	Read MICR data and transmit	112
1B 77 52	Transmit last MICR read	112

**MICR Parsing**

<b>Code (Hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1B 77 50	Define parsing format, save in NVRAM	112
1B 77 70	Define parsing format, do not save permanently	112

**Check Flip Commands**

<b>Code (Hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1B 77 46	Check flip command	120
1B 77 46-47	Enhanced check flip status reporting	120

**User data storage**

Code (hexadecimal)	Command	Page
1B 27 <i>m a0 a1 a2 d1...dm</i>	Write to user data storage	122
1B 34 <i>m a0 a1 a2</i>	Read from user data storage	122
1B 6A <i>k</i>	Read from non-volatile memory (NVRAM)	122
1B 73 <i>n1 n2 k</i>	Write to non-volatile memory (NVRAM)	122
1D 22 <i>n</i>	Select memory type (SRAM/flash) where to save logos or user-defined fonts	123
1D 22 55 <i>n1 n2</i>	Flash memory user sectors allocation	123
1D 40 <i>n</i>	Erase user flash sector	124
1D 97 <i>m n</i>	User storage status	125

**Flash download**

Code (hexadecimal)	Command	Page
1B 5B 7D	Switch to flash download (boot) mode	126
1D 00	Return boot sector firmware part number	127
1D 01	Return segment number status of flash memory	127
1D 02 <i>n</i>	Select flash memory sector to download	127
1D 06	Get firmware CRC	127
1D 07	Return microprocessor CRC	128
1D 0E	Erase all flash contents except boot sector	128
1D 0F	Return main program flash CRC	128
1D 10 <i>n</i>	Erase selected flash sector	128
1D 11 <i>aL aH cL cH d1...dn</i>	Download to active flash sector	129
<b>1D 8E <i>m nL nH d1 ... dx</i></b>	<b>Download paper type description</b>	<b>129</b>
<b>1D 8F <i>m</i></b>	<b>Return paper type description</b>	<b>130</b>
1D FF	Reset firmware	130

**Ethernet setup commands**

Code (hexadecimal)	Command	Page
1B 5B 7D	Switch to flash download (boot mode)	126
1F 08 00	Restore default settings	131
1F 08 01 <i>n1 n2 n3 n4</i>	Set IP address	131
1F 08 02 <i>n1 n2 n3 n4</i>	Set net mask	131
1F 08 03 <i>n1 n2 n3 n4</i>	Set gateway	131
1F 08 04 <i>n1 n2 n3 n4</i>	Set raw TCPIP port	132
1F 08 05 <i>n1</i>	LP Daemon	132
1F 08 06 <i>n1</i>	Telnet Daemon	132
1F 08 07 <i>n1</i>	BootP	132
1F 08 08 <i>n1</i>	DHCP (auto-configuration)	132
1F 08 09 <i>n1</i>	Inactivity time-out	133
1F 08 0A <i>n1</i>	Keep-alive pings (arps)	133

---

## Command conventions

The following information describes how each command is organized:

<b>Name:</b>	Name of command.
<b>ASCII:</b>	The ASCII control code.
<b>Hexadecimal:</b>	The hexadecimal control code.
<b>Decimal:</b>	The decimal control code.
<b>Value:</b>	A description of the command operands.
<b>Range:</b>	The upper and lower limits of the command operand.
<b>Default:</b>	The command operand default after printer reset.
<b>Description:</b>	Brief description and summary of the command.
<b>Formulas:</b>	Any formulas used for this command.
<b>Exceptions:</b>	Describes any exceptions to this command; for example, incompatible commands.
<b>Related information:</b>	Describes related information for this command; for example, bit information.



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## Command descriptions

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### Printer actions

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

- Station select
  - Platen control
  - Resetting the printer
  - Cutting the paper
  - Opening the cash drawers
- 

### Clear printer

**ASCII**            DLE  
**Hexadecimal**    10  
**Decimal**            16

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

- Receipt station is selected
- Double-wide command (0x12) is canceled
- Line spacing, pitch, and user-defined character sets are maintained at current selections (RAM is not affected)
- Single-wide, single-high, non-rotated, and left-aligned characters are set
- Printing position is set to column one
- Slip platen is opened
- Slip printhead is homed
- 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 pages 97 and 98.)

---

### Close form

**ASCII:**            DC1  
**Hexadecimal:**    11  
**Decimal:**            17

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

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

**Chapter 4: Programming commands****Open form**

**ASCII:** CAN  
**Hexadecimal:** 18  
**Decimal:** 24

When the printer is in A756 and A758 emulation mode or in A760 (native) non-page mode, this command opens the feed roller and platen (forms compensation arm assembly) so that a form may be inserted (default position).

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

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

**Perform partial knife cut**

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

Partially cuts the receipt, leaving 5 mm (0.20") of paper. This command is implemented the same as Full knife cut (19 and 1B 69).

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

**Exceptions**

Line feed is executed first if print buffer is not empty.

This command is processed regardless of which station is selected.

**Generate tone**

**ASCII** ESC BEL  
**Hexadecimal** 1B 07  
**Decimal** 27 7

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

**Return home**

**ASCII** ESC <  
**Hexadecimal** 1B 3C  
**Decimal** 27 60

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

**Related Information**

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

**Select peripheral device (for multi-drop)**

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

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

**Default:** 1 (bit 0), device selected

Selects the device to which the host computer sends data.

**Exception**

This command is ignored.

**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

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.

Clears the print line buffer and resets the printer to the default settings for the start-up configuration (refer to Default settings above).

**Set slip paper eject length**

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

**Value of *n*:** 0 to 255

**Exception**

This command is ignored.

**Select receipt or slip for printing; slip for MICR read**

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

**Value of *n*:** 1, 2, 3 Receipt selected  
 4 Slip selected

**Default of *n*:** 1

Selects the station for printing. When slip is selected, the printer waits (based on the slip waiting time setting [i.e.: 1B 66 m *n*]) for the paper to be inserted. When slip has already been selected and the selection is changed, the form is opened.

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

**Exceptions**

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

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

**Select receipt or slip for setting line spacing**

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

**Value of n:** 1,2,3 Select receipt  
 4 Select Slip

**Default of n:** 1

Selects which station receives the effects of the following commands:

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

**Exceptions**

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

**Select paper sensors to output paper end signals**

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

**Value 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 enabled
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 disabled
	On	08	8	Paper roll-end sensor enabled
4,5,6,7	-	-	-	Undefined

**Range of n:** 1-255

**Default of n:** 15

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.

**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 of *n***

Bit	Function
0,1	Stop receipt on receipt low
4	Stop slip if trailing edge uncovered
5	Stop slip if leading edge uncover
<b>Default:</b>	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.

**Related information**

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

**Set slip paper waiting time**

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

**Value of *m*:** Not used

**Value of *n*:** Tenths of seconds

The time that the printer waits for a slip to be inserted is set using the configuration menu. The default is forever, but it can be set to 1, 3, or 5 minutes using the configuration menu. “*n*” sets the time (*n* x 0.1 seconds) that the printer waits to close the platen and start printing once the slip has been inserted. The printer reads that a slip is inserted when the leading edge and trailing edge sensors are covered. The slip-in LED on the slip table is lit (green) when both sensors are covered.

If a slip is not inserted in the time specified, the receipt station is selected for the next function. The times set by this command are used only by the command, “Select receipt or Slip for printing, Slip for MICR read” (1B 63 30 *n*), with *n* set to 04.

**Chapter 4: Programming commands****Generate pulse to open cash drawer**

**ASCII** ESC p n p1 p2  
**Hexadecimal** 1B 70 n p1 p2  
**Decimal** 27 112 n p1 p2

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

**Value of p1:** 0–255

**Value of p2:** 0–255

Sends a pulse to open the cash drawer.

**Formulas**

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

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

**Related information**

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

**Set current color**

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

**Default of m:** 0 (monochrome)

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

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

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

**Description**

When the monochrome paper type command (00) is set, this command is recognized and retained but has no effect. The monochrome paper selection (usually black) controls the output.

When two-color paper is loaded and the two-color paper type command set, this command will designate which of the two colors will be used for everything not specified as having an explicit color parameter(s) such as color logos, side bars, surround graphics, background watermarks or color raster graphics.

**Exception**

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

**Select slip station**

<b>ASCII</b>	FS
<b>Hexadecimal</b>	1C
<b>Decimal</b>	28

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

**Select cut mode and cut paper**

<b>ASCII</b>	GS V <i>m</i>	GS V <i>m n</i>
<b>Hexadecimal</b>	1D 56 <i>m</i>	1D 56 <i>m n</i>
<b>Decimal</b>	29 86 <i>m</i>	29 86 <i>m n</i>

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

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

<i>m</i>	Feed and cut mode
0, 48	Full cut (no extra feed). Partial cut on the A760.
1, 49	Partial cut (no extra feed).
65	Feeds paper to cutting position + ( <i>n</i> times vertical motion unit), and cuts the paper completely.
66	Feeds paper to cutting position + ( <i>n</i> 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.

**Exceptions**

If *m* is out of the specified range, the command is ignored.

**Set paper type (ColorPOS®)**

<b>ASCII</b>	G5 0x81 <i>m n</i>
<b>Hexadecimal</b>	1D 81 <i>m n</i>
<b>Decimal</b>	29 129 <i>m n</i>

- Value of *m*:**
- 0 = monochrome (black) paper (Kanzaki P-310)
  - 1 = Two-color (red/black) papers (Kanzaki P-310RB)
  - 4 = Two-color (blue/black) papers (Kanzaki P-320BB)
  - 5 = Two-color (red/black) papers (Kanzaki P-320PB)

**Default:** 0 (monochrome paper)

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

(*m n* = 0 0) defines the default monochrome (black category, initial version) paper, out-of-box printers will also have factory preset descriptions for customer selected color types; initial release consists of two defined color types: (*m n* = 1 0) Kanzaki P-310RB red/black paper and (*m n* = 5 0) Kanzaki P-320RB red/black paper or Kanzaki P-320BB blue/black paper. Other valid values of *m n* may be present if the download paper type description command has been executed defining additional types.

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

An incorrect setting of *m n* for a two-color paper or non-standard monochrome paper, or failure to set *m n* when a color paper is inserted will result in poor print quality

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

The following list clarifies how the A760 printer will behave in each emulation mode:

Two-color paper and ColorPOS® commands and features are supported only in A760 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 A758 or A756 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 A760 native, the font and LPI will remain unchanged because the A760 native mode supports all font and LPI options offered in the emulation modes.

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

Emulation Mode	LPI Options	Font(s) Options	Font Size	Default LPI	Default EDR	Comments
<b>A760 native</b>	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	
<b>A758, A756 emulation</b>	6.00,7.52,8.13	Standard	13x24	7.52	3	



---

### Set interpretation of “Set current color” command

**ASCII** US ETX SYN ENQ *n*

**Hexadecimal** 1F 03 16 05 *n*

**Decimal** 31 03 22 05 *n*

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

This command defines how to interpret the 1B 72 command for legacy environments. It provides a method to resolve any differences in the definition of command 1B72 between the A795 native mode and earlier implementations in other printers.

In A795 native mode, the standard “Set current color” command should be used.

#### Related information

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

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

---

### 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.

#### Exception

This command is available in A758 emulation and A760 native mode only.

---

## Print and paper feed

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

---

### Print and feed paper one line

**ASCII** LF  
**Hexadecimal** 0A  
**Decimal** 10

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

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

---

### Print and eject slip

**ASCII** FF  
**Hexadecimal** 0C  
**Decimal** 12

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

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

#### Exception

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

---

### Print and carriage return

**ASCII** CR  
**Hexadecimal** 0D  
**Decimal** 13

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

#### Related information

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

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

---

### Feed *n* print lines

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

**Value of *n*:** The number of lines to feed at current line height setting.

**Range of *n*:** 0–127 in A756 emulation  
0–255 in A756 emulation and  
A760 native mode

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

**Feed *n* dot rows**

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

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

**Range of *n*:**   0–127 in A756 emulation  
                   0–255 in A758 emulation and  
                   A760 native mode

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

**Add *n* extra dot rows**

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

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

**Range of *n*:**   0–12

**Default:**       Receipt - 3 extra dot rows  
                   Slip -    3 extra dot rows

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

**Formulas**

The following table shows the relationship between the number of lines per inch and each extra dot row added for both receipt and slip stations:

**Receipt Station**

Extra rows	Lines per inch	Dot rows
0	8.47	24
1	8.13	25
2	7.81	26
3	7.52	27
4	7.25	28
5	7.00	29
6	6.77	30
7	6.55	31
8	6.35	32
9	6.16	33

**Receipt Station**

Extra rows	Lines per inch	Dot rows
10	5.98	34
11	5.81	35
12	5.64	36

**Slip Station**

Extra rows	Lines per inch	Dot rows
0	10.29	7
1	9.00	8
2	8.00	9
3	7.20	10
4	6.55	11
5	6.00	12
6	5.54	13
7	5.14	14
8	4.80	15
9	4.50	16
10	4.24	17
11	4.00	18
12	3.79	19

---

### Print

**ASCII** ETB  
**Hexadecimal** 17  
**Decimal** 23

Prints one line from the buffer and feeds paper one line. Executes LF on receipt. Executes LF on slip if previous character was not a CR.

---

### Print and feed paper

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

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

**Range of *n*:** 0–255

Prints one line from the buffer and feeds the paper.

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

### Related information

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

---

### Print and reverse feed paper

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

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

**Range of *n*:** 0–255

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

### Exceptions

The receipt station cannot be reverse fed.

---

### Print and feed *n* lines

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

**Value of *n*:** Number of lines to be printed and fed.

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

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

---

**Print and reverse feed *n* lines**

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

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

**Range of *n*:**    0 – 255

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

---

**Reverse feed *n* lines**

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

**Range of *n*:**    0 – 127     A756 emulation mode  
                   0 – 255     A758 emulation mode and  
                                   A760 native mode

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

---

**Reverse feed *n* dots**

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

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

**Range of *n*:**    0 – 127     A756 emulation mode  
                   0 – 255     A758 emulation mode and  
                                   A760 native mode

Reverses the paper feed in the slip station by *n* dots at 1/72 inch (CognitiveTPG 7150™ command). This command is ignored if receipt station is selected.

---

## Vertical and horizontal positioning

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

---

### Horizontal tab

<b>ASCII</b>	HT
<b>Hexadecimal</b>	09
<b>Decimal</b>	9

Moves the print position to the next tab position set by the set horizontal tab positions (1B 44 *n*1 *n*2 ... 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

<b>ASCII</b>	GS P <i>x y</i>
<b>Hexadecimal</b>	1D 50 <i>x y</i>
<b>Decimal</b>	29 80 <i>x y</i>

**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.

The default horizontal motion is *x* - 203.

---

### Set column

<b>ASCII</b>	ESC DC4 <i>n</i>
<b>Hexadecimal</b>	1B 14 <i>n</i>
<b>Decimal</b>	27 20 <i>n</i>

**Value of *n*:** Receipt - 1-44 = Standard pitch  
1-56 = Compressed pitch

Slip - 1-66 = Standard pitch  
1-80 = Compressed pitch

**Default of *n*:** 1

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

### Exceptions

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

**Set absolute starting position**

<b>ASCII</b>	ESC \$ <i>n1 n2</i>
<b>Hexadecimal</b>	1B 24 <i>n1 n2</i>
<b>Decimal</b>	27 36 <i>n1 n2</i>

**Value of *n*:** *n* = Number of dots to be moved from the beginning of the line.  
*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.

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

**Formulas**

Determine the value of *n* by multiplying the column for the absolute starting position by 10 (slip, or receipt standard pitch) or 8 (receipt compressed pitch). The example shows how to calculate column 29 (10 dots per column) as the absolute starting position.

28 x 10 = 280 dots (beginning of column 29)  
 280/256 = 1, remainder of 24  
*n1* = 24 *n2* = 1

**Related information**

This command is also used in the graphics mode on the receipt. See graphic commands in this chapter for more 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 this command (set relative print position) will be interpreted accordingly. For more information, see the description of the command set horizontal and vertical minimum motion units command (1D 50) in this document.

**Set vertical line spacing to 1/6 inch**

<b>ASCII</b>	ESC 2
<b>Hexadecimal</b>	1B 32
<b>Decimal</b>	27 50

**Default:** 3.33 mm (0.13")

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

**Set vertical line spacing**

<b>ASCII</b>	ESC 3 <i>n</i>
<b>Hexadecimal</b>	1B 33 <i>n</i>
<b>Decimal</b>	27 51 <i>n</i>

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

**Range of *n*:** 0 – 255

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

Sets the line spacing for the receipt and for the slip. For the receipt, the space is set to *n*/406 inches. For the slip, the line spacing is set to *n*/144 inches. 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 (decimal)

**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.



**Set relative print position**

<b>ASCII</b>	ESC \ n1 n2
<b>Hexadecimal</b>	1B 5C n1 n2
<b>Decimal</b>	27 92 n1 n2

**Value of n:**

To move the relative starting position right of the current position by  $n$  dots:

$n1$  = 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 by  $n$  dots:

$n1$  = Remainder after dividing  $(65,536-n)$  by 256  
 $n2$  = Integer after dividing  $(65,536-n)$  by 256

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

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

**Formulas**

*To move to the left:*

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

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

*To move to the right:*

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

$2 \times 10 =$  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 (A760 receipt vs. A756 receipt)**

There is a difference in the normal behavior of this command in A758 emulation and A760 native modes, as compared to the original A756. The difference exists when the command is used to move to the left. The A756 processes the whole print string prior to putting it in the buffer for the printhead. This method of processing allows the A756 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 A758 emulation and A760 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.

---

### 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.

#### Exception

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

---

### 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  $((nH \times 256) + nL)$  times horizontal motion unit inches. The horizontal motion units are set by the set horizontal and vertical minimum motion units command (1D 50), 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.

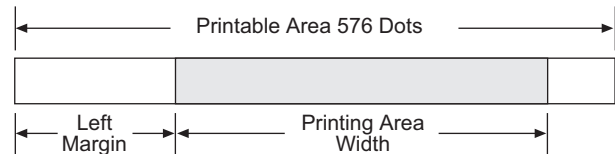
To set the left margin to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

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**

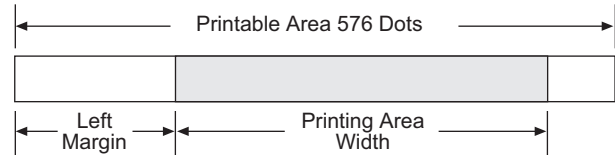
To set the width of the printing area to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

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  $406 = (1 \times 256) + 150$ .

**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.

---

### 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.

---

### 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.

---

### Select 90 degree counter-clockwise rotated print

**ASCII** ESC DC2  
**Hexadecimal** 1B 12  
**Decimal** 27 18

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

#### Exceptions

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

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

#### Related information

See “Summary of rotated printing” in this document.

---

### Select pitch (column width)

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

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

**Default:** 0 (Standard pitch)

Selects the character pitch for a print line.

#### Formulas

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

Pitch	Receipt Columns	Receipt CPI	Slip Columns	Slip CPI
Standard	44	15.6	66	13.9
Compressed	56	20.3	80	17.1

#### Related information

Look in Chapter 3: Programming the Printer, “Character appearance” for a description of both pitches.

**Set right-side character spacing**

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

**Range of *n*:** 0 – 32 (decimal)

**Default:** 0

Sets the right side character spacing to [ *n* x horizontal or vertical motion units]. Values for this command are set independently in standard and paper mode.

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.

**Select print mode**

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

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

**Value of *n***

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

Bits 1, 2 and 6 are not used.

<sup>1</sup>Standard and compressed pitch cannot be used together in the same line.

<sup>2</sup>Double-high character cannot be used with normal character in the same line, nor can they be used on the slip station.

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.

**Exception**

This is ignored in A756 emulation mode and is only valid on the receipt station.

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

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

Pitch	Receipt Station	Receipt CPI	Slip Station	Slip CPI
Standard	44	15.6	66	13.9
Compressed	56	20.3	80	17.1

**Related information**

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

1B 16 <i>n</i>	Select pitch
1B 45 <i>n</i>	Emphasized
1B 47 <i>n</i>	Double-strike
12	Double-wide
13	Single-wide
1B 2D <i>n</i>	Underline

## Chapter 4: Programming commands

**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 code page 437 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.

**Define user-defined character set**

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

**Values and ranges:****Receipt:**

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

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

*c1* = Hex 20–FF (20 is always printed as a space)

*c2* = Hex 20–FF (20 is always printed as a space)

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

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

*ni* = the number of dot columns for the *i*th character,  $1 \leq ni \leq 16$

*d* = the dot data for the characters

The number of bytes for the *i*th character cell is  $3 \times ni$ .

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*, *c1*, *c2*, *n1*) aborts the command.

**Related information**

See 1D 22 *n* (select memory type where to save user-define fonts.)

**Slip:**

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

*c1* = Hex 20–FF

*c2* = Hex 20–FF

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

*d* = the column data for the *n*th character as specified by *d1 ... dn*

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

Each byte is one 7-dot high column (full- or half-dot column.)

Overlapped dots are not printed.

The data must contain  $[(c2 - c1 + 1) \times 12]$  bytes. (See illustration on top of next page.)

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

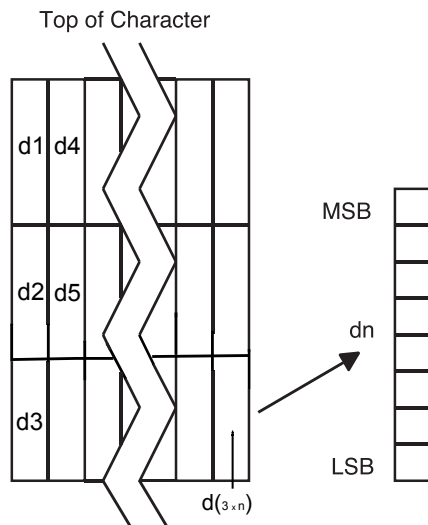
Any invalid byte (*s*, *c1*, *c2*, *n1*) aborts the command.

User-defined character sets for both slip and receipt may be used at the same time. The command clears bit image logo data from RAM. The illustration on the next page provides a sample of a character cell.

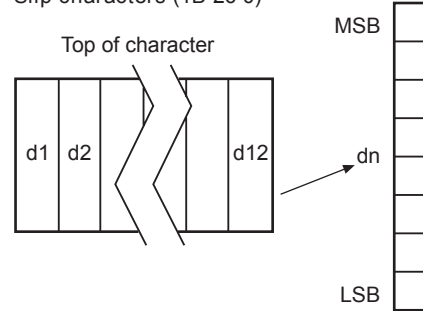
**Related information**

See 1D 22 *n* (select memory type where to save user-define fonts.)

Receipt characters (1B 26 3)



Slip characters (1B 26 0)

**Select or cancel underline mode**

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

	<u>Decimal</u>	<u>Hex</u>
<b>Value of <i>n</i>:</b>	0, 48	30 = Cancel underline mode
	1, 49	31 = Select underline mode
	2, 50	32 = Select double thickness underline mode

**Default:** 0 (Cancel underline mode)

Turns underline mode on or off. 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.

This command is only available in A758 emulation and A760 native mode.

**Copy character set from ROM to RAM**

**ASCII** ESC : 0 0 0  
**Hexadecimal** 1B 3A 30 30 30  
**Decimal** 27 58 48 48 48

**Default:** Code page 437

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 code page 437 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 (bit 0)

Starts or stops emphasized printing on slip and receipt.

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

#### Exceptions

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

#### Related information

This command and the select print mode(s) command (1B 21) function identically.

---

### Select double-strike

	<b>A756 emulation</b>	<b>A760 native mode</b>
<b>ASCII</b>	ESC G	ESC G <i>n</i>
<b>Hexadecimal</b>	1B 47	1B 47 <i>n</i>
<b>Decimal</b>	27 71	27 71 <i>n</i>

**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 for the slip station. Overprints a second pass of the print line on the slip station to improve penetration of multipart forms and increase print contract. The second pass is printed the same direction as the first to ensure accuracy of the overprint. The printer is reset to the standard print mode after a clear printer (0×10) command is received.

#### Exceptions

The settings do not apply in page mode, However they can be set or cleared in page mode.

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

This command functions the same as A756 when the printer is in A756 emulation mode. In A760 native mode, the command takes a parameter to enable and disable it.

#### Related information

Printer output is the same as in emphasized mode.



**Cancel double-strike**

<b>ASCII</b>	ESC H
<b>Hexadecimal</b>	1B 48
<b>Decimal</b>	27 72

Turn off double-strike mode on the slip station in A756 emulation mode.

This command is ignored in the A758 emulation mode and A760 native mode.

This command works on both slip and receipt stations.

**Select or cancel italic print**

<b>ASCII</b>	ESC I <i>n</i>
<b>Hexadecimal</b>	1B 49 <i>n</i>
<b>Decimal</b>	27 73 <i>n</i>

**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. This command is only available A758 emulation and A760 native modes.

Italic print mode is available for built-in, user-defined characters. This command only works on the receipt station.

**Exceptions**

Only the lowest bit of *n* is valid. This command is only valid for the receipt station in A758 emulation and A760 native modes.

**Select international character set**

<b>ASCII</b>	ESC R <i>n</i>	or	ESC t <i>n</i>
<b>Hexadecimal</b>	1B 52 <i>n</i>	or	1B 74 <i>n</i>
<b>Decimal</b>	27 82 <i>n</i>	or	27 116 <i>n</i>

**Value of *n*:**

<b>A760 native mode</b>	<b>A756 emulation</b>
0 = Code Page 437	0 = Code Page 437
1 = Code Page 850	Not 0 = Code Page 850
2 = Code Page 852	
3 = Code Page 860	
4 = Code Page 863	
5 = Code Page 865	
6 = Code Page 858	
7 = Code Page 866	
8 = Code Page 1252	
9 = Code Page 862	
10 = Code Page 737, Greek (only in A760 native mode)	
12 = Code Page 857	
<b>Default:</b>	0 (Code Page 437)

Selects the character set to be used. Look in “Appendix B: Resident Character Sets” for the character sets.

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

**Exception**

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

**Related information**

This command may also be known as select character code table.

**Chapter 4: Programming commands****Select character code table**

See the previous command, select international character set.

**Select or cancel 90 degree clockwise rotated print**

<b>ASCII</b>	ESC <i>V n</i>
<b>Hexadecimal</b>	1B 56 <i>n</i>
<b>Decimal</b>	27 86 <i>n</i>
<b>Value of <i>n</i>:</b>	0 = Cancel 1 = Set
<b>Default:</b>	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 or cancel upside-down print mode**

<b>ASCII</b>	ESC { <i>n</i>
<b>Hexadecimal</b>	1B 7B <i>n</i>
<b>Decimal</b>	27 123 <i>n</i>
<b>Value of <i>n</i>:</b>	0 = Cancel 1 = Set
<b>Default:</b>	0 (Cancel)

Prints upside-down characters. The character order is inverted in the buffer so text is readable. The command remains in effect until the rotated print (1B 12) command is received. 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.

The rotated print command (1B 12) cancels this command.

**Select character size**

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

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

**Range of *n*:** 00–07, 10–17, ...70–77

**Default of *n*:** 0

Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

**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. This command is only valid for the receipt station.

This is only available in A758 emulation and A760 native modes.

**Chapter 4: Programming commands****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**

This command is only valid for the receipt station.

This is only available in A758 emulation and A760 native modes.

**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 *n*:** 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*,...)

This command is only available on the receipt station in A758 emulation and A760 native modes.

**Exceptions**

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

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## Graphics

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

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### Download BMP logo

**ASCII:** ESC (+\*.BMP file)  
**Hexadecimal:** 1B (+\*.BMP file)  
**Decimal:** 27 66 77 (+\*.BMP file)  
**Value:** Maximum width = 576  
(640 for 8.5 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 download BMP file to save it as a logo, send the hexadecimal code 1B followed by the whole BMP file.

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

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

BMPs and bit images continue to be definable only for the receipt station. However, there is no longer an automatic erasure whenever the user downloads a character set (as happened previously) as well as in the case where the current logo was never set > 0, (the automatic erasure

if user flash memory had filled up with inactive logo 0 definitions upon next power cycle). Warnings about the effect of running out of defined logo space during a download apply (i.e. the command is ignored). The application is required to manage user data space, downloaded font space, and logo space.

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

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

### Exceptions

BMP file images that are not monochrome are put into the print buffer. This command is only valid for the receipt station.

This is only available in A758 emulation and A760 native modes.

### Related information

Microsoft BMP bitmap file format.

**Select bit image mode**

**ASCII** ESC \* *m n1 n2 d1 ... dn*  
**Hexadecimal** 1B 2A *m n1 n2 d1 ... dn*  
**Decimal** 27 42 *m n1 n2 d1 ... dn*

**Value of *m*:****Receipt Station**

Value of <i>m</i>	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 × 288
1	8-Dot double-density	8 (68 DPI)	0–576 (203 DPI)	8 × 576
32	24-Dot single-density	24 (203 DPI)	0–288 (101 DPI)	24 × 288
33	24-Dot double-density	24 (203 DPI)	0–576 (203 DPI)	24 × 576

**Slip Station**

Value of <i>m</i>	Mode	No. of dots (vertical)**	No. of dots (horizontal)	No. of dots/line
0	7-Dot single-density	7 (72 DPI)	330 (69.5 DPI)	7 × 330
1*	7-Dot double-density	7 (72 DPI)	660 (139 DPI)	7 × 660
32, 32	Not available on slip			

In single density, one byte (7-dots) is printed in each full dot column; in double-density, one byte is printed in each half/full dot column.

\* Adjacent horizontal dots (overlapping dots) are not printed on the slip.

\*\*In A758 emulation and A760 native modes, there are 8 vertical dots.

**Value of *n*:**

Value of <i>n</i> (8-dot single-density mode)	Value of <i>n</i> (24-dot single-density mode)	Value of <i>d</i>
$n1 + (256 \times n2)$	$3 \times [n1 + (256 \times n2)]$	Number of bytes of data*

\*Printed left to right (8-dot mode); Printed down then across (24-dot mode).

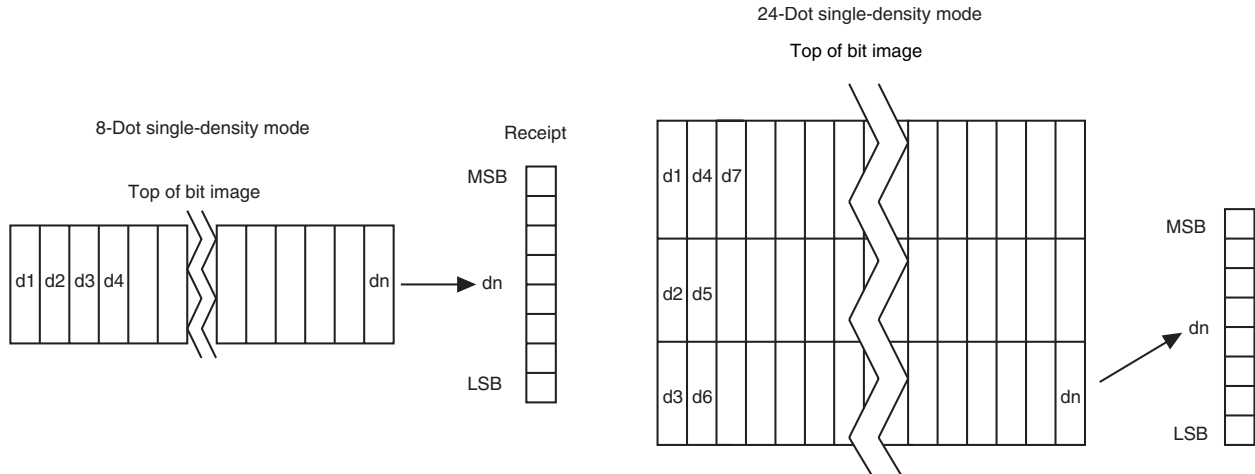
**Formulas**

8-dot single-density  $n1 + (256 \times n2)$   
 24-dot single-density  $3 \times [n1 + (256 \times n2)]$

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 on next page.

In A756 emulation mode, slip graphics are only 7-bit (MSB not printed.) In A758 emulation and A760 native modes, slip graphics are 8-bit.



**Select double-density graphics**

**ASCII**            ESC Y  $n_1 n_2 d_1 \dots d_n$    or   ESC L  $n_1 n_2 d_1 \dots d_n$   
**Hexadecimal**   1B 59  $n_1 n_2 d_1 \dots d_n$    or   1B 4C  $n_1 n_2 d_1 \dots d_n$   
**Decimal**         27 89  $n_1 n_2 d_1 \dots d_n$    or   27 76  $n_1 n_2 d_1 \dots d_n$

**Value of  $n$ :**

Value of $n$ (8-dot single-density mode)	Value of $n$ (24-dot single-density mode)	Value of $d$
$n_1 + (256 \times n_2)$	$3 \times [n_1 + (256 \times n_2)]$	Number of bytes of data (printed down, then across)

Enters one line of 7 (slip in A756 mode) or 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. The number of bytes sent is represented by the formulas in the table.

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

**Exception**

1B 4C  $n_1 n_2 d_1 \dots d_n$  is only valid in A756 emulation mode.



**Select the current logo (downloaded bit image)**

<b>ASCII</b>	GS # <i>n</i>
<b>Hexadecimal</b>	1D 23 <i>n</i>
<b>Decimal</b>	29 35 <i>n</i>

**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.

**Exception**

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

**Define downloaded bit image**

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

**Value of n1:** See the following table  
**Value of n2:** See the following table  
**Value of d:** See the following table

Value of n1	Value of n2	Value of d
1–56 (8 x n1 = number of horizontal dot columns)	1–64 (number of vertical bytes)	Bytes of data (printed down, then across)

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

Enters a downloaded bit image (such as a logo) into RAM or flash with the number of dots specified by n1 and n2 in A756 emulation, unless loaded in to flash. If in RAM, the downloaded bit image is available until power is turned off, another bit image is defined, or initialize printer (1B 40) command is received, or define user-defined character set (1B 26), command is received.

By default, A756 emulation loads downloaded bit image to SRAM, while A758 emulation and A760 native modes loads them to flash.

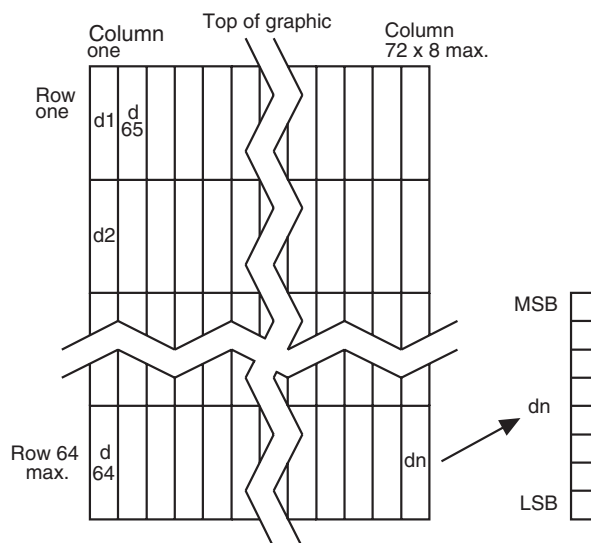
See the illustration below for a graphic representation of the downloaded bit image.

See the illustration for the print downloaded bit image command (1D 2F) for a representation of the bit image

**Related Information**

See 1D 22 n (select memory type to store logos) and 1D 23 n (select the current logo.)

**Exception**



**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 <i>m</i>	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 two-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.

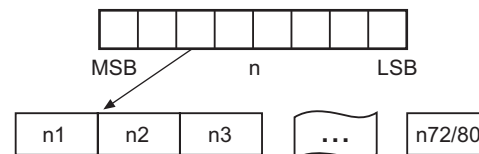
**Print raster monochrome graphics (ColorPOS®)**

**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 two-color paper is indicated by the set paper type command, then the raster will be printed in the color that is defined by the set current color command.



**Print raster color graphics (ColorPOS®)**

**ASCII** GS 0x83 n1.....n144 (576 dots 80 mm paper) / n160 (640 dots, 82.5 mm paper)

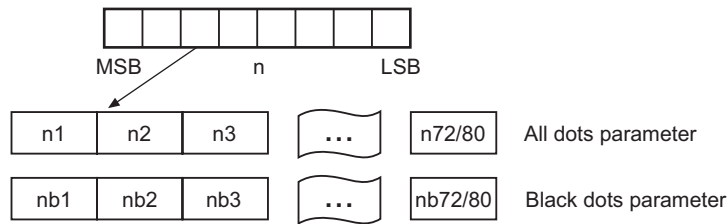
**Hexadecimal** 1D 83 n1.....n144 (576 dots 80 mm paper) / n160 (640 dots, 82.5 mm paper)

**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®)**

<b>ASCII</b>	G5 0x84 <i>m n1 n2 d1.....dx</i> , <i>x = (n1 * n2*8) * m</i>
<b>Hexadecimal</b>	1D 84 <i>m n1 n2 d1.....dx</i> , <i>x = (n1 * n2*8) * m</i>
<b>Decimal</b>	29 132 <i>m n1 n2 d1.....dx</i> , <i>x = (n1 * n2*8) * m</i>
<b>Value of <i>m</i>:</b>	1 = monochrome 2 = two-color
<b>Max <i>n1</i> =</b>	576/8 for 80 mm paper or 640/8 for 82.5 mm paper

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

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

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

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

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

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

**Apply shading to logo (ColorPOS®)**

<b>ASCII</b>	G5 0x8B <i>n m o</i>
<b>Hexadecimal</b>	1D 8B <i>n m o</i>
<b>Decimal</b>	29 139 <i>n m o</i>

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

$0 \leq m \leq 100$ , possibly resulting in a logo suitable for background watermark mode use

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

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

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

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

**Chapter 4: Programming commands****Merge watermark mode (ColorPOS®)**

**ASCII**           GS 0x8C *n m*  
**Hexadecimal**   1D 8C *n m*  
**Decimal**         29 140 *n m*

**Default**        0 (off)

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

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

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

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

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

**Monochrome shade mode (ColorPOS®)**

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

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

*m* specifies the percentage of shading,  $0 \leq m \leq 100$ .

$m = 0$  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 background only.*

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

Both text and monochrome graphics are affected by this command.

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

**Color shade mode (ColorPOS®)**

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

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

*m* specifies the percentage of shading,  $0 \leq m \leq 100$ .

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

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

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

Both text and monochrome graphics are affected by this command.

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

**Logo print with color plane swap (ColorPOS®)**

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

This command will print logo *n*. The command is ignored if a logo with index *n* has not been defined. If *m* = 0 the color(s) as defined in the logo are used; if *m* = 1 and if the

logo is a color one, then the two color planes (black and paper-color) in the logo are swapped.

**Chapter 4: Programming commands****Form and merge real-time surround graphic (ColorPOS®)**

<b>ASCII</b>	G5 0x90 <i>mxyopq</i>
<b>Hexadecimal</b>	1D 90 <i>mxyopq</i>
<b>Decimal</b>	29 144 <i>mxyopq</i>

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

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

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

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

Each 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®)**

<b>ASCII</b>	G5 0x91 <i>n</i>
<b>Hexadecimal</b>	1D 91 <i>n</i>
<b>Decimal</b>	29 145 <i>n</i>

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®)**

<b>ASCII</b>	G5 0x92 <i>n</i>
<b>Hexadecimal</b>	1D 92 <i>n</i>
<b>Decimal</b>	29 146 <i>n</i>

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.

**Shade and store logo (ColorPOS®)**

<b>ASCII</b>	G5 0x9A <i>n m o</i>
<b>Hexadecimal</b>	1D 9A <i>n m o</i>
<b>Decimal</b>	29 154 <i>n m o</i>

<b>Value of <i>n</i>:</b>	<i>n</i> is ID (logo index value) of an existing logo in either flash or RAM memory
<b>Value of <i>m</i>:</b>	<i>m</i> is the % of shading to be applied to the logo, $0 \leq m \leq 100$ .
<b>Value of <i>o</i>:</b>	<i>o</i> is the new ID (logo index value) to be used to store the shaded result, according to the current setting of user storage into flash or RAM.

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

**Logo print with knife cut**

<b>ASCII</b>	G5 0x9B <i>m n</i>
<b>Hexadecimal</b>	1D 9B <i>m n</i>
<b>Decimal</b>	29 155 <i>m n</i>

<b>Value of <i>m</i>:</b>	0 = Standard size 1 = Double wide 2 = Double high 3 = Double high/wide
<b>Value of <i>n</i>:</b>	01 - FF (Hex) #dot rows = $n \times 24$ <i>n</i> = 5 is the recommended setting

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

The formula “ $n \times 24$ ” is used to determine the number of dot rows to move the paper from the start of the logo to the position of the cut.

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

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

The command is available only in A795 native mode.

**Related information**

See “Print downloaded bit image” command.

## Chapter 4: Programming commands

**Apply margin message mode (ColorPOS®)**

<b>ASCII</b>	US 0x99 <i>l m n o</i>
<b>Hexadecimal</b>	1D 99 <i>l m n o</i>
<b>Decimal</b>	29 153 <i>l m n o</i>
<b>Value of <i>l</i>:</b>	<i>l</i> is a binary switch:  0 = disables margin message merging 1 = enable left margin message merging 2 = enable right margin message merging <i>l</i> > 2 ignore command
<b>Value of <i>m</i>:</b>	<i>m</i> is the ID (index) of the logo to be used in the merging. If a logo with index <i>m</i> does not exist or is wider than the print raster width then this command is ignored.
<b>Value of <i>n</i>:</b>	<i>n</i> is the number of raster rows to be empty (skipped) before repeating the designated margin message merge
<b>Value of <i>o</i>:</b>	<i>o</i> is a right – left toggle switch:  <i>o</i> = 0 no toggling of the margin message merge <i>o</i> = 1 enable toggling, starting with a left margin message first <i>o</i> = 2 enable toggling, starting with a right margin message first <i>o</i> > 2 ignore entire command

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

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

**Set temporary max target speed**

<b>ASCII</b>	GS 0xA0 <i>nl nh</i>
<b>Hexadecimal</b>	1D A0 <i>nl nh</i>
<b>Decimal</b>	29
<b>Values:</b>	15H - B4H monochrome 15H - 64H color
<b>Default:</b>	0 - normal speed

This command sets a specific speed for an operation, allowing the user more control of the print environment.

The speed is maintained as long as it is less than the speed automatically set by power management. A parameter of zero (0) restores the normal max speed.

**Set LogoEZ® colorization**

<b>ASCII</b>	US ETX SYN <i>f s p/t t</i>
<b>Hexadecimal</b>	1F 03 16 <i>f s p/t t</i>
<b>Decimal</b>	31 03 22 <i>f s p/t t</i>
<b>Value of f:</b>	0 = turn off all LogoEZ® colorization features 1 = link print logo after knife cut 2 = link watermark printing 3 = link margin message printing 4 = link logo print before cut
<b>Default:</b>	0 (Off)

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

The command is available only in A760 native mode. Once logos have been loaded and enabled they can be used in any emulation mode. Skip distances remain constant. A760 native mode must be used to turn the feature off.

**Value descriptions:**

**f =** function selector and defines which parameters are used :

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

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

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

**Example:**

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

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

- stop background merging (1D 9B 1 command)
- skip *s* (feed paper) dot rows (15 *s* command) – adds spacing in addition to any set by the application around a knife cut command
- set centered justification (1B 61 1 command), saving the previous justification
- if the logo at F0h is currently defined, print logo by sending print downloaded bit image, normal size (1D 2F 0 command) without changing the value of current logo
- reset justification to previous value (1B 61 [previous value])
- skip (feed paper) “*p*” dot rows after logo (15 *p* command)

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

*continued...*

**f = 2** link watermark printing

**Example:**

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

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

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

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

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

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

**f = 3** link margin message printing

**Example:**

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

Toggle mode values for *t*:

- 0 = both left and right side
- 1 = toggle sides, starting with left side
- 2 = right side margin message only
- 3 = left margin message only

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

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

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

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

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

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

Immediately before executing a knife-cut command, if  $s > 0$ , execute the following:

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

**Related information**

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

**LogoEZ® utility default settings:**

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

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

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

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

**Chapter 4: Programming commands****Set LogoEZ® attribute mapping****ASCII** US ETX ETB *a m s***Hexadecimal** 1F 03 17 *a m s***Decimal** 31 03 23 *a m s*

**Values:**

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

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

**Original attribute mapped table**

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

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

**Attributes substituted table**

<i>m</i> bit on	attributes substituted
7	Bold substituted

<i>s</i> bit on	attributes substituted
0	Italic
1	Reverse
2	Underline
3	Double high
4	Double wide
5	Compressed print
6	Alternate color
7	Color reverse

*continued...*

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

The command is available only in A760 native mode. Once attributes have been defined and enabled they can be used in any emulation mode. A760 native mode must be used to turn the feature off.

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

In the tables you will see that there are 7 input attributes and 9 outputs. It is expected that the alternate color attribute will be used most. For example, when the alternate color attribute is combined with the reverse substitution attribute, the result is white characters on a color background. The color reverse attribute without alternate color will print black text on a color background. Any mappings utilizing compressed and/or double-wide attributes will effect the length of a line and could cause unintended line wraps. Mappings containing double-high attributes could cause unintended receipt lengths.

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

#### Related information

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

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

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

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

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

**Chapter 4: Programming commands****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 A758 graphic emulation in A758 emulation or A760 native modes.

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.

**Exception**

This command is available in A758 or A760 native modes only.

**Enable constant speed logos**

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

**Value:** 0 = disabled  
 1 = enabled

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

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



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## Status

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### Status command introduction

The A760 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 stored in the printer buffer. Periodically, when the printer has time, it scans the input buffer looking for these commands. When found by the printer, these commands are processed immediately. This gives the application the ability to query the printer when it is in a busy state in order to correct whatever fault has occurred.

**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.

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### 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 A756, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A760 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.

**Request alternate status (parallel 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	High = Open Low = Closed or Not Present
01	Drawer 2	High = Open Low = Closed or Not Present
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 <sup>1</sup>

<sup>1</sup>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, when the IEEE 1284 interface is in unidirectional mode. When this command is send to the printer, the printer goes “Busy” unit all data which has been sent to the print 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-232C)**

Bit	Function	0 Signifies	1 Signifies
0	Receipt paper	OK	Low (only if paper low sensor is (enabled))
1	Receipt cover front cover	Closed	Open
2	Receipt paper	OK	Out
3	Always zero		Always zero*
4	Always zero		
5	Slip leading edge sensor	Not covered	Covered
6	Slip trailing edge sensor	Not covered	Covered
7	Always zero	OK	Always zero*

\*The printer does not process ESC v until an error condition is cleared.

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 real time commands, in this document for details about fault conditions reporting.

**Transmit printer ID**

**ASCII**           GS | *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:

<b>n</b>	<b>Printer ID</b>	<b>Specification</b>	<b>ID (Hexadecimal)</b>
1, 49	Printer model ID	CognitiveTPG A760	0x28 (A758 emulation and A760 native modes)
1, 49	Printer model ID	CognitiveTPG A756	0x26 (A756 emulation)
2, 50	Type ID	Installed options	Refer to the table below
3, 51	ROM version ID	ROM version	0x00
4, 52	Logo definition	Logo definition	Refer to table next column

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

**Type ID (*n* = 2)**

<b>Bit</b>	<b>Off/On</b>	<b>Hex</b>	<b>Decimal</b>	<b>Function</b>
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.
	Off	00	0	No MICR installed.
3	On	08	8	MICR installed.
	Off	00	0	Not used. Fixed to Off.
4	-	-	-	Undefined
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

***n* = 4 : Logo Definition**

<b>Bit</b>	<b>Off/On</b>	<b>Hex</b>	<b>Decimal</b>	<b>Function</b>
0	Off	00	0	No logo definition loaded by application.
	On	01	1	Logo loaded by application
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.

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

**Transmit printer ID, remote diagnostics extension**

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

**Values of *n*:** Refer to table

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

Performs the remote diagnostic function specified by *n*.

Eighteen remote diagnostic items are defined: eight printer ID items and ten printer tally items. 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.

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
"	22	34	Serial #	Not available, cannot clear serial # item
#	23	35	Serial #	Return Serial #, preceded by <i>n</i> 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

Continued...

## Chapter 4: Programming commands

<b>Value of <i>n</i></b>				
<b>ASCII</b>	<b>Hex</b>	<b>Dec</b>	<b>Remote diagnostic item</b>	<b>Function</b>
é	82	130	Receipt lines tally	Clear receipt lines tally to 0
â	83	131	Receipt lines tally	Return receipt lines tally, preceded by <i>n</i> 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
å	86	134	Knife cut tally	Clear knife cut tally to 0
ç	87	135	Knife cut tally	Return knife cut tally, returns 10 bytes
ê	88	136	Slip Character tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
ë	89	137	Slip character tally	Write to NVRAM, and printed on receipt to verify
è	8A	138	Slip character tally	Clear slip tally to 0
ï	8B	139	Slip character tally	Return slip character tally, returns 10 bytes
î	8C	140	MICR read tally, 8 digit ASCII numeric 99,999,999	Write to NVRAM
ì	8D	141	MICR read tally	Write to NVRAM, and print on receipt to verify
Ä	8E	142	MICR read tally	Clear MICR read tally to 0
Å	8F	143	MICR read tally	Return MICR read tally, returns to 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
ò	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

Continued...

## Chapter 4: Programming commands

Value of <i>n</i>				
ASCII	Hex	Dec	Remote diagnostic item	Function
<u>a</u>	A6	166	Flash cycles tally	Clear flash cycles cut tally to 0
<u>o</u>	A7	167	Flash cycles tally	Return flash cycles cut tally, returns 10 bytes
<u>z</u>	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
j	AD	173	Cover openings tally	Write to NVRAM, and print on receipt to verify
«	AE	174	Cover openings tally	Clear cover openings tally to 0
»	AF	175	Cover openings tally	Return cover openings tally, returns 10 bytes
	B2	178	Max temperature tally	Reset max temperature reached value
	B3	179	Max temperature tally	Return max temperature reached since it was reset, returns 10 bytes
⊥	B4	180	Slip lines tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
⊥	B5	181	Slip line tally	Write to NVRAM, and print on receipt to verify
⊥	B6	182	Slip lines tally	Clear slip lines tally to 0
⊥	B7	183	Slip lines tally	Return slip line tally, returns 10 bytes

**Transmit status**

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

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

**Range of n:** 1–4  
 49–52

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

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

When XON/XOFF RS-232C communications handshaking control is selected, the printer transmits the one byte response regardless of the host signal DSR.

**Printer status (n = 1 or n = 49)**

Bit	Off/On	Hex	Decimal	Status for transmit status
0	Off	00	0	Receipt paper adequate.
	On	01	1	Receipt paper low.
1	Off	00	0	Receipt paper adequate.
	On	02	2	Receipt paper low.
2	Off	00	0	Receipt paper present.
	On	04	4	Receipt paper exhausted.
3	Off	00	0	Receipt paper present.
	On	08	8	Receipt paper exhausted.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present.
	On	20	32	Slip leading edge sensor: no paper.
6	Off	00	0	Slip trailing edge sensor: paper present.
	On	20	32	Slip trailing edge sensor: no paper.
7	Off	00	0	Not used. Fixed to off.

When unsolicited status mode (USM) is enabled using the enable/disable unsolicited status mode command (1D 61), the status transmitted by this command (transmit status) and the USM status must be differentiated according to the information found in recognizing data from the printer. This is found in the real time commands section of this document.

The status bytes to be transmitted are described in the following four tables.

**Exceptions**

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

Unlike the A756, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A760 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.

**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.

*Continued...*



## Chapter 4: Programming commands

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

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

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

Bit	Off/On	Hex	Decimal	Status for transmit status
0	–	–	–	Undefined. Fixed to off.
1	–	–	–	Undefined. Fixed to off.
2	Off	00	0	User data storage write successful
	On	04	4	User data storage write failed, specified area not erased.
3	Off	00	0	Flash logo area adequate, definition stored.
	On	08	8	Flash logo area not adequate for recent definition.
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	No impact user-defined characters written to flash.
	On	04	64	Impact user-defined characters written to flash.
7	–	–	–	Undefined.

**Send printer software version**

<b>ASCII</b>	AX V
<b>Hexadecimal</b>	1F 56
<b>Decimal</b>	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:

- 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 to cancel a slip waiting condition when using the wait for slip command.

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.

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### 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 within a few msec of detecting it in the input buffer and will transmit status regardless of the condition of the DSR signal.

Second, the printer transmits status whenever it recognizes a real time status transmission command sequence, even if that sequence happens to occur naturally within the data of another command, such as graphics data.

In this case the sequence will also be handled correctly as the graphics data it is intended to be when the graphics command is executed from the buffer.

Third, care must be taken not to insert a real time command into the data sequence of another command that consists of two or more bytes.

In this case the printer will use the real time command sequence bytes instead of the other command's parameter bytes when finally executing that other command from the buffer; the other command will NOT be executed correctly.

These three situations generally preclude use of standard DOS drivers for the serial communication ports when using real time commands.

---

### Moving data through the buffer

Applications should not let the buffer fill up with real time commands when the printer is busy at the RS-232C interface. A busy condition at the RS-232C interface can be determined by bit 3 of the response to 1D 05, or 1D 04 1, or 10 04 1. The reason for a particular busy condition can be determined by other responses to 1D 04 *n* or 10 04 *n*.

Although the printer responds to real time commands when it is busy, it will place them into the buffer behind any other data there, and flush them out in the order in which they were received. When the printer is busy due simply to buffer full (that is, it can't print data as fast as it can receive it), then data continues to be processed out of the buffer at approximately print speed and the real time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed to the buffer until the condition clears one way or another. In either case, but more quickly in the case of an error condition, the buffer can fill with real time commands.

When the DLE (0x10) sequences are being used, the last byte stored when the buffer fills up could be the DLE (0x10) code, with no room for the subsequent EOT or ENQ. When this lone DLE (0x10) byte is finally processed out of the buffer it will be interpreted as a clear printer command.

Similarly, when the GS (1D) sequences are being used, the last byte stored when the buffer fills up could be the GS (1D) code, with no room for the subsequent EOT or ETX or ENQ. When this lone GS (1D) byte is finally processed out of the buffer it will use the next byte, whatever it is, as the second byte in its GS (1D) sequence.

To guard against this situation, the application must determine the cause of a busy condition and take appropriate action or pace the real time commands to avoid filling the buffer. There is a minimum of 256 bytes available in the printer's buffer when it goes busy.

**Busy line and fault conditions**

If the printer is in error condition (cover is open, paper is exhausted...), the printer will still accept data, respond to the batch mode status commands (1B 76 and 1B 75 0), handle the cash drawer commands, and not go busy until it

actually tries to execute a print command. Then it will stay busy and stop processing data out of the receive buffer until the condition clears. It will respond to the real time commands as described below.

**Real-time status transmission**

	<u>GS sequence</u>	<u>DLE sequence</u>
<b>ASCII</b>	GS EOT <i>n</i>	DLE EOT <i>n</i>
<b>Hexadecimal</b>	1D 04 <i>n</i>	10 04 <i>n</i>
<b>Decimal</b>	29 4 <i>n</i>	16 4 <i>n</i>

**Value of *n*:** GS/DLE sequence

- 1 = Transmit printer status
- 2 = Transmit RS-232C busy status
- 3 = Transmit error status
- 4 = Transmit receipt paper status
- 5 = Slip paper status

Transmits the selected one byte printer status specified by *n* command within a few msec 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 A756, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A760 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.

*Continued...*

## Chapter 4: Programming commands

**2 = Transmit RS-232C Busy Status**

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to off.
1	On	02	2	Fixed to on.
2	Off	00	0	Receipt and cassette cover closed.
	On	04	4	Receipt and cassette cover open.
3	Off	00	0	Paper feed button is not pressed.
	On	08	8	Paper feed button is pressed.
4	On	10	16	Fixed to on.
5	Off	00	0	Printing not stopped due to paper condition.
	On	20	32	Printing stopped due to paper condition.
6	Off	00	0	No error condition.
	On	40	64	Error condition exists in the printer.
7	Off	00	0	Fixed to off.

**3 = Transmit error status**

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to off.
1	On	02	2	Fixed to on.
2	Off	00	0	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	Receipt Paper adequate
	On	04	4	Receipt Paper low
3	Off	00	0	Receipt Paper adequate
	On	08	8	Receipt Paper low
4	On	10	16	Fixed to on
5	Off	00	0	Receipt Paper present
	On	20	32	Receipt Paper exhausted
6	Off	00	0	Receipt Paper present
	On	40	64	Receipt Paper exhausted
7	Off	00	0	Fixed to off

**5 = Transmit Slip Paper Status**

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Slip paper selected
	On	04	4	Receipt paper selected
3	Off	00	0	Not waiting for slip
	On	08	8	Waiting for slip
4	On	10	16	Fixed to On
5	Off	00	0	Slip leading edge sensor: paper preset
	On	20	32	Slip leading edge sensor: no paper
6	Off	00	0	Slip trailing edge sensor: paper preset
	On	40	64	Slip trailing edge sensor: no paper
7	Off	00	0	Fixed to Off

**Chapter 4: Programming commands****Real-time request to printer**

	<u>GS sequence</u>	<u>DLE sequence</u>
<b>ASCII</b>	GS ETX <i>n</i>	DLE ENQ <i>n</i>
<b>Hexadecimal</b>	1D 03 <i>n</i>	10 05 <i>n</i>
	29 3 <i>n</i>	16 5 <i>n</i>
<b>Value of <i>n</i>:</b>	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.

***n* = 3**

Cancels the slip waiting status. This sequence is ignored except when the printer is waiting for a slip to be inserted.

When slip waiting is canceled, the receive and print buffers are cleared and the receipt is selected. When printing on the slip is to continue, the slip must be selected again.

**Exceptions**

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

An application using the DLE 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 1D 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.**

0	Off	00	0	Paper adequate.
	On	01	1	Paper low (if paper low sensor enabled).
1	Off	00	0	Paper adequate.
	On	02	2	Paper low (if paper low sensor enabled).
2	Off	00	0	Both receipt and cassette door closed.
	On	04	4	Both receipt and cassette door open.
3	Off	00	0	Not busy at the RS-232C interface.
	On	08	8	Printer is busy at the RS-232C interface.
4	Off	00	0	One or both cash drawers open.
	On	10	16	Both cash drawers closed.
5	Off	00	0	Paper present at both slip sensors.
	On	20	32	Paper not present at one or both sensors
6	Off	00	0	No error condition.
	On	40	64	Error condition exists in the printer.
7	On	80	128	Fixed to on.

**Real-time commands disable**

**ASCII** US z n  
**Hexadecimal** 1F 7A n  
**Decimal** 31 122 n

**Value of n:** 0 = disable  
 1 = enable

This command is used to disable real time commands. They are disabled prior to sending graphic or other data to the printer that may contain embedded real time commands.

**Exceptions**

Unlike the A756, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A760 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.

This command is a batch command and processed in the order received.

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## Unsolicited status mode

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### 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



## Chapter 4: Programming commands

**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 RS-232C interface.
	On	08	8	Printer is busy at the RS-232C 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	Mechanical error occurred
3	Off	00	0	No knife error.
	On	08	8	Knife error occurred.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No recoverable error.
	On	40	64	Recoverable error: Cover open, paper out, temperature or voltage error is out of range.
7	Off	00	0	Not used. Fixed to off.

**Third byte (paper sensor information)**

Bit	Off/On	Hex	Decimal	Status for 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 adequate
	On	02	2	Receipt paper low (if paper low sensor enabled)
2	Off	00	0	Receipt paper present.
	On	04	4	Receipt paper exhausted.
3	Off	00	0	Receipt paper present.
	On	08	8	Receipt paper exhausted.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present
	On	20	32	Slip leading edge sensor: no paper
6	Off	00	0	Slip trailing edge sensor: paper present
	On	40	64	Slip trailing edge sensor: no paper
7	Off	00	0	Not used. Fixed to off.

**Fourth byte (paper sensor information)**

Bit	Off/On	Hex	Decimal	Status for USM
0	Off	00	0	Slip paper selected
	On	01	1	Receipt paper selected
1	Off	00	0	Possible to print on slip
	On	02	2	Not possible to print on slip because no form has been inserted
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

**Chapter 4: Programming commands****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.

<b>Batch mode response</b>		<b>Response recognized by:</b>								
<b>ASCII</b>	<b>HEX</b>									
ECS <i>u</i> 0	1B 75 0	0	0	0	0	0	0	x	x	Binary
ESC <i>v</i>	1B 76	0	x	x	0	0	x	x	x	Binary
GS <i>l n</i>	1D 49 <i>n</i>	0	x	x	0	x	x	x	x	Binary
GS <i>r n</i>	1D 72 <i>n</i>	0	x	x	0	x	x	x	x	Binary
<b>Real time response</b>		<b>Response recognized by:</b>								
<b>ASCII</b>	<b>HEX</b>									
GS EOT <i>n</i>	1D 04 <i>n</i>	0	x	x	1	x	x	1	0	Binary
DLE EOT <i>n</i>	10 04 <i>n</i>	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
<b>Unsolicited status mode (USM)</b>		<b>Response recognized by:</b>								
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.

**Note:** A756 firmware can be set for module widths in bar codes ranging from 2 dots to 4 dots per module (DPM) for the narrow modules. The default is 3 DPM.

A760 firmware range from 1 dot per module (DPM) printed on the receipt, The default is 2 DPM.

---

### 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 15.2 CPI  
 1 = Compressed pitch at 19 CPI

**Default:** 0 (Not printed)

Selects standard and compressed font for printing bar code characters.

When slip is selected as the interface, HRI is always compressed.

---

### Select bar code height

**ASCII** GS h *n*  
**Hexadecimal** 1D 68 *n*  
**Decimal** 29 104 *n*

**Value of *n*:** Number of dots

**Range of *n*:** 1–255

**Default:** 162

Sets the bar code height to ( $n/154''$ ) for receipt and ( $n/172''$ ) for slip.

**Chapter 4: Programming commands****Print bar code**

	<u>First Variation</u>	<u>Second Variation</u>
<b>ASCII</b>	GS k m d1...dk NUL	GS k m n d1...dn
<b>Hexadecimal</b>	1D 6B m d1...dk 00	1D 6B m n d1...dn
<b>Decimal</b>	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 .

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. Length *k* is not specified in command string; it depends on the bar code being printed.

<i>m</i>	Bar code	<i>d1...dk</i>	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) <i>d1 = dk = 42</i> (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**	1–255	Variable length, maximum 1000 characters

\*\*This bar code can not be printed on the slip station.

Second variation: length  $n$  specified at beginning of string. Except as noted,  $0 < n < 256$ .

<i>m</i>	Bar code	<i>d1...dn</i>	<i>n</i>
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	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
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
74	Code 128 auto compress	0–255 00–FF	Variable
75	PDF 417	0–255 00–FF	Variable length
78	Code EAN 128 auto compress	0–255 00–FF	Variable
79	PDF 417 data length specified via integer $n = nH:nL 1D 6B m nL nH d1...dn$	0–255 00–FF	Variable

The value of  $m$  selects the bar code system as described in the table.

The variable  $d$  indicates the character code to be encoded into the specified bar code system. If character code  $d$  cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

### Exceptions

Illegal data cancels this command.

PDF 417 format cannot be printed on the slip.

Bar codes on the slip are always LEFT justified.

Code 93 and PDF 417 are only available in A760 native mode.

**Chapter 4: Programming commands****Set GS1 DataBar (RSS) parameters**

Setting of parameters for RSS barcode

**ASCII** GS q a b c d e f L fH  
**Hexadecimal** 1D 71 a b c d e f L fH  
**Decimal** 29 113 a b c d e f L fH

a	byte	pixels per minimum unit, default 3, minimum 2, maximum 6 (value a applies to parameters b, c, d)
b	byte	X undercut, default 0, can be set 0 to a-1
c	byte	Y undercut, default 0, can be set 0 to a-1
d	byte	separator height, default a, can be set a to a*2
e	byte	segment width, used only by GS1 Expanded and Expanded Stacked, default 22, must be even number 2 to 22
f	word	line height, used only by UCC128, default 25, can be set 1 to 500

*Note:* For GS1 DataBar commands, consult ISO/IEC 24721. For further information, visit [www.gs1.org](http://www.gs1.org).

**Print GS1 DataBar (RSS), data length specified**

**ASCII** GS k m nL nH d1... dn  
**Hexadecimal** 1D 6B m nL nH d1... dn  
**Decimal** 29 107 m nL nH d1... dn

<b>m</b>	<b>Type</b>
61	GS1
62	GS1 Truncated
63	GS1 Stacked
64	GS1 Stacked Omnidirectional
65	GS1 Limited
66	GS1 Expanded and Expanded Stacked
67	UPC-A
68	UPC-E
69	EAN-13
6A	EAN-8
6B	UCC/EAN-128 with CC-A or CC-B
6C	UCC/EAN-128 with CC-C

*Note:* Data length specified 1 to 2436 via integer nH : nL.

**Print GS1 DataBar (RSS ), null terminated****ASCII** GS k n d1... 00**Hexadecimal** 1D 6B n d1... 00**Decimal** 29 107 n d1... 00

<b><i>n</i></b>	<b>Type</b>
51	GS1
52	GS1 Truncated
53	GS1 Stacked
54	GS1 Stacked Omnidirectional
55	GS1 Limited
56	GS1 Expanded and Expanded Stacked
57	UPC-A
58	UPC-E
59	EAN-13
5A	EAN-8
5B	UCC/EAN-128 with CC-A or CC-B
5C	UCC/EAN-128 with CC-C

*Note:* Null terminated, data length 1 to 2436

**Chapter 4: Programming commands****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:**

<b>Value:</b>	<b>Ranges:</b>	<b>Description:</b>
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.”

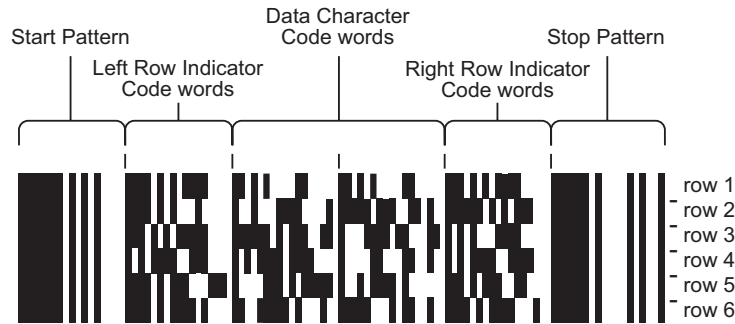
There are three mutually exclusive sets of symbol patterns, or clusters, each having 929 distinct patterns. Because different clusters are used for adjacent rows, it is possible for the decoder to tell if the scanning path is crossing row boundaries without the use of separator bars.

*continued...*



**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.

**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:** 3 for receipt; 2 for slip

Sets the bar code width to *n* dots.

**Related Information:**

The "Set bar code width" command (1D 77 n) affects the x dimension and row height for PDF 417.

n value	x dimension	row height
2	2	7
3	3	10
4	4	13
5	5	17
6	6	20

**Formulas**

$n/8$  mm ( $n/203$  inch) for receipt.

$n/5.7$  mm ( $n/144$  inch) for slip.

**Chapter 4: Programming commands**

---

**Page mode**

Page mode is one of two modes that the A760 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. Once the printer receives the (0 × 0C) command, it prints the page and returns the printer to standard mode.

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.

**Limitations**

Page mode is only implemented on the receipt station in A758 emulation and A760 native modes.

---

**Print and return to standard mode**

**ASCII** FF  
**Hexadecimal** 0C  
**Decimal** 12

The processed data is printed and the printer returns to standard mode. The developed data is deleted after being printed. This command has the same code as the print and eject slip command, which is executed when the printer is not in page mode.

**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.

This command has the same code as the open form command, which is performed when the printer is not in page mode.

**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**

<b>ASCII</b>	ESC L
<b>Hexadecimal</b>	1B 4C
<b>Decimal</b>	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.

<b>Paper type</b>	<b>Total memory allocated (kBytes)</b>	<b>Area of construction (mm)</b>
Monochrome paper	40.5	72 wide × 72 high
Two-color paper	81.0	72 wide × 72 high (dots) 72 wide × 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.

**Chapter 4: Programming commands****Select standard mode**

<b>ASCII</b>	ESC S
<b>Hexadecimal</b>	1B 53
<b>Decimal</b>	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**

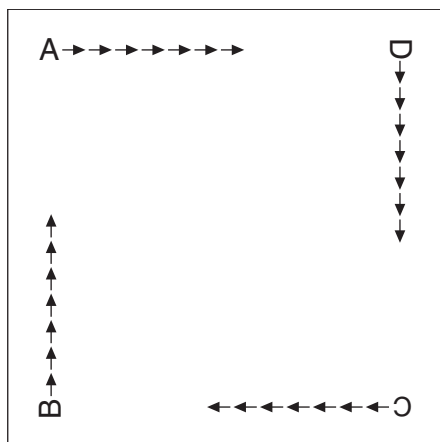
This command is effective only in page mode.

**Select print direction in page mode**

<b>ASCII</b>	ESCT <i>n</i>
<b>Hexadecimal</b>	1B 54 <i>n</i>
<b>Decimal</b>	27 84 <i>n</i>

<b>Value of <i>n</i>:</b>	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**

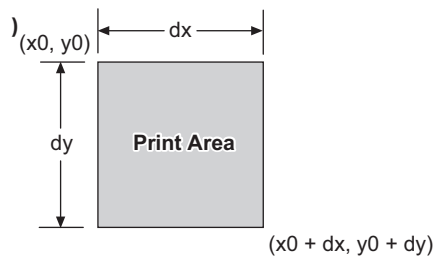
<b>ASCII</b>	ESC W <i>n1, n2 ...n8</i>	
<b>Hexadecimal</b>	1B 57 <i>n1, n2 ...n8</i>	
<b>Decimal</b>	27 87 <i>n1, n2 ...n8</i>	

**Range of *n*:** 0–255

<b>Default:</b>	<i>n1–4</i> =	0
	<i>n5</i> =	64
	<i>n6</i> =	2
	<i>n7</i> =	64
	<i>n8</i> =	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**

The starting position of the print area is the upper left of the area to be printed ( $x_0, y_0$ ). 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  $x_0, y_0, dx,$  and  $dy$ .

- $x_0 = [(n_1 + n_2 \times 256) \times (\text{horizontal direction of the fundamental calculation pitch})]$
- $y_0 = [(n_3 + n_4 \times 256) \times (\text{vertical direction of the fundamental calculation pitch})]$
- $dx = [(n_5 + n_6 \times 256) \times (\text{horizontal direction of the fundamental calculation pitch})]$
- $dy = [(n_7 + n_8 \times 256) \times (\text{vertical direction of the fundamental calculation pitch})]$

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 free RAM. Without any free RAM, bitmap rotations and enlargements cannot be performed. Use the user storage status command (1D 97 *m n*) to determine the amount of free memory.

**Exceptions**

The command is effective only in page mode.

---

### 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  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$  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

$[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$  inches.

#### Exceptions

This command is effective only in page mode.

If the  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$  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  $[(nL + nH \times 256) \times \text{vertical or horizontal motion unit}]$  inches. The amount of movement is calculated only for the paper roll.

When pitch  $n$  is specified to the movement downward:  
 $nL + nH \times 256 = n$

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:  
 $nL + nH \times 256 - 65536 = N$

#### 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.

This command is available in A758 emulation and A760 native modes.

---

### 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  $t \times 100$  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.

This command is available in A758 emulation and A760 native modes.

**Chapter 4: Programming commands**

---

**MICR commands**

---

**MICR reading**

These commands control the Magnetic Ink Character Recognition (MICR) check reader, including how it parses the character strings on checks.

The section, MICR parsing, describes how to create a parsing format and how to create and maintain an exceptions table.

---

**Read MICR data and transmit**

**ASCII**           ESC w 1  
**Hexadecimal**   1B 77 01  
**Decimal**         27 119 1

**Default:**       All data returned

Reads and transmits the MICR data and adds a carriage return (0x0D). If no parsing format is selected with either

of the define parsing format commands (see below), all data will be returned, which is the default.

---

**Transmit last MICR read**

**ASCII:**           ESC w R  
**Hexadecimal:**   1B 77 52  
**Decimal:**         27 119 82

Resends the previously decoded MICR data (as if the parsing has not been defined) to the host. The return data is defined in the “Read MICR data and transmit”

command (1B 77 01) without parsing and presents the data from the last MICR read since power-up or reset or indicates in the status that no read has yet occurred.

---

**MICR parsing**

This section describes MICR parsing in detail and includes several examples of useful parsing variations. It also describes how to create a parsing format and how to create and maintain an exception table.

---

**Define parsing format, save in NVRAM**

**ASCII:**           ESC w P *d1 d2 ... dn 0D*  
**Hexadecimal:**   1B 77 50 *d1 d2 ... dn 0D*  
**Decimal:**         27 119 80 *d1 d2 ... dn 0D*

Defines and saves parsing format. See parsing parameter string options in this document. Send with this command the parse data that is to be the default parse string at printer power-up. If no parameters are selected, parsing is not performed.

*d1* through *dn* are the parse string. The string must be CR terminated. If the string has invalid characters in it or is too long, the printer will store a null string, and raw MICR data will be returned.

---

**Define parsing format, do not save permanently**

**ASCII**           ESC w p  
**Hexadecimal**   1B 77 70  
**Decimal**         27 119 112

Defines, but does not save parsing format. See parsing parameter string options in this document. Send this command as often as desired to change the previous parse format string. The data sent with 1B 77 50 will be restored at power-up.

**Exception**

If no parameters are selected, parsing is not performed.



---

**Parsing parameter string options**
**Variable length fields**

Variable length field name	Selector	Comments
Transit number	T	Full 9-digit routing/transit number
Bank number	B	Digits 4–8 of transit number
Check digit	D	Digit 9 of transit number
Account number	A	
Check serial number	C	Separate from account number
Amount	\$	This field may not be present or readable

---

**Variable length field optional modifiers**

Variable length field optional modifiers	Selector	Comments
Zero fill to length	0	ASCII zero preceding maximum length
Maximum length	nn	1- or 2-digit ASCII number
Remove space/dash	X	
Replace space/dash with 0	x	

---

**Examples of variable length field format specifications**

Account #, all characters in the field, keep spaces and dashes	A
Account #, all characters in the field, replace spaces and dashes	xA
Account #, maximum 12 characters, keep spaces and dashes	12A
Account #, always 12 characters zero filled, remove spaces and dashes	012XA

**Chapter 4: Programming commands****Other parameters**

<b>Error number</b>	<b>E</b>	<b>One digit returned</b>
		0 Read OK
		1 Read error: bad character, empty field invalid length, check digit invalid

<b>Status</b>	<b>S</b>	<b>Two digits returned</b>
		01 No MICR data
		09 Mexican check
		08 Canadian check
		05 Error in transit number
		07 Error in account number
		04 Error in check serial number
		10 Business or commercial check
		11 Amount field present
		00 No error

<b>Field separator</b>	<b>'x</b>
	Field separator preceded by a single quote, so a field separator of the letter A would be sent as 'A (0x27 0x41).
	If a carriage return is specified as a separator (0x27 0x0D), a final carriage return must still terminate the parsing parameter string.

*Continued...*

Country code	Un	One digit returned
	n	Returned if US check
	nothing	Returned if not US check

Country code	Km	One digit returned
	m	Returned if Canadian check
	nothing	Returned if not Canadian check

Check type	L	One digit returned
	1	Personal check
	2	Business or commercial check

Ten parameters are more than enough to specify all variable length fields with a field separator each and other status information that may be helpful to an application. More than 10 parameters are not recommended because they use up space in non-volatile memory (NVRAM) available for the exception table.

The parsing parameter string is stored packed in NVRAM starting at word 10, with the total byte length stored in the high order byte of word 10. While most parameters take

two bytes of NVRAM, the following parameters take only one byte: B, D, E, S, L. None of the parsing examples in the following section take more than 14 bytes (seven words) of NVRAM.

The exception table starts at word 20. If the parsing parameter string extends into word 20, then the first exception table entry is unavailable.

### Sample parsing formats

The following strings show various sample formats that you can use assuming they meet your parsing format needs. Included with the sample format is a description of the data that is returned to the application.

#### ESC w p 18 A <CR>

- Maximum 18 characters in the account number
- Final carriage return

#### ESC w p 18 X A <CR>

- Maximum 18 characters in the account number with spaces and dashes removed
- Final Carriage Return

#### ESC w p 18 x A <CR>

- Maximum 18 characters in the account number with spaces and dashes replaced with 0
- Final carriage return

#### ESC w p 018 A <CR>

- Always 18 characters in the account number (high order zero-filled if necessary)
- Final carriage return

#### ESC w p 018 X A <CR>

- Always 18 characters in the account number with spaces and dashes removed
- Final carriage return

#### ESC w p 018 x A <CR>

- Always 18 characters in the account number with spaces and dashes replaced with 0
- Final Carriage Return

#### ESC w p T 18 X A 04C <CR>

- All characters in the transit number
- All characters in the account number (up to 18) with spaces and dashes removed
- Always four characters in the check number (zero-filled if check number is only three characters long)
- Final carriage return

#### ESC w p K9 X T 18 X A 04C <CR>

- U.S. check: all nine characters in the transit number (because there are no dashes)
- Canadian check: dash in transit number removed; “9” inserted at beginning, resulting in a fully numeric nine character transit number
- All characters in the account number (up to 18) with spaces and dashes removed
- Always four characters in the check number (zero-filled if check number is only three characters long)
- Final carriage return

#### ESC w p T / A / C / S <CR>

- All characters in the transit number
- Field separator: /
- All characters in the account number
- Field separator: /
- All characters in the check number
- Field separator: /
- Two-digit status
- Final carriage return

#### Notes:

All parameters are ASCII characters, i.e. greater than or equal to 0x20, with the exception of a non-ASCII character enclosed in single quotes as a field separator. This applies both to parameter specifications sent from application to printer, and to MICR data returned from printer to application.

Parameters are positional; their order in the parameter string is the order in which the parsed MICR data will be returned. Unrecognized parameters will be ignored, and processing of the parsing parameters will stop. Any data remaining after the unrecognized parameter will be treated as normal input data.

If parameters are not defined (for example, 1B 77 50 <CR> or 1B 77 70 <CR>) parsing is not selected. One status byte followed by all decoded MICR characters will be returned. The chart on the next page is the default parsing format if no other is selected:

**Chapter 4: Programming commands**

<b>Status</b>	<b>Status byte value</b>
Good read, data follows	0x00
Bad read, data follows	0x01
No check present, no data	0x02
Paper jam, no data	0x03
No MICR characters, no data	0x04

<b>MICR characters</b>	<b>ASCII</b>	<b>Hexadecimal</b>
Numerics	0 ... 9	0x30 ... 0x39
Unrecognized character	?	0x3F
Space		0x20
Amount symbol	&	0x26
Dash symbol	'	0x27
"on us" symbol	(	0x28
Transit symbol	)	0x29

Once a parsing format is specified, the following values are returned:

<b>MICR characters</b>	<b>ASCII</b>	<b>Hexadecimal</b>
Numerics	0 ... 9	0x30 ... 0x39
Space		0x20
Dash	-	0x2D

Field separator\*

Country code\*

\*As specified in the parsing parameter string

**Chapter 4: Programming commands****Check serial number**

Parsing the check serial number

Most banks print the check serial number in three easily recognizable spots. The printer firmware will look for the number in these spots, using the following ordered algorithm. The examples use letters to represent symbols on the check:

<b>t</b>	Transit symbol
<b>o</b>	“on us” symbol
<b>\$</b>	Amount symbol
<b>-</b>	Dash
<b>c</b>	Check serial number
<b>x</b>	Any other number

A number bracketed by “on us” symbols in the auxiliary “on us” field is the check serial number.

```
o c c c c c c o t x x x x x x x x t x x x x x x x x o
```

Otherwise, a three or more digit number to the right of the rightmost “on us” symbol, and to the left of the leftmost amount symbol if an amount field is present, is the check serial number.

```
t x x x x x x x x t x x x x x x x x o c c c c
t x x x x x x x x t x x x x x x x x o c c c c $ x x x x x x $
```

If both of these searches fail to produce the check serial number, extract the whole account number field from between the rightmost transit symbol and the rightmost “on us” symbol. A three, four, or five-digit number to the right of the rightmost transit symbol, separated by a space or a dash from the rest of the account number is the check serial number.

```
t x x x x x x x x t c c c c x x x x x x x x o
t x x x x x x x x t c c c c - x x x x x x x x o
t x x x x x x x x t c c c c x x x x x x x x o x x
```

If all of these searches fail to produce the distinct check serial number, and the check serial number field has been specified in the parsing parameter string options, no check serial number will be returned. If it is imbedded within the account number field, it will be returned as part of that variable length field.

**Exceptions**

Some banks print the check serial number in a location that cannot be electronically distinguished without specific exception information, although it can be visually distinguished because it is repeated in the upper right corner of the check. For these cases, the printer can hold up to nine exceptions for specific banks in its non-volatile memory (NVRAM), which is accessed by the read and write NVRAM commands. The specific bank is picked out by its transit number, and the firmware will look in the exception table for a transit number match before looking in the normal check serial number locations.

In this example, without an exception table entry, the firmware would always pick the rightmost four-digit number as the check serial number following rule two above. The bank with the three digit check serial number and the four digit extension after the “on us” symbol would need to be exceptionally recognized:

```
t x x x x x x x x t c c c - x x x x x x x x x o x x x x
t x x x x x x x x t x x x - x x x x x x x x x o c c c c
```

In this example, without an exception table entry, the firmware would not be able to pick out the check serial number because it is not separated from the rest of the account number:

```
t x x x x x x x x t c c c c x x x x x x x x x x o
```

In this example, without an exception table entry, the firmware would not be able to pick out the check serial number correctly, because it is imbedded within the rest of the account number:

```
t x x x x x x x x t x x x - c c c - x x x x x x x x x o
```

### Loading the exception table

The exception table begins at word 20 in NVRAM. Each entry takes five words. There is room for eight exceptions with a sumcheck written in the last word. An application can load local exceptions into the printer using the write

NVRAM command:

```
0x1B 0x73 n1 n2 k
```

which writes the two byte word n1:n2 to word k in NVRAM.

### Exception table entry format

Each exception table entry consists of five words. The first two words contain the first eight characters of the transit number by packing the low order nibble of the numeric transit number characters. For Canadian checks, eliminate the dash and store the eight numerics.

The next three words are used as six individual bytes to tell the firmware how to interpret the MICR characters that fall to the right of the rightmost transit symbol. Each of the six bytes is positional and consists of two parts: character type and number.

The three high order bits of each byte mark the character type. The characters can be marked in three ways: check serial # character, account # character, or “skip this character or symbol.”

The five low order bits of each byte contain the number of characters of that type to extract. Most exceptions will not need to use all six bytes; in that case clear the unused bytes to zero.

Bits within byte	7	6	5	4	3	2	1	0
Check serial # character string	0	0	1	n	n	n	n	n
Account # character string	0	1	0	n	n	n	n	n
Character string to ignore	1	0	0	n	n	n	n	n

#### Example 1

```
t123456780t12349876543210o
```

1234 is the check serial #  
9876543210 is the account #

To load the second table entry, which starts at word 25, the transit number 123456780 would be stored in the first two words of its table entry using this string of commands:

```
0x1B 0x73 0x12 0x34 25  
0x1B 0x73 0x56 0x78 26
```

After the right transit symbol are immediately the four characters of the check serial #, followed immediately by the ten characters of the account number. These would be bitwise encoded as:

```
0 0 1 0 0 1 0 0 (check #, four characters)  
and 0 1 0 0 1 0 1 0 (account #, 10 characters)
```

then stored in the other three words of the table entry using:

```
0x1B 0x73 0x24 0x4A 27  
0x1B 0x73 0x00 0x00 28  
0x1B 0x73 0x00 0x00 29
```

#### Example 2

```
t22137-632t001 6042202o927540
```

2754 is the check serial #  
6042202 is the account #

To load the third table entry, which starts at word 30, the transit number 2137-632 would be stored in the first two words of its table entry using this string of commands:

```
0x1B 0x73 0x22 0x13 30  
0x1B 0x73 0x76 0x32 31
```

After the right transit symbol are four characters to skip, a seven digit account number, two characters to skip, and finally a four digit check serial #. The final character to skip need not be encoded. These would be bitwise encoded as:

```
1 0 0 0 0 1 0 0 (skip four characters)  
0 1 0 0 0 1 1 1 (account #, seven characters)  
1 0 0 0 0 0 1 0 (skip two characters)  
0 0 1 0 0 1 0 0 (check #, four characters)
```

then stored in the other three words of the table entry using:

```
0x1B 0x73 0x84 0x47 32  
0x1B 0x73 0x82 0x24 33  
0x1B 0x73 0x00 0x00 34.
```

**Chapter 4: Programming commands****Maintaining the exception table**

Present contents of the exception table can be examined using the read NVRAM command:

```
0x1B 0x6A k
```

which reads and returns word k in NVRAM. When the exception table is full, a new entry can replace an older, less frequently used entry, by merely rewriting the words for that table entry.

**Check flip commands****Check flip command**

<b>ASCII</b>	ESC w F
<b>Hexadecimal</b>	1B 77 46
<b>Decimal</b>	27 119 70

Causes a check on the slip table to be fed into the printer, flipped and left with the trailing edge of the check in the slip feed rollers. Prior to the flip, the check is measured to see that it is of an appropriate size (see A760 ColorPOS® User Guide Chapter 5: Paper and Supplies, Forms Specification) to be flipped. If not, the check is fed back to the user.

**Exception**

This command is available only in A758 emulation and A760 native mode.

**Enhanced check flip status reporting command**

<b>ASCII</b>	ESC w G
<b>Hexadecimal</b>	1B 77 46 – 47
<b>Decimal</b>	27 119 70 – 71

Performs the same operation as Hex 1B 77 46, and returns a successful or error code.

See chart on next page.



## Chapter 4: Programming commands

Code	Description
0 (00h)	Successful check flip.
1 (01h)	Check/slip not detected by (at least) outside slip sensor.
2 (02h)	Flip sensor is covered when should not be. Slip stuck in flip mechanism.
3 (03h)	Outside slip sensor covered. Inside slip sensor uncovered. Slip feed rollers open or slipping on check.
4 (04h)	Slip motor times out while running check backward to uncover the inside slip sensor. Slip feed roller slipping or check jammed.
5 (05h)	Slip motor times out while running check forward to find trailing edge and measure check length. Check is too long or jammed.
6 (06h)	Check length less than specified minimum. Check is too short
7 (07h)	Check length more than specified maximum. Check is too long
8 (08h)	Slip motor times out while running check backwards towards flip mechanism. Does not require covering/uncovering sensors.

Code	Description
9 (09h)	Slip motor times out after flip sensor is covered. Check misses flip gate.
10 (0Ah)	Slip motor times out while check is being fed into the flip mechanism (to cover flip sensor) Check missed being diverted by flip gate or jammed.
11 (0Bh)	Flip motor times out during check being fed into flip mechanism to cover flip sensor.
12 (0Ch)	Slip motor times out while continuing to feed check farther into flip mechanism to uncover inside slip sensor.
13 (0Dh)	Flip motor times out while continuing to feed check farther into flip mechanism to uncover inside slip sensor.
14 (0Eh)	Slip motor times out while receiving check out of flip mechanism to cover inside slip sensor.
15 (0Fh)	Flip motor times out while pushing check out of flip mechanism to cover inside slip sensor.
31 (1Fh)	Flip sensor remains covered after check should be out of flip mechanism.
47 (2Fh)	Slip motor times out while running check out of slip station while waiting for outside slip sensor to be covered.

**Chapter 4: Programming commands**

---

**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.

---

**Read from user data storage****ASCII** ESC 4 *m a0 a1 a2***Hexadecimal** 1B 34 *m a0 a1 a2***Decimal** 27 52 *m a0 a1 a2***Value of *m*:** 0 – 255

Reads *m* bytes of data from the user data storage flash page at the address specified. Returns *m* bytes to the application, followed by a carriage return (0Dh).

The high order byte of the address (*a0*) ranges from 0 to *n2*–1, with *n2* specified in the flash allocation command. If the flash allocation command has been used, the *a0* = 0 always.

---

**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.

---

**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*:** 1<sup>st</sup> Byte**Value of *n2*:** 2<sup>nd</sup> Byte**Range of *k*:** 20 – 63 (decimal locations)

Writes the two-byte word, *n1 n2*, to location *k* in history EEROM.

**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)** Hex 30

Loads active logo to RAM only. This is used to print a special logo but not have it take up flash memory. A logo defined following this command is not preserved over a power cycle. The printer disables interrupts while writing to flash. Any command that cause data to be written to flash should be followed by a 50 Msec delay to allow significant time for the write operation.

**n = 49 (ASCII n = 1)** Hex 31

Loads active logo to flash memory. This is the default condition for logo flash storage. A logo defined following this command is stored in flash memory.

**n = 50 (ASCII n = 2)** Hex 32

Loads user-defined characters to RAM only. This is the default condition for user-defined character storage. Any user-defined characters defined following this command are not preserved over a power cycle.

**n = 51 (ASCII n = 3)** Hex 33

Loads user-defined characters to flash memory. An application must use this command to store user-defined characters in flash memory. Any user-defined characters defined following this command are stored in flash memory. A user-defined character cannot be redefined in flash memory. The flash memory page must be erased by an application before redefining user-defined characters. For more information, see the erase user flash sector

(1D 40 n) command.

Specifies whether to load the logos or user-defined characters to 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 A760 native mode. In A756 and 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)

n1 is the number of 64k sectors used for logos and user-defined characters.

n2 is the number of 64k sectors used for user data storage.

This command sets the allocation of flash sectors between user data storage and logos/user-defined characters. This allocation is saved in the EEPROM of the printer and is therefore saved across power cycles.

The printer will respond to the flash allocation command being sent with ACK (06H).

n1 + n2 <= 5 (dec) (1M)

n1 + n2 <= 21 (dec) 15 (hex) (2M)

The A760 has been configured at the factory with 1M or 2M of flash memory.

*Note: Flash memory is made up of user and program code. Therefore, the available flash memory space will vary with the amount of program code utilized.*

If n1 + n2 is greater than the maximum number of sectors available, the command is ignored. Reissuing this command with different parameters will erase all sectors.

**Exception**

This command is available only in A758 emulation and A760 native modes.

**Chapter 4: Programming commands****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)** Hex 31

This command erases all 64K flash memory sectors allocated to user-defined character and logos storage. Those sectors should be erased in two situations: when the logo definition area is full and an application is attempting to define new logos, and when an application wants to replace one user-defined character set with another. In both cases, all logos and character set definitions are erased and must be redefined.

***n* = 50 (ASCII *n* = 2)** Hex 32

This command erases all sectors available for user data storage.

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 ten seconds after sending the erase user flash sector (1D 40 n) command before sending data.*

**User storage status (ColorPOS®)**

<b>ASCII</b>	G5 0x97 m n
<b>Hexadecimal</b>	1D 97 m n
<b>Decimal</b>	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* = 3 return the CRC of a logo indexed 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).

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  $0x40 \leq n < 0x80$ .

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:

1<sup>st</sup> *m* (type) byte

2<sup>nd</sup> *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 RS-232C – Xon/Xoff, then “X symbol substitution response” should be configured with the setting communications parameters command (US STX , 1F 02).

**Chapter 4: Programming commands****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 up.
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 is 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 DOWN 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**

<b>ASCII</b>	ESC [ }
<b>Hexadecimal</b>	1B 5B 7D
<b>Decimal</b>	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 (*n*) 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.

**Chapter 4: Programming commands****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 <i>n</i> (for number of data bytes)	Range of address ( <i>aL aH</i> )	Range of count ( <i>cL cH</i> )
$((cH * 256) + cL)$	0000–FFFF (hexadecimal)	0001–FFFF (hexadecimal)

**Range:** Addresses run from 0 to 64K.

Contains a start address ( $aH \times 256 + aL$ ) and count ( $cH \times 256 + cL$ ) 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 count must always be 256.

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 Ox8E *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 two-color thermal papers. New paper definitions should be obtained from trusted sources such as the CognitiveTPG 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 preloaded 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.

**Chapter 4: Programming commands****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

Ends the load process and reboots the printer. Before executing this command, the printer should have firmware loaded and external switches set to the runtime settings. Application software for downloading should prompt the user to set the external switches and confirm before sending this command. If the downloading was started from a diagnostic, the reboot will cause the printer to re-enter download state unless the external switches are changed.

---

## Ethernet setup commands

---

The following commands are designed to set the required printer internal parameters for Ethernet operation. The commands can only be used in the Flash download (boot) mode (see page 126). See page 20 for default setup.

---

### Restore default settings

**ASCII** US BS NUL  
**Hexadecimal** 1F 08 00  
**Decimal** 31 8 0

Restores the Ethernet settings to the preset values.

Default settings are:

IP address:	192.0.0.192 (in use after boot time-out of two minutes)
Net mask:	0.0.0.0 (default mask of selected IP is used)
Gateway:	none
Raw TCPIP port 9001:	active
Telnet Daemon:	enabled
LP Daemon:	disabled
Bootp:	disabled
DHCP:	enabled
Inactivity timeout:	enabled
Keep alive pings:	disabled

---

### Setting IP address

**ASCII** US BS SOH *n1 n2 n3 n4*  
**Hexadecimal** 1F 08 01 *n1 n2 n3 n4*  
**Decimal** 31 8 1 *n1 n2 n3 n4*  
**Default:** 192.0.0.192

Sets the IP address value specified by the values of *n1* to *n4*.

---

### Setting Net Mask

**ASCII** US BS STX *n1 n2 n3 n4*  
**Hexadecimal** 1F 08 02 *n1 n2 n3 n4*  
**Decimal** 31 8 2 *n1 n2 n3 n4*  
**Default:** 0.0.0.0

Sets the Net Mask value specified by the values *n1* to *n4*.

---

### Setting the Gateway

**ASCII** US BS ETX *n1 n2 n3 n4*  
**Hexadecimal** 1F 08 03 *n1 n2 n3 n4*  
**Decimal** 31 8 3 *n1 n2 n3 n4*  
**Default:** none

Sets the printer to the gateway having the IP address value specified by the values *n1* to *n4*. A gateway, even when the printer is on another subnet, is not always needed.

The printer initiates no connection and obtains the gateway address from the host packets.

**Chapter 4: Programming commands****Setting raw TCPIP port 9001**

**ASCII** US BS EOT *n1 n2 n3 n4*  
**Hexadecimal** 1F 08 04 *n1 n2 n3 n4*  
**Decimal** 31 8 4 *n1 n2 n3 n4*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** enabled

Sets the port where the printer will look for raw tcpip communications.

**LP Daemon**

**ASCII** US BS ENQ *n1*  
**Hexadecimal** 1F 08 05 *n1*  
**Decimal** 31 8 5 *n1*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** disabled

Enables or disables the printer LP Daemon. The LP listens on port 515.

**Telnet Daemon**

**ASCII** US BS ACK *n1*  
**Hexadecimal** 1F 08 06 *n1*  
**Decimal** 31 8 6 *n1*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** enabled

Enables or disables the printer Telnet server. The Telnet server listens on port 23.

**BootP**

**ASCII** US BS BELL *n1*  
**Hexadecimal** 1F 08 07 *n1*  
**Decimal** 31 8 7 *n1*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** disabled

Enables or disables the use of BootP at power-up to obtain an IP address.

BootP is a subset of DHCP.

**DHCP (auto-configuration)**

**ASCII** US BS BS *n1*  
**Hexadecimal** 1F 08 08 *n1*  
**Decimal** 31 8 8 *n1*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** enabled

Enables or disables the use of DHCP at power-up to obtain an IP address. If no address is found within two minutes, DHCP obtains the default IP address.

**Inactivity timeout**

**ASCII** US BS HT *n1*  
**Hexadecimal** 1F 08 09 *n1*  
**Decimal** 31 8 9 *n1*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** enabled

Enables or disables resetting of open TCP ports after five (5) minutes inactivity.

---

**Keep alive pings**

**ASCII** US BS LF *n1*  
**Hexadecimal** 1F 08 0A *n1*  
**Decimal** 31 8 10 *n1*

**n1 = 0:** disabled

**n1 = 1:** enabled

**Default:** enabled

Enables or disables sending of the keep alive pings (self arps). Keep alive pings may be required for use with such things as smart hubs; to remind the smart hub to which port a printer is connected.

If enabled, self arps are sent every ten (10) minutes.

# Appendix A: **Commands listed by hexadecimal code**

## By command code

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

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
09	Horizontal tab	46
0A	Print and feed paper one line	42
0C	Print and eject slip	42
0C	Print and return to standard mode/print and eject slip	106
0D	Print and carriage return	42
10	Clear printer	33
10 04 <i>n</i>	Real-time status transmission (DLE sequence)	92
10 05 <i>n</i>	Real-time request to printer (DLE sequence)	94
11	Close form	33
12	Select double-wide characters	52
13	Select single-wide characters	52
14 <i>n</i>	Feed <i>n</i> print lines	42
15 <i>n</i>	Feed <i>n</i> dot rows	43
16 <i>n</i>	Add <i>n</i> extra dot rows	43
17	Print	44
18	Open form	34
18	Cancel print data in page mode	106
1A	Perform partial knife cut (or code 1B 6D)	34
1B (+*.BMP file)	Download BMP logo	62
1B 07	Generate tone	34
1B 0C	Print data in page mode	106

Code (hexadecimal)	Command	Page
1B 12	Select 90 degree counter-clockwise rotated print	52
1B 14 <i>n</i>	Set column	46
1B 16 <i>n</i>	Select pitch (column width)	52
1B 20 <i>n</i>	Set right-side character spacing	53
1B 21 <i>n</i>	Select print mode	53
1B 24 <i>nL nH</i>	Set absolute starting position	47
1B 25 <i>n</i>	Select or cancel user-defined character set	54
1B 26 <i>s c1 c2</i>	Define user-defined character sets	54
1B 27 <i>m a0 a1 a2 d1...dm</i>	Write to user data storage	122
1B 2A <i>m n1 n2 d1...dn</i>	Select bit image mode	63
1B 2D <i>n</i>	Select or cancel underline mode	55
1B 32	Set vertical line spacing to 1/6 inch	47
1B 33 <i>n</i>	Set vertical line spacing	47
1B 34 <i>m a0 a1 a2</i>	Read from user data storage	122
1B 3A 30 30 30	Copy character set from ROM to RAM	55
1B 3C	Return home	34
1B 3D <i>n</i>	Select peripheral device (for multi-drop)	35
1B 3F <i>n</i>	Cancel user-defined character	56
1B 40	Initialize printer	35
1B 43 <i>n</i>	Set slip paper eject length	35
1B 44 [ <i>n</i> ] <i>k 00</i>	Set horizontal tab positions	48
1B 45 <i>n</i>	Select or cancel emphasized mode	56
1B 47 <i>n</i>	Select double-strike	56
1B 48	Cancel double-strike	57
1B 49 <i>n</i>	Select or cancel italic print	57
1B 4A <i>n</i>	Print and feed paper	44

**Appendix A: Commands by hexadecimal code**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1B 4B <i>n</i>	Print and reverse feed paper	44
1B 4C	Select page mode	107
1B 4C <i>n1 n2 d1...dn</i>	Select double-density graphics (A756 emulation)	64
1B 52 <i>n</i>	Select international character code	57
1B 53	Select standard mode	108
1B 54 <i>n</i>	Select print direction in page mode	108
1B 56 <i>n</i>	Select or cancel 90 degree clockwise rotated print	58
1B 57 <i>n1, n2...n8</i>	Set print area in page mode	109
1B 59 <i>n1 n2 d1...dn</i>	Select double-density graphics	64
1B 5B 7D	Switch to flash download (boot) mode	126
1B 5C <i>n1 n2</i>	Set relative print position	49
1B 61 <i>n</i>	Select justification	50
1B 63 30 <i>n</i>	Select receipt or slip for printing; slip for MICR read	35
1B 63 31 <i>n</i>	Select receipt or slip for setting line spacing	36
1B 63 33 <i>n</i>	Select paper sensors to output paper end signals (parallel only)	36
1B 63 34 <i>n</i>	Select sensors to stop printing	37
1B 63 35 <i>n</i>	Enable or disable panel button	37
1B 64 <i>n</i>	Print and feed <i>n</i> lines	44
1B 65 <i>n</i>	Print and reverse feed <i>n</i> lines	45
1B 66 <i>m n</i>	Set slip paper waiting time	37
1B 6A <i>k</i>	Read from non-volatile memory (NVRAM)	122
1B 6D	Perform partial knife cut (or code 1A)	34
1B 70 <i>n p1 p2</i>	Generate pulse to open cash drawer	38
1B 72 <i>m</i>	Set current color	38
1B 73 <i>n1 n2 k</i>	Write to non-volatile memory (NVRAM)	122
1B 74 <i>n</i>	Select international character set	57



Code (hexadecimal)	Command	Page
1B 75 0	Transmit peripheral device status (RS-232C printers only)	82
1B 75 <i>n</i>	Request alternate status (A756 emulation only)	82
1B 76	Transmit paper sensor status	83
1B 77 01	Read MICR data and transmit	112
1B 77 46	Check flip command	120
1B 77 46-47	Enhanced check flip status reporting	120
1B 77 50	Define parsing format, save in NVRAM	112
1B 77 52	Transmit last MICR read	112
1B 77 70	Define parsing format, do not save permanently	112
1B 7B <i>n</i>	Select or cancel upside-down print mode	58
1C	Select slip station	39
1D 00	Return boot sector firmware part number	127
1D 01	Return segment number status of flash memory	127
1D 02 <i>n</i>	Select flash memory sector to download	127
1D 03 <i>n</i>	Real-time request to printer (GS sequence)	94
1D 04 <i>n</i>	Real-time status transmission (GS sequence)	92
1D 05	Real-time printer status transmission	95
1D 06	Get firmware CRC	127
1D 07	Return microprocessor CRC	128
1D 0E	Erase all flash contents except boot sector	128
1D 0F	Return main program flash CRC	128
1D 10 <i>n</i>	Erase selected flash sector	128
1D 11 <i>aL aH cL cH d1...dn</i>	Download to active flash sector	129
1D 14 <i>n</i>	Reverse feed <i>n</i> lines	45
1D 15 <i>n</i>	Reverse feed <i>n</i> dots	45
1D 21 <i>n</i>	Select character size	59
1D 22 55 <i>n1 n2</i>	Flash memory user sectors allocation	123

**Appendix A: Commands by hexadecimal code**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1D 22 <i>n</i>	Select memory type (SRAM/flash) where to save logos or user-defined fonts	123
1D 23 <i>n</i>	Select the current logo (downloaded bit image)	65
1D 24 <i>nL nH</i>	Set absolute vertical print position in page mode	110
1D 2A <i>n1 n2 d1 ... dn</i>	Define downloaded bit image	66
1D 2F <i>m</i>	Print downloaded bit image	67
1D 3A	Select or cancel macro definition	111
1D 40 <i>n</i>	Erase user flash sector	124
1D 42 <i>n</i>	Select or cancel white/black reverse print mode	60
1D 48 <i>n</i>	Select printing position for HRI characters	99
1D 49 <i>n</i>	Transmit printer ID	84
1D 49 40 <i>n</i>	Transmit printer ID, remote diagnostics extension	85
1D 4C <i>nL nH</i>	Set left margin	50
1D 50 <i>x y</i>	Set horizontal and vertical minimum motion units	46
1D 56 <i>m</i>	Select cut mode and cut paper (or code 1D 56 <i>m n</i> )	39
1D 56 <i>m n</i>	Select cut mode and cut paper (or code 1D 56 <i>m</i> )	39
1D 57 <i>nL nH</i>	Set printing area width	51
1D 5C <i>nL nH</i>	Set relative vertical print position in page mode	110
1D 5E <i>r t m</i>	Execute macro	111
1D 61 <i>n</i>	Select or cancel unsolicited status mode	96
1D 66 <i>n</i>	Select pitch for HRI characters	99
1D 68 <i>n</i>	Select bar code height	99
1D 6B <i>m d1 ... dk 00</i> or 1D 6B <i>m n d1 ... dn</i>	Print bar code	100
1D 6B <i>m nL nH d1 ... dn</i>	Print GS1 DataBar (RSS), data length specified	102
1D 6B <i>n d1 ... 00</i>	Print GS1 DataBar (RSS), null terminated	103
1D 70 <i>a b c d e f</i>	Select PDF 417 parameters	104
1D 71 <i>a b c d e f L fH</i>	Set GS1 DataBar (RSS) parameters	102
1D 72 <i>n</i>	Transmit status	88
1D 77 <i>n</i>	Select bar code width	105
<b>1D 81 <i>m n</i></b>	<b>Set paper type (for two-color printing)</b>	<b>40</b>

Code (hexadecimal)	Command	Page
1D 82 n1...n72 or ...n80	Print raster monochrome graphics	67
1D 83 n1...n144 or ...n160	Print raster color graphics	68
1D 84 m n1 n2 d1...dx	Download logo image	69
1D 85 m n	Reverse color text mode (two-color)	60
1D 86 m	Monochrome shade mode	70
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	69
1D 8C n m	Merge watermark mode	70
1D 8D n m	Text strike-through mode	61
1D 8E m nL nH d1 ... dx	Download paper type description	129
1D 8F m	Return paper type description	130
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
1D 97 m n	User storage status	125
1D 9A n m o	Shade and store logo	73
1D 9B m n	Logo print with knife cut	73
1D 99 l m n o	Apply margin message mode	74
1D A0 nl nh	Set temporary max target speed	74
1D FF	Reset firmware	130
1F 03 16 f s p/r t	LogoEZ® colorization	75
1F 03 16 05 n	Set interpretation of "Set current color" command	41
1F 03 17 a m s	LogoEZ® attribute mapping	78

**Appendix A: Commands by hexadecimal code**

<b>Code (hexadecimal)</b>	<b>Command</b>	<b>Page</b>
1F 04 <i>n</i>	Convert 6-dots/mm bitmap to 8-dots/mm bitmap	80
1F 05 <i>n</i>	Select superscript or subscript modes	61
1F 08 00	Restore default settings(Ethernet)	131
1F 08 01 <i>n1 n2 n3 n4</i>	Set IP settings (Ethernet)	131
1F 08 02 <i>n1 n2 n3 n4</i>	Set net mask (Ethernet)	131
1F 08 03 <i>n1 n2 n3 n4</i>	Set Gateway (Ethernet)	131
1F 08 04 <i>n1 n2 n3 n4</i>	Set raw TCPIP port 9001 (Ethernet)	132
1F 08 05 <i>n1</i>	LP Daemon (Ethernet)	132
1F 08 06 <i>n1</i>	Telnet Daemon (Ethernet)	132
1F 08 07 <i>n1</i>	BootP (Ethernet)	132
1F 08 08 <i>n1</i>	DHCP (auto-configuration) (Ethernet)	132
1F 08 09 <i>n1</i>	Inactivity timeout (Ethernet)	133
1F 08 0A <i>n1</i>	Keep alive pings (arps) (Ethernet)	133
1F 56	Send printer software version	89
1F 74	Print test form	41
1F 7A <i>n</i>	Real-time commands disable	95
1F 7B <i>n</i>	Enable constant speed logos	80

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Appendix B: Resident Character Sets

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

Appendix B: Resident Character Sets

Code page 737 (Greek)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
		SP	0	@	P	`	p	A	P	ι	⋮	⊥	⊥	ω	Ω
	0	16	32	48	64	80	96	112	128	144	160	176	192	208	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
		!	1	A	Q	a	q	B	Σ	κ	⋮	⊥	⊥	α	±
	1	17	33	49	65	81	97	113	129	145	161	177	193	209	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
		"	2	B	R	b	r	Γ	Τ	λ	⋮	⊥	⊥	ε	≥
	2	18	34	50	66	82	98	114	130	146	162	178	194	210	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
		#	3	C	S	c	s	Δ	Υ	μ		⊥	⊥	η	≤
	3	19	35	51	67	83	99	115	131	147	163	179	195	211	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
		\$	4	D	T	d	t	E	φ	v	⊥	—	⊥	ï	ï
	4	20	36	52	68	84	100	116	132	148	164	180	196	212	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
		%	5	E	U	e	u	Z	X	ξ	⊥	⊥	⊥	ι	ÿ
	5	21	37	53	69	85	101	117	133	149	165	181	197	213	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
		&	6	F	V	f	v	H	Ψ	ο	⊥	⊥	⊥	ο	÷
	6	22	38	54	70	86	102	118	134	150	166	182	198	214	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
		'	7	G	W	g	w	Θ	Ω	π	⊥	⊥	⊥	ù	≈
	7	23	39	55	71	87	103	119	135	151	167	183	199	215	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
		(	8	H	X	h	x	Ι	α	ρ	⊥	⊥	⊥	ü	ο
	8	24	40	56	72	88	104	120	136	152	168	184	200	216	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
		)	9	Ι	Υ	i	y	Κ	β	σ	⊥	⊥	⊥	ώ	•
	9	25	41	57	73	89	105	121	137	153	169	185	201	217	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
		*	:	J	Z	j	z	Λ	γ	ς	⊥	⊥	⊥	Α	•
	10	26	42	58	74	90	106	122	138	154	170	186	202	218	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
		+	;	K	[	k	{	M	δ	τ	⊥	⊥	■	Ε	√
	11	27	43	59	75	91	107	123	139	155	171	187	203	219	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
		,	<	L	\	l		N	ε	υ	⊥	⊥	■	Η	n
	12	28	44	60	76	92	108	124	140	156	172	188	204	220	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
		-	=	M	]	m	}	Ξ	ζ	φ	⊥	⊥	■	Ι	²
	13	29	45	61	77	93	109	125	141	157	173	189	205	221	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
		.	>	N	^	n	~	O	η	X	⊥	⊥	■	Ο	■
	14	30	46	62	78	94	110	126	142	158	174	190	206	222	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
		/	?	O	_	ο	Δ	Π	θ	ψ	⊥	⊥	■	Υ	BLANK
	15	31	47	63	79	95	111	127	143	159	175	191	207	223	255

Appendix B: Resident Character Sets

Code page 850 (Multilingual)

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



## Appendix B: Resident Character Sets

## Code page 852 (Slavic)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	0	@	P	,	p	Ç	É	á	⋮	L	đ	Ó	-
			48	64	80	96	112	128	144	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	A	Q	a	q	ü	Í	í	⌞	Đ	ß	”
			49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	34	"	2	B	R	b	r	é	í	ó	⌞	Đ	Ô	‘
			50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	35	#	3	C	S	c	s	â	ô	ú	⌞	Ě	Ň	ˇ
			51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	36	\$	4	D	T	d	t	ä	ö	À	⌞	ď	ň	^
			52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	37	%	5	E	U	e	u	ů	Ľ	ą	Á	†	Ň	ň
			53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	38	&	6	F	V	f	v	ć	ǐ	ž	Â	Ā	í	š
			54	70	86	103	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	39	'	7	G	W	g	w	ç	Ś	ž	Ě	ǎ	î	š
			55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	40	(	8	H	X	h	x	ł	ś	Ę	Ş	⌞	ě	Ŕ
			56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	41	)	9	I	Y	i	y	ë	Ö	ę	⌞	⌞	Ú	..
			57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	42	*	:	J	Z	j	z	Ő	Ü		⌞	⌞	ř	.
			58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	43	+	;	K	[	k	}	ő	ř	ż	⌞	■	Ú	ú
			59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	44	,	<	L	\	l		î	ř	Č	⌞	■	ý	Ř
			60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	45	-	=	M	]	m	}	Ż	Ł	ś	Ż	=	Ŧ	Ÿ
			61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	46	.	>	N	^	n	~	Ä	×	«	ż	⌞	Ů	ț
			62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	47	/	?	O	_	o	△	Ć	č	»	⌞	■	'	
			63	79	95	111	127	143	159	175	191	207	223	239	255

Appendix B: Resident Character Sets

Code page 857 (Turkish)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	SP	0	@	P	`	p	Ç	É	á	☐	⌞	◦	Ó	240
01	11	!	1	A	Q	a	q	ü	æ	í	☐	⌞	a	β	±
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	"	2	B	R	b	r	é	Æ	ó	☐	⌞	Ê	Ô	¾
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	#	3	C	S	c	s	â	ô	ú	☐	⌞	Ë	Ò	¶
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	\$	4	D	T	d	t	ä	ö	ñ	☐	—	È	õ	§
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	%	5	E	U	e	u	à	ò	Ñ	Á	+		Õ	÷
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	&	6	F	V	f	v	â	û	Ĝ	Â	ã	í	μ	´
6	22	38	54	70	86	103	118	134	150	166	182	198	214	230	246
07	17	'	7	G	W	g	w	ç	ù	ğ	À	Ã	î		°
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	(	8	H	X	h	x	ê	ï	ı	©	⌞	ï	×	◦
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	)	9	I	Y	i	y	ë	Ö	®	☐	☐	☐	Ú	¨
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	*	3A	J	Z	j	z	è	Ü	☐	☐	☐	☐	Û	·
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	+	3B	;	K	[	k	{	ı	ø	½	☐	☐	Ù	1
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	,	3C	<	L	\	l		î	£	¼	☐	☐	ı	3
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	-	3D	=	M	]	m	}	ı	Ø	ı	☐	=	ÿ	2
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	.	3E	>	N	^	n	~	Ä	Ş	«	☐	☐	ı	■
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	/	3F	?	O	_	o	△	Å	Ş	»	☐	☐	ı	·
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

Appendix B: Resident Character Sets

Code page 858 (with Eurosymbol)

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

Appendix B: Resident Character Sets

Code page 860 (Portuguese)

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

Appendix B: Resident Character Sets

Code page 862 (Hebrew)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0	
			0	@	P	`	p	א	ב	á	⋮	⌒	⌒	∞	≡	
	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1	
		!	1	A	Q	a	q	ב	ס	í	⋮	⌒	⌒	β	±	
	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2	
		"	2	B	R	b	r	ג	ע	ó	⋮	⌒	⌒	Γ	≥	
	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3	
		#	3	C	S	c	s	ד	ף	ú		⌒	⌒	π	≤	
	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4	
		\$	4	D	T	d	t	ה	פ	ñ	⌒	⌒	⌒	Σ	∫	
	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5	
		%	5	E	U	e	u	ו	ץ	Ñ	⌒	⌒	⌒	σ	∫	
	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6	
		&	6	F	V	f	v	ז	צ	a	⌒	⌒	⌒	μ	÷	
	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7	
		'	7	G	W	g	w	ח	ק	o	⌒	⌒	⌒	τ	≈	
	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8	
		(	8	H	X	h	x	ט	ר	z	⌒	⌒	⌒	Φ	◦	
	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9	
		)	9	I	Y	i	y	י	ש	⌒	⌒	⌒	⌒	Θ	•	
	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA	
		*	:	J	Z	j	z	ך	ת	⌒	⌒	⌒	⌒	Ω	•	
	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB	
		+	;	K	[	k	{	כ	ץ	½	⌒	⌒	⌒	δ	√	
	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC	
		,	<	L	\	l		ל	£	¼	⌒	⌒	⌒	∞	ñ	
	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD	
		-	=	M	]	m	}	ם	¥	i	⌒	⌒	⌒	∅	²	
	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE	
		.	>	N	^	n	~	מ	Pt	«	⌒	⌒	⌒	ε	■	
	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF	
		/	?	O	_	o	△	ו	f	α	⌒	⌒	⌒	⌒	⌒	
	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

## Appendix B: Resident Character Sets

## Code page 863 (French Canadian)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
NUL		SP	0	@	P	`	p	Ç	É		⋮	L	⌌	α	≡
0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
XON	!	1	A	Q	a	q	ü	È	'	⋮	⌌	⌌	β	±	
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
"	2	B	R	b	r	é	Ê	ó	⋮	⌌	⌌	Γ	≥		
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
XOFF	#	3	C	S	c	s	â	ô	ú		⌌	⌌	π	≤	
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
\$	4	D	T	d	t	Â	Ë	⋮	⌌	⌌	⌌	Σ	ƒ		
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
%	5	E	U	e	u	à	ï	⋮	⌌	⌌	⌌	⌌	σ	J	
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
&	6	F	V	f	v	ŕ	û	³	⋮	⌌	⌌	⌌	μ	÷	
6	22	38	54	70	86	103	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
'	7	G	W	g	w	ç	ù	⋮	⌌	⌌	⌌	⌌	τ	≈	
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
(	8	H	X	h	x	ê	α	î	⋮	⌌	⌌	⌌	ϕ	°	
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
)	9	I	Y	i	y	ë	ô	⋮	⌌	⌌	⌌	⌌	⊖	•	
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
LF	*	:	J	Z	j	z	è	Ü	⋮	⌌	⌌	⌌	⌌	Ω	•
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
ESC	+	;	K	[	k	{	ï	¢	½	⋮	⌌	⌌	■	δ	√
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
,	12	<	L	\	l		î	£	¼	⋮	⌌	⌌	■	∞	η
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
CR	GS	-	=	M	]	m	}	=	ù	¾	⋮	⌌	⌌	∅	²
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
.	14	>	N	^	n	~	À	Û	«	⋮	⌌	⌌	⌌	ε	■
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
/	15	?	O	_	o	SP	§	f	»	⋮	⌌	⌌	■	⌌	255
15	31	47	63	79	95	111	127	143	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	@	P	`	p	А	Р	а	⋮	Л	ll	р	Ё	
	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1	
		!	1	А	Q	а	q	Б	С	б	⋮	⊥	⊥	с	ё	
	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2	
		"	2	В	R	в	r	В	Т	в	⋮	⊥	⊥	т	Є	
	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3	
		#	3	С	S	с	s	Г	У	г		⊥	⊥	у	є	
	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4	
		\$	4	D	T	d	t	Д	Ф	д	⊥	—	⊥	ф	ї	
	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5	
		%	5	E	U	e	u	Е	Х	e	⊥	⊥	⊥	х	і	
	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6	
		&	6	F	V	f	v	Ж	Ц	ж	⊥	⊥	⊥	ц	Ѹ	
	6	22	38	54	70	86	103	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7	
		'	7	G	W	g	w	З	Ч	з	⊥	⊥	⊥	ч	ѹ	
	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8	
		(	8	Н	Х	h	x	И	Ш	и	⊥	⊥	⊥	ш	°	
	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9	
		)	9	І	У	i	u	Й	Щ	й	⊥	⊥	⊥	щ	•	
	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA	
		*	:	J	Z	j	z	К	Ъ	к		ll	Г	Ъ	•	
	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB	
		+	;	K	[	k	{	Л	Ы	л	⊥	⊥	■	ы	√	
	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC	
		,	<	L	\	l		М	Ь	м	⊥	⊥	■	ь	№	
	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD	
		-	=	M	]	m	}	Н	Э	н	ll	=	■	э	Ѡ	
	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE	
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	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF	
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	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255



Appendix B: Resident Character Sets

Code page 1252 (Windows Latin 1)

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
			0	@	P	`	p	€	Not Used	NBSP	°	À	Đ	à	đ
0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
		!	1	A	Q	a	q	Not Used	‘	ı	±	Á	Ñ	á	ñ
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
		"	2	B	R	b	r	,	,	ç	²	Â	Ò	â	ò
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
		#	3	C	S	c	s	f	“	£	³	Ã	Ó	ã	ó
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
		\$	4	D	T	d	t	”	”	α	´	Ä	Ô	ä	ô
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
		%	5	E	U	e	u	...	·	¥	μ	Å	Õ	å	õ
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
		&	6	F	V	f	v	†	-	ı	¶	Æ	Ö	æ	ö
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
		'	7	G	W	g	w	‡	—	§	·	Ç	×	ç	÷
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
		(	8	H	X	h	x	ˆ	˜	..	¸	È	Ø	è	ø
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
		)	9	I	Y	i	y	‰	™	©	ı	É	Ù	é	ù
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
		*	:	J	Z	j	z	Š	š			Ê	Ú	ê	ú
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
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11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
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12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
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15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

