

Chapter 6: Programming Information

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Commands control all operations and functions of the printer; from selecting the size and placement of characters and graphics on the receipt to feeding and cutting the paper. The operation of various printers may be emulated by the commands, including the following:

- ◆ Axiohm A793
- ◆ Axiohm A794 Native Mode
- ◆ Axiohm APOS
- ◆ Epson TM-T88

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

Some commands listed and described here may not be implemented. They will be identified as not implemented. If received, they are ignored and not sent to the print buffer as data. Any non-legal commands are sent to the print buffer as data.

List of Commands

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Comparisons

The following table details the list of commands whose behavior differs from the A793(A756) and the A794(A758) because of the physical differences of a 6 dots/mm head (A793/A756) versus an 8 dots/mm head (A794/A758).

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 $n/203$ inch steps instead of $n/152$ inch steps.
16 <i>n</i>	Add <i>n</i> Extra Dot Rows	The dot rows will be measured in $n/203$ inches versus $n/152$ 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 the previous product. 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 new printhead are smaller, user defined characters that were used on the previous printers will appear smaller on the new printer.
1B 2A <i>m n1 n2 d1...dn</i>	Select Bit Image Mode	In emulation mode, graphics are scaled to best match the size of the graphic in the previous printer.
1B 33 <i>n</i>	Set Line Spacing	This command uses <i>n</i> in terms of $n/360$ inches. Since the previous product had a fundamental step of $1/180$ inch and the new product 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	(Same as above)
1B 59 <i>n1 n2 d1...dn</i>	Select Double-Density Graphics	In 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 emulation mode, this command calculates how many character positions to move based on the previous product's character width in dots (10) versus the current product (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 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on the previous product.
1D 2F <i>m</i>	Print Downloaded Bit Image	(Same as above)

Command Descriptions

Command Conventions

The following information describes how each command is organized:

Command Name

A descriptive name (not the ASCII code) used to identify the command.

Description

A brief summary of the command, followed by more detailed information, if necessary.

ASCII	the ASCII control code
Hexadecimal	the Hexadecimal control code
Decimal	the Decimal control code

Value or Values a description of the command operand values

Range the upper and lower limits of the command operand

Default the command operand default after printer reset

Formulas any formulas used for this command.

Exceptions

Describes any exceptions to this command, for example, other commands that the command cannot be used with.

Related Information

This section describes any related information for this command and provides references to other sections for additional information.

Printer Function Commands

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

- ◆ Printing
- ◆ Feeding the paper
- ◆ Resetting the printer
- ◆ Cutting the paper
- ◆ Opening the cash drawers
- ◆ Defining the print area

Clear Printer

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

- ◆ Double-Wide command (12) is canceled
- ◆ Line Spacing, Pitch, and User-Defined Character Sets are maintained at current selections (RAM is not affected)
- ◆ Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set
- ◆ Printer is restarted and error status is cleared in a fault condition
- ◆ Printing position is set to column one
- ◆ Knife is homed

ASCII	DLE
Hexadecimal	10
Decimal	16

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.

Perform Full Knife Cut

Cuts the receipt. Use either Hex 19 or Hex 1B 69.

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

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

Exceptions

The full cut is replaced by a partial cut in the Axiohm A793 emulation.

Perform Partial Knife Cut

Partially cuts the receipt. The length of the cut can be changed through the configuration menu. The default setting leaves .20 inches (5 mm) of paper on the left edge. See Setting Partial Cut Distance in Diagnostics.

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

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

Formulas

The cut edge is 144 dot rows or .71 inch (18 mm) above the print station.

Exceptions

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

Generate Tone

Generates an audible tone

ASCII	ESC BEL
Hexadecimal	1B 07
Decimal	27 7

Select Print Mode

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

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

Value of *n* See table

Value of <i>n</i>		0	1
Bit	Function		
Bit 0 ¹	Pitch	Standard Pitch 44 Col/Line, 15 CPI	Compressed Pitch 56 Col/Line, 20 CPI
Bit 3	Emphasized Mode	Canceled	Set
Bit 4	Double High	Canceled	Set
Bit 5	Double Wide	Canceled	Set
Bit 7	Underlined Mode	Canceled	Set

¹Bits 1, 2 and 6 are not used.

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

Exceptions

Refer to the above table for exceptions.

Related Information

See the *Print Specifications Guide* for a description of standard and compressed character pitches.

Select Peripheral Device (for Multi-Drop)

Selects the device to which the host computer sends data.

ASCII	ESC = <i>n</i>
Hexadecimal	1B 3D <i>n</i>
Decimal	27 61 <i>n</i>

Value of <i>n</i>	0 (bit 0), device not selected
	1 (bit 0), device selected

Default	1 (bit 0), device selected
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Related Information

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

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

Initialize Printer

Clears the print line buffer and resets the printer to the default settings for the startup configuration (refer to Default settings below).

Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set and User-defined characters or logo graphics are cleared.

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

Exceptions

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

Select Paper Sensors to Output Paper End Signals

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.

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

Range of *n* 1-255

Default of *n* 12

Exceptions

This command can only be used with a parallel interface.
 The command is ignored if it used with a serial interface.

Select Sensors to Stop Printing

Selects the paper sensor used to detect when the paper is out. The printer finishes printing the current line and feeds the paper before stopping.

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

Value of *n* Sensor status

Bit	Sensor	Sensor Status	
		0	1
0	Receipt Paper Near-End	Disabled	Enabled
1	Receipt Paper Near-End	Disabled	Enabled
2-4	Undefined		
6	Undefined		

Bits 5 and 7 are not used.

Default 0

Enable or Disable Panel Button

Enables or disables the paper feed button by toggling the paper feed button on and off. Only the lowest bit is used to toggle 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.

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)

Exceptions

Functions that require the panel button cannot be used when it has been disabled with this command.

Read from Non-Volatile Memory

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

ASCII	ESC j <i>k</i>
Hexadecimal	1B 6A <i>k</i>
Decimal	27 106 <i>k</i>

Range of *k* 0-63 (Decimal)

Generate Pulse to Open Cash Drawer

Sends a pulse to open the cash drawer.

ASCII	ESC p <i>n p1 p2</i>
Hexadecimal	1B 70 <i>n p1 p2</i>
Decimal	27 112 <i>n p1 p2</i>

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

Value of *p1* On-time

Value of *p2* Off-time

Formulas

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

- ◆ *p1* (Hex) x 2 ms
- ◆ *p2* (Hex) x 2 ms

Related Information

The off-time is the delay before the printer performs the next operation.

Write to Non-Volatile Memory (NVRAM)

Writes two-byte word, $n1\ n2$, to location k in history EEROM.

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

Value of $n1$ 1st Byte

Value of $n2$ 2nd Byte

Range of k 0-63 (Decimal)

Select Cut Mode and Cut Paper

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 .

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

Value of m Selects the mode as shown in the table

Value of n Determines cutting position

m	Feed and Cut Mode
0, 48	Full cut (no extra feed).
1, 49	Partial cut (no extra feed).
65	Feeds paper to cutting position + (n times vertical motion unit), and cuts the paper completely.
66	Feeds paper to cutting position + (n times vertical motion unit), and cuts the paper partially.

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

Range of n 0 – 255

Default of m, n 0

Formulas

n times the vertical motion unit equals the cutting position to which the paper is fed.

Vertical Positioning and Print Commands

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

Print and Feed One Line

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

ASCII	LF
Hexadecimal	0A
Decimal	10

Activate Carriage Return

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.

ASCII	CR
Hexadecimal	0D
Decimal	13

Related Information

See Ignoring/Using the Carriage Return in *Diagnostics* for more information.

Feed *n* Print Lines

Feeds the paper *n* lines at the current line height without printing.

ASCII	DC4 <i>n</i>
Hexadecimal	14 <i>n</i>
Decimal	20 <i>n</i>

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

Range of *n* 0-127

Feed n Dot Rows

Feeds the paper n dot rows ($n/203$ inch, $n/8$ mm), without printing.

ASCII NAK n
Hexadecimal 15 n
Decimal 21 n

Value of n $n/203$ inch

Range of n 0-255

Add n Extra Dot Rows

Adds n extra dot rows ($n/203$ inch, $n/8$ mm) to the character height to increase space between print lines or decrease the number of lines per inch.

ASCII SYN n
Hexadecimal 16 n
Decimal 22 n

Value of n Number of extra dot rows

Range of n 0-16

Default 3 extra dot rows

Formulas

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

Extra Rows	Lines Per Inch	Dot Rows	Extra Rows	Lines Per Inch	Dot Rows
0	8.5	24	9	6.1	33
1	8.1	25	10	6.0	34
2	7.8	26	11	5.8	35
3	7.5	27	12	5.6	36
4	7.2	28	13	5.5	37
5	7.0	29	14	5.3	38
6	6.8	30	15	5.2	39
7	6.5	31	16	5.1	40
8	6.3	32			

Print

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

ASCII	ETB
Hexadecimal	17
Decimal	23

Set Column

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.

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

Value of <i>n</i>	1-44= Standard pitch
	1-56= Compressed pitch

Default of *n* 1

Exceptions

This command cannot be used with Single- or Double-Density graphics.

Set Line Spacing to 1/6 Inch

Sets the default line spacing to 1/6 of an inch (4.23 mm).

ASCII	ESC 2
Hexadecimal	1B 32
Decimal	27 50

Set Line Spacing

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

The minimum line spacing is 8.5 lines per inch. The line spacing equals the character height when n is too small.

If the Set Horizontal and Vertical Minimum Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (Set Line Spacing) will be interpreted accordingly.

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

Value of n $n/406$ inch

Range of n 0-255

Default 0.13 inch (3.37 mm)

Related Information

For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command in this document.

Print and Feed Paper

Prints one line from the buffer and feeds the paper $n/203$ inch ($n/8$ mm). The line height equals the character height when n is too small.

If the Set Horizontal and Vertical Minimum Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion units, the parameters of this command (Print and Feed Paper) will be interpreted accordingly.

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

Value of n $n/203$ inch

Range of n 0-255

Related Information

For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command in this document.

Print and Feed n Lines

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

ASCII ESC d n

Hexadecimal 1B 64 n

Decimal 27 100 n

Range of n 1-255 (0 is interpreted as 1)

Horizontal Positioning Commands

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

Horizontal Tab

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.

ASCII	HT
Hexadecimal	09
Decimal	9

Set Right-Side Character Spacing

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

The units of horizontal and vertical motion are specified by the Set Horizontal and Vertical Minimum Motion Units (GS P) 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 (GS P) command the value must be in even units and not less than the minimum amount of horizontal movement.

In standard mode the horizontal motion unit is used.

In page mode the horizontal or vertical motion unit differs and depends on the starting position of the printable area. When the starting printing position is the upper left or lower right of the printable area (set by Select Print Direction in Page Mode, ESC T) 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, ESC T) the vertical motion unit (y) is used.

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

Range of n 0 – 32

Default 0

Set Absolute Starting Position

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.

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 Absolute Print Position) will be interpreted accordingly and varies according to printer emulation.

ASCII	ESC \$ <i>n1 n2</i>
Hexadecimal	1B 24 <i>n1 n2</i>
Decimal	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.

Formulas

The example shows how to calculate 280 dots as the absolute starting position.

$280/256 = 1$, remainder of 24
 $n1 = 24$ $n2 = 1$

Related Information

This command is also used in graphics mode. See Graphics Commands in this document for more information.

For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command (1D 50) in this document.

Set Horizontal Tab Positions

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.

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

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

Value of k 0-32

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

Formulas

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

Exceptions

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

Standard pitch = 44 columns
Compressed pitch = 56 columns

Set Relative Print Position

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.

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

Value of *n*

To Move the Relative Starting Position Right of the Current Position:

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

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

To Move the Relative Starting Position Left of the Current Position:

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

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

Formulas

To move to the left:

The example shows how to set the relative position 20 dots to the left of the current position.

$65,536 - 20 = 65,516$
 $65,516 / 256 = 255$, remainder of 236
n1 = 236, *n2* = 255

To move to the right:

The example shows how to set the relative position 20 dots to the right 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 (A794 receipt vs. A793 receipt)

There is a difference in the normal behavior of this command in A794 Emulation Mode as compared to the original A793. The difference exists when the command is used to move to the left. The A793 processes the whole print string prior to putting it in the buffer for the print head. This method of processing allows the A794 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 A794 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

Specifies the alignment of characters, graphics, logos, and bar codes (see the value of *n* table).

ASCII	ESC a <i>n</i>
Hexadecimal	1B 61 <i>n</i>
Decimal	27 97 <i>n</i>

Value of <i>n</i>	0, 48 = Left aligned
	1, 49 = Center aligned
	2, 50 = Right aligned

Range of <i>n</i>	0-2, 48-50
--------------------------	------------

Default	0 (Left aligned)
----------------	------------------

Exceptions

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

Set Left Margin

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). This command is described below.

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 (1D 57) 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.

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

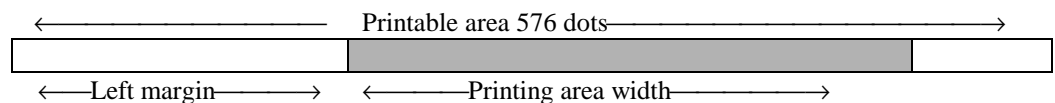
To set the left margin to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

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



Set Horizontal and Vertical Minimum Motion Units

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.

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

Value of x	Horizontal
--------------------------------	------------

Value of y	Vertical
--------------------------------	----------

Range of x	0 - 255
--------------------------------	---------

Range of y	0 - 255
--------------------------------	---------

Default of x:	203
-----------------------------------	-----

Default of y:	203
-----------------------------------	-----

Set Printing Area Width

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), which is described earlier in this document.

The width of the printing area follows the Set Left Margin command (1D 4C). See the Set Left Margin command (GS L) earlier in this document for a description.

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)

Formulas

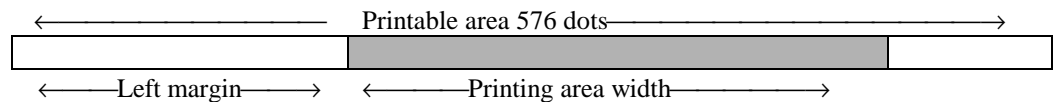
To set the width of the printing area to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

```
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.

Print 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

Prints double-wide characters. The printer is reset to single-wide mode after a line has been printed or the Clear Printer (10) command is received. Double-wide characters may be used in the same line with single-wide characters.

ASCII	DC2
Hexadecimal	12
Decimal	18

Exceptions

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

Select Single-Wide Characters

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

ASCII	DC3
Hexadecimal	13
Decimal	19

Exceptions

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

Select 90 Degree Counter-Clockwise Rotated Print

Rotates characters 90 degrees counter-clockwise. The command remains in effect until the printer is reset or until a Clear Printer (10) or Cancel Rotated Print (1B 56) command is received.

ASCII ESC DC2
Hexadecimal 1B 12
Decimal 27 18

Related Information

See "Summary of Rotated Printing" in this document.

Select Pitch (Column Width)

Selects the character pitch for a print line

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)

Formulas

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

Pitch	Receipt Columns	Receipt CPI
Standard	44	15.6
Compressed	56	20.3

Related Information

See *Print Specifications* for a description of both pitches.

Select Character Set

Selects the character set. When an undefined RAM character is selected, current active ROM Code Page character is used. See the *Printing Specification Guide* for the character sets.

ASCII	ESC % <i>n</i>
Hexadecimal	1B 25 <i>n</i>
Decimal	27 37 <i>n</i>

Value of <i>n</i>	0 = Code Page 437
	1 = User Defined (RAM)
	2 = Code Page 850

Range of <i>n</i>	0-2
--------------------------	-----

Default	0 (Code Page 437)
----------------	-------------------

Define User-Defined Character Set

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

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

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

Values and Ranges

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

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

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*

n = the number of dot columns for the *n*th character as specified by *n1 ... nm*

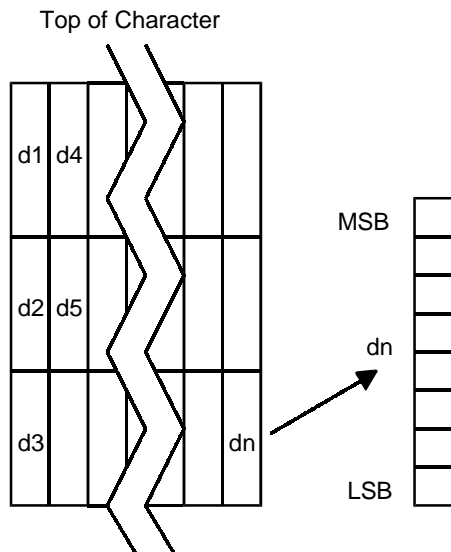
n = 1-16

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

The number of bytes for a character cell is *s* x *n1*

The bytes are printed down and across each cell

See the illustration.



Select or 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.

ASCII	ESC - <i>n</i>
Hexadecimal	1B 2D <i>n</i>
Decimal	27 45 <i>n</i>

Value of <i>n</i>	0, 48 = Cancel underline mode
	1, 49 = Select underline mode
	2, 50 = Select double thickness underline mode

Default	0 (Cancel underline mode)
----------------	---------------------------

Exceptions

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

Copy Character Set from ROM to RAM

Copies characters in the active ROM set to RAM. Use this command to re-initialize the User-Defined Character Set.

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

Default current active ROM Code Page

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

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

ASCII	ESC ? <i>n</i>
Hexadecimal	1B 3F <i>n</i>
Decimal	27 63 <i>n</i>

Range of *n* 32-255

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

Starts or stops emphasized printing. The printer is reset to the standard print mode after a Clear Printer (10) command is received.

ASCII	ESC E <i>n</i>
Hexadecimal	1B 45 <i>n</i>
Decimal	27 69 <i>n</i>

Value of *n* 0 = Off
 1 = On
 (When 0 and 1 are the Least Significant Bit, LSB)

Default 0 (Off)

Exceptions

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

Related Information

This command and the Select Print Mode(s) command (1B 21) function identically. They should have the same setting when used together.

Select or Cancel Double Strike

Turns double strike mode on or off. Identical to Emphasized mode. The printer is reset to the standard print mode after a Clear Printer (10) command is received.

ASCII	ESC G <i>n</i>
Hexadecimal	1B 47 <i>n</i>
Decimal	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)

Exceptions

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

Select or Cancel Italic Print

Turns Italic print mode on or off. The printer is reset to the standard print mode after a Clear Printer (10) command is received.

ASCII	ESC I <i>n</i>
Hexadecimal	1B 49 <i>n</i>
Decimal	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)

Exceptions

Only the lowest bit of *n* is valid.

Select Character Code Table

Selects the character set to be used. See *Print Specifications* for the character sets.

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

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

Value of *n* 0 = Code Page 437
 1 = Code Page 850
 2 = Code Page 852
 3 = Code Page 860
 4 = Code Page 863
 5 = Code Page 865
 6 = Code Page 858
 7 = Code Page 866

Default 0 (Code Page 437)

Related Information

This command may also be known as Select International Character Set.

Select International Character Set

See the previous command, Select Character Code Table (page 72)

Select or Cancel 90 Degree Clockwise Rotated Print

Rotates characters 90 degrees clockwise. The command remains in effect until the printer is reset or until a Clear Printer (10) or Rotated Print (1B 12) command is received. See Summary of Rotated Printing in this document.

ASCII	ESC V <i>n</i>
Hexadecimal	1B 56 <i>n</i>
Decimal	27 86 <i>n</i>

Value of <i>n</i>	0 = Cancel
	1 = Set

Default	0 (Cancel)
----------------	------------

Select or Cancel Upside-Down Print Mode

Prints upside-down characters. The command may be combined with Clock Wise Rotated print (1B 56) or Counter Clock Wise Rotated print (1B 12). The character order is inverted in the buffer so text is readable. Only bit 0 is used. Bits 1-7 are not used. See Summary of Rotated Printing in this document for more information.

ASCII	ESC { <i>n</i>
Hexadecimal	1B 7B <i>n</i>
Decimal	27 123 <i>n</i>

Value of <i>n</i>	0 = Cancel
	1 = Set

Default	0 (Cancel)
----------------	------------

Exceptions

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

It cannot be used with right side up characters on the same line.

Select Or Cancel White/Black Reverse Print Mode

Turns on White/Black reverse printing mode. In White/Black reverse printing 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 printing mode is selected it is also applied to character spacing which is set by Right-Side Character Spacing (ESC SP).

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 (HT), Set Absolute Starting Position (ESC S), and Set Relative Print Position (ESC \).

ASCII	GS B <i>n</i>
Hexadecimal	1D 42 <i>n</i>
Decimal	29 66 <i>n</i>

Value of <i>n</i>	0 = Off 1 = On
--------------------------	-------------------

(When 0 and 1 are the Least Significant Bit, LSB)

Default	0 (Off)
----------------	---------

Exceptions

Only the lowest bit of *n* is valid.

Select or Cancel Smoothing Mode

This command is ignored.

ASCII	GS b <i>n</i>
Hexadecimal	1D 62 <i>n</i>
Decimal	29 98 <i>n</i>

Select Superscript or Subscript Modes

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*,...)

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)

Exceptions

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

Summary of Rotated Printing

The table shows the combinations of upside-down print, 90 degree clockwise rotated print, and 90 degree counterclockwise rotated print.

90 degree clockwise rotated and 90 degree counterclockwise rotated print commands are mutually exclusive: The setting of the last received command is effective .

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 <i>n</i>	Rotated CW 1B 56 <i>n</i>	Rotated CCW 1B 12	Resulting Output
Canceled	Canceled	Canceled	1 (See Below)
Canceled	Set	Canceled	2 (See Below)
Set	Canceled	Canceled	3 (See Below)
Set	Set	Canceled	4 (See Below)
Canceled	Canceled	Set	5 (See Below)
Set	Canceled	Set	6 (See Below)

1. ABC 2. >BC 3. ABC < 4. <BC > 5. <BC > 6. >BC <

Note: Right-side up and upside down print modes cannot be mixed on the same line.

Graphics Commands

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

Print Raster Graphics

Prints one row of data. *n1* ... *nl*: bytes describing the line to print.

ASCII	DC1 <i>n1</i> ... <i>nl</i>
Hexadecimal	11 <i>n1</i> ... <i>n72</i>
Decimal	17 <i>n1</i> ... <i>nl</i>

Value of *n* *n1*...*n72* = Data bytes

Range 0-255

Exceptions

Raster graphics is not available in Page Mode.

Download BMP Logo

Enters a downloaded BMP logo into RAM or Flash.

The downloaded BMP logo can be printer by using the Print Downloaded Image (1D 2A) command.

ASCII	ESC + "BMP file"
Hexadecimal	1B
Decimal	27

Value	Maximum width =	576
	Maximum height =	512

Exceptions

BMP file images that are not monochrome are ignored.

Related Information

Microsoft BMP bitmap file format.

Set Absolute Starting Position

Sets the print starting position for graphics at the specified number of dots from the beginning of the line. The print starting position is reset to column one after each line.

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 Absolute Starting Position) will be interpreted accordingly. For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command in this document.

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

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

Value of *n1* = Remainder after dividing *n* by 256

Value of *n2* = Integer after dividing *n* by 256

Formulas

$$n = ((n1 + (256 \times n2)) \times 2)$$

The resulting dot column must be less than 576.

Select Bit Image Mode

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.

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

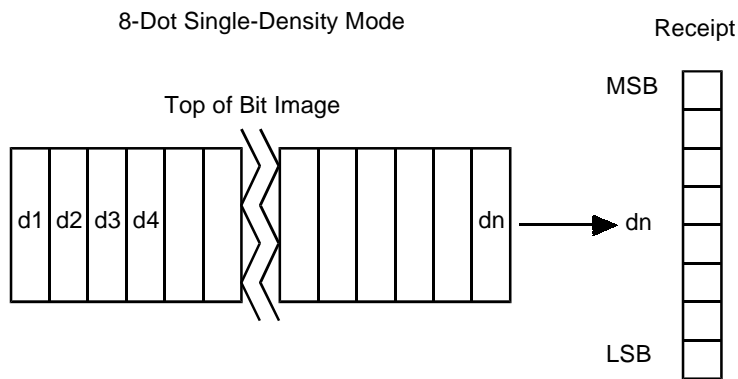
Value of *m*

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 x 288
1	8 Dot Double Density	8 (68 DPI)	0-576 (203 DPI)	8 x 576
32	24 Dot Single Density	24 (203 DPI)	0-288 (101 DPI)	24 x 288
33	24 Dot Double Density	24 (203 DPI)	0-576 (203 DPI)	24 x 576

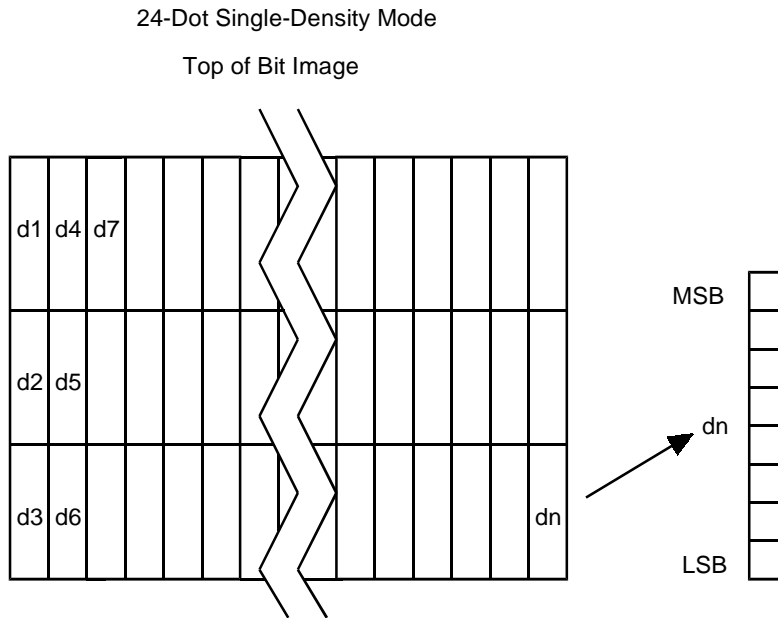
Value of *n*

Value of <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 Down, Then Across)

Related Information



Select Bit Image Mode (continued)



Select Single-Density Graphics

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

Each bit corresponds to two horizontal dots. Compare to Set Bit Image Mode (1B 2A, m=0) earlier in this document.

ASCII	ESC K <i>n1 n2 d1 ... dn</i>
Hexadecimal	1B 4B <i>n1 n2 d1 ... dn</i>
Decimal	27 75 <i>n1 n2 d1 ... dn</i>

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 Down, Then Across)

Formulas

See the above table.

Select Double-Density Graphics

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

Each bit corresponds to one horizontal dot. Compare to Set Bit Image Mode (1B 2A, m=1) earlier in this document.

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

Value of n

Value of n (8-Dot Single Density Mode)	Value of n (24-Dot Single Density Mode)	Value of d
$n1 + (256 \times n2)$	$3 \times [n1 + (256 \times n2)]$	Number of Bytes of Data (Printed Down, Then Across)

Formulas

See the above table.

Select the Current Logo

Selects a 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.

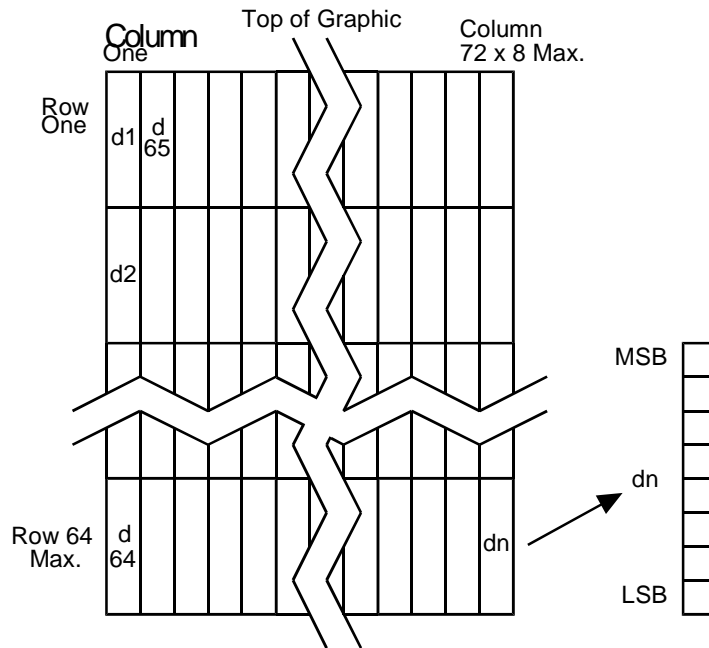
ASCII	GS # <i>n</i>
Hexadecimal	1D 23 <i>n</i>
Decimal	29 35 <i>n</i>

Range of <i>n</i>	0 – 255
--------------------------	---------

Define Downloaded Bit Image

Enters a downloaded bit image (such as a logo) into RAM or Flash with the number of dots specified by $n1$ and $n2$. The downloaded bit image is available until power is turned off, another bit image is defined, or either Initialize Printer (1B 40), command is received.

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



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

Value of n

Value of $n1$	Value of $n2$	Value of d
1-72 (8 x $n1$ = Number of Horizontal Dot Columns)	1-64 (Number of Vertical Bytes) ¹	Bytes of Data (Printed Down, Then Across)

¹The 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).

Ranges

See table

Exceptions

See the illustration for the Print Downloaded Bit Image command (1D 2F) for a representation of the bit image.

Print Downloaded Bit Image

Prints the downloaded bit image in RAM or Flash at a density specified by *m*. It is ignored if any data is in the print buffer, if the downloaded bit image is undefined.

See the illustration on the previous page for a representation of the bit image.

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

Value and Range of *m*

Value of <i>m</i>	Print Mode	Vertical DPI ¹	Horizontal DPI*
0	Normal	203	203
1	Double Wide	203	101
2	Double High	101	203
3	Quadruple	101	101

¹Dot density measured in dots per inch

Convert 6 Dots/mm Bitmap to 8 Dots/mm Bitmap

Selects or cancels 6 dot/mm emulation mode.

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

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)

Printer Status Commands

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 were received.

When a fault occurs, the printer will go busy at the RS-232C interface and not respond to either of the 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.

Real Time commands allow the printer to function when it is busy at the RS-232C interface. See the following section, Real Time Commands, for details about these commands.

Request Alternate Status (parallel printers only)

This command allows the printer to inform the host when the data in the buffer has been processed. When this command is sent to the printer, the printer goes "Busy" until all data which has been sent to the printer 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.

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

Value and Range of *n*

Value of <i>n</i>	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 ¹

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

Transmit Peripheral Device Status (RS-232C printers only)

Transmits current status of the cash drawers on one byte. If a drawer is not connected, the status will indicate it is closed.

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

Value of returned byte

Bit	1 Signifies	0 Signifies
0	Drawer 1 & 2 Closed	Drawer 1 or 2 Open
1	Drawer 1 & 2 Closed	Drawer 1 or 2 Open

Bits 2-7 are not used.

Transmit Paper Sensor Status

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. See the following table.

ASCII ESC v
Hexadecimal 1B 76
Decimal 27 118

Values

Status Byte (RS-232)			
Bit	Function	0 Signifies	1 Signifies
0	Receipt Paper	Present	Low (only if paper low sensor is enabled)
1	Receipt Cover	Closed	Open
2	Receipt Paper	Present	Out
3	Knife Position	Home Position	Not Home Position
4	Not Used	Fixed to Zero	Fixed to Zero
5	Temperature	In valid range	Too hot or too cold
6	Voltage	In valid range	Too high or too low
7	Not Used	Fixed to Zero	Fixed to Zero

Related Information

See Busy Line and Fault Conditions in the Real Time Commands section of this document for details about fault condition reporting.

Transmit Printer ID

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.

When Auto Status Back (ASB) is enabled using the Enable/Disable Automatic Status Back command (ID 61), the status transmitted by this command (Transmit Printer ID) and the ASB status must be differentiated according to the information found in Recognizing Data from the Printer, (in the Real Time Commands section in this document).

ASCII	GS I <i>n</i>
Hexadecimal	1D 49 <i>n</i>
Decimal	29 73 <i>n</i>

Value of <i>n</i>	1, 49 = Printer model ID
	2, 50 = Type ID
	3, 51 = ROM version ID

<i>n</i>	Printer ID	Specification	ID (Hexadecimal)
1, 49	Printer model ID	Axiohm A794	0x24
2, 50	Type ID	Installed options	Refer to next table
3, 51	ROM version ID	ROM version	0x00

Type ID (<i>n</i> = 2)				
Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	No two-byte character code installed.
	On	01	1	Two-byte character code installed.
1	Off	00	0	No knife installed.
	On	02	2	Knife installed.
2	-	-	-	Undefined.
3	-	-	-	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

Transmit Printer ID, Remote Diagnostics Extension

Performs the remote diagnostic functions specified by *n*.

Each returned message is defined as: $n + \text{data} + \langle \text{CR} \rangle$

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

Values of *n* Refer to table

Value of <i>n</i>		Remote diagnostic item	Function
Hex	Dec		
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
26	38	Class/model #	Not available, cannot clear Class/model # item
27	39	Class/model #	Return Class/model #, returns 17 bytes
28	40	Boot firmware part #	Not available, cannot write to ROM
29	41	Boot firmware part #	Not available, cannot write to ROM
2A	42	Boot firmware part #	Not available, cannot write to ROM
2B	43	Boot firmware part #, 12 digit ASCII	Return Boot firmware part #, returns 14 bytes
2C	44	Boot firmware CRC	Not available, cannot write to ROM
2D	45	Boot firmware CRC	Not available, cannot write to ROM
2E	46	Boot firmware CRC	Not available, cannot write to ROM
2F	47	Boot firmware CRC, 4 digit ASCII	Return Boot firmware CRC, returns 6 bytes
30	48	Flash firmware part #	Not available, cannot write to ROM

Value of <i>n</i>		Remote diagnostic item	Function
Hex	Dec		
31	49	Flash firmware part #	Not available, cannot write to ROM
32	50	Flash firmware part #	Not available, cannot write to ROM
33	51	Flash firmware part #, 12 digit ASCII	Return Flash firmware part #, returns 14 bytes
34	52	Flash firmware CRC	Not available, cannot write to ROM
35	53	Flash firmware CRC	Not available, cannot write to ROM
36	54	Flash firmware CRC	Not available, cannot write to ROM
37	55	Flash firmware CRC, 4 digit ASCII	Return Flash firmware CRC, returns 6 bytes
80	128	Receipt lines tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM Example, send 12 bytes to printer: GS I @ Ç00010000 To set receipt lines tally to 10,000
81	129	Receipt lines tally	Write to NVRAM, and print on receipt to verify Example, send 12 bytes to printer: GS I @ ü00010000 This will print on receipt: Receipt tally written: 10,000
82	130	Receipt lines tally	Clear receipt lines tally to 0
83	131	Receipt lines tally	Return receipt lines tally, preceded by <i>n</i> to identify Printer returns 10 bytes in above example: â00010000<CR>
84	132	Knife cut tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
85	133	Knife cut tally	Write to NVRAM, and print on receipt to verify
86	134	Knife cut tally	Clear knife cut tally to 0
87	135	Knife cut tally	Return knife cut tally, returns 10 bytes
90	144	Hours on tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
91	145	Hours on tally	Write to NVRAM, and print on receipt to verify
92	146	Hours on tally	Clear Hours on tally to 0
93	147	Hours on tally	Return Hours on tally, returns 10 bytes
94	148	Boot firmware version	Not available

Value of <i>n</i>		Remote diagnostic item	Function
Hex	Dec		
95	149	Boot firmware version	Not available
96	150	Boot firmware version	Not available
97	151	Boot firmware version	Return Boot firmware version, returns 6 bytes
A0	160	Flash firmware version	Not available
A1	161	Flash firmware version	Not available
A2	162	Flash firmware version	Not available
A3	163	Flash firmware version	Return Flash firmware version, returns 6 bytes
A4	164	Flash cycles tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
A5	165	Flash cycles tally	Write to NVRAM, and print on receipt to verify
A6	166	Flash cycles tally	Clear Flash cycles cut tally to 0
A7	167	Flash cycles tally	Return Flash cycles cut tally, returns 10 bytes
A8	168	Knife jams tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
A9	169	Knife jams tally	Write to NVRAM, and print on receipt to verify
AA	170	Knife jams tally	Clear Knife jams tally to 0
AB	171	Knife jams tally	Return Knife jams tally, returns 10 bytes
AC	172	Cover openings tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
AD	173	Cover openings tally	Write to NVRAM, and print on receipt to verify
AE	174	Cover openings tally	Clear Cover openings tally to 0
AF	175	Cover openings tally	Return Cover openings tally, returns 10 bytes
B0	176	Max Temperature tally, 8 digit ASCII numeric, max 99,999,999	Not available
B1	177	Max Temperature tally	Not available
B2	178	Max Temperature tally	Set Max temp tally to -273
B3	179	Max Temperature tally	Return Cover openings tally, returns 10 bytes

Select or Cancel Automatic Status Back (ASB)

Enables or disables automatic status back (ASB) and specifies the status items. This command is a batch mode command; that is, it is processed after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and changing the ASB response, depending on the receive buffer status.

If any of the status items listed above are selected, ASB is enabled and the printer automatically transmits 4 status bytes whenever the selected status changes. If no status is selected, ASB is disabled. All four status bytes are transmitted without checking DSR.

If the error status is enabled, a change in the following conditions will trigger the ASB:

- ◆ Receipt Cover
- ◆ Knife Error
- ◆ Out-of-Range Printhead Temperature
- ◆ Out-of-Range Voltage
- ◆ Paper Exhaust

ASCII GS a n
Hexadecimal 1D 61 n
Decimal 29 97 n

Value of n Status of ASB
Byte 1= printer information
Byte 2= error information
Byte 3= paper sensor information
Byte 4= Paper sensor information

The bits of *n* are defined in the table.

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Cash drawer status disabled.
	On	01	1	Cash drawer status enabled.
1	Off	00	0	RS-232C Busy status disabled.
	On	02	2	RS-232C Busy status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Receipt paper roll status disabled.
	On	08	8	Receipt paper roll status enabled.
4	-	-	-	Undefined
5	-	-	-	Undefined.
6	-	-	-	Undefined
7	-	-	-	Undefined

Select or Cancel Automatic Status Back (ASB) (continued)**Default** 0 (ASB disabled)**Exceptions**If $n = 0$, ASB is disabled.**Related Information**

When the printer is disabled by the Select Peripheral Device command (1B 3D), this command (Enable/Disable Automatic Status Back) is disabled but Automatic Status Back is not disabled.

When Auto Status Back (ASB) is enabled using this command, the status transmitted by other commands and the ASB status be differentiated according to the information found in Recognizing Data from the Printer, (in the Real Time Commands section in this document). The status bytes to be transmitted are described in the following four tables.

First Byte (Printer Information)				
Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to off.
1	Off	00	0	Not used. Fixed to off.
2	Off	00	0	One or both cash drawers open.
	On	04	4	Both cash drawers closed.
3	Off	00	0	Not Busy at the RS232C interface.
	On	08	8	Printer is Busy at the RS232C interface.
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Cover closed.
	On	20	32	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.

Select or Cancel Automatic Status Back (ASB) (continued)

Second Byte (Error information)				
Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined
1	-	-	-	Undefined
2	-	-	-	Undefined
3	Off On	00 08	0 8	No knife error. Knife error occurred.
4	Off	00	0	Not used. Fixed to off.
5	Off On	00 20	0 32	No unrecoverable error. Unrecoverable error occurred.
6	Off	00	0	No recoverable error.
	On	40	64	Recoverable Error : Cover open, paper out, temperature or voltage error is out of range.
7	Off	00	0	Not used. Fixed to off.

Third Byte (Paper Sensor Information)				
Bit	Off/On	Hex	Decimal	Status for ASB
0	Off On	00 01	0 1	Paper present Paper low (if paper low sensor enabled)
1	Off On	00 02	0 2	Paper present Paper low (if paper low sensor enabled)
2	Off On	00 04	0 4	Paper present. Paper exhausted.
3	Off On	00 08	0 8	Paper present. Paper exhausted.
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Fourth Byte (Paper Sensor Information)				
Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Transmit Status

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

When DTR/DSR RS232C communications handshaking control is selected, the printer transmits the one byte response only when the host signal DSR indicates it is ready to receive data.

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

When Auto Status Back (ASB) is enabled using the Enable/Disable Automatic Status Back command (1D 61), the status transmitted by this command (Transmit Status) and the ASB status must be differentiated according to the information found in Recognizing Data from the Printer, (in the Real Time Commands section in this document).

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

Value of *n* 1, 49 = printer status
 2, 50 = cash drawer status
 4, 52 = Flash memory User Sector status

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

Printer Status (<i>n</i> = 1 or <i>n</i> = 49)				
Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	Paper present.
	On	01	1	Paper exhausted.
1	Off	00	0	Cover closed.
	On	02	2	Cover open.
2	Off	00	0	Paper present.
	On	04	4	Paper exhausted.
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Transmit Status (continued)

Cash Drawer Status ($n = 2$ or $n = 50$)				
Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	One or both cash drawers open.
	On	01	1	Both cash drawers closed.
1	Off	00	0	One or both cash drawers open.
	On	02	2	Both cash drawers closed.
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Flash memory User Sector Status ($n = 4$ or $n = 52$)				
Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	Off	00	0	Not Used. Fixed to off
3	Off	00	0	Flash Logo area adequate, definition stored
	On	08	8	Flash logo area not adequate
4	Off	00	0	Not used. Fixed to off.
5	Off	00	00	No user-defined characters written to Flash
	On	20	32	User-defined characters written to Flash
6	Off	00	0	Not used. Fixed to off.
7	-	-	-	Undefined.

Exceptions

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

Send Printer Software Version

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: 1.234.56 (8 bytes). The boot version is 1.23. The flash version is 4.56.

ASCII	AX V
Hexadecimal	1F 56
Decimal	31 86

Print Test Form

Prints the current printer configuration settings on the receipt.

ASCII	AX t
Hexadecimal	1F 74
Decimal	31 116

Real Time Commands

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

- ◆ Real Time Status Transmission: GS (Hex 1D) Sequence and DLE (Hex 10) Sequence
- ◆ Real Time Request to Printer: GS (Hex 1D) Sequence and DLE (Hex 10) Sequence
- ◆ Real Time Printer Status Transmission

The original Printer Status commands, Transmit Printer Status (Hex 1B 76, ASCII ESC v) and Transmit Cash Drawer Status (Hex 1B 75 0, ASCII ESC u 0) are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they were received. If the paper exhausts while printing data that was in the buffer ahead of the status command, the printer goes busy at the RS-232C interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, thermal printhead overheat, etc. In addition, there is no way to restart the printer after a paper jam or other error.

The Real Time commands are implemented in two ways to correct these problems. Both implementations offer the same functionality; which one you choose depends on the current usage of your application.

Rules for Using Real Time Commands

Three situations must be understood when using real time commands.

First, the printer executes the Real Time command upon receiving it and will transmit status regardless of the condition of the DSR signal.

Second, the printer transmits status whenever it recognizes a Real Time Status Transmission command sequence, even if that sequence happens to occur naturally within the data of another command, such as graphics data.

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

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

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

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

Moving Data through the Buffer

Applications should not let the buffer fill up with Real Time commands when the printer is busy at the RS-232C interface. A busy condition at the RS-232C interface can be determined by bit 3 of the response to GS ENQ or GS EOT 1 or DLE EOT 1. The reason for a particular busy condition can be determined by other responses to GS EOT n or DLE EOT 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 of 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 sequences are being used, the last byte stored when the buffer fills up could be the DLE code, with no room for the subsequent EOT or ENQ. When this lone DLE byte is finally processed out of the buffer it will be interpreted as a Clear Printer command.

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

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 ESC u and ESC v are non-Real Time responses and will arrive in the order in which they were solicited.

Batch Mode Response	Response Recognized By:								
ESC u 0	0	0	0	0	0	0	x	x	Binary
ESC v	0	0	0	0	0	X	x	x	Binary
GS I n	0	x	x	0	X	X	x	x	Binary
GS r n	0	x	x	0	X	X	x	x	Binary
Real Time Response	Response Recognized By:								
GS EOT n	0	x	x	1	x	X	1	0	Binary
DLE EOT n	0	x	x	1	x	X	1	0	Binary
GS ENQ	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
Auto Status Back (ASB)	Response Recognized By:								
ASB Byte 1	0	x	x	1	x	X	0	0	Binary
ASB Bytes 2-4	0	x	x	0	x	X	x	x	Binary

Real Time Request to Printer

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.

	<u>GS Sequence</u>	<u>DLE Sequence</u>
ASCII	GS ETX <i>n</i>	DLE ENQ <i>n</i>
Hexadecimal	1D 03 <i>n</i>	10 05 <i>n</i>
Decimal	29 3 <i>n</i>	16 5 <i>n</i>

Value of *n*

- 1 = recover and restart
- 2 = recover and clear buffers

***n* = 1**

Restarts printing from the beginning of the line where an error occurred, after recovering from the error. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

This command will attempt recovery from a knife error. Other errors associated with the receipt, such as paper out or printhead overheating, can be recovered from only by clearing the specific condition, such as loading paper or letting the printhead cool down.

***n* = 2**

Recovers from an error after clearing the receive and print buffers. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

The same error recovery possibilities exist as for *n* = 1.

Exceptions

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

Real Time Status Transmission

Transmits the selected one byte printer status specified by *n* in Real Time according to the following parameters. This command includes two sequences: GS and DLE.

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

Value of <i>n</i>	<u>GS Sequence</u>
	1 = Transmit printer status
	2 = Transmit RS-232C busy status
	3 = Transmit error status
	4 = Transmit receipt paper status

<u>DLE Sequence</u>
1 = Transmit printer status
2 = Transmit RS-232C busy status
3 = Transmit error status
4 = Transmit receipt paper status

Exceptions

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

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.

Real Time Status Transmission (continued)**2 = Transmit RS-232C Busy Status**

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

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

Real Time Status Transmission (continued)**4 = Transmit Receipt Paper Status**

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Paper adequate
	On	04	4	Paper low (if paper low sensor enabled)
3	Off	00	0	Paper adequate
	On	08	8	Paper low (if paper low sensor enabled)
4	On	10	16	Fixed to On
5	Off	00	0	Paper present
	On	20	32	Paper exhausted
6	Off	00	0	Paper present
	On	40	64	Paper exhausted
7	Off	00	0	Fixed to Off

Real Time Printer Status Transmission

Transmits one byte status of the printer in real time.

ASCII GS ENQ
Hexadecimal 1D 05
Decimal 29 5

Value of Byte

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Paper adequate.
	On	01	1	Paper low (if paper low sensor enabled).
1	Off	00	0	Paper adequate.
	On	02	2	Paper low (if paper low sensor enabled).
2	Off	00	0	Cover closed.
	On	04	4	Cover open.
3	Off	00	0	Not busy at the RS-232C interface.
	On	08	8	Printer is busy at the RS-232C interface.
4	Off	00	0	One or both cash drawers open.
	On	10	16	Both cash drawers closed.
5	Off	00	0	Fixed to Off.
6	Off	00	0	No error condition.
	On	40	64	Error condition exists in the printer.
7	On	80	128	Fixed to On.

Bar Code Commands

These commands format and print bar codes and are described in order of their hexadecimal codes.

Select Printing Position of HRI Characters

Prints HRI (Human Readable Interface) characters above or below the bar code.

ASCII	GS H <i>n</i>
Hexadecimal	1D 48 <i>n</i>
Decimal	29 72 <i>n</i>

Value of <i>n</i>	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)
----------------	-----------------

Select Pitch of HRI Characters

Select font used to print HRI characters.

ASCII	GS f <i>n</i>
Hexadecimal	1D 66 <i>n</i>
Decimal	29 102 <i>n</i>

Value of <i>n</i>	0 = Standard Pitch at 15 CPI
	1 = Compressed Pitch at 20 CPI

Default	0 (Standard Pitch at 15 CPI)
----------------	------------------------------

Select Bar Code Height

Sets the bar code height to n dots or $n/203$ inch ($n/8$ mm).

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

Value of n	Number of dots
Range of n	1-255
Default	216

Print Bar Code

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 NULL character to terminate the string; the second uses a length byte at the beginning of the string to compensate for the Code 128 bar code that can accept a NULL character as part of the data. With the second variation the length of byte is specified at the beginning of the string.

Bar codes can be aligned left, center, or right using the Align Positions command (1B 61).

The check digit is calculated for UPC and JAN (EAN) codes if it is not sent from the host computer. Six-character zero-suppressed UPC-E tags are generated from full 11 or 12 characters sent from the host computer according to standard UPC-E rules. Start/Stop characters are added for Code 39 if they are not included.

Rotated barcodes set with small modules (select bar code width command 1D 77 n , with $n=1$ or 2) and PDF417 barcodes in any orientation are printed at low speed, for better readability.

	<u>First Variation</u>	<u>Second Variation</u>
ASCII	GS k $m d1...dk$ NUL	GS k $m n d1...dn$
Hexadecimal	1D 6B $m d1...dk$ NUL	1D 6B $m n d1...dn$
Decimal	29 107 $m d1 dk$ NUL	29 107 $m n d1...dn$
	(0 = End of command)	

Exceptions

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

Illegal data cancels the command.

Print Bar Code (continued)**Values**

First Variation: String terminated with NULL Character

<i>M</i>	Bar Code	<i>D</i>	<i>n</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>dI</i> = <i>dk</i> = 42 (start/stop code is supplied by printer if necessary)	Variable Length
5	Interleaved 2 of 5	48- 57	Variable Length (Even Number)
6	Codabar	65- 68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable Length
10	PDF 417	32-255	Variable Length

Second Variation Length of Byte Specified at Beginning of String

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. See the table. If character code *d* cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

Print Bar Code (continued)

<i>m</i>	Bar Code	<i>D</i>	<i>n</i> , Length
65	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
66	UPC-E	48- 57	Fixed Length: 11, 12
67	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
68	JAN8 (EAN)	48- 57	Fixed Length: 7, 8
69	CODE39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) <i>d1</i> = <i>dk</i> = 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
73	Code 128*	0-105 <i>d1</i> = 103-105 (must be a Start code) <i>d2</i> = 0-102 (data bytes) (Stop code is provided by the printer)	Variable
75	PDF 417	0-255	Variable Length

Select Bar Code Width

Sets the bar code module to $(n+1)/203$ inch ($((n+1)/8$ mm).

ASCII	GS w <i>n</i>
Hexadecimal	1D 77 <i>n</i>
Decimal	29 119 <i>n</i>

Value of *n* 1, 2, 3, 4, 5

Default *n*=2

Formulas

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

Page Mode Commands

Page mode is one of two modes that the A794 printer uses to operate. Standard mode is typical of how most printers operate by printing data as it is received and feeding paper as the various paper feed commands are received. Page mode is different in that it processes or prepares the data as a “page” in memory before it prints it. Think of this as a virtual page. The page can be any area within certain parameters that you define. The page is printed using either the FF (0C) or the ESC FF (1B 0C) command.

The Select Page Mode command (1B 4C) puts the printer into page mode. Any commands that are received are interpreted as page mode commands. Several commands react differently when in standard mode and page mode. The descriptions of these individual commands in this chapter indicate the differences in how they operate in the two modes.

Print and Return to Standard Mode

When printing is completed, values for Select Print Direction in Page Mode (ESC T) and Set Print Area in Page Mode (ESC W) and the position for buffering character data are set. Buffered data is not deleted from the printer.

The processed data is printed and the printer returns to standard mode. The developed data is deleted after being printed. For more information see Page Mode in this document.

ASCII	FF
Hexadecimal	0C
Decimal	12

Exceptions

This command is enabled only in page mode.

Cancel Print Data in Page Mode

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.

ASCII	CAN
Hexadecimal	18
Decimal	24

Exceptions

This command is only used in page mode.

Print Data in Page Mode

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 (ESC T) and Set Print Area in Page Mode (ESC W), and sets the position for buffering character data.

ASCII	ESC FF
Hexadecimal	1B 0C
Decimal	27 12

Exceptions

This command is enabled only in page mode.

Select Page Mode

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 (ESC S) 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 (ESC T) within the printing area defined by Set Print Area in Page Mode (ESC W).

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 (ESC SP)
- ◆ Select 1/6-Inch Line Spacing (ESC 2)
- ◆ Set Line Spacing (ESC 3)

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 (ESC V)
- ◆ Set Counter Clockwise Rotation (ESC DC2)
- ◆ Select Justification (ESC a)
- ◆ Select or Cancel Upside-Down Printing (1B 7B).
- ◆ Set Left Margin (GS L)
- ◆ Set Print Area Width (GS W)

ASCII	ESC L
Hexadecimal	1B 4C
Decimal	27 76

Exceptions

The command is enabled only when input at the beginning of a line

The command has no effect if page mode has previously been selected.

Select Standard Mode

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 (ESC W) 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 (ESC SP)
- ◆ Select 1/6 Inch Line Spacing (ESC 2)
- ◆ Set Line Spacing (ESC 3)

Standard mode is automatically selected when power is turned on, the printer is reset, or the Initialize Printer command (ESC @) is used.

ASCII	ESC S
Hexadecimal	1B 53
Decimal	27 83

Exceptions

This command is effective only in page mode.

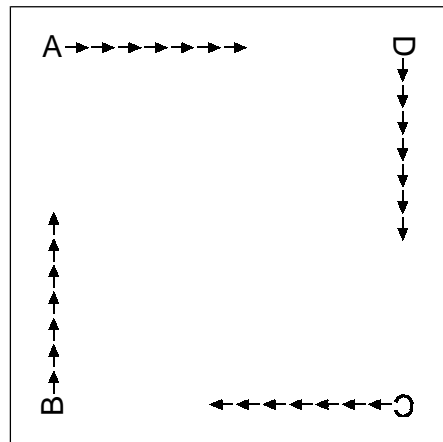
Select Print Direction in Page Mode

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

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 (FF or ESC FF).

ASCII	ESC T <i>n</i>
Hexadecimal	1B 54 <i>n</i>
Decimal	27 84 <i>n</i>

Value of <i>n</i>	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

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

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 (FF or ESC FF).

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

Range of *n* 0-255

Default	<i>n1-4</i> =	0
	<i>n5</i> =	64
	<i>n6</i> =	2
	<i>n7</i> =	64
	<i>n8</i> =	2

Formulas

The starting position of the print area is the upper left of the area to be printed (*x0*, *y0*). The length of the area to be printed in the *y* direction is set to *dy* inches. The length of the area to be printed in the *x* direction is set to *dx* inches. Use the equations to determine the Value of *x0*, *y0*, *dx*, and *dy*.

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).

- ◆ $x0 = [(n1 + n2 \times 256) \times (\text{horizontal direction of the fundamental calculation pitch})]$
- ◆ $y0 = [(n3 + n4 \times 256) \times (\text{vertical direction of the fundamental calculation pitch})]$
- ◆ $dx = [(n5 + n6 \times 256) \times (\text{horizontal direction of the fundamental calculation pitch})]$
- ◆ $dy = [(n7 + n8 \times 256) \times (\text{vertical direction of the fundamental calculation pitch})]$

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.

Select Character Size

Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 6, 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 direction 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 (ESC !) command can also select or cancel double-width and double-height modes. However, the setting of the last received command is effective.

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

Select Character Size (continued)

Value of n 1-8 = vertical number of times normal font
 1-8 = horizontal number of times normal font

Range of n 0-255

Default of n 11 hexadecimal

Exceptions

If n is out of the defined range, this command is ignored.

Set Absolute Vertical Print Position in Page Mode

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 (ESC T) and operates setting 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 (GS P) command.

The Set Horizontal and Vertical Minimum Motion Units (GS P) 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.

ASCII	GS \$ $nL nH$
Hexadecimal	1D 24 $nL nH$
Decimal	29 36 $nL nH$

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

Sets the relative vertical print starting position from the current position. This command can also change the horizontal and vertical motion unit. The unit of horizontal and vertical motion is specified by this command.

This command functions as follows, depending on the print starting position set by Select Print Direction in Page Mode (ESC T):

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

ASCII	<code>GS \ nL nH</code>
Hexadecimal	<code>1D 5C nL nH</code>
Decimal	<code>29 92 nL nH</code>

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.

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.

Macro Commands

These commands are used to select and perform a user-defined sequence of printer operations.

Select or Cancel Macro Definition

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 (GS ^) 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 (ESC @), thus, the Initialize Printer (ESC @) command may be used as part of the macro definition.

If the printer receives a second Select or Cancel Macro Definition (GS :) command immediately after previously receiving a Select or Cancel Macro Definition (GS :) the printer remains in the macro undefined state.

ASCII	GS :
Hexadecimal	1D 3A
Decimal	29 58

Formulas

The contents of the macro can be defined up to 2048 bytes.

Exceptions

If the macro definition exceeds 2048 bytes, excess data is not stored.

Execute Macro

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.

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.

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.

Flash Download Commands

These commands are used to load firmware into the printer.

There are three ways to enter the download mode.

1. Powering the printer up with DIP Switch 1 down.
2. While the printer is running normally, send the command, "Switch to Flash Download Mode (1B 5B 7D)" to leave normal operation and enter the download mode.
3. If the Flash 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 UP position during reboot to return to normal printer operation.**

When each flash download command is received, the printer returns either ACK or NAK to the host computer when each command is received:

- ◆ ACK (hexadecimal 06)
Sent when the printer has received a host transmission and has completed the request successfully.
- ◆ NAK (hexadecimal 15)
Sent when a request is unsuccessful.

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.

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

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.

ASCII	ESC [}
Hexadecimal	1B 5B 7D
Decimal	27 91 125

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

Returns ACK (06 hex) + 12 bytes ASCII string describing the Flash memory Boot sector Firmware part number. Ex : 189-1234567A

ASCII	GS NULL
Hexadecimal	1D 00
Decimal	29 0

Exceptions

Available only in download mode.

Return Segment Number Status of Flash Memory

Returns the size of the flash used. There may be 4, 8, or 16 sectors (64K each) 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.

ASCII	GS SOH
Hexadecimal	1D 01
Decimal	29 1

Exceptions

Available only in download mode.

Select Flash Memory Sector to Download

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

ASCII	GS STX <i>nn</i>
Hexadecimal	1D 02 <i>nn</i>
Decimal	29 2 <i>nn</i>

Value of *n* the flash sector to which the next download operation applies

Range of *n* 0

Exceptions

Available only in download mode.

Get Firmware CRC

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.

ASCII	GS ACK
Hexadecimal	1D 06
Decimal	29 6

Return Boot Sector CRC

Returns the CRC calculated over the boot sector code space.

ASCII	GS BEL
Hexadecimal	1D 07
Decimal	29 7

Formulas

ACK <low byte> <high byte>

Erase All Flash Contents Except Boot Sector

Causes the entire flash memory to be erased.

The printer returns ACK if the command is successful; NAK if it is unsuccessful.

ASCII	GS SO
Hexadecimal	1D 0E
Decimal	29 14

Exceptions

Available only in download mode.

Return Main Program Flash CRC

Returns the CRC calculated over the flash firmware code space. The format of the response is ACK <low byte> <high byte>.

ASCII	GS SI
Hexadecimal	1D 0F
Decimal	29 15

Erase Selected Flash Sector

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.

ASCII	GS DLE <i>n</i>
Hexadecimal	1D 10 <i>n</i>
Decimal	29 16 <i>n</i>

Value and Range of <i>n</i>	0-2 = 256k bytes Flash
	0-14 = 1M bytes Flash
	0-30 = 2M bytes Flash

Exceptions

Available only in download mode.

Download to Active Flash Sector

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 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.

ASCII	GS DC1 <i>al ah cl ch d1...dn</i>
Hexadecimal	1D 11 <i>al ah cl ch d1...dn</i>
Decimal	29 17 <i>al ah cl ch d1...dn</i>

Value of *al* = low byte of the address (it is sent before the high byte)

Value of *ah* = high byte of the address (it is sent after the low byte)

Value of *cl* = low byte of the count (it is sent before the high byte)

Value of *ch* = high byte of the count (it is sent after the low byte)

Value of *d* = data bytes, from 1 to *n*

Value of <i>n</i> (for number of data bytes)	Range of Address (<i>al ah</i>)	Range of Count (<i>cl ch</i>)
$((ch \times 256) + cl)$	0000-FFFF (hexadecimal)	0001-FFFF (hexadecimal)

Range Addresses run from 0 to 64K.

Related Information

Available only in download mode.

Select Memory Type (SRAM/Flash) Where to Save Logos or User-Defined Fonts

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.

ASCII	GS " <i>n</i>
Hexadecimal	1D 22 <i>n</i>
Decimal	29 34 <i>n</i>

Value of *n* 48-51

n = 48 (ASCII *n* = 0)

Loads active logo to RAM only. This is used to print a special logo but not have it take up flash memory. A logo defined following this command is not preserved over a power cycle.

n = 49 (ASCII *n* = 1)

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

n = 50 (ASCII *n* = 2)

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

n = 51 (ASCII *n* = 3)

Loads user-defined characters to flash memory. An application must use this command to store user-defined characters in flash memory. Any user-defined characters defined following this command are stored in flash memory. A user-defined character cannot be redefined in flash memory. The flash memory page must be erased by an application before redefining user-defined characters. For more information, see the Erase User Flash Sector (1D 40 *n*) Command earlier in this section.

Erase User Flash Sector

Erases a page of flash memory and sends a carriage return when the operation is complete.

ASCII	GS @ <i>n</i>
Hexadecimal	1D 40 <i>n</i>
Decimal	29 64 <i>n</i>

Value of *n* 49-50

n = 49 (ASCII *n* = 1)

This command erases the entire 64K page available for user-defined characters and multiple logos. The page should be erased in two situations: when the logo definition areas 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.

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

Reset Firmware

Reboots the printer.

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