



TURNKEY PRINTING SOLUTIONS

TPSK PRINTER SERIES

24 & 12V

USER MANUAL

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EVOLUTIONS

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INTRODUCTION

The TPSK series is part of the "Compact Kiosk" printer family. The wide range of temperature and humidity operating conditions allows integration to a system used indoors or outdoors.

The TPSK printers are turnkey units that contain the printing head, the interface controller board, the paper roll bucket and a cutter / paper chute assembly to protect and display the printed ticket.

The main characteristics are:

- Easy connection (12V or 24V power supply and serial interface)
- Easy paper loading with a front printer door, a bucket to set the roll of paper, and a "Clamshell" system to easily set the paper under the print head.
- Different ways to install the printer, including a possible sliding system for sealing.
- Compact size in which 4 inch paper rolls can be used.
- Many information sent back to the host system such as : jam, low paper, out of paper ...
- A specific cutter patented by Axiohm with which the ticket can be cut when the user pulls it.
This protects the ticket in a chute while it is printed. The chute on the existing units is optimized for a 4 inch ticket length.
Please contact Axiohm for other needs.

Note: This manual is not applicable to the version TPSK2401 (User Manual ref 3109472/Z) that is driven with a different command set.

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1 TECHNICAL SPECIFICATIONS

The following table gathers the main characteristics of the printing unit.

ITEM	12 V Version	24 V Version	UNIT
Printing method	Static thermal dot line printing	Static thermal dot line printing	--
Paper loading	Clamshell	Clamshell	--
Number of resistor dots	384	384	dots
Resolution	8 horizontal & vertical	8 horizontal & vertical	Dots/mm
Printing width	48	48	mm
Printing speed	100 maximum*	100	mm/s
Paper width	+0.1	+0.1	mm
	60	60	
	-1	-1	
Head T° detection	By Thermistor	By Thermistor	--
Paper feed pitch	1	1	Motor steps
	0.125	0.125	mm
Paper empty detection	Opto-sensor	Opto-sensor	--
Operating voltage range Vcc (logic)	4.75-5.25	4.75-5.25	V DC
Vch (dot)	10.8-13.2 (max 16 stand by)	20 - 26.4 (max. 30 stand by)	V DC
Current Consumption: Vch	28	22.6	mA per resistor dot "on" at nominal voltage
Current Consumption: Vcc (all dots "on")	42	42	mA
Nominal dot energy (High sensitivity paper)	0.34 ^{*1}	0.32 ^{*1}	mJ
Current Consumption: Stepping motor	300	300	mA per activated phase at nominal voltage
Current Consumption: interface board Stand-by 12 or 24V	80	40	mA
Peak print head current (all dots "on" at nominal value)	10.8	8.8	A
Over all dimensions:	Width	102	mm
	Depth	160,5	mm
	Height	204,37	mm
Weight	1700	1700	g
Storage range*2	-20 to +85	-20 to +85	°C
Relative humidity*2	20 to 95 no condensing	20 to 95 no condensing	%
Operating range*2	0 to +70	0 to +70	°C
Electrical lifetime *3	10 ⁸	10 ⁸	pulses on OE signal
Mechanical lifetime *3	50	50	km
Specified standards	UL60950 ; CSA 22.2-60950 (cUL) ; CE class B, ROHS, IEC60950 ; C-Tick, FCC class B.		

*1 In standard conditions: Nominal Volts, 25°C, for a print head with a resistance of 1000 Ω (24V) or 480 Ω (12V), at 800 PPS. When used with 12V the maximum is not reached at room temperature and nominal voltage.

*2 Contact Axiohm for recommendations if extended conditions are required

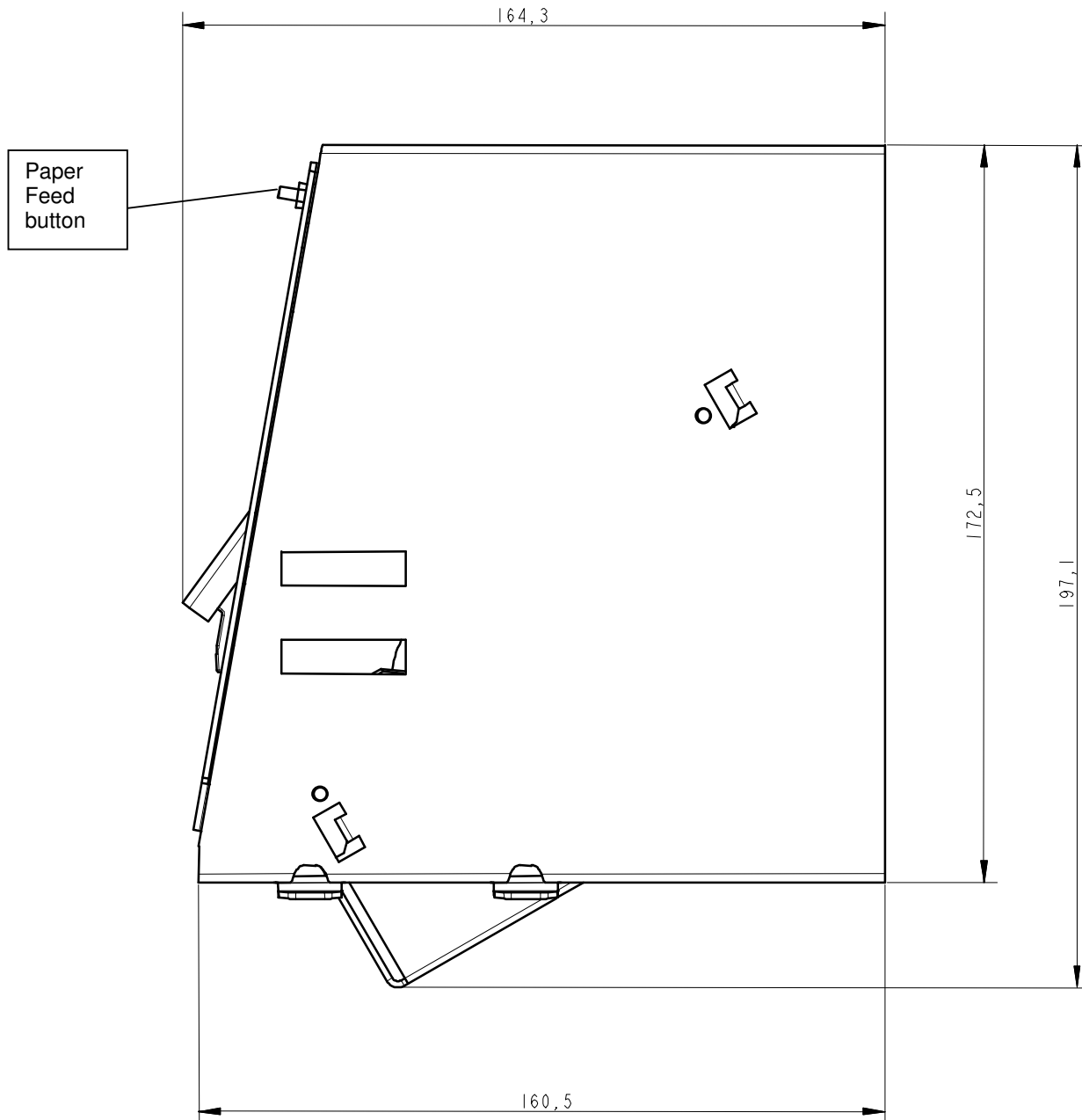
*3 Per AXIOHM conditions

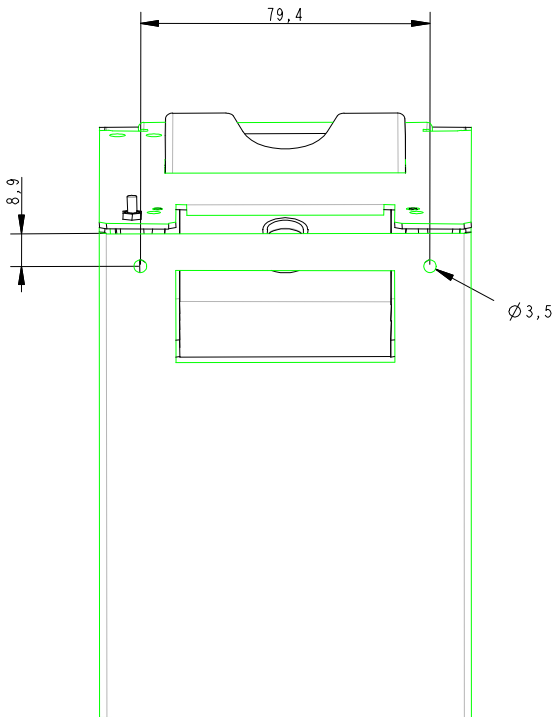
1.1 Features

Flash Memory Size	128kb
Amount of Flash Memory accessible for user storage	48 kb
Resident character set	PC Code Pages: 858 and 437
Bar code support	Code 39, UPC-A, UPC-E, JAN8 (EAN), JAN13 (EAN), Interleaved 2 of 5 (ITF), Codabar, Code 128
Drivers available	Windows 98, 2000, XP
Human Interface	Configuration software commands for easy setup

2 MECHANICAL FEATURES

2.1 External Dimensions

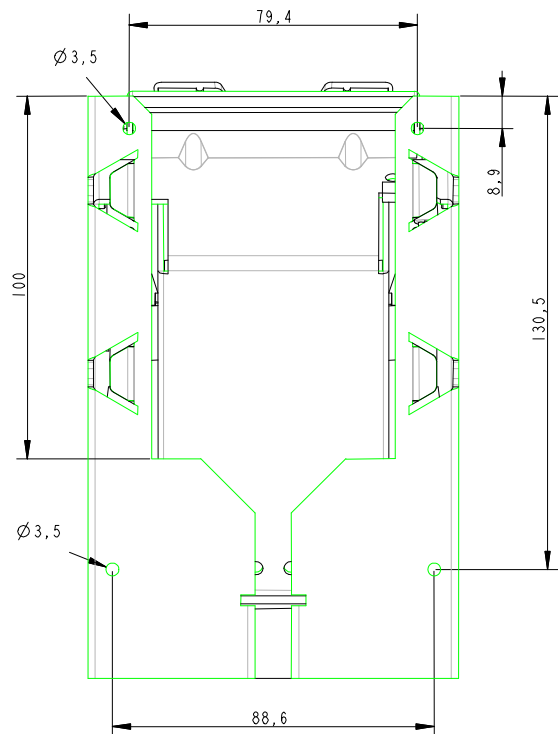




The support for this printer needs to be "U shaped" to allow the paper roll bucket to protrude through.

The printer can be either fixed (four holes underneath & two above the unit), or free to slide with its guiding tabs (for sealing issue if needed).

Holes of fixation (binding) were placed on the chassis



2.2 Housing features for ticket access

See section «Recommendations».

2.3 Paper Loading

Maximum paper roll diameter is 102 mm. Paper / roll width must be 59 to 60 mm.

The following steps are needed to load the paper:

- Open the door by pulling it
- Remove the core of the preceding roll if necessary
- Place the new roll
- Set the paper end through the door chute over the platen
- Close the door, keeping the paper end tight to avoid a possible paper loop.
- Pull the paper end to cut; if the paper is loaded.



Step n°1



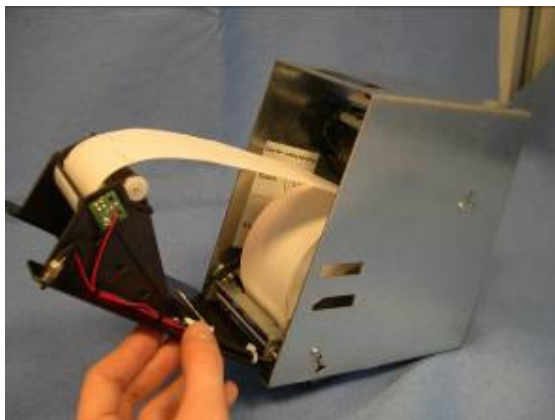
Step n°2



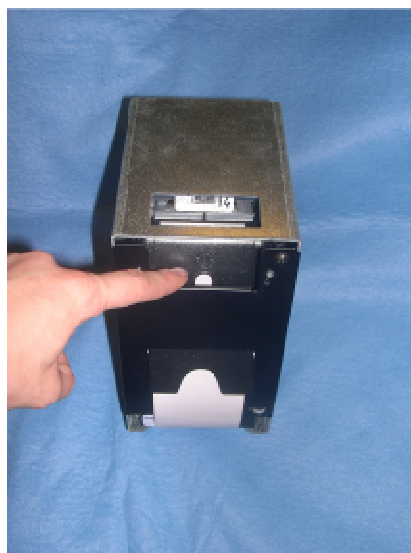
Step n°3



Step n°4



Step n°5



Step n°6 (you must check if you see the paper in the hole)

Step n°7: Push the door until complete closing

2.4 Self test

By opening and closing the door, a ticket is printed. Printer setting can be checked on it.

2.5 CUTTER SYSTEM / PAPER CHUTE

The paper is fed into a chute. The user has access to the ticket end at the chute exit. The user then cuts the receipt when he pulls the ticket.

With this system (on existing units), the distance between the printing line and the cutting line is between 20 and 21 mm. It is possible to print a header (or footer) of the next ticket in this area.

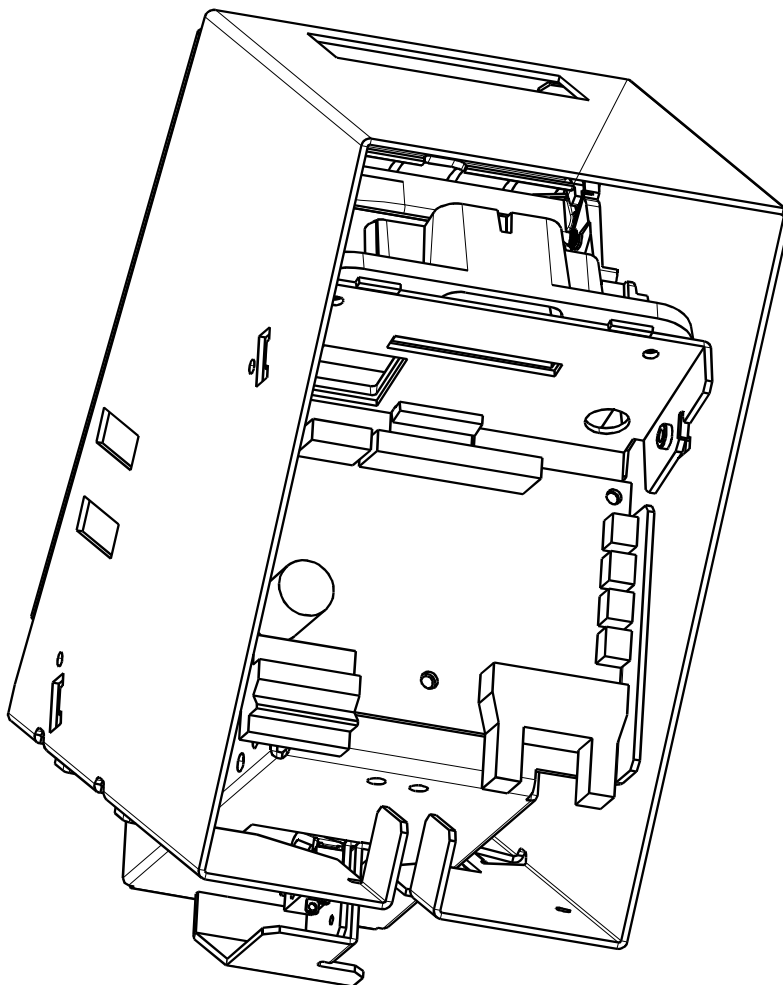
The chute hides the ticket from the user until it is fully printed; the length of ticket with the existing TPSWS002 PRINTER is 4 inches. With tickets shorter than 3.75 inches, the user would not access the ticket end. It is possible to print a ticket longer than 4 inches; sensors and software provide security to avoid jam when the ticket is pulled during printing.



- Chute length optimised
for 4 inch tickets:
- for ticket protection
 - for ticket end access

3 INTERFACE BOARD FEATURES

3.1 Overview:



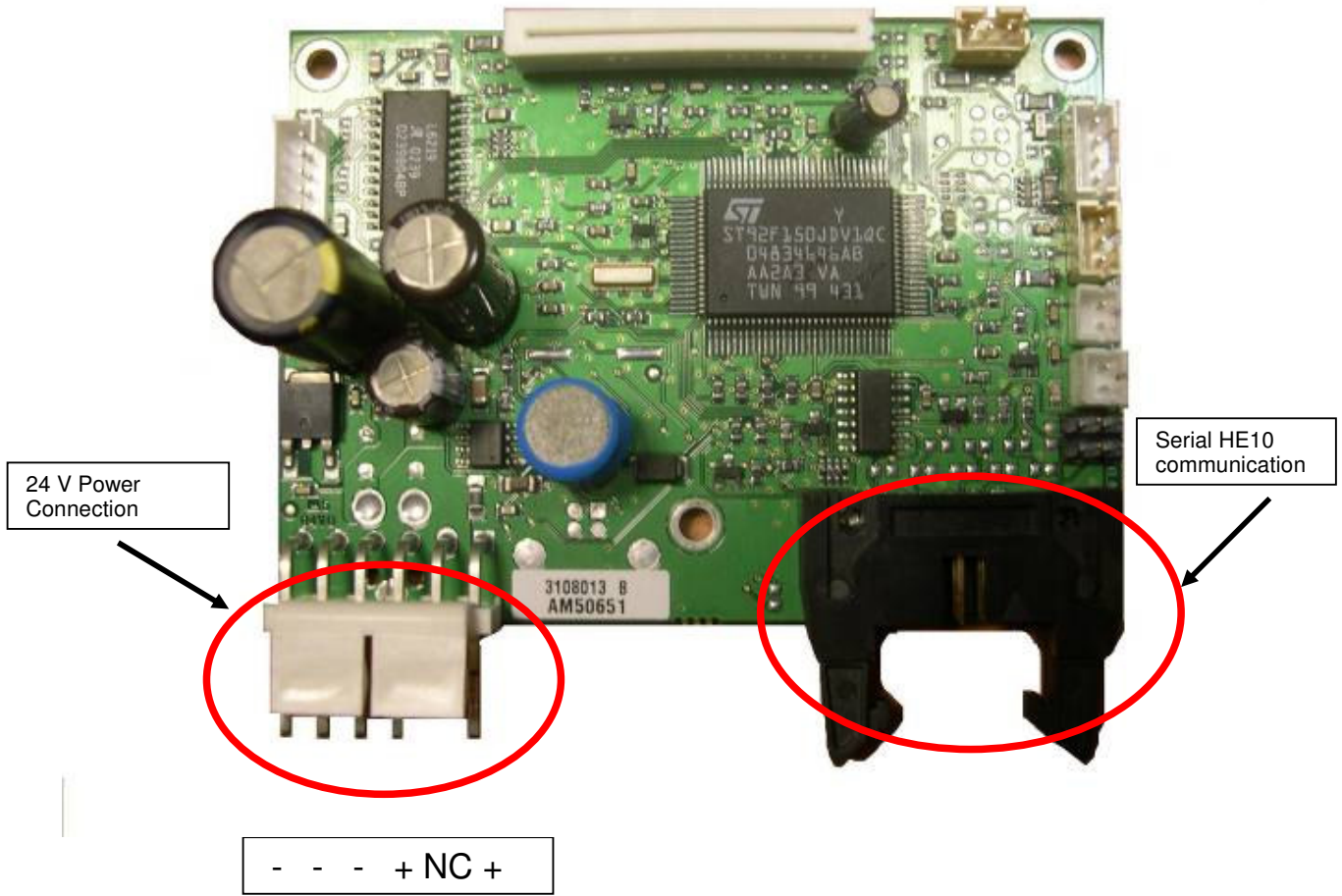
Printer connections are available directly on the board connectors at the printer rear.

The power supply must be a switch power supply AC/DC - 24V 3A mean, with minimum recommended power 55VA (possible peak of 8.8A during 1.5ms) or 12V 6A mean with minimum recommended power 55VA (possible peak of 10.8A during 1.5ms).

A missing pin on the connector allows an easy locating.

The communication is serial RS232. Communication parameters can be modified (see the control code list). Default setting is 115200 Bauds, N, 8, 1.

3.2 Power supply connector location



Warning: Please use the missing pin as a locating: a reversed connection can destroy the PCB.

3.3 Serial HE10 Pinout

Pinout Description

HE10 (board side)	
1 :	GND
2 :	TXD
3 :	GND
4 :	RXD
5 :	NC
6 :	NC
7 :	DSR
8 :	GND
9 :	DTR

Recommended Connector

HE10: 10 points with locating and holding clips
3M ref.: 89110-0103HA or equivalent

3.4 Self test ticket description

To print a self ticket:

- open and close the door

Here is the description of the self test print out.

- Model Number	:	- This is a 15 digit number fixed by Axiohm.
- Serial Number	:	- This is a 10 digits number fixed by Axiohm
	:	First letter: always D
	:	Next two digits: year of production
	:	Next two digits: week of production
	:	Next 5 digits: incremental number that is reset every Monday morning.
BOOT FIRMWARE		
Revision	:	-Vx.xx
CRC	:	This a 4 digits check sum
Flash FIRMWARE		
Revision	:	-Vx.xx
CRC	:	This a 4 digits check sum
HARDWARE		
- Flash Memory Size	:	- Total size of the main flash memory.
- Flash Size User	:	- Amount of Flash memory allocated to logos or user defined fonts.
	:	
- SRAM Size	:	- Total size of the RAM Memory
- CPU Clock Freq.	:	- Microprocessor Clock frequency.
MECHANISM		
- Type	:	- CHTP/HTP
- Voltage	:	- 24V
- Print Density	:	- Percentage of the nominal heating time value for specified paper.
- Partial Cut	:	- Indicate the number of motor steps to perform a partial cut.

- Paper Low Sensor	:	- Enable Paper Low sensor management.
- Pre Heating	:	- This mode is used to maintain print head temperature above minimum value.
- Max Speed	:	- Printer top speed limit.
COMMUNICATION		
- RX Buffer Size	:	- This indicates the size of the data Input buffer (Bytes).
- Interface Type	:	- Indicates if RS232 or USB interface is used. Automatic detection of USB interface
Baud rate	:	Baud rate Value.
Data Bits	:	Number of data bits.
Stop Bit(s)	:	Number of stop bit(s).
Parity	:	Type of parity to control frame validity.
Flow Control	:	Hardware or software handshaking.
Reception Errors	:	Indicates which action is to be done when a wrong data is received.
PRINT OPTIONS		
- User Logo defined	:	- Current status = Yes if at least one logo is defined.
- User Char defined	:	- Current status = Yes if at least one font is defined.
- Code Page (437,858)	:	Indicates default internal code page selected upon reset.

(For further information, please contact your distributor or Axiohm Technical Support Team at www.axiohm.com)

Example:

*** DIAGNOSTICS FORM ***

- Model number :0000000000000000
- Serial number: 0000000000

BOOT FIRMWARE

- Revision : V1.02
- CRC : 8A8B

FLASH FIRMWARE

- Revision : V1.03
- CRC : 33F4

HARDWARE

- Flash Memory Size : 64 kbytes
- Flash User Size : 48 kbytes
- SRAM Size : 6 kbytes
- CPU Clock Freq. : 24 MHz

MECHANISM

- Type : CHTP/HTP
- Voltage : 24V
- Print Density : 100%
- Pre Heating : Off
- Paper Low Sensor : Enabled
- Opto. Threshold : 102
- Opto Jam s/h : FA/28
- Opto Pass Mode : Off
- Max speed : 100 mm/s

COMMUNICATION INTERFACE

- RX Buffer Size : 1024
- Interface Type : RS232
- Baud Rate : 115200
- Data Bits : 8
- Stop Bit(s) : 1
- Parity : NONE
- Flow Control : Dtr/Dsr
- Reception error : Ignore

PRINT OPTIONS

- Demo Mode : Disabled
- Autotest /close : Enabled
- Button : Enabled
- User Logo defined : No
- User Char defined : No
- Code Page : 437

4 LIST OF CONTROL CODES

Code (Hexadecimal)	Command	Page
09	Horizontal Tab	25
0A	Print and Feed One Line	22
0D	Activate Carriage Return	22
10 04 <i>n</i>	Real Time Status Transmission	45
11 <i>n1...n1</i>	Print Raster Graphics	34
14 <i>n</i>	Feed <i>n</i> Print Lines	22
15 <i>n</i>	Feed <i>n</i> Dot Rows	23
1B 20 <i>n</i>	Set Right-Side Character Spacing	25
1B 21 <i>n</i>	Select Print Mode	31
1B 24 <i>n1 n2</i>	Set Absolute Starting Position	26
1B 2D <i>n</i>	Select or Cancel Underline Mode	32
1B 32	Set Line Spacing to 1/6 Inch	23
1B 33 <i>n</i>	Set Line Spacing	23
1B 40	Initialize Printer	21
1B 44 [<i>n</i>]... <i>k</i> NUL	Set Horizontal Tab Positions	27
1B 4A <i>n</i>	Print and Feed Paper	24
1B 52 <i>n</i>	Select International Character Set	33
1B 5B 7D	Switch to Flash Download Mode	52
1B 5C <i>n1 n2</i>	Set Relative Print Position	28
1B 61 <i>n</i>	Select Justification	29
1B 64 <i>n</i>	Print and Feed <i>n</i> Lines	24
1B 76	Transmit Paper Sensor Status	37
1D 01	Request Flash Memory Size	52
1D 02 <i>nn</i>	Select Flash Memory Sector to Download	52
1D 06	Get Flash Firmware CRC Status	53
1D 07	Return Boot Sector CRC	53
1D 08	Return SRAM Size	41
1D 0E	Erase All Flash Contents Except Boot	53
1D 0F	Return Main Program Flash CRC	53

LIST OF CONTROL CODES (continued)

Code (Hexadecimal)	Command	Page
1D 10 <i>n</i>	Erase Selected Flash Sector	54
1D 11 <i>al ah cl ch d1...dn</i>	Download to Active Flash Sector	54
1D 23 <i>n</i>	Select the Current Logo	34
1D 2A <i>n1 n2 d1...dn]</i>	Define Downloaded Bit Image	35
1D 2F <i>m</i>	Print Downloaded Bit Image	36
1D 3B <i>n1 n2 n3 n4</i>	Jam sensor calibration	61
1D 40 <i>n</i>	Erase User Flash Sector	56
1D 42 <i>n</i>	Select or Cancel White/Black Reverse Print Mode	32
1D 48 <i>n</i>	Select Printing Position of HRI Characters	48
1D 49 <i>n</i>	Transmit Printer ID	38
1D 49 40 <i>n</i>	Transmit Printer ID, Remote Diagnostics Extension	39
1D 4C <i>nL nH</i>	Set Left Margin	29
1D 57 <i>nL nH</i>	Set Printing Area Width	30
1D 66 <i>n</i>	Select Pitch of HRI Characters	48
1D 68 <i>n</i>	Select Bar Code Height	48
1D 6B <i>m d1...dn</i>	Print Bar Code	49
1D 6B <i>m d1...dk NUL</i>	Print Bar Code	49
1D 72 <i>n</i>	Transmit Status	40
1D 73 <i>n</i>	Set Sensor Threshold	40
1D 77 <i>n</i>	Select Bar Code Width	49
1D FF	Reset Firmware	21
1F 01 <i>d1.. d8192</i>	Erase Boot Sector + Download New Boot Code	55
1F 02 <i>n1 n2 n3 n4 n5 n6</i>	Set Communication Interface Parameters	57
1F 03 AA <i>n</i>	Set Autotest Mode	58
1F 03 A1 <i>n</i>	Set Voltage Mechanism	58
1F 03 03 <i>n</i>	Paper Low Sensor Option	58
1F 03 B2 <i>n</i>	Enable/Disable Paper Feed Button	59
1F 03 0B <i>n</i>	Set Preheating Mode	59
1F 03 96 <i>n</i>	Set Paper Pass (flapper) sensor Threshold	59
1F 0B 4E 52 4A <i>n</i>	Set Print Density	60
1F 0D 43 4C 45 <i>n</i>	Reset EEPROM	60
1F 56	Send Printer Software Version	41
1F 65 <i>n</i>	Return Logo Checksum	36
1F 74	Print Test Form	61
1D 6C <i>m</i>	Transmit Selected A/D Channel	41
1F 77 <i>n</i>	Return User Flash Memory Allocation Status	56

5 COMMAND DESCRIPTION

5.1 Command conventions

The following information describes how each command is organized:

Command Name

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

Description

A brief summary of the command, followed by 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 formula used for this command.

Exceptions

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

Related Information

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

5.2 Reset commands

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 and Left-Aligned characters and reset active logo.

Default bar code settings

ASCII	ESC @	
Hexadecimal	1B 40	
Decimal	27 64	
Default	Character Pitch	12.7 CPI
	Number of Columns Width	24 characters
	Extra Dot Rows	3
	Character Set	Default
	Printing Position	Column One

RESET FIRMWARE

Reboots the printer.

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

5.3 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 the buffer contents and feeds one line.

ASCII	LF
Hexadecimal	0A
Decimal	10

ACTIVATE CARRIAGE RETURN

Prints the buffer contents and feeds one line.

ASCII	CR
Hexadecimal	0D
Decimal	13

Note: this command is almost similar to the previously described <0A>, it was originally made to be compatible with impact printers on which an actual carriage return was necessary. Some applications expect the command to be ignored, while others use it as print command.

FEED *n* PRINT LINES

Feeds *n* lines of paper with the current line/character height.

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* 255

Exception(s)

The command is ignored when it is not sent at the beginning of a line.

FEED *n* DOT ROWS

Feeds *n* dot lines: (the dot height is 0.125mm, the paper feeding with this command is: $n/203$ inch, $n/8$ mm).

ASCII	NAK <i>n</i>
Hexadecimal	15 <i>n</i>
Decimal	21 <i>n</i>
Value of <i>n</i>	$n/203$ inch
Range of <i>n</i>	0-255

Example: <15> <CB> will feed 203 lines thus one inch of paper.

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.

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

Value of <i>n</i>	$n/406$ inch
Range of <i>n</i>	0-255
Default	0.13 inch (3.37 mm)

Exception(s)

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

PRINT AND FEED PAPER

Prints buffer contents and feeds $n/203$ inch ($n/8$ mm) of paper.

Sets the print starting position to the beginning of the line (when printing and feeding are completed).

ASCII	ESC J n
Hexadecimal	1B 4A n
Decimal	27 74 n
Value of n	$n/203$ inch
Range of n	0-255

Exception(s)

If n is too small, the line height equals the character height.

PRINT AND FEED N LINES

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

ASCII	ESC d n
Hexadecimal	1B 64 n
Decimal	27 100 n
Range for n	0-255

5.4 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 *n1 n2 ... 00*) command. The print position is reset to column one after each line.

When no tabs are defined to the right of the current position, or if the next tab is past the right margin, Line Feed is executed.

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

ASCII	HT
Hexadecimal	09
Decimal	9

SET RIGHT-SIDE CHARACTER SPACING

Sets the right side character spacing to [*n*].

ASCII	ESC SP <i>n</i>
Hexadecimal	1B 20 <i>n</i>
Decimal	27 32 <i>n</i>
Range for <i>n</i>	0 – 32
Default	0

Note: *n* has to be a multiple of 4.

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.

ASCII	ESC \$ <i>nL nH</i>
Hexadecimal	1B 24 <i>nL nH</i>
Decimal	27 36 <i>nL nH</i>

Value of *n* *n* = Number of dots to be moved from the beginning of the line
 nL = Remainder after dividing *n* by 256
 nH = Integer after dividing *n* by 256

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

Note: *nL* has to be a multiple of 4.

Formulas

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

$280/256 = 1$, remainder of 24

$nL = 24$ $nH = 1$

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.

Any setting that exceeds the printable area is ignored.

ASCII	ESC \ <i>nL nH</i>
Hexadecimal	1B 5C <i>nL nH</i>
Decimal	27 92 <i>nL nH</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

nL = Remainder after dividing *n* by 256

nH = Integer after dividing *n* by 256

The values for *nL* and *nH* 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

nL = Remainder after dividing (65536-*n*) by 256

nH = Integer after dividing (65536-*n*) by 256

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

Note: where *nL* is a multiple of 4.

Formulas

To move to the left:

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

$$65536-20 = 65516$$

$$65516/256 = 255, \text{ remainder of } 236$$

$$nL = 236, nH = 255$$

To move to the right:

The example shows how to set the relative position 260 dots to the right of the current position.

$$260/256 = 1, \text{ remainder of } 4$$

$$nL = 04, nH = 01$$

SELECT JUSTIFICATION

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

ASCII	ESC a n
Hexadecimal	1B 61 n
Decimal	27 97 n
Value of n	0, 48 = Left aligned 1, 49 = Center aligned 2, 50 = Right aligned
Range of n	0-2, 48-50
Default	0 (Left aligned)

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 $((nH \times 256) + nL)$ dots.

The Set Printing Area Width command (1D 57), sets the width of the printing area. 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 384. See the illustration.

The command is ignored if it is not at the beginning of the line.

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	384 dots (the maximum printable area)

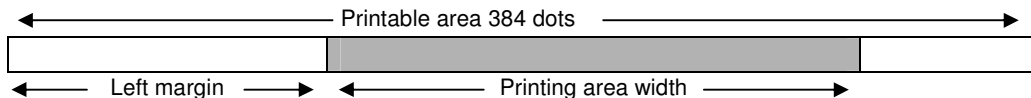
Note: where nL is a multiple of 4.

Formulas

To set the left margin to one inch, send the four-byte string: GS L 203 0

Or, to set the left margin to two inches, send the four-byte string: GS L 150 1

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



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 $((nH \times 256) + nL)$ dots. 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. The command is ignored if it is not at the beginning of the line.

ASCII	GS W <i>nL nH</i>
Hexadecimal	1D 57 <i>nL nH</i>
Decimal	29 87 <i>nL nH</i>
Range of <i>nL</i>	0-255
Range of <i>nH</i>	0-255
Default	384 dots (the maximum printable area)

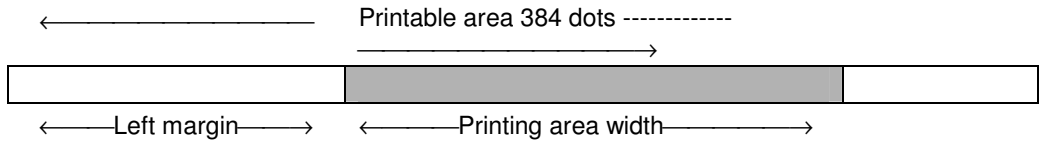
Note: where *nL* is a multiple of 4.
Minimum print area width = 4

Formulas

To set the width of the printing area to one inch, send the four-byte string: GS W 203 0

Or, to set the width of the printing area to two inches, send the four-byte string: GS W 150 1

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



Exceptions

This command is effective only at the beginning of a line. If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 384 dots.

5.5 Print characteristics commands

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

SELECT PRINT MODE

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

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

Value of *n*: See table

Value of <i>n</i> Bit ¹	Function	0	1
Bit 0	Pitch (See chart below)	Standard Pitch	Compressed Pitch
Bit 4	Double High	Canceled	Set
Bit 5	Double Wide	Canceled	Set
Bit 7	Underlined Mode	Canceled	Set (bar thickness = 2)

¹ Bits 1, 2,3 and 6 are not used

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

This command affects the pitch selection.

Pitch	CPI
Standard	12.7
Compressed	16.9

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 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, Set Relative Print Position commands, or in white/black reverse print mode.

Underline mode may also be turned ON and OFF with the Select Print Mode(s) command (1B 21).

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 and bar thickness = 2 2-50 =
Default	(Cancel underline mode)

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 graphics, logos, bar code, HRI characters, and spacing skipped by Horizontal Tab (HT), Set Absolute Starting Position (ESC \$), and Set Relative Print Position (ESC \).

ASCII	GS B <i>n</i>
Hexadecimal	1D 42 <i>n</i>
Decimal	29 66 <i>n</i>
	<i>n</i> is the least significant Bit, LSB
Value of <i>n</i>	0 = Off 1 = On
Default	0 (Off)

Exceptions

Only the lowest bit of *n* is valid.

5.6 Font commands

SELECT INTERNATIONAL CHARACTER SET

Selects the character set mapping to be used.

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

<i>n</i>	Country
0	USA
1	France
2	Germany
3	UK
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

Default = 0

Additional codes

	<i>n</i>	35 _D 23 _H	36 _D 24 _H	64 _D 40 _H	91 _D 5B _H	92 _D 5C _H	93 _D 5D _H	94 _D 5E _H	96 _D 60 _H	123 _D 7B _H	124 _D 7C _H	125 _D 7D _H	126 _D 7E _H
U.S.A.	0	#	\$	@	[\]	^	`	{		}	~
France	1	#	\$	à	°	ç	§	^	`	é	ù	è	"
Germany	2	#	\$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	3	£	\$	@	[\]	^	`	{		}	~
Denmark I	4	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	5	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	6	#	\$	@	°	\	é	^	`	ù	à	ò	è
Spain	7	Pt	\$	@	i	Ñ	¿	^	`	"	ñ	}	~
Japan	8	#	\$	@	[¥]	^	`	{		}	~
Norway	9	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	10	#	\$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

5.7 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. $n1 \dots ni$: bytes describing the line to print.

<11> has to be sent at the beginning of each dot line, the following 48 bytes give the status of the 384 dots.

ASCII	DC1 $n1 \dots n48$
Hexadecimal	11 $n1 \dots n48$
Decimal	17 $n1 \dots n48$
Value of n	$n1 \dots n48$ = Data bytes
Range for ni	0 - 255

Note: to convert a bmp file so that it can be sent to the printer using this graphic command. The bmp must be defined 'black and white', 384 pixels wide (or less but multiple of 8). The <11> must be added to the file every 48 bytes (or less depending on the number of pixels on the image width).

5.8 Logo commands

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 , or command 1B40 is sent, or printer is rebooted.

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 use memory space in the flash.

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 memory and prints it. If there is no definition for logo n , then no logo is printed.

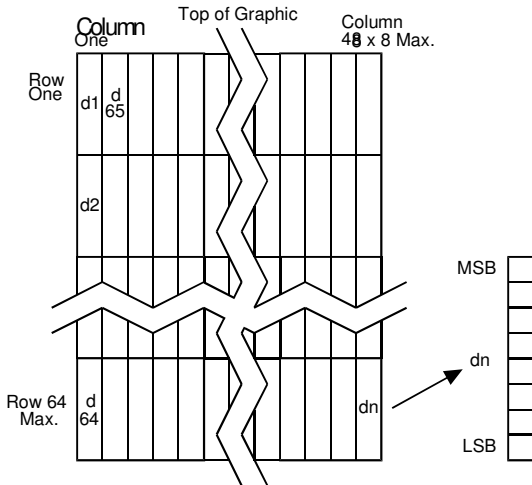
An application using multiple logos, into flash memory, is responsible for erasing the flash memory page when the logo area is full.

ASCII	GS # n
Hexadecimal	1D 23 n
Decimal	29 35 n
Range of n	0 – 64

DEFINE DOWNLOADED BIT IMAGE

Enters a downloaded bit image (such as a logo) into Flash with the number of dots specified by $n1$ and $n2$. The downloaded bit image is available until another bit image is defined, or either Initialize Printer (1B 40 or 1D 40 31), 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
1-48 (8 x $n1$ = Number of Horizontal Dot Columns)	1-255 (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 49138).

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 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

RETURN LOGO CHECKSUM

Returns the checksum of a logo downloaded using “Define Downloaded Bit Image”.

ASCII US *e n*
Hexadecimal **1F 65** *n*
Decimal 31 101 *n*

Returns 4 Bytes:

Command ID + Flag + checksum of the logo specified by *n*.

Byte 1 = 65h

Byte 2 = 01 - if logo *n* exists
 - if logo *n* doesn't exist.

Byte 3 = Checksum (LSB) or 00h if logo *n* doesn't exist.

Byte 4 = Checksum (MSB) or 00h if logo *n* doesn't exist.

Checksum is two's complement of sum of **all** bytes in the download sequence.

Ex: Checksum = -(0x1D + 0x2A + ...)
 for the “Define Downloaded Bit Image” command.

5.9 Printer status commands

These commands enable the printer to communicate with the host computer. 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 communication 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 print head cool down, the printer will resume processing the data in its reception buffer.

Real Time commands allow the printer to respond immediately, even though it is busy at the communication interface. See the following section, Real Time Commands, for details about these commands.

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			
Bit	Function	0 Signifies	1 Signifies
0	Paper Low	OK	Low
1	Door/Lid	Closed	Opened
2	Paper Out	Present	Out
3	JAM	OK	JAM
4	Flapper on paper path	High position	Down position
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.

Note: in the case of : an opened lid, a paper out, a Jam, and a flapper down; the printer will stop feeding paper before reporting the status.

TRANSMIT PRINTER ID

Transmits the printer model, type of version as defined below. This command is processed as normal printer data.

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

Operand: *n* = printer ID select

Limit: Decimal: $1 \leq n \leq 2$; $49 \leq n \leq 50$; $n = 66,67,68$

 Hex: $01 \leq n \leq 02$; $31 \leq n \leq 32$; $n = 42,43,44$

"GS I" OPERAND AND RETURNED STATUS DEFINITION						
<i>n</i>		Printer ID	Function		Value	
Decimal	Hex				Decimal	Hex
1, 49	01, 31	Model	TPSK		53	35
2, 50	02, 32	Type	Bit	Function	Value	
					0	1
			0	2-byte character code	Not installed	Installed
			1	Undefined		
			2	Undefined		
			3	Undefined		
			4	Fixed	Always 0	-
			7	Fixed	Always 0	-
66	42	Manufacturer	AXIOHM			
67	43	Printer name	TPSK			
68	44	Serial number	Depends on actual S/N			

Note: for $n = 66, 67, 68$ the printer response is sent back in the following format.

Header: 5F (hex)
 Data: ASCII string
 NULL: 00 (hex)

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 @ <i>n</i>
Hexadecimal	1D 49 40 <i>n</i>
Decimal	29 73 64 <i>n</i>

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
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
27	39	Class/model #	Return Class/model #, returns 17 bytes
2F	47	Boot firmware CRC, 4 digit ASCII	Return Boot firmware CRC, returns 6 bytes
37	55	Flash firmware CRC, 4 digit ASCII	Return Flash firmware CRC, returns 6 bytes
97	151	Boot firmware version	Return Boot firmware version, returns 6 bytes
A3	163	Flash firmware version	Return Flash firmware version, returns 6 bytes

* $0 \times 20 \leq \text{digit} \leq 0 \times 7A$

If any digit is out of the defined range, Write to NVRAM is ignored.

TRANSMIT STATUS

Transmits the status specified by n .

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

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

Value of n 4, 52 = Flash memory User Sector status

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

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	Logo(s) defined.
	On	08	8	No logo defined.
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	Off	00	0	Not used. Fixed to off.
7	-	-	-	Undefined.

Exceptions

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

SET SENSOR THRESHOLD

Synopsis: This command configures the sensors (except Flapper sensor, see page detection threshold).

ASCII GS s m n
Hexadecimal **1D** **73** m n
Decimal 29 115 m n

Operand: m = sensor select
 n = threshold value

Limit: Decimal $m=6; m=8; m=9$
 $0 \leq n \leq 255$
Hex: $m=06; m=08; m=09$
 $00 \leq n \leq FF$

Default: Decimal: $n = 102$
Hex: $n = 66$

Description: This command will store the sensor detection threshold in non-volatile memory.

Note: This command must be followed by a reset.

m		Sensor		
Decimal	Hex	Connector	Sensor	Mechanism
6	06	-	Low Paper	-
8	08	-	Opto jam	-
9	09	-	Hyst opto jam	-

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: the printer returns 1.07 1.15
This means the boot version is 1.07 and the flash version is 1.15.

ASCII	US V
Hexadecimal	1F 56
Decimal	31 86

RETURN SRAM SIZE

Returns the size of SRAM on board, on one byte as number of 64 Kbytes sectors.

ASCII	GS BS
Hexadecimal	1D 08
Decimal	29 08

SRAM sizes

4 kb (internal RAM only)	0
128 kb (w/extension)	2

TRANSMIT SELECTED A/D CHANNEL

Returns the size of SRAM on board, on one byte as number of 64 Kbytes sectors.

ASCII	GS / m
Hexadecimal	1D 6C m
Decimal	29 108 m

Returns the voltage.

* $m = 0 \times 08$

Sends an octet of between 0 and 255
= value measured on the A-D converter
= AD measure

Voltage (V) = $0.11274 \times \text{AD measure}$

Example:

AD measure = 213 => Voltage = 24.01V

AD measure = 186 => Voltage = 21.00V

* $m = 0 \times 09$

Sends an octet of between 0 and 255
= value measured on the temperature converter
= AD measure

$RTH = 100 / ((255 / \text{AD measure}) - 1)$

Temp ($^{\circ}\text{C}$) = $(3950 / (\ln(RTH / 30) + 13.255)) - 273$

Example:

AD measure = 60 => Temp = 24.43 $^{\circ}\text{C}$

AD measure = 27 => Temp = 47.47 $^{\circ}\text{C}$

Note: tolerance not taken into consideration and calculation not precise

5.10 Real time commands

The Real Time commands provide an application interface to the printer even when the printer is not handling other commands.

Real Time Status Transmission: DLE (Hex 10) Sequence
Real Time Request to Printer: DLE (Hex 10) Sequence
Real Time Printer Status Transmission

The original Printer Status commands, Transmit Printer Status (Hex 1B 76, ASCII ESC v) 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 communication interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: thermal print head overheating, etc. In addition, there is no way to restart the printer after a paper jam or other error.

The Real Time commands are provided to overcome these restrictions.

RULES FOR USING REAL TIME COMMANDS

Three situations must be understood when using real time commands:

- 1) The printer executes the Real Time command upon receiving it and will transmit status regardless of the condition of the host being ready to receive or not.
- 2) 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 be processed both ways: as a real time command and as the graphics data it is intended to be when the graphics command is executed from the buffer. The result is that the host might receive status messages it has not requested.
- 3) If the printer is in error condition, meaning that the communication interface is likely to be busy, the host must be able to send the real time commands regardless of this busy state at the interface. Otherwise those commands wouldn't be received and processed.

MOVING DATA THROUGH THE BUFFER

Applications should not let the buffer filled up with Real Time commands when the printer is detected busy at the communication interface. A busy condition can be determined by bit 3 of the response to DLE EOT 1. Other responses to DLE EOT n can determine the reason for a particular busy condition.

Although the printer responds to Real Time commands when it is busy, it will place them into the buffer following the other data already there.

When the printer is only busy because the buffer is full (meaning it cannot print data as fast as it can receive them), then data continue to be processed out of the buffer (approximately at the print speed), the Real Time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed off the buffer (until the error condition is cleared)

In both cases the buffer can be filled with Real Time commands; it will be quicker in the case of an error condition.

To avoid this situation, the application must determine the cause of a busy condition and take appropriate action with sending the Real Time commands to avoid filling the buffer. There is a minimum of 256 bytes available in the printer buffer when it turns busy.

BUSY LINE AND FAULT CONDITIONS

If the printer is in error condition (cover is open, out of paper...), the printer will turn busy immediately. It will then stay busy and stop processing data out of the reception buffer until the error condition is cleared. It will respond to the Real Time commands as described below.

REAL TIME RECOVERY FROM FAULT

This command will select the recovery mode when the printer detects a fault condition. Any fault condition that prevents the printer from printing requires one of these commands to allow printing to resume.

	<u>DLE Sequence</u>
ASCII	DLE ENQ <i>n</i>
Hexadecimal	10 05 <i>n</i>
Decimal	16 5 <i>n</i>

Operand	<i>n</i> = recovery mode
Limit	Decimal: <i>n</i>
	Hex: <i>n</i>

"DLE ENQ" OPERAND DEFINITION		
<i>n</i>		Fault recovery mode
Decimal	Hex	
2	02	Recovers from a fault after clearing the reception and print buffers. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this operand.

Notes:

- This command will attempt recovery from any fault that prevents printing, including jams and paper out.
- Recovering from a print head over temperature condition is only accomplished by waiting until the print head has returned to its operating temperature range.
- This command will be ignored until manual intervention has occurred to clear the fault condition. The indication of manual intervention for clearing paper out, paper jams, cutter fault, consists of opening and closing the clamshell door.

REAL TIME STATUS TRANSMISSION

Transmits in real time the selected one byte printer status. It is specified by n according to the following parameters.

	<u>DLE Sequence</u>
ASCII	DLE EOT n
Hexadecimal	10 04 n
Decimal	16 4 n

Value of n	<u>DLE Sequence</u>
	1 = Transmit printer status
	2 = Transmit communication interface 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	On	04	4	Fixed to On.
3	Off	00	0	Not busy at the communication interface. Printer is Busy at the communication interface.
	On	08	8	
4	On	10	16	Fixed to On.
5				Undefined.
6				Undefined.
7	Off	00	0	Fixed to Off.

2 = Transmit communication interface 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	UP	00	0	Flapper on Paper Path
	Down	04	4	
3	OK	00	0	Opto JAM
	JAM	08	8	
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 print head temperature and power supply voltage are in range.
	On	40	64	Thermal print head temperature or power supply voltage is out of range.
7	Off	00	0	Fixed to Off

4 = Transmit Receipt Paper Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Paper not low
	On	04	4	Paper low
3	Off	00	0	Paper not low
	On	08	8	Paper low
4	On	10	16	Fixed to On
5	Off	00	0	Paper present
	On	20	32	Paper out
6	Off	00	0	Paper present
	On	40	64	Paper out
7	Off	00	0	Fixed to Off

5.11 Bar code commands

These commands format and print bar 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 *n* Printing position

- 0 = Not printed
- 1 = Above the bar code
- 2 = Below the bar code
- 3 = Both above and below the bar code

Default 0 (Not printed)

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 *n* 0 = Standard Pitch at 12.7 CPI
1 = Compressed Pitch at 16.9 CPI

Default 1 (Standard Pitch at 16.9 CPI)

SELECT BAR CODE HEIGHT

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

ASCII	GS h <i>n</i>
Hexadecimal	1D 68 <i>n</i>
Decimal	29 104 <i>n</i>

Value of *n* Number of dots

Range of *n* 1-255

Default 216

SELECT BAR CODE WIDTH

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

ASCII	GS w <i>n</i>
Hexadecimal	1D 77 n
Decimal	29 119 <i>n</i>
Value of <i>n</i>	1 2, 3, 4, 5,6
Default	n=3
Formulas	$n/203$ inch ($n/8$ mm).

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 byte at the beginning of the string that determines the string length.

Bar codes can be aligned left, centered, or aligned 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.

	<u>First Variation</u>	<u>Second Variation</u>
ASCII	GS <i>k m d1...dk</i> NUL	GS <i>k m n d1...dn</i>
Hexadecimal	1D 6B m d1...dk NUL	1D 6B m n d1...dn
Decimal	29 107 <i>m d1 dk</i> NUL	29 107 <i>m n d1...dn</i>

(0 = End of command)

Exceptions

The command is only valid at the beginning of a line - Illegal data will cancel the command.

Print Bar Code (continued)

Values

First Variation: Data string terminated with NULL Character

M	Bar Code	D	n, Length
0	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
1	UPC-E	48- 57	Fixed Length: 11, 12
2	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
3	JAN8 (EAN)	48- 57	Fixed Length: 7,8
4	Code 39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) <i>d1 = dk = 42</i> (start/stop code is supplied by printer if necessary)	Variable Length
5	Interleaved 2 of 5	48- 57	Variable Length (Even Number)

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.

m	Bar Code	D	n, Length
65	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
66	UPC-E	48- 57	Fixed Length: 11, 12
67	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
68	JAN8 (EAN)	48- 57	Fixed Length: 7, 8
69	CODE39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) <i>d1 = dk = 42</i> (start/stop code is supplied by printer if necessary)	Variable
70	Interleaved 2 of 5 (ITF)	48- 57	Variable (Even Number)
73	Code 128	0-105 <i>d1 = 103-105</i> (must be a Start code) <i>d2 = 0-102</i> (data bytes) (Stop code is provided by the printer)	Variable

5.12 Flash firmware download commands

These commands are used to load firmware into the printer.

There are two ways to enter the download mode.

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.

If the Flash is found corrupted during Level 0 diagnostics the download mode is automatically entered after a printer reset.

The printer never goes directly from the download mode to normal operating mode. To return to normal printer operation, the operator must turn the unit off and on to reboot, or the application must send a command to cancel download mode and reboot (**1D FF**).

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

ACK (hexadecimal 06)

Is sent when the printer has received a host transmission and has successfully completed the request.

NAK (hexadecimal 15)

Is sent when a request is unsuccessfully completed.

Each command is described in the following pages.

Firmware Download Sequence

By providing a set of low-level commands, great freedom of implementation is given to customer application to customize the sequence to match its specific requirements.

The main steps of a typical Firmware download sequence are shown here after:

Error checking and error recovery are not described

- 1) Switch to Flash Download Mode
- 2) Check Flash Memory Size
- 3) Erase all Flash Memory sectors, except Boot Sector
- 4) Download Code to Active Flash Sector
 - 4.1) Select Flash memory sector #n (each sector contains 64kbytes)
 - 4.1.1) Program segment of N bytes
 - 4.1.2) if more segments, loop back to 4.1.1)
 - 4.2) if more sectors to program, loop back to 4.1)
- 5) Check Flash CRC
- 6) Reboot Printer

COMMANDS

SWITCH TO FLASH DOWNLOAD MODE

Sets the printer in flash download mode.

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.

REQUEST FLASH MEMORY SIZE

Returns the size of the flash used. There may be 2 sectors (64K each) in flash memory. This command assures that the firmware to be downloaded has the appropriate size for flash memory.

ASCII	GS SOH
Hexadecimal	1D 01
Decimal	29 1

The returned value corresponds to the highest sector number that can be accepted by the Select Sector to Download (1D 02 *nn*) command :

1 = 128 Kbytes Flash

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 and Range of *n* 0-1 = 128k bytes Flash

Exceptions

Available only in download mode.

GET FLASH FIRMWARE CRC STATUS

This command gives the Flash firmware CRC.

This is performed normally after downloading completely a new firmware to verify that the downloaded firmware is valid

The printer transmits ACK if the calculated CRC is correct; NAK if the CRC is incorrect

ASCII	GS ACK
Hexadecimal	1D 06
Decimal	29 6

RETURN BOOT SECTOR CRC

Returns the CRC calculated over the boot sector code area.

ASCII	GS BEL
Hexadecimal	1D 07
Decimal	29 7

Formulas

ACK <low byte> <high byte>

ERASE ALL FLASH CONTENTS EXCEPT BOOT SECTOR

Erases the entire flash memory.

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 area. 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 *n*
Hexadecimal **1D 10** *n*
Decimal 29 16 *n*

Value and Range of *n* 0-1 = 128k 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 *al ah cl ch d1...dn*
Hexadecimal **1D 11** *al ah cl ch d1...dn*
Decimal 29 17 *al ah cl ch d1...dn*

Value of *al* = low byte of the address (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.

ERASE BOOT SECTOR + DOWNLOAD NEW BOOT CODE

Waits for new boot code to be downloaded, then if CRC on this new boot code is valid, the boot code sector is erased and reprogrammed with new code.

Printer automatically reboots after program sequence is complete.

ASCII	US SOH <i>d1 .. d8192</i>
Hexadecimal	1F 01 <i>d1 .. d8192</i>
Decimal	31 01 <i>d1 .. d8192</i>

Exceptions

Available only in download mode.

Note:

During erase and download sequence, power supply must be maintained and no reset sequence should be performed.

5.13 User flash memory commands

ERASE USER FLASH SECTOR

Erases a section of user 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 <i>n</i>	49 <i>n</i> = 49 (ASCII <i>n</i> = 1)

This command erases all 64K Flash memory sectors allocated to logo storage. Those sectors should be erased when the logo definition area is full and the driving application is attempting to define new logos. All logo definitions are erased and must be redefined.

Important: While erasing flash memory, all communication is disabled. The printer responds to the application only when the erase sequence is completed. After sending the Erase User Flash Sector (1D 40-*n*) command, an application should wait for the printer response before sending new 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.

RETURN USER FLASH MEMORY ALLOCATION STATUS

Returns the amount of Flash memory available in user section.

ASCII	US w <i>n</i>
Hexadecimal	1F 77 <i>n</i>
Decimal	31 119 <i>n</i>
Value of <i>n</i>	49

Returns the number of bytes available as a zero terminated ASCII string. Each digit is coded in decimal.

5.14 Peripheral control commands

SET COMMUNICATION INTERFACE PARAMETERS

Synopsis: Setting communication parameters

ASCII	US	STX	<i>n1</i>	<i>n2</i>	<i>n3</i>	<i>n4</i>	<i>n5</i>	<i>n6</i>
Hexadecimal	1F	02	<i>n1</i>	<i>n2</i>	<i>n3</i>	<i>n4</i>	<i>n5</i>	<i>n6</i>
Decimal	31	2	<i>n1</i>	<i>n2</i>	<i>n3</i>	<i>n4</i>	<i>n5</i>	<i>n6</i>

Description:

<u><i>n1</i></u>	<u>Interface</u>
00h	RS232
<u><i>n2</i>, bit [0..2]</u>	<u>RS232 Baudrate</u>
03h	9600
04h	19200
05h	38400
06h	57600
07h	115200
<u><i>n2</i>, bit 4</u>	<u>RS232 Number of stop bits</u>
0	1
1	2
<u><i>n2</i>, bit 5</u>	<u>RS232 Number of data bits</u>
0	8
<u><i>n3</i></u>	<u>RS232 Parity</u>
0x00	Odd parity
0x01	Even parity
<u><i>n4</i></u>	<u>RS232 Parity mode</u>
0x00	No parity
0x01	Enabled and set using parameter described above
<u><i>n5</i></u>	<u>RS232 Handshaking</u>
0x00	Xon/Xoff
0x01	DTR/DSR
<u><i>n6</i></u>	<u>RS232 Parity Error Processing</u>
0x00	Ignore
0x01	Print '?'

Notes: 1) This command is processed only in boot mode.

If the printer is running in normal mode, send first command "switch to Boot Mode" (1B 5B 7D).

2) This command must be followed by "Printer Reset" command (1D FF).

SET AUTOTEST AFTER CLOSE MODE

ASCII	US	ETX	⏏	<i>n</i>
Hexadecimal	1F	03	AA	n
Decimal	31	3	178	<i>n</i>

Value of *n*
0 = disable
1 = enable

Range of *n* 0-1

Default 1 (enable)

SET VOLTAGE MECHANISM

This command will store the Voltage Mechanism parameter setting in non-volatile memory.

ASCII	US	ETX	<i>i</i>	<i>n</i>
Hexadecimal	1F	03	A1	n
Decimal	31	3	161	<i>n</i>

Operand: *n* = Mode selection

Value
Decimal 0 12 Volts 10.8V ≤ voltage range ≤ 13.2V (On Average)

1 24 Volts 20.0V ≤ voltage range ≤ 26.4V (On Average)

Default 1

Limit :
Dec: $0 \leq n \leq 1$
Hex: $00 \leq n \leq 01$

Note : Voltage range: components tolerance not taken into consideration.
This command must be followed by a reset.

PAPER LOW SENSOR OPTION

This command will store the paper low sensor option in non-volatile memory (NVRAM).

ASCII	US	ETX	ETX	<i>n</i>
Hexadecimal	1F	03	03	n
Decimal	31	3	3	<i>n</i>

Operand: *n* = mode Selection

Value
Decimal 0 Disabled

1 Enabled (Sensor)

2 Enabled (switch)

Default: 0

Limit:
Dec: $0 \leq n \leq 2$
Hex: $00 \leq n \leq 02$

Note: This command must be followed by a reset.

ENABLE/ DISABLE PAPER FEED BUTTON

This command turns the paper feed button enable or disable.

ASCII	US	ETX	␣	<i>n</i>
Hexadecimal	1F	03	B2	n
Decimal	31	3	178	<i>n</i>

Value of *n*
 0 = disable
 1 = enable

Range of *n* 0-1

Default 1 (enable)

SET PRE-HEATING MODE

Synopsis: Set Print head pre – Heating mode (NVRAM).

ASCII	US	ETX	VT	<i>n</i>
Hexadecimal	1F	03	0B	n
Decimal	31	3	11	<i>n</i>

Operand: *n* = Mode selection

Value 0 Disabled

Decimal 1 Enabled

Default 0

Limit: Dec: $0 \leq n \leq 1$
 Hex: $00 \leq n \leq 01$

Description: This command will store the print-head pre-heating option in non-volatile memory (NVRAM).

Note: When this mode is enabled, the controller monitors the print-head temperature and keeps it above 19-24°C.

If the temperature is around 0°C and the preheating mode is active, the preheating will be automatically start until the temperature will be around 19-24°C. After the preheating will become not active again.

This command must be followed by a reset.

SET PAPER PASS (FLAPPER) SENSOR THRESHOLD

ASCII	US	ETX	Û	<i>n</i>
Hexadecimal	1F	03	96	n
Decimal	31	3	150	<i>n</i>

Limit: Decimal: $10 \leq n \leq 60$
 & $n = 255$ will disable the sensor
 Hex: $0A \leq n \leq 3C$

SET PRINT DENSITY

Synopsis: Setting Print density

ASCII	US	VT	N	R	J	<i>n</i>
Hexadecimal	1F	0B	4E	52	4A	<i>n</i>
Decimal	31	11	83	80	69	<i>n</i>

Limit: Decimal: $80 \leq n \leq 120$
 Hex: $50 \leq n \leq 78$

This command must be followed by a reset (1D FF).

Note: where *n* must be a multiple of 5.

Description: Set the print density (energy applied to paper) in percent relative to nominal energy.

WARNINGS !!

Choose a print density setting no higher than necessary to achieve acceptable print density.

- **Failure to observe this rule may result in a printer service call.**
- **Failure to observe this rule may void the printer warranty.**
- **Consult your Axiohm technical support specialist if you have questions.**

RESET EEPROM

Synopsis: Reset EEPROM

ASCII	US	CR	C	L	E	<i>n</i>
Hexadecimal	1F	0D	43	4C	45	<i>n</i>
Decimal	31	13	67	76	69	<i>n</i>

Operand: *n* = security byte Limit: *n* = 0

Description: This command will reset the non-volatile memory configuration items to their default values.

Note: This command must be sent while the printer is in its boot-operating mode. Once the configuration parameters are downloaded to the printer using this command, the printer must be reset before they take effect.

RESET EEPROM OPERAND DEFINITION		
<i>n</i>		Reset
Decimal	Hex	
0	00	Reset EEPROM

PRINT TEST FORM

Prints the current configuration settings on the receipt.

ASCII	US t
Hexadecimal	1F 74
Decimal	31 116

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

JAM SENSOR CALIBRATION

Calibrate the Paper Jam opto sensor.

This command feeds paper to create a loop when using a cover in production.

ASCII	GS ; n1 n2 n3 n4
Hexadecimal	1D 3B n1 n2 n3 n4
Decimal	29 59 n1 n2 n3 n4

This command must be used for production or maintenance only. Contact a tech support if needed.

5.15 Font Download

DOWNLOAD FONT

Synopsis	Download single byte printer font
Syntax	ASCII: FS L f_8 t w h {d}
	Hex: 1C 4C f_8 t w h {d}
Operand	f: 8 character font name
	t: font storage Id
	w: font character width in dots, including inter-character space
	h: font character height in dots, not including inter-line space
	d: downloaded data bytes
Limit	Hex: $0x20 \leq f \leq 0x7F$
	$0x30 \leq t \leq 0x33$
	$0x01 \leq w \leq 0x30$
	$0x01 \leq h \leq 0x40$
	$0x00 \leq d \leq 0xFF$
Returns	ASCII: OK: ACK
	Fault: NAK
	Hex: OK: 0x06
	Fault: 0x15
Description	This command will download a single byte font code page to the printer. If the download is successful, an ACK will be returned. If unsuccessful, a NAK will be returned.

A font must always be downloaded completely, which corresponds to 224 characters.

The font name is used to identify the font. It will be printed on the diagnostics or configuration form. When a downloaded font is to be deleted, the font name is used to identify the font. Two fonts cannot have the same name.

Each character is downloaded as rasters, from top to bottom, and for each raster, from leftmost byte to rightmost byte.

The storage Id provides the operand for the 'ESC t n' (1Bh 74h n) command that will be used to select this code page. Two fonts cannot have the same storage Id.

READ FONT INFORMATION

Synopsis	Read Font information and checksum
Syntax	ASCII: FS F t Hex: 1C 46 t
Operand	t: Font storage Id
Limit	Hex: 0x30 ≤ t ≤ 0x34
Returns	ASCII: OK: ACK followed by font name = 8 bytes ASCII string font width = 1 byte font height = 1 byte number of characters = 2 bytes (little endian) 16 bit checksum = 2 bytes (little endian) Fault: NAK
Description	If selected font exists, this command returns ACK followed by font information. Else it returns NAK.

CHECK EASYFONT COMPATIBILITY

Synopsis	Check EasyFont compatibility
Syntax	ASCII: FS H Hex: 1C 48
Returns	ASCII: OK: ACK + list of available font Ids + 00 Fault: NAK Hex: OK: 06 + list of available font Ids + 00 Fault: 15
Description	This command asks the printer whether it supports or not Easyfont. If it does, it also returns the list of available font Ids (single byte, double byte) that can be used to download a font.

6 RECOMMENDATIONS

6.1 Storage:

If the printer has been stored for a long time with paper set below the print head, it may be necessary to re-load the paper before operating.

6.2 Duty cycle:

If the temperature is greater than 60°C, the printer must not be used to print more than one ticket (with maximum length 5 inches) per minute.

If the temperature is lower than 60°C, the printer can be used up to 3 tickets (with maximum length 5 inches) per minute.

Higher duty cycle can destroy the paper feed motor.

Printing is stopped thanks to a software security feature, if the temperature of the print head becomes too high. Printing will re-start after cooling.

6.3 Grounding:

The printer must be grounded. This can be done either by setting it on a grounded metal support or by connecting its external chassis.

6.4 Print head Cleaning:

This printer is designed with the print head facing down, this avoid dust accumulation. However, in heavy duty condition or if the paper used has a poor quality, it is recommended to clean the print head. The print head is visible and accessible when the door is opened.

To clean the heating dots of the head, use a cotton stick containing a solvent alcohol (ethanol, methanol, or IPA), but do not touch the print head with your fingers!

AXIOHM can provide cleaning kits, ref.: CK60000A

6.5 Ticket access / Housing features:

To maintain printer reliability, the pressure on the Clamshell door must be limited. **In case of sealing needs, make sure the pressure applied to the door is lower than 6 lbs.**

This pressure must be applied around the ticket exit chute.

Please contact Axiohm Technical Support team for specific integration.

6.6 Paper recommendations:

- KP440 KANZAN paper

Property	Method	Unit	Value
Grams	ISO 536	g/m ²	58 +/- 5
Thickness	ISO 534	µm	64 +/- 4
Surface smoothness	ISO 5627 (Beck)	sec	300 min
Brightness	R457-	%	75 min
Whiteness	Macbeth RD 914	OD	0.09 min
Tensile strength	ISO 1924/1	KN/m	> 3.3 MD > 2 CD
Tear Strength	ISO 1974	mN	> 250 MD > 250 CD
Color Image	-	-	Black
Saturation Density	Dynamic test	Macbeth RD914	1 min
Initiation T°	Heated platen	°C	75 ± 5
Saturation T°	Heated platen	°C	100 ± 5
Moisture content	ISO 287	%	6.5 ± 1.0

7 TROUBLESHOOTING

Situation	Problem	Solution
<p><u>Paper loading:</u> When the paper is correctly loaded and the printer is powered, closing the door will generate a self-test ticket.</p>	<p>The self-test ticket is not printed.</p>	<p>Check if the printer is powered.</p> <p>Check if the paper end is tight enough:</p> <ul style="list-style-type: none"> - Open the door. - Keep the paper end tight from the chute outlet. - Close the door; printing of the self-test should begin.
<p><u>Printing tickets:</u></p>	<p>Printer prints blank tickets.</p>	<p>Make sure the paper roll is not set upside down; see the instruction label inside the printer.</p>
	<p>Tickets do not come out: Even though no error message is sent. Even though tickets are required, and the printer makes noise as if it was printing.</p>	<p>Open the printer door.</p> <p>Check if there is a small black plastic part (paper guide) between the roller and the white plastic flap.</p> <p>This guide is clipped to the roller axle and attached to the white flap; if it is missing, there is a gap between the roller and the flap in which the paper can be fed.*</p>
	<p>Printer prints erratic characters.</p>	<p>A wrong baud rate could be the cause:</p> <p>The baud rate is indicated on the self-test ticket, which can be printed by closing the door.</p>
	<p>Printer does not start printing, even though paper path is clear and there is no visible jam.</p>	<p>If your application can detect status return, check the sensor status.</p> <p>If your application does not detect the status return, or you cannot easily check them: Make sure that all sensors are plugged in correctly</p> <ul style="list-style-type: none"> - Four connectors on the right side of the PCB, from top to bottom: 4 contacts, 3 contacts, 2 contacts with red wires, 2 contacts with black wires. <p>Check the door switch for contact (small mushroom switch on the left of the printer mechanism). When applying pressure to the switch, it should make a noise; if it does not, there is no contact and the switch may need to be replaced.</p>

* For replacement of this part, call maintenance.