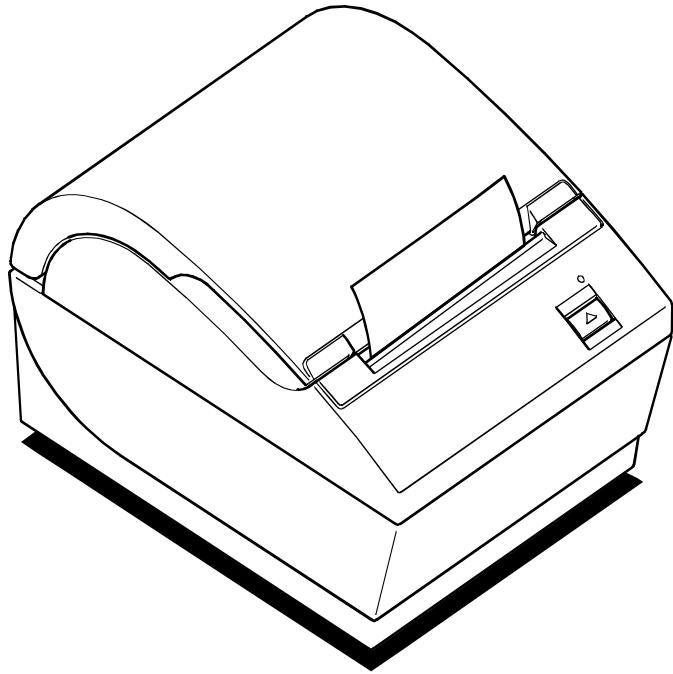


# A794 Thermal Receipt Printer Owner's Guide



A794-D100

**Axiom™**

# Legal Notices

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## Disclaimer

Information in this document is subject to change without notice. Consult your Axiohm sales representative for information that is applicable and current. Axiohm reserves the right to improve products as new technology, components, software, and firmware become available.

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Federal Communications Commission (FCC)  
Radio Frequency Interference Statement

## Warning

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

## Note

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

---

## Information to the User

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

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

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

#### **Power Supply**

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

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

#### **Communication Interface Cable**

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

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

#### **Power Cord**

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

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

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#### **Industry Canada (IC) Radio Frequency Interference Statement**

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

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

---

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

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

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

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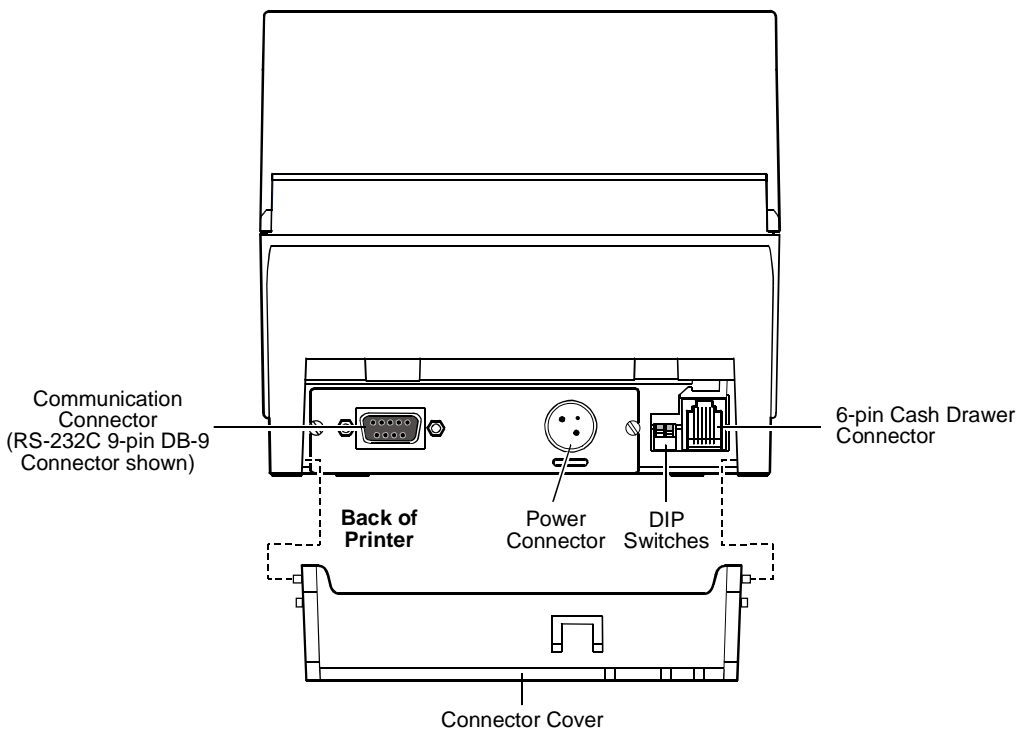
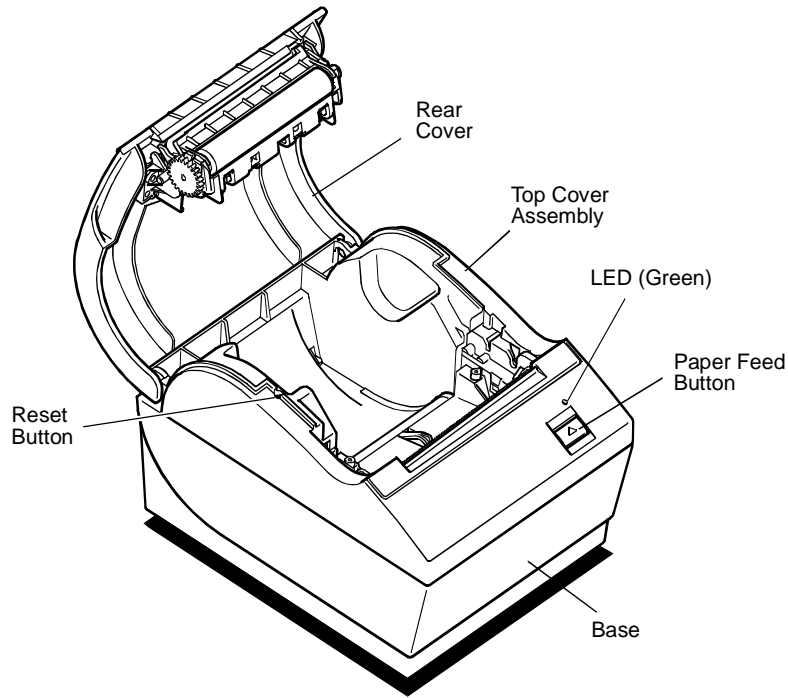
# Chapter 1: About the Printer

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- ◆ **Description of Printer**
- ◆ **Models Available**
  - Model Identification
  - Communication Interfaces
- ◆ **Features**
- ◆ **Options**

## Description of Printer

The A794 thermal receipt printer is extremely fast, quiet, and very reliable. With thermal printing technology, there is no ribbon cassette to change, and paper loading is extremely simple. The printer is small enough to fit almost anywhere and is easy to use with the receipt exiting from the top. There is no journal as it is kept electronically by the host system.







## Features

<b>Interfaces</b>	RS-232C, Parallel
<b>Memory/Firmware</b>	512K Flash Memory, History EEROM, 4K Buffer (see "Options" for additional memory.)
<b>Resident Character Sets</b>	PC Code Page 437 (US), PC Code Page 850 (Multilingual), PC Code Page 852; Code Pages 865, 858, 860, 863, 866, and 1252.
<b>Integrated Bar Codes</b>	Code 39, UPC-A, UPC-E, JAN8 (EAN), JAN13 (EAN), Interleaved 2 of 5, Codabar, Code 128, EAN 128, PDF-417 (two-dimensional).
<b>Print</b>	Host-selectable 44 or 56 columns of print on 80 mm wide thermal paper.
<b>Print Resolution</b>	8 dots/mm
<b>Speed</b>	Up to 130 mm/second throughput.
<b>Human Interface</b>	Speaker for software-generated tone. Drop-in paper loading. Configuration Menu for easy configuration.
<b>Cash Drawer Driver</b>	Connector for one or two cash drawers (use a "Y" cord for two drawers.)

## Options

- ◆ Knife (Cutter)
- ◆ Wall Mount Kit
- ◆ Power Supply: 55 Watt/75 Watt
- ◆ Power Cords: US, SEV, UK AC Cord, and Australia AC Cord
- ◆ 1MB memory
- ◆ Paper Low Sensor
- ◆ Paper Width
  - ◆ 82.5 mm
  - ◆ 80 mm
- ◆ Interface Boards
  - ◆ RS 232C
  - ◆ IEEE Bi-Directional Parallel

# Chapter 2: Using the Printer

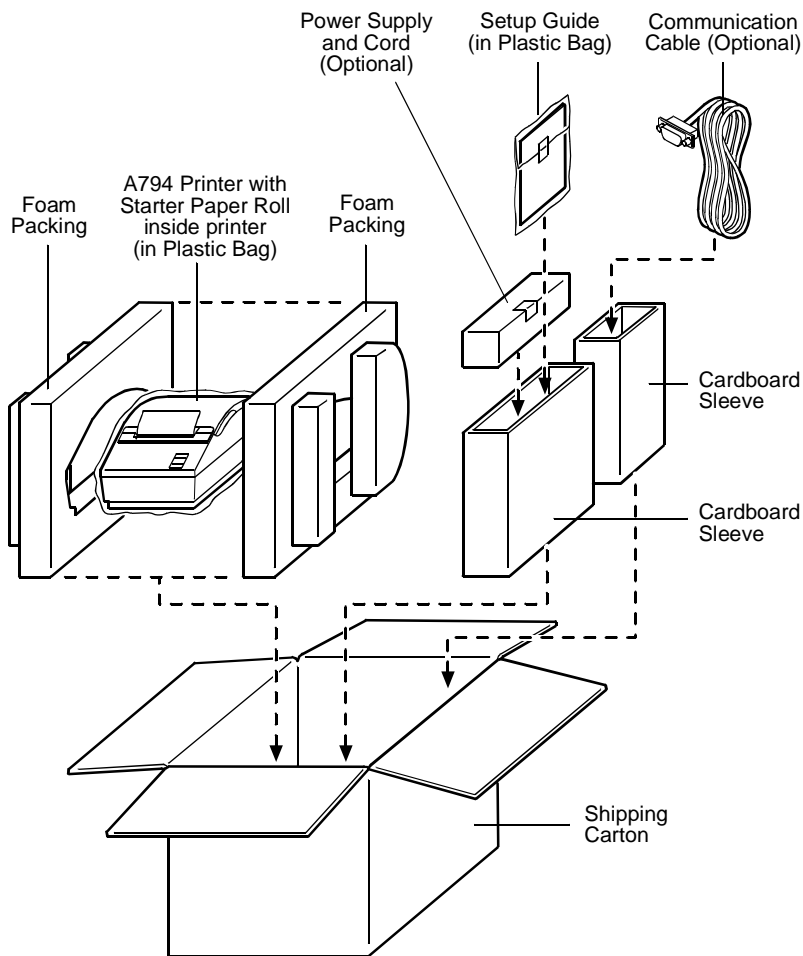
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- ◆ **Unpack the Printer**
  - Remove the Starter Paper Roll Supports
  
- ◆ **Choose a Location**
  - On a Flat Surface
  - On a Wall
  
- ◆ **Connect the Cables**
  - Communication Cable
  - Cash Drawer Cables
  - Power Supply Cable
  
- ◆ **Printer Controls**
  
- ◆ **Loading Receipt Paper**
  
- ◆ **Configuring the Printer**
  
- ◆ **Troubleshooting the Printer**
  - Printer Tone and Green LED
  - Printing Problems
  - Printer Does Not Function

## Unpack the Printer

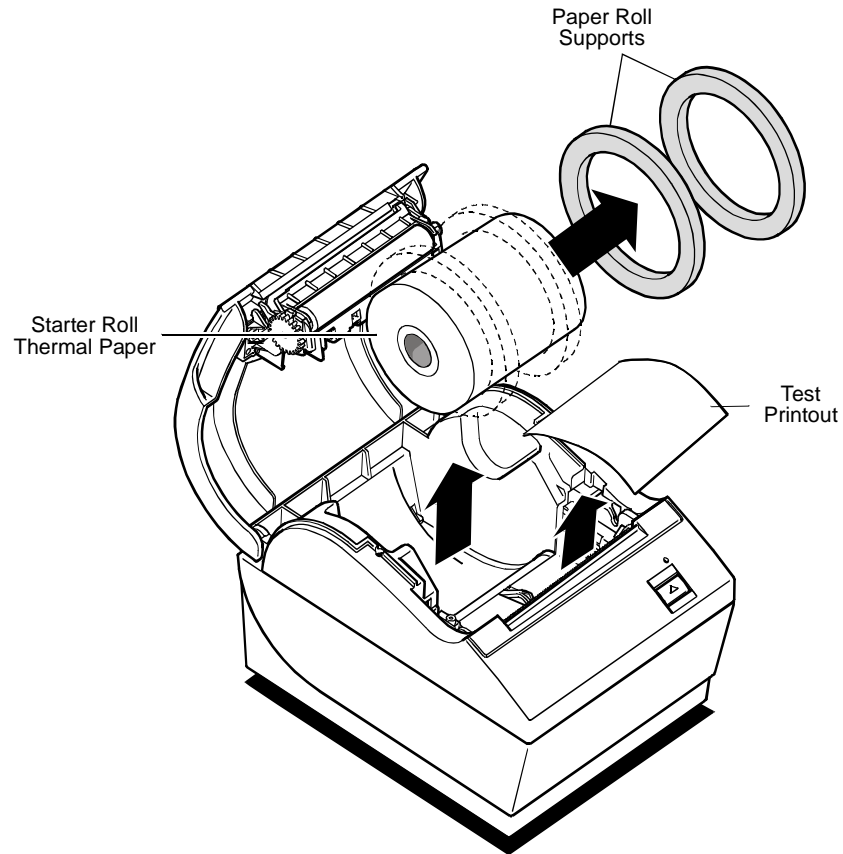
Save all packing materials for use if printer needs to be repacked. Check that all items listed were shipped. For a single pack (multi-packs differ in packing configuration):

- ◆ Printer enclosed in a plastic bag with foam packing material
- ◆ Thermal starter paper roll (inside receipt bucket of printer)
- ◆ Test printout protecting the printhead (inside receipt bucket of printer)
- ◆ Power supply with cable (optional)
- ◆ Installation report card (please complete this form and return to Axiohm)
- ◆ *A794 Thermal Receipt Printer: Setup Guide*
- ◆ Communication cable, (from host computer to printer, optional)



To report any missing items, or to report a printer that was damaged during shipping, call your supplier or call an Axiohm representative at 1-(877) 209-0156.

## Remove the Starter Paper Roll Supports



1. Open the Rear Cover by pushing up on each side of the cover until it unsnaps. Remove the Test Printout.
2. Lift the Starter Paper Roll out of the paper bucket and slide the two Paper Roll Supports off.
3. Remove all tape on the leading edge of the roll.
4. Place the Starter Paper Roll back into the bucket so that it unrolls from the bottom.
5. Close the Rear Cover.

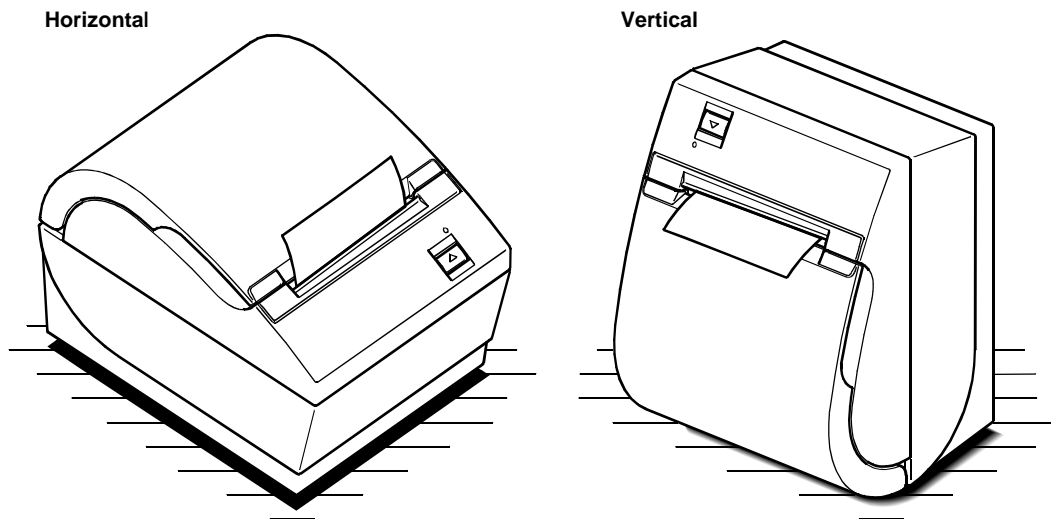
## Choose a Location

You can install the printer three ways: flat on a level surface, set vertically on a level surface, or mounted on a wall using the optional wall-mount kit. Always be sure to leave room to open the cover and access the cables.

**Note:** Position printer in a location that allows access to the cables, room to open the cover and away from traffic areas to limit the chance of being knocked or damaged.

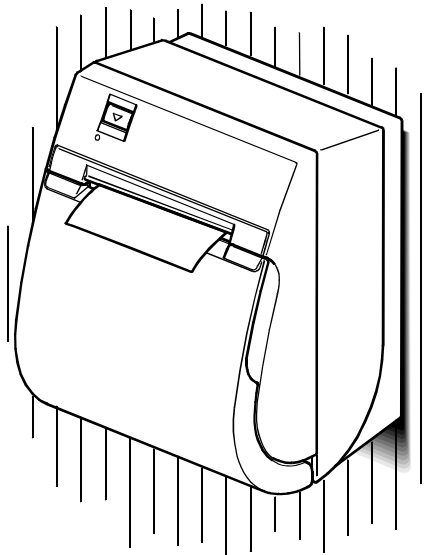
For more information about	See this document
Setting up the printer	<i>A794 Setup Guide</i>

### On a Flat Surface



**Note:** For vertical placement on a flat surface, space must be provided for the cables at the back of the unit, either by an elevated platform or holes in the surface.

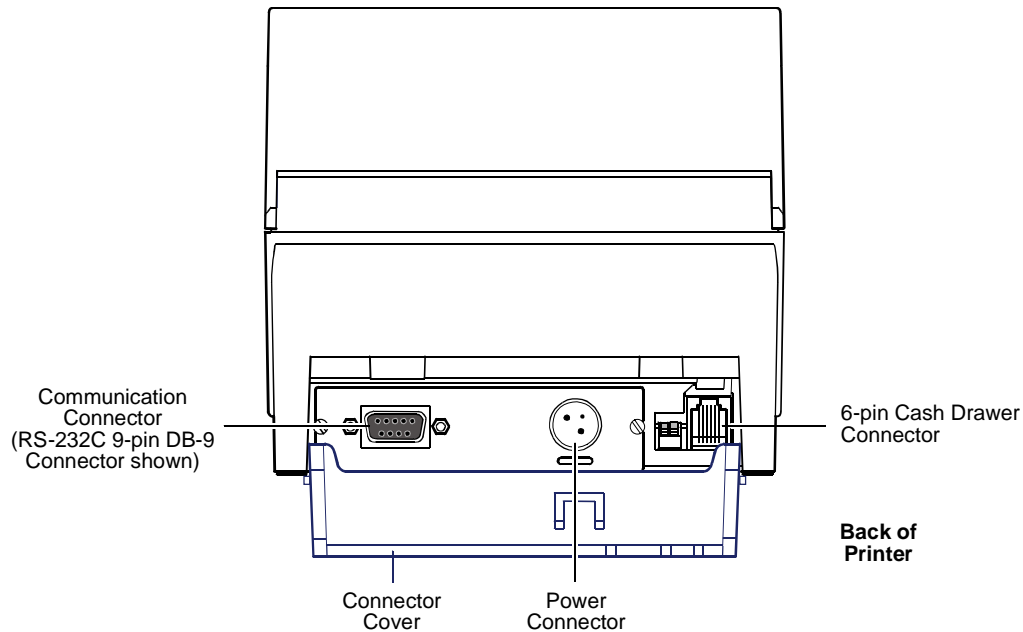
### On a Wall



Requires optional wall-mount kit A794-K260.

## Connect the Cables

**Caution:** Connect the cables to the printer before plugging in the power supply. If power is received from the host computer, turn it off before connecting any cables.



**Note:** Depending on your printer configuration, the connector panel may vary from the above illustration.

### Communication Cable

The communication cable connects the printer to the host computer. To install the communication cable:

1. Turn off the host computer.
2. Open the Connector Cover at the rear of the printer.
3. Attach the Communication Cable to the connector shown on the back of the printer above. Tighten the screws to secure the cable.
4. Connect the cable to the host computer.

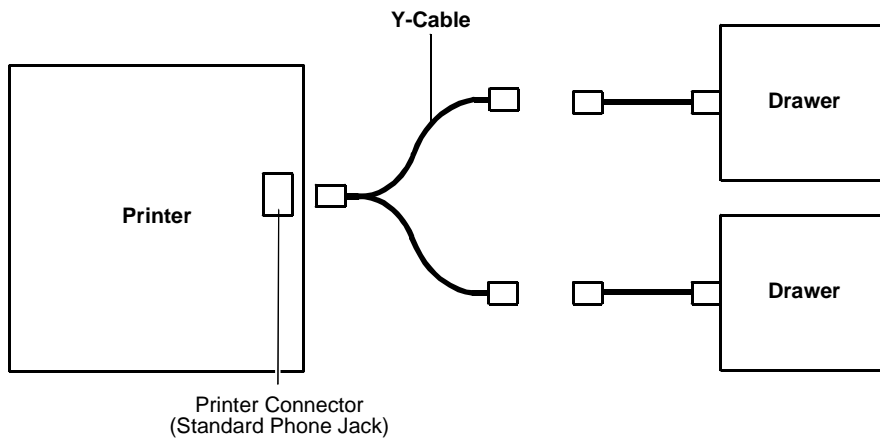
## Cash Drawer Cables

The Cash Drawer Cable connects the printer to one or two cash drawers.

1. Open Connector Cover at rear of printer if not previously open.
2. Plug the cable into the Cash Drawer Connector (standard phone jack) located at the rear of the printer (see illustration on previous page.)

**Note:**

- a. If your system has two cash drawers, attach a Y-cable to the printer's Cash Drawer Connector as shown.
- b. Leave some slack in the cord to route through the Strain Relief at a later time.

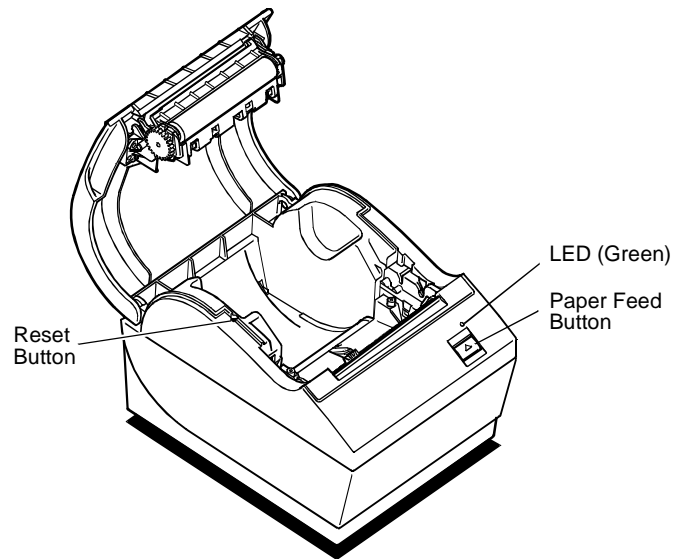


## Power Supply Cable

Connect the Power Supply Cable last.

1. Plug the Power Cord into the Power Supply.
2. Plug the Power Cord into the Power Connector located at the rear of printer (see illustration on previous page.)
3. Snap the Connector Cover closed, ensuring that the Communication, Cash Drawer and Power Supply Cables are aligned with the slots provided for each in the Connector Cover. Verify that the strain relief on the Connector Cover aligns with Power Supply Cable.
4. Plug the Power Supply into a grounded outlet. The Green LED on the top cover will light up.

## Printer Controls



### Reset Button

Should a paper jam or fault condition occur, press the Reset Button to reset the printer. The printer performs a startup routine, as if having been turned off, then on again.

### Paper Feed Button

Press the Paper Feed Button to advance the paper.

Used in conjunction with the Reset Button to print the Diagnostic Mode or allow access to the Configuration Menu. (See page 16.)

### LED

The green LED shows the printer status by shining or flashing. A continuous green (non-flashing) LED represents an "ON", no-fault condition.

Status	LED
Paper Is Low	Flashes Slowly
Paper Is Out	Flashes Quickly
Knife Jam	Flashes Quickly then Slowly



**Tone**

A single beep indicates the printer has successfully completed its startup routine (after having been reset or the power supply turned on).

If the printer beeps twice, a problem may be indicated.

<b>For more information about</b>	<b>See these "sections"</b>
Paper Feed Button	"Testing the Printer" "Configuring the Printer"
Reset Button	"Troubleshooting the Printer" "Testing the Printer" "Configuring the Printer"
LED	"Troubleshooting the Printer"
Tone	"Troubleshooting the Printer"

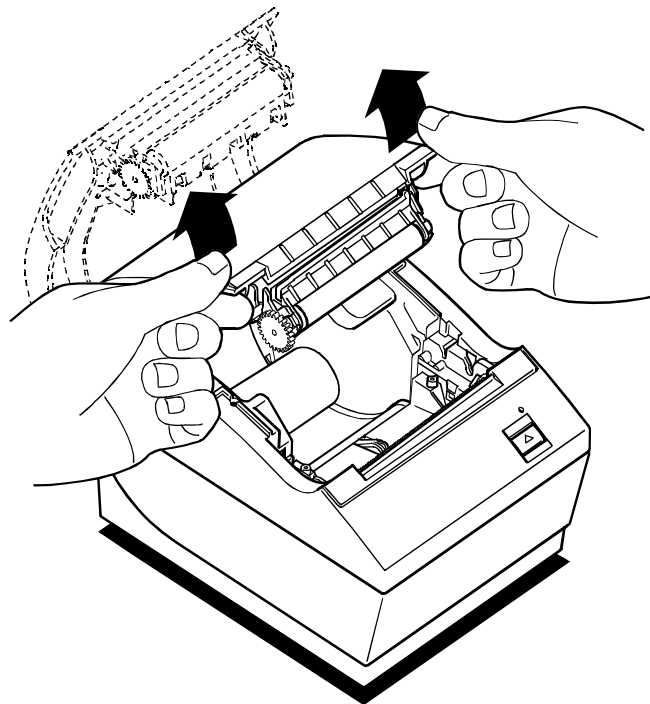
## Loading Receipt Paper

Change the paper when any of the following conditions occurs:

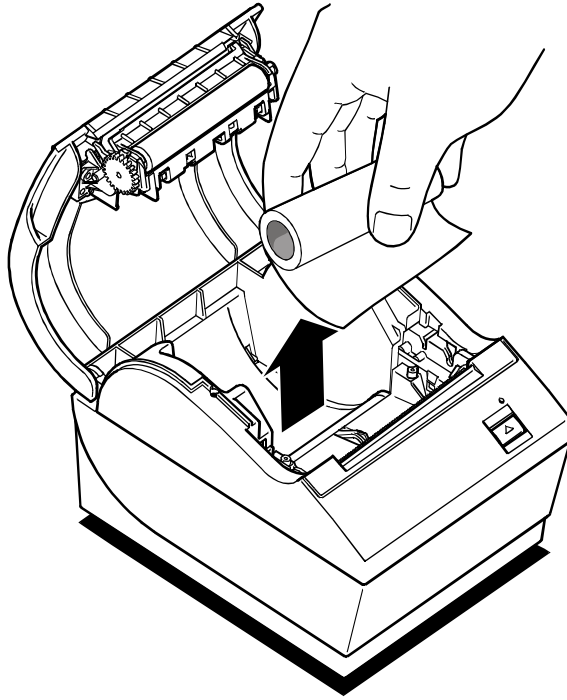
- ◆ Colored stripe appears on the receipt paper indicating the paper is low.  
Change the paper as soon as possible to avoid running out of paper part way through a transaction.
- ◆ Green LED flashes (slow flash) indicating the paper is low.  
Change the paper as soon as possible to avoid running out of paper part way through a transaction.
- ◆ Green LED flashes (quick flash) indicating the paper is out.  
Change the paper immediately or data may be lost.

**Caution:** Do not operate the printer or host computer if the printer runs out of paper. The printer will not operate without paper, but it may continue to accept data from the host computer. Because the printer cannot print that additional data, it may be lost.

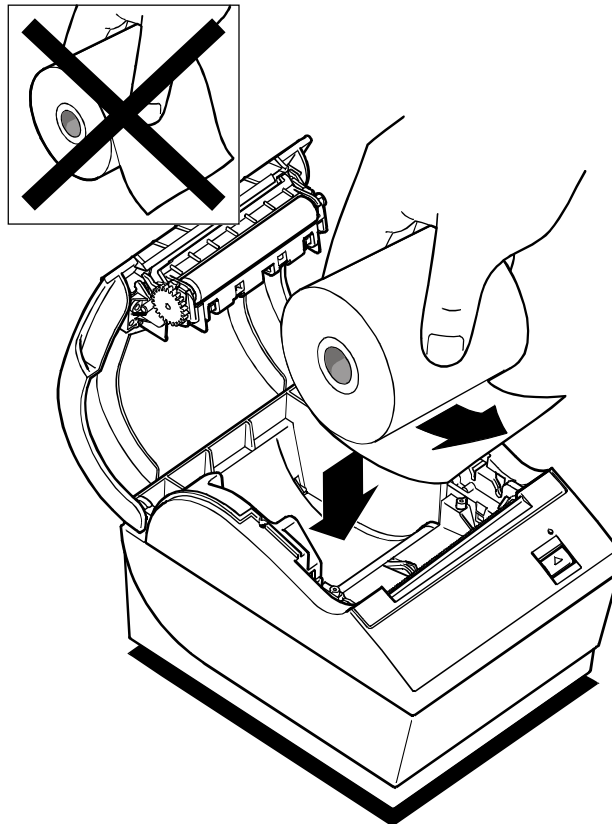
### To Load the Paper:

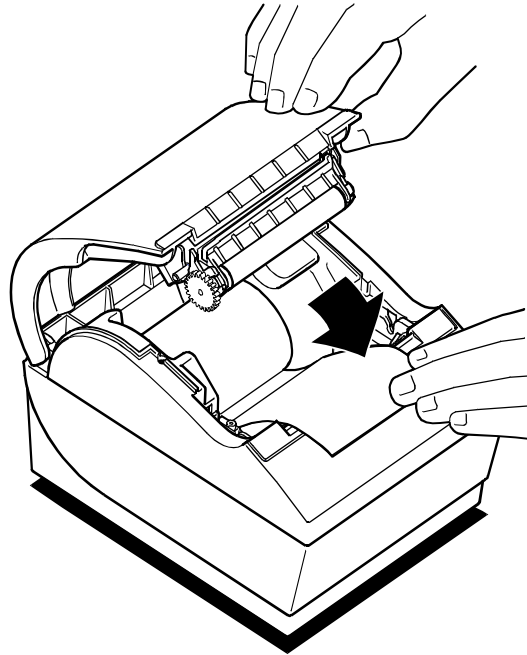


1. Open the Rear Cover by lifting up on each side of the cover until it unsnaps.



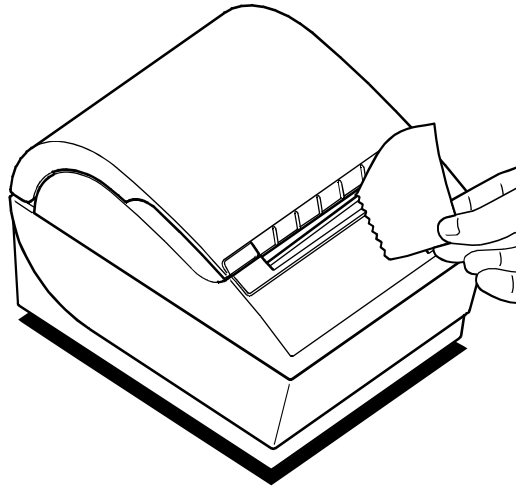
2. Remove the used paper roll.
3. Tear off the end of the new roll so that the edge is loose.





4. Place the new roll into the paper bucket with a few inches of paper extending over the cabinet front (or top, if printer is mounted vertically).

**Caution:** The Paper must unroll from the bottom to ensure the printer will print and to prevent paper jamming.



5. Close the cover. Pull the excess paper across the tear-off blade and remove.
6. Advance the paper if necessary by pressing the Paper Feed Button.

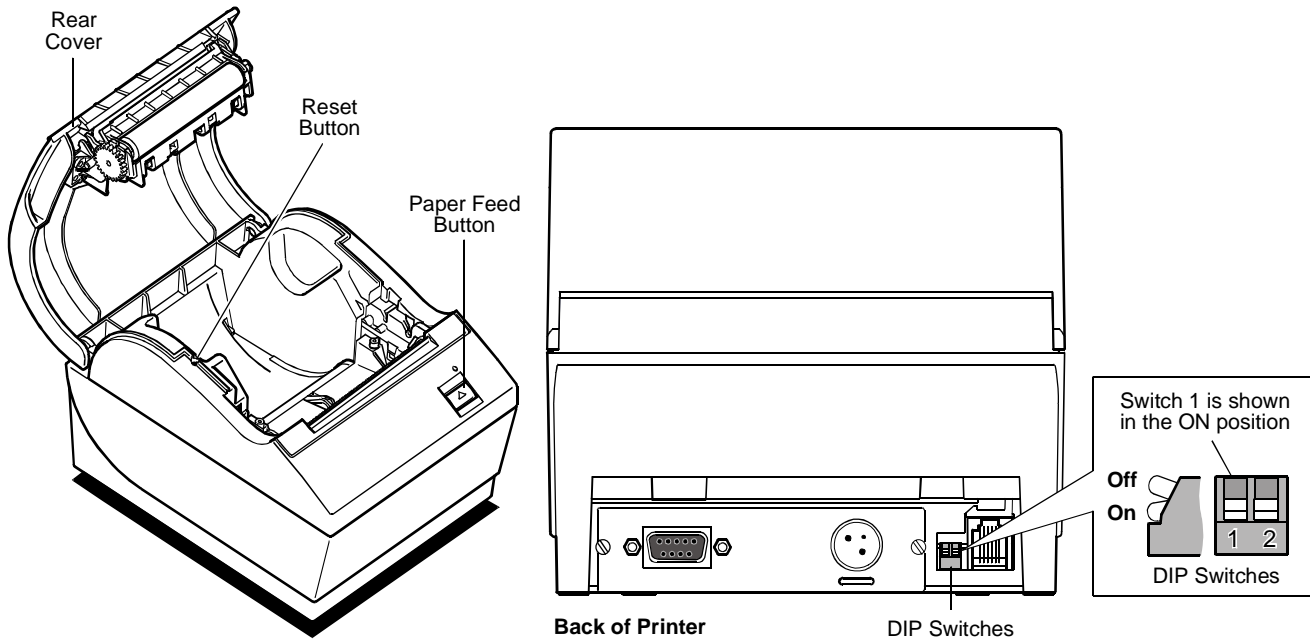
**Note:** In the event of a paper jam, remove the roll and tear a new clean edge. Place the roll into the paper bucket, so that it unrolls from the bottom of the roll.

For more information about	See this section
Paper jams	"Troubleshooting the Printer"

## Configuring the Printer

The Configuration Menu allows the user to set general printer parameters. The test prints the settings for several functions, and partially cuts the paper between each variation.

The printouts may vary for each model. The test ends with a partial cut of the paper, then begins again. A test printout may use several feet of paper to complete.



To start the test:

1. Set DIP Switch 1 to ON position (down.) DIP Switch 2 must **always** be set to ON position (down.)
2. Place paper into the bucket as described in the previous section, "Changing Paper."
3. Press the Reset Button.
4. Press and hold the Paper Feed Button while closing the cover.
  - ◆ The printer prints the Diagnostics Form and the Configuration Main Menu.
  - ◆ Printer pauses and waits for Main Menu selection to be made (see sample printout on the next page.)
5. Continue through your menu selections until you are asked to: "Save New Parameters?". Select Yes or No.
  - a. If answer Yes is selected, return DIP Switch 1 to OFF position (up.)
  - b. Repeat Steps 3 and 4 above.
    - ◆ Diagnostic printout verifies new settings. (See sample printout on the following page.)
6. If answer NO is selected, printer returns to the menu to set parameters again.

```

*** A794 - Diagnostics Form ***

Model number       : A794-2105
Serial number      : A991102521

Boot Firmware
Revision          : V2.04
CRC               : A352
P/N              : 189-1073007A
Flash Firmware
Revision          : V2.12
CRC               : 483B
P/N              : 189-1073057A

H/W parameters
Flash Memory Size : 512 kbytes
Flash Logos/Fonts : 64 kbytes
Flash User Storage : 64 kbytes
SRAM Size         : 256 kbytes
CPU Clock Freq.  : 50 MHz
Head Setting      : A
Pre-Heating       : Disabled
Print Density     : 100 %
Max Speed         : 130 mm/sec
Paper Width       : 80 mm
Max Power         : 55 W
Knife             : Enabled
Partial Cut       : 135 steps
Paper Low Sensor  : Enabled

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

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

```

```

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

```

```

***** MAIN MENU *****
*****

Select a sub-menu :
- EXIT                -> 1 click
- Print Current Configuration -> 2 clicks
- Set Communication Interface -> 3 clicks
- Set Diagnostics Modes    -> 4 clicks
- Set Emulation/Software Options -> 5 clicks
- Set Hardware Options      -> 6 clicks

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

```

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

---

For more information about	See this section
Poorly printed test printout	"Troubleshooting the Printer"

## Troubleshooting the Printer

The printer is simple and generally trouble-free, but from time to time minor problems may occur. Follow these procedures to determine the cause and resolution of any problems the printer may be having. If the procedures in this section do not correct the problem, contact a service representative.

For more information about	See this section
Detailed and technical troubleshooting	"Service Level Troubleshooting" in the <i>A794 Service Guide</i>

### Printer Tone and Green LED

Problem	Possible Causes	What to Do	Where to Go
Green LED, quick continuous flashing.	Paper out. Cover off. Knife unable to home.	Put in a new paper roll. Put the cover on. Contact your authorized service representative.	<i>A794 Owner's Guide</i>  Contact your authorized service representative.
Green LED, slow continuous flashing.	Paper is low (if Paper Low Sensor is installed). Other problems may be indicated.	Put in a new paper roll.  Contact your authorized service representative.	<i>A794 Owner's Guide</i>
Printer beeps (two-tone—low frequency, high frequency).	Printer has been turned on and is ready to operate.	No action is required.	
Printer beeps and flashes green LED in various combinations.	These all indicate serious problems.	Contact your authorized service representative.	

## Printing Problems

Problem	Possible Causes	What to Do	Where to Go
Colored stripe on the receipt.	Paper is low.	Change the paper.	<i>A794 Owner's Guide</i>
Receipt does not come out all the way.	Paper is jammed.	Open the receipt cover, inspect the knife, and clear any jammed paper.	
Printer starts to print, but stops while the receipt is being printed.	Paper is jammed.	Open the receipt cover, inspect the knife, and clear any jammed paper.	
Receipt is not cut.	Paper is jammed.	Open the receipt cover, inspect the knife, and clear any jammed paper.	
	The printer is not configured for a knife.	Contact your authorized service representative.	
Print is light or spotty.	Paper roll loaded incorrectly.	Check that the paper is loaded properly.	<i>A794 Owner's Guide</i>
	Thermal printhead is dirty.	Use recommended thermal receipt paper.	<i>A794 Owner's Guide</i>
	Variations in paper.	Increase print density in "Set Hardware Options" of printer Configuration Menu to 110% or 120% as needed.	<i>A794 Owner's Guide</i> <b>USE CAUTION when changing this setting.</b>
Vertical column of print is missing.	This indicates a serious problem with the printer electronics.	Contact your authorized service representative.	
One side of receipt is missing.	This indicates a serious problem with the printer electronics.	Contact your authorized service representative.	

## Printer Does Not Function

Problem	Possible Causes	What to Do	Where to Go
Printer does not function when turned on.	Printer not plugged in.	Check that printer cables are properly connected on both ends.	<i>A794 Setup Guide</i>
		Check that the host or power supply is getting power.	<i>A794 Setup Guide</i>
	Receipt cover not fully closed.	Close and latch the receipt cover.	



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# Chapter 3: Media and Supplies Guide

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- ◆ **Ordering Thermal Paper**

  - Thermal Paper Specifications

  - Manufacturers

  - How to Order

- ◆ **Ordering Miscellaneous Supplies**

  - Ordering Cash Drawers

  - Ordering Power Supply and Power Cord

  - Ordering Communication Cables

  - Wall-Mount Kit

## Ordering Thermal Paper

### Thermal Paper Specifications

The printer requires qualified thermal paper with the following dimensions:

Width	Diameter	Length
80 mm $\pm$ .2 mm (3.15 in. $\pm$ .02 in.)	90 mm max. (3.54 in.)	322 ft. nominal.
82.5 mm $\pm$ .2 mm (3.25 in. $\pm$ .02 in.)	90 mm max. (3.54 in.)	322 ft. nominal.

The paper must not be attached at the core. Use paper with a colored stripe at the end to indicate that the paper is running low.

The above figures are based on a core diameter of  $22 \pm .5$  mm (.87 in.) outside,  $11.5 \pm .5$  mm (.45 in.) inside.

### Manufacturers

Axiohm recommends the following paper grades produced by their respective manufacturers. There are a number of paper converters qualified to provide this paper, provided the POS rolls are from these recommended grades.

Qualified Manufacturers	Phone	Paper Grade (Density)
<b>Appleton Papers, Inc. (USA)</b> 825 E Wisconsin Ave. Appleton, WI 54912	Voice: 800-922-1729	Optima T1030 (Light)
	Voice: 920-734-9841	Optima T1012A (Standard)
	Fax: 800-922-1712	Optima T1062A-16 (Standard)
		Optima Superior (Standard)
<b>Kanzaki Specialty Papers (USA)</b> 20 Cummings St. Ware, MA 01082-2002	Voice: 888-526-9254	P-300 (Light)
	Voice: 413-736-3216	P-310 (Standard)
	Fax: 413-731-8864	P-350 (Standard)
		P-354 (Standard)
		TO-260 (Standard)
		TO-282 (Standard)
		TO-381L (Standard)
<b>Jujo Thermal LTD.</b> P.O. Box 92 FIN-27501 Kauttua, Finland	Voice: 358-38-393-2900	AF50KS-E3 (Standard)
	Fax: 358-38-393-2419	AP62KS-E3 (Standard)

### How to Order

To order paper rolls, contact your converter of choice. Axiohm can provide the following paper in small lots to facilitate product evaluation and testing. To order directly from Axiohm, use the following part numbers:

- |                    |                          |                   |
|--------------------|--------------------------|-------------------|
| ◆ Standard Density | 50 Rolls, 90 mm diameter | Axiohm #A152-0034 |
| ◆ Light Density    | 50 Rolls, 90 mm diameter | Axiohm #A152-0035 |

## Ordering Miscellaneous Supplies

### Ordering Cash Drawers

Order cash drawers from the following suppliers:

Cash Drawers	Number
NCR	7052-K657
M-S Cash Drawer Corp.	EP-125 K series, EP-127, EP-102
APG Cash Drawer	Model 322
Indiana Cash Drawer	Model SLD

### Ordering Power Supply and Power Cord

Contact your sales representative to order the power supply and power cords listed in the table. The numbers are for reference only. Suppliers may use other numbers.

Item	Type	Number
55W power supply with attached cable to printer and U.S. power supply cord		A794-K330
55W power supply, attached cable		A794-K301
Power supply cord (to outlet)	United States	A794-K320
	International (no plug)	A794-K321
	United Kingdom	A794-K322
	S.E.V.	A794-K323
	Australia	A794-K324
	International (with plug)	A794-K326

## Ordering Communication Cables

Contact your sales representative to order the communication cables listed in the table. The numbers are for reference only. Suppliers may use other numbers.

Communication Cables	Length	Order Number
RS-232C 25-pin male (printer) to 9 pin female (host)	(2 meters—6.6 ft.)	A141-0005
RS-232C 25-pin male (printer) to 9 pin female (host)	(6 meters—19.7 ft.)	A141-0006
RS-232C 25-pin female (host) to 9-pin female (printer)	(3 meters—9.8 ft.)	A141-0008
RS-232C 9-pin female (ferrite-host) to 9-pin female (printer)	(3 meters—9.8 ft.)	A141-0007
IEEE-1284 Parallel 25-pin male to 25-pin male	(3 meters—9.8 ft.)	A141-0009

## Wall-Mount Kit

Contact your sales representative to order the wall-mount kit.

Printer wall-mount kit: A794-K260

# Chapter 4: Print Specifications

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- ◆ **Characters**
  - Print Modes
  - Size
  
- ◆ **Paper Specifications**
  
- ◆ **Print Zones**
  - Print Zones for 80 mm Paper
  - Print Zones for 82.5 mm Paper
  
- ◆ **Print Density and Density of Receipt Print Lines**
  
- ◆ **Duty Cycle Restrictions (Printing Solid Blocks)**
  
- ◆ **Character Sets**
  - Code Page 437
  - Code Page 850
  - Code Page 852
  - Code Page 858
  - Code Page 860
  - Code Page 863
  - Code Page 865
  - Code Page 866
  - Code Page 1252

# Characters

## Print Modes

Available print modes:

- ◆ Standard
- ◆ Compressed
- ◆ Double High
- ◆ Double Wide
- ◆ Upside Down
- ◆ Rotated
- ◆ Underlined
- ◆ Bold
- ◆ Reverse
- ◆ Italic
- ◆ Scaled

## Size

Characters sizes for the Standard and Compressed mode:

### Standard

- ◆ Characters per Inch: 15.6
- ◆ Characters per Line: 44
- ◆ Cell Size: 13 x 24 Dots

### Compressed

- ◆ Characters per Inch: 20.3
- ◆ Characters per Line: 56
- ◆ Cell Size: 10 x 24 Dots

**For more information about**

Programming the printer to  
print the various print modes.

**See this section**

“Programming Information”

## Paper Specifications

The printer requires qualified thermal paper with the following dimensions:

Width	Diameter	Length
80 mm ± .2 mm (3.15 in. ± .02 in.)	90 mm max. (3.54 in.)	322 ft. nominal.
82.5 mm ± .2 mm (3.25 in. ± .02 in.)	90 mm max. (3.54 in.)	322 ft. nominal.

The paper must not be attached at the core. Use paper with a colored stripe at the end to indicate that the paper is running low.

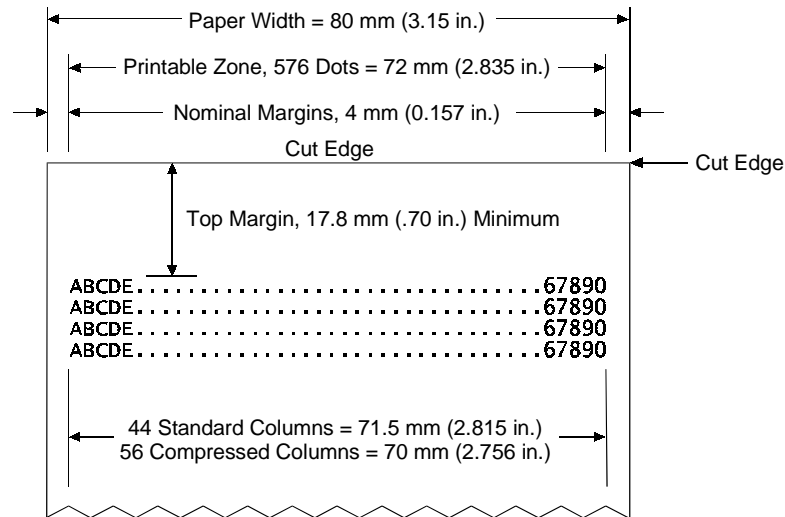
The above figures are based on a core diameter of 22 ± .5 mm (.87 in.) outside, 11.5 ± .5 mm (.45 in.) inside.

## Print Zones

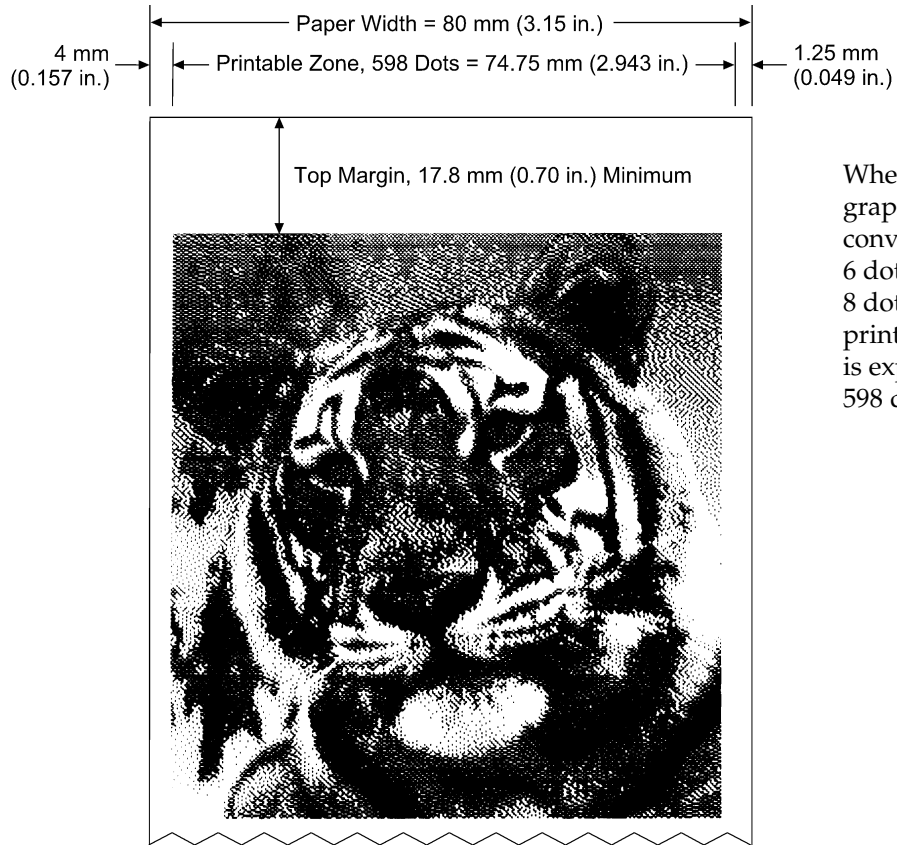
### Print Zones for 80 mm Paper

Specifications of print zone for 80 mm paper:

- ◆ 576 dots (addressable) @ 8 dots/mm, centered on 80 mm
- ◆ Standard Mode: minimum margins: 2.5 mm (.098 inches)
- ◆ Top margin to manual tearoff: 17.8 mm (0.70 inches)
- ◆ Top margin to knife cut: 19.0 mm (0.75 inches)





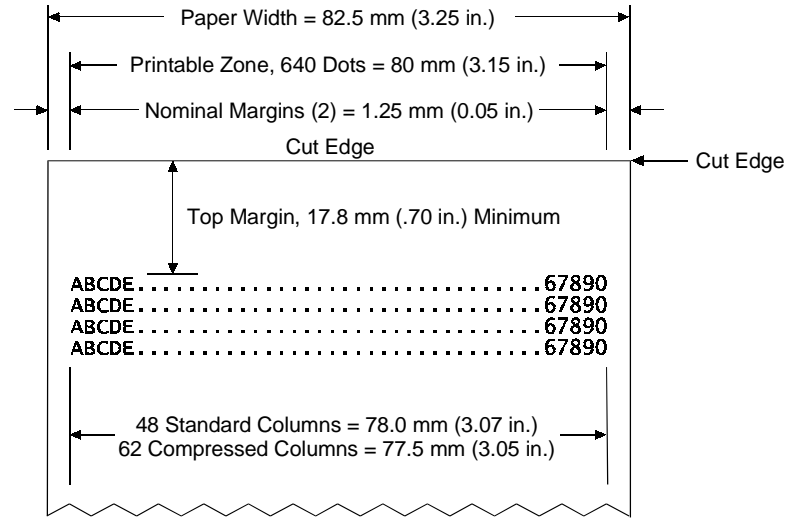


When printing graphics or logos, converted from 6 dot/mm to 8 dot/mm, the printable zone is expanded to 598 dots.

### Print Zones for 82.5 mm Paper

Specifications of print zone for 82.5 mm paper:

- ◆ 640 dots (addressable) @ 8 dots/mm, centered on 82.5 mm
- ◆ Standard mode: minimum margins: 1.0 mm (0.040 inches)
- ◆ Top margin to manual tearoff: 17.8 mm (0.70 inches)
- ◆ Top margin to knife cut: 19.0 mm (0.75 inches)



## Print Density and Density of Receipt Print Lines

This function makes it possible to adjust the energy level of the printhead to darken the printout. An adjustment should only be made when necessary. The factory setting is 100%.

**Warning:** Choose an energy level no higher than necessary to achieve a dark printout. Failure to observe this rule may result in a printer service call or voiding of the printer warranty. Consult your Axiohm technical support specialist if you have any questions.

When the printer prints high density print lines (text or graphics), it automatically slows down.

*To change the Print Density:*

1. Enter the Configuration Menu.
2. Select "Set Hardware Options" from Main Menu.  
"Hardware Options Menu" is printed on the receipt and the question "Set Print Density?" asked.
3. Answer YES (Long click).

A warning is printed, followed by:

Print Density

100%	1 Click
110% (+)	2 Clicks
120% (++)	3 Clicks

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

## Duty Cycle Restrictions (Printing Solid Blocks)

There are restrictions on the duty cycle because of the heat generated by the receipt thermal printhead when printing solid blocks (regardless of the length of the block in relation to the print line). The restrictions are ambient temperature, the percentage of time (measured against one minute) of continuous solid printing, and the amount of coverage.

**Caution:** When the duty cycle approaches the limits shown in the table, the receipt printhead will heat up and shut down. This may damage the printhead.

To avoid this problem, do one or a combination of the following:

4. Reduce the amount of coverage.
5. Reduce the time of continuous solid printing.
6. Reduce the ambient temperature.

### Allowable Duty Cycle (measured over one minute of continuous printing)

Amount of Solid Coverage	Ambient Temperature		
	25°C	35° C	50° C
20%	100%	50%	20%
40%	50%	25%	10%
100%	20%	10%	4%

For reference:

- ◆ A typical receipt with text (contains some blank spaces) is approximately 12% dot coverage.
- ◆ A full line of text characters (every cell on the line has a character in it) is approximately 25% dot coverage.
- ◆ Graphics are approximately 40% dot coverage.
- ◆ Barcodes are approximately 50% dot coverage.
- ◆ A solid black line is 100% dot coverage.

# Character Sets

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1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
		"	2	B	R	b	r	é	È	ó	⋮	⊥	⌌	Γ	≥
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
	XOFF	#	3	C	S	c	s	â	ô	ú		⊥	⌌	π	≤
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
		\$	4	D	T	d	t	ã	õ	ñ	⊥	—	⌌	Σ	∫
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
		%	5	E	U	e	u	à	ò	Ñ	⊥	+	⌌	σ	J
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
		&	6	F	V	f	v	Á	Ú	á	⊥	⊥	⌌	μ	÷
6	22	38	54	70	86	103	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
		'	7	G	W	g	w	ç	ù	ó	⊥	⊥	⊥	τ	≈
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
		(	8	H	X	h	x	ê	ì	¿	⊥	⊥	⊥	φ	°
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
		)	9	I	Y	i	y	Ê	Ï	Ò	⊥	⊥	⊥	Θ	•
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
LF		*	:	J	Z	j	z	è	Ü	¬	⊥	⊥	⊥	Ω	•
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
	ESC	+	;	K	[	k	{	í	¢	½	⊥	⊥	■	δ	√
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
		,	<	L	\	l		Ô	£	¼	⊥	⊥	■	∞	n
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
CR	GS	-	=	M	]	m	}	ì	Ú	i	⊥	=	■	∅	²
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
		.	>	N	^	n	~	Ã	Pt	«	⊥	⊥	■	ε	■
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
		/	?	O	_	o	SP	Â	Ó	»	⊥	⊥	■	∩	
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

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

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

Code Page 866

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0	
			0	@	P	`	p	À	Р	а	⋮	⌒	⌒	р	Ë	
	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1	
		!	1	À	Q	а	q	Б	С	б	⋮	⊥	⊥	с	ë	
	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2	
		"	2	В	Р	в	r	В	Т	в	⋮	⊥	⊥	т	€	
	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3	
		#	3	С	Ѕ	с	s	Г	У	г		⊥	⊥	у	€	
	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4	
		\$	4	Д	Т	d	t	Д	Ф	д	⊥	—	⊥	ф	ï	
	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5	
		%	5	Е	U	e	u	Е	Х	e	⊥	⊥	⊥	х	ï	
	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6	
		&	6	Ф	В	f	v	Ж	Ц	ж	⊥	⊥	⊥	ц	ÿ	
	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7	
		'	7	Г	W	g	w	З	Ч	з	⊥	⊥	⊥	ч	ÿ	
	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8	
		(	8	Н	Х	h	x	И	Ш	и	⊥	⊥	⊥	ш	°	
	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9	
		)	9	І	У	i	y	Й	Щ	й	⊥	⊥	⊥	щ	•	
	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA	
		*	:	Ј	Ѕ	j	z	К	Ъ	к	⊥	⊥	⊥	ъ	•	
	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB	
		+	;	К	[	k	{	Л	Ы	л	⊥	⊥	■	ы	√	
	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC	
		,	<	Л	\	І		М	Ь	м	⊥	⊥	■	ь	№	
	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD	
		-	=	М	]	m	}	Н	Э	н	⊥	=	■	э	ѡ	
	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE	
		.	>	Н	^	н	~	О	Ю	о	⊥	⊥	■	ю	■	
	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF	
		/	?	О	_	о	△	П	Я	п	⊥	⊥	■	я		
	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255

### Code Page 1252

00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0	
0	16	32	0	@	P	`	p	€	Not Used 144	NBSP	°	À	Đ	à	đ	
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1	
1	17	33	!	1	A	Q	a	q	Not Used 129	'	i	±	Á	Ñ	á	ñ
02	12	22	"	2	B	R	b	r	2	¢	²	Â	Ò	â	ò	
03	13	23	#	3	C	S	c	s	,	ƒ	³	Ã	Ó	ã	ó	
04	14	24	\$	4	D	T	d	t	“	£	´	Ä	Ô	ä	ô	
05	15	25	%	5	E	U	e	u	”	¥	µ	Å	Õ	å	õ	
06	16	26	&	6	F	V	f	v	...	¦	¶	Æ	Ö	æ	ö	
07	17	27	'	7	G	W	g	w	†	—	·	Ç	×	ç	÷	
08	18	28	(	8	H	X	h	x	ˆ	˜	¨	È	Ø	è	ø	
09	19	29	)	9	I	Y	i	y	‰	™	©	É	Ù	é	ù	
0A	1A	2A	*	:	J	Z	j	z	Š	š	ª	Ê	Ú	ê	ú	
0B	1B	2B	+	;	K	[	k	{	<	>	«	»	Ë	Û	ë	û
0C	1C	2C	,	<	L	\	l		Œ	œ	¬	¼	Ì	Ü	ì	ü
0D	1D	2D	-	=	M	]	m	}	Not Used 141	Not Used 157	SHY	½	Í	Ý	í	ý
0E	1E	2E	.	>	N	^	n	~	Ž	ž	®	¾	Î	Þ	î	þ
0F	1F	2F	/	?	O	_	o	△	Not Used 143	ÿ	—	¿	Ï	ß	ï	ÿ
15	31	47														

# Chapter 5: Communication Interface

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- ◆ **Communication Overview**
  - Interface
  - Sending Commands
  
- ◆ **RS-232C Interface**
  - Print Speed and Timing
  - XON/XOFF Protocol
  - DTR/DSR Protocol
  - RS-232C Technical Specifications
  
- ◆ **Parallel Interface**

## Communication Overview

In order for a receipt to be printed, a program must be in place that translates the data from the host computer into a language that the printer can understand. This program must tell the printer exactly how to print each character. This chapter describes how to create such a program or modify an existing one.

### Interface

In order for the printer to communicate with the host, a communication link must be set up. The printer supports the RS-232C Serial and IEEE 1284 Parallel interface.

The interfaces have a protocol associated with them that the host must understand and adhere to. Only when the interface parameters are matched and the proper protocol is used, will the host and the printer be able to communicate.

For more information about	See this section
Protocol description	"RS-232C Interface"

### Sending Commands

Once the communication link is established, commands can be sent to the printer. This section describes how to send commands to the printer using DOS and BASIC. This section does not take into account the necessary protocol, but is meant as a general introduction to how the printer functions.

#### Using DOS to Send Commands

One way of getting commands to the printer is to send them directly from DOS. For example, the command

```
COPY CON: COM1:
```

sets the computer up such that the hexadecimal code corresponding to any key that was pressed would be sent to the communication port COM1 when the COPY mode is exited. If the printer is connected to COM1, then the data will go to the printer.

Exit the COPY mode by typing

```
CTRL Z
```

and then pressing the ENTER key. Once the computer knows to direct data from any print command to the proper port, commands can be sent from any software program.

#### Using BASIC to Send Commands

In BASIC, printer commands are sent as a string of characters that are preceded by the LPRINT command. For example,

```
LPRINT CHR$( &H0A)
```

sends the hexadecimal number 0A to the printer, which causes the printer to print the contents of its print buffer. Previously sent commands tell the printer exactly how this data should appear on the paper. For example,

```
LPRINT CHR$( &H12); "ABC"; CHR$( &H0A)
```

sends the hexadecimal numbers 12 41 42 43 0A to the printer. This causes the printer to set itself to double wide mode (12), load the print buffer with "ABC" (41 42 43), and finally, print (0A). Again, the communication link that the BASIC program outputs to must be matched to that of the printer.

## RS-232C Interface

The RS-232C interface uses either XON/XOFF (software) or DTR/DSR (hardware) protocol to control the flow of information between the computer and the printer. For XON/XOFF, a particular character is sent back and forth between the host and the printer to regulate the communication. For DTR/DSR, changes in the DTR/DSR signal on the RS-232C interface coordinate the information flow.

The RS-232C interface offers the standard settings that are selected through the Configuration Menu described on page 10 of the "Diagnostics and Configuration" chapter in the *A794 Service Guide*.

## Print Speed and Timing

The fast speed of the printer requires the application to send data to the printer at least as fast as it is printed. The application must also allow receipt lines to be buffered ahead at the printer, so the printer will be able to print each line immediately after the preceding line, without stopping to wait for more data. Ideally, the application will send all the data for an entire receipt without pausing between characters or lines transmitted.

If the application sends data at 9600 baud and pauses between lines for as short a time as 50 milliseconds, the printer will never be able to print at full speed. However, if the application sends data at 19.2 K baud and does not pause between lines, the printer will be able to print at its full speed of 2400 lines/minute. The table below shows that with a pause of 50 milliseconds after each line, the transmit time equals or exceeds the printer process time, slowing down the printer, regardless of the baud rate.

**50 Millisecond Pause after Each Line**

Characters per Line	Lines per Receipt	Transmit Time (9600 Baud) in Seconds	Transmit Time (19.2 K Baud) in Seconds	Transmit Time (115.2 K Baud) in Seconds	Process Time* in Seconds
20	20	1.40	1.20	1.03	0.50
20	40	2.80	2.40	2.06	1.00
44	20	1.88	1.44	1.07	0.50
44	40	3.76	2.88	2.15	1.00

\*Process Time is the time it would take the printer to process the data if all transmitted data were present. (It is not the time it takes to print the receipt.)

Example: 20 characters/line, with 20 lines = 0.5 seconds process time for the printer. It takes 1.2 seconds to send the data to the printer at 19.2K baud speed with a 50ms delay after each line. Thus the printer would have to wait 0.7 seconds longer to receive the data that it could process it if no delays existed and the transmission speed were faster.



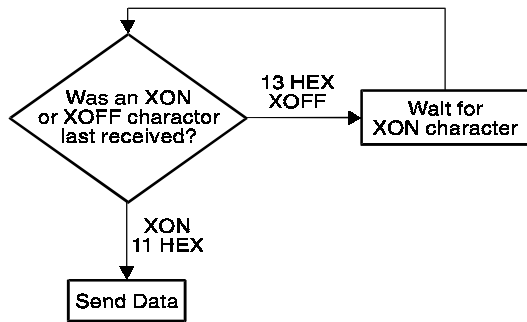
The next table shows that with no delay between lines, the transmit time is much less than the process time, allowing the printer to print at full speed.

No Delay Between Lines					
Char. per Line	Lines per Receipt	Transmit Time (9600 Baud) in Seconds	Transmit Time (19.2 K Baud) in Seconds	Transmit Time (115.2 K Baud) in Seconds	Process Time in Seconds
20	20	0.40	0.20	0.035	0.50
20	40	0.80	0.40	0.070	1.00
44	20	0.88	0.44	0.075	0.50
44	40	1.76	0.88	0.150	1.00

## XON/XOFF Protocol

The XON/XOFF characters coordinate the information transfer between the printer and the host computer. The printer sends an XON character when it is ready to receive data and it sends an XOFF character when it cannot accept any more data. The software on the host computer must monitor the communication link as shown in the following flowchart in order to send data at the appropriate times.

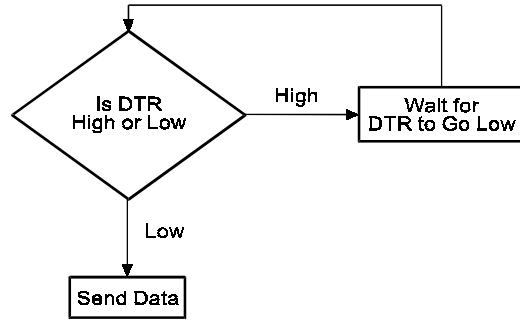
If XON/XOFF has been selected, the printer also toggles the DTR signal, as described in the next section, but it does not look at the DSR signal to transmit data.



XON character = hexadecimal 11,  
XOFF character = hexadecimal 13.

## DTR/DSR Protocol

The DTR signal is used to control data transmission to the printer. It is driven low when the printer is ready to receive data and driven high when it cannot accept any more data. Data is transmitted from the printer after it confirms that the DSR signal is low.



## RS-232C Technical Specifications

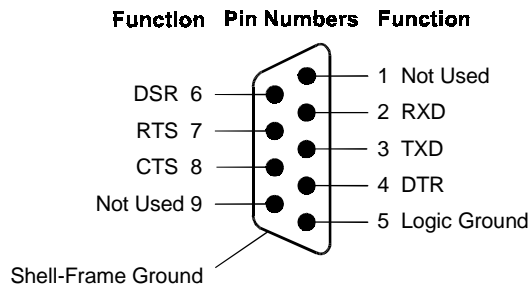
This section describes the pin settings for the connectors and the RS-232C interface parameters. The RS-232C parameters are selected through the configuration menu feature. The RS-232C parameters must match those of the host computer.

For more information about	See these sections or documents
Configuration menu feature	<i>A794 Owner's Guide</i>
RS-232C settings	"RS-232C Serial Interface Settings" in the <i>A794 Service Guide</i>

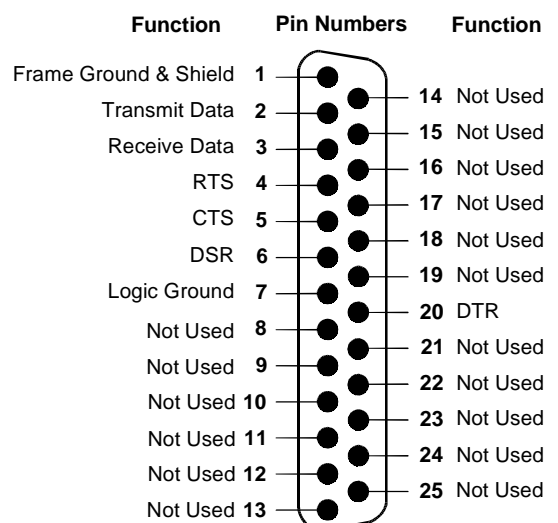
### Communication Connectors

The following illustration shows the RS-232C communication connectors and pin assignments. The connectors are located at the rear of the printer, and are specified as male, DB9, 9-pin D-shell, and female DB25, 25-pin with RTS and CTS pins connected.

#### 9-pin DB-9 Connector

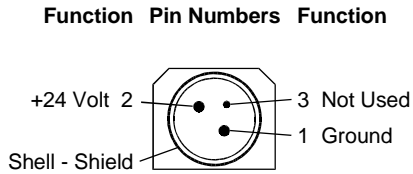


#### 25-pin DB-25 Connector



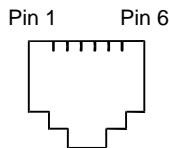
### Power Connector

With RS-232C, the printer is always remotely powered. The following illustration shows the power cable connector and pin assignments. The power cable connector is a 3-pin mini DIN plug and is located at the rear of the printer.



### Cash Drawer Connector

The following illustration shows the pinouts for the cash drawer connector.



The following table shows the pinouts for the cash drawer. The connector can support two cash drawers with a Y cable, and is located at the rear of the printer.

Pin Number	Cash Drawer Connector
1	Frame Ground
2	Drawer 1 Driver
3	Status Switch +
4	+24 VDC
5	Drawer 2 Driver
6	Status Switch -

## RS-232C Settings

The printer supports the standard RS-232C settings:

<b>Baud Rate</b>	1200, 2400, 4800, 9600, 19.2 K, 38.4 K, 57.6 K, 115.2 K
<b>Parity</b>	Parity Enabled, Parity Disabled, Even Parity, Odd Parity
<b>Flow Control Method</b>	XON/XOFF, DTR/DSR
<b>Data Reception Errors</b>	Print "?" for Data Errors, Ignore Data Errors

Generally the printer is shipped with all the RS-232C parameters pre-set at the factory. If you need to change any of these settings, you can do so using the configuration menu feature.

This feature prints instructions on the receipt for changing the RS-232C settings (in addition to other settings).

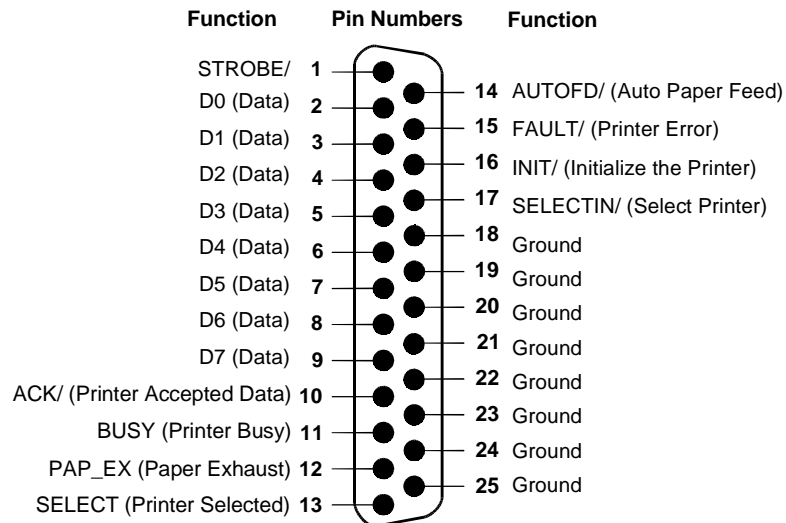
<b>For more information about</b>	<b>See this section</b>
Changing the RS-232C settings through the configuration menu	"Diagnostics and Configuration" in the <i>A794 Service Guide</i>

## Parallel Interface

The printer is also available with an IEEE-1284 parallel interface. The printer configuration must be set to the parallel interface using the printer's Configuration Menu described in the "Diagnostics and Configuration" section of the *A794 Service Guide*.

### IEEE Bi-directional Parallel Connector

The following illustration shows the parallel communication connector and pin assignments. The connector is located at the rear of the printer, and is designated as an IEEE 1284-A receptacle, commonly known as a D-Subminiature 25 pin.



# Chapter 6: Programming Information

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- ◆ **Command Conventions**
- ◆ **List of Commands and Locations**
  - By Command Code
  - By Function
- ◆ **Comparisons**
- ◆ **Command Descriptions**
  - Printer Function Commands
  - Vertical Positioning and Print Commands
  - Horizontal Positioning Commands
  - Print Characteristics Commands
  - Graphics Commands
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    - Batch Mode
    - Real Time
    - Auto Status Back
  - Bar Code Commands
  - Page Mode Commands
  - Macro Commands
  - User Data Storage Commands
  - Flash Download Commands

## Command Conventions

The following information describes how each command is organized:

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

## List of Commands and Location

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

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

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

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

All items in **BOLD** are new or have additional functionality when compared to the A793.

### By Command Code

Code (Hexadecimal)	Command	Page
09	Horizontal Tab	72
0A	Print and Feed One Line	68
<b>0C</b>	<b>Print and Return to Standard Mode</b>	<b>124</b>
0D	Print and Carriage Return	68
10	Clear Printer	61
10 04 <i>n</i>	Real Time Status Transmission (DLE Sequence)	112
10 05 <i>n</i>	Real Time Request to Printer (DLE Sequence)	115
<b>11 <i>n1...n72</i></b>	<b>Print Raster Graphics</b>	<b>92</b>
12	Select Double-Wide Characters	79
13	Select Single-Wide Characters	79
14 <i>n</i>	Feed <i>n</i> Print Lines	68
15 <i>n</i>	Feed <i>n</i> Dot Rows	69
16 <i>n</i>	Add <i>n</i> Extra Dot Rows	69
17	Print	70
<b>18</b>	<b>Cancel Print Data in Page Mode</b>	<b>124</b>
19	Perform Full Knife Cut	61
<b>1A</b>	<b>Perform Partial Knife Cut</b>	<b>62</b>
<b>1B (+*.bmp)</b>	<b>Download BMP Logo</b>	<b>93</b>
1B 07	Generate Tone	62
<b>1B 0C</b>	<b>Print Data in Page Mode</b>	<b>125</b>
1B 12	Select 90 Degree Counter-Clockwise Rotated Print	80
1B 14 <i>n</i>	Set Column	72
1B 16 <i>n</i>	Select Pitch (Column Width)	80
1B 20 <i>n</i>	Set Right-Side Character Spacing	81



Code (Hexadecimal)	Command	Page
1B 21 <i>n</i>	Select Print Mode	82
1B 24 <i>nL nH</i>	Set Absolute Starting Position	73
1B 25 <i>n</i>	Select or Cancel User-Defined Character Set	83
1B 26 <i>s c1 c2 n1 d1...mn dn</i>	Define User-Defined Character Set	83
1B 27 <i>m a0 a1 a2 d1 ... dn</i>	Write to User Data Storage	132
1B 2A <i>m n1 n2 d1...dn</i>	Select Bit Image Mode	94
<b>1B 2D <i>n</i></b>	<b>Select or Cancel Underline Mode</b>	<b>84</b>
1B 2E <i>m n rL rH d1 ... dn</i>	Advanced Raster Graphics	96
1B 32	Set Line Spacing to 1/6 Inch	70
1B 33 <i>n</i>	Set Line Spacing	70
1B 34 <i>m a0 a1 a2</i>	Read from User Data Storage	132
1B 3A 30 30 30	Copy Character Set from ROM to RAM	85
<b>1B 3D <i>n</i></b>	<b>Select Peripheral Device (for Multi-Drop)</b>	<b>62</b>
1B 3F <i>n</i>	Cancel User-Defined Character	85
1B 40	Initialize Printer	63
1B 44 [ <i>n</i> ]... <i>k</i> NUL	Set Horizontal Tab Positions	74
1B 45 <i>n</i>	Select or Cancel Emphasized Mode	86
1B 47 <i>n</i>	Select or Cancel Double Strike	86
<b>1B 49 <i>n</i></b>	<b>Select or Cancel Italic Print</b>	<b>87</b>
1B 4A <i>n</i>	Print and Feed Paper	71
1B 4B <i>n1 n2 d1...dn</i>	Select Single-Density Graphics	96
<b>1B 4C</b>	<b>Select Page Mode</b>	<b>125</b>
<b>1B 52 <i>n</i></b>	<b>Select International Character Set</b>	<b>87</b>
<b>1B 53</b>	<b>Select Standard Mode</b>	<b>126</b>
<b>1B 54 <i>n</i></b>	<b>Select Print Direction in Page Mode</b>	<b>126</b>
1B 56 <i>n</i>	Select or Cancel 90 Degree Clockwise Rotated Print	88
<b>1B 57 <i>n1, n2...n8</i></b>	<b>Set Print Area in Page Mode</b>	<b>127</b>
1B 59 <i>n1 n2 d1...dn</i>	Select Double-Density Graphics	97
1B 5B 7D	Switch to Flash Download Mode	135
1B 5C <i>n1 n2</i>	Set Relative Print Position	75
1B 61 <i>n</i>	Select Justification	76
<b>1B 63 33 <i>n</i></b>	<b>Select Paper Sensors to Output Paper End Signals</b>	<b>64</b>
1B 63 34 <i>n</i>	Select Sensors to Stop Printing	65
1B 63 35 <i>n</i>	Enable or Disable Panel Button	65
1B 64 <i>n</i>	Print and Feed <i>n</i> Lines	71
1B 69	Perform Full Knife Cut	61
1B 6A <i>k</i>	Read from Non-Volatile Memory	132
1B 6D	Perform Partial Knife Cut	62
1B 70 <i>n p1 p2</i>	Generate Pulse to Open Cash Drawer	66
1B 73 <i>n1 n2 k</i>	Write to Non-Volatile Memory (NVRAM)	132
<b>1B 74 <i>n</i></b>	<b>Select Character Code Table</b>	<b>87</b>

Code (Hexadecimal)	Command	Page
1B 75 <i>n</i>	Request Alternate Status	102
1B 75 0	Transmit Peripheral Device Status	102
1B 76	Transmit Paper Sensor Status	103
1B 7B <i>n</i>	Select or Cancel Upside Down Print Mode	88
1D 00	Return Boot Sector Firmware Part Number	136
1D 01	Return Segment Number Status of Flash Memory	136
1D 02 <i>n</i>	Select Flash Memory Sector to Download	136
1D 03 <i>n</i>	Real Time Request to Printer (GS Sequence)	115
1D 04 <i>n</i>	Real Time Status Transmission (GS Sequence)	112
1D 05	Real Time Printer Status Transmission	116
1D 06	Get Firmware CRC	136
1D 07	Return Micro Processor CRC	137
1D 0E	Erase All Flash Contents Except Boot Sector	137
1D 0F	Return Main Program Flash CRC	137
1D 10 <i>n</i>	Erase Selected Flash Sector	137
1D 11 <i>aL aH cL cH d1...dn</i>	Download to Active Flash Sector	138
<b>1D 21 <i>n</i></b>	<b>Select Character Size</b>	<b>88</b>
1D 22 <i>n</i>	Select Memory Type (SRAM/Flash) Where to Save Logos or User-Defined Fonts	132
<b>1D 22 55 <i>n1 n2</i></b>	<b>Flash Memory User Sectors Allocation</b>	<b>134</b>
1D 23 <i>n</i>	Select the Current Logo	98
<b>1D 24 <i>nL nH</i></b>	<b>Set Absolute Vertical Print Position in Page Mode</b>	<b>128</b>
1D 2A <i>n1 n2 d1...dn</i>	Define Downloaded Bit Image	99
1D 2F <i>m</i>	Print Downloaded Bit Image	100
<b>1D 3A</b>	<b>Select or Cancel Macro Definition</b>	<b>130</b>
1D 40 <i>n</i>	Erase User Flash Sector	134
<b>1D 42 <i>n</i></b>	<b>Select or Cancel White/Black Reverse Print Mode</b>	<b>90</b>
1D 48 <i>n</i>	Select Printing Position of HRI Characters	121
1D 49 <i>n</i>	Transmit Printer ID	104
1D 49 40 <i>n</i>	Transmit Printer ID, Remote Diagnostics Extension	105
1D 4C <i>nL nH</i>	Set Left Margin	77
1D 50 <i>x y</i>	Set Horizontal and Vertical Minimum Motion Units	71
1D 56 <i>m</i>	Select Cut Mode and Cut Paper	66
1D 56 <i>m n</i>	Select Cut Mode and Cut Paper	66
1D 57 <i>nL nH</i>	Set Printing Area Width	78
<b>1D 5C <i>nL nH</i></b>	<b>Set Relative Vertical Print Position in Page Mode</b>	<b>129</b>
<b>1D 5E <i>r t m</i></b>	<b>Execute Macro</b>	<b>131</b>
1D 61 <i>n</i>	Select or Cancel Automatic Status Back (ASB)	117
1D 62 <i>n</i>	Select or Cancel Smoothing Mode	90
1D 66 <i>n</i>	Select Pitch of HRI Characters	121
1D 68 <i>n</i>	Select Bar Code Height	121

<b>Code (Hexadecimal)</b>	<b>Command</b>	<b>Page</b>
<b>1D 6B <i>m d1...dk</i> 00</b>	<b>Print Bar Code</b>	<b>122</b>
1D 6B <i>m n d1...dn</i>	Print Bar Code	122
1D 72 <i>n</i>	Transmit Status	107
1D 77 <i>n</i>	Select Bar Code Width	123
1D FF	Reset Firmware	138
<b>1F 04 <i>n</i></b>	<b>Convert 6 Dots/mm Bitmap to 8 Dots/mm Bitmap</b>	<b>100</b>
<b>1F 05 <i>n</i></b>	<b>Select Superscript or Subscript Modes</b>	<b>91</b>
1F 56	Send Printer Software Version	109
<b>1F 74</b>	<b>Print Test Form</b>	<b>67</b>

## By Function

All items in **BOLD** are new or have additional functionality when compared to the A793.

### Printer Function Commands

Code (Hexadecimal)	Command	Page
10	Clear Printer	61
19	Perform Full Knife Cut	61
<b>1A</b>	<b>Perform Partial Knife Cut</b>	<b>62</b>
1B 07	Generate Tone	62
<b>1B 3D n</b>	<b>Select Peripheral Device (for Multi-Drop)</b>	<b>62</b>
1B 40	Initialize Printer	63
<b>1B 63 33 n</b>	<b>Select Paper Sensors to Output Paper End Signals (Parallel Only)</b>	<b>64</b>
1B 63 34 n	Select Sensors to Stop Printing	65
1B 63 35 n	Enable or Disable Panel Buttons	65
1B 69	Perform Full Knife Cut	61
1B 6D	Perform Partial Knife Cut	62
1B 70 n p1 p2	Generate Pulse to Open Cash Drawer	66
1D 56 m	Select Cut Mode and Cut Paper	66
1D 56 m n	Select Cut Mode and Cut Paper	66
<b>1F 74</b>	<b>Print Test Form</b>	<b>67</b>

### Vertical Positioning and Print Commands

Code (Hexadecimal)	Command	Page
0A	Print and Feed Paper One Line	68
0D	Print and Carriage Return	68
14 n	Feed <i>n</i> Print Lines	68
15 n	Feed <i>n</i> Dot Rows	69
16 n	Add <i>n</i> Extra Dot Rows	69
17	Print	70
1B 32	Set Line Spacing to 1/6 Inch	70
1B 33 n	Set Line Spacing	70
1B 4A n	Print and Feed Paper	71
1B 64 n	Print and Feed <i>n</i> Lines	71
1D 50 x y	Set Horizontal and Vertical Minimum Motion Units	71

**Horizontal Positioning Commands**

Code (Hexadecimal)	Command	Page
09	Horizontal Tab	72
1B 14 n	Set Column	72
1B 24 nL nH	Set Absolute Starting Position	73
1B 44 [n] k 00	Set Horizontal Tabs	74
1B 5C n1 n2	Set Relative Print Position	75
1B 61 n	Select Justification	76
1D 4C nL nH	Set Left Margin	77
1D 57 nL nH	Set Printing Area Width	78

**Print Characteristic Commands**

Code (Hexadecimal)	Command	Page
12	Select Double-Wide Characters	79
13	Select Single-Wide Characters	79
1B 12	Select 90 Degree Counter-Clockwise Rotated Print	80
1B 16 n	Select Pitch (Column Width)	80
1B 20 n	Set Character Right-Side Spacing	81
1B 21 n	Select Print Modes	82
1B 25 n	Select or Cancel User-Defined Character Set	83
1B 26 s c1 c2 d1...dn	Define User-Defined Characters	83
<b>1B 2D n</b>	<b>Select or Cancel Underline Mode</b>	<b>84</b>
1B 3A 30 30 30	Copy Character Set from ROM to RAM	85
1B 3F n	Cancel User-Defined Characters	85
1B 45 n	Select or Cancel Emphasized Mode	86
1B 47 n	Select Double Strike	86
<b>1B 49 n</b>	<b>Select or Cancel Italic Print</b>	<b>87</b>
<b>1B 52 n</b>	<b>Select International Character Set and Select Character Code Table</b>	<b>87</b>
1B 56 n	Select or Cancel 90 Degrees Clockwise Rotated Print	88
<b>1B 74 n</b>	<b>Select International Character Set</b>	<b>87</b>
1B 7B n	Select or Cancel Upside Down Printing Mode	88
<b>1D 21 n</b>	<b>Select Character Size</b>	<b>88</b>
<b>1D 42 n</b>	<b>Select or Cancel White/Black Reverse Print Mode</b>	<b>90</b>
1D 62 n	Select or Cancel Smoothing Mode	90
<b>1F 05 n</b>	<b>Select Superscript or Subscript Modes</b>	<b>91</b>

## Graphics Commands

Code (Hexadecimal)	Command	Page
11 n1 ... n72	Print Raster Graphics	92
1B (+*.bmp)	Download BMP Logo	93
1B 2A m n1 n2 d1...dn	Select Bit Image Mode	94
1B 2E m n rL rH d1 ... dn	Advanced Raster Graphics	96
1B 4B n1 n2 d1...dn	Select Single-Density Graphics	96
1B 59 n1 n2 d1...dn	Select Double-Density Graphics	97
1D 23 n	Select Current Logo (Downloaded Bit Image)	98
1D 2A n1 n2 d1...dn]	Define Downloaded Bit Image	99
1D 2F m	Print Downloaded Bit Image	100
1F 04 n	Convert 6 Dots/mm Bitmap to 8 Dots/mm Bitmap	100

## Status Commands

### Batch Mode

Code (Hexadecimal)	Command	Page
1B 75 0	Transmit Peripheral Device Status	102
1B 75 n	Request Alternate Status	102
1B 76	Transmit Paper Sensor Status	103
1D 49 n	Transmit Printer ID	104
1D 49 40 n	Transmit Printer ID, Remote Diagnostics Extension	105
1D 72 n	Transmit Status	107
1F 56	Send Printer Software Version	109

### Real Time

Code (Hexadecimal)	Command	Page
10 04 n	Real Time Status Transmission (DLE Sequence)	112
10 05 n	Real Time Request to Printer (DLE Sequence)	115
1D 03 n	Real Time Request to Printer (GS Sequence)	115
1D 04 n	Real Time Status Transmission (GS Sequence)	112
1D 05	Real Time Printer Status Transmission	116

### Auto Status Back

Code (Hexadecimal)	Command	Page
1D 61 n	Select or Cancel Auto Status Back	117

**Barcode Commands**

Code (Hexadecimal)	Command	Page
1D 48 n	Select Printing Position for HRI Characters	121
1D 66 n	Select Pitch for HRI Characters	121
1D 68 n	Select Bar Code Height	121
1D 6B m d1...dk 00 or 1D 6B m n d1...dn	<b>Print Bar Code</b>	122
1D 77 n	Select Bar Code Width	123

**Page Mode Commands**

Code (Hexadecimal)	Command	Page
0C	<b>Print and Return to Standard Mode</b>	124
18	<b>Cancel Print Data in Page Mode</b>	124
1B 0C	<b>Print Data in Page Mode</b>	125
1B 4C	<b>Select Page Mode</b>	125
1B 53	<b>Select Standard Mode</b>	126
1B 54 n	<b>Select Print Direction in Page Mode</b>	126
1B 57 n1, n2...n8	<b>Set Print Area in Page Mode</b>	127
1D 24 nL nH	<b>Set Absolute Vertical Print Position in Page Mode</b>	128
1D 5C nL nH	<b>Set Relative Vertical Print Position in Page Mode</b>	129

**Macro Commands**

Code (Hexadecimal)	Command	Page
1D 3A	<b>Select or Cancel Macro Definition</b>	130
1D 5E r t m	<b>Execute Macro</b>	131

**User Data Storage Commands**

Code (Hexadecimal)	Command	Page
1B 27 m a0 a1 a2 d1...dn	Write to User Data Storage	132
1B 34 m a0 a1 a2	Read from User Data Storage	132
1B 6A k	Read from Non-Volatile Memory	132
1B 73 n1 n2 k	Write to Non-Volatile Memory (NVRAM)	132
1D 22 n	Select Memory Type (SRAM/Flash) Where to Save Logos or User-Defined Fonts	132
1D 22 55 n1 n2	<b>Flash Memory User Sectors Allocation</b>	134
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**Flash Download Commands**

Code (Hexadecimal)	Command	Page
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1D 00	Return Boot Sector Firmware Part Number	136
1D 01	Return Segment Number Status of Flash Memory	136
1D 02 n	Select Flash Memory Sector to Download	136
1D 06	Get Firmware CRC	136
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1D 0E	Erase All Flash Contents Except Boot Sector	137
1D 0F	Return Main Program Flash CRC	137
1D 10 n	Erase Selected Flash Sector	137
1D 11 aL aH cL cH d1...dn	Download to Active Flash Sector	138
1D FF	Reset Firmware	138



## Comparisons

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

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 A793. In text mode, the equivalent character position is calculated.
1B 26 <i>s c1 c2 n1 d1...nm dn]</i>	Define User-Defined Character Set	Since the dots on the A794 printhead are smaller, user defined characters that were used on the previous printers will appear smaller on the A974 printer.
1B 2A <i>m n1 n2 d1...dn</i>	Select Bit Image Mode	In A793 Emulation Mode, graphics are scaled to best match the size of the graphic in the A793 printer.
1B 33 <i>n</i>	Set Line Spacing	This command uses <i>n</i> in terms of $n/360$ inches. Since the A793 had a fundamental step of $1/152$ inch and the A794 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 A793 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 A793 Emulation Mode, this command calculates how many character positions to move based on the A793 character width in dots (10) versus the A794 (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 A793 Emulation Mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A793.
1D 2F <i>m</i>	Print Downloaded Bit Image	(Same as above)

# Command Descriptions

## Printer Function Commands

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

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

### Clear Printer

<b>ASCII</b>	DLE
<b>Hexadecimal</b>	10
<b>Decimal</b>	16

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

- ◆ Double-Wide command (0x12) is canceled
- ◆ Line Spacing, Pitch, and User-Defined Character Sets are maintained at current selections (RAM is not affected)
- ◆ Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set
- ◆ Printer is restarted and error status is cleared in a fault condition
- ◆ Printing position is set to column one
- ◆ Knife is homed

### Exceptions

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

### Related Information

This command is recognized in A793 Emulation and A794 Native Mode, ignored in TM-T88 Emulation.

### Perform Full Knife Cut

<b>ASCII</b>	EM	ESC i
<b>Hexadecimal</b>	19	1B 69
<b>Decimal</b>	25	27 105

Cuts the receipt.

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

### Exceptions

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

### Perform Partial Knife Cut

<b>ASCII</b>	SUB	ESC m
<b>Hexadecimal</b>	1A	1B 6D
<b>Decimal</b>	26	27 109

Partially cuts the receipt. The default setting leaves 5 mm. (0.20 inch) of paper on the left edge. (See Setting Partial Cut Distance in Diagnostics.)

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

#### Formulas

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

#### Exceptions

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

### Generate Tone

<b>ASCII</b>	ESC BEL
<b>Hexadecimal</b>	1B 07
<b>Decimal</b>	27 7

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

#### Related Information

This command is recognized in A793 Emulation and A794 Native Mode, ignored in TM-T88 Emulation.

### Select Peripheral Device (for Multi-Drop)

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

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

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

Selects the device to which the host computer sends data.

#### Related Information

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

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

**Initialize Printer**

<b>ASCII</b>	ESC @
<b>Hexadecimal</b>	1B 40
<b>Decimal</b>	27 64

<b>Default:</b>	Character Pitch:	15.6 CPI
	Column Width:	44 characters
	Extra Dot Rows:	3
	Character Set:	Code Page 437
	Printing Position:	Column One

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

Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set and User-defined characters or logo graphics are cleared. (Flash Memory is not affected.) Tabs reset to default. Receipt selection state is selected.

**Exceptions**

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

### Select Paper Sensors to Output Paper End Signals

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

#### 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

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

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

#### Exceptions

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

### Select Sensors to Stop Printing

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

**Value of *n*:**    Sensor status

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

Bits 5 and 7 are not used.

**Default:**        0

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

### Enable or Disable Panel Button

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

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

**Default:**        0 (Enable)

Enables or disables the Paper Feed Button. If the last bit is 0, the Paper Feed Button is enabled. If the last bit is 1, the Paper Feed Button is disabled.

### Exceptions

Functions that require the Paper Feed Button (except for the Execute Macro [1D 5E] command) cannot be used when it has been disabled with this command.

### Generate Pulse to Open Cash Drawer

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

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

**Value of *p1*:**   0-255

**Value of *p2*:**   0-255

Sends a pulse to open the cash drawer.

#### Formulas

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

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

#### Related Information

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

### Select Cut Mode and Cut Paper

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

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

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

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

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

**Range of *n*:**    0 – 255

**Default of *m, n*:**    0

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

#### Formulas

*n* times the vertical motion unit is used to determine the cutting position to which the paper is fed.

**Print Test Form**

**ASCII**            AX t  
**Hexadecimal**   1F 74  
**Decimal**        31 116

Prints the current printer configuration settings on the receipt.

Disabled in Page Mode.



## 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

<b>ASCII</b>	LF
<b>Hexadecimal</b>	0A
<b>Decimal</b>	10

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

Carriage Return/Line Feed pair prints and feeds only one line.

### Activate Carriage Return

<b>ASCII</b>	CR
<b>Hexadecimal</b>	0D
<b>Decimal</b>	13

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

#### Related Information

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

This command is recognized in A793 Emulation and A794 Native Mode, ignored in TM-T88 Emulation.

Carriage Return/Line Feed pair prints and feeds only one line.

### Feed *n* Print Lines

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

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

**Range of *n*:** 0-255 in A794 Native Mode  
0-127 in A793 Emulation

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

#### Related Information

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

**Feed  $n$  Dot Rows**

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

**Value of  $n$ :**     $n/203$  inch

**Range of  $n$ :**    0-255 in A794 Native Mode  
                       0-127 in A793 Emulation

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

**Related Information**

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

**Add  $n$  Extra Dot Rows**

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

**Value of  $n$ :**    Number of extra dot rows

**Range of  $n$ :**    0-16

**Default:**        3 extra dot rows

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

**Formulas**

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

<b>Extra Rows</b>	<b>Lines Per Inch</b>	<b>Dot Rows</b>	<b>Extra Rows</b>	<b>Lines Per Inch</b>	<b>Dot Rows</b>
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			

**Related Information**

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

**Print**

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

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

**Related Information**

This command is recognized in A793 Emulation and A794 Native Mode, ignored in TM-T88 Emulation.

**Set Line Spacing to 1/6 Inch**

**ASCII**            ESC 2  
**Hexadecimal**    1B 32  
**Decimal**           27 50  
**Default:**        3.33 mm (0.13 inch)

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

**Set Line Spacing**

**ASCII**            ESC 3 *n*  
**Hexadecimal**    1B 33 *n*  
**Decimal**           27 51 *n*  
**Value of *n*:**    *n*/406 inch in A794 Native Mode  
                     *n*/360 inch in A793 Emulation Mode  
                     *n*/203 inch in TM-T88 Emulation Mode  
**Range of *n*:**    0-255  
**Default:**        3.37 mm (0.13 inch)

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

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

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

**Related Information**

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

**Print and Feed Paper**

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

**Value of *n*:**    *n*/203 inch in A794 Native Mode and TM-T88 Emulation Mode  
*n*/360 inch in A793 Emulation Mode

**Range of *n*:**    0-255

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

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

**Related Information**

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

**Print and Feed *n* Lines**

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

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

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

**Set Horizontal and Vertical Minimum Motion Units**

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

**Value of *x*:**    Horizontal

**Value of *y*:**    Vertical

**Range of *x*:**    0 – 255

**Range of *y*:**    0 – 255

**Default of *x*:**   203

**Default of *y*:**   203

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

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

## Horizontal Positioning Commands

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

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

### Horizontal Tab

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

Moves the print position to the next tab position set by the Set Horizontal Tab Positions (1B 44 *n*<sub>1</sub> *n*<sub>2</sub> ... 00) command. The print position is reset to column one after each line.

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

When no tabs are defined to the right of the current position, or if the next tab is past the right margin, Line Feed is executed. HT has no effect in Page Mode.

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

### Set Column

<b>ASCII</b>	ESC DC4 <i>n</i>
<b>Hexadecimal</b>	1B 14 <i>n</i>
<b>Decimal</b>	27 20 <i>n</i>
<b>Value of <i>n</i>:</b>	1-44= Standard pitch 1-56= Compressed pitch

**Default of *n*:** 1

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

### Exceptions

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

### Related Information

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

## Set Absolute Starting Position

<b>ASCII</b>	ESC \$ <i>nL nH</i>
<b>Hexadecimal</b>	1B 24 <i>nL nH</i>
<b>Decimal</b>	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.

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

### Formulas

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

$28 \times 10 = 280$  dots (beginning of column 29)  
 $280/256 = 1$ , remainder of 24  
 $nL = 24$   $nH = 1$

### Related Information

If the Set Horizontal and Vertical Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of the Set Relative Print Position command will be interpreted accordingly. For more information, see the description of the command Set Horizontal and Vertical Minimum Motion Units command (1D 50) in this document.

### Compatibility Information (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 A793 to backup in the print string and replace characters and their associated attributes when a "Set Relative Print Position" command instructs the printer to move the print position to the left.

In order to improve the speed of printing, the 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.

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

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

**Set Horizontal Tab Positions****ASCII**        ESC D [n]...k NUL**Hexadecimal**    1B 44 [n]...k 00**Decimal**        27 68 [n]...k 0**Value of *n*:**    Column number for tab minus one.  
(*n* is always less than or equal to the current selected column width)**Value of *k*:**    0-32**Default:**        Every 8 characters from column. 1 (9, 17, 25, etc.) for normal print.Sets up to 32 horizontal tab positions *n* columns from column one, but does not move the print position. See the Horizontal Tab command (09).

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

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

**Formulas**

Set the tab positions in ascending order and put Hex 00 at the end.

Hex 1B 44 00 (number of tabs not specified) clears all tab positions.

**Exceptions**

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

Standard pitch =    44 columns

Compressed pitch = 56 columns

## Set Relative Print Position

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

### Value of *n*:

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

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

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

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

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

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

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

### Formulas

*To move to the left:*

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

$2 \times 10 = 20$  dots (two columns to be moved 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:*

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

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

### Related Information

If the Set Horizontal and Vertical Minimum Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (Set Relative Print Position) will be interpreted accordingly. For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command (1D 50) in this document.

(continued next page)



**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 A793 to backup in the print string and replace characters and their associated attributes when a "Set Relative Print Position" command instructs the printer to move the print position to the left.

In order to improve the speed of printing, the 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.

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

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

**Select Justification**

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

Specifies the alignment of characters, graphics, logos, and bar codes on the receipt station according to the above table.

**Related information**

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

On the A793 this command accepts any  $n \leq 255$ , using the low 2 bits:

00	left aligned
01	center
10	right aligned
11	center

## Set Left Margin

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

**Range of *nL*:** 0-255

**Range of *nH*:** 0-255

**Default:**        576 dots (the maximum printable area)

### Formulas

Sets the left margin of the printing area. The left margin is set to  $((nH \times 256) + nL)$  times horizontal motion unit) inches. The horizontal motion units are set by the Set Horizontal and Vertical Minimum Motion Units command (1D 50), described in this manual.

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

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots. See the illustration.

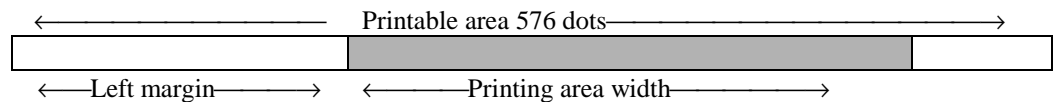
To set the left margin to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

```
GS L 203 0
```

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

```
GS L 150 1
```

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



### Exceptions:

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

## Set Printing Area Width

**ASCII** GS W *nL nH*

**Hexadecimal** 1D 57 *nL nH*

**Decimal** 29 87 *nL nH*

**Range of *nL*:** 0-255

**Range of *nH*:** 0-255

**Default:** 576 dots (the maximum printable area)

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

The width of the printing area follows the Set Left Margin command (1D 4C). See the Set Left Margin command (10 4C ...) earlier in this document for a description.

### Formulas

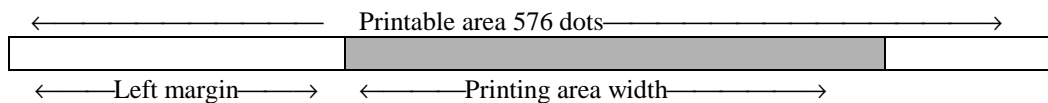
To set the width of the printing area to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

```
GS W 203 0
```

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

```
GS W 150 1
```

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



### Exceptions

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

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots. See the illustration.

## 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.

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

### Select Double-Wide Characters

ASCII	DC2
Hexadecimal	12
Decimal	18

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

#### Exceptions

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

#### Related Information

This command is ignored in TM-T88 Emulation.

### Select Single-Wide Characters

ASCII	DC3
Hexadecimal	13
Decimal	19

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

#### Exceptions

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

#### Related Information

This command is ignored in TM-T88 Emulation.

### Select 90 Degree Counter-Clockwise Rotated Print

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

Rotates characters 90 degrees counter-clockwise. The command remains in effect until the printer is reset or until a Clear Printer (0x10), Select or Cancel Upside Down Print (1B 7B) or Cancel Rotated Print (1B 56) command is received.

#### Exceptions

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

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

#### Related Information

See "Summary of Rotated Printing" in this document.

This command is ignored in TM-T88 Emulation.

### Select Pitch (Column Width)

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

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

**Default:**       0 (Standard pitch)

Selects the character pitch for a print line

#### Formulas

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

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

#### Related Information

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

This command and the Select Print Modes command (1B 21 *n*) affect pitch selection.

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

## Set Right-Side Character Spacing

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

**Range of *n*:**   0 – 32

**Default:**       0

Sets the right side character spacing to [*n* × 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 (1D 50 ...) command. Changes in the horizontal or vertical units do not affect the current right side character spacing. When the horizontal or vertical motion unit is changed by the Set Horizontal and Vertical Minimum Motion Units (1D 50 ...) command the value must be in even units and not less than the minimum amount of horizontal movement.

In Standard Mode the horizontal motion unit is used.

In Page Mode the horizontal or vertical motion unit differs and depends on the starting position of the printable area. When the starting printing position is the upper left or lower right of the printable area (set by Select Print Direction in Page Mode, 1B 54 *n*) the horizontal motion unit (*x*) is used. When the starting printing position is the upper right or lower left of the printable area (set by Select Print Direction in Page Mode, 1B 54 *n*) the vertical motion unit (*y*) is used.

### Related Information

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

**Select Print Mode**ASCII           ESC ! *n*Hexadecimal   1B 21 *n*Decimal        27 33 *n***Value of *n*:**   Pitch selection (standard, compressed, double high, or double wide.)

Value of <i>n</i>			
Bit <sup>1</sup>	Function	0	1
Bit 0	Pitch <sup>2</sup> (See chart below)	Standard Pitch	Compressed Pitch
Bit 3	Emphasized Mode	Canceled	Set
Bit 4	Double High	Canceled	Set
Bit 5	Double Wide	Canceled	Set
Bit 7	Underlined Mode	Canceled	Set

<sup>1</sup>Bits 1, 2 and 6 are not used.<sup>2</sup>Standard and compressed pitch cannot be used together in the same line.**Default:**        0 (for bits 0, 3, 4, 5, 7)This command and Select Pitch (Column Width) command (1B 16 *n*) affect Pitch Selection.

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

Selects the Print Mode: standard, compressed, emphasized, underlined, double high, or double wide.

**Exceptions**

Refer to the above table for exceptions.

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

The bits in this command perform the same function as the standalone functions:

1B 16 *n* Select Pich  
 1B 45 *n* Emphasized  
 1B 47 *n* Double Strike  
 12       Double Wide  
 13       Single Wide  
 1B 2D *n* Underline

### Select or Cancel User-Defined Character Set

<b>ASCII</b>	ESC % <i>n</i>
<b>Hexadecimal</b>	1B 25 <i>n</i>
<b>Decimal</b>	27 37 <i>n</i>
<b>Value of <i>n</i>:</b>	0 = Code Page 437 1 = User Defined (RAM) 2 = Code Page 850
<b>Range of <i>n</i>:</b>	0-2
<b>Default:</b>	0 (Code Page 437)

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

#### Exception:

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

#### Related Information

In TM-T88 Emulation, the low order bit of *n* is used to select the User-Defined Character Set and the current active ROM Code Page is not affected.

### Define User-Defined Character Set

<b>ASCII</b>	ESC & <i>s c1 c2 n1 d1 ... nn dn]</i>
<b>Hexadecimal</b>	1B 26 <i>s c1 c2 n1 d1 ... nn dn]</i>
<b>Decimal</b>	27 38 <i>s c1 c2 n1 d1 ... nn dn]</i>

#### 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 ... nn*

*n* = 1-16

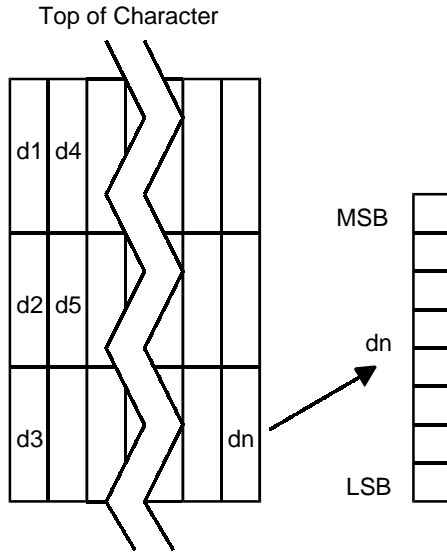
*d* = the column data for the *n*th character as specified by *d1 ... dn*

The number of bytes for a character cell is  $s \times n1$

The bytes are printed down and across each cell

See the illustration on next page.





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

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

#### Related Information

See 1D 22 *n* (Select Memory Type) to save User-Defined Characters

### Select or Cancel Underline Mode

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

**Value of *n*:** 0, 48 = Cancel underline mode  
 1, 49 = Select underline mode  
 2, 50 = Select double thickness underline mode

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

Turns underline mode on or off. Underlines cannot be printed for spaces set by the Horizontal Tab, Set Absolute Start Position, or Set Relative Print Position commands.

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

#### Exceptions

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

#### Related Information

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

### Copy Character Set from ROM to RAM

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

**Default:**       current active ROM Code Page

Copies characters in the active ROM set to RAM. Use this command to re-initialize the User-Defined Character Set. Code Page 437 is copied by default at initialization.

This command is ignored if current font is the user font.

#### Related Information

To modify characters in one of the character set variations, such as Rotated Print, select one of the Rotated Print commands, copy to RAM, then use the Define User-Defined Character Set command (1B 26).

### Cancel User-Defined Character

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

**Value of *n*:**   Specified character code.

**Range of *n*:**   32-255

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

#### Exceptions

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

**Select or Cancel Emphasized Mode**

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

**Value of *n*:**    0 (bit 0) not selected  
                   1 (bit 0) selected  
                   (When 0 and 1 are the Least Significant Bit, LSB)

**Range of *n*:**    0-255

**Default:**        0 (Off)

Starts or stops emphasized printing. The printer is reset to the standard Print Mode after a Clear Printer (0x10) command is received.

**Exceptions**

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

**Related Information**

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

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

**Select or Cancel Double Strike**

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

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

**Default:**        0 (Off)

Turns double strike mode on or off. Identical to Emphasized mode. The printer is reset to the standard Print Mode after a Clear Printer (0x10) command is received.

**Exceptions**

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

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

**Related Information**

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

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

**Select or Cancel Italic Print**

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

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

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

**Default:**       0 (Off)

Turns Italic Print Mode on or off. The printer is reset to the standard Print Mode after a Clear Printer (0x10) command is received.

**Exceptions**

Only the lowest bit of *n* is valid.

**Related Information**

This command is recognized only in A794 Native Mode.

In A973 and TM-T88 Emulations, the parameter byte is put into the buffer.

**Select International Character Set and Select Character Code Table**

**ASCII:**           ESC R *n*           ESC t *n*  
**Hexadecimal:**  1B 52 *n*           1B 74 *n*  
**Decimal:**        27 82 *n*           27 116 *n*

	<b>A794 Native Mode</b>	<b>A793 Emulation</b>	<b>TM-T88 Emulation</b> (1B 52 <i>n</i> only)
<b>Value of <i>n</i>:</b>	0 = Code Page 437	0 = Code Page 437	0 = U.S.A.
	1 = Code Page 850	Not 0 = Code Page 850	1 = France
	2 = Code Page 852		2 = Germany
	3 = Code Page 860		3 = -U.K.
	4 = Code Page 863		4 = Denmark I
	5 = Code Page 865		5 = Sweden
	6 = Code Page 858		6 = Italy
	7 = Code Page 866		7 = Spain
	8 = Code Page 1252		8 = Japan
			9 = Norway
			10 = Denmark II

**Default:**       0 (Code Page 437)

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.

**Related Information**

The TM-T88 Emulation selection applies only to the command "Select International Character Set" (1B 52 *n*). The TM-T88 Emulation generates the same as A794 Native Mode for the command "Select Character Code Table" (1B 74 *n*).

**Select or Cancel 90 Degree Clockwise Rotated Print**

**ASCII**           ESC V *n*

**Hexadecimal**   1B 56 *n*

**Decimal**        27 86 *n*

**Value of *n*:**   0 = Cancel

                  1 = Set

**Default:**       0 (Cancel)

Rotates characters 90 degrees clockwise. The command remains in effect until the printer is reset or until a Clear Printer (0x10) or Rotated Print (1B 12) command is received. See Summary of Rotated Printing in this document.

**Select or Cancel Upside Down Print Mode**

**ASCII**           ESC { *n*

**Hexadecimal**   1B 7B *n*

**Decimal**        27 123 *n*

**Value of *n*:**   0 = Cancel

                  1 = Set

**Default:**       0 (Cancel)

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

**Exceptions**

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

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

**Select Character Size**

**ASCII**           GS ! *n*

**Hexadecimal**   1D 21 *n*

**Decimal**        29 33 *n*

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

                  1-8 = horizontal number of times normal font

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

**Default of *n*:** 11 hexadecimal

Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 6, as follows:

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

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

This command is effective for all characters (except for HRI characters).

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

In Page Mode, vertical and horizontal directions are based on the character orientation. When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.

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

#### Exception

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

#### Related Information

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

**Select Or Cancel White/Black Reverse Print Mode**

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

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

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

**Range of *n*:**   0-255

**Default:**       0 (Off)

Turns on White/Black Reverse Print Mode. In White/Black Reverse Print Mode, print dots and non-print dots are reversed, which means that white characters are printed on a black background. When the White/Black Reverse Print Mode is selected it is also applied to character spacing which is set by Right-Side Character Spacing (1B 20).

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

White/Black Reverse Print Mode does not affect bit image, downloaded bit image, bar code, HRI characters, and spacing skipped by Horizontal Tab (09), Set Absolute Starting Position (1B 24 ...), and Set Relative Print Position (1B 5C).

White/Black Reverse Print Mode has a higher priority than Underline Mode. When Underline Mode is on and White/Black Reverse Print Mode is selected, Underline Mode is disabled, but not canceled.

**Exceptions**

Only the lowest bit of *n* is valid.

**Related Information**

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

**Select or Cancel Smoothing Mode**

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

This command is ignored.

## Select Superscript or Subscript Modes

<b>ASCII</b>	AX ENQ <i>n</i>
<b>Hexadecimal</b>	1F 05 <i>n</i>
<b>Decimal</b>	31 05 <i>n</i>
<b>Value of <i>n</i>:</b>	0 = Normal character size 1 = Select subscript size 2 = Select superscript size
<b>Default:</b>	0 (normal size)

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

### Exceptions

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

### Related Information

In A7193 Emulation, this command is unrecognized and the parameter byte is put into the print buffer.

## Summary of Rotated Printing

The table shows the combinations of Set/Cancel Upside Down Print, Set/Cancel Rotated Print (clockwise), and Rotated Print (counterclockwise).

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

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

Upside Down (1B 7B <i>n</i> )	Rotated CW (1B 56 <i>n</i> )	Rotated CCW (1B 12)	Resulting Output
Canceled	Canceled	Cleared	A B C
Canceled	Set	X	⌵ B ⌵
Set	Canceled	X	⌶ B ⌶
Set	Set	X	⌶ B ⌵
X	X	Set	⌵ B ⌶

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

- ◆ Standard and compressed pitch
- ◆ Vertical (normal) and rotated
- ◆ Right-side up and upside down
- ◆ Single high (normal) and double high



## Graphics Commands

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

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

### Print Raster Graphics

**ASCII**           DC1 *n1 ...nl*

**Hexadecimal** 11 *n1 ...n72*

**Decimal**       17 *n1 ...nl*

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

**Range:**        0-255

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

### Exceptions

Raster graphics is not available in Page Mode.

### Related Information

This command is recognized only in A794 Native Mode.

In A793 and TM-T88 Emulations, the data bytes are put into the print buffer.

## Download BMP Logo

**ASCII:** ESC (\*.BMP file)  
**Hexadecimal:** 1B (\*.BMP file)  
**Decimal:** 27 (\*.BMP file)

**Value:** Maximum width = 576  
Maximum height = 512

Enters a downloaded BMP logo into RAM or Flash.

The downloaded BMP logo can be printed by using the Print Downloaded Bit Image (1D 2F *m*) command.

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

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

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

### Exceptions

BMP file images that are not monochrome are ignored.

### Related Information

Microsoft BMP bitmap file format.

This command is recognized only in A794 Native Mode.

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

**Select Bit Image Mode**

**ASCII**            ESC \* *m 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

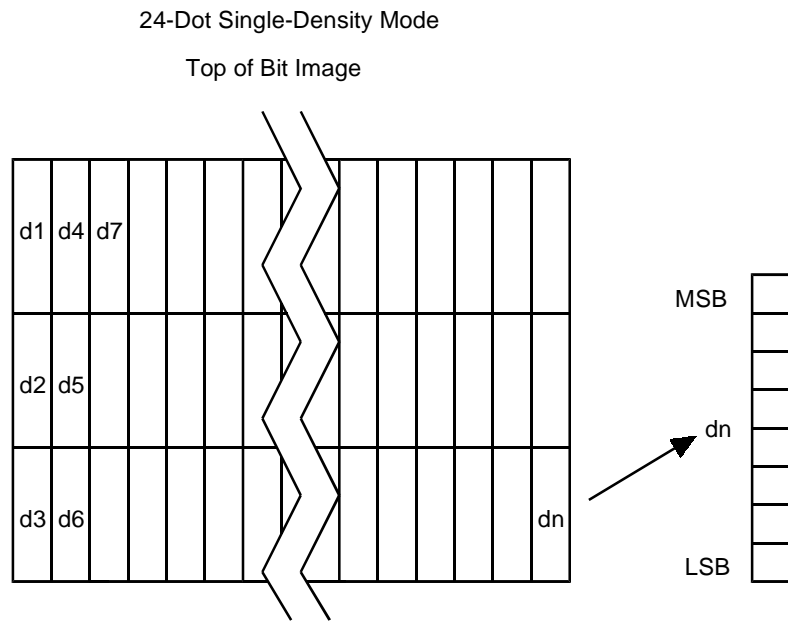
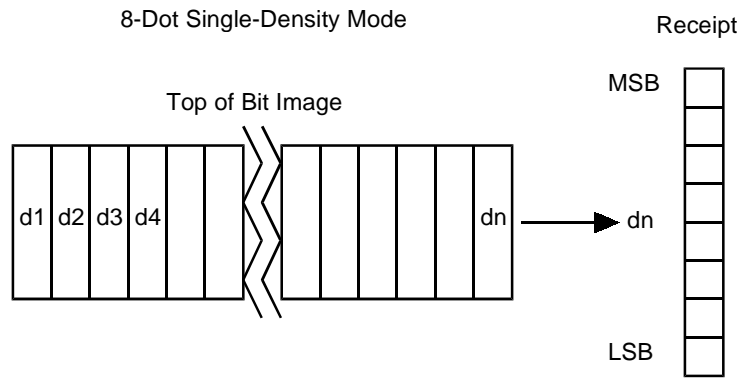
**Value of *n*:**

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)

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

See the illustration for graphic representations of the bit image on the next page.

**Related Information**



### Print Advanced Raster Graphics

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

**Value of *m*:** horizontal offset from left margin =  $8 \times m$  dots

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

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

*d1 ... dn*: **data bytes**

**Range:**  $0 \leq m \leq 72$   
 $0 \leq n \leq 72$   
 $0 \leq r \leq 65535$   
 $0 \leq d1 \dots dn \leq 255$

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

#### Exceptions

Advanced Raster graphics is not available in Page Mode

### Select Single-Density Graphics

**ASCII** ESC K *n1 n2 d1 ... dn*  
**Hexadecimal** 1B 4B *n1 n2 d1 ... dn*  
**Decimal** 27 75 *n1 n2 d1 ... dn*

**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)

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.

#### Formulas

See the above table.

#### Related Information

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

**Select Double-Density Graphics**

**ASCII**           ESC Y  $n1\ n2\ d1\ \dots\ dn$   
**Hexadecimal**   1B 59  $n1\ n2\ d1\ \dots\ dn$   
**Decimal**         27 89  $n1\ n2\ d1\ \dots\ dn$

**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)

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.

**Formulas**

See the above table.

**Related Information**

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

### Select the Current Logo

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

**Range of *n*:**   0 – 255

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.

#### Related Information

This command is recognized only in A794 Native Mode.

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

### Define Downloaded Bit Image

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

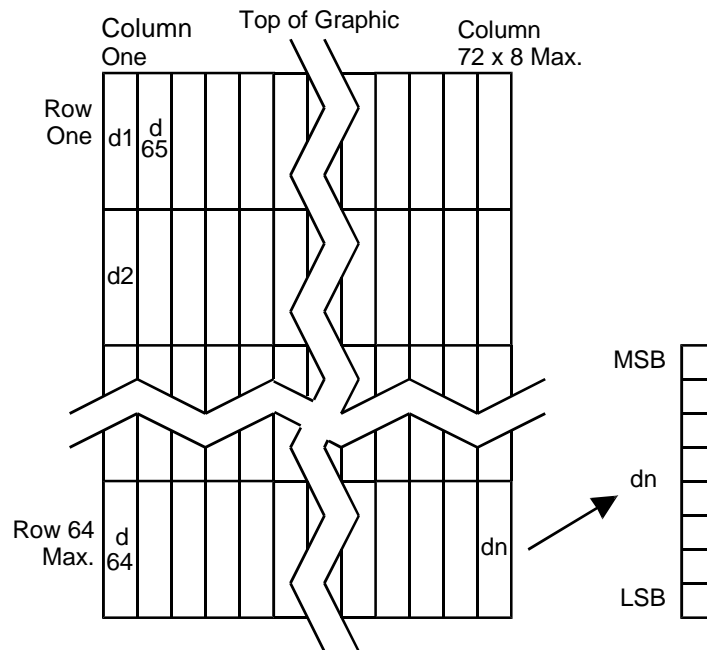
Value of n:

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

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

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

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





**Print Downloaded Bit Image**

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

**Value and Range of *m*:**

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

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, or if the data defined exceeds one line.

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

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

**ASCII**           AX EOT *n*  
**Hexadecimal**   1F 04 *n*  
**Decimal**        31 04 *n*

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

(When 0 and 1 are the LSB)

**Default:**     0 (Off)

Selects or cancels 6 dot/mm Emulation Mode.

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

## Status Commands

### Status Command Introduction

The A794 has three methods of providing status to the application. These methods are through Batch Status Commands, Real Time Status Commands, and Auto Status Back. An application may use one or more of these methods to understand the current status of the printer. A brief description of each of these methods follows.

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

**Real-Time Commands** – These commands are sent to the printer and are NOT stored in the printer's buffer. Instead, they are acted on immediately (regardless of the printer's BUSY status) and their response (if any) is returned to the application. This gives the application the ability to query the printer when it is in a busy state in order to correct whatever fault has occurred.

**Auto Status Back** – This mechanism allows the application developer to program the printer to automatically respond with a four byte status when certain conditions in the printer change.

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

### Batch Mode

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

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

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

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

**Value of returned byte:**

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

Bits 2-7 are not used.

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

**Exceptions**

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A794 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

**Related Information**

In TM-T88 Emulation, this command is ignored.

**Request Alternate Status (A793 Emulation Only)**

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

**Value and Range of n:**

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

<sup>1</sup>PAPER EXHAUST LINE is valid to indicate previously requested status.

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

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

**Transmit Paper Sensor Status**

**ASCII**           ESC v  
**Hexadecimal**   1B 76  
**Decimal**         27 118

**Values:**

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

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

**Related Information**

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

In TM-T88 Emulation, this command is ignored.

**Transmit Printer ID**

<b>ASCII</b>	GS I <i>n</i>
<b>Hexadecimal</b>	1D 49 <i>n</i>
<b>Decimal</b>	29 73 <i>n</i>
<b>Value of <i>n</i>:</b>	1, 49 = Printer model ID
	2, 50 = Type ID
	3, 51 = ROM version ID
	4, 52 = Logo Definition

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

<b>n</b>	<b>Printer ID</b>	<b>Specification</b>	<b>ID (Hexadecimal)</b>
1, 49	Printer model ID	Axiohm A794	0x24
2, 50	Type ID	Installed options	Refer to next table
3, 51	ROM version ID	ROM version	0x00
4, 52	Logo Definition	Logo Definition	Refer to table below

*n* = 2 or 50: Type ID

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

*n* = 4 or 52: Logo Definition

<b>Bit</b>	<b>Off/On</b>	<b>Hex</b>	<b>Decimal</b>	<b>Function</b>
0	Off	00	0	No logo downloaded(SRAM or Flash)
	On	01	1	Logo downloaded(SRAM or Flash)
1-7	Off	00	0	Not used. Fixed to Off.

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

When Auto Status Back (ASB) is enabled using the Enable/Disable Automatic Status Back command (1D 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).

**Transmit Printer ID, Remote Diagnostics Extension**

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

**Values of *n*:**   Refer to table

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

Value of <i>n</i>	Remote Diagnostic Item		Function
	ASCII	Hex    Dec	
Space	20	32	Serial #, 10 digit ASCII  Write to NVRAM Example, send 14 bytes to printer: GS I @ 0x20 1234567890
!	21	33	Serial #  Write to NVRAM, and print on receipt to verify Example, send 14 bytes to printer: GS I @ ! 1234567890 This will print on receipt: Serial # written: 1234567890
#	23	35	Serial #  Return Serial #, preceded by <i>n</i> to identify Printer returns 12 bytes in above example: #1234567890<CR>
\$	24	36	Class/model #, 15 digit ASCII  Write to NVRAM
%	25	37	Class/model #  Write to NVRAM, and print on receipt to verify
'	27	39	Class/model #  Return Class/model #, returns 17 bytes
+	2B	43	Boot firmware part #, 12 digit ASCII  Return Boot firmware part #, returns 14 bytes
/	2F	47	Boot firmware CRC, 4 digit ASCII  Return Boot firmware CRC, returns 6 bytes
3	33	51	Flash firmware part #, 12 digit ASCII  Return Flash firmware part #, returns 14 bytes
7	37	55	Flash firmware CRC, 4 digit ASCII  Return Flash firmware CRC, returns 6 bytes
Ç	80	128	Receipt lines tally, 8 digit ASCII numeric, max 99,999,999  Write to NVRAM Example, send 12 bytes to printer: GS I @ Ç00010000 To set receipt lines tally to 10,000
ü	81	129	Receipt lines tally  Write to NVRAM, and print on receipt to verify Example, send 12 bytes to printer: GS I @ ü00010000 This will print on receipt: Receipt tally written: 10,000
é	82	130	Receipt lines tally  Clear receipt lines tally to 0

Value of <i>n</i> ASCII	Remote Diagnostic Item		Function
	Hex	Dec	
â	83	131	Receipt lines tally Return receipt lines tally, preceded by <i>n</i> to identify Printer returns 10 bytes in above example: â00010000<CR>
ä	84	132	Knife cut tally, 8 digit ASCII numeric, max 99,999,999 Write to NVRAM
à	85	133	Knife cut tally Write to NVRAM, and print on receipt to verify
å	86	134	Knife cut tally Clear knife cut tally to 0
ç	87	135	Knife cut tally Return knife cut tally, returns 10 bytes
É	90	144	Hours on tally, 8 digit ASCII numeric, max 99,999,999 Write to NVRAM
æ	91	145	Hours on tally Write to NVRAM, and print on receipt to verify
Æ	92	146	Hours on tally Clear Hours on tally to 0
ô	93	147	Hours on tally Return Hours on tally, returns 10 bytes
ù	97	151	Boot firmware version Return Boot firmware version, returns 6 bytes
ú	A3	163	Flash firmware version Return Flash firmware version, returns 6 bytes
ñ	A4	164	Flash cycles tally, 8 digit ASCII numeric, max 99,999,999 Write to NVRAM
Ñ	A5	165	Flash cycles tally Write to NVRAM, and print on receipt to verify
ä	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
ı	A8	168	Knife jams tally, 8 digit ASCII numeric, max 99,999,999 Write to NVRAM
□	A9	169	Knife jams tally Write to NVRAM, and print on receipt to verify
□	AA	170	Knife jams tally Clear Knife jams tally to 0
½	AB	171	Knife jams tally Return Knife jams tally, returns 10 bytes
¼	AC	172	Cover openings tally, 8 digit ASCII numeric, max 99,999,999 Write to NVRAM
i	AD	173	Cover openings tally Write to NVRAM, and print on receipt to verify
«	AE	174	Cover openings tally Clear Cover openings tally to 0
»	AF	175	Cover openings tally Return Cover openings tally, returns 10 bytes
□	B2	178	Max Temperature tally Reset Max Temperature Reached value
	B3	179	Max Temperature tally Return Max Temperature Reached since it was reset, returns 10 bytes

Performs the remote diagnostic function specified by *n*.

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

The table that follows describes the variables.

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

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

### Transmit Status

<b>ASCII</b>	GS r <i>n</i>
<b>Hexadecimal</b>	1D 72 <i>n</i>
<b>Decimal</b>	29 114 <i>n</i>

**Value of *n*:**

- 1, 49 = printer status
- 2, 50 = cash drawer status
- 4, 52 = Flash Memory User Sector status

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

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

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

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. This is found in the Real Time Commands section in this document.

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

### Exceptions

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A794 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.



<b>Printer Status (<math>n = 1</math> or <math>n = 49</math>)</b>				
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.

<b>Cash Drawer Status (<math>n = 2</math> or <math>n = 50</math>)</b>				
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.

<b>Flash Memory User Sector Status (<math>n = 4</math> or <math>n = 52</math>)</b>				
Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	-	-	-	Undefined. Fixed to off.
1	-	-	-	Undefined. Fixed to off.
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 thermal user-defined characters written to Flash.
	On	20	32	Thermal User-defined characters written to Flash.
6	Off	00	0	Not used. Fixed to off.
7	-	-	-	Undefined.

### Exceptions

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

**Send Printer Software Version**

<b>ASCII</b>	AX V
<b>Hexadecimal</b>	1F 56
<b>Decimal</b>	31 86

The printer returns 8 bytes containing the boot and Flash software version. The first 4 bytes returned are an ASCII string for the boot version. The second 4 bytes are an ASCII string for the Flash version. Example: For 1.234.56 (8 bytes), the boot version is 1.23 and the Flash version is 4.56.

## Real Time Commands

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

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

The Batch Mode Printer Status commands are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they were received. If the paper exhausts while printing data that was in the buffer ahead of the status command, the printer goes busy at the RS-232C interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, thermal printhead overheat, etc. In addition, there is no way to restart the printer after a paper jam or other error, when using Batch Mode Status commands.

The Real Time commands are implemented in two ways in order to overcome the limitations of Batch Mode Status commands. Both implementations offer the same functionality; which one you choose depends on the current usage of your application.

### Preferred Implementation

For a new application the GS (1D) sequences are recommended to avoid possible misinterpretation of a DLE (0x10) sequence as a Clear Printer (0x10 0, ASCII DLE NUL) command.

An application using these GS (1D) sequences, does not need to distinguish for the printer between the new real time commands and the Clear Printer command. This implementation is ideal for an existing A756 application that already uses the Clear Printer command or for a new application being developed.

### Alternate Implementation

The alternate implementation uses the DLE (0x10) sequences as implemented on other printers. An application using these DLE (0x10) sequences and the original A756 Clear Printer command (0x10) must distinguish for the printer between the new real time commands and the Clear Printer command by adding a NUL (0x00) to the Clear Printer command.

An application using these DLE (0x10) sequences must also send the second byte of the sequence within 100 milliseconds of the first, to prevent the first byte being mistaken for a Clear Printer command.

### Rules for Using Real Time Commands

Three situations must be understood when using real time commands.

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

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

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

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

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

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

### Moving Data through the Buffer

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

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

When the printer is busy due to an error condition, then data stops being processed 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 (0x10) sequences are being used, the last byte stored when the buffer fills up could be the DLE (0x10) code, with no room for the subsequent EOT or ENQ. When this lone DLE (0x10) byte is finally processed out of the buffer it will be interpreted as a Clear Printer command.

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

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

### Busy Line and Fault Conditions

If the printer is in error condition (cover is open, paper is exhausted...), the printer will still accept data, respond to the batch mode status commands (1B 76 and 1B 75 0), handle the cash drawer commands, and not go busy until it actually tries to execute a print command. Then it will stay busy and stop processing data out of the receive buffer until the condition clears. It will respond to the Real Time commands as described below.

### Real Time Status Transmission

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

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

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

Transmits the selected one byte printer status specified by *n* in Real Time according to the following parameters. This command includes two sequences: GS (1D) and DLE (0x10).

### Exceptions

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

An application using DLE (0x10) sequence must send EOT within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a Clear Printer command. Avoid this possibility by using the ID 04 *n* sequence, which is handled exactly the same as 10 04 *n*.

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A794 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

### Related Information

#### 1 = Transmit Printer Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off.
1	On	02	2	Fixed to On.
2	Off	00	0	One or both cash drawers open.
	On	04	4	Both cash drawers closed.
3	Off	00	0	Not busy at the RS-232C interface.
	On	08	8	Printer is Busy at the RS-232C interface.
4	On	10	16	Fixed to On.
5				Undefined.
6				Undefined.
7	Off	00	0	Fixed to Off.

## 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 Request to Printer**

	<u>GS Sequence</u>	<u>DLE Sequence</u>
<b>ASCII</b>	GS ETX <i>n</i>	DLE ENQ <i>n</i>
<b>Hexadecimal</b>	1D 03 <i>n</i>	10 05 <i>n</i>
<b>Decimal</b>	29 3 <i>n</i>	16 5 <i>n</i>
<b>Value of <i>n</i>:</b>	1 = recover and restart 2 = recover and clear buffers	

The printer responds to a request from the host specified by *n*. This command includes two sequences: GS and DLE. The operations performed depend on the value of *n*, according to the following parameters.

***n* = 1**

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

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

***n* = 2**

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

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

**Exceptions**

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

An application using DLE (0x10) sequence must send ENQ within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a Clear Printer command. Avoid this possibility by using the ID 03 *n* sequence, that is handled exactly the same as 10 05 *n*.



**Real Time Printer Status Transmission**

**ASCII**           GS ENQ  
**Hexadecimal**   1D 05  
**Decimal**         29 5

Transmits one byte status of the printer in real time.

**Value of Byte:**

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

**Exceptions**

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A794 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

## Auto Status Back

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

**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

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

**Default:** 0 (ASB disabled)

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

### Exceptions

If  $n = 0$ , ASB is disabled.

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A794 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

### Related Information

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.

In TM-T88 Emulation, when the Handshaking Mode communication parameter is set to "RX Buffer Full", the power on ASB default is 02 (Busy Status enabled.) "RX Buffer Full" is the default Handshaking Mode in TM-T88 Emulation.

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)

<b>Second Byte (Error information)</b>				
<b>Bit</b>	<b>Off/On</b>	<b>Hex</b>	<b>Decimal</b>	<b>Status for ASB</b>
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  On	00  40	0  64	No recoverable error.  Recoverable Error : Cover open, paper out, temperature or voltage error is out of range.
7	Off	00	0	Not used. Fixed to off.
<b>Third Byte (Paper Sensor Information)</b>				
<b>Bit</b>	<b>Off/On</b>	<b>Hex</b>	<b>Decimal</b>	<b>Status for ASB</b>
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.
<b>Fourth Byte (Paper Sensor Information)</b>				
<b>Bit</b>	<b>Off/On</b>	<b>Hex</b>	<b>Decimal</b>	<b>Status for ASB</b>
0	-	-	-	Undefined
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

**Recognizing Data from the Printer**

An application sending various Real Time and non-Real Time commands to which the printer responds can determine which command a response belongs to by the table below.

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

<b>Batch Mode Response</b>	<b>Response Recognized By:</b>								
1B 75 0	0	0	0	0	0	0	x	x	Binary
1B 76	0	0	0	0	0	x	x	x	Binary
1D 49 <i>n</i>	0	x	x	0	x	x	x	x	Binary
1D 72 <i>n</i>	0	x	x	0	x	x	x	x	Binary

<b>Real Time Response</b>	<b>Response Recognized By:</b>								
1D 04 <i>n</i>	0	x	x	1	x	x	1	0	Binary
10 04 <i>n</i>	0	x	x	1	x	x	1	0	Binary
1D 05	1	x	x	x	x	x	x	x	Binary
XON	0	0	0	1	0	0	0	1	Binary
XOFF	0	0	0	1	0	0	1	1	Binary

<b>Auto Status Back (ASB)</b>	<b>Response Recognized By:</b>								
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

## Bar Code Commands

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

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

### Select Printing Position of HRI Characters

**ASCII** GS H *n*

**Hexadecimal** 1D 48 *n*

**Decimal** 29 72 *n*

**Value of *n*:** Printing position

0 = Not printed

1 = Above the bar code

2 = Below the bar code

3 = Both above and below the bar code

**Default:** 0 (Not printed)

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

### Select Pitch of HRI Characters

**ASCII** GS f *n*

**Hexadecimal** 1D 66 *n*

**Decimal** 29 102 *n*

**Value of *n*:** 0 = Standard Pitch at 15 CPI

1 = Compressed Pitch at 20 CPI

**Default:** 0 (Standard Pitch at 15 CPI)

Selects standard and compressed font for printing Bar Code characters.

### Select Bar Code Height

**ASCII** GS h *n*

**Hexadecimal** 1D 68 *n*

**Decimal** 29 104 *n*

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

**Range of *n*:** 1-255

**Default:** 216

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

## Print Bar Code

	<u>First Variation</u>	<u>Second Variation</u>
<b>ASCII</b>	GS k m d1...dk NUL	GS k m n d1...dn
<b>Hexadecimal</b>	1D 6B m d1...dk 00	1D 6B m n d1...dn
<b>Decimal</b>	29 107 m d1 dk 0	29 107 m n d1...dn

(0 = End of command)

Selects the bar code type and prints a bar code for the ASCII characters entered. If the width of the bar code exceeds one line, the bar code is not printed.

There are two variations to this command. The first variation uses a NUL character to terminate the string; the second uses a length byte at the beginning of the string to compensate for the Code 128 bar code, which can accept a NUL character as part of the data. With the second variation the length of byte is specified at the beginning of the string.

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

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

Rotated barcodes set with small modules (select bar code width command 1D 77 n , with n=1 or 2) and PDF 417 barcodes in any orientation are printed at low speed, for better readability.

### Exceptions

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

Illegal data cancels the command.

### Values:

First Variation: String terminated with NUL Character

<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>d1 = dk = 42</i> (start/stop code is supplied by printer if necessary)	Variable Length
5	Interleaved 2 of 5	48- 57	Variable Length (Even Number)
6	Codabar	65- 68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable Length
10	PDF 417	32-255	Variable Length

## Print Bar Code (continued)

## Second Variation Length of Byte Specified at Beginning of String

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

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

$m$	Bar Code	$d$	$n$ , 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) $d1 = dk = 42$ (start/stop code is supplied by printer if necessary)	Variable
70	Interleaved 2 of 5 (ITF)	48- 57	Variable (Even Number)
71	CODABAR (NW-7)	65- 68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable
72	Code 93	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) $d1 = dn = 42$ (start/stop code is supplied by printer if necessary)	Variable
73	Code 128*	0-105 $d1 = 103-105$ (must be a Start code) $d2 = 0-102$ (data bytes) (Stop code is provided by the printer)	Variable
75	PDF 417	0-255	Variable Length

**Exceptions:** Code 93 and PDF 417 are only available in A794 Native Mode.

**Select Bar Code Width**

**ASCII** GS w  $n$

**Hexadecimal** 1D 77  $n$

**Decimal** 29 119  $n$

**Value of  $n$ :** 2, 3, 4, 5, 6

**Default:**  $n=3$

Sets the bar code width to  $n$  dots.

**Formulas**

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



## Page Mode 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.

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

### Print and Return to Standard Mode

<b>ASCII</b>	FF
<b>Hexadecimal</b>	0C
<b>Decimal</b>	12

When printing is completed, values for Select Print Direction in Page Mode (1B 54*n*) and Set Print Area in Page Mode (1B 57 *n1, n2, ...n8*) and the position for buffering character data are set. Buffered data is not deleted from the printer.

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

#### Exceptions

This command is enabled only in Page Mode.

### Cancel Print Data in Page Mode

<b>ASCII</b>	CAN
<b>Hexadecimal</b>	18
<b>Decimal</b>	24

Deletes all the data to be printed in the "page" area. Any data from the previously selected "page" area that is also part of the current data to be printed is deleted.

#### Exceptions

This command is only used in Page Mode.

**Print Data in Page Mode**

<b>ASCII</b>	ESC FF
<b>Hexadecimal</b>	1B 0C
<b>Decimal</b>	27 12

Collectively prints all buffered data in the printing area.

After printing, the printer does not clear the buffered data and sets values for Select Print Direction in Page Mode (1B 54 *n*) and Set Print Area in Page Mode (1B 57 ...), and sets the position for buffering character data.

**Exceptions**

This command is enabled only in Page Mode.

**Select Page Mode**

<b>ASCII</b>	ESC L
<b>Hexadecimal</b>	1B 4C
<b>Decimal</b>	27 76

Switches from Standard Mode to Page Mode. After printing has been completed either by the Print and Return to Standard Mode (FF) command or Select Standard Mode (1B 53) the printer returns to Standard Mode. The developed data is deleted after being printed. For more information see Page Mode in this document

This command sets the position where data is buffered to the position specified by Select Print Direction in Page Mode (1B 54) within the printing area defined by Set Print Area in Page Mode (1B 57).

This command switches the settings for the following commands (which values can be set independently in Standard Mode and Page Mode) to those for Page Mode.

- ◆ Set Right-Side Character Spacing (1B 20)
- ◆ Select 1/6-Inch Line Spacing (1B 32)
- ◆ Set Line Spacing (1B 33)

It is possible only to set values for the following commands in Page Mode. These commands are not executed.

- ◆ Select or Cancel 90 Degree Clockwise Rotation (1B 56)
- ◆ Set Counter Clockwise Rotation (1B 12)
- ◆ Select Justification (1B 61)
- ◆ Select or Cancel Upside-Down Printing (1B 7B)
- ◆ Set Left Margin (1D 4C)
- ◆ Set Print Area Width (1D 57)

**Exceptions**

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

The command has no effect if Page Mode has previously been selected.

### Select Standard Mode

ASCII	ESC S
Hexadecimal	1B 53
Decimal	27 83

Switches from Page Mode to Standard Mode. In switching from Page Mode to Standard Mode, data buffered in Page Mode are cleared, the printing area set by Set Print Area in Page Mode (1B 57) is initialized and the print position is set to the beginning of the line.

This command switches the settings for the following commands (the values for these commands can be set independently in Standard Mode and Page Mode) to those for Standard Mode:

- ◆ Set Right-Side Character Spacing (1B 20)
- ◆ Select 1/6 Inch Line Spacing (1B 32)
- ◆ Set Line Spacing (1B 33)

Standard Mode is automatically selected when power is turned on, the printer is reset, or the Initialize Printer command (1B 40) is used.

#### Exceptions

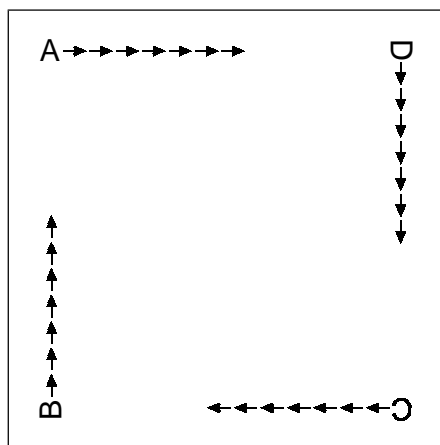
This command is effective only in Page Mode.

### Select Print Direction in Page Mode

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

Value of *n*: Start position

- 0 = Upper left corner proceeding across page to the right (A)
- 1 = Lower left corner proceeding up the page (B)
- 2 = Lower right corner proceeding across page to the left (upside down) (C)
- 3 = Upper right corner proceeding down page (D)



Default: 0

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

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed using the Print Page Mode commands (0C or 1B 0C).

### Exceptions

The command is valid only in Page Mode.

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

### Set Print Area in Page Mode

**ASCII**           ESC W  $n1, n2 \dots n8$

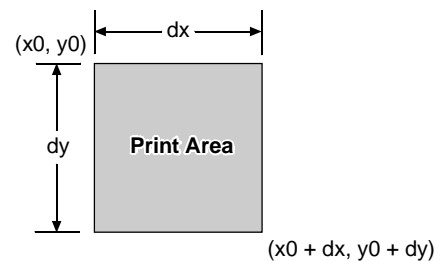
**Hexadecimal** 1B 57  $n1, n2 \dots n8$

**Decimal**       27 87  $n1, n2 \dots n8$

**Range of  $n$ :** 0-255

**Default:**

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



Sets the position and size of the printing area in Page Mode.

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed using the Print Page Mode commands (0C or 1B 0C).

### Formulas

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

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

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.

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).

### Exceptions

The command is effective only in Page Mode.

### Set Absolute Vertical Print Position in Page Mode

<b>ASCII</b>	GS \$ <i>nL nH</i>
<b>Hexadecimal</b>	1D 24 <i>nL nH</i>
<b>Decimal</b>	29 36 <i>nL nH</i>

Sets the absolute vertical print starting position for buffer character data in Page Mode. The absolute print position is set to  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$  inches.

The vertical or horizontal motion unit for the paper roll is used and the horizontal starting buffer position does not move.

The reference starting position is set by Select Print Direction in Page Mode (1B 54). This sets the absolute position in the vertical direction when the starting position is set to the upper left or lower right; and sets the absolute position in the horizontal when the starting position is set to the upper right or lower left. The horizontal and vertical motion unit are specified by the Set Horizontal and Vertical Minimum Motion Units (1D 50) command.

The Set Horizontal and Vertical Minimum Motion Units (1D 50) command can be used to change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

#### Formulas

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

#### Exceptions

This command is effective only in Page Mode.

If the  $[(nL + nH \times 256) \times (\text{vertical or horizontal motion unit})]$  exceeds the specified printing area, this command is ignored.

## Set Relative Vertical Print Position in Page Mode

**ASCII**            `GS \ nL nH`  
**Hexadecimal**    `1D 5C nL nH`  
**Decimal**           `29 92 nL nH`

### Value:

The value for the horizontal and vertical movement cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.

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

This command functions as follows, depending on the print starting position set by Select Print Direction in Page Mode (1B 54):

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.

### 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

<b>ASCII</b>	GS :
<b>Hexadecimal</b>	1D 3A
<b>Decimal</b>	29 58

Starts or ends macro definition. Macro definition begins when this command is received during normal operation and ends when this command is received during macro definition. The macro definition is cleared, during definition of the macro when the Execute Macro (1D 5E) command is received.

Normal printing occurs while the macro is defined. When the power is turned on the macro is not defined.

The defined contents of the macro are not cleared by the Initialize Printer (1B 40), thus, the Initialize Printer (1B 40) command may be used as part of the macro definition.

If the printer receives a second Select or Cancel Macro Definition (1D 3A) command immediately after previously receiving a Select or Cancel Macro Definition (1D 3A) the printer remains in the macro undefined state.

### Formulas

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

### Exceptions

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

**Execute Macro**

**ASCII**             $GS \wedge r t m$   
**Hexadecimal**    $1D 5E r t m$   
**Decimal**          $29 94 r t m$

**Value of  $r$ :**     The number of times to execute the macro.

**Value of  $t$ :**     The waiting time for executing the macro.

Executes a macro. After waiting for a specified period the printer waits for the Paper Feed Button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats this operation the number of specified times.

When the macro is executed by pressing the Paper Feed Button ( $m = 1$ ), paper cannot be fed by using the Paper Feed Button.

**Formulas**

The waiting time is  $t \times 100$  ms for every macro execution.

$m$  specifies macro executing mode when the LSB (Least significant bit)  $m = 0$

The macro executes  $r$  times continuously at the interval specified by  $t$  when the LSB (Least significant bit) of  $m = 1$ .

**Exceptions**

If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.

If the macro is not defined or if  $r$  is 0, nothing is executed.



## User Data Storage Commands

### Write to User Data Storage

ASCII	ESC ' <i>m a0 a1 a2 d1 ... dm</i>
Hexadecimal	1B 27 <i>m a0 a1 a2 d1 ... dm</i>
Decimal	27 39 <i>m a0 a1 a2 d1 ... dm</i>
Value of <i>m</i> :	0 – 255

Writes *m* bytes of data to the User Data Storage Flash Page at the address specified. The printer waits for *m* bytes of data following the 3-byte address, *addr*.

If any of the memory locations addressed by this command are not currently erased, the command is not executed.

### Read from User Data Storage

ASCII	ESC 4 <i>m a0 a1 a2</i>
Hexadecimal	1B 34 <i>m a0 a1 a2</i>
Decimal	27 52 <i>m a0 a1 a2</i>
Value of <i>m</i> :	0 – 255

Reads *m* bytes of data from the User Data Storage Flash Page at the address specified.

### Read from Non-Volatile Memory

ASCII	ESC j <i>k</i>
Hexadecimal	1B 6A <i>k</i>
Decimal	27 106 <i>k</i>
Range of <i>k</i> :	20 – 63 (decimal)

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

#### Related Information:

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

### Write to Non-Volatile Memory (NVRAM)

ASCII	ESC s <i>n1 n2 k</i>
Hexadecimal	1B 73 <i>n1 n2 k</i>
Decimal	27 115 <i>n1 n2 k</i>

Value of *n1*: 1<sup>st</sup> Byte

Value of *n2*: 2<sup>nd</sup> Byte

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

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

#### Related Information:

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

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

**ASCII**           GS " *n*  
**Hexadecimal**   1D 22 *n*  
**Decimal**         29 34 *n*

**Value of *n*:**    48 - 51

*n* = 48 (ASCII *n* = 0)

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

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

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

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

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

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

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

Specifies whether to load the logos or user-defined characters to Flash Memory or to RAM (volatile memory). The selection remains in effect until it is changed via this command or until the power cycles.

#### Related Information:

This command is recognized in A794 Native Mode. In A793 and TM-T88 Emulations, parameter bytes go into the print buffer.

### Flash Memory User Sectors Allocation

**ASCII**           GS " U *n1 n*  
**Hexadecimal**   1D 22 55 *n1 n2*  
**Decimal**         29 34 85 *n1 n2*

**Default Value of *n1*:**   1 (see below)

**Default Value of *n2*:**   1 (see below)

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

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

$n1 + n2 \leq 2$  (512K)

$n1 + n2 \leq 10$  (1M)

$n1 + n2 \leq 18$  (2M)

If  $n1 + n2$  is greater than the maximum number of sectors available, the command is ignored.

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

### Erase User Flash Sector

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

**Value of *n*:**       49 - 50

$n = 49$  (ASCII  $n = 1$ )

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

$n = 50$  (ASCII  $n = 2$ )

This command erases all sectors available for user data storage.

Erases a page of Flash Memory and sends a carriage return when the operation is complete.

### Related Information

See command "Flash Memory User Sectors Allocation" (1D 22 55 *n1 n2*).

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

## Flash Download Commands

These commands are used to load firmware into the printer.

The commands are listed in numerical order according to their hexadecimal codes. Each command is described and the hexadecimal, decimal, and ASCII codes are listed.

There are three ways to enter the Download Mode.

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

Communicates to the printer information downloaded from applications. Data is downloaded to Flash memory to query the state of the firmware, calculate the firmware CRC and other functions.

### Switch to Flash Download Mode

<b>ASCII</b>	ESC [ }
<b>Hexadecimal</b>	1B 5B 7D
<b>Decimal</b>	27 91 125

Puts the printer in Flash Download Mode in preparation to receive commands controlling the downloading of objects into Flash Memory. When this command is received, the printer leaves normal operation and can no longer print transactions until the Reboot the Printer command (1D FF) is received or the printer is rebooted.

This command does not affect the current communication parameters. Once the printer is in Flash Download Mode, this command is no longer available.

### Related Information

See Entering Flash Download Mode elsewhere in this book to put the printer in Flash Download Mode using the Configuration Menu.

**Return Boot Sector Firmware Part Number**

**ASCII**           GS NULL  
**Hexadecimal**   1D 00  
**Decimal**         29 0

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

**Exceptions**

Available only in Download Mode.

**Return Segment Number Status of Flash Memory**

**ASCII**           GS SOH  
**Hexadecimal**   1D 01  
**Decimal**         29 1

Returns the size of the Flash used. There may be 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.

**Exceptions**

Available only in Download Mode.

**Select Flash Memory Sector to Download**

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

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

**Range of *n*:**    0

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

**Exceptions**

Available only in Download Mode.

**Get Firmware CRC**

**ASCII**           GS ACK  
**Hexadecimal**   1D 06  
**Decimal**         29 6

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

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

**Return Microprocessor CRC**

**ASCII**           GS BEL  
**Hexadecimal**   1D 07  
**Decimal**         29 7

Returns the CRC calculated over the boot sector code space.

**Formulas**

ACK <low byte> <high byte>

**Erase All Flash Contents Except Boot Sector**

**ASCII**           GS SO  
**Hexadecimal**   1D 0E  
**Decimal**         29 14

Causes the entire Flash Memory to be erased.

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

**Exceptions**

Available only in Download Mode.

**Return Main Program Flash CRC**

**ASCII**           GS SI  
**Hexadecimal**   1D 0F  
**Decimal**         29 15

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

**Erase Selected Flash Sector**

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

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

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

**Exceptions**

Available only in Download Mode.

### Download to Active Flash Sector

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

**Value of *aL*:** low byte of the address

**Value of *aH*:** high byte of the address

**Value of *cL*:** low byte of the count

**Value of *cH*:** high byte of the count

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

Value of <i>n</i> (for number of data bytes)	Range of Address ( <i>aL aH</i> )	Range of Count ( <i>cL cH</i> )
$((cH * 256) + cL)$	0000-FFFF (hexadecimal)	0001-FFFF (hexadecimal)

**Range:** Addresses run from 0 to 64K.

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

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

#### Related Information

Available only in Download Mode.

### Reset Firmware

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

Reboots the printer.

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