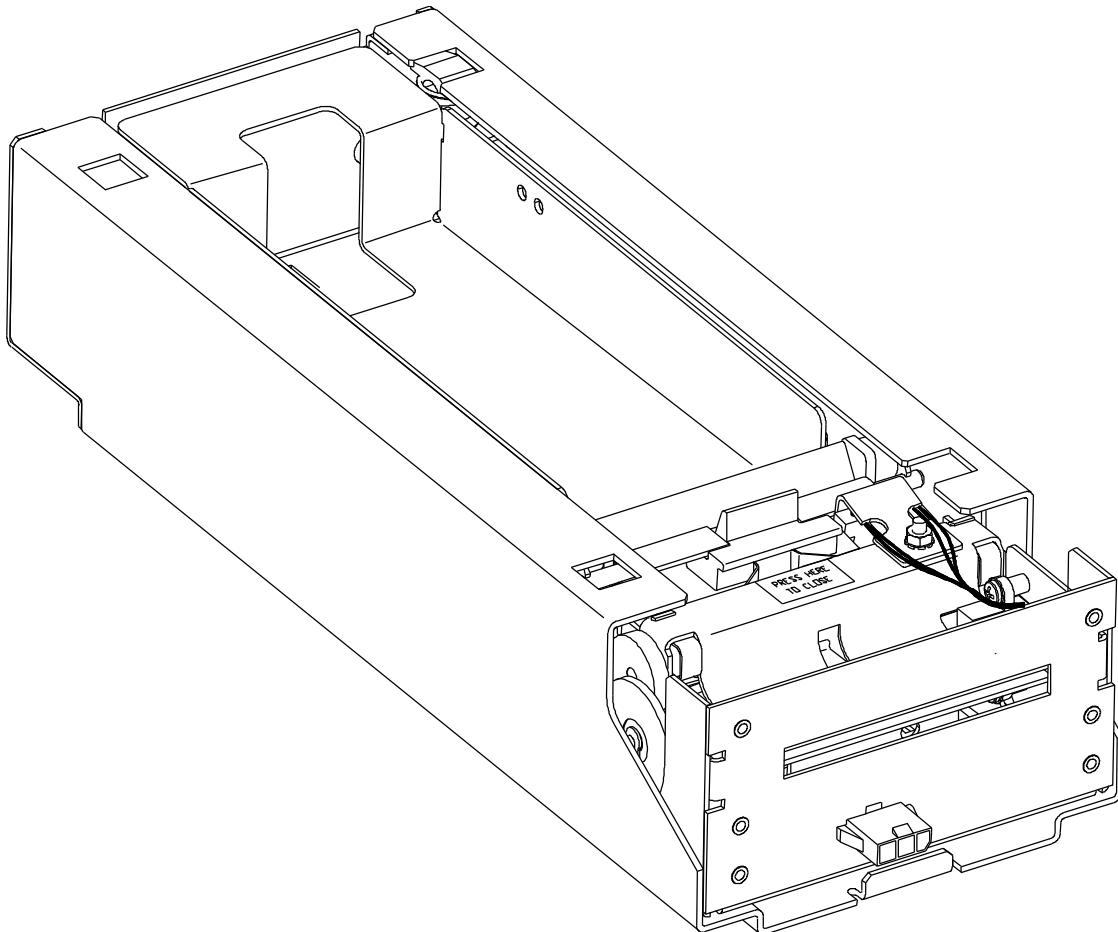


# 800 Series

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Models 850, 860

# OEM Integration Manual



**ithaca**  
a product of TRANSACT

PN: 85-03431

Rev C

Dec-01



# Change History

Rev A Initial Release

Rev B Updated all views to match current geometry. Included commands (GS a ).

Rev C Added Buzzer, ticket switch, and LED information.

## **Important:**

Before installing any equipment be sure to consult the specifications in this manual. Failure to do so may cause integration problems. Before building, please confirm any specifications with TransAct's Ithaca Facility's Sales Department. Portions of this integration manual may be changed without prior notice.

## **Note:**

Losses that can be attributed to improper installation and working procedures are not the responsibility of TransAct Technologies Inc. No part of this manual may be used to recreate any part of the 800 Series Printer. This manual is to be used for integration purposes only. If this manual contains any questionable information or mistakes please contact TransAct for assistance.

## **Disclaimer**

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TransAct cannot guarantee that changes in software and equipment made by other manufacturers, and referred to in this publication, do not affect the applicability of information in this publication.

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## Series 800 General Information

### Who should read this guide?

This document provides information useful to the original equipment manufacturer (OEM) who will integrate the 800 Series printer into their products.

### What is included in this guide?

This Integration Manual has been organized to include information on the mechanical, electrical, and command language requirements of the 800 Series printer. This manual provides an overview of the Series 800 printer specifications, features and operational procedures.

- 
- Specifications/Custom Specifications
  - Chassis Mounting/Mounting Locations
  - Integration Specifics and Recommendations
  - Power and Interface Communications
- 

### Warranty Options

All 800 Series Printers come with a standard 24-month standard warranty covering both parts and labor that starts upon shipment from the factory. An optional extended warranty, covering both parts and labor for an additional 12 months, may be purchased separately. For more information concerning the warranty options, please contact the Sales Department at TransAct's Ithaca facility. You are responsible for insuring any product returned for service, and you assume the risk of loss during shipment to Ithaca C.O.D. packages are not accepted and warranty repairs are subject to the terms and conditions as stated on the Ithaca warranty policy (packed with each new printer).

### Internet Support

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#### **[www.transact-tech.com](http://www.transact-tech.com)**

TransAct Technologies Incorporated maintains an Internet web site with content devoted to supporting our products. At our Support Services section for our Ithaca brand products you can find documentation for the 800 Series printer including a current copy of this Integration Manual. Our on-line support also includes an option to obtain assistance from a technical support specialist by filling out a e-mail assistance request form. Your e-mail will be received by one of our support specialists and they will contact you via a phone call. The 800 Series printer support pages offer the latest information. They include the current version of this manual; Command Codes and Descriptions, Character Fonts, Printer Features, Communication Specifics, and Ticket Specifications.

## Service Information

TransAct Technologies Incorporated has a full service organization to meet your printer service and repair requirements. If your printer needs service, please contact your service provider first. If any problems still persist, you can directly contact the Ithaca facility's Technical Support Department at (607) 257-8901 or (877) 7ithaca for a return authorization. International customers should contact your distributor for services. TransAct offers the following service programs to meet your needs.

- 
- Extended Warranty
  - Depot Repair
  - Maintenance Contract
  - Internet Support
- 

## Ithaca Product Support Procedure

**Monday through Friday, 8A.M. to 5 P.M. (excluding holidays)**

To obtain technical support, call TransAct's Ithaca Facility at (607) 257-8901 and ask for Technical Support. When you call, please have the following information at hand:

- 
- The Model Number and Serial Number of the printer
  - A list of any other peripheral devices attached to the same port as the printer
  - What application software, operating system, and network (if any) you are using
  - What happened and what you were doing when the problem occurred
  - How you tried to solve the problem
  - Return Materials Authorization and Return Policies
- 

If the technical support person determines that the printer should be serviced at our facility, and you want to return the printer for repair, a Returned Materials Authorization (RMA) number must be issued before returning the printer. Repairs are warranted for 90 days from the date of repair or for the balance of the original warranty period, whichever is greater. Please prepare the printer being returned for repair as follows:

- 
- Pack the printer to be returned in the original packing material.
  - Packing material may be purchased from TransAct's Ithaca Facility.
  - Do not return any accessories unless asked to do so by a support technician.
  - Write the RMA number clearly on the outside of the box.
-

## Contacting TransAct's Ithaca Facility

Contact TransAct's Ithaca facility for general information about integrating 800 Series printers with your system. The Sales and Technical Support Departments will be able to help you with most of your questions. Call the Technical Support Department to receive technical support; order documentation; receive additional information about the 800 Series; or send in a printer for service. To order supplies; receive information about other Ithaca products; or obtain information about your warranty, contact the Sales Department. To receive information on International distribution, look on our web site at [www.transact-tech.com](http://www.transact-tech.com)

You may reach both the Sales and Technical Support Departments at the following address and telephone or fax numbers:

---

TransAct Technologies Incorporated  
Ithaca Facility  
20 Bomax Drive  
Ithaca, NY 14850 USA

---

Telephone	(877) 7ithaca or (607) 257-8901
Main fax	(607) 257-8922
Sales fax	(607) 257-3868
Technical Support fax	(607) 257-3911
Web site	<a href="http://www.transact-tech.com">http://www.transact-tech.com</a>

## Series 800 Specifications and Requirements

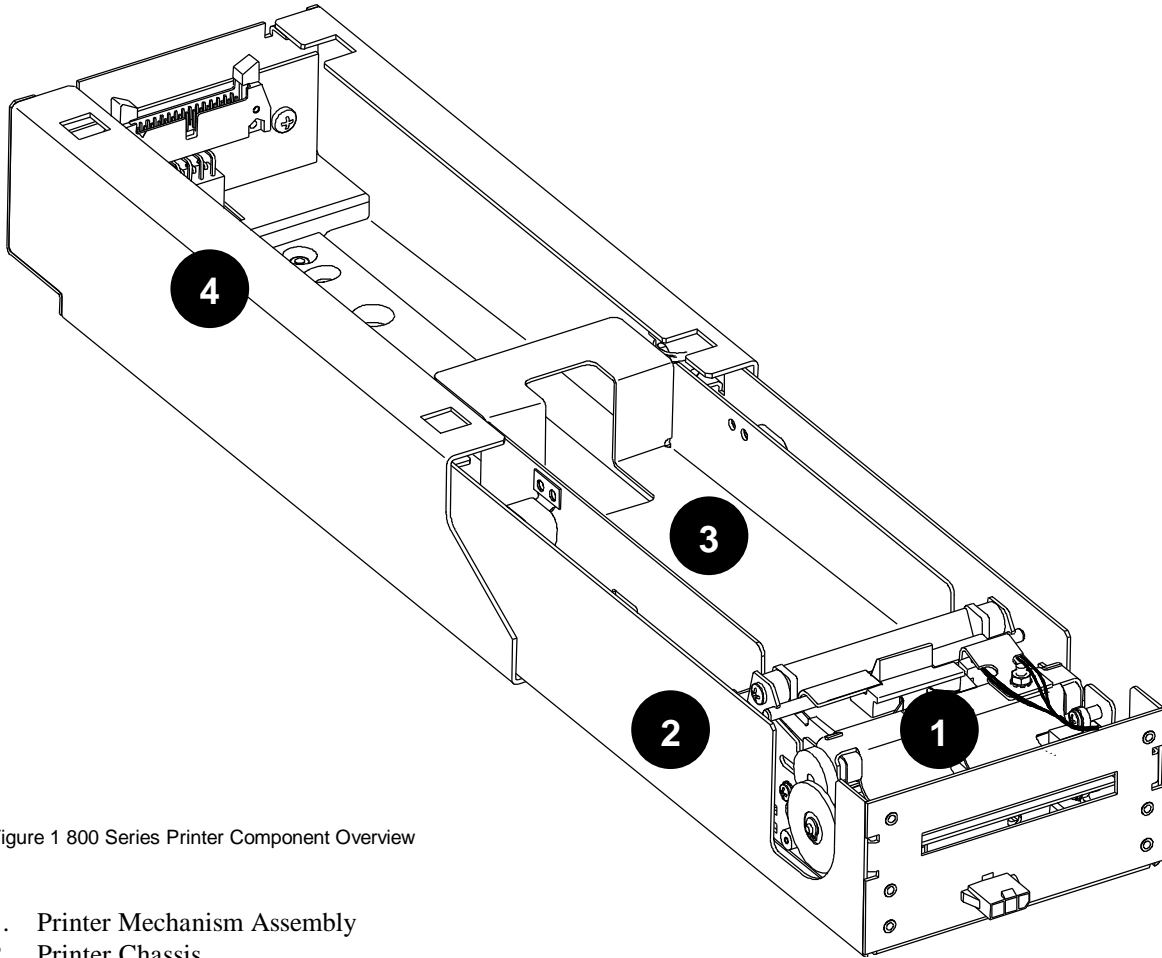


Figure 1 800 Series Printer Component Overview

1. Printer Mechanism Assembly
2. Printer Chassis
3. Printer Ticket Bucket (200, 400, 600)
4. Outer Slide Chassis

### Series 800 Model Functionality Descriptions

*There is a specific functional difference between the Model 850 and the Model 860 printers. As an option, the Model 860 incorporates a void and reprint sensor that verifies the integrity of the barcode. The Model 860 can automatically determine if the ticket's barcode is, or is not readable.*

### Standard Features

The following features are common to the 800 Series Printers:

- 
- Perforated fan folded tickets in a stack of 200 tickets.
  - Barcode and total ticket cash-out capabilities.
  - Horizontal ticket exit.
  - Ticket separation performed by customer.
  - Modular printer mechanism, ticket tray and sliding unit for easy maintenance.

- 
- Modular Interface PCB.
  - Audible Buzzer
- 

## **Optional Features**

---

- 400 and 600 count ticket trays.
  - Void and Reprint (Model 860 only)
-

---

(Dimensions reflect use of 200 unit ticket bucket unless otherwise noted)

---

## Dimensions

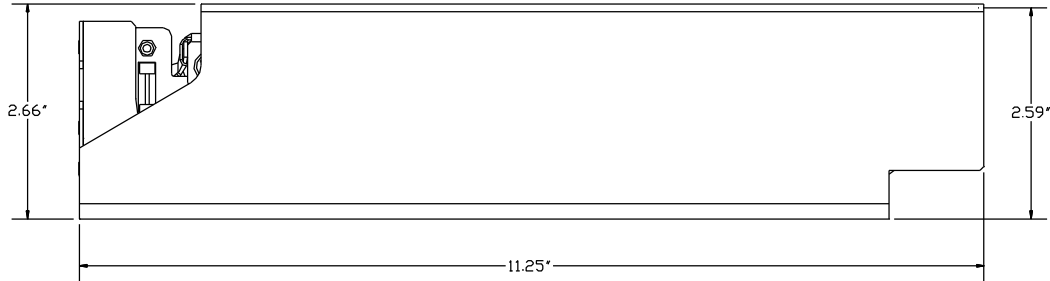


Figure 2 Series 800 Printer: Dimensions

**Stationery Module Size:**    **H:** 2.66" (67.6mm)    **W:** 4.46" (113.3 mm)    **D:** 11.25" (285.75 mm)

The Series 800 is a stationery module, and is designed to work with either of the three interchangeable Ticket Buckets. Please be sure to specify the desired box size when making your selections.

**200 ticket setup:**            **H:** 2.610" (66.29 mm)    **W:** 4.46" (113.3 mm)    **D:** 11.25" (285.75 mm)

**400 ticket setup:**            **H:** 4.0" (101.60 mm)    **W:** 4.46" (113.3 mm)    **D:** 11.25" (285.75 mm)

**600 ticket setup:**            **H:** 5.5" (139.70 mm)    **W:** 4.46" (113.3 mm)    **D:** 11.25" (285.75 mm)

**Weight**                            5.3 lbs.

---

## Interface

**Type**                                Bi-Directional, serial RS-232 using transmit, receive, and ground.  
**Protocol**                            Ready/Busy or XON/XOFF, 9600 baud, 8 data bits, no parity,  
    1 start bit, 1 stop bit.

---

## Printer

**Printer Type:**                    Fixed 2.25" linear thermal head.

---

## Printer Environmental Conditions

**Operating Temperature Range:**            0° ~ 40°C (32° ~ 77°F)  
**Shipping/Storage Temperature Range:**    -10° ~ 50°C (14° ~ 122°F)  
**Operating Humidity Range:**                10% ~ 90% Noncondensing only  
**Shipping/Storage Humidity Range:**        5% ~ 90% Noncondensing only

---

## ESD

Ground maintained between printer and product chassis.

**40 KV sustained air discharge** (door closed).

**8 KV sustained current injection** (door closed).

**15 KV protection for exposed electronics** (open, loading position).

---

## Reliability

<b>Printer Life:</b>	20 million character lines.
<b>Mean time between failures:</b>	45,000 hrs. @ 25% duty cycle.
<b>Printer electronics:</b>	250,000 hrs.
<b>Printhead Life:</b>	50Km min.
<b>Flex ribbon (sliding module):</b>	1,500 cycles min.

---

## Power Requirements

24 Vdc  $\pm$  5%.  
2.2 Amps max. @ 24 Vdc @ 25% print ratio.

---

## Test Standards

FCC 47CFR, Part 15, Class A.

EN 55022, Class A.

ESD IEC 1000-4-2, 6kv direct discharge and 8kv air discharge.

Radiated RF IEC 1000-4-3, 3 v/m from 27 MHz to 1 GHz.

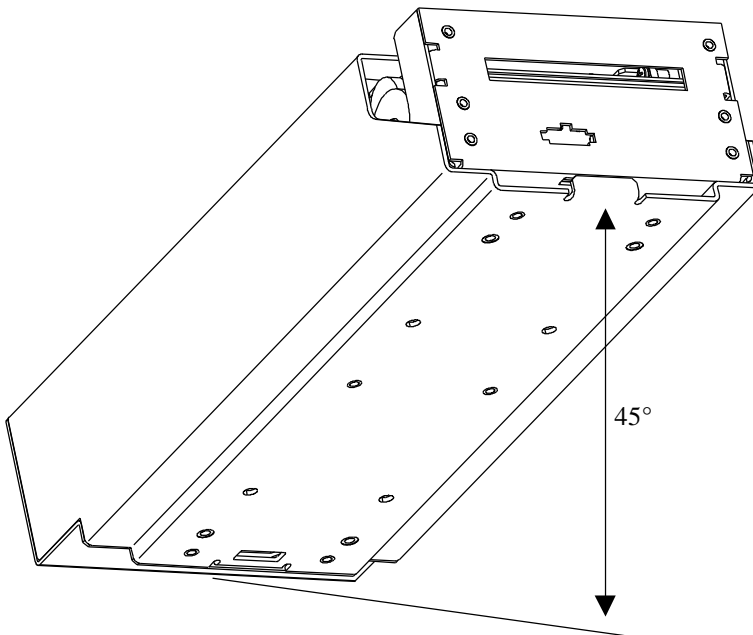
Fast transit (burst) IEC 1000-4-4, 2kv powerline, 1kv I/O lines (level 3, Industrial environment).

**Acoustic Noise:** **Sound pressure level:** 60 decibels max.  
(measured in 10 positions @ operator level with distance of 1 meter).

---

## Mechanism Characteristics

<b>Drawer Slide Force:</b>	2 lbs. max.
<b>Opening Distance:</b>	200mm (8") (approximate )
<b>Drawer Holding Force:</b>	4 lbs. (out of detents)
<b>Mechanism Operating Angle:</b>	Horizontal to 45° inclination (ticket exit slot up).

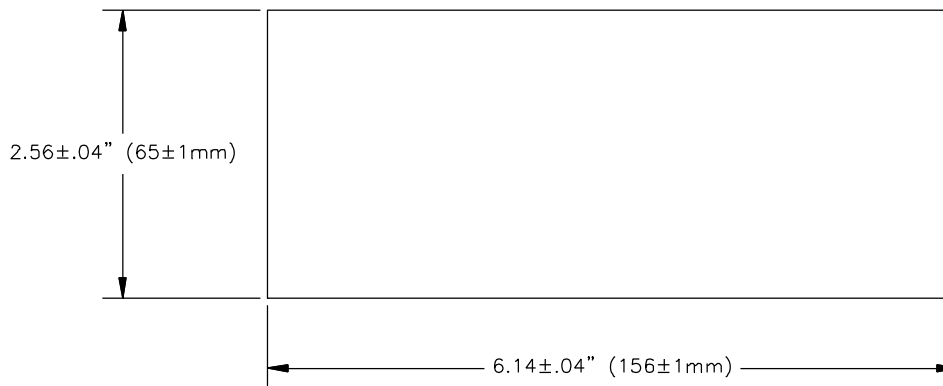


## Printing Specifications

<b>Print Method:</b>	Thermal Sensitive Line Dot System.
<b>Ticket Handling:</b>	Straight. Entire path is accessible.
<b>Print Speed:</b>	125 mm/sec. (5" per sec.) max. (in text mode)
<b>Paper advance speed:</b>	125 mm/sec. (5" per sec.) min.
<b>Resolution:</b>	203dpi x 203dpi and 136dpi x 203dpi.
<b>Dot Pitch-Horizontal:</b>	0.125 mm (8 dots/mm)
<b>Dot Pitch-Verticle:</b>	0.125 mm (8 dots/mm)
<b>Line Feed Pitch:</b>	3.2 mm (.125")
<b>Characters per line:</b>	30 min.
<b>No. of Elements:</b>	500 dots in-line
<b>Print Width:</b>	62.5 mm (2.46")
<b>Data Buffer:</b>	8K
<b>Memory:</b>	256K EPROM & 128K RAM

## Ticket Specifications

**Dimension:** (same size as US dollars)



<b>Ticket Width:</b>	$65 \pm 1$ mm ( $2.56" \pm .04"$ )
<b>Ticket Length:</b>	$156 \pm 1$ mm ( $6.14" \pm .04"$ ) between perforations
<b>Ticket Thickness:</b>	.114mm - .127mm (.0045" - .005")
<b>Ticket Density:</b>	Equivalent to 20 lb. paper.
<b>Ticket Weight:</b>	Equivalent to 20 lb. paper.
<b>Reading Code:</b>	Interleaved, 2 of 5
<b>Minimum Bar Width:</b>	0.5 mm min./0.6 max.
<b>W : N Ratio:</b>	3 : 1
<b>Letter Quantity:</b>	6 min./18 max.
<b>PCS Value:</b>	0.6 min.
<b>Printing Ink:</b>	BLACK: (visible light absorbtion: 600 ~ 700 nm)

**Optical Reflection Level:** White thick bar: 3.0V min. Black thick bar: 2.0V max.  
**Amplitude Level:** 0.5V (white and black bar).

**Waveform Distortion:** 0.3V max.



**Transmission Level:** Level 1: 1.3V max. Level 2: 0.5V min.

---

## Ticket Specifications (continued)

The 800 Series printer requires the following tickets for proper printing:

**Ticket Type:** Kanzaki TO-381N or approved equivalent  
Thermal sensitive layer facing down.  
Thermal sensitive side to be coated for wear characteristics.  
Top coating comparable to Seiko paper.

**Quantities Available:** Fan-folded stacks of 200, 400 and 600 tickets.

---

## Design Envelope: Ticket Clearance

A maximum paper clearance distance of .75" is required above the printer's ticket buckets. The maximum clearances for all ticket buckets will vary, but should fall within the .75" maximum clearance measurement.

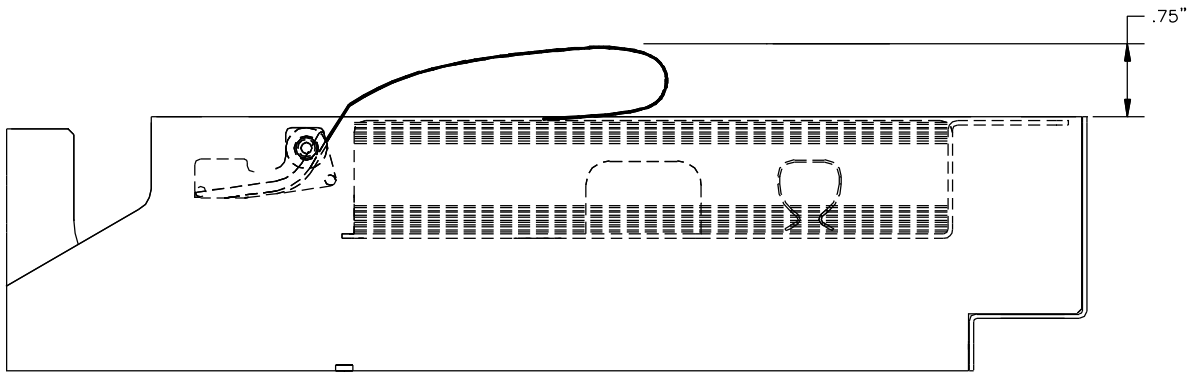


Figure 3 Design Envelope: Ticket Clearance

## Print Characteristics

The statistics for the five internal fonts the 800 Series Printer supports appear below. Height and width are expressed in terms of dots.

Height	Width	Horizontal cpi	Vertical cpi
24	12	16.9	8.4
32	16	12.7	6.4
32	20	10.2	6.4
56	28	7.3	3.6

Table 1 Font Statistics

## Black Dot Position and Presentation Scheme

All graphics preprinted on the ticket must be in thermal paper compatible ink.

### Black Dot Position

The back of the ticket is used for the Black Dot/Top of Form indicator. For the printer to sense when a ticket has been indexed to the printing position, a Black Dot/Top of Form sensor is needed. It must be printed in black, thermal paper compatible, infrared readable ink. The 10.16mm area in line with the Black Dot/Top of Form indicator and the ticket edge (keep-out zone) must remain clear, as the Ticket Out Sensor will read that area while the ticket is printed and presented. The remaining area on the back of the ticket may be used for rules and disclaimer.

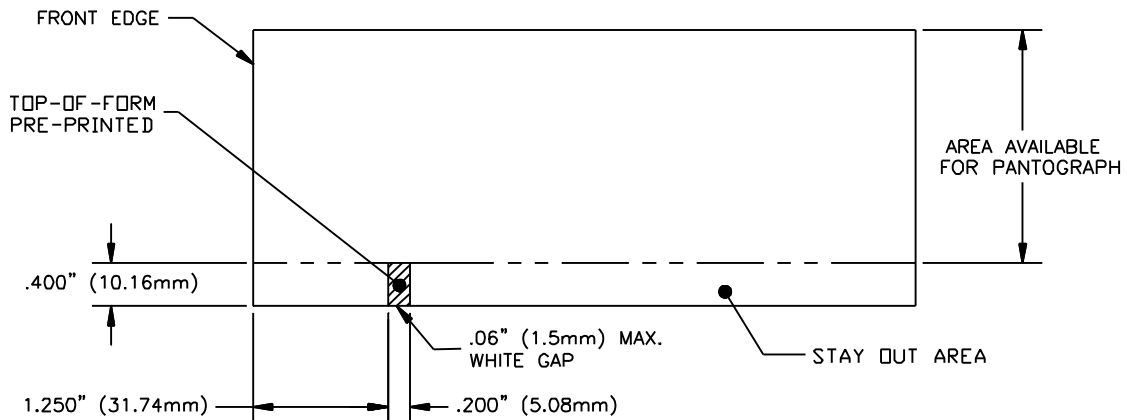


Figure 4 Location of Black Dot/Top of Form Indicator on Back of Ticket

## Ticket Stack Orientation

To ensure the ticket is loaded correctly into the printer, the ticket stack must be properly loaded in the ticket box. The stack must be oriented so that the Black Dot/Top of Form mark of the tickets is on the leading edge of the ticket, not near the perforation of the next ticket. If the top ticket on the stack has the back facing upward, the perforation attaching the next ticket will be toward the front of the Ticket Supply Box with the Black Dot/Top of Form indicator in the rear right corner. If the print area is facing upward, the perforation attaching the next ticket will be toward the rear of the Ticket Supply Box. For instructions on inserting the first ticket into the printer, see "Loading Tickets into Feeding Mechanism" on page 23.

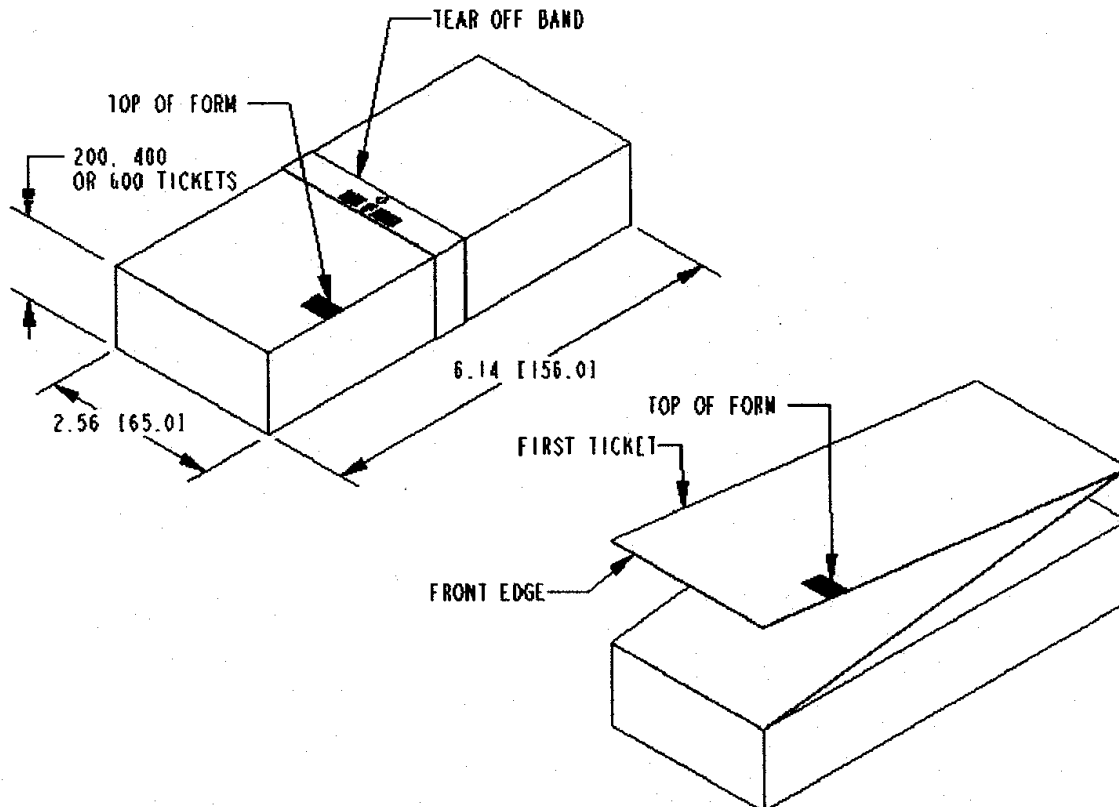


Figure 5 Ticket Stack Orientation

# Mounting Requirements

## Chassis Mounting to Final Product

Bottom:                    4x M4x0.7 press nuts  
                                  4x .180" thru holes

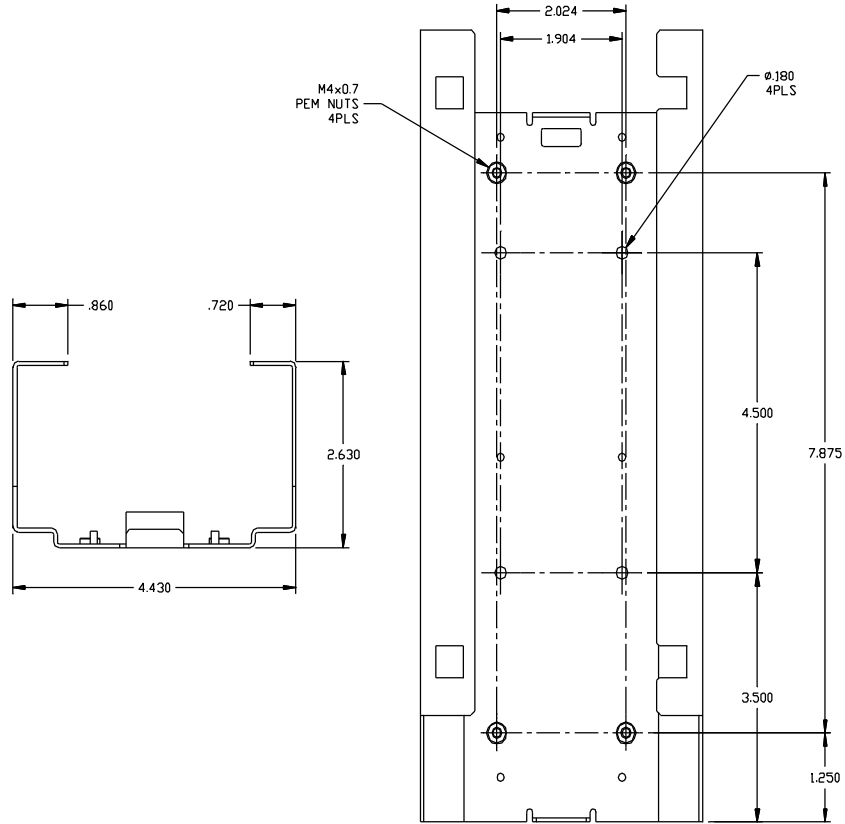


Figure 6 Outer Chassis Mounting to Final Product

## Custom Bezel Specifications and Recommendations

### Custom Bezel to Printer Mechanism Mounting points

Series 800 printers are designed to accommodate a customer supplied bezel assembly that is mounted following the hardware and mounting dimensions as listed. The following drawing shows the positioning and dimensions of the Series 800 printer's mounting points.

**Front:** 6x M3x0.5 press nuts and interface with custom bezel

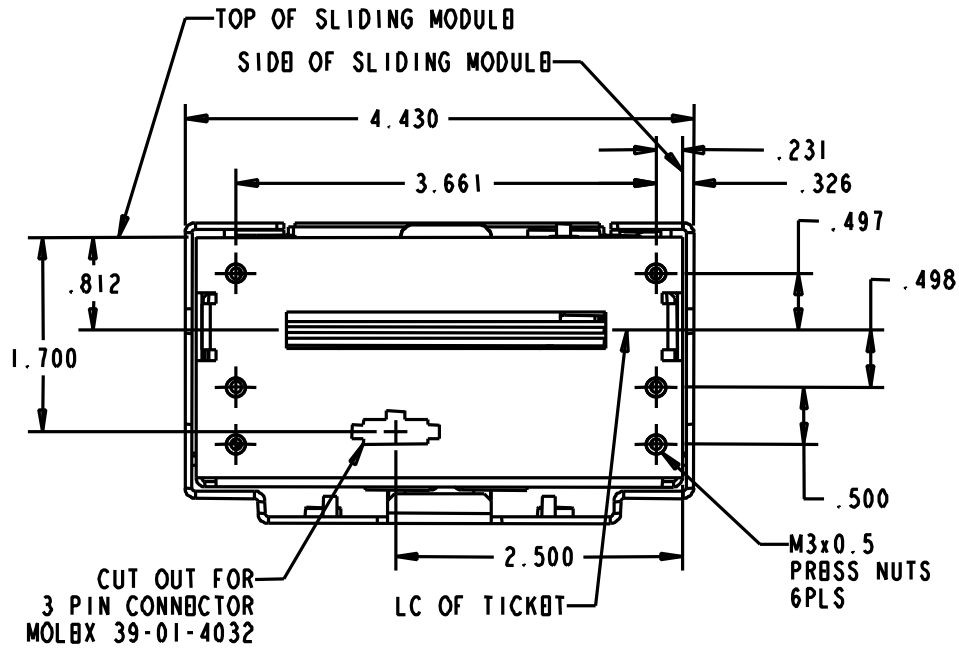


Figure 7 Custom Bezel Mounting and Hardware Requirements

## Series 800 Printer Sensors

The Series 800 printers use several sensors to provide feedback to the host system. All power and interface communications are handled by the Communications PCB.

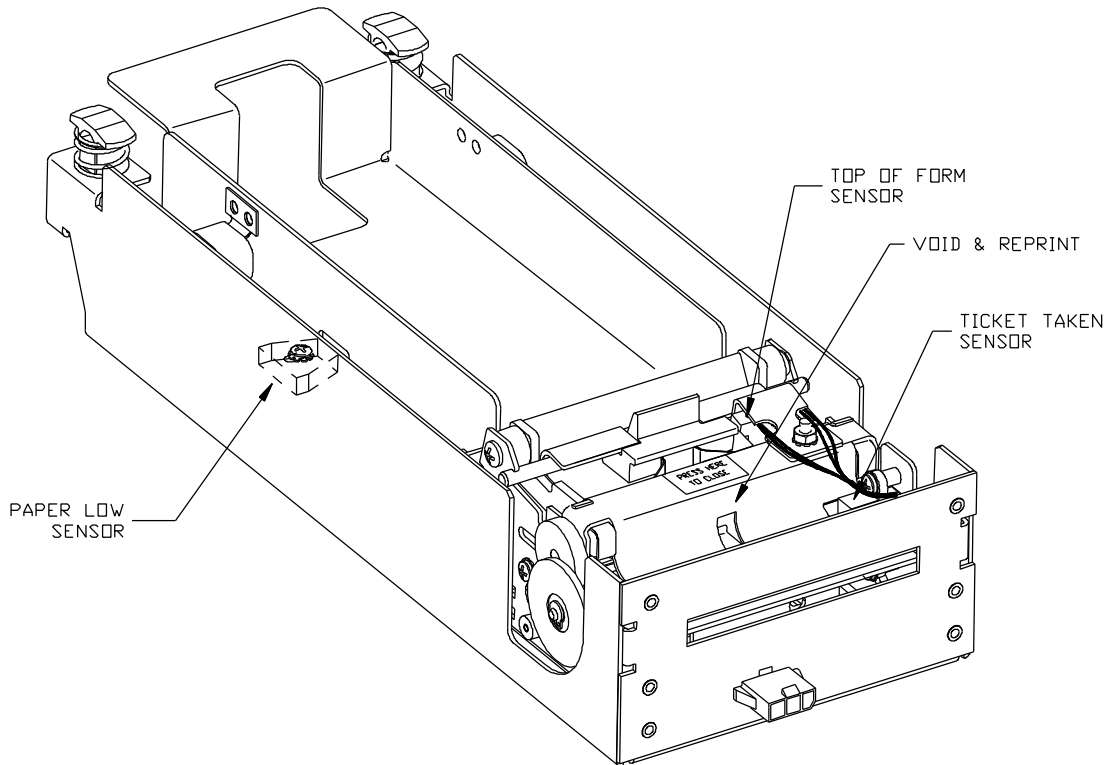


Figure 8 Sensor Breakdown and Locations

---

### Paper Low Sensor

A Paper Low Sensor optically senses the number of tickets remaining in the printer's ticket bucket. The sensor will detect when the number of tickets reaches below 30-35 tickets. The paper low status will be reported on the status byte, when a status requested is issued by the host.

---

### Top-of-Form Sensor

A Top of Form Sensor is used to control ticket loading and printing.

---

### Ticket Taken Sensor

A Ticket Taken Sensor is used to determine when customers have actually taken the printed ticket.

---

### Head-Up Switch

A Head Up Switch signals when the thermal printhead assembly has been opened. The Head Up Switch is located under the printhead and is not visible from the top view.

---

### Void and Reprint (Model 860 only)

The Void and Reprint Sensor verifies the integrity of the ticket barcode.

## Open/Close Position Sensor/Audible Alarm

The printer has an OPEN/CLOSE POSITION sensor to determine if the Printer Mechanism Assembly is in the full-racked position. If the Printer Mechanism Assembly is not in the fully racked position, then the printer status LED will blink indicating the printer is not ready.

1. **Open/Close Position Sensor** (Sliding Module).
2. **Audible Alarm Buzzer** (PIEZO - game controlled).

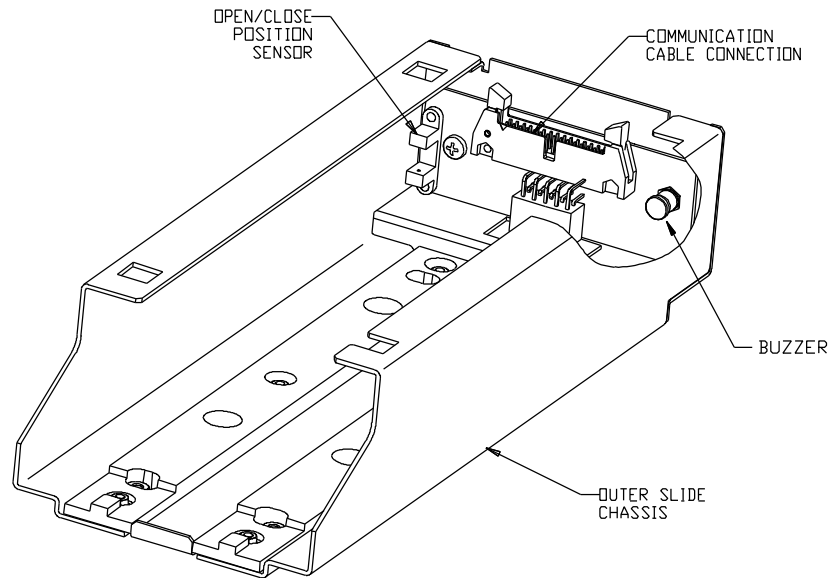


Figure 9 Open/Close Position/Audible Alarm



---

## Printer Status LED

The printer has been outfitted with a LED indicator system that provides the condition of the printer by using a series of blinks to communicate the status of the printer. If a customer supplied Bezel is installed, the status of the Bezel will be identical to the LED

The following table lists the different LED indications and provides a brief description.

Condition	Status LED/Bezel
Unit Ready	On
Head Up	Med Blink
Door Open	Med Blink
Paper Out	Slow Blink
Temperature Error	Fast Blink
Paper Jam	4 Blinks Pause
Ram Error	2 Blinks Pause
Checksum Error	5 Blinks Pause

Table 2 Printer Status LED Indication Descriptions

# Electrical Connections

## Serial Interface Specifications

---

### The XON/XOFF Protocol

The RS-232 serial interface communicates using hardware and XON/XOFF flow control. Flow control helps to ensure that the computer does not send information to the printer faster than it can print.

The XON/XOFF protocol is a popular data communications protocol. When the printer's buffer is approximately 50 percent full, it sends the ASCII code XOFF (13 Hex) to the computer to tell it to stop sending data. When there is again room (that is, space for approximately 30 percent more characters in the buffer), the printer sends the ASCII code XON (11 Hex) to the computer to tell it to resume sending data. (XON is also known as DC1; XOFF is synonymous with DC3.) If the computer does not stop sending data after it receives an XOFF, the data that overflows the buffer will be lost and the printer will halt.

**The printer will send an XON code when it goes on-line to get things started. It will send an XOFF code to stop the computer from sending information if the input buffer is approximately 50 percent full.**

---

### Ready/Busy Protocol

The RS-232C interface uses the RTS/CTS, DTR/DSR, or XON/XOFF protocol. For RTS/CTS, changes in the RTS/CTS signal coordinate the information flow. For DTR/DSR, changes in the DTR/DSR signal coordinate the information flow. For XON/XOFF, data characters transmitted between the host computer control communication data flow.

The RS-232C version of the Series 800 Printer offers the standard communication options that are configured in the flash.

#### RTS/CTS Protocol

The RTS signal is used to control data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host will transmit data to the printer when it recognizes the state of the printer's RTS signal is high.

#### DTR/DSR Protocol

The DTR signal is used to control data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host will transmit data to the printer when it recognizes the state of the printer's DTR signal is high.

# Board Close-ups and Physical Connections

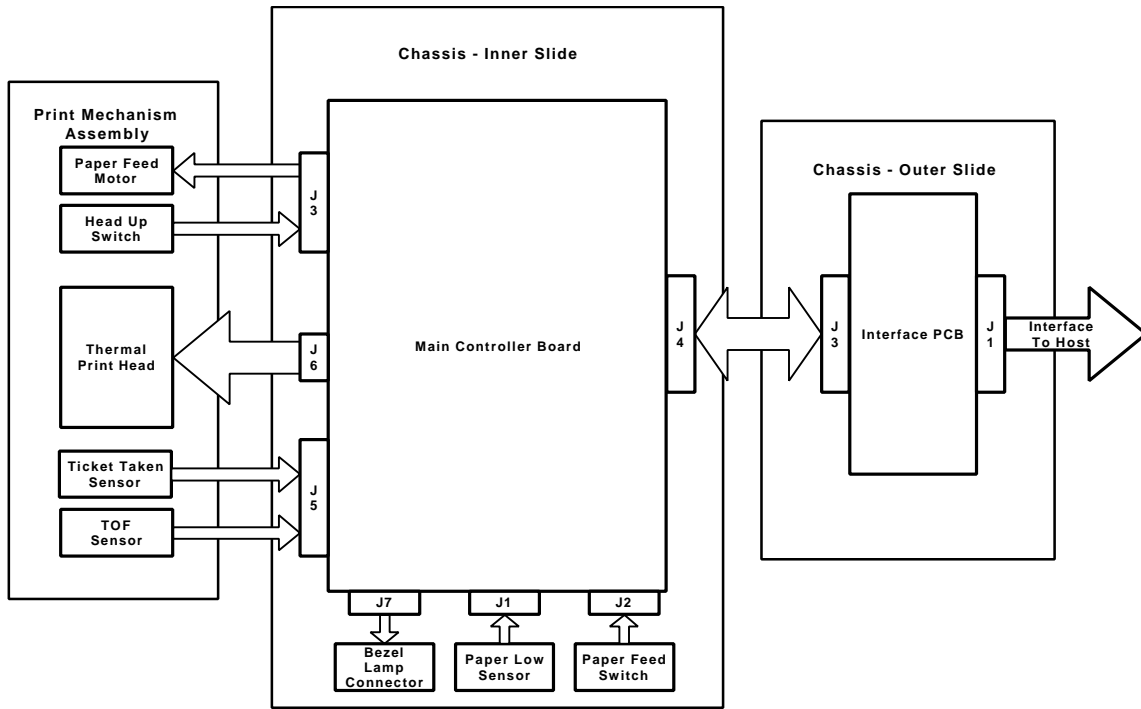


Figure 10 Series 800 Electrical Operations Diagram

## Serial Communications PCB

All power and communications are supplied through the Serial Communications PCB located at the rear of the printer. The connector is a Molex 39-30-1400 and will mate with a Molex 39-01-2140.

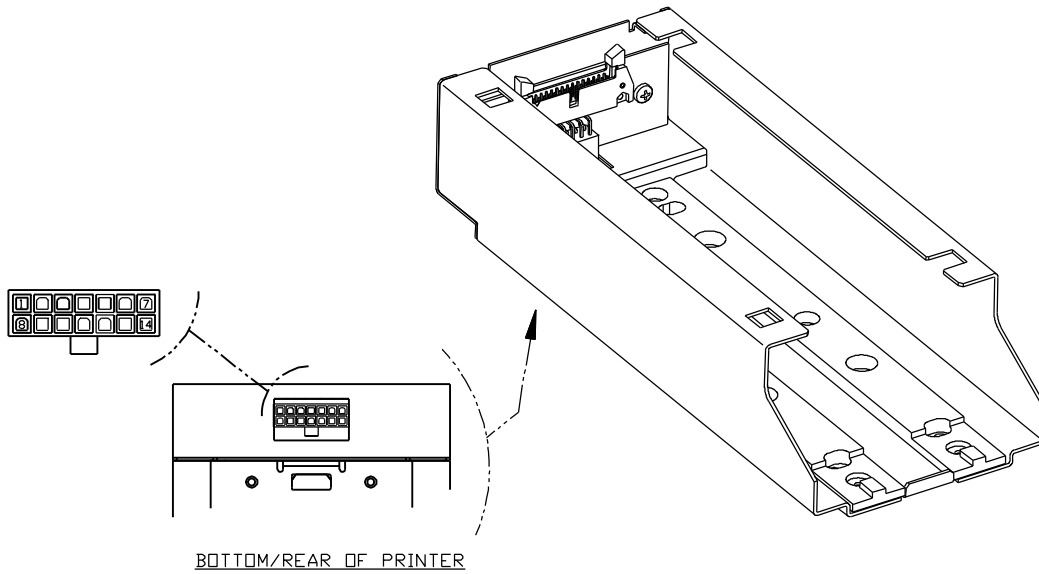


Figure 11 Serial Communication PCB Location and Connector Info

Serial Communication PCB Pin-Outs		
PIN #	FUNCTION	I/O
1	MRESET	I
2	Not Connected	N/C
3	+12 VDC	I
4	Not Connected	N/C
5	GND	-
6	+24VDC	-
7	GND	-
8	+24VDC	-
9	Modulated +24VDC	O
10	GND	-
11	RS232 RXD	I
12	RS232 TXD	O
13	DTS	O
14	RTS	O

Table 3 Serial Communication PCB Pin-Outs

## Bezel Power Connector

The bezel connector is a Molex 39-01-4032 and will mate with a Molex 39-01-4030.

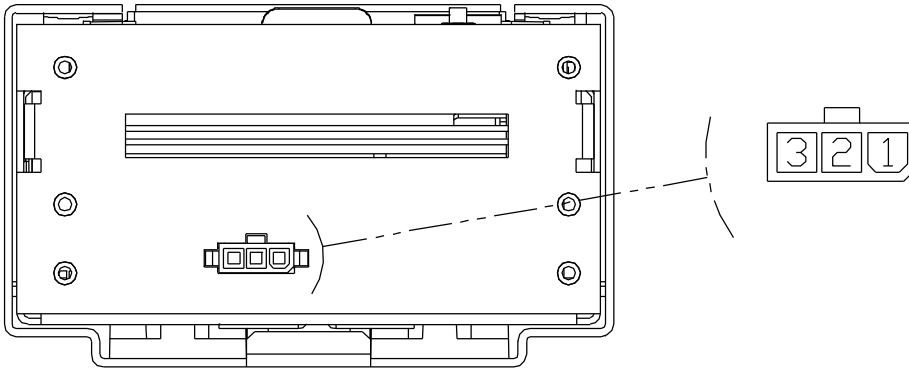


Figure 12 Bezel Power Connector Location and Connector Information

Bezel Power Connector Pin-Outs	
PIN #	FUNCTION
1	Modulated +24VDC
2	Not Connected
3	GND

Table 4 Bezel Power Connector Pin-Outs

# Operational Procedures

**!DO NOT PLUG OR UNPLUG THE PRINTER WITH POWER ON!**

Maintenance is quick and easy with the 800 Series line of printers. There is no set schedule for preventative maintenance; simply perform the appropriate maintenance as needed.

## Racking/Unracking the Printer Mechanism Assembly

All Series 800 printers use a slider/detent system with springs to retain the Printer Mechanism Assembly from accidentally being separated from the Outer Chassis. The Series 800 is opened for service by simply pulling the Printer Mechanism Assembly out of the Outer Chassis as you would a filing cabinet.

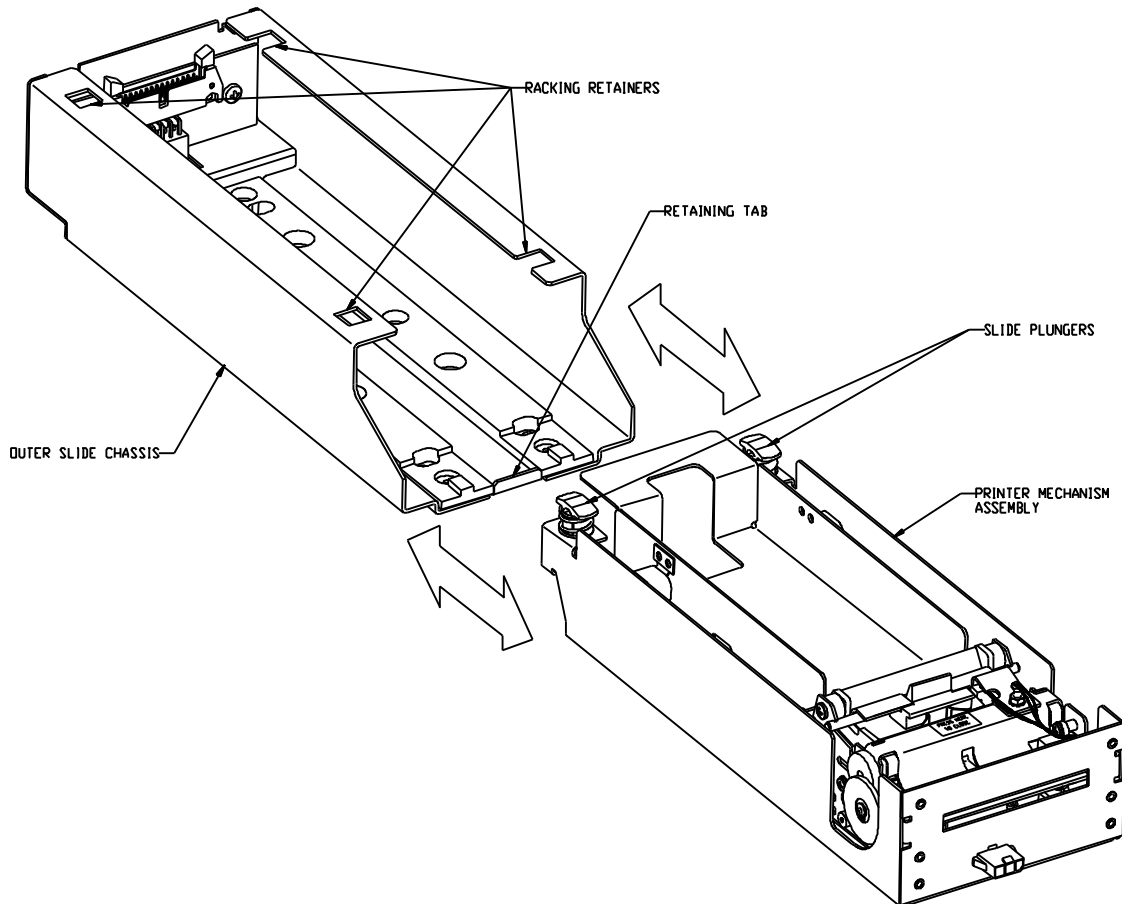


Figure 13 Racking/Unracking the Printer Mechanism Assembly

1. Pull the Printer Mechanism Assembly towards you until the slide plungers fit into the front racking retainers (detents) of the Outer Slide Chassis.
2. Lift the front end of the Printer Mechanism Assembly up until it is free of the retaining tab located on the front, inside area of the Outer Chassis.

If the Printer Mechanism Assembly is removed from the Outer Slide Chassis, the 30-pin cable joining the printer Serial Communication Board and the printer's Main Controller Board must be disconnected.

---

## Loading Tickets into Feeding Mechanism

When loading new ticket stacks, be sure that the printer mechanism assembly has been unseated from the outer slide chassis's racking retainers. The first ticket of the stack must be inserted into the printer by hand. The Series 800 Printers' Ticket Supply Box is integrated with a guide to direct the ticket into the printer mechanism. Once the leading ticket enters the TOP OF FORM sensor, the ticket will be automatically fed into the Printer Mechanism Assembly.

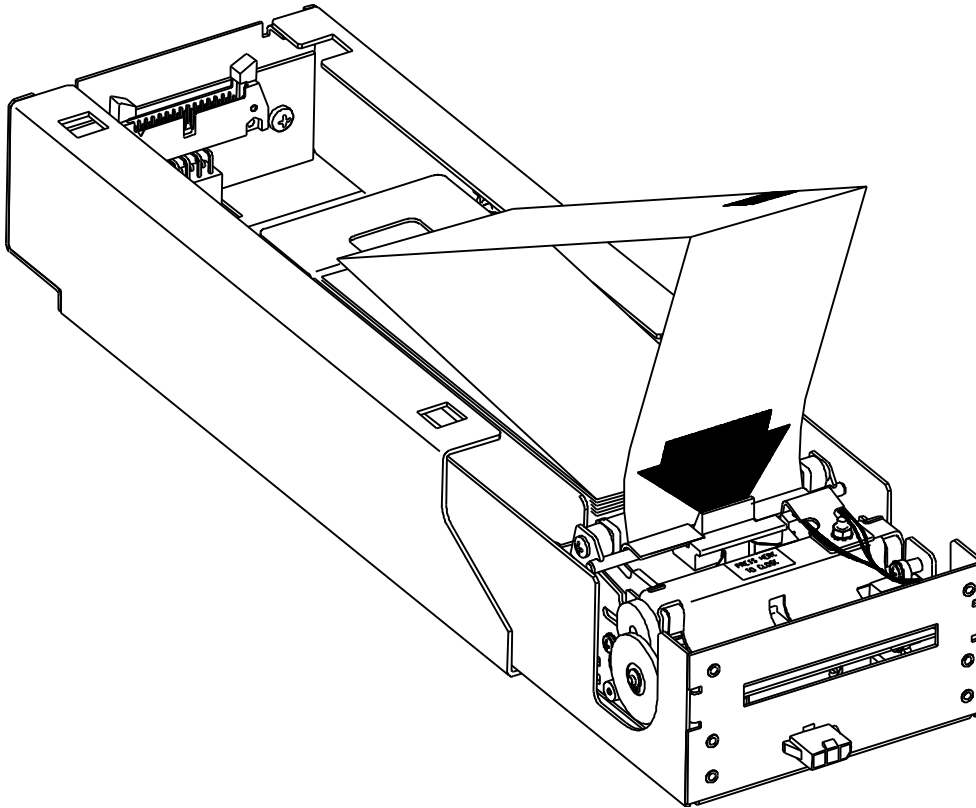


Figure 14 Ticket Loading and Ticket Feed Mechanism

---

### Loading tickets into the ticket supply box: (Refer to the label on printer)

- Load tickets into the ticket supply box sensitized side down (make sure Black Dot is facing you).
- Orientate the tickets so that the Black Dot is towards the leading edge of the ticket.

---

### Feeding tickets into the Printer Mechanism Assembly: (Refer to the label on printer)

1. Check to ensure that the tickets have been placed in the ticket supply box with the proper black dot orientation.
2. Insert the leading ticket into the Printer Mechanism Assembly's insertion guide area. The ticket should be fed about a 1/2" into the mechanism; at this time, the machine automatically completes the feeding process.
3. Slide the printer mechanism assembly back into the closed position, making sure that the assembly's slide plungers snap into the racking retainers within the outer slide chassis.
4. The printer is ready to receive information.

## Removing Loaded Tickets

The Series 800 printers have two ways to remove unused tickets from the printer mechanism assembly. The first way is to use the feed button, it will feed out tickets from within the printer mechanism assembly. The second way is to release the plastic actuator latch to release tickets from within the printer mechanism assembly. After the actuator latch is pulled toward the front of the printer, the printer mechanism assembly can be rotated up towards the front of the printer. This will allow an opening that provides space to clean the printhead, check the printer for ticket jams, or prepare the paper path for ticket replenishing.

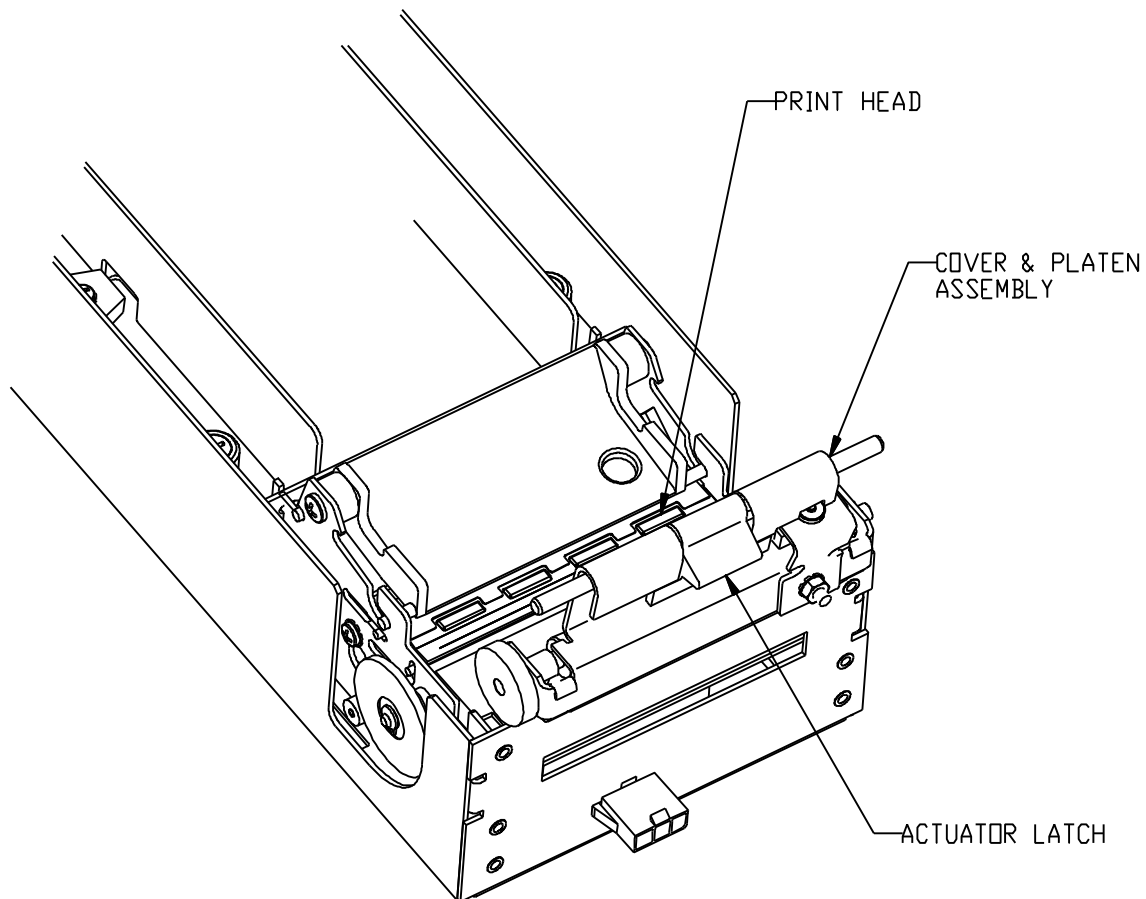


Figure 15 Actuator latch and cover & platen assembly

### Unloading Tickets from the Printer by opening the Platen assembly

1. Pull printer mechanism assembly out of the slide chassis until it stops in the open position
2. Pull the plastic actuator latch towards the front of the printer.
3. Swing the platen assembly up and towards the front of the printer.
4. Remove all tickets from the ticket path and check for any debris.
5. Press the green label to relatch the platen assembly.
6. Proceed with ticket loading procedure.



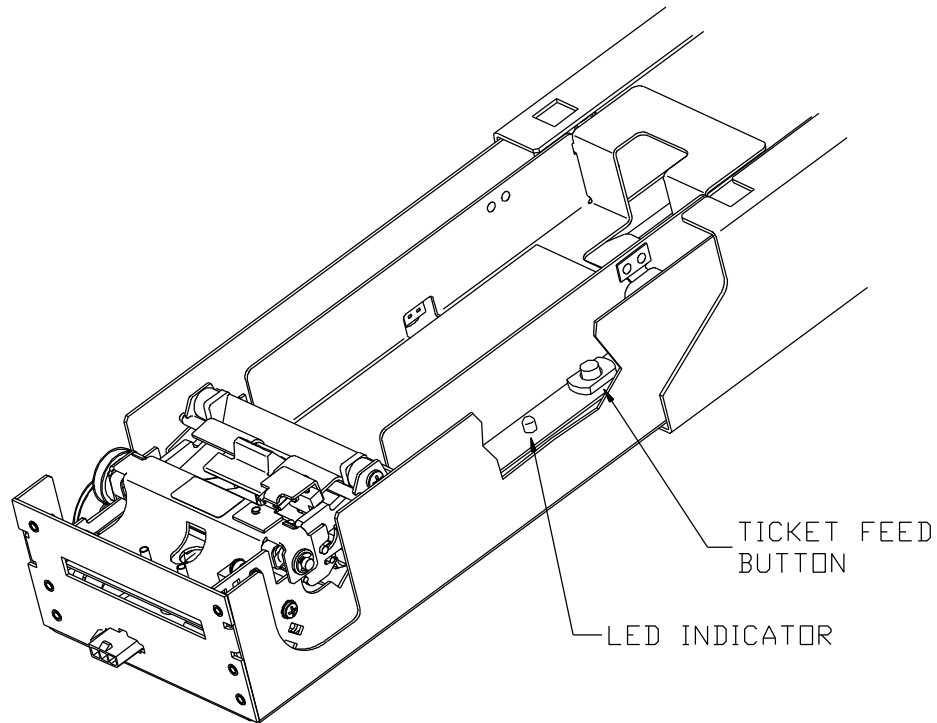


Figure 16 Feed Switch and LED indicator Location

#### **Unloading Tickets from the Printer using the feed button**

1. Pull printer mechanism assembly out of the slide chassis until it stops in the open position.
2. Separate ticket currently loaded in the platen assembly from the ticket bundle.
3. Press the feed button to eject the ticket.
4. Remove any remaining tickets from the ticket supply box.
5. Proceed with ticket loading procedure.

## Cleaning the Print Head

Once the unit is opened, the ticket path is accessible for cleaning or clearing ticket jams. Use a soft brush to clean the paper dust from inside the printer and chassis area. The paper dust should also be removed from the sensor optics. If streaking on the printed ticket is evident, the thermal print head may need to be cleaned. This can be done by inserting a thermal printer cleaning card.

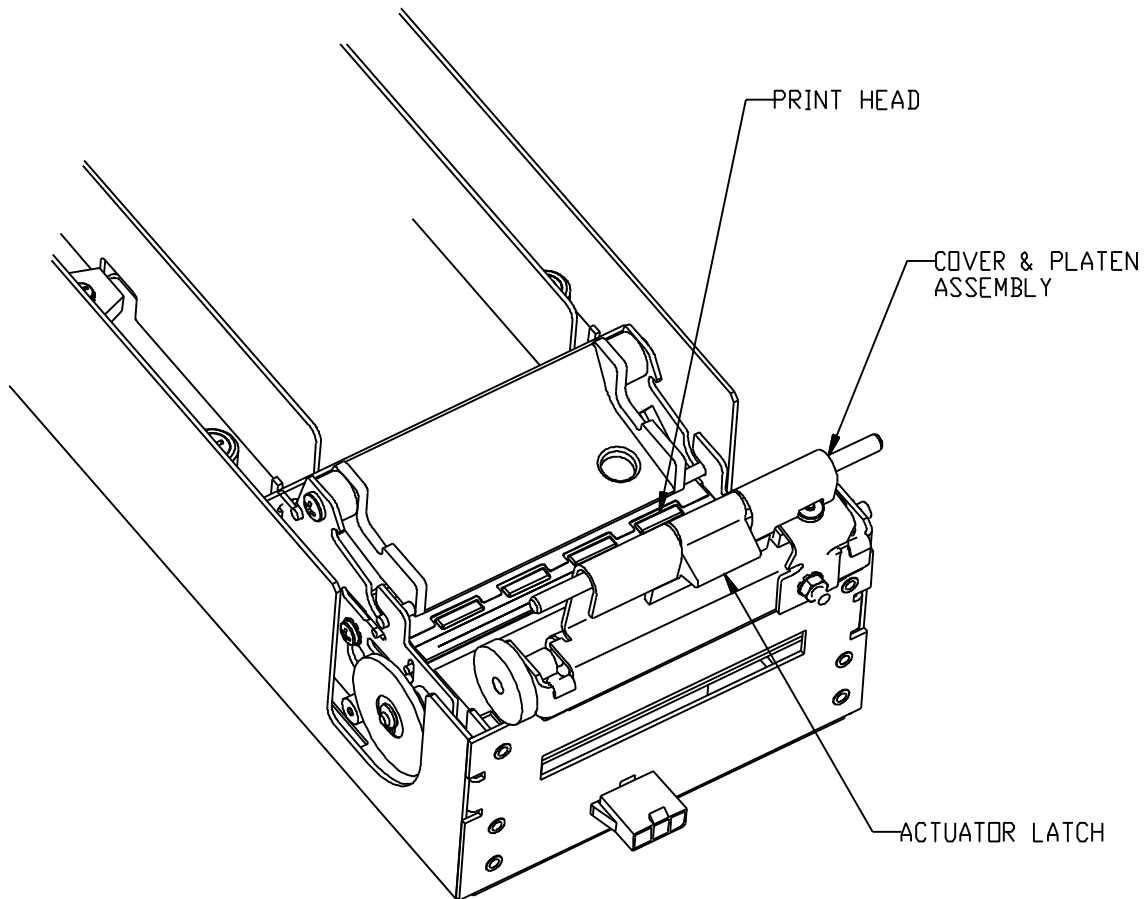


Figure 17 Cleaning the Printhead

1. Press the feed button, or open the plastic actuator latch and remove all tickets from ticket feed path to expose the print head.
2. Press the green label to relatch the platen assembly.
3. Open cleaning card pouch and remove cleaning card.
4. Insert cleaning card into feed path.
5. The cleaning card will automatically be drawn into the feed path.
6. Repeat process if necessary.
7. Properly dispose of used cleaning card.

Cleaning cards are available through TransAct or can also be purchased direct from Enefco International Ltd. at (888) 578-0141.

**Description:**

2.5" x 6" Thermal Cleaning Card (box of 25)  
 2.5" x 6" Thermal Cleaning Card (box of 25)

**Part Number:**

100-03322 (TransAct)  
 GTP250PB (Enefco)

## Programming for the 800 Series

The first step in programming the 800 Series is to understand how the printer works. This section covers all the points that need to be understood to program the 800 Series Printer correctly, including both basic and advanced topics.

As an ASCII-based printer, the 800 Series accepts 8-bit ASCII characters as both data and commands. The ASCII table in the Character Codes section shows the relationship between the 8-bit values and the characters they represent. Most environments either use the ASCII character table as the default for character values or support an ASCII mode where characters are interpreted by the ASCII values.

Below is the general information that is needed for programming the 800 Series Printer.

---

### Resetting the Printer

Each print job should begin with a printer reset command. This ensures that the printer always begins in a known state.

The command characters used to reset the 800 Series are ESC (decimal value 27) and \* (decimal value 42).

---

### Command Parameters

When sending a command, all of the command characters and parameters that make up a command must be sent. This is especially important when using the bar code and graphics commands. Sending too few characters to fill the required parameters for a command will either cause the command to fail or result in subsequent data being lost.

---

### Character Evaluation

Most of the parameters that are sent to the 800 Series Printer are evaluated based on their decimal value. Some commands accept parameters by either their decimal value or the representative character. For example, the set print orientation command

(GS V) interprets both a NULL (ASCII decimal value of 0) and the '0' character as meaning the same thing.

---

## 16-bit Character Parameters

The maximum value a single 8-bit character can represent is 255. Some commands, though, can take values that are greater than 255. The set horizontal starting position command (ESC X), for example, specifies a distance (in dots) that the next text object will print from the left margin. Because a dot is only 1/8 of a millimeter, a value of 255 would place the object only a little over 31 mm from the left margin. To allow for longer distances to be specified, two 8-bit characters are used to specify the value, by combining them into one 16-bit character. Though the calculations are all done within the 800 Series Printer, it is important to understand how the characters are handled.

The decimal value of the first character that is sent (usually noted as  $n1$ ) is multiplied by 256. The decimal value of the second character sent (usually noted as  $n2$ ) is then added to this.

To send a value under 256 to a command that takes the  $n1$   $n2$  parameters, simply send the first character with a 0 value. For values greater than 256 but less than 512, the first parameter should be sent with a value of 1. For values greater than 512 but less than 768, the first parameter should be set to 2, and so on.

---

## Conversions

The table below lists some common values and their relationship for converting from dots to inches using the  $n1$   $n2$  parameters.

Inches	Dots	$n1$	$n2$
0.5	101	0	101
1.0	203	0	203
1.5	304	1	48
2.0	406	1	150
2.5	507	1	251
3.0	609	2	97
3.5	710	2	198
4.0	812	3	44

Table 5 Conversion from Dots to Inches

## Font Statistics

The information below lists the statistics for the five internal fonts the 800 Series Printer supports. Height and width are expressed in terms of dots.

Font	Height	Width	Horizontal cpi	Vertical cpi
ESC P	24	12	16.9	8.4
ESC M	32	16	12.7	6.4
ESC U	32	20	10.2	6.4
ESC T	56	28	7.3	3.6

Table 6 Font Statistics

## Objects

Objects are the basic units that the 800 Series prints. An object can be either a line of text characters, a bar code, a landscape graphic, a landscape line, or a bitmap dot line. Each of these objects has different rules relating to them, as discussed below.

Objects can also be either active or complete. An active object is one that is still receiving the data that composes it. A completed object is one that has been terminated. A line of text that has not yet received a line feed or carriage return is a good example of an active object. Until a terminator character, like a line feed, is sent, more text characters can be added to the text object. Bar code and graphic objects do not require special terminator characters (such as line feeds). Instead they are considered complete as soon as they receive the correct amount of data.

## Print Modes

The 800 Series possesses three modes of printing: bitmap graphics mode, portrait printing mode, and landscape printing mode. Each mode operates under very different rules. These rules are detailed below.

### Bitmap Graphics Mode

At its most basic level, an 800 Series Printer is a direct thermal printer that creates images on a ticket by heating the individual elements of its print head. The print head has 448 elements (or dots). When it prints, some of these dots will be turned on (heated), and the printer’s motor will advance the ticket by a step. The ticket stock that is under a heated element will then turn black. For each motor step, a dot line is printed. By controlling the length of each step, the 800 Series Printer can print in either 203 x 203 dpi or 203 x 138 resolution, as a longer step makes larger dots and therefore results in lower resolution. Each dot line is a complete object and is printed by the 800 Series as soon as it is processed. Because of this, a bitmap dot line should not be sent while a portrait object or a landscape page is being constructed.



---

## Portrait Printing Mode

On power-up, the 800 Series Printer is set for portrait printing. In portrait printing mode, text characters travel out of the printer from the top of the character to the bottom. It is also possible to switch to this mode using the set print orientation command (GS V).

Portrait printing mode is also referred to as immediate mode printing, because each object that is sent to the printer while the printer is in portrait printing mode is printed as soon as the object is completed. No two objects may be printed on the same line in this mode because the ticket is advanced as each object is completed and printed.

Certain commands are disabled or work differently while the 800 Series is in portrait printing mode. Exact details can be found under each command's description.

---

## Landscape Printing Mode

By using the set print orientation command (GS V), the 800 Series Printer can be configured for landscape printing. In landscape printing, text characters travel out of the printer from the left side of the character to the right. Before the 800 Series Printer can be switched to landscape printing mode, the set characters per line command (GS t) must be set. The set characters per line command defines the width of the landscape page. A landscape page is defined as the area allocated by the 800 Series in which landscape text, graphics, bar codes, and line objects may be printed. The height of this landscape page always equals the width of the 800 Series's print head. The width of the landscape page is calculated when the set characters per line command (GS t) is sent. The width of the page is equal to the number of characters per line multiplied by the width of the current font. The default font is 16 dots wide (2 mm), and the default number of characters per line is 80.

In landscape printing mode, completed objects are placed within a memory buffer in the 800 Series and are only printed when the landscape page is terminated. A form feed (FF) character is usually used to terminate a landscape page. This causes the 800 Series to print the objects that have been placed on the landscape page and advance to the next ticket. After a landscape page is printed, the 800 Series will remain in landscape printing mode. If more objects are sent to the 800 Series, a new landscape page will be allocated with a width equal to the previous page. To change the width of a landscape page, you must send the set characters per line command (GS t) followed by the set print orientation command (GS V). Because the 800 Series does not print objects immediately in landscape mode, multiple objects can be placed on the same line. The set horizontal starting position (ESC X) and set vertical starting position (ESC Y) commands allow objects to be placed at any location within a landscape page. In the case of objects positioned to overlap each other, the first object that is sent to the printer will be printed in the overlapping area.

Objects that would normally print below the bottom of the landscape page can be either wrapped to the next ticket or truncated by using the select line wrap/truncate modes command (GS T). Unless the set vertical starting position command (ESC Y) is used, the first object sent will be printed at the top of the landscape page.

---

## General Notes

The 800 Series Printer may be in only one print mode at a time. Multiple areas may be printed in different print modes on a single ticket, but these areas may only be adjacent to one another, they may not overlap.

In any mode, the set feed length command (GS L) is used to determine how far the 800 Series will feed in search of a Black Dot/Top of Form indicator. If the 800 Series finds a Black Dot/Top of Form indicator

before the maximum feed distance is reached, it will stop at that point, rather than continuing. This command is only needed when dealing with continuous-feed tickets.

## Text Objects

A text object is simply a line of printable characters. A text object is created whenever the 800 Series receives a printable character that is not otherwise part of a command. Once it is created, a text object will remain active until it is terminated.

While a text object is active, any printable characters sent to the 800 Series will be added to that text object. The only exceptions are printable characters that are sent as part of a command. While a text object is active, commands that alter text line attributes (such as font and double-high character commands) are ignored. Commands that alter text character attributes (such as double-wide and inverse) may be sent at any time, though.

Line attributes include the five basic fonts (P, M, U, and T), plus the double-high font command (GS DC2). These commands may not be issued while a text object is active; instead they should be issued before a text object is begun. The font line attribute persists until another font command is received. The double-high line attribute persists either until the cancel double-high command (GS DC3) is sent or the current font is changed. The character attribute commands include the set font to double wide (SO) and set inverse print mode (GS RS) commands. These commands may be issued or canceled at any time. Character attributes persist only until the end of a text object.

A text object can be terminated with a carriage return, a line feed, or both, in either combination. If the length of the text object exceeds the space allowed for printing, it will either wrap to the next line or truncate at the end of the printable area. The decision to wrap or truncate is determined by the select line wrap/truncate mode command (GS T). By default, text objects will wrap to the next line.



## Bar Code Objects

A bar code object is created by the print bar code command (GS k). Specified within the command is the symbology to be used, amount of data to be encoded, and data itself. Other attributes of the bar code, such as height and width, can be set using other commands.

The set bar code height command (GS h) specifies the height of the bar code in dots, or 1/8 mm. The maximum height for a bar code is 256 dots or 32 mm. In cases where a taller bar code is needed, a second bar code can be printed below the first at the same left offset. The set bar code module width (GS w) and set bar code element width (GSW) commands can be used to alter the width of the bar code. See the command descriptions later in the next section for a full explanation of the differences between these two commands.

The limitations of each symbology must be adhered to when sending data for a bar code. For example, you should not send alphabetic characters to symbologies that only accept numeric data (like the UPC/EAN symbology).

### Other items must also be considered when printing bar codes:

*(If any of these items are ignored, the printed bar code may be unreadable.)*

- 
- Sufficient blank space on either side of the bar code must be left to create a quiet zone.
  - A good ratio/element size must be selected if the default values are not being used.
  - Adequate room must be available for the bar code to be printed on the ticket.
- 

A bar code object is self-terminating and will be processed as soon as the proper amount of data has been sent to it. The print bar code command's (GS k) second parameter specifies whether a fixed amount of data will be sent or whether delimiters will be used. In either case, the data sent must match the parameter setting. If a fixed number of characters are specified, then the exact number of characters specified must be sent. If delimiters are indicated, then matching characters must be sent before and after the bar code data to specify the beginning and end of the data. If an incorrect number of characters or delimiters are sent, the 800 Series will not print correctly.

Bar codes that are too long to fit within the printable area of a ticket are truncated. This usually results in an unreadable bar code being printed. To correct this condition, a narrower ratio must be set, fewer digits encoded, or a more compact symbology used.

---

## Bar codes

Codabar  
 Code 3 of 9  
 Code 128-A  
 Code 128-B  
 Code 128-C  
 Code 128-Auto  
 EAN-8  
 EAN-13  
 Interleaved 2 of 5  
 UPC-A  
 UPC-E

## Graphic Objects

Graphic objects are created by the landscape printing mode graphics command (GS \*). Graphic objects may only be printed as part of a landscape page. To print a graphic without entering landscape printing mode, you must use bitmap graphics mode.

No landscape graphic may be wider than 256 dots, though they may be as tall as the width of the 800 Series's print head. If a graphic needs to be printed wider than 256 dots, either subdivide it into narrower sections or print it using bitmap graphics commands.

## Line Objects

Line objects are created using the draw line in landscape printing mode command (GS l).

Line objects may only be printed as part of a landscape page. If the length of a line object is set to exceed the printable area of a ticket, the line will be truncated at the end of the printable area.

## Command Reference

This section describes the commands for programming the 800 Series Printer. The commands are listed by name in alphabetical order. Each section contains a description of the command. The ASCII, hexadecimal, and decimal values for each command are also provided. See Appendix A for a list of ASCII, hexadecimal, and binary codes.

**Below are some of the tasks that can be accomplished with the commands:**

---

- Define bar code size and position.
  - Return firmware revision and printer status information.
  - Define ticket orientation.
  - Print graphics in inverse text mode and print enlarged characters.
  - Send line feeds and carriage returns.
-

## Commands

The following command information has been arranged alphabetically.

### **BEL** **Audio alert**

**Description** The default is a single sound, lasting the period of time defined by the audio alert setting. If the audio alert is off, it does not function.

**Expression**

**ASCII** [BEL]

**Hexadecimal** 07H

**Decimal** <7>

**Parameters**

None

### **HT** **Horizontal Tab**

**Description**

Moves cursor position to next multiple of eight single-width characters. Note that double-width characters count as two single-width characters. If the HT command causes the cursor to move beyond the printable area, the text will wrap to the next line.

**Expression**

**ASCII** [HT]

**Hexadecimal** 09H

**Decimal** <9>

**Parameters**

None

### **LF** **Line Feed**

**Description**

Prints the current line of text and advances the text position to the beginning of the next line. Note that the line feed, line feed/carriage return, carriage return, and carriage return/line feed instructions all behave as a single line feed. If the current line extends beyond the printable area, the text will wrap to the next printable area.

All character attributes (including inverse and double-wide text) will be cleared after the line is printed.

**Expression**

**ASCII** [LF]

**Hexadecimal** 0AH

**Decimal** <10>

**Parameters**

None

**FF** **Form Feed****Description**

Prints the contents of the text buffer and advances the print media. The distance the media will advance depends on two factors: the feed distance specified by the GS L command and the presence of a Black Dot/Top of Form indicator. The 800 Series will advance until a Black Dot/Top of Form indicator is detected or until the feed distance (specified by the GS L command) has been reached.

When the printer is powered on, the feed distance stored in NVRAM is used as the default distance; the factory default is 7½ inches. A new feed distance specified by the GS L command will override the NVRAM setting until the printer is either powered down or a reset command is issued (by the ESC @ or ESC \* command).

The FF and ESC E commands are the same and produce the same result.

**Expression**

**ASCII** [FF]

**Hexadecimal** 0CH

**Decimal** <12>

**Parameters**

None

**CR** **Carriage Return****Description**

Prints the current line of text and advances the text position to the beginning of the next line. Note that the line feed, line feed/carriage return, carriage return, and carriage return/line feed instructions all behave as a single line feed. If the current line extends beyond the printable area, the text will wrap to the next printable area. All character attributes (including inverse and double-wide text) will be cleared after the line is printed.

**Expression**

**ASCII** [CR]

**Hexadecimal** 0DH

**Decimal** <13>

**Parameters**

None

**SO** **Set Font to Double Wide****Description**

Causes all the text that follows the command on the same line to be printed as double-wide characters. Double-wide characters are canceled by a line feed (CR or LF) or the DC4 command.

Double wide is a character attribute and is available on a character-by-character basis. Double-wide text can be canceled at any point on the line. Double-wide text is automatically canceled at the end of the line. Therefore, subsequent lines will not be printed as double-wide text unless the SO command is reissued at the beginning of each line.

**See also**

DC4

**Expression**

**ASCII** [SO]

**Hexadecimal** 0EH

**Decimal** <14>

**Parameters**

None

**DC4** **Cancel Double-wide Mode****Description**

Cancels doublewide text printing and returns the text to normal.

**See also**

SO

ESC W

**Expression**

**ASCII** [DC4]

**Hexadecimal** 14H

**Decimal** <20>

**Parameters**

None

**20h - FFh** **Printable Characters****Description**

These characters, while not part of an escape (command) sequence, will be printed using the currently selected font. The standard, printable ASCII characters are associated with their normal values, which range from decimal value 32 to decimal value 126. The other four values are represented as follows:

**Expression**

**Decimal** <32>-<126>, <153>, <169>, <174>, <176>

**Hexadecimal** 20H-7EH, 99H, A9H, AEH, B0H

Character	Name	Decimal	Hexadecimal
™	Trademark	153	99H
©	Copyright	169	A9H
®	Registered	174	AEH
°	Degree	176	B0H

See Appendix A for a summary of character codes.

**Parameters**

None

**ESC BEL <n<sub>1</sub>> <n<sub>2</sub>> <n<sub>3</sub>> Configure audio alert**

**Description** The [ESC] [BEL] <n<sub>1</sub>> <n<sub>2</sub>> <n<sub>3</sub>> command alters the way the audio alert sounds. The default is a single sound lasting the period of time defined by the audio alert setting. The [ESC] [BEL] <n<sub>1</sub>> <n<sub>2</sub>> <n<sub>3</sub>> command allows the sound to be altered.

**ASCII** [ESC] [BEL] <n<sub>1</sub>> <n<sub>2</sub>> <n<sub>3</sub>>

**Hexadecimal** 1BH 07H <n<sub>1</sub>> <n<sub>2</sub>> <n<sub>3</sub>>

**Decimal** <27> <7> <n<sub>1</sub>> <n<sub>2</sub>> <n<sub>3</sub>>

**Where** <n<sub>1</sub>> is the number of alert cycles  
 <n<sub>2</sub>> is the on time of the alert cycle in ten Ms intervals  
 <n<sub>3</sub>> is the off time of the alert cycle in ten Ms intervals

**ESC \* Reset to Defaults**

**Description** Returns the printer to its power-up condition, clears all buffers, and resets all character attributes. The ESC \* command is the same as the ESC @ command.

**See also**

ESC @

**Expression**

**ASCII** [ESC] \*

**Hexadecimal** 1BH 2AH

**Decimal** <27> <42>

**Parameters**

None

**ESC @ Reset to Power-up Condition**

**Description** Returns the printer to its power-up condition, clears all buffers, and resets all character attributes. The ESC @ command is the same as the ESC \* command.

**See also**

ESC \*

**Expression**

**ASCII** [ESC] @

**Hexadecimal** 1BH 40H

**Decimal** <27> <64>

**Parameters**

None

**ESC E****Form Feed****Description**

Prints the contents of the text buffer and advances the print media. The distance the media will advance depends on two factors: the feed distance specified by the GS L command and the presence of a top of form indicator. The 800 Series will advance until a top of form indicator is detected or until the feed distance (specified by the GS L command) has been reached.

When the printer is powered on, the feed distance stored in NVRAM is used as the default distance; the factory default is 7½ inches. A new feed distance specified by the GS L command will override the NVRAM setting until the printer is either powered down or a reset command is issued (by the ESC @ or ESC \* command). The FF and ESC E commands are the same and produce the same result.

**See also**

FF

**Expression****ASCII** [ESC] E**Hexadecimal** 1BH 2AH**Decimal** <27> <69>**Parameters**

None

**ESC J****Feed *n* Sublines****Description**

Feeds *n* number of sublines (*n*/203 inch). This command causes the printer to print data stored in the buffer and then feed *n* number of dot lines. This command is similar to the GS d command.

**See also**

GS d

**Expression****ASCII** [ESC] J <*n*>**Hexadecimal** 1BH 4AH <*n*>**Decimal** <27> <74> <*n*>**Parameters***n* = the desired number of sublines to feed



**ESC M****Set Font to 12 cpi****Description**

Changes to the 12 cpi normal font. The cell dimension is 32H x 16W. This is the default font.

Fonts may only be changed at the beginning of a line, prior to any printable characters. This font will remain in effect until the printer is reset (by the ESC @ or ESC \* command) or another font is selected.

**See also**

ESC P

ESC T

ESC U

**Expression****ASCII** [ESC] M <n>**Hexadecimal** 1BH 4AH <n>**Decimal** <27> <77> <n>**Parameters**

None

Font	Height	Width	Horizontal cpi	Vertical cpi
ESC P	24	12	16.9	8.4
ESC M	32	16	12.7	6.4
ESC U	32	20	10.2	6.4
ESC T	56	28	7.3	3.6

Table 7 Specifications for setting font to 12 cpi

**ESC P****Set Font to 16 cpi****Description**

Changes to the 16 cpi mini font. The cell dimension is 24H x 12W. Fonts may only be changed at the beginning of a line, prior to any printable characters. This font will remain in effect until the printer is reset (by the ESC @ or ESC \* command) or another font is selected.

**See also**

ESC M

ESC T

ESC U

**Expression****ASCII** [ESC] P**Hexadecimal** 1BH 50H**Decimal** <27> <80>**Parameters**

None

Font	Height	Width	Horizontal cpi	Vertical cpi
ESC P	24	12	16.9	8.4
ESC M	32	16	12.7	6.4
ESC U	32	20	10.2	6.4
ESC T	56	28	7.3	3.6

Table 8 Specifications for setting font to 16 cpi

**ESC T****Set Font to 7 cpi****Description**

Changes to the 7 cpi headline font. The cell dimension is 56H x 28W. Fonts may only be changed at the beginning of a line, prior to any printable characters. This font will remain in effect until the printer is reset (by the ESC @ or ESC \* command) or another font is selected.

**See also**

ESC M

ESC P

ESC U

**Expression****ASCII** [ESC] T**Hexadecimal** 1BH 54H**Decimal** <27> <84>**Parameters**

None

Font	Height	Width	Horizontal cpi	Vertical cpi
ESC P	24	12	16.9	8.4
ESC M	32	16	12.7	6.4
ESC U	32	20	10.2	6.4
ESC T	56	28	7.3	3.6

Table 9 Specifications for setting font to 7 cpi

**ESC U****Set Font to 10 cpi****Description**

Changes to the 10 cpi headline font. The cell dimension is 32H x 20W.

Fonts may only be changed at the beginning of a line, prior to any printable characters. This font will remain in effect until the printer is reset (by the ESC @ or ESC \* command) or another font is selected.

**See also**

ESC M

ESC P

ESC T

**Expression****ASCII** [ESC] U**Hexadecimal** 1BH 54H**Decimal** <27> <85>**Parameters**

None

Font	Height	Width	Horizontal cpi	Vertical cpi
ESC P	24	12	16.9	8.4
ESC M	32	16	12.7	6.4
ESC U	32	20	10.2	6.4
ESC T	56	28	7.3	3.6

Table 10 Specifications for setting font to 10 cpi

**ESC V****Return Firmware Revision****Description**

Returns two ASCII characters that represent the firmware revision.

**Expression**

**ASCII** [ESC] V  
**Hexadecimal** 1BH 56H  
**Decimal** <27> <86>  
**Parameters**  
 None

**ESC W****Wrap Data****Description**

Causes the characters *n1* and *n2* to be echoed back to the host. As soon as *n1* is received by the printer, the printer, in turn, will transmit *n1* back to the host. Your program should wait to receive *n1* before outputting *n2*. If you do not wait, you may lose *n1*. If *n1* and *n2* are received successfully by the host, you can be reasonably assured that there is an 800 Series attached to the serial port and your program can communicate with the printer.

**Expression**

**ASCII** [ESC] W *n1 n2*  
**Hexadecimal** 1BH 76H *n1 n2*  
**Decimal** <27> <87> *n1 n2*  
**Parameters**  
*n1* = first character to echo  
*n2* = second character to echo

**ESC X****Set Horizontal Starting Position****Description**

This command is used in landscape printing to set a new offset from the left margin from which to begin printing text and bar code objects. Distance is specified in dots (1 dot = 1/203 inch). The *n1* and *n2* parameters are evaluated to form a 16-bit word as follows: first, the *n1* parameter's decimal value is multiplied by 256, then the result is added to the decimal value of the *n2* parameter.

**Expression**

**ASCII** [ESC] X *n1 n2*  
**Hexadecimal** 1BH 76H *n1 n2*  
**Decimal** <27> <88> *n1 n2*  
**Parameters**  
*n1* = high-order byte of 16-bit word that specifies distance  
*n2* = low-order byte of 16-bit word that specifies distance

**ESC Y****Set Vertical Starting Position****Description**

Used in landscape printing to set a new offset from the top margin from which to begin printing text and bar code objects. Distance is specified in millimeters. The 800 Series Printer print heads are 56 millimeters wide.

**Expression**

**ASCII** [ESC]Y *n*  
**Hexadecimal** 1BH 59H *n*  
**Decimal** <27> <89> *n*  
**Parameters**

$n$  = the offset distance in millimeters

## **GS DC2** **Set Font to Double-high**

### **Description**

Causes the current font to be printed at twice its normal height. The double-high setting will remain in effect until the current line attributes are cleared.

### **See also**

GS DC3

### **Expression**

**ASCII** [GS] [DC2]

**Hexadecimal** 1DH 12H

**Decimal** <29> <18>

### **Parameters**

None

## **GS DC3** **Cancel Double-high Font**

### **Description**

Cancels the double-high characters and returns to normal size font. This command must be sent at the beginning of a line, in front of any printable characters.

### **See also**

GS DC2

### **Expression**

**ASCII** [GS] [DC3]

**Hexadecimal** 1DH 13H

**Decimal** <29> <19>

### **Parameters**

None

## **GS RS** **Set Inverse Print Mode**

### **Description**

Causes all the data that follows the command and appears on the current line to be printed as inverse characters (white on black). Inverse characters are canceled when character attributes are canceled.

### **See also**

GS US

### **Expression**

**ASCII** [GS] [RS]

**Hexadecimal** 1DH 1EH

**Decimal** <29> <30>

### **Parameters**

None

**GS US****Cancel Inverse Print Mode****Description**

Cancels the inverse print mode (white on black) and returns text back to its normal attributes for the remainder of the current line.

**See also**

GS RS

**Expression**

**ASCII** [GS] [US]

**Hexadecimal** 1DH 1FH

**Decimal** <29> <31>

**Parameters**

None

**GS \*****Landscape Mode Graphics****Description**

Prints a graphic image (in landscape mode only).

**Expression**

**ASCII** [GS] \* n1 n2 t h w d1...dm

**Hexadecimal** 1DH 2AH n1 n2 t h w d1...dm

**Decimal** <29> <42> <n1> <n2> <t> <h> <w> <d1...dm>

**Parameters**

*n1* = most significant byte of left offset

*n2* = least significant byte of left offset

*t* = offset from top (in millimeters)

*h* = height of graphic (in millimeters)

*w* = width of graphic (in dots)

*d1* = first data byte

*dm* = last data byte ( $h * w$ )

**GS /****Define Void Print (860 only)****Description**

User can change the default text that is printed when a ticket is automatically voided during the void and reprint.

**Expression**

**ASCII** [GS] / <n>....

**Hexadecimal** 1DH 2FH <n>....

**Decimal** <29> <47> <n> ...

**Parameters**

*n* = 0 First Void Text

*n* = 1 Second Void Text

Note: All data following the <n> is entered into a buffer until a NUL is found. Text can not exceed 512 bytes of data , commands are allowed in the text string, but they should not contain a NUL character.

**GS A Starting Position of Bar Code****Description**

Defines the distance from the left where the first bar code will print. The distance is represented in  $n/203$ -inch (dot) increments. This command is used to center a bar code on a text line.

**Expression**

**ASCII** [GS] A  $n1 n2$

**Hexadecimal** 1DH 41H  $n1 n2$

**Decimal** <29> <65>  $n1 n2$

**Parameters**

$n1$  = the most significant byte

$n2$  = the least significant byte

Inches/203 =  $(n1 * 256) + n2$

Length (in inches)	Number of Dots	n1	n2
0.5	102	0	102
1.0	203	0	203
2.0	406	1	150
3.0	609	2	97

Table 11 Starting position of bar code

**GS G** **Print Custom Graphic**

**Description**

Prints a custom graphic. These graphics are predefined by the manufacturer.

**Expression**

**ASCII** [GS] G *n1 n2 t d*

**Hexadecimal** 1DH 47H *n1 n2 t d*

**Decimal** <29> <71> <*n1*> <*n2*> <*t*> <*d*>

**Parameters**

*n1* = the most significant byte of left offset

*n2* = the least significant byte of left offset

*t* = offset from top (in millimeters)

*d* = the direction to print the arrow. Right = 0; Left = 1

0 = Arrow (→) graphic with inverted “INSERT FACE UP” text inside.

If you were looking at a ticket printed in landscape mode, the arrow will point to the right.

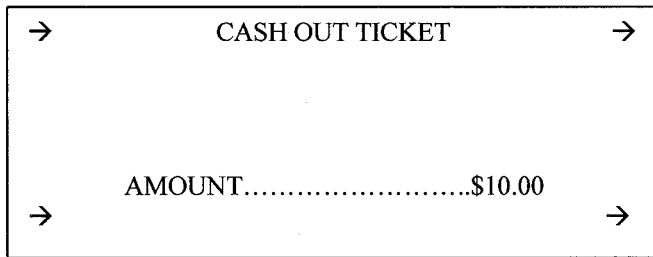


Figure 19 Printing Custom Graphics

1 = Arrow (←) graphic with inverted “INSERT FACE UP” text inside.

If you were looking at a ticket printed in landscape mode, the arrow will point to the left.

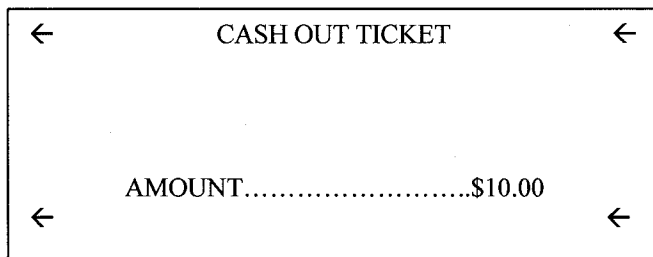


Figure 20 Printing Custom Graphics

**GS L****Set Feed Length****Description**

Sets the distance the print media will advance upon receipt of a form feed (FF or ESC E) command. The distance is defined as  $n/203$  inches. The number of dots =  $n1 * 256 + n2$ .

**Expression**

**ASCII** [GS] L *n1 n2*

**Hexadecimal** 1DH 4CH *n1 n2*

**Decimal** <29> <76> *n1 n2*

**Parameters**

*n1* = the most significant byte

*n2* = the least significant byte

$\text{inches}/203 = (n1 * 256) + n2$

Length (in inches)	Number of Dots	n1	n2
0.5	102	0	102
1.0	203	0	203
2.0	406	1	150
3.0	609	2	97
4.0	812	3	44
5.0	1015	3	247
6.0	1218	4	194
7.0	1421	5	141
8.0	1624	6	88

Table 12 Set Feed Length Specifications

**GS S****Return Printer Status****Description**

Returns a single status byte. The printer status is determined by testing the individual bits within the returned status byte. Only bits that have defined values should be tested. Do not test bits designated as reserved. When polling for the status byte, your program must wait for the status byte to arrive. The printer will take several milliseconds to process the request and then transmit the status byte. If your program does not wait for a received character, you may receive erroneous results. ESC A and GS S are functionally identical. ESC A is provided for compatibility with the Ithaca 800 Series Printer bitmap graphics mode. If possible, you should use GS S in order to ensure future compatibility.

**Expression**

**ASCII** [GS] S

**Hexadecimal** 1DH 53H

**Decimal** <29> <83>

**Parameters**

None

**Returns**

Bit	Bit = 0	Bit = 1
0 LSB	Printer Ready	Printer Not Ready
1	Not Top of Form	Top of Form
2	RESERVED	1 Always
3	Head is Down	Head is Up
4	Door is Closed	Door is Open
5	Ticket Loaded	Out of Ticket
6	RESERVED	1 Always
7 MSB	RESERVED	RESERVED



**GS T Select Line Wrap/Truncate Modes****Description**

Determines how to handle a text wrap condition. A text wrap condition occurs when text extends beyond the end of a line or a page. The default is to wrap at the end of a line and a page.

**Expression**

**ASCII** [GS] T <n>

**Hexadecimal** 1DH 54H <n>

**Decimal** <29> <84> <n>

**Parameters**

*n* = 0 truncate in both directions

*n* = 1 wrap at end of line, but not end of page

*n* = 2 wrap at end of page, but not end of line

*n* = 3 wrap at end of line and end of page

**GS V Set Print Orientation****Description**

Causes the printer to print the data stored in the print buffer and then change to the selected orientation.

**See also**

GS t

**Expression**

**ASCII** [GS] V *n*

**Hexadecimal** 1DH 56H <n>

**Decimal** <29> <86> <n>

**Parameters**

*n* = Specifies the orientation and speed/resolution

*n* = 0 Portrait 203 x 203 High Speed

*n* = 1 Landscape 203 x 203 High Speed



Figure 21 Print Orientation

**GS W Set Bar Code Element Width****Description**

Selects the horizontal size of a bar code element. The “Thin” parameter represents the thickness of the thin bars (in dots). The “Thick” parameter represents the thickness of the thick bars (in dots). Each dot measures 0.0049 inches in 203 dpi and 0.0073 inches in 138 dpi.

In Code 39, Interleaved 2 of 5, and Codabar, the thick bar width is set according to the “Thick” parameter, however, all other symbologies ignore the “Thick” parameter. The “Thin” parameter is used by all symbologies.

**Expression**

<b>ASCII</b>	[GS] W Thin Thick
<b>Hexadecimal</b>	1DH 57H Thin Thick
<b>Decimal</b>	<29> <87> Thin Thick

**Parameters**

*Thin* = thickness of thin bars

*Thick* = thickness of thick bars

**GS a <n> Barcode Verification (860 only)****Description**

Defines if the printer will respond with a barcode verification status. If selected, the printer will respond with a [ACK] B if the barcode is ok, or [NAK] B if the barcode is bad.

**Parameters**

*N=1* (turn, ON)

*0* (turn OFF)

*Note: This command is only available on the M860*

**GS d** **Feed *n* Text Lines****Description**

Prints the contents of the buffer and feeds *n* number of text lines. This command has the same effect as line feeds.

**See also**

ESC J

**Expression**

**ASCII**           [GS] d <*n*>

**Hexadecimal**   1DH 64H <*n*>

**Decimal**        <29> <100> <*n*>

**Parameters**

*n* = the desired distance (in text lines) to advance the print head

**GS h** **Set Bar Code Height****Description**

Defines the height of the bars (in dots) for bar codes. The height is defined in *n*/203 inch increments. For example, specify 203 as the value for *n* to print a 1-inch high bar code. The bar code height is always rounded up to the next multiple of 8.

**Expression**

**ASCII**           [GS] h <*n*>

**Hexadecimal**   1DH 68H<*n*>

**Decimal**        <29> <104> <*n*>

**Parameters**

*n* = the desired height (in dot lines) of the bar code

**GS k****Print Bar Code****Description**

Prints a bar code at the current position in the current orientation. The *n* parameter selects the symbology to be printed. The *m* parameter specifies how many characters are to be encoded as part of the bar code. If the number of characters to be encoded is variable, the *m* parameters can be set to zero. This will cause the printer to read the next character sent as a delimiter character. Further characters will then be encoded into the bar code until a character is found that matches the start character.

**Expression**

**ASCII** [GS] k <*n*> <*m*> *d1...dm*

**Hexadecimal** 1DH 6BH <*n*> <*m*> *d1...dm*

**Decimal** <29> <107> <*n*> <*m*> *d1...dm*

**Parameters**

*n* = Selects the bar code symbology to be used

*m* = Specifies the number of characters to be encoded.

Also specifies which EAN/UPC symbology will be used.

*d1...dm* = The data characters to be encoded

Character Value	Bar Code Selected	
n = 0	reserved	
n = 1	reserved	
n = 2	EAN/UPC Auto	
	m = 6	UPC-E
	m = 7	EAN-8
	m = 11	UPC-A
	m = 12	EAN-13
n = 3	reserved	
n = 4	Code 3 of 9	
n = 5	reserved	
n = 6	Codabar	
n = 7	Interleaved 2 of 5	
n = 8	Code 128-A	
n = 9	Code 128-B	
n = 10	Code 128-C	
n = 11	Code 128-Auto	
n = 12	reserved	
n = 13	reserved	
n = 14	reserved	
n = 15	reserved	

**GS l** **Draw Line in Landscape Mode****Description**

Draws a line in landscape mode. The thickness of the line is determined by the bit set by the data, *m*.

**Expression**

**ASCII** [GS] l <n1> <n2> <L1> <L2> <m>

**Hexadecimal** 1DH 6CH <n1> <n2> <L1> <L2> <m>

**Decimal** <29> <108> <n1> <n2> <L1> <L2> <m>

**Parameters**

*n1* = most significant byte of the offset from the left (in dots)

*n2* = least significant byte of the offset from the left (in dots)

*L1* = most significant byte of the line length (in dots)

*L2* = least significant byte of the line length (in dots)

- **where:**

- offset = inches/203 =  $(n1 * 256) + n2$

- length = inches/203 =  $(L1 * 256) + L2$

- *m* = the data (where 0 = top and 7 = bottom)

**GS t** **Set Characters per Line in Landscape****Description**

Creates an internal memory buffer to store landscape text and bar codes until a form feed is received. The size of the buffer is determined by *n*, the number of characters per line. The *n* parameter is converted internally to millimeters, so new line lengths can be automatically calculated in the event a font change takes place. The conversion to millimeters is done by multiplying the value of *n* by the width of whatever font is currently set when the GS t command is sent.

This command may be used in conjunction with the GS T command to determine where, if at all, text wraps to the next line.

This command is similar to the GS u command.

**See also**

GS u

GS T

**Expression**

**ASCII** [GS] t <*n*>

**Hexadecimal** 1DH 74H <*n*>

**Decimal** <29> <116> <*n*>

**Parameters**

*n* = the desired number of characters per line in landscape mode

**GS u** **Set Characters per Line in Portrait****Description**

Creates an internal memory buffer to store portrait text and bar codes. The size of the buffer is determined by  $n$ , the number of characters per line. The  $n$  parameter is converted internally to millimeters, so new line lengths can be automatically calculated in the event that a font change takes place. The conversion to millimeters is done by multiplying the value of  $n$  by the width of whatever font is currently set when the GS u command is sent.

This command may be used in conjunction with the GS T command to determine where, if at all, text wraps to the next line. This command is similar to the GS t command.

**See also**

GS t

GS T

**Expression**ASCII [GS] u  $\langle n \rangle$ Hexadecimal 1DH 75H  $\langle n \rangle$ Decimal  $\langle 29 \rangle$   $\langle 117 \rangle$   $\langle n \rangle$ **Parameters**

$n$  = the desired number of characters per line in portrait mode.

**GS w** **Set Bar Code Module Width****Description**

Selects the horizontal size of a bar code module. The parameter,  $n$ , represents the thickness of the thin bars (in dots). Each dot measures 0.0049 inches in 203 dpi and 0.0073 inches in 138 dpi. With Code 39, Interleaved 2 of 5, and Codabar, the thick bars will be automatically adjusted to  $2 * n$ .

**Expression**ASCII [GS] w  $\langle n \rangle$ Hexadecimal 1DH 77H  $\langle n \rangle$ Decimal  $\langle 29 \rangle$   $\langle 119 \rangle$   $\langle n \rangle$ **Parameters**

$n$  = the desired horizontal size (in dots) of thin bar codes; with Code 39, Interleaved 2 of 5, and Codabar, thick bar codes =  $2 * n$

**GS z Request Printer Status**

**Description**

Returns a single status byte. The printer status is determined by testing the individual bits within the returned status byte. Do not test bits designated as reserved. All sensor bits defined below are debounced reading of the hardware sensors.

**Expression**

**ASCII** [GS] z  
**Hexadecimal** 1DH 7AH  
**Decimal** <29> <122>

**Parameters**

None

**Returns**

<b>Bit</b>	<b>Bit = 0</b>	<b>Bit = 1</b>
0 LSB	Ticket not low	Ticket low
1	Ticket not in printer	Ticket in printer
2	Not Top of Form State	Top of Form State
3	(logical)Ticket loaded	Ticket not loaded <sup>1</sup>
4	Bar Code not Completed	Bar Code Completed
5	Ticket not Completed	Ticket Completed
6	Ticket not in path	Ticket in path
7 MSB	No paper jam	Paper Jam

---

<sup>1</sup>This status will also be set for Door Open or Head Up. Head Up and Door Open status are available on [GS] S command.

## Available Commands

Name	Description	Page
BEL	Audio alert	36
HT	Horizontal Tab	36
LF	Line Feed	36
FF	Form Feed	37
CR	Carriage Return	37
SO	Set Font to Double Wide	37
DC4	Cancel Double-wide Mode	38
ESC BEL	Configure audio alert	39
20h - FFh	Printable Characters	38
ESC *	Reset to Defaults	39
ESC @	Reset to Power-up Condition	39
ESC E	Form Feed	40
ESC J <i>n</i>	Feed <i>n</i> Sublines	40
ESC T	Set Font to 7 cpi	42
ESC M	Set Font to 12 cpi	41
ESC P	Set Font to 16 cpi	41
ESC U	Set Font to 10 cpi	42
ESC V	Return Firmware Revision	43
ESC W <i>n1 n2</i>	Wrap Data	43
ESC X <i>n1 n2</i>	Set Horizontal Starting Position	43
ESC Y <i>n1</i>	Set Vertical Starting Position	43
GS DC2	Set Font to Double High	44
GS DC3	Cancel Double High	44
GS RS	Set Inverse Print Mode	44
GS US	Cancel Inverse Print Mode	45
GS * <i>n1 n2 t h w dl...dm</i>	Landscape Mode Graphics	45
GS / < <i>n</i> >...	Void Print Text	45
GS A <i>n1 n2</i>	Bar Code Start Position	46
GS G <i>n1 n2 t d</i>	Print Custom Graphic	47
GS L <i>n1 n2</i>	Set Feed Length	48
GS S	Return Printer Status	48
GS T < <i>n</i> >	Select Line Wrap/Truncate Modes	49
GS V < <i>n</i> >	Set Print Orientation	49
GS W <i>Thin Thick</i>	Set Bar Code Element Width	50
GS a < <i>n</i> >	Turn ON/OFF Barcode Verification Status	50
GS d < <i>n</i> >	Feed <i>n</i> Text Lines	51
GS h < <i>n</i> >	Set Bar Code Height	51
GS k <i>n m dl...dk</i>	Print Bar Code	52
GS l <i>n1 n2 l1 l2 m</i>	Draw Line in Landscape Mode	53
GS t < <i>n</i> >	Set Characters per Line (Landscape)	53
GS u < <i>n</i> >	Set Characters per Line (Portrait)	54
GS w < <i>n</i> >	Set Bar Code Module Width	54



## Appendix A: Character Codes

Below is a list showing the ASCII codes from 1 to 176. The list shows the ASCII characters and names, and the corresponding decimal, hexadecimal, and binary values.

The ^ symbol represents the control key on your keyboard.

Character	Name	Decimal	Hexadecimal	Binary
None	NUL	0	00	0000 0000
^A	SCH	1	01	0000 0001
^B	STX	2	02	0000 0010
^C	ETX	3	03	0000 0011
^D	EOT	4	04	0000 0100
^E	ENQ	5	05	0000 0101
^F	ACK	6	06	0000 0110
^G	BEL	7	07	0000 0111
^H	BS	8	08	0000 1000
^I	HT	9	09	0000 1001
^J	LF	10	0A	0000 1010
^K	VT	11	0B	0000 1011
^L	FF	12	0C	0000 1100
^M	CR	13	0D	0000 1101
^N	SO	14	0E	0000 1110
^O	SI	15	0F	0000 1111
^P	DLE	16	10	0001 0000
^Q	DC1	17	11	0001 0001
^R	DC2	18	12	0001 0010
^S	DC3	19	13	0001 0011
^T	DC4	20	14	0001 0100
^U	NAK	21	15	0001 0101
^V	SYN	22	16	0001 0110
^W	ETB	23	17	0001 0111
^X	CAN	24	18	0001 1000
^Y	EM	25	19	0001 1001
^Z	SUB	26	1A	0001 1010
^[	ESC	27	1B	0001 1011
^\	FS	28	1C	0001 1100
^]	GS	29	1D	0001 1101
^^	RS	30	1E	0001 1000
^	US	31	1F	0001 1111
Space	space	32	20	0010 0000
!	exclamation pt.	33	21	0010 0001
"	quotation mark	34	22	0010 0010
#	number sign	35	23	0010 0011
\$	dollar sign	36	24	0010 0100

Character	Name	Decimal	Hexadecimal	Binary
%	percent sign	37	25	0010 0101
&	ampersand	38	26	0010 0110
'	apostrophe	39	27	0010 0111
(	open parentheses	40	28	0010 1000
)	close parentheses	41	29	0010 1001
*	asterisk	42	2A	0010 1010
+	plus sign	43	2B	0010 1011
,	comma	44	2C	0010 1100
-	hyphen	45	2D	0010 1101
.	period	46	2E	0010 1110
/	slash	47	2F	0010 1111
0	zero	48	30	0011 0000
1	one	49	31	0011 0001
2	two	50	32	0011 0010
3	three	51	33	0011 0011
4	four	52	34	0011 0100
5	five	53	35	0011 0101
6	six	54	36	0011 0110
7	seven	55	37	0011 0111
8	eight	56	38	0011 1000
9	nine	57	39	0011 1001
:	colon	58	3A	0011 1010
;	semicolon	59	3B	0011 1011
<	less than sign	60	3C	0011 1100
=	equal sign	61	3D	0011 1101
>	greater than sign	62	3E	0011 1110
?	question mark	63	3F	0011 1111
@	at sign	64	40	0100 0000
A	capital A	65	41	0100 0001
B	capital B	66	42	0100 0010
C	capital C	67	43	0100 0011
D	capital D	68	44	0100 0100
E	capital E	69	45	0100 0101
F	capital F	70	46	0100 0110
G	capital G	71	47	0100 0111
H	capital H	72	48	0100 1000
I	capital I	73	49	0100 1001
J	capital J	74	4A	0100 1010
K	capital K	75	4B	0100 1011
L	capital L	76	4C	0100 1100
M	capital M	77	4D	0100 1101
N	capital N	78	4E	0100 1110
O	capital O	79	4F	0100 1111
P	capital P	80	50	0101 0000
Q	capital Q	81	51	0101 0001
R	capital R	82	52	0101 0010
S	capital S	83	53	0101 0011
T	capital T	84	54	0101 0100

Character	Name	Decimal	Hexadecimal	Binary
U	capital U	85	55	0101 0101
V	capital V	86	56	0101 0110
W	capital W	87	57	0101 0111
X	capital X	88	58	0101 1000
Y	capital Y	89	59	0101 1001
Z	capital Z	90	5A	0101 1010
[	open bracket	91	5B	0101 1011
\	back slash	92	5C	0101 1100
]	close bracket	93	5D	0101 1101
^	caret	94	5E	0101 1110
_	underscore	95	5F	0101 1111
`	accent grave	96	60	0110 0000
a	lowercase a	97	61	0110 0001
b	lowercase b	98	62	0110 0010
c	lowercase c	99	63	0110 0011
d	lowercase d	100	64	0110 0110
e	lowercase e	101	65	0110 0101
f	lowercase f	102	66	0110 0110
g	lowercase g	103	67	0110 0111
h	lowercase h	104	68	0110 1000
i	lowercase i	105	69	0110 1001
j	lowercase j	106	6A	0110 1010
k	lowercase k	107	6B	0110 1011
l	lowercase l	108	6C	0110 1100
m	lowercase m	109	6D	0110 1101
n	lowercase n	110	6E	0110 1110
o	lowercase o	111	6F	0110 1111
p	lowercase p	112	70	0111 0000
q	lowercase q	113	71	0111 0001
r	lowercase r	114	72	0111 0010
s	lowercase s	115	73	0111 0011
t	lowercase t	116	74	0111 0100
u	lowercase u	117	75	0111 0101
v	lowercase v	118	76	0111 0110
w	lowercase w	119	77	0111 0111
x	lowercase x	120	78	0111 1000
y	lowercase y	121	79	0111 1001
z	lowercase z	122	7A	0111 1010
{	open brace	123	7B	0111 1011
	vertical line	124	7C	0111 1100
}	close brace	125	7D	0111 1101
~	tilde	126	7E	0111 1110
Delete	DEL	127	7F	0111 1111
™	Trademark	153	99	1001 1001
©	Copyright	169	A9	1010 1001
®	Registered	174	AE	1010 1110
°	Degree	176	B0	1011 0000

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