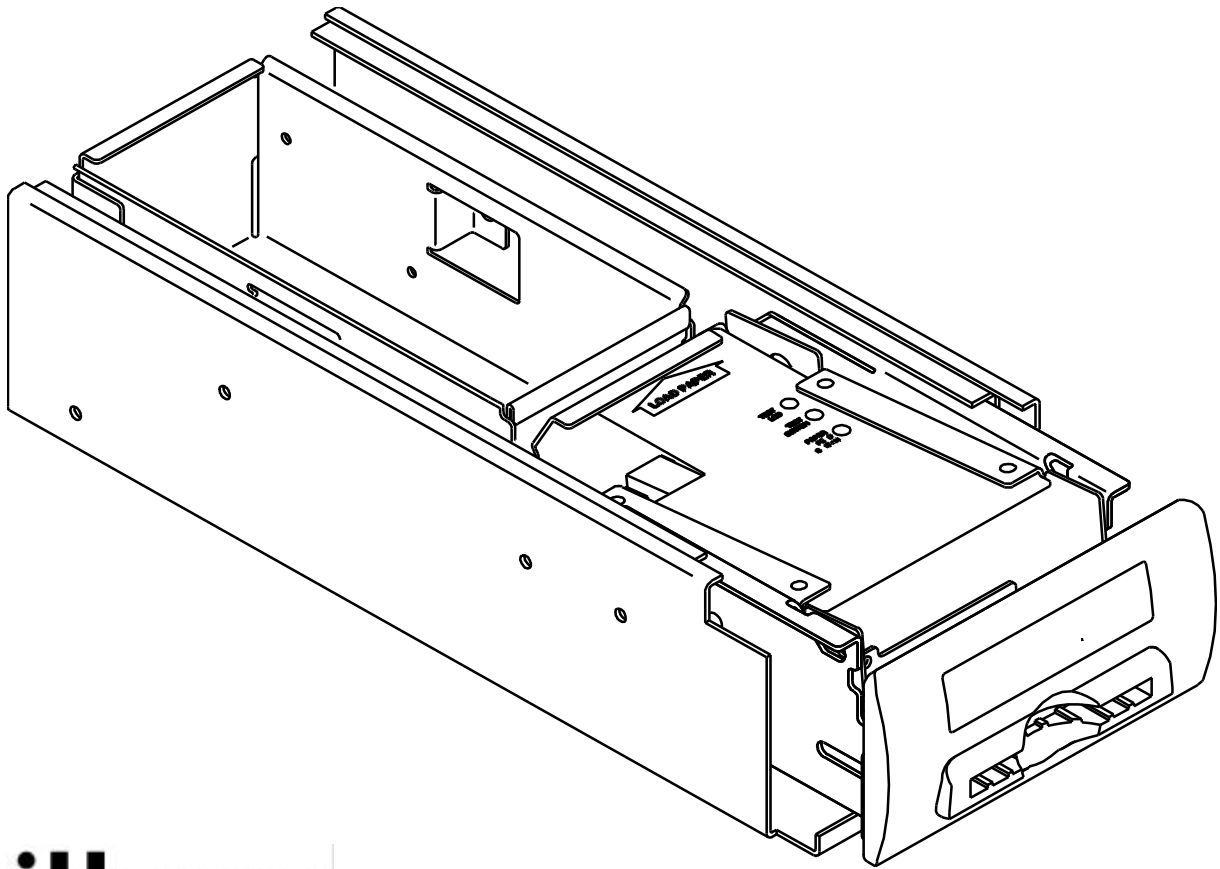


700 Series

Model 750

OEM Integration Manual



ithaca
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PN: 70-00240

Rev G

Change History

- Rev A Initial Release
- Rev B Correct Ticket Present Sensor and Black Dot Sensor Location information
Added RMA Procedure Section with Service Section.
- Rev C Changed Paper Chassis wording to Ticket Supply Box.
- Rev D Updated GSz Command, and corrected ESC c, ESC d, ESC e commands. Added (note 1 on pg. 82)
Added new 65mm x 156mm drawing and specifications on pg. 21. Took out Maxicode/Barcode on page 81.
Added print head cleaning instructions and card ordering info on pg. 39.
- Rev E Took out references to 20 cpi [ESC] s command. Took out ESC F1 “Feed Sublines” information. Took out all undocumented commands.
- Rev F various updates to the mounting dimension views & converted all dims to inches(millimeters)
- Rev G Updated disclaimer

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. Specifications within this document are for both 62-mm and 65-mm wide tickets. Early demo units only support 62-mm tickets.

Note:

All figure specifications are given in inches. 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 Model 750. This manual is to be used for integration purposes only. If this manual contains any questionable information or mistakes please contact TransAct for assistance.

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Chapter 1: Introduction

Who should read this guide?

This document provides information useful to the original equipment manufacturer (OEM) who will integrate the 700 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 700 Series printer and its options. Starting with *Chapter 2: 700 Series Configuration System*, this manual provides an overview of the Model 750's optional configurations, specifications and features. Following this section, each option is shown, and all relevant information is organized into several sub-categories. These sub-categories are carried across each option and cover topics such as:

-
- Specifications/Custom Specifications

 - Chassis Mounting/Mounting Locations

 - Integration Specifics and Recommendations

 - Power and Interface Communications

Warranty Options

All 700 Series Printers come with a standard 12-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). See "Contacting TransAct's Ithaca Facility" on page 2.

Internet Support

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 700 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 700 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, which ever 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 700 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 700 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

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	http://www.transact-tech.com

Chapter 2: 700 Series Configuration System

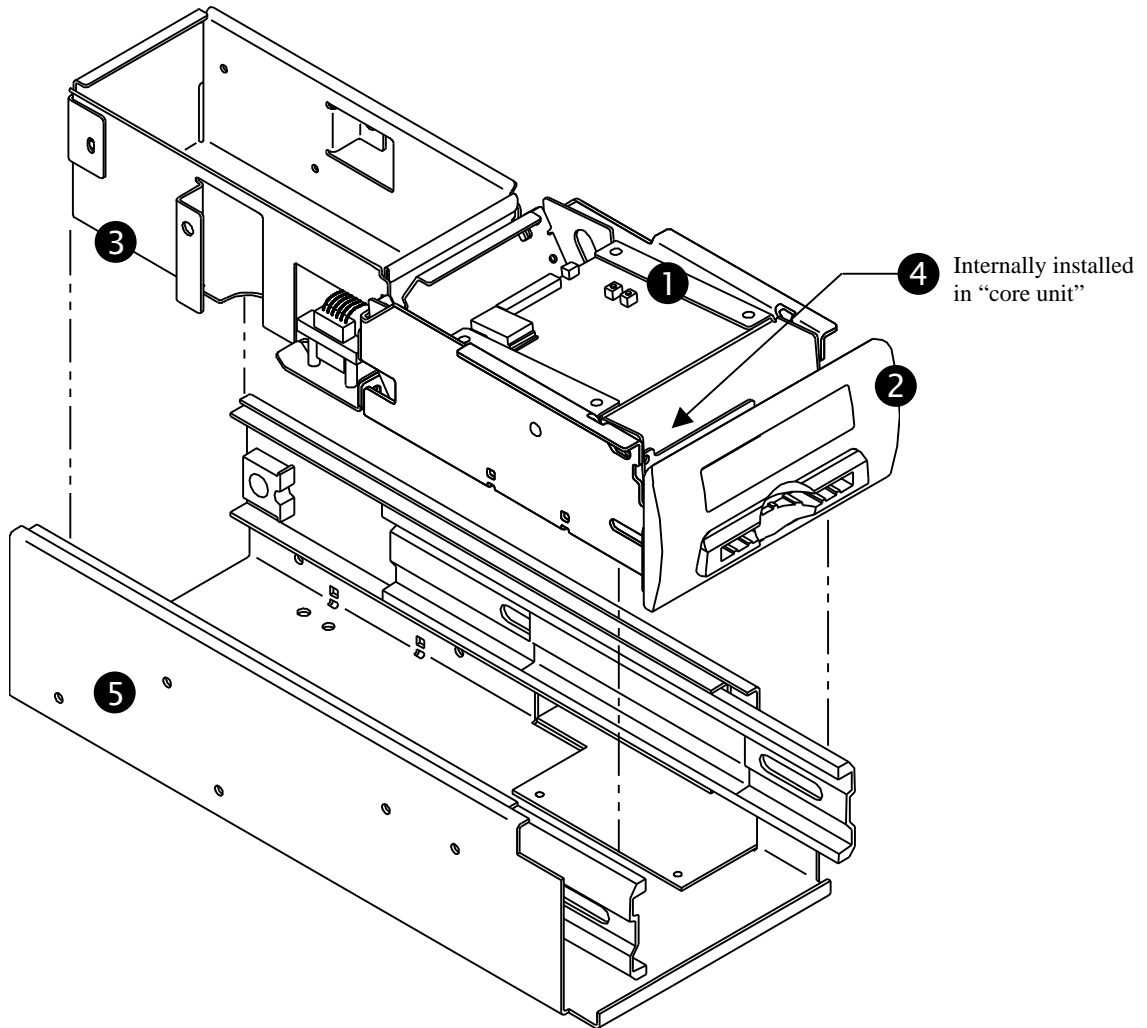


Figure 1 700 Series Core unit and configurable options

- 1 700 Series Printer (“Core Unit” Main Chassis Assembly)
- 2 Bezel Assembly Option
- 3 Ticket Supply Box (specify size)
- 4 Ticket Present Sensor Option
- 5 Drawer Chassis Assembly

Model 750 “Core” Printer: Main Chassis Assembly

The 700 Series printer operates with a unique system that allows for printing and presentation of the ticket, without allowing for ticket removal during printing. The ticket remains out of the reach of the user until all printing is complete. The perforation is located at a tear bar. Only in that position is the ticket protruding from the bezel and the perforation easy to tear. Even if the user removes the ticket before the ticket is completely presented, there will be no disturbance of the graphics as all printing is complete. The following ticket will then proceed to the correct printing position, unaffected by the premature removal. This system requires a specific ticket length and a Black Dot/Top of Form indicator in a precise location for presentation to work as described. Both of these features keep the ticket in the proper locations for printing and separation. Any changes to these features require consideration of the presentation scheme. The benefit of the Model 750 is to allow for the entire printer and Ticket Supply Box to be removed through a 4.68 by 2.38 inch opening in the front of the printer.

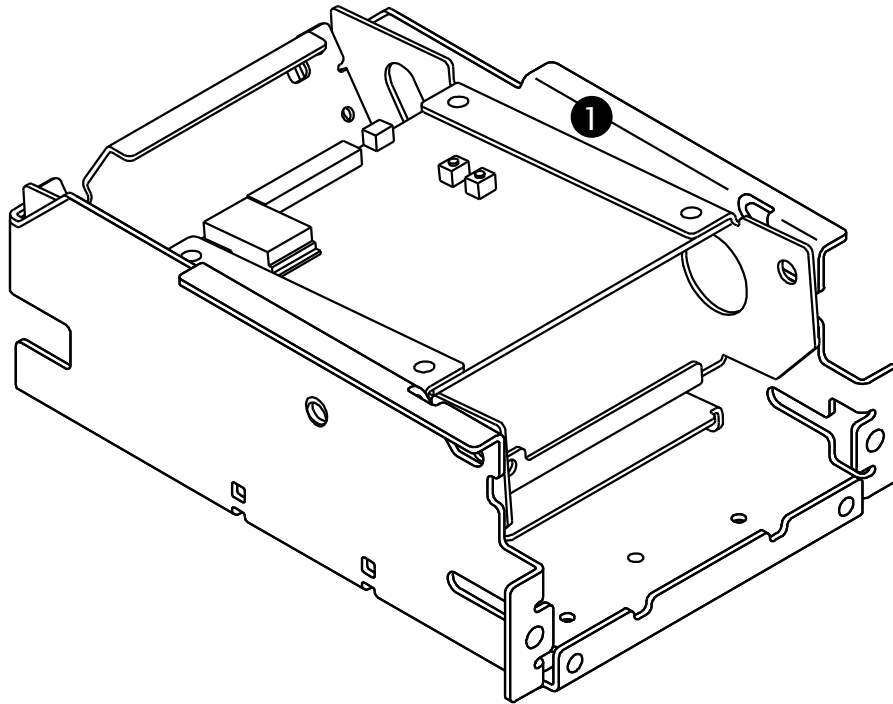


Figure 2 Model 750 “Core” Printer: Main Chassis Assembly

750 “Core” Printer: Main Chassis Assembly Highlights

-
- Modular options configured to fit most space requirements
-
- Ticket confinement until completion of printing
-
- Self-Service use
-
- Easy Ticket Loading and Maintenance
-

Standard Features

The following features are common to the 750 Model Printer.

-
- Easy Ticket Loading

 - Self Diagnostics

 - Ticket Out Sensing

 - Black Dot Sensing (Top of Form)

 - High Quality Printing (Text, Barcodes, Graphics, Lines)

 - Bitmap Graphics, Portrait, and Landscape Printing

 - Ticket Containment

 - Flexible Configuration Options

 - Optional Ticket Supply Box (Holds up to 400 tickets) (w/ ticket low)

750 Printing Highlights

-
- Print Speed: 51 mm/sec (2 in. per second)

 - 4 Selectable Fonts: 7.5 cpi, 10 cpi, 12 cpi, 16.5 cpi

 - Print Modes: Normal, Double-High, Double-Wide,
Double-High/Double Wide

 - Print Resolution: 8 dots per mm (203 dpi) Horizontal & Vertical

 - Print Zone Width: 56 mm (2.205 in.)

 - Printhead Life: 25 Km

 - Data Buffer: 4K

 - Memory: 64K EPROM & 32K RAM

 - Bar Code: 3 of 9, Interleaved 2 of 5, UPC-A & UPC-E, Codabar, EAN8
& EAN13, Code 128, Postnet, and MSI Plessey

Power Requirements

The *Model 750* is designed to be powered by a 24 VDC \pm 10% with a maximum current of 1.5 amps.

Print Characteristics

The statistics for the five internal fonts the 700 Series Printer supports appear below. Height and width are expressed in terms of dots.

Height	Width	Horizontal cpi	Vertical cpi
16	10	20.3	12.7
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

700 Series Printer Specifications

(Dimensions reflect "Core Unit" unless otherwise noted)

Dimensions

Height 3.36"(85.3mm) **Width** 5.46"(138.6mm) **Depth** 6.27"(159.2mm)

120 mm Ticket Supply box

Height 3.36"(85.3mm)

Width 5.46"(138.6mm)

Depth 11.3"(287.0mm)

156 mm Ticket Supply Box

Height 3.36"(85.3mm)

Width 5.46"(138.6mm)

Depth 12.8"(325.1mm)

Weight

Model 750

3.31 Kg (7.30lbs.)

General

Ticket Handling Straight. Entire path is accessible.

Power Input 24 VDC \pm 10%

Current 1.5 amps (maximum)

Interface

Type Bi-directional, serial RS-232 using transmit, receive, and ground

Protocol CTS or XON/XOFF, 9600 baud, 8 data bits, no parity, 1 start bit, 1 stop bit

Printer

Model Fixed 2.25" linear thermal head

Average Life Approximately 25 km of paper (replaceable)

Printing Method Direct thermal

Speed Approximately 2" per second

Ticket Width Maximum width of 2.56" (65 mm)

Resolution 203 x 203 and 136 x 203 dots per inch

Environmental

Conditions Operating Temperature Range 0 °C ~ 40 °C

Storage Temperature Range 20 °C ~ 70 °C

Operating Humidity Range 5% ~ 95% Noncondensing only

Storage Humidity Range 5% ~ 95% Noncondensing only

Model 750 “Core” Main Chassis Assembly Mounting

The Main Chassis Assembly contains the printing components, presentation platens, and main circuitry. When installed into a product, the Main Chassis requires a space 5.46 inches in width, 2.38 inches in height, and 6.27 inches in length. Mounting points consist of two holes and/or 2 threaded fasteners at the front, one threaded fastener on each side panel, and four threaded fasteners at the rear (also used for attachment of the Ticket Supply Box). All mounting diagrams reflect “Core” Unit without additional options.

Front Mounting

M3 x 0.5 PEMS x2
 Holes: Dia: .196” x2

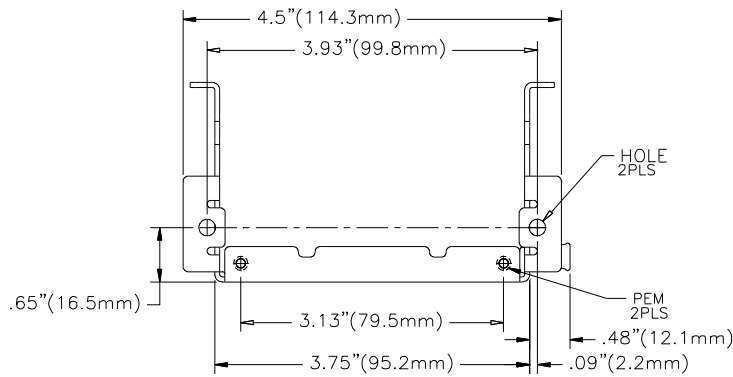


Figure 3 Main Chassis Mounting: Front of “Core” Printer

Rear Mounting

M3 x 0.5 PEMS x 4

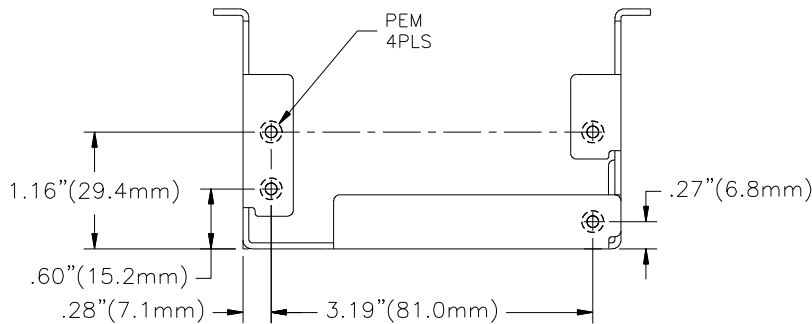


Figure 4 Main Chassis Mounting: Rear of “Core” Printer

Side Mounting

M4 x 0.7 PEMS x 2

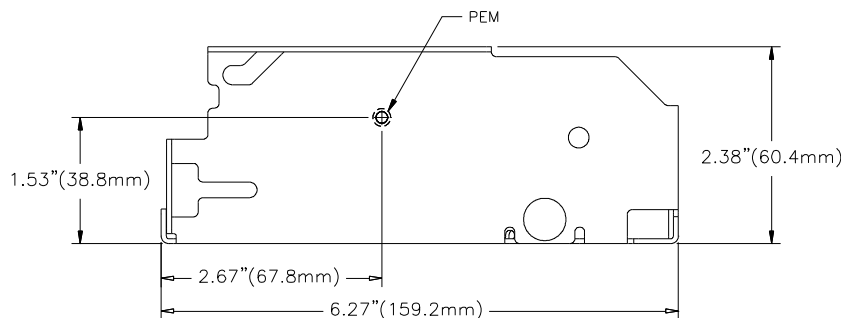


Figure 5 Main Chassis Mounting: Side of “Core” Printer

Power and Interface Communications (Main Chassis Assembly)

The 700 Series printer can be equipped with a flex cable that is used in conjunction with the Drawer Chassis Assembly option. This cabling device allows for continuous power and signal supply when the printer is in the fully extended position. If the Drawer Chassis is not selected as an option, a 14-pin discrete wire can be used as shown below. Both connectors are located on the printer connector board, J1 and J2.

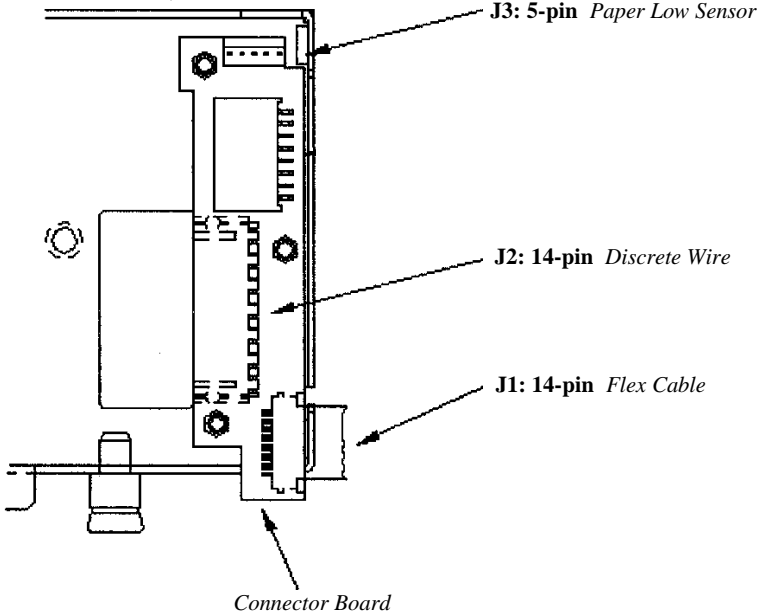


Figure 6 Bottom Rear Section of Main Chassis Assembly

Option 2: Bezel Assembly Option (includes exit lamp)

The front plate of the Main Chassis Assembly is designed to interface with a cosmetic Bezel Assembly for the ticket exit. The plate has two holes for mounting screws and a slot for the ticket exit.

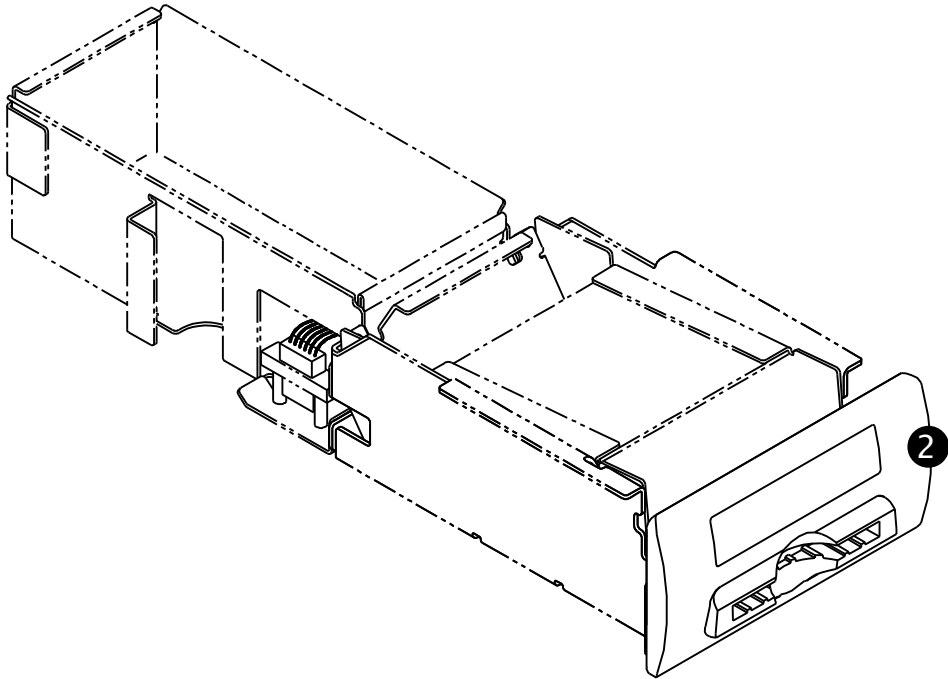


Figure 7 Bezel Assembly Option

Custom Bezel Specifications and Recommendations

Main Chassis Mounting points

M3 - 0.5 x2	PEMS	
M4 - 0.7	PEMS (sides)	x2
Dia: .20"	HOLE	x2

The Model 750 employs a Bezel Assembly option that ensures tickets will not jam when being dispensed. The Core Printer is set up to receive Ithaca Series, or custom bezels using any combination of holes or PEMS seen below. The following drawing shows the positioning and dimensions of the Core Printer's mounting points.

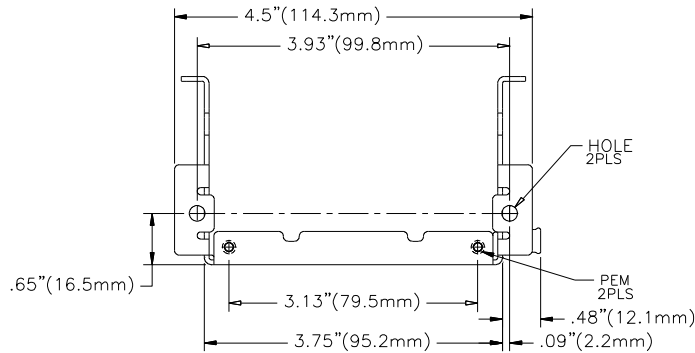


Figure 8 Bezel Assembly to Main Chassis Assembly Mounting Points

In order for a customized Bezel Assembly to work correctly with the 750, attention needs to be given to several key integration specifications. The discharge chute platens in the Main Chassis Assembly end before the front plate, requiring that the bezel's ticket guides protrude into the chassis.

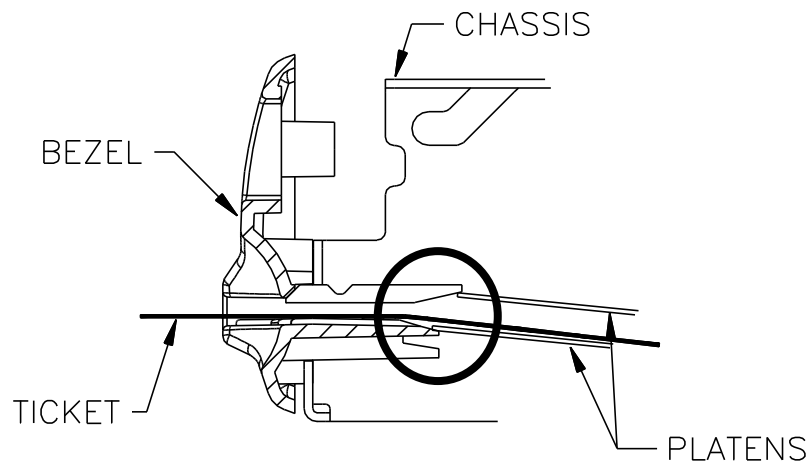


Figure 9 Bezel Assembly Mounting Concerns

Bezel Assembly Exit Lamp Board

A lamp board is included with the Ithaca 700 Series bezel. The lamp is used to illuminate a user instruction panel and the ticket exit. The lamp board comes with 2 one-watt bulbs for use at 13 VDC. Other bulbs may be used for other voltage and wattage, provided the current does not exceed design parameters.

Exit Lamp Board	Power Requirements
Voltage	13 VDC \pm 10%
Current	150 mA NOM

Option 3: Ticket Supply Box

The Model 750 is designed to work with either of the three different sized Ticket Supply Box options. Please be sure to specify the desired box size when making your selections.

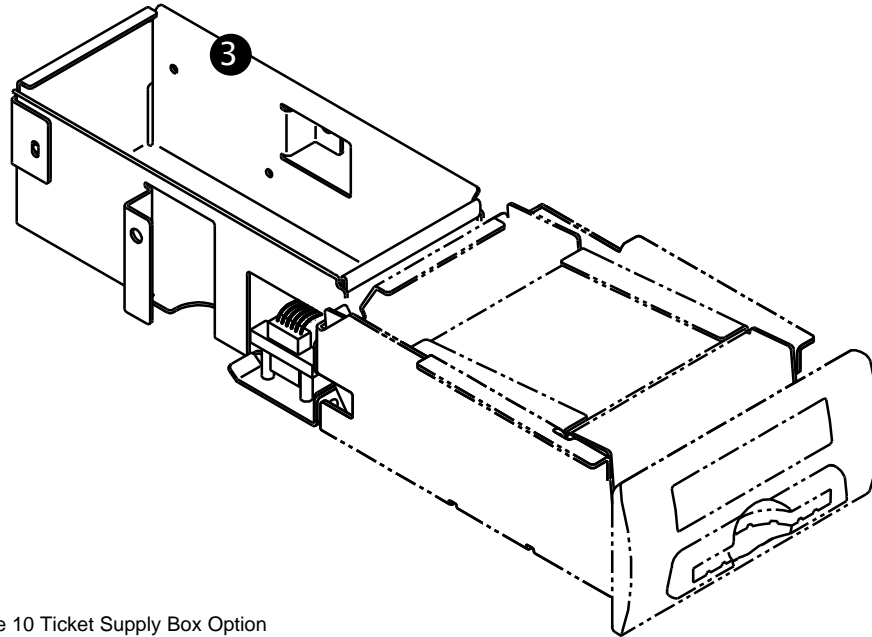


Figure 10 Ticket Supply Box Option

Specifications and Dimensions

The Ticket Supply Box that holds the 120-mm tickets has a height of 2.375" and holds a 58 mm stack of tickets. The width is 3.75", and the depth is 4.98".

The Ticket Supply Box that holds the 156-mm tickets has a height of 2.375" and holds a 58mm stack of tickets. The width is 3.75" and the depth is 6.402".

62-120mm **W:** 3.75"(95.2mm) x **H:** 2.375"(60.3mm) x **D:** 4.98"(126.4mm)

Ticket size: 58mm stack

65-120mm **W:** 3.75"(95.2mm) x **H:** 2.375"(60.3mm) x **D:** 4.98"(126.4mm)

Ticket size: 58mm stack

65-156mm **W:** 3.75"(95.2mm) x **H:** 2.375"(60.3mm) x **D:** 6.402"(162.6mm)

Ticket size: 58mm stack

All three Ticket Supply Box options are compatible with the Main Chassis Assembly and the Drawer Chassis Assembly.

Mounting Locations

In addition to the mounting locations for the Main Chassis, the Ticket Supply Box adds one additional M4 - 0.7 threaded mounting location on each side.

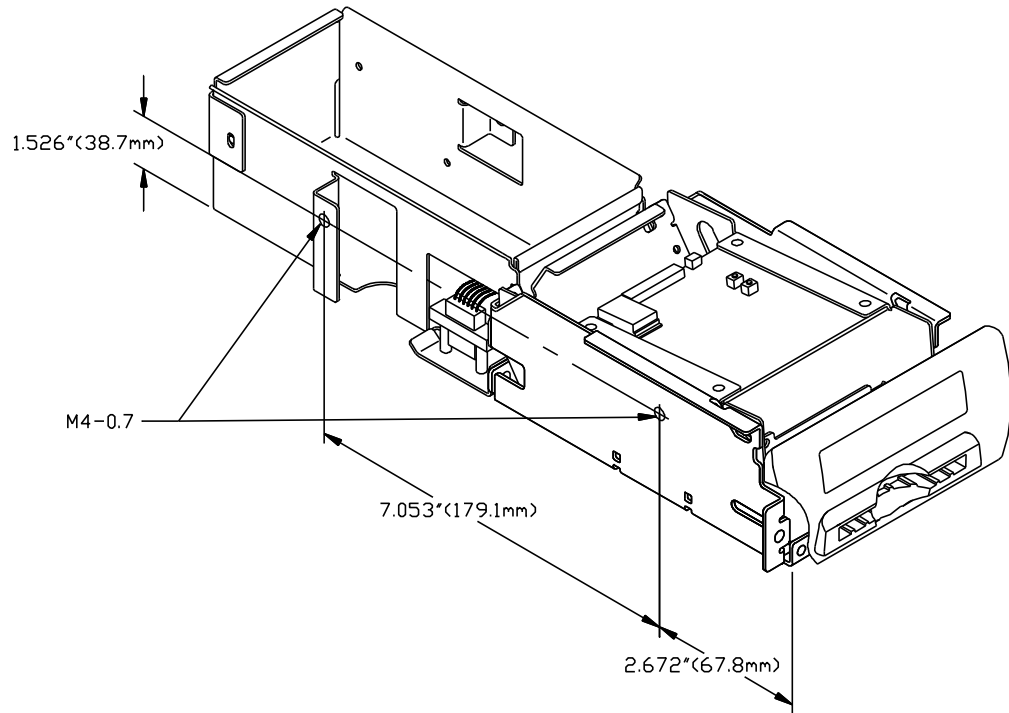


Figure 11 Chassis Mounting: Side of Main Chassis/Ticket Supply Box

Ticket Supply Box to Main Chassis Mounting Points (Ticket Supply Box detail)

M3 - 0.5 PEMS x 4

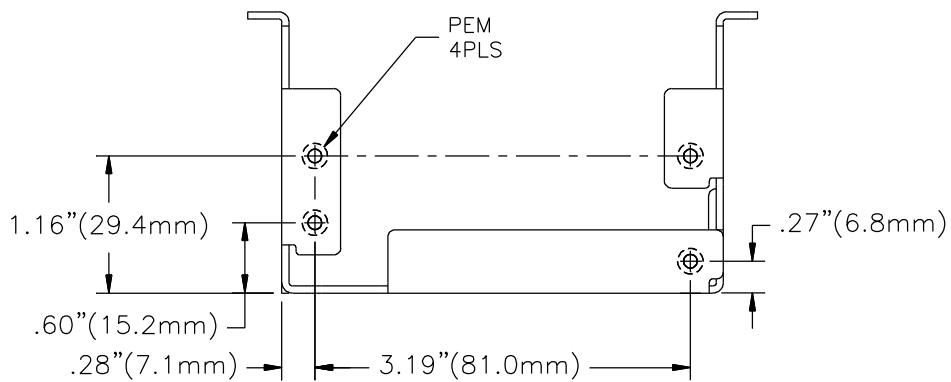


Figure 12 Ticket Supply Box to Main Chassis Mounting Points

Integration Specifics and Recommendations

Interface Mounting

To mount a Ticket Supply Box to the Main Chassis Assembly two things must be considered, first, the location of the interfacing points and second, the ticket entrance into the printer. The Ticket Supply Box attaches to the Main Chassis Assembly at the four threaded fasteners (M4 x 0.7) located on the “Core” unit’s rear panel. The printer entrance is located inside the Main Chassis Assembly. A ticket box includes a chute that protrudes into the chassis to guide the ticket into the printer. See Figure 13 below.

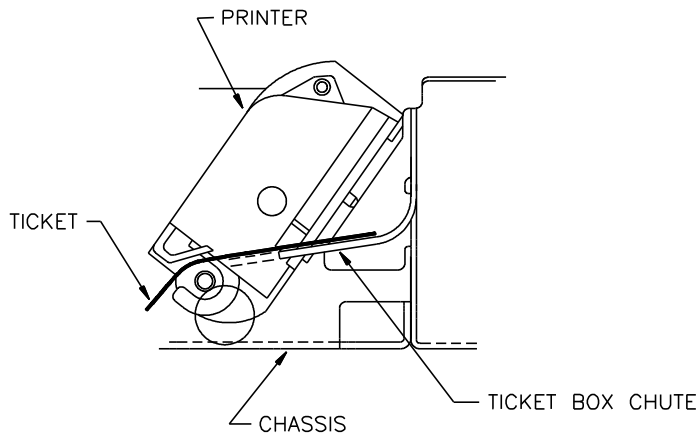


Figure 13 Ticket Supply Box with Chute

Ticket Clearance

The ticket stack is in a fan-folded geometry. As a ticket is pulled into the printer, the following tickets lift out of the Ticket Supply Box. A clearance of two inches above the Ticket Supply Box is recommended to allow the tickets to exit the supply box.

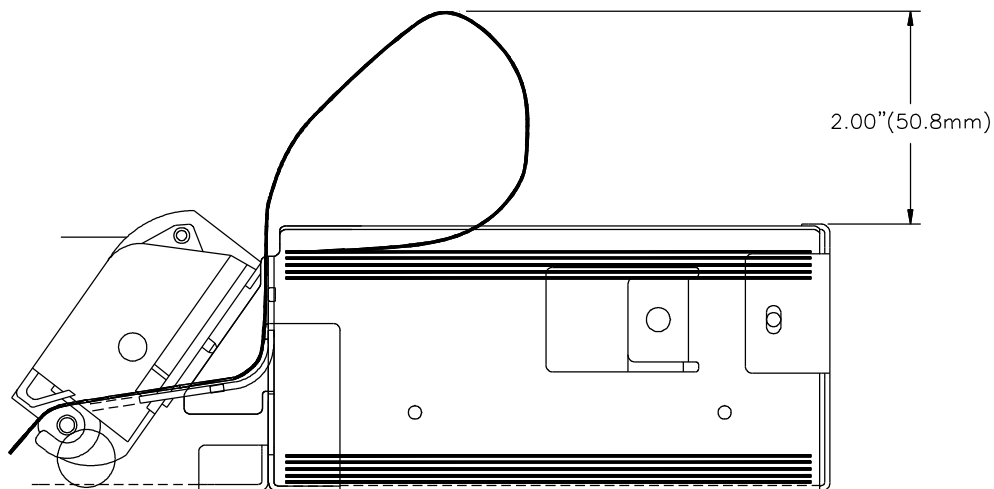


Figure 14 Ticket Clearance

Ticket Supply Power and Interface Communications

The Model 750 with a Ticket Supply Box option uses the J3: 5-Pin connector as the primary link for the Supply Box's Ticket Low Sensor's power and communication. The J3 connector is located on the bottom rear of the printer's Main Chassis.

Ticket Low Sensor

All Ticket Supply Boxes are configured with a Ticket Low Sensor. The Ticket Low Sensor detects when the ticket stack is approximately 45 tickets. A replacement Ticket Low Sensor can be acquired from Optek. TransAct recommends using the following Optek Ticket Low Sensor in your machine.

Replacement Ticket Low Sensor:	Optek 0PB773T
---------------------------------------	----------------------

Signal Levels Needed

V_{OH} 5 VDC NOM

V_{OL} 0.6 - 1.2 VDC @ 5mA

Option 4: Ticket Present Sensor

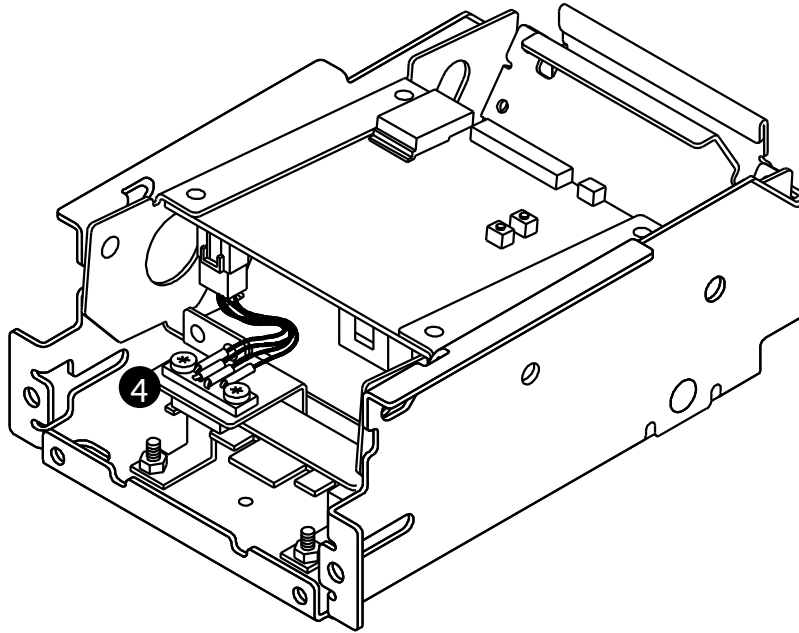


Figure 15 Ticket Present Sensor Option

Mounting Location

The ticket sensor is attached to a double holed interior bracket. From its mounting position, the sensor plugs into the top PC Board.

Ticket Present Sensor Power and Interface Communications

The Model 750 uses the J7: 4-Pin connector as the primary link for the Ticket Present Sensor's power and communication. The J7 connector is located on the left front of the Main Chassis Assembly.

A replacement Ticket Present Sensor can be acquired from OMRON. TransAct recommends using the following Ticket Present Sensor in your machine.

Replacement Ticket Present Sensor:	OMRON	SB5
---	--------------	------------

Option 5: Drawer Chassis Assembly (Includes Power PCB)

The Model 750 Drawer Chassis Assembly option allows added convenience for loading and maintenance while providing added security. The “Core Unit” 750 printer is mounted on slides allowing it to extend out from inside the product. If the Drawer Chassis Assembly option is selected, the Ticket Supply Box option must also be integrated.

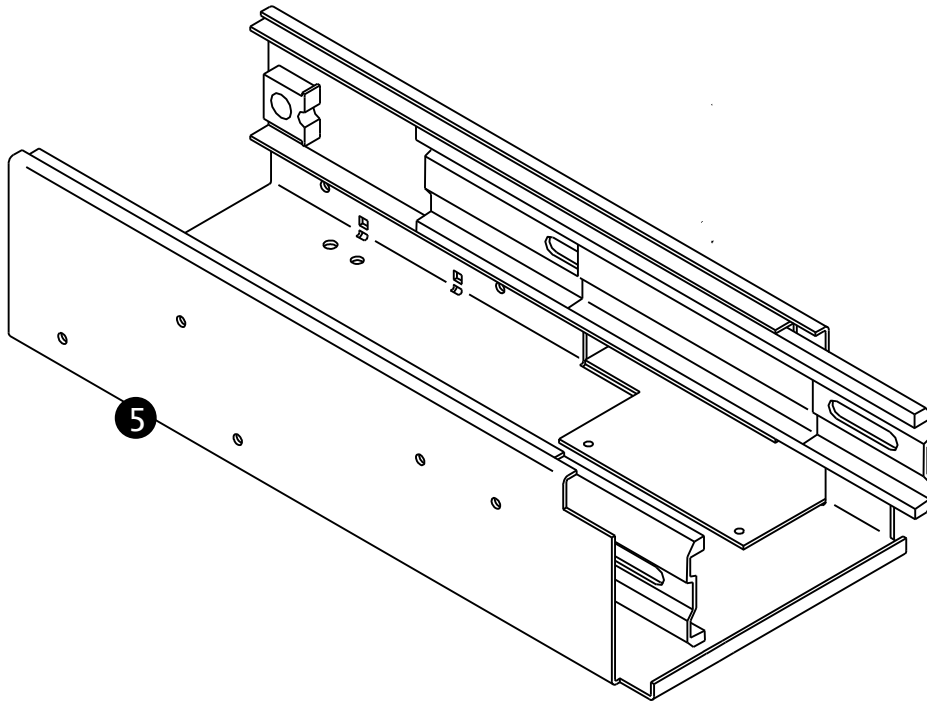


Figure 16 Drawer Chassis Assembly Option

Integration Specifics and Recommendations

Mounting Hardware

Holes (6)

Dia.: .158

PEMs (5)

M3 - 0.5

Side Views of Drawer Chassis Assembly

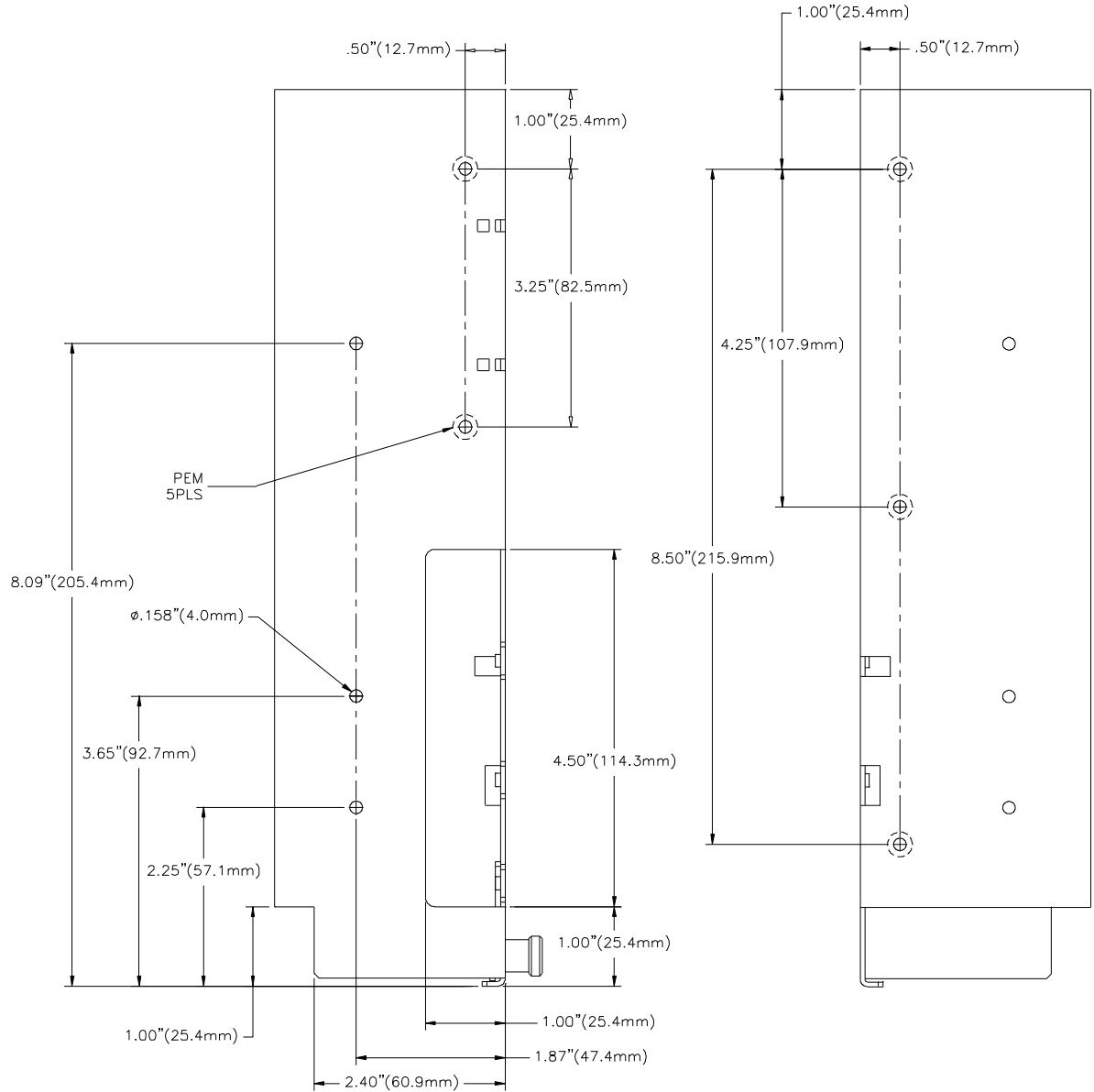


Figure 18 Mounting Points on Drawer Chassis Assembly

Combined Dimensions: Main Chassis, Ticket Supply Box, and
Drawer Chassis

62mm x 120mm

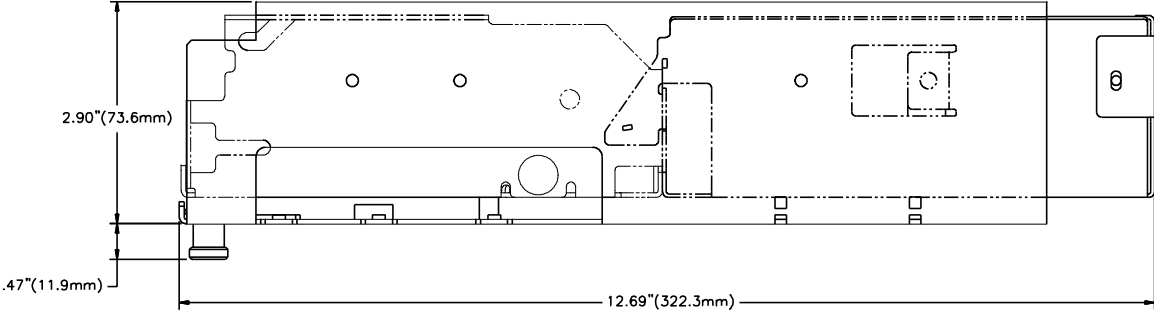


Figure 19 Model 750 Printer: Ticket Supply Box, & Drawer Chassis (62mm x 120mm)

Combined Dimensions: Main Chassis, Ticket Supply Box, and
Drawer Chassis

65mm x 156mm

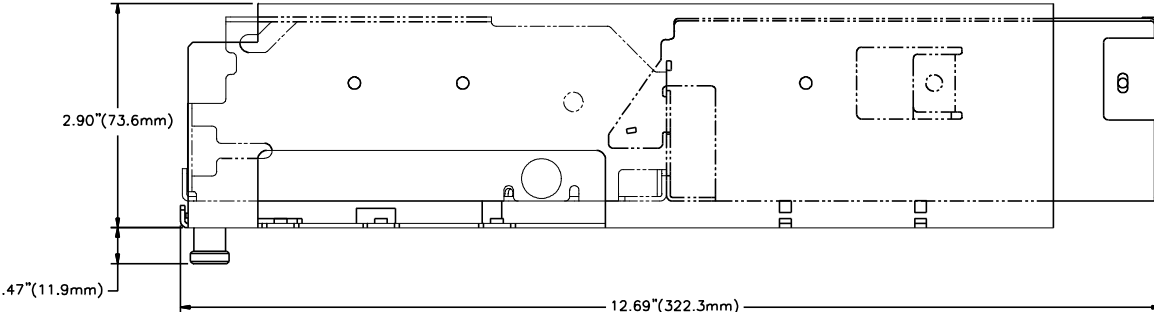


Figure 20 Model 750 Printer: Ticket Supply Box, & Drawer Chassis (65mm x 156mm)

PCB Board Accommodation

The Drawer Chassis's PCB Board protrudes beyond the chassis by .47 inches. Consideration to this specific dimension must be given when developing product integration Specifications.

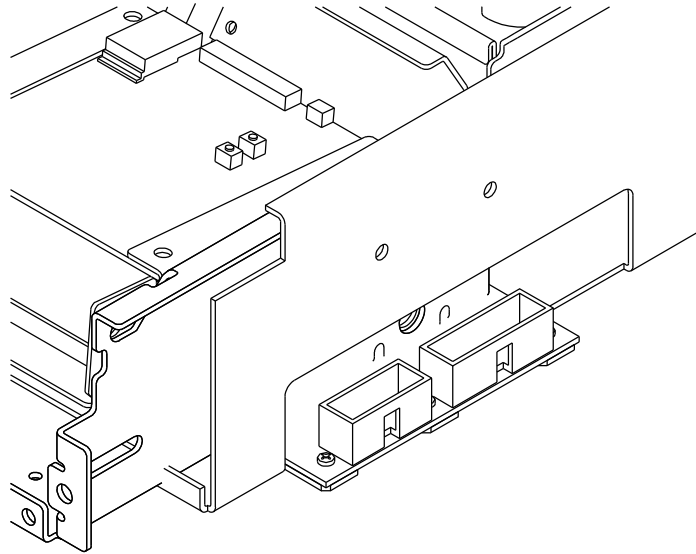


Figure 21 Drawer Chassis PCB Board Accommodation

Drawer Chassis Quick Release Design

The printer is accessed by a release knob on the underside of the Drawer Chassis. The unit will move forward on its slides, allowing it to be grasped and pulled into the fully extended position. For adequate access to the release, clearance must be left around the 1/2-inch release knob. Access to the knob may be from a separate secure location of the product.

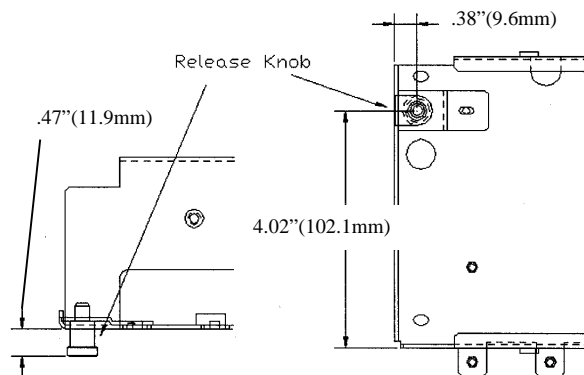


Figure 22 Drawer Chassis Release Knob Location

Drawer Chassis Power PCB and Interface Communications

The Model 750, with a Drawer Chassis option, uses Power PCB as the primary link for the printer's power and communication. The PCB Board is located at the right front of the Drawer Chassis and contains connectors that support Flex Cable use. In addition to this, the J3: 16-Pin connector is a Card Reader.

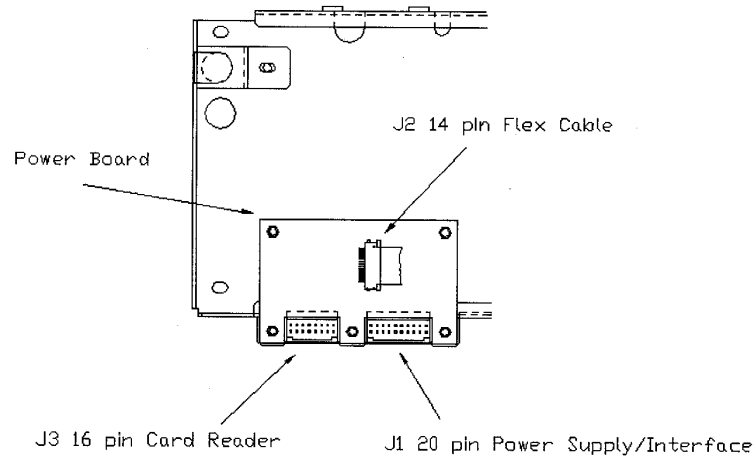


Figure 23 Drawer Chassis Power Interface Location

Power Board

14, 16, and 20-Pin Connectors

Power Requirements

J2: 14-Pin (*Flex Cable*)

Voltage	24 VDC ± 10%
Current	1.5 amps (maximum)

J3: 16-Pin (*Card reader*)

Voltage	24 VDC ± 10%
Current	1.5 amps (maximum)

J1: 20-Pin (*Power Supply/Interface*)

Voltage	24 VDC ± 10%
Current	1.5 amps (maximum)

Chapter 3: Ticket Specifications and Procedures

Physical Dimensions and Operating Characteristics

The 700 Series printer requires the following tickets for proper printing:

Ticket Type	Top coated, high sensitivity, direct thermal
Ticket Width	62.00 mm \pm 0.4 mm or 65.00 mm \pm 0.4 mm
Ticket Length	120 mm \pm 0.5 mm or 156 mm \pm 0.5 mm
Thickness	0.112 \pm 0.005 mm (TAPPI T-411)
Ticket Weight	27# (102 g/m ² TAPPI T-410)
Brightness	84% minimum/89% average (TAPPI T-525)
Smoothness	450 minimum/2000 average (TAPPI T-479)
Count	500

Environmental Conditions

Activation Temperature

Initial	74 \pm 5 °C
Effective	83 \pm 5 °C
Optimum	90 \pm 5 °C
Image	Black
Development	1.35/1.60 (ATLANTEK 0.5 ms) 1.10/1.40 (ATLANTEK 0.35 ms)
Ticket type	Kanzaki TO-381N or approved equivalent
Ithaca Ticket Part Number	100-02108

Print Area and Presentation Scheme

The front of the ticket is used for printing of ticket graphics including directional arrows and/or bar coding. With the exception of the space listed, all areas on the front are available for printing. In order to prevent premature removal of the ticket from the printer, the first 14.5 mm of each ticket is not available for printing. Any printing specified in that area will cause the ticket graphics to print over onto the next ticket, leaving incomplete information for the user. Dense graphics should be left out of this area to ensure a proper reading by the ticket present sensor. The locations for both of these areas are shown in Figure .

The ticket length is specific to the presentation scheme with the 700 Series Bezel Assembly and Ticket Supply Box.

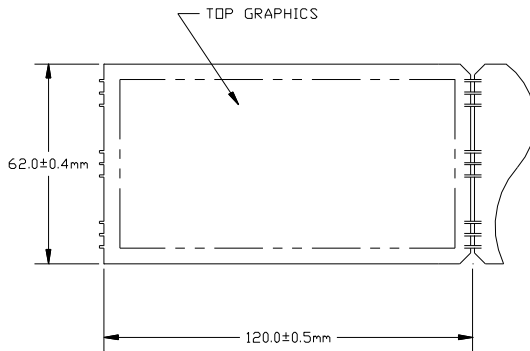


Figure 24 Print Area and Presentation Scheme

Ticket Type	Top coated, high sensitivity, direct thermal
Ticket Width	62.00 mm ± 0.4 mm 65.00 mm ± 0.4 mm (one-way only)
Ticket Length	120 mm ± 0.5 mm 156 mm ± 0.5 mm

Black Dot/Top of Form Preprinted Indicator

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

The back of the ticket is used for the Black Dot/Top of Form indicator and the rules and disclaimer area may be preprinted. For the printer to sense when a ticket has been indexed to the printing position, a Black Dot/Top of Form indicator is needed. It must be printed in black, thermal paper compatible, infrared readable ink with a McBeth Densitometer reading of 1.5 to 0.3. The indicator must be 3 mm by 8 mm and located a distance of 3.5 mm from the right side and 6 mm from the top of the ticket back. (See Figure below.) The 11.5 mm 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.

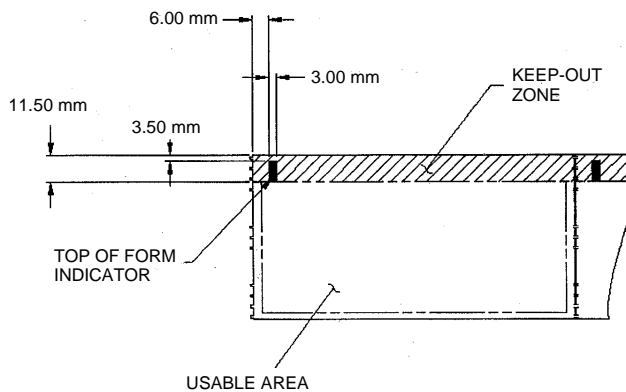


Figure 25 Location of Black Dot/Top of Form Indicator on Back of Ticket

Perforation Specification

The tickets are perforated and stacked in a fan-folded geometry. The perforation requirements are made, so the ticket separates easily when the user needs to remove it, but the perforation remains intact while being pulled through the printer. The perforation is made up of nine narrow attachment points, three in the center and three on each side. These small points allow the tickets to fold into a stack and allow for easy separation when positioned under the Ticket Tear Bar. The exact dimensions of the perforations are shown below.

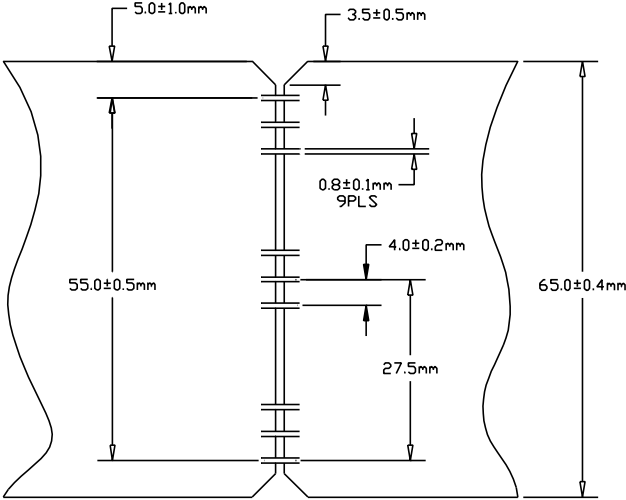


Figure 26 Perforation Specifications

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 indicator of the first ticket 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 the following page.

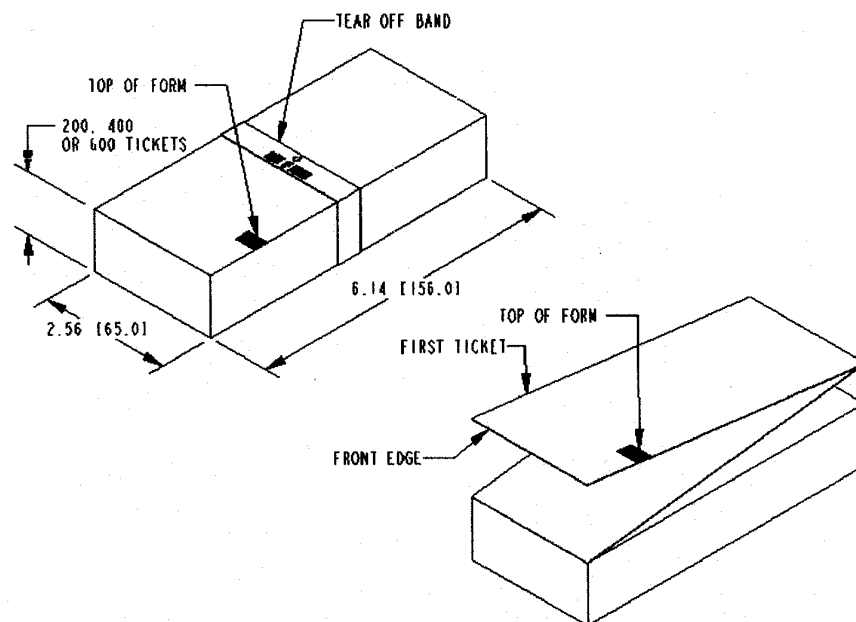


Figure 27 Ticket Stack Orientation

Loading Tickets into Feeding Mechanism

The first ticket of the stack must be inserted into the printer by hand. With the Series 700 Printer Ticket Supply Box, there is a guide to direct the ticket into the printer mechanism. To load the printer, grasp the first ticket, and insert it into the guide until the ticket reaches the printer mechanism. Continue pushing gently until the printer mechanism detects the ticket and the motor pulls it through the printer. The printer will stop feeding automatically. Pressing the Ticket Feed button on the printer controller board will run the motor to present blank tickets or to aid in loading.

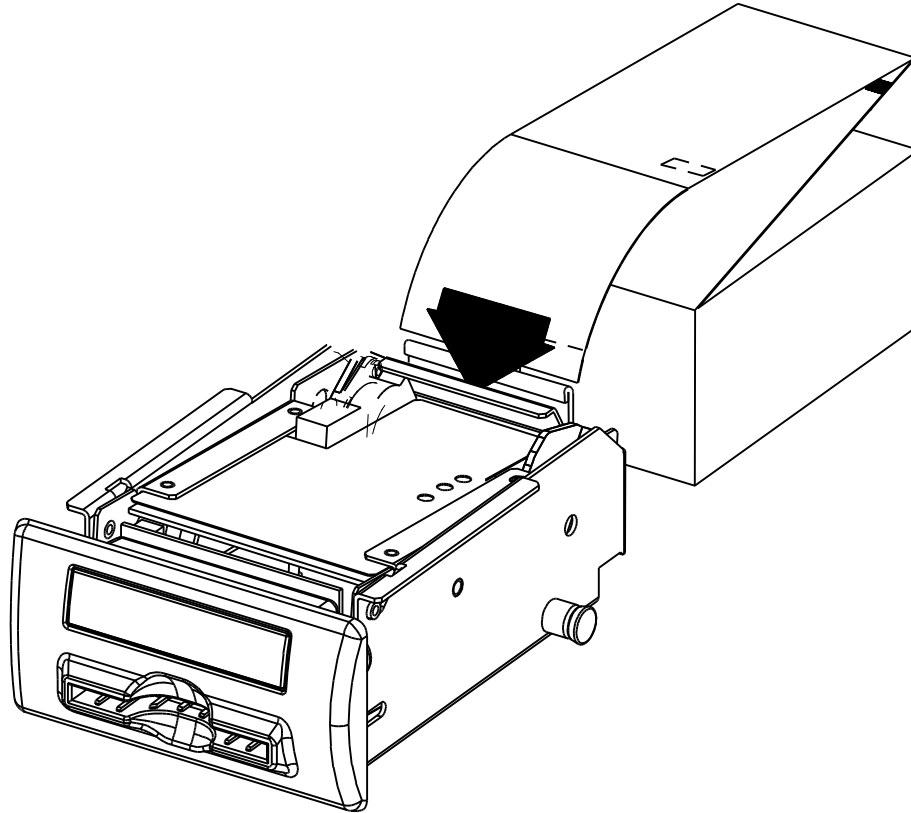


Figure 28 Ticket Loading and Ticket Feed Mechanism

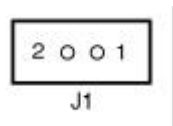
1. Insert the first ticket, blank side up, into the ticket feed guides as shown by the load ticket arrow on the instruction card.
2. The printer will automatically feed the ticket when the ticket is sensed by the printer.
3. If ticket does not feed automatically, press the Ticket Feed switch.
4. Remove the excess ticket from the front of the printer.

Chapter 4: Electrical Connections

J1: 2-pin: Connector Board (Lamp Board)

Pin #	Signal	Description	Parameters
1	PRNTR LMP+	Lamp Voltage	13 VDC @ 150 mA NOM If used with SDG Lamp Board
2	PRNTR LMP-	Lamp Return	

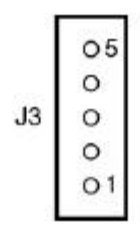
Table 2 Connector P1 - Molex 50-57-9402 J1



J3: 5-pin: Connector Board (Ticket Low Sensor)

Pin #	Signal	Description	Parameters
1	+5VDC	Sensor Voltage	4.75 - 5 VDC @ 10 mA maximum
2	TICKET LOW	Output Signal	Open Collector Output: Active Low Signal V _{OH} 5 VDC NOM V _{OL} 0.6 - 1.2 VDC @ 5mA
3	PGND	Ground	20 mA maximum
4	ANODE	LED Anode	+5 VDC NOM @12 mA
5	CATHODE	LED Cathode	12 mA NOM

Table 3 Ticket Low Sensor, J3

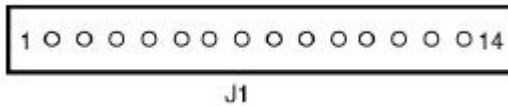


All connector views are shown from the PCB component side.

J1: 14-pin: Connector Board (Flex Cable)

Pin #	Signal	Description	Parameters
1	+24VDC	Printer Voltage	0.5 A maximum (<i>each</i>)
2	+24VDC		
3	+24VDC		
4	PGND	Printer Ground	0.5 A maximum (<i>each</i>)
5	PGND		
6	PGND		
7	TXP	Printer Transmit	Per RS-232C
8	RXP	Printer Receive	
9	COMP	Printer Common	
10	MRESET \setminus	Master Reset	Active Low Signal - Optically Isolated <i>Vin(H)</i> 13 VDC <i>Vin(L)</i> 0.3-1.2 V @15 mA
11	PRNTR LMP+	Lamp Voltage	0.5 A maximum (<i>each</i>)
12	PRNTR LMP-	Lamp Return	
13	+VRESET	Reset Voltage	13 VDC \pm 10% @15 mA
14	N/C	No Connect	

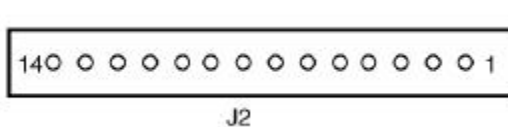
Table 4 Connector Board Interface to Power Board Interface (flex cable), J1



J2: 14-pin: Connector Board (Discrete Wire)

Pin #	Signal	Description	Parameters
1	+24VDC	Printer Voltage	1.5 A maximum (<i>total</i>)
2	+24VDC		
3	PGND	Printer Ground	1.5 A maximum (<i>total</i>)
4	TXP	Transmit	Per RS-232C
5	RXP	Receive	
6	COMP	Common	
7	MRESET \setminus	Master Reset	Active Low Signal - Optically Isolated <i>Vin(H)</i> 13 VDC <i>Vin(L)</i> 0.3-1.2V @ 15 mA
8	PRNTR LMP+	Lamp Voltage	13 VDC @ 150 mA NOM (if used with SDG lamp board)
9	PRNTR LMP-	Lamp Return	
10	+VRESET	Reset Voltage	13 VDC \pm 10% @15 mA
11	PGND	Printer Ground	1.5 A maximum (<i>total</i>)
12	RTSP	Printer Request to Send	Per RS-232C
13	CTSP	Printer Clear to Send	
14	DTRP	Printer Data Terminal Ready	

Table 5 Power Board (discrete wire), J2, Molex 70555-0048

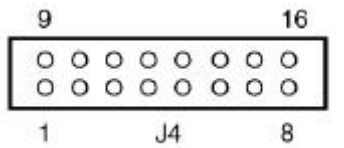


All connector views are shown from the PCB component side.

J4: 16-pin: Connector Board (Interconnect Cable)

Pin #	Signal	Description	Parameters
1	+24VDC	Printer Voltage	1.5 A max total
2	PGND	Printer Ground	1.5 A max total
3	DTRP	Printer Data Terminal Ready	Per RS 232-C
4	+5VDC		
5	PRNTR LMP	+ Lamp Voltage	13 VDC @ 150 mA NOM
6	LED -	Paper Low LED Cathode	
7	LED+	Paper Low LED Anode	
8	PAPERLOW	Paper Low Sensor Output	
9	TXP	Transmit	Per RS 232-C
10	RXP	Receive	Per RS 232-C
11	COMP	Common	Per RS 232-C
12	CTSP	Printer Clear to Send	Per RS 232-C
13	PRNTR LMP	- Lamp Return	
14	RTSP	Printer Request to Send	Per RS 232-C
15	MRESET\	Master Reset	Active Low Signal – Optically Isolated Vin(H) 13 VDC Vin(L) 0.3 – 1.2 V @ 15 mA
16	+VRESET	Reset Voltage	13 VDC +- 10% @15 mA

Table 6 Connector Board (Interconnect cable), J4



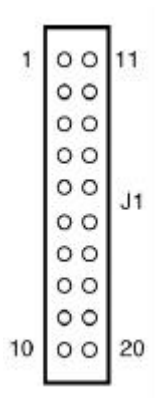
All connector views are shown from the PCB component side.

J1: 20-pin: Power Board (Input from OEM host machine)

The 20-pin connector is used to interface the printer to the host machine.

Pin #	Signal	Description	Parameters
1	+24VDC	Printer Voltage	1.5 A maximum (<i>total</i>)
2	PGND	Printer Ground	1.5 A maximum (<i>total</i>)
3	TXP	Printer Transmit	Per RS-232C
4	RXP	Printer Receive	
5	COMP	Printer Common	
6	MRESET\	Master Reset	Active Low Signal - Optically Isolated Vin(H) 13 VDC Vin(L) 0.3 - 1.2 V @15 mA
7	TXC	Card Transmit	Per RS-232C
8	RXC	Card Receive	
9	COMC	Card Common	
10	+ 24 VDC	Printer Voltage	1.5 A maximum (<i>total</i>)
11	PGND	Printer Ground	1.5 A maximum (<i>total</i>)
12	PRNTR LMP +	Printer Lamp Voltage	13 VDC 150 mA NOM (if used with SDG Lamp Board)
13	PRNTR LMP -	Printer Lamp Return	
14	+VRESET	Reset Voltage	13 VDC ± 10% @15 mA
15	TXB	Broadcast Transmit	Per RS-232C
16	COMB	Broadcast Common	
17	CARD LMP +	Card Lamp Voltage	13 VDC 150 mA NOM (if used with SDG Bezel Lamp Board)
18	CARD LMP -	Card Lamp Return	
19	+13 VDC	Card Reader Voltage	0.5 A maximum
20	CGND	Card Reader Ground	

Table 7 Power Board Interface to Host Interface, J1, Molex 15-41-7020

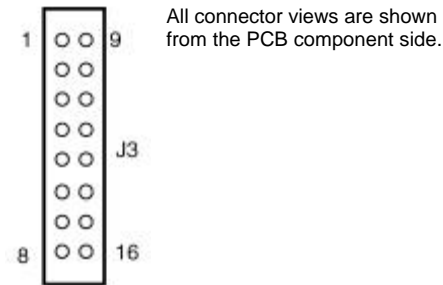


All connector views are shown from the PCB component side.

J3: 16-pin: Power Board (card reader)

Pin #	Signal	Description	Parameters
1	TXC	Card Transmit	Per RS 232-C
2	RTSC	Card Request to Send	
3	DTRC	Card Data Terminal Ready	
4	RXC	Card Receive	
5	CTSC	Card Clear to Send	
6	DSRC	Card Set Ready	
7	COMC	Card Common	
8	TXB	Broadcast Transmit	
9	+13VDC	Card Reader Voltage	0.5 A max
10	+5VDC	Card Reader Voltage	0.4 A max
11	CGND	Card Ground	0.5 A max
12	CHASSIS	Chassis Ground	0.5 A max
13	N/C	No Connect	
14	CARD LMP+	Lamp Voltage	13 VDC @ 150 mA NOM
15	CARD LMP-	Lamp Return	If used with SDG Bezel Lamp Board
16	COMB	Broadcast Common	Per RS 232-C

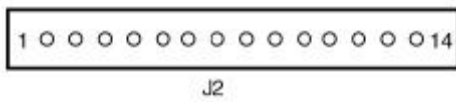
Table 8 Power Board Card Reader, J3



J2: 14-Pin: Power Board (Flex Cable)

Pin #	Signal	Description	Parameters
1	+24VDC	Printer Voltage	0.5 A maximum <i>(each)</i>
2	+24VDC		
3	+24VDC		
4	PGND	Printer Ground	0.5 A maximum <i>(each)</i>
5	PGND		
6	PGND		
7	TXP	Printer Transmit	Per RS-232C
8	RXP	Printer Receive	
9	COMP	Printer Common	
10	MRESET \bar{L}	Master Reset	Active Low Signal - Optically Isolated <i>V_{in(H)} 13 VDC</i> <i>V_{in(L)} 0.3-1.2 V @15 mA</i>
11	PRNTR LMP+	Lamp Voltage	0.5 A maximum <i>(each)</i>
12	PRNTR LMP-	Lamp Return	
13	+VRESET	Reset Voltage	13 VDC \pm 10% @15 mA
14	N/C	No Connect	

Table 9 Power Board to Connector Board (flex cable), J2

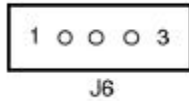


All connector views are shown from the PCB component side.

J6: 3-Pin: Printer Controller Board (Ticket Out Sensor)

Pin #	Signal	Description	Parameters
1	VCC	Logic Supply	+5 VOLTS
2	/TICKET	Ticket Out Signal	Active Low
3	GND	Printer	1.5 A maximum (total)

Table 10 Printer Controller Board (Ticket Out Sensor), J6

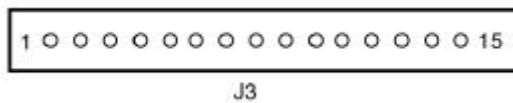


All connector views are shown from the PCB component side.

J3: 15-Pin: Printer Controller Board (Print Head)

Pin #	Signal	Description	Parameters
1	+VP	Head Voltage	+24 VDC
2	+VP	Head Voltage	+24 VDC
3	GND	Printer Ground	
4	GND	Printer Ground	
5	VCC	Logic Supply	+5 volts
6	TH1	Head Temperature Sensor input	
7	PDO	Head Data	From Printhead
8	/OE	Head Output Enable	
9	PCLK	Head Data Clock	
10	/LOAD	Head Data Latch	
11	PDI	Head Data	To Printhead
12	GND	Printer Ground	
13	GND	Printer Ground	
14	+VP	Head Voltage	+24 VDC
15	+VP	Head Voltage	+24 VDC

Table 11 Printer Controller Board (Print Head), J3

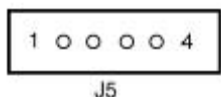


All connector views are shown from the PCB component side.

J5: 4-Pin: Printer Controller Board (Stepper Motor)

Pin #	Signal	Description	Parameters
1	OUT 1A	Motor Phase A	
2	OUT 1B	Motor Phase A	
3	OUT 2A	Motor Phase B	
4	OUT 2B	Motor Phase B	

Table 12 Printer Controller Board (Stepper Motor), J5

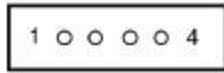


All connector views are shown from the PCB component side.

J7: 4-Pin: Printer Controller Board (Ticket Sensor)

Pin #	Signal	Description
1	SNSA	ANODE (red wire)
2	XMTCLK	CATHODE (black wire)
3	SNSC	OUTPUT COLLECTOR (blue wire)
4	Ground	OUTPUT EMITTER (orange wire)

Table 13 Printer Controller Board (Ticket Sensor), J7



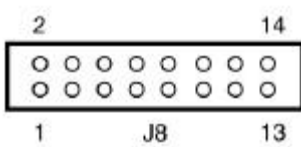
All connector views are shown from the PCB component side.

J7

J8: 14-Pin: Printer Controller Board (Interconnect Cable)

Pin #	Signal	Description	Description
1	+24VDC	Printer Voltage	Printer Voltage
2	TXP	Transmit	Transmit
3	GND	Printer Ground	Printer Ground
4	RXP	Printer Receive	Printer Receive
5	DTR	Printer Data Terminal	Printer Handshake
6	GND	Printer Ground	Printer Ground
7	VCC	Printer Voltage	Logic Supply
8	CTS	Printer Clear to Send	Printer Clear to Send
9	GND	Printer Ground	Printer Ground
10	RTS	Request to Send	Printer handshake
11	VCC	Printer Voltage	Logic Supply
12	/MRESET	Master Reset	Master Reset
13	/TICKET_LOW	Ticket Low Signal	Active Low
14	+VRESET	Reset Voltage	=13 VDC @ 15mA

Table 14 Printer Controller Board (Interconnect Cable), J8



All connector views are shown from the PCB component side.

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.

Board Close-ups and Physical Connections

The following insert pages are as follows:

-
- Model 750 Wiring Schematic
-
- Power Board Connections Schematic
-
- Connector Board Connections Schematic
-
- Controller Board Connections Schematic
-

Figure 29 Model 750 Wiring Schematic

Figure 30 Power Board Connections Schematic

Figure 31 Connector Board Connections Schematic

Figure 32 Controller Board Connections Schematic

Chapter 5: Printer Maintenance

Maintenance is quick and easy with the 700 Series printer. There is no set schedule for maintenance; simply perform the appropriate maintenance as needed.

The Model 750 is opened for service by pulling the pin located at the bottom right rear of the Drawer Chassis. This allows the Controller Board and printer mechanism to be tilted from the operating position. As it is lifted, the Main Chassis Assembly can either be rotated into an open position or lifted from the Drawer Chassis. If it is removed from the Drawer Chassis, the 14-pin cable adjoining the printer connector board and the printer controller board must be disconnected. 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.

Cleaning the Print Head

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.

1. Remove all tickets from the ticket feed path.
2. Open cleaning card pouch and remove cleaning card.
3. Insert cleaning card into feed path.
4. Press and hold the Feed Button. The cleaning card will be drawn into the feed path.
5. Release the Feed Button after the cleaning card comes out the “retrieve ticket”(front) Bezel.
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)

Troubleshooting

If the 700 Series printer is experiencing printing problems, check to see if the unit is receiving power. The green test LED, located on the top of the “Core” printer, should be on when the printer is correctly receiving power. After confirming that the printer is receiving power, check to see that the ticket has been loaded correctly and is not jammed in the ticket path. Pressing the Ticket Feed switch-on the top of the “Core” printer-will advance a single ticket thru the print mechanism, automatically positioning the tickets correctly. Check all connections to ensure a proper signal.

If the printer does not stop feeding when it automatically scrolls the ticket, check to see that the tickets are facing the right direction so the ticket present sensor detects the Black Dot/Top of Form indicator.

Chapter 6: Programming Overview

This section covers all the points that need to be understood to program the 700 Series Printer correctly, including both basic and advanced topics.

Programming for the 700 Series

The first step in programming the 700 Series is to understand how the printer works.

As an ASCII-based printer, the 700 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 700 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 700 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 700 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 700 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 15 Conversion from Dots to Inches

Font Statistics

The information below lists the statistics for the five internal fonts the 700 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 16 Font Statistics

Objects

Objects are the basic units that the 700 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 700 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 700 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 700 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 700 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.

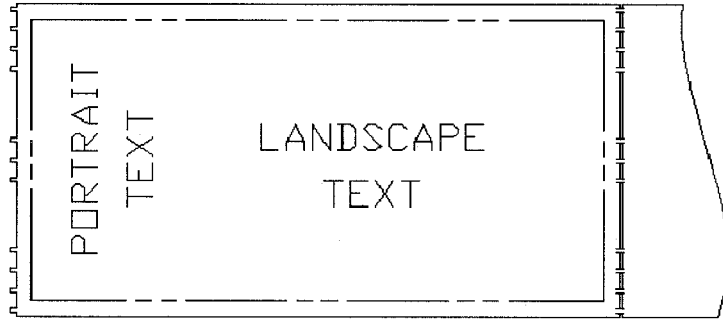


Figure 33 Portrait and landscape Print Modes

Portrait Printing Mode

On power-up, the 700 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 700 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 700 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 700 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 700 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 700 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 700 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 700 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 700 Series will remain in landscape printing mode. If more objects are sent to the 700 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 700 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 700 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 700 Series will feed in search of a Black Dot/Top of Form indicator. If the 700 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 700 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 700 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 POSTNET bar code symbology is an exception and does not respond to any of these commands. Instead, it always prints within the U.S. Postal Service's specifications.

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 700 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 700 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.

Chapter 7: Command Reference

This section describes the commands for programming the 700 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

The following information are the listings of the commands arranged alphabetically.

Commands

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	
Decimal 9Hex 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

Decimal 10

Hex 0A

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 700 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

Decimal 12

Hex 0C

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

Decimal 13

Hex 0D

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

Decimal 14

Hex 0E

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

Decimal 20

Hex 14

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

Hex 20-7E, 99, A9, AE, B0

Character	Name	Decimal	Hex
™	Trademark	153	99
©	Copyright	169	A9
®	Registered	174	AE
°	Degree	176	B0

See Appendix A for a summary of character codes.

Parameters

None

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 *

Decimal ESC 42

Hex ESC 2A

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 @

Decimal 27 64

Hex 1B 40

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 700 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

Decimal 27 69

Hex 1B 45

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*

Decimal 27 74 *n*

Hex 1B 4A *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

Decimal 27 77

Hex 1B 4D

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 17 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

Decimal 27 80

Hex 1B 50

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 18 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

Decimal 27 84

Hex 1B 54

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 19 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

Decimal 27 85

Hex 1B 55

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 20 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

Decimal 27 86

Hex 1B 56

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 700 Series attached to the serial port and your program can communicate with the printer.

Expression

ASCII ESC W *n1 n2*

Decimal 27 87 *n1 n2*

Hex 1B 57 *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*

Decimal 27 88 *n1 n2*

Hex 1B 58 *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 700 Series Printer print heads are 56 millimeters wide.

Expression

ASCII ESC Y *n*

Decimal 27 89 *n*

Hex 1B 59 *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

Decimal 29 18

Hex 1D 12

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

Decimal 29 19

Hex 1D 13

Parameters

None

GS RSSet 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

Decimal 29 30

Hex 1D 1E

Parameters

None

GS USCancel 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

Decimal 29 31

Hex 1D 1F

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

Decimal 29 42 n1 n2 t h w d1...dm

Hex 1D 2A 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 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

Decimal 29 65 n1 n2

Hex 1D 41 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

Table 21 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*

Decimal 29 71 *n1 n2 t d*

Hex 1D 47 *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.

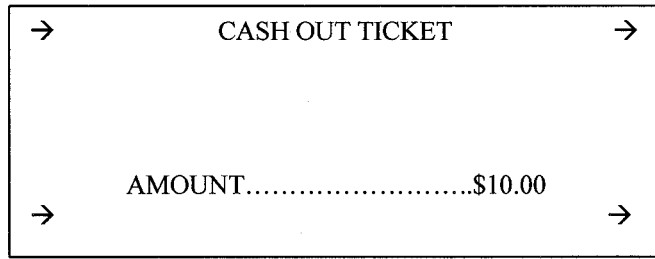


Figure 34 Printing Custom Graphics

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.

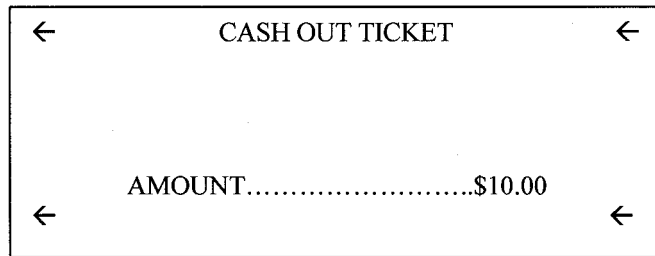


Figure 35 Printing Custom Graphics

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 $n1 n2$

Decimal 29 76 $n1 n2$

Hex 1D 4C $n1 n2$

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 22 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 700 Series Printer bitmap graphics mode. If possible, you should use GS S in order to ensure future compatibility.

Expression

ASCII GS S

Decimal 29 83

Hex 1D 53

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	RESERVED
3	RESERVED	RESERVED
4	RESERVED	RESERVED
5	Ticket Loaded	Out of Ticket
6	RESERVED	RESERVED
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*

Decimal 29 84 *n*

Hex 1D 54 *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 700 Series 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*

Decimal 29 86 *n*

Hex 1D 56 *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

n = 2 Landscape 203 x 138 High Speed

n = 4 Landscape 203 x 203 High Resolution

n = 6 Landscape 203 x 138 High Resolution

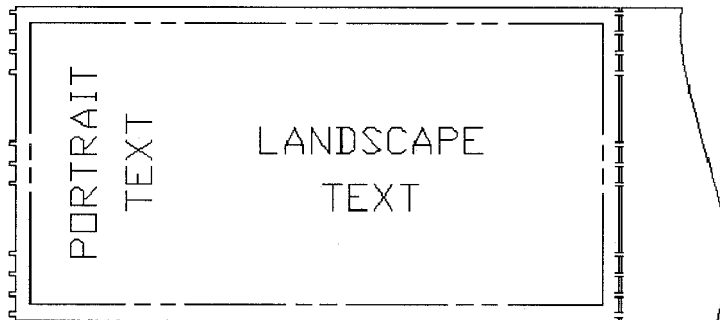


Figure 36 Print Orientation

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

ASCII GS W Thin Thick

Decimal 29 87 Thin Thick

Hex 1D 57 Thin Thick

Parameters

Thin = thickness of thin bars

Thick = thickness of thick bars

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*

Decimal 29 100 *n*

Hex 1D 64 *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*

Decimal 29 104 *n*

Hex 1D 68 *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 $d1...dm$

Decimal 29 107 n m $d1...dm$

Hex 1D 6B 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 IDraw 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 I n1 n2 L1 L2 m

Decimal 29 108 n1 n2 L1 L2 m

Hex 1D 6C 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

ExpressionASCII GS t n Decimal 29 116 n Hex 1D 74 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

ExpressionASCII GS u n Decimal 29 117 n Hex 1D 75 n **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 *n*

Decimal 29 119 *n*

Hex 1D 77 *n*

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

Decimal 29 122

Hex 1D 7A

Parameters

None

Returns

Bit	Bit = 0	Bit = 1
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
4	Bar Code not Completed	Bar Code Completed
5	Ticket not Completed	Ticket Completed
6	Ticket not in path	Ticket in path ¹
7 MSB	No paper jam	Paper Jam ²

¹ Optional Ticket Present Sensor must be installed for the ticket in path status

² Paper Jam status is not available on all firmware, customer specific, specify when ordering printer.

Available Commands

Name	Description	Page
HT	Horizontal Tab	50
LF	Line Feed	51
FF	Form Feed	51
CR	Carriage Return	52
SO	Set Font to Double Wide	52
DC4	Cancel Double-wide Mode	53
20h - FFh	Printable Characters	53
ESC *	Reset to Defaults	54
ESC @	Reset to Power-up Condition	54
ESC E	Form Feed	54
ESC J <i>n</i>	Feed <i>n</i> Sublines	55
ESC M	Set Font to 12 cpi	55
ESC P	Set Font to 16 cpi	56
ESC U	Set Font to 10 cpi	57
ESC V	Return Firmware Revision	57
ESC W <i>n1 n2</i>	Wrap Data	58
ESC X <i>n1 n2</i>	Set Horizontal Starting Position	58
ESC Y <i>n1</i>	Set Vertical Starting Position	59
GS DC2	Set Font to Double High	59
GS DC3	Cancel Double High	59
GS RS	Set Inverse Print Mode	60
GS US	Cancel Inverse Print Mode	60
GS * <i>n1 n2 t h w d1...dm</i>	Landscape Mode Graphics	
61		
GS A <i>n1 n2</i>	Bar Code Start Position	61
GS G <i>n1 n2 t d</i>	Print Custom Graphic	62
GS L <i>n1 n2</i>	Set Feed Length	63
GS S	Return Printer Status	63
GS T <i>n</i>	Select Line Wrap/Truncate Modes	64
GS V <i>n</i>	Set Print Orientation	65
GS W <i>Thin Thick</i>	Set Bar Code Element Width	66
GS d <i>n</i>	Feed <i>n</i> Text Lines	66
GS h <i>n</i>	Set Bar Code Height	66
GS k <i>n m d1...dk</i>	Print Bar Code	
67		
GS l <i>n1 n2 l1 l2 m</i>	Draw Line in Landscape Mode	68
GS t <i>n</i>	Set Characters per Line (Landscape)	69
GS u <i>n</i>	Set Characters per Line (Portrait)	69
GS w <i>n</i>	Set Bar Code Module Width	70

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

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(HT)Horizontal Tab	50

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