

SureMark Printers



# DBCS User's Guide

**Note**

Before using this information and the product it supports, be sure to read "Safety Information" on page xi and the general information under Appendix G, "Notices" on page 173.

**Third Edition (September 2000)**

This edition applies to IBM SureMark Printers, models TI5, TG5,, TF7 and TM7. This edition replaces publication GA18-7710-01.

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# Contents

<b>Preface</b> . . . . .	ix
Who Should Read This Manual . . . . .	ix
How This Manual Is Organized . . . . .	ix
Related Publications and Diskettes . . . . .	x
Where to Find More Information . . . . .	x
Tell Us What You Think . . . . .	x
Safety Information . . . . .	xi
<b>Summary of Changes</b> . . . . .	xix
Web-only Update for GA27-4256-01 (March 2002). . . . .	xix
Web-only Update for GA27-4256-01 (June 2001) . . . . .	xix
GA18-7710-01 . . . . .	xix
GA27-4256-00 . . . . .	xix
<b>Figures</b> . . . . .	xxi
<b>Tables</b> . . . . .	xxiii

---

## Part 1. General Information . . . . . 1

<b>Chapter 1. Introduction</b> . . . . .	3
Printer Overview . . . . .	3
Description of Models . . . . .	4
Features Used with the SureMark Printers . . . . .	5
Planning Information . . . . .	5
Your Responsibilities . . . . .	5
Limitations . . . . .	6
Communication Interfaces . . . . .	6
Temperature and Humidity Limits . . . . .	7
Physical Dimensions . . . . .	7
Power Requirements . . . . .	8
Hardware Requirements . . . . .	8
Software Requirements . . . . .	9
Single-Byte Character Set (SBCS) Code Pages . . . . .	9
Double-Byte Character Set (DBCS) Code Pages . . . . .	10
Bar Codes . . . . .	10
<b>Chapter 2. Installation Instructions</b> . . . . .	11
Unpacking the Printer . . . . .	11
Installing the SureMark Printers . . . . .	12
Installing for RS-232/RS-485 Communication . . . . .	12
Installing for USB Communication . . . . .	15
Using the Wall Mounting Feature . . . . .	18
Installing the Fillers . . . . .	19
Installing Fillers for RS-232/RS-485 Printers . . . . .	19
Installing Fillers for USB Printers . . . . .	21
RS-232 Communication Mode Selections . . . . .	23
Baud Rate Selection . . . . .	23
RS-232 Communications Protocol Selection . . . . .	23
USB Communication Mode . . . . .	25
USB Selection . . . . .	25
<b>Chapter 3. SureMark Installation, Service, and Utility Software</b> . . . . .	27

Software Adjustments (Models TI5 and TG5 Only) . . . . .	27
Using the 4690 Operating System . . . . .	27
Using IBM Point-of-Sale Device Diagnostics . . . . .	28
Using Reference/Service Diskettes (RS-485 or RS-232 Only) . . . . .	28
4610 DBCS Installation Utility Diskette . . . . .	31
DBCS Code Page Download . . . . .	31
4610 DBCS Installation Utility Diskette Code Page Download . . . . .	31
DBCS Code Page Download – POSS for Windows (RS-485 and USB only) . . . . .	33
DBCS User-Defined Character Download . . . . .	35
Firmware Update . . . . .	36
4610 DBCS Installation Utility Diskette for Updating SureMark Firmware . . . . .	36
Using POSS For Windows for Updating SureMark Firmware (RS-485 and USB Only) . . . . .	37
Using 4690 OS 4610 Utility to Update SureMark Firmware . . . . .	38
Updating 4610 Firmware Using RS-232 Attachment Cable . . . . .	38
Limitation on Updating Firmware . . . . .	39
Emulating the IBM Model 3 or Model 4 Printers . . . . .	39
Enabling Emulation Using 4610 DBCS Installation Utility Diskette . . . . .	39
Enabling Emulation Using 4690 On-Line Terminal Diagnostics . . . . .	40
Limitations for Emulation . . . . .	40
Printing Saved Data . . . . .	41
Emulating an Epson Single-Station Printer (Single-Station SureMark Only) . . . . .	41
Enabling Epson Emulation . . . . .	42
Limitations for Epson Emulation . . . . .	42
Changing the Printer Mode between DBCS and SBCS . . . . .	42
Proportional Font Conversion Utility . . . . .	43
Resources on the Internet . . . . .	43

---

**Part 2. Models TI5 and TG5. . . . . 45**

<b>Chapter 4. Operation (Models TI5 and TG5) . . . . .</b>	<b>47</b>
Operating Controls and Indicators . . . . .	47
Ribbon Loading . . . . .	49
Paper Loading . . . . .	51
Thermal Printhead Cleaning . . . . .	53
<b>Chapter 5. Testing and Problem Analysis – Models TI5 and TG5 . . . . .</b>	<b>55</b>
Testing the Printer . . . . .	55
Offline Tests . . . . .	56
Customer Receipt Test . . . . .	56
Document Insert Test . . . . .	56
Resetting the Printer - Offline . . . . .	59
Problem Determination . . . . .	59

---

**Part 3. Models TF7 and TM7 . . . . . 61**

<b>Chapter 6. Operation (Models TF7 and TM7) . . . . .</b>	<b>63</b>
Operating Controls and Indicators . . . . .	63
Paper Loading . . . . .	63
Thermal Printhead Cleaning . . . . .	66
<b>Chapter 7. Testing and Problem Analysis – Models TF7 and TM7 . . . . .</b>	<b>67</b>
Testing the Printer . . . . .	67
Offline Test . . . . .	68
RS-232 Hex Dump . . . . .	69

Resetting the Printer - Offline . . . . .	70
Problem Determination . . . . .	70

---

**Part 4. Appendixes.** . . . . . 71

<b>Appendix A. Consumable Supplies</b> . . . . .	73
Paper Specifications . . . . .	73
Thermal Paper . . . . .	73
Document Insert Forms (Models TI5 and TG5 Only) . . . . .	74
Print Ribbons (Models TI5 and TG5 Only) . . . . .	75

<b>Appendix B. Technical Information.</b> . . . . .	77
General Description . . . . .	77
Specifications . . . . .	77
Memory Units . . . . .	79
Immediate Commands . . . . .	79
Voltage Conversion Circuitry . . . . .	79
RS-485 Serial I/O Parameters . . . . .	80
Cash Drawer Connector Pin Assignments . . . . .	80
RS-232 Connector Pin Assignments . . . . .	80
RS-232 Parameters . . . . .	81
USB Connector Pin Assignments . . . . .	81
Code Page Definitions . . . . .	82
Generic Code Page . . . . .	83
Code Page 437 . . . . .	84
Code Page 858 . . . . .	85
Code Page 860 . . . . .	86
Code Page 863 . . . . .	87
Code Page 865 . . . . .	88
Code Page 932 . . . . .	89
Code Page 949 . . . . .	90
Code Page 950 . . . . .	91
Code Page 1381 . . . . .	92
Character Fonts . . . . .	93
Thermal Printing Font . . . . .	93
Impact Printing Fonts (Models TI5 and TG5 Only) . . . . .	94

<b>Appendix C. RS-232 Programming Information</b> . . . . .	100
RS-232 Commands Summary by Function . . . . .	100
Alphabetized RS-232 Commands Summary . . . . .	104
System Commands . . . . .	107
Exercise Program . . . . .	107
Verify Previous Commands Completed . . . . .	107
Status Request . . . . .	107
Extended Address Command – Request Printer ID . . . . .	107
Preset or Onetime-Set Commands . . . . .	109
Download Graphics (Logo) Commands . . . . .	109
Predefine Messages . . . . .	111
Download User-Defined Characters . . . . .	112
Download Double-Byte Characters . . . . .	117
Flash Storage Write . . . . .	121
Erase Flash EPROM Sector . . . . .	121
Send Checksum of Flash EPROM Sector . . . . .	122
Microcode Tolerance (MCT) Information - Loading . . . . .	122
Microcode Tolerance (MCT) Information - Request . . . . .	123
DBCS Address Vectors . . . . .	125

Setup Commands . . . . .	125
Set Print Mode . . . . .	125
Set or Cancel Double-Wide Mode . . . . .	126
Set or Cancel Double-High Mode. . . . .	127
Set or Cancel Underline Mode. . . . .	127
Set or Cancel Overline Mode . . . . .	127
Set or Cancel Invert Mode . . . . .	127
Set or Cancel Emphasized Printing . . . . .	128
Set or Cancel High Quality Print Mode. . . . .	128
Set Print Station . . . . .	128
Select User-Defined or Resident Character Sets . . . . .	129
Set Code Page . . . . .	129
Set Inter-Character Spacing. . . . .	129
Set Inter-Character Spacing – DBCS . . . . .	130
Set or Cancel Rotated Characters . . . . .	130
Set Print Station Parameters . . . . .	130
Select 1/8-Inch Line Spacing . . . . .	131
Select 1/6-Inch Line Spacing . . . . .	131
Select Color Printing . . . . .	132
Set Line Spacing Using Minimum Units . . . . .	132
Set Sheet Eject Length . . . . .	133
Set Horizontal Tab Positions . . . . .	133
Set Left Margin Position . . . . .	133
Set Relative Position . . . . .	134
Align Positions . . . . .	134
Set or Cancel Unidirectional Printing . . . . .	135
Set Error Recovery Function . . . . .	136
Define Document Wait Time . . . . .	136
Status Sent to System. . . . .	137
Select Character for Reprinted Lines . . . . .	137
Reinitialize the Printer. . . . .	138
Enable or Disable the Feed Buttons (Models TI5 and TG5 Only) . . . . .	138
Enable or Disable the Beeper (Models TF7 and TM7 Only) . . . . .	139
Enable or Disable Upside-Down Printing . . . . .	139
Select Character Size for Scalable Fonts . . . . .	140
Fix Font Matrix . . . . .	141
Print Logo Inline . . . . .	141
Enable or Disable Two-Color Printing . . . . .	141
Bar Code Commands . . . . .	142
Print Bar Code . . . . .	142
Select Horizontal Size of Bar Code . . . . .	145
Select Bar Code Height . . . . .	146
Select Printing Position of Human Readable Information (HRI) . . . . .	146
Select Font for HRI . . . . .	146
Print PDF417 Bar Code . . . . .	147
Select PDF417 ECC (Error Correction Codewords) Level . . . . .	147
Select Aspect Ratio PDF417 Bar Code . . . . .	148
Enable PDF417 Truncation . . . . .	148
Print Character Commands . . . . .	148
Print and Line Feed. . . . .	148
Print and Line Feed. . . . .	149
Print, Form Feed, and Cut the Paper (FF) . . . . .	149
Print and Feed Paper n lines . . . . .	149
Print and Feed Paper Using Minimum Units. . . . .	149
Print Graphic Messages . . . . .	150
Select and Print a Graphics (Logo) Command . . . . .	150

Print Predefined Graphics (Logo) Command . . . . .	151
Print Predefined Messages . . . . .	152
Miscellaneous Commands . . . . .	152
Tab to Next Tab Stop . . . . .	152
Return Home (Select Printhead Location). . . . .	153
Paper Cut/DI Eject . . . . .	153
Generate Drive Pulse for Cash Drawer . . . . .	153
Retrieve the Flash Storage . . . . .	154
Retrieve Size of User Flash Storage . . . . .	154
Retrieve Printer Usage Statistics . . . . .	154
Asynchronous (Real-Time) Commands . . . . .	155
Real-Time Requests . . . . .	156
Data Buffer Management and Batch Printing . . . . .	157
Reset Line Count . . . . .	157
Disable Line Count . . . . .	157
Hold Printing Until Buffer is Released . . . . .	157
Document Handling. . . . .	157
Portrait Mode . . . . .	158
Landscape Mode . . . . .	158
Status Summary . . . . .	160
Message from the Printer . . . . .	160
Status Byte 1 . . . . .	160
Status Byte 2 . . . . .	161
Status Byte 3 . . . . .	161
Status Byte 4 . . . . .	162
Status Byte 5 . . . . .	162
Status Byte 6 . . . . .	162
Status Byte 7 . . . . .	162
Status Byte 8 . . . . .	162
<b>Appendix D. Uploading Electronic Journal Data . . . . .</b>	<b>163</b>
Enable the Upload of EJ Data . . . . .	163
Disable the Upload of EJ Data. . . . .	163
Upload the EJ Data. . . . .	163
Request the Size of the EJ Space . . . . .	164
Erase the EJ Data in the Printer . . . . .	164
<b>Appendix E. Proportional Fonts . . . . .</b>	<b>165</b>
Preparing the Fonts. . . . .	165
Implementing Proportional Fonts . . . . .	165
Layout Using Align Commands . . . . .	165
Layout using Set Tab Position . . . . .	166
<b>Appendix F. Emulation Support for Epson Single-Station Printer . . . . .</b>	<b>169</b>
Commands Supported in Emulation Mode . . . . .	169
Commands with Limited Support in Emulation Mode . . . . .	171
Commands Not Supported in Emulation Mode . . . . .	172
Connectivity Differences . . . . .	172
<b>Appendix G. Notices . . . . .</b>	<b>173</b>
Electronic Emission Notices. . . . .	173
Federal Communications Commission (FCC) Statement . . . . .	173
Industry Canada Class A Emission Compliance Statement . . . . .	173
Avis de conformité aux normes d'Industrie Canada . . . . .	173
European Union (EU) Mark of Conformity Statement . . . . .	174
Japanese Voluntary Control Council for Interference (VCCI) Statement . . . . .	175

updated March 18, 2002

Korean Communications Statement . . . . .	175
Chinese Class A warning statement . . . . .	175
Taiwanese Class A Warning Statement . . . . .	175
Australia / New Zealand Compliance Statement . . . . .	176
Trademarks. . . . .	176
<b>Index . . . . .</b>	<b>177</b>



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## Preface

This manual assists you with installing, testing, and performing problem determination for models T15, TF7, and TM7 of the IBM SureMark Printer.

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### Who Should Read This Manual

This manual is intended for use by persons who are installing, testing, or programming a Model T15, TF7 or TM7 IBM SureMark Printer. The manual should also be used for problem determination on the printer.

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### How This Manual Is Organized

Part 1 contains information that applies to SureMark printers in general:

- Chapter 1, "Introduction" provides an overview of the features and options of the SureMark printers.
- Chapter 2, "Installation Instructions" – provides information on installing the SureMark printers.
- Chapter 3, "SureMark Installation, Service, and Utility Software" – provides information about using SureMark utilities to setup or modify your system configuration.

Part 2 contains information that is specific to the thermal/impact SureMark printer, Models T15 and TG5:

- Chapter 4, "Operation (Models T15 and TG5)" – provides information about the controls and indicators. Ribbon loading and paper loading instructions are also included.
- Chapter 5, "Testing and Problem Analysis – Models T15 and TG5" – provides information on testing and on problem determination.

Part 3 contains information that is specific to the single-station SureMark printers, models TF7 and TM7:

- Chapter 6, "Operation (Models TF7 and TM7)" – provides information on the controls and indicators. Paper loading instructions are also included.
- Chapter 7, "Testing and Problem Analysis – Models TF7 and TM7" – provides information on testing and on problem determination.

The appendixes contain the following information:

- Appendix A, "Consumable Supplies" – information about consumable supplies.
- Appendix B, "Technical Information" – information about technical specifications.
- Appendix C, "RS-232 Programming Information" – information about RS-232 programming commands.
- Appendix D, "Uploading Electronic Journal Data" – information about uploading electronic journal data while the SureMark is in Model 4 emulation mode.
- Appendix E, "Proportional Fonts" – information about creating and using proportional fonts.
- Appendix F, "Emulation Support for Epson Single-Station Printer" – expanded information about Epson emulation mode.
- Appendix G, "Notices" – information about trademarks and electronic emission notices

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## Related Publications and Diskettes

- *IBM SureMark Printers: DBCS Hardware Service Manual*, GY27-0397
- *IBM SureMark Printers: DBCS Installation Utilities Diskette*
- *IBM 4693 Point-of-Sale Terminals Reference Diskette*
- *IBM 4694/4695 Point-of-Sale Terminals Service Diskette*
- *IBM Safety Information – Read This First*, GA27-4004
- *IBM SurePOS 700 Series: System Reference*, SA27-4220
- *IBM SurePOS 500 Series: System Reference*, SA27-4255
- *POSS Programming Reference and User's Guide*, SC30-3560

The diskettes are only available by download from the Internet. See “Resources on the Internet” on page 43 for more information.

For information about ordering IBM publications that are not shipped with the SureMark printers, contact your IBM representative or your place of purchase.

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## Where to Find More Information

A CD-ROM is available that contains books that are part of the IBM Retail Store Solutions Library Collection, SK2T-0331.

Current versions of Retail Store Solutions documentation and downloadable diskettes are available on the IBM Retail Store Solutions Web site. See “Resources on the Internet” on page 43 for information about accessing the site.

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## Tell Us What You Think

Your feedback is important in helping to provide the most accurate and high-quality information. Please take a few moments to tell us what you think about this book. The only way for us to know if you are satisfied with our books, or how we might improve their quality, is through feedback from customers like you. If you have any comments about this book, there is a comment form at the back of this book. You can also get a copy of the form from the PDF version of the book on the Web.

To access a PDF version of this book, visit the Retail Store Solutions Web site at:  
<http://www.ibm.com/solutions/retail/store>

From there, select **Support** at the left, then select **Publications**.

After you have filled out the form, return it by mail, by fax, or by giving it to an IBM representative. If applicable, include a reference to the specific location of the text on which you are commenting. For instance, include the page or table number.

Between major revisions of this manual we may make minor technical updates. The latest softcopy version of this manual is available under Publications on the IBM Retail Store Solutions Web site.

## Safety Information



**Danger:**

Before you begin to install this product, read the safety information in *IBM Safety Information - Read This First*, GA27-4004. This booklet describes safe procedures for cabling and plugging in electrical equipment.



**Gevaar:**

Voordat u begint met de installatie van dit produkt, moet u eerst de veiligheidsinstructies lezen in de brochure *Veiligheidsinstructies—Lees dit eerst*, GA27-4004. Hierin wordt beschreven hoe u elektrische apparatuur op een veilige manier moet bekabelen en aansluiten.



**Perigo:**

Antes de começar a instalar este produto, leia as informações de segurança contidas em *Informações Sobre Segurança—Leia Isto Primeiro*, GA27-4004. Esse folheto descreve procedimentos de segurança para a instalação de cabos e conexões em equipamentos elétricos.



**Fare!**

Før du installerer dette produkt, skal du lse sikkerhedsforskrifterne i *Sikkerhedsforskrifter—Læs dette først* GA27-4004. Vejledningen beskriver den fremgangsmåde, du skal bruge ved tilslutning af kabler og udstyr.



**Gevaar**

Voordat u begint met het installeren van dit produkt, dient u eerst de veiligheidsrichtlijnen te lezen die zijn vermeld in de publikatie *IBM Safety Information - Read This First*, GA27-4004. In dit boekje vindt u veilige procedures voor het aansluiten van elektrische apparatuur.



**VAARA**

Ennen kuin aloitat tämän tuotteen asennuksen, lue julkaisussa *Turvaohjeet—Luetämä ensin*, GA27-4004, olevat turvaohjeet. Tässä kirjasessa on ohjeet siitä, miten sä hkölaitteet kaapeloidaan ja kytketään turvallisesti.



**Danger**

Avant d'installer le présent produit, consultez le livret *Informations pour la sécurité—Lisez-moi d'abord*, GA27-4004, qui décrit les procédures à respecter pour effectuer les opérations de câblage et brancher les équipements électriques en toute sécurité.



**Vorsicht**

Bevor mit der Installation des Produktes begonnen wird, die Sicherheitshinweise in *Sicherheitsinformationen—Bitte zuerst lesen*, IBM Form GA27-4004. Diese Veröffentlichung beschreibt die Sicherheitsvorkehrungen für das Verkabeln und Anschließen elektrischer Geräte.



**Vigyázat**

Mielőtt megkezdi a berendezés üzembe helyezését, olvassa el a *IBM Safety Information — Read This First*, GA27-4004 könyvecskében leírt biztonsági információt. Ez a könyv leírja, milyen biztonsági intézkedéseket kell megtenni az elektromos berendezés huzalozásakor illetve csatlakoztatásakor.



**Pericolo**

prima di iniziare l'installazione di questo prodotto, leggere le informazioni relative alla sicurezza riportate nell'opuscolo *Informazioni di sicurezza—Prime informazioni da leggere* in cui sono descritte le procedure per il cablaggio ed il collegamento di apparecchiature elettriche.



**Fare**

Før du begynner å installere dette produktet, må du lese sikkerhetsinformasjonen i *Sikkerhetsinformasjon—Les dette først*, GA27–4004 som beskriver sikkerhetsrutinene for kabling og tilkobling av elektrisk utstyr.



**Perigo**

Antes de iniciar a instalação deste produto, leia as informações de segurança *Informações de Segurança—Leia Primeiro*, GA27–4004. Este documento descreve como efectuar, de um modo seguro, as ligações eléctricas dos equipamentos.



**Peligro**

Antes de empezar a instalar este producto, lea la información de seguridad en *Información de Seguridad—Lea Esto Primero*, GA27–4004. Este documento describe los procedimientos de seguridad para cablear y enchufar equipos eléctricos.



**Varning—livsfara**

Innan du börjar installera den här produkten bör du läsa säkerhetsinformationen i dokumentet *Säkerhetsföreskrifter—Läs detta först*, GA27-4004. Där beskrivs hur du på ett säkert sätt ansluter elektrisk utrustning.

危險：安裝本產品之前，請先閱讀  
"IBM Safety Information--Read  
This First" GA27-4004 手冊中所提  
供的安全注意事項。這本手冊將會說明  
使用電器設備的纜線及電源的安全程序。

Opasnost: Prije nego sto počnete sa instalacijom produkta,  
pročitajte naputak o pravilima o sigurnom rukovanju u  
Upozorenje: Pravila o sigurnom rukovanju - Prvo pročitaj ovo,  
GA27-4004. Ovaj privitak opisuje sigurnosne postupke za  
priklučivanje kabela i priključivanje na električno napajanje.

**Upozornění:** než zahájíte instalaci tohoto produktu, přečtěte si  
nejprve bezpečnostní informace v pokynech „Bezpečnostní  
informace“ č. GA27-4004. Tato brožurka popisuje bezpečnostní  
opatření pro kabeláž a zapojení elektrického zařízení.

**Κίνδυνος:** Πριν ξεκινήσετε την εγκατάσταση αυτού του προϊόντος,  
διαβάστε τις πληροφορίες ασφάλειας στο φυλλάδιο *IBM Safety  
Information-Read this first*, GA27-4004. Στο φυλλάδιο αυτό  
περιγράφονται οι ασφαλείς διαδικασίες για την καλωδίωση των  
ηλεκτρικών συσκευών και τη σύνδεσή τους στην πρίζα.

危險：導入作業を開始する前に、安全に関する  
小冊子 GA27-4004 の「最初にお読みください」  
(Read This First) の項をお読みください。  
この小冊子は、電気機器の安全な配線と接続の  
手順について説明しています。

위험: 이 제품을 설치하기 전에 반드시  
"주의: 안전 정보-시작하기 전에"  
(GA27-4004) 에 있는 안전 정보를  
읽으십시오.

סכנה : לפני שמתחילים בהתקנת מוצר זה, יש לקרוא את הוראות הבטיחות בחוברת  
Caution: Safety Information - Read This First, GA27-4004  
חוברת זו מתארת את הוראות הבטיחות לחיבור הכבלים ולחיבור לחשמל של ציוד חשמלי.

خطر: قبل عملية بدء تركيب هذا المنتج، قم بقراءة معلومات  
الحمية الموجودة في التحذير: معلومات الحماية – Read This First  
GA27-4004 . يقوم هذا الكتيب بوصف اجراءات الأمان  
لتوصيل الأدوات الكهربائية بالكابلات والمقبس الكهربائي.



### ОПАСНОСТ

Пред да почнете да го инсталирате овој продукт, прочитајте ја информацијата за безбедност:  
"Предупредување: Информација за безбедност: Прочитајте го прво ова", GA27-4004.  
Оваа брошура опишува безбедносни процедури за каблирање и вклучување на електрична опрема.

### Uwaga:

Przed rozpoczęciem instalacji produktu należy zapoznać się z instrukcją: "IBM Safety Information - Read This First", GA27-4004.  
Zawiera ona warunki bezpieczeństwa przy podłączeniu do sieci elektrycznej i eksploatacji.

**ОСТОРОЖНО:** Прежде чем устанавливать этот продукт, прочтите Инструкцию по технике безопасности в документе "Внимание: Инструкция по технике безопасности -- Прочсть в первую очередь", GA27-4004. В этой брошюре описаны безопасные способы каблирования и подключения электрического оборудования.

Nebezpečenstvo: Pred inštaláciou výrobku si prečítajte bezpečnostné predpisy v  
Výstraha: Bezpečnostné predpisy - Prečítaj ako prvé, GA27-4004. V tejto brožúrke sú opísané bezpečnostné postupy pre pripojenie elektrických zariadení.

Pozor: Preden začnete z instalacijo tega produkta preberite poglavje: "Opozorilo: Informacije o varnem rokovanju-preberi pred uporabo," GA27-4004. To poglavje opisuje pravilne postopke za kabliranje,

### 危險：

開始安裝此產品之前，請先閱讀安全資訊。

### 注意：

請先閱讀 - 安全資訊 GA27-4004

此冊子說明插接電器設備之電纜線的安全程序。

updated March 18, 2002

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## Summary of Changes

This section summarizes the changes included in the latest editions of this manual.

---

### Web-only Update for GA27-4256-01 (March 2002)

This update contains updates to the paper loading procedure for models TM6 and TF6. See “Paper Loading” on page 63.

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### Web-only Update for GA27-4256-01 (June 2001)

This edition includes the updates for the TG5 model.

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### GA18-7710-01

This edition includes information for the support of a USB logic card.

Information that was added includes:

- “USB Connector Pin Assignments” on page 81.
- USB information has been added to “Voltage Conversion Circuitry” on page 79 and “Hardware Requirements” on page 8.
- The part number for the available USB cables has been added to “Features Used with the SureMark Printers” on page 5.
- Information about your responsibilities when using USB communications has been added to “Planning Information” on page 5.
- The data rate for USB communications has been added to “Communication Interfaces” on page 6.
- Information about installing the SureMark printer for use with USB communications has been added to “Installing for USB Communication” on page 15.
- Information about installing fillers for the SureMark printer when using USB communications has been added to “Installing Fillers for USB Printers” on page 21.
- Communication mode information for USB has been added to “USB Communication Mode” on page 25.
- Relevant information for performing problem determination with USB has been added to Table 6 on page 59.

---

### GA27-4256-00

This edition includes information for the support of the new single-station SureMark printers, which are models TF7 and TM7, and also information about new functions and commands for Model T15. Changed or new information is indicated by a revision bar (|) in the left margin. (There are no revision bars in the margin of figures. Refer to “Figures” on page xxi for revision bars that show which figures have been changed.)

Changes for this edition include:

- Because there are important differences between models TF7 and TM7, which are single-station SureMark printers, and the Model T15 thermal/impact SureMark printer, the book has been reorganized into three parts.

- Part 1, “General Information” on page 1 contains information that is similar for all SureMark models. Information about the new single-station printers has been added throughout this part.
- Part 2, “Models TI5 and TG5” on page 45 contains information that is specific to the Model TI5 thermal/impact SureMark printer.
- Part 3, “Models TF7 and TM7” on page 61 contains information that is specific to the new single-station SureMark printers – models TF7 and TM7.
- A new thermal font has been added. See “Set Print Mode” on page 125 and “Thermal Printing Font” on page 93.
- Support for emulation of an Epson single-station printer has been added. (Emulation is only available when the SureMark is in SBCS mode.) See “Emulating an Epson Single-Station Printer (Single-Station SureMark Only)” on page 41 for information about how to enable emulation and an overview of the limitations to using emulation mode. See Appendix F, “Emulation Support for Epson Single-Station Printer” on page 169 for detailed information about what Epson commands are supported in emulation mode.
- A font conversion utility has been added as part of the support for proportional fonts. See “Proportional Font Conversion Utility” on page 43.
- Information about uploading electronic journal data while the printer is emulating a Model 4 printer has been added. See Appendix D, “Uploading Electronic Journal Data” on page 163.
- The following commands have been added:
  - “Proportional Font” on page 114
  - “Select Color Printing” on page 132
  - $n=09$  (Align Column Right) for “Align Positions” on page 134
  - “Enable or Disable Upside-Down Printing” on page 139
  - “Select Character Size for Scalable Fonts” on page 140
  - “Fix Font Matrix” on page 141
  - “Print Logo Inline” on page 141
  - “Enable or Disable Two-Color Printing” on page 141
  - $n=09$  (Code 128A, 128B, and 128C) for “Print Bar Code” on page 142
- The following command, which is supported only on models TF7 and TM7, has been added:
  - “Enable or Disable the Beeper (Models TF7 and TM7 Only)” on page 138

## Figures

1.	IBM SureMark Printers . . . . .	3
2.	SureMark Printer Dimensions – Models TI5 and TG5 . . . . .	7
3.	SureMark Printer Dimensions – Models TF7 and TM7 . . . . .	8
4.	Cable Connectors and RS-232 Settings Switch for Thermal/Impact SureMark Printers . . . . .	12
5.	Cable Connectors for Single-Station SureMark Printers. . . . .	13
6.	RS-232 Mode Switches for Single-Station SureMark Printers. . . . .	13
7.	RS-232 and RS-485 Cable Routing for Single-Station SureMark Printers . . . . .	14
8.	USB Ports for Thermal/Impact SureMark Printers (View is from the bottom rear of the printer)	15
9.	USB Ports for Single-Station SureMark Printers . . . . .	16
10.	USB Cable Routing for Single-Station SureMark Printers . . . . .	16
11.	Mounting a Single-Station SureMark on a Wall . . . . .	18
12.	Installing the Fillers for RS-232/RS-485 Systems . . . . .	20
13.	Installing the Fillers for USB Systems . . . . .	22
14.	Adjustment and Alignment Printouts . . . . .	30
15.	Switch for Epson Emulation . . . . .	42
16.	SureMark Printer - Indicators, Controls, and Printing Stations (Models TI5 and TG5) . . . . .	47
17.	Inserting Documents . . . . .	48
18.	Printable Area of an Inserted Document (Portrait) . . . . .	48
19.	Printable Area of an Inserted Document (Landscape) . . . . .	49
20.	Opening the Ribbon Cover . . . . .	49
21.	Ribbon Cartridge Loading . . . . .	50
22.	Ribbon Path around the Printhead . . . . .	50
23.	Paper Cover – Models TI5 and TG5. . . . .	51
24.	Paper Loading Path –: Models TI5 and TG5. . . . .	52
25.	Printhead and Print Line Area – Models TI5 and TG5 . . . . .	53
26.	Offline Printer Test Pattern – Customer Receipt Station (Models TI5 and TG5) . . . . .	57
27.	SureMark Printer - Indicator, Control, and Printing Station (Models TF7 and TM7) . . . . .	63
28.	Paper Loading Path. . . . .	64
29.	Paper Loading Path (Models TF7 and TM7) . . . . .	65
30.	Printhead and Print Line Area (Models TF7 and TM7) . . . . .	66
31.	Offline Printer Test Pattern – Models TF7 and TM7 . . . . .	69
32.	Printer's Resident Character Set - Generic Code Page . . . . .	83
33.	Code Page 437 . . . . .	84
34.	Code Page 858 . . . . .	85
35.	Code Page 860 . . . . .	86
36.	Code Page 863 . . . . .	87
37.	Code Page 865 . . . . .	88
38.	Code Page 932 . . . . .	89
39.	Code Page 949 . . . . .	90
40.	Code Page 950 . . . . .	91
41.	Code Page 1381 . . . . .	92
42.	Proportional Font Example . . . . .	116

updated March 18, 2002

## Tables

1.	Warranty Information . . . . .	1
2.	Adjustment Procedures Using 4690 Operating System . . . . .	28
I 3.	Adjustment Procedures Using the Point-of-Sale Device Diagnostics . . . . .	28
4.	Font Files for DBCS Code Pages . . . . .	33
5.	UDC Font File Names for DBCS Code Pages . . . . .	36
6.	Troubleshooting – Models TI5 and TG5 . . . . .	59
7.	Troubleshooting – Models TF7 and TM7 . . . . .	70
8.	Station Characteristics . . . . .	78
9.	Sound Characteristics . . . . .	78
10.	9-pin to 9-pin RS-232 Connector Layout . . . . .	81
11.	25-pin to 25-pin RS-232 Connector Layout . . . . .	81
12.	RS-232 Commands Organized by Function . . . . .	100
13.	RS-232 Commands in Alphabetical Order . . . . .	104
14.	Address Ranges for DBCS Code Pages . . . . .	118
15.	MCT Command Definitions. . . . .	123
16.	Fonts for Models TI5, TG5, TF7, and TM7 . . . . .	126
17.	Width and Height for Scalable Fonts . . . . .	140
I 18.	Code 128 character set . . . . .	143
19.	Retrievable Usage Data . . . . .	155
20.	Commands Supported in Epson Emulation Mode . . . . .	169
21.	Commands with Limited Support in Epson Emulation Mode. . . . .	171
22.	Commands Not Supported in Epson Emulation Mode . . . . .	172





## Part 1. General Information

This part contains descriptions of the SureMark printers that support DBCS mode and information about installing the printers.

The following table shows the warranty information for each printer model.

*Table 1. Warranty Information*

<b>Machine type</b>	<b>Description</b>	<b>Warranty service</b>	<b>Warranty upgrade</b>
4610-TI3	Attaches to the IBM 4694/4800. RS232, RS485, USB (Pearl white covers)	IOR 24x7	none
4610-TI4	Attaches to the IBM 4694/4800. RS232, RS485, USB (Pearl white covers)	IOR 24x7	none
4610-TI5 (DBCS – AP only)	Attaches to the IBM 4694/4800. RS232, RS485, USB (Pearl white covers)	IOR 24x7	none
4610-TM6	Attaches to the IBM 4694/4800. RS232, RS485, USB (Pearl white covers)	IOR 24x7	none
4610-TM7 (DBCS – AP only)	Attaches to the IBM 4694/4800. RS232, RS485, USB (Pearl white covers)	IOR 24x7	none
4610-TF6	TM6 with iron gray covers to match 4840	Depot repair	IOR 24x7 IOR 9x5
4610-TF7	TM7 with iron gray covers to match 4840	Depot repair	IOR 24x7, IOR 9x5
4610-IF6	Functionally equivalent to TF6 with iron gray covers but with IOR warranty	IOR 24x7	none
4610-TG3	Functionally equivalent to Model TI3 with iron gray covers to match the IBM 4840	IOR 24x7	none
4610-TG4	Functionally equivalent to Model TI4 with iron gray covers to match the IBM 4840	IOR 24x7	none
4610-TG5 (DBCS – AP only)	Functionally equivalent to Model TI5 with iron gray covers to match the IBM 4840	IOR 24x7	none
4610-DG3	Functionally equivalent to Model TG3 but with Depot warranty	Depot repair	IOR 24x7, 9x5
4610-DG4	Functionally equivalent to Model TG4 but with Depot warranty	Depot repair	IOR 24x7, 9x5
4610-DI3	Functionally equivalent to Model TI3 but with Depot warranty	Depot repair	IOR 24x7, 9x5
4610-DI4	Functionally equivalent to Model TI4 but with Depot warranty	Depot repair	IOR 24x7, 9x5
4610-DM6	Functionally equivalent to Model TM6 but with Depot warranty	Depot repair	IOR 24x7, 9x5

updated March 18, 2002

**Note:** IOR 24x7 is IBM onsite repair 24 hours times seven days per week. 9x5 is nine hours per day for five days per week.

## Chapter 1. Introduction

Printer Overview . . . . .	3
Description of Models . . . . .	4
Features Used with the SureMark Printers . . . . .	5
Planning Information . . . . .	5
Your Responsibilities . . . . .	5
Limitations . . . . .	6
Communication Interfaces . . . . .	6
Temperature and Humidity Limits . . . . .	7
Physical Dimensions . . . . .	7
Models T15 and TG5 . . . . .	7
Models TF7 and TM7 . . . . .	7
Power Requirements . . . . .	8
Hardware Requirements . . . . .	8
Software Requirements . . . . .	9
Operating System Requirements . . . . .	9
Application Requirements . . . . .	9
Single-Byte Character Set (SBCS) Code Pages . . . . .	9
Double-Byte Character Set (DBCS) Code Pages . . . . .	10
Bar Codes . . . . .	10

### Printer Overview

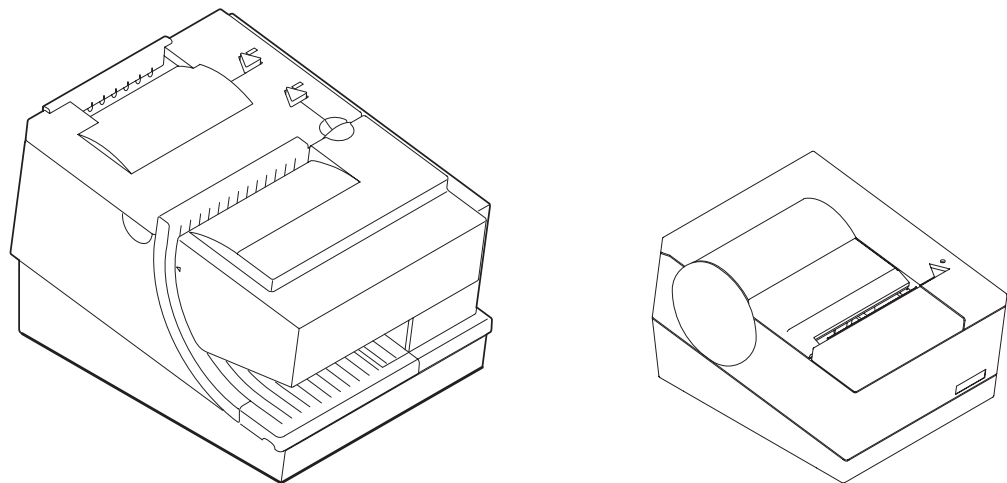


Figure 1. IBM SureMark Printers

The IBM SureMark printers are high-performance, high-function printers. The SureMark is available in several models:

- Models T15 and TG5 feature a thermal customer receipt station and an impact document insert station. The dual printheads enable quiet, fast printing at the customer receipt station while providing the capability to print and frank checks and to print multipart forms through the document insert station.
- Models TF7 and TM7 are single-station thermal printers. They contain no document insert station. These models cost less, weigh less, and have a smaller footprint than the Models T15 and TG5 printer. Models TF7 and TM7 have been designed for wall mounting, if desired by the retailer.

All SureMark printers provide:

- Fast, quiet receipt printing
- Easy paper loading
- 2-MB flash memory for storing messages, logos, code pages, and double-byte character sets
- Bar code generation
- Downloadable fonts and code pages
- Downloadable microcode
- Small footprint
- Support for RS-232 (EIA 232) and RS-485 (EIA 485) interfaces

The single-station SureMark printers, and also SureMark Models TI5 and TG5 printers that have been updated with the latest firmware, support the following in the thermal station:

- Proportional fonts (SBCS only)
- Scalable fonts
- Color printing – black plus one accent on two-color thermal paper (thermal station only)
- Upside-down printing

Additional features of some SureMark models include:

- Support for USB interface (models TI5, TG5, and TM7)
- Easy-to-load ribbon cartridge (Models TI5 and TG5)
- Epson emulation (models TF7 and TM7, SBCS only)

---

## Description of Models

SureMark printers are available in the following models that can operate in either single-byte character set (SBCS) mode or double-byte character set (DBCS) mode:

### Models TI5 and TG5

Standard models that supports receipt and document printing. Model TG5 is equivalent to Model TI5 but with iron gray covers to match the IBM 4840 system units.

### Models TF7 and TM7

Smaller models that contain only a thermal customer receipt station. Because there is no document insert station, these models do not support document printing.

Models TF7 and TM7 have an audible alarm, a spill-resistant design, and an optional wall mount.

For Food Service customers, the covers on Model TF7 match the IBM SurePOS 500 Series systems. For Retail customers, the covers on Model TM7 match the IBM 4694 systems if the RS-232/RS-485 interface is ordered, and match the IBM SurePOS 700 Series systems if the USB interface is ordered.

When any of these printers operates in DBCS mode, you can use one of the following character sets (characters must be downloaded to the printer from the Utility Diskette or using POSS for Windows):

- Japanese
- Korean
- Traditional Chinese
- Simplified Chinese

**Note:** IOR 24x7 is IBM onsite repair 24 hours times seven days per week. 9x5 is nine hours per day for five days per week.

## Features Used with the SureMark Printers

All models support the following features:

- Integration Panel
- 40-Character VFD Post Extension
- Distributed Printer Cable (RS-485)
- Integrated Cable (RS-485)
- Short RS-232 Communications Cable, 2 m (about 6.6 ft), P/N 86H2192
- Long RS-232 Communications Cable, 4 m (about 13.1 ft), P/N 86H2195
- Power Supply (RS-232 and USB), P/N 42H1176
- Power Cords (country-specific)
- RS-232/RS-485 Interface Card

Models TI5, TG5, and TM7 support the following features:

- USB Cable — Powered, 0.5 m (about 1.6 ft), P/N 01L1646
- USB Cable — Powered, 3.8 m (about 12.5 ft), P/N 01L647
- USB Cable — Standard, 5.0 m (about 16.4 ft), P/N 08L2014
- USB Interface Card

Because a cash drawer can attach directly to the SureMark, all models also support the following features:

- Compact Cash Drawer - Vertical Till
- Compact Cash Drawer - Horizontal Till
- Full-size Cash Drawer - Adjustable Till
- Full-size Cash Drawer - Fixed Till Insert
- Short Cash Drawer Cable, P/N 72H3802
- Long Cash Drawer Cable, P/N 72H3803

---

## Planning Information

### Your Responsibilities

You are responsible for replenishing consumable supplies, including roll paper for the thermal (customer receipt station) printer, and, depending on your model, forms and ribbon cartridges for the impact (document insert) station. (See Appendix A, “Consumable Supplies”.)

The customer must load the appropriate DBCS fonts in the printer.

If you plan to use RS-232 communications, you are responsible for ordering a 24 V dc power supply with a power cord. You are also responsible for ordering the RS-232 cable.

**Note:** If a 3-wire RS-232 cable is to be used, the printer must be set to XON/XOFF mode. (See “RS-232 Communications Protocol Selection” on page 23.)

It is the customers responsibilities to update printer firmware as needed prior to installing printers and as desired during the printer’s life.

If you plan to use RS-485 communications, you are responsible for ordering the RS-485 cable.

If you plan to use USB communications, you are responsible for ordering one of the following:

- A powered USB cable, P/N 08L2014.
- A standard USB cable with a Type B connector for the printer, and a power brick. The 3.8-m USB cable for a distributed configuration is P/N 01L1647 and the 0.5-m USB cable for an integrated configuration is P/N 01L1646.

**SureMark printers have no physical journal station. You must use an electronic journaling application instead.** Electronic journaling eliminates the need to store paper journal tapes and the time-consuming task of searching papers should the need arise.

## Limitations

SureMark printers have a safety feature that slows printing if excessive duty cycles are used. This feature protects the printer hardware from potential damage and should not be noticeable during normal operation.

## Communication Interfaces

All SureMark printers can support the RS-232 and RS-485 interfaces. Models TI5, TG5, and TM7 can also support the USB interface. For SureMark models that can support the USB interface, you can upgrade installed printers from RS-232/RS-485 to USB by ordering a USB interface card.

RS-232 supports 9600 and 19 200 baud rates. RS-485 operates at a 187.5K baud rate. USB supports data rates up to 12 Mbps.

## Temperature and Humidity Limits

<b>Shipping</b>	-40° to 60° C (-40° to 140° F) with 5% to 100% relative humidity including condensation, but excluding rain
<b>Storage</b>	0 to 60° C (32 to 140° F)
<b>Operating</b>	0 to 40° C (32 to 104° F) with 8 to 80% relative humidity

To allow convection cooling, ventilation holes in the covers must not be blocked.

## Physical Dimensions

### Models T15 and TG5

<b>Width</b>	190.5 mm (7.5 in.)
<b>Depth</b>	255 mm (10 in.)
<b>Height</b>	Front: 140 mm (5.5 in.), Rear: 190 mm (7.5 in.)
<b>Weight</b>	4.4 kg (9.6 lb)

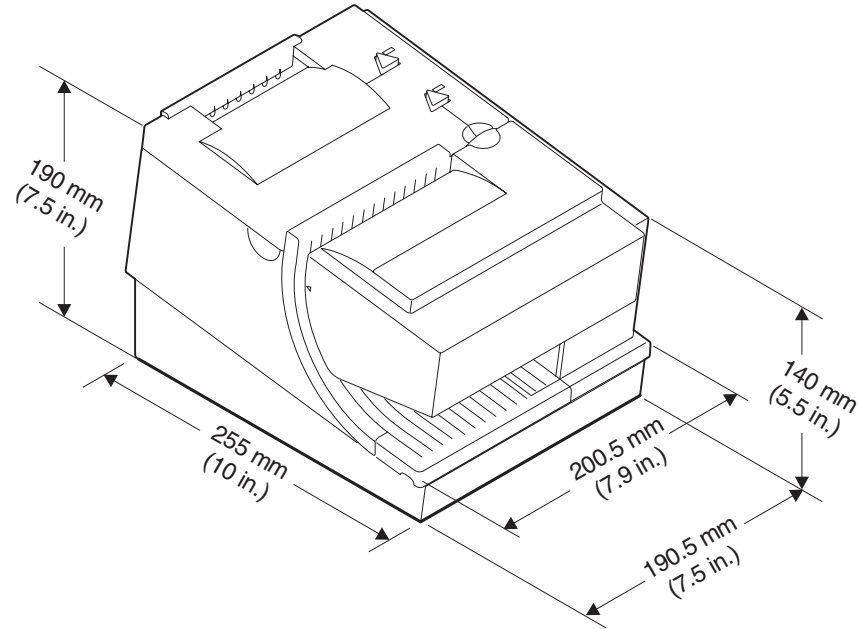


Figure 2. SureMark Printer Dimensions – Models T15 and TG5

### Models TF7 and TM7

<b>Width</b>	145 mm (5.7 in.)
<b>Depth</b>	177 mm (7.0 in.)
<b>Height</b>	Front: 95 mm (3.7 in.), Rear: 121 mm (4.8 in.)
<b>Weight</b>	1.4 kg (3.0 lb) without paper

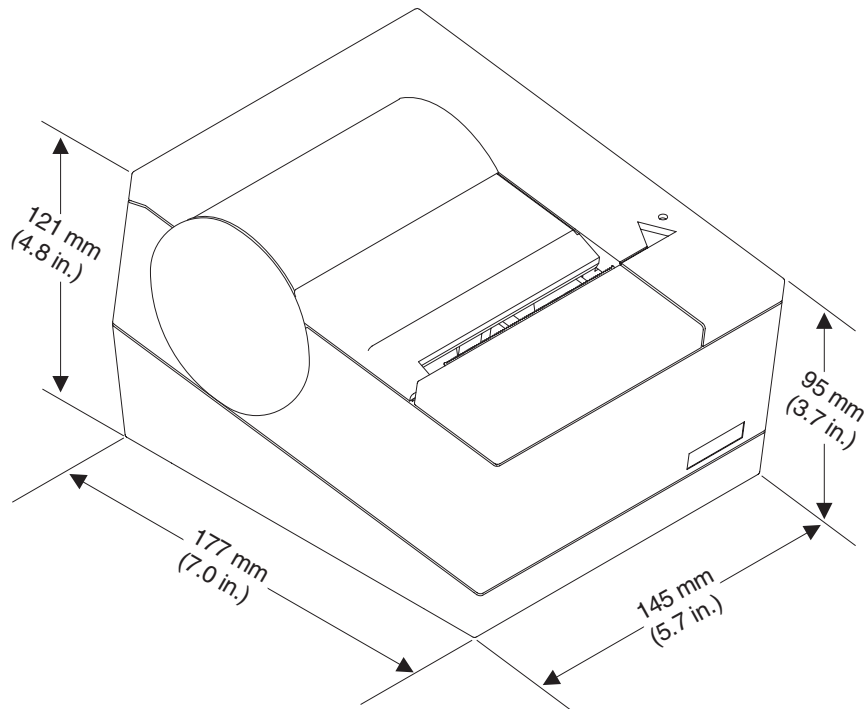


Figure 3. SureMark Printer Dimensions – Models TF7 and TM7

## Power Requirements

The SureMark printers do not contain a power supply. When the printer is operating in RS-232 mode, an external power supply must be attached to connector J2 of the interface card of the printer. This connector is located under the printer and is accessible without removing the printer covers. (See Figure 4 on page 12 for thermal/impact SureMark printers, and Figure 5 on page 13 for single-station SureMark printers.) Connector J2 has the following pin functions:

Pin	Signal
1	+24 V dc
2	Not Connected
3	Ground

When the SureMark printer is operating in RS-485 mode, power is supplied to the printer from the IBM POS system. The system supplies 5V, 24 V, or 38 V dc to the printer.

When the SureMark printer has the USB feature installed and is using the powered USB cable, 24V is supplied from the system unit.

When the SureMark printer has the USB feature installed and is using a 4-wire cable with a Type B connector, you must use an external power brick (+24V dc).

## Hardware Requirements

The SureMark printers work with the following systems:

- IBM 4694 systems (both SBCS and DBCS models)
- 4614 (RS-232 connection only with power supply)
- IBM 4695 systems (RS-232 connection only and with power supply)



updated March 18, 2002

- PC or other store controller with an RS-232 or USB port
- SurePOS 700 Series systems (USB connection only)
- SurePOS 500 Series systems (RS-232 connection only)

## Software Requirements

### Operating System Requirements

When using the RS-485 interface, attach SureMark printers to systems that are running one of these operating systems:

- IBM PC DOS 2000 or later with POSS for DOS V1.60(c) or later
- Windows Version 3.1 or later with POSS for Windows V1.43 or later
- Windows NT Version 3.51 or later with POSS for Windows V1.43 or later
- Windows 95/98 with POSS for Windows V1.43 or later
- 4690 OS V2R4, when available

When using the USB interface, attach SureMark printers to systems that are running one of these operating systems:

- Windows 98, 2nd Edition with POSS for Windows V2.00 or later
- Windows 2000 Professional with POSS for Windows V2.00 or later

When using the RS-232 or RS-485 interface, you can use OLE for Retail POS (OPOS) V1.4.0 with the following operating systems, if POSS for Windows V1.43 or later is first installed:

- Windows 95
- Windows NT 4.0

POSS drivers can be downloaded from the Retail Store Solutions Web site. See “Resources on the Internet” on page 43 for more information.

If you use the RS-485 interface, you must use POSS or 4690 OS drivers. If you use the RS-232 interface, use the commands described in Appendix C, “RS-232 Programming Information” on page 97.

### Application Requirements

Many IBM retail applications run on the 4690 OS in single-byte mode. The applications can be modified to run in double-byte mode with customer engagement.

Customers must be at these application levels (or higher) when running the 4690 OS:

Application Name	Product Number	Maintenance Level
IBM SUREPOS Application Client/Server Environment for 4690 OS	5745-C44	N/A
IBM 4680 Chain Drug Sales Application	5669-212	9201
IBM 4680-4690 General Sales Application	5696-546	9701
IBM 4680-4690 Supermarket Application	5696-536	9701

## Single-Byte Character Set (SBCS) Code Pages

These SBCS code pages are resident in the printer:

- Generic
- 437 (US)
- 858 (International)

- 860 (Portuguese)
- 863 (Canadian French)
- 865 (Norwegian)

When you download a DBCS code page, the SBCS code page of the character set is downloaded as user-defined code page 1. Additional code pages (three thermal and one impact) can be downloaded, if desired, using the 4610 DBCS Installation Utility Diskette. The diskette is available on the Web. See “Resources on the Internet” on page 43 for more information.

## Double-Byte Character Set (DBCS) Code Pages

The following DBCS code pages are available for downloading to Models TI5, TG5, TF7, and TM7 of the SureMark printer:

- 932 (Japanese)
- 949 (Korean)
- 950 (Traditional Chinese)
- 1381 (Simplified Chinese)

Use the 4610 DBCS Installation Utility Diskette to download the code pages. The diskette is available on the Web. See “Resources on the Internet” on page 43 for more information.

When you download a DBCS code page, the SBCS code page of the character set is downloaded as user-defined code page 1.

All character sets cannot be resident simultaneously.

## Bar Codes

SureMark printers can generate these bar codes:

- UPC-A
- UPC-E
- JAN13 (EAN-13)
- JAN8 (EAN-8)
- Code 39
- ITF
- Codabar
- Code 128C
- Codes 128A, 128B, and 128C (requires latest firmware for Models TI5 and TG5)
- Code 93
- PDF 417

---

## Chapter 2. Installation Instructions

Unpacking the Printer . . . . .	11
Installing the SureMark Printers . . . . .	12
Installing for RS-232/RS-485 Communication . . . . .	12
Installing for USB Communication . . . . .	15
Using the Wall Mounting Feature . . . . .	18
Installing the Fillers . . . . .	19
Installing Fillers for RS-232/RS-485 Printers . . . . .	19
Installing Fillers for USB Printers . . . . .	21
RS-232 Communication Mode Selections . . . . .	23
Baud Rate Selection . . . . .	23
RS-232 Communications Protocol Selection . . . . .	23
DTR/DSR Control . . . . .	23
XON/XOFF Control . . . . .	24
USB Communication Mode . . . . .	25
USB Selection . . . . .	25

Before installing a SureMark printer, be sure to read “Electronic Emission Notices” on page 173.



To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



To avoid shock hazard:

- The power cord must be connected to a properly wired and earthed receptacle.
- Any equipment to which this product will be attached must also be connected to properly wired receptacles.

**Note:** For translations of these safety notices, see *IBM Safety Information – Read This First, GA27–4004*.

---

### Unpacking the Printer

**Note:** Save all packing material and shipping containers.

1. Remove the SureMark printer from the shipping container and place it on a flat surface.
2. Open any shipping containers of additional options and accessories to install with the SureMark printer.
3. Carefully remove any remaining packing material and packing tape.

## Installing the SureMark Printers

### Installing for RS-232/RS-485 Communication

1. Power the system off and disconnect the RS-232 power supply.
2. Locate the rear cable connectors.
3. If you are using the RS-232 communication port:
  - a. Check the settings on the RS-232 mode switch, which is near the rear cable connections. (See Figure 4.) See "RS-232 Communication Mode Selections" on page 23 for information on switch settings.

**Note:** If the RS-232 communication cable has only 3 wires or if the system output is 3 pins (2 signals and a ground), you must use XON/XOFF mode.

- b. Connect the power supply to the printer.
4. Connect the RS-485 or RS-232 communication cable to the correct port.

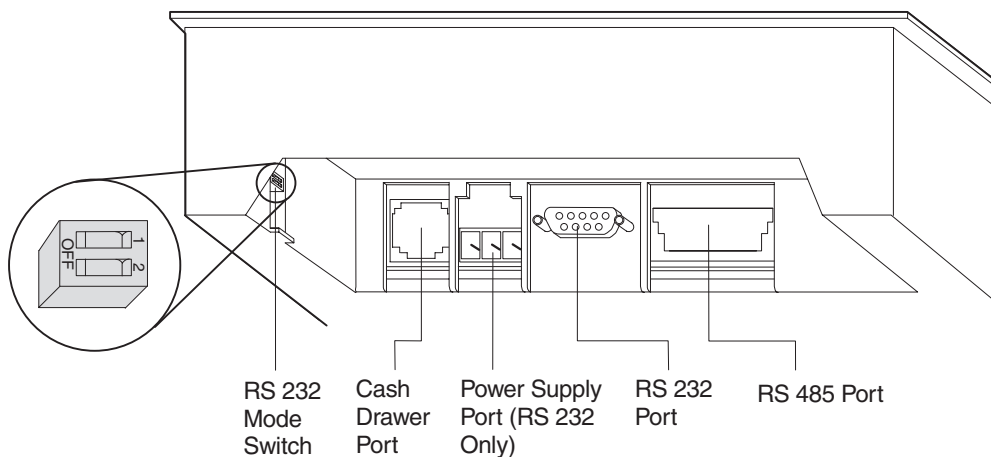


Figure 4. Cable Connectors and RS-232 Settings Switch for Thermal/Impact SureMark Printers. (View is from the bottom rear of the printer.)

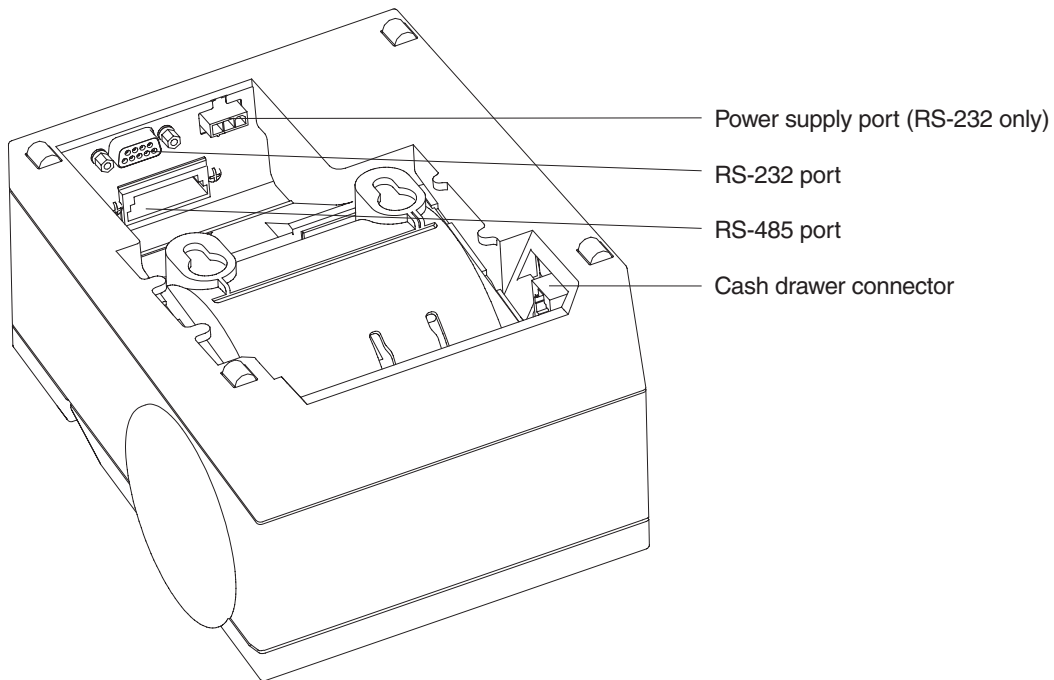


Figure 5. Cable Connectors for Single-Station SureMark Printers. (View is from the bottom rear of the printer)

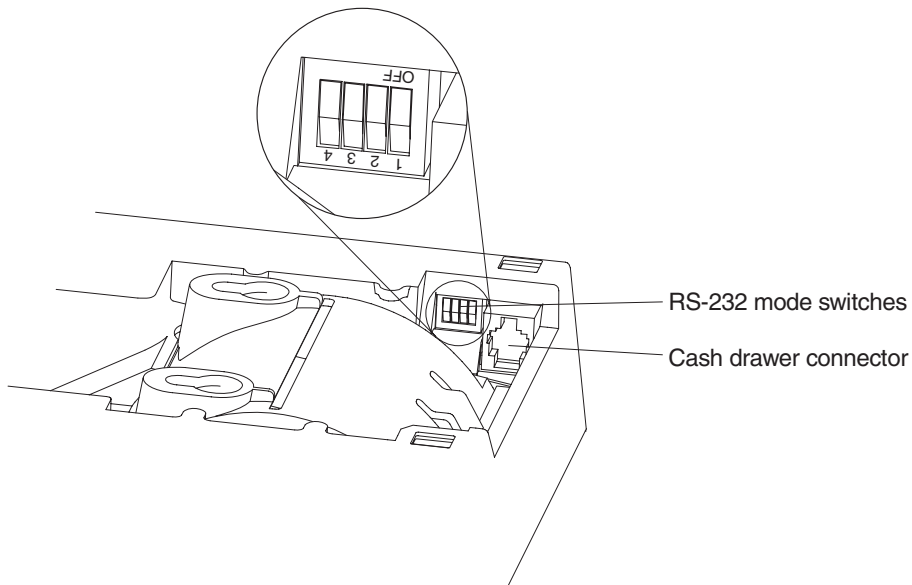


Figure 6. RS-232 Mode Switches for Single-Station SureMark Printers. (View is from the bottom rear of the printer)

5. For single-station printers, route any power cord and cables as shown in Figure 7 on page 14.

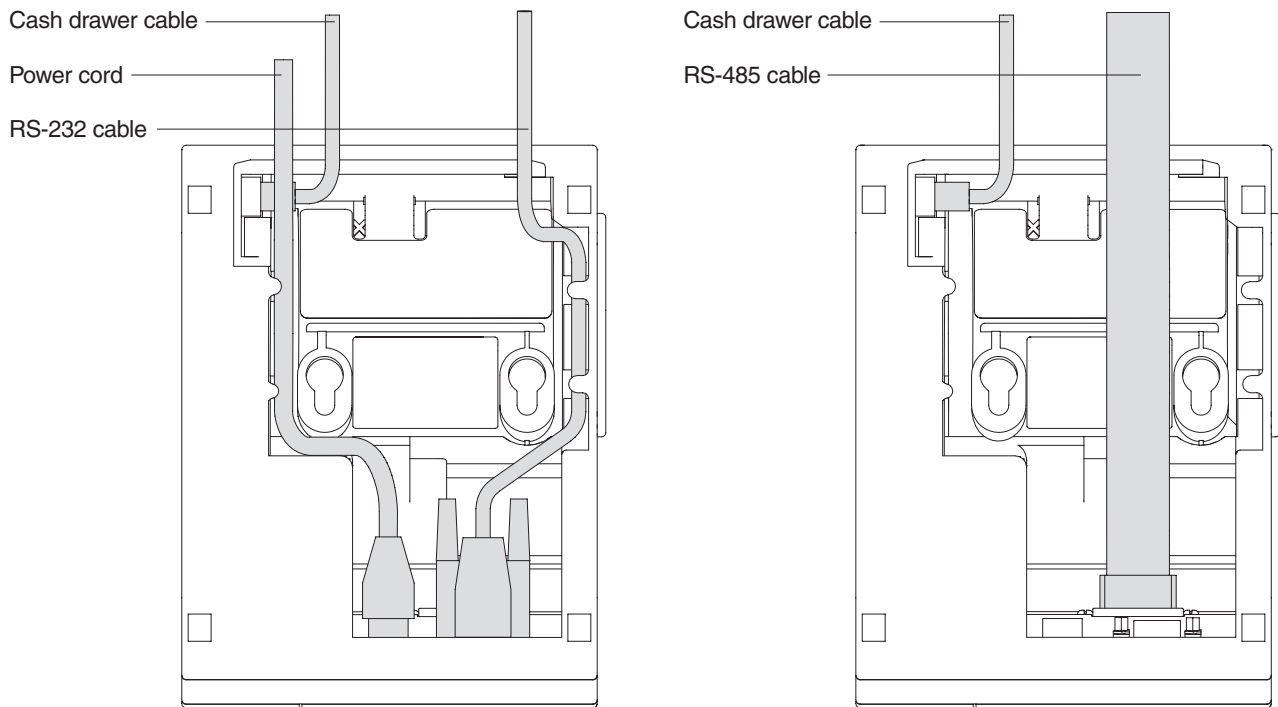


Figure 7. RS-232 and RS-485 Cable Routing for Single-Station SureMark Printers

6. Connect any other signal cables for I/O devices to the correct ports.
7. Check that all signal cables are installed and seated in the correct ports.
8. If you are installing the printer on an integrated unit:
  - a. Pull out the locking lever at the left side of the system unit. (wide systems only)
  - b. For single-station printers, place the printer in the square-shaped filler panel.
  - c. Route the keyboard cable to the side of the tab as shown in Figure 12 on page 20.
  - d. Route all cables attached to the printer through the center opening of the system unit and place the printer (with its filler panel, if it is a single-station printer) on the system unit.
  - e. If you have fillers to install, go to “Installing the Fillers” on page 19.
  - f. Lift the system unit rear cover and attach any cables from the printer to the system unit. (If this is a RS-232-attached printer, reattach the brick power cord if you had to detach it to route it through the center opening.)
9. Power on the printer by either:
  - Connecting the brick power supply cable to a properly wired and grounded power source and powering it on
  - Powering on the POS system unit for an RS-485-attached printer.

**Note:** Both voltage sources should not be connected to the printer at the same time, even if one of the sources is powered off. Potential system damage could occur under these conditions.
10. For single-station SureMark printers, turn on the power on/off switch on the printer.

11. For thermal/impact printers, locate the ribbon cartridge and install it in the printer. (See “Ribbon Loading” on page 49.) Be sure that the ribbon is routed through the printhead correctly.
12. Load the paper roll into the printer. See “Paper Loading” on page 51 for thermal/impact SureMark printers or “Paper Loading” on page 63 for single-station SureMark printers.
13. Installation is now complete. Go to Chapter 5, “Testing and Problem Analysis – Models TI5 and TG5” on page 55 for thermal/impact printers or Chapter 7, “Testing and Problem Analysis – Models TF7 and TM7” on page 67 for single-station printers and run the offline tests.

## Installing for USB Communication

1. Disconnect the power brick from the printer, if one is connected.
2. Locate the rear cable connectors.

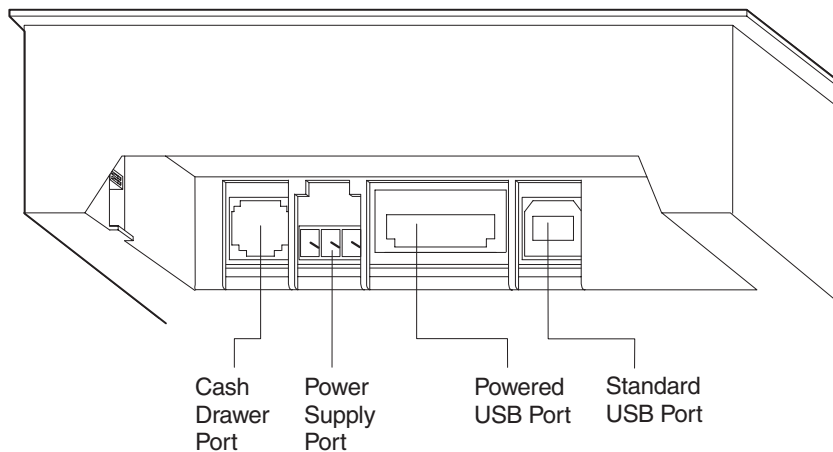


Figure 8. USB Ports for Thermal/Impact SureMark Printers (View is from the bottom rear of the printer)

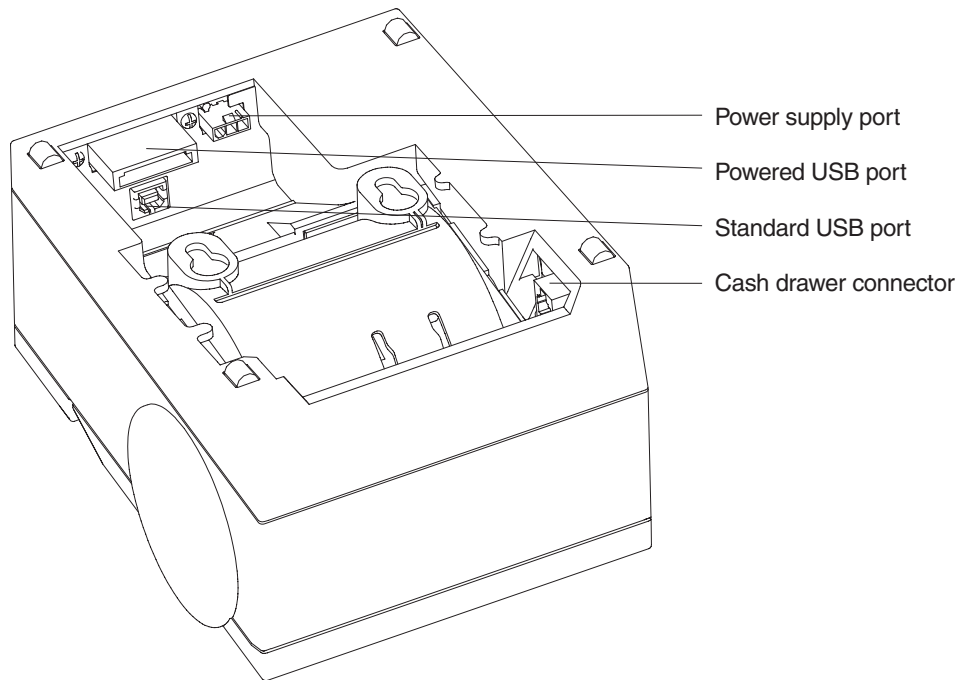


Figure 9. USB Ports for Single-Station SureMark Printers. (View is from the bottom rear of the printer)

3. For single-station printers, route any power cord and cables as shown in Figure 10.

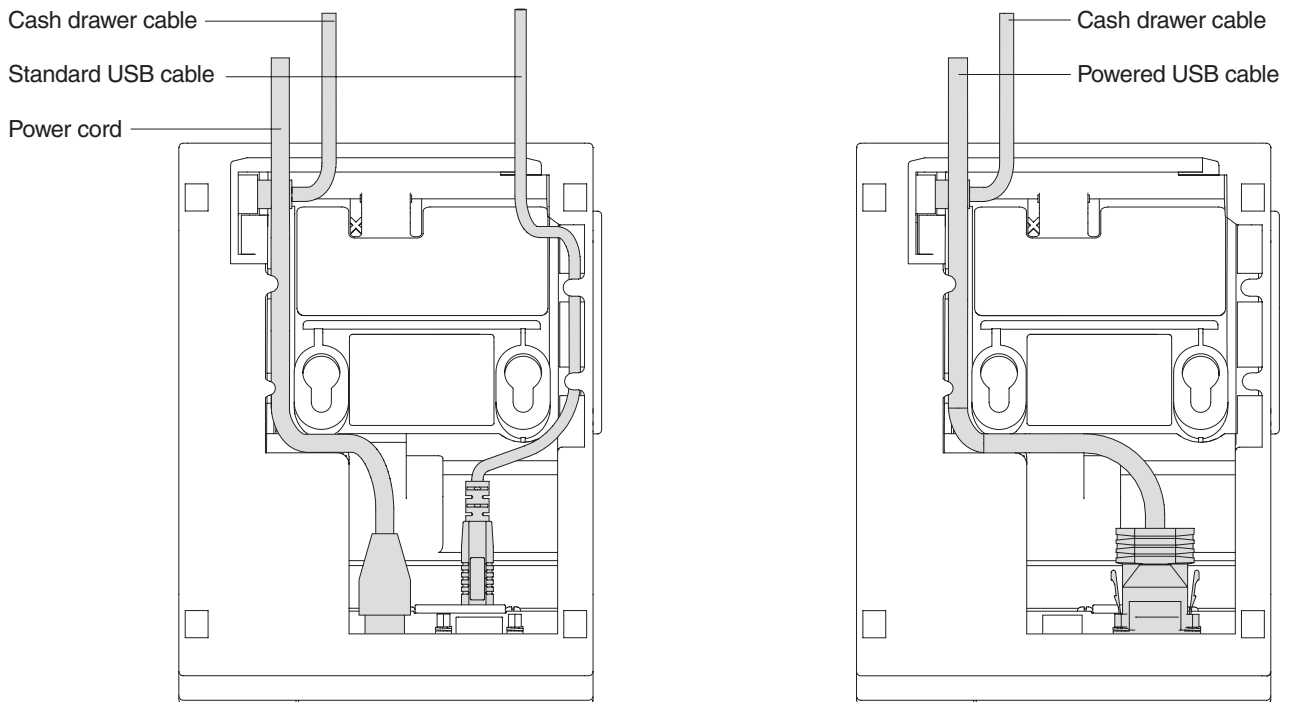


Figure 10. USB Cable Routing for Single-Station SureMark Printers

4. Connect the USB communication cable to the correct port.
5. Connect any other signal cables for I/O devices to the correct ports.



6. Check that all signal cables are installed and seated in the correct ports.
7. If you are installing the printer on an integrated SurePOS 700 Series system:
  - a. For single-station printers, place the printer in the square-shaped filler panel.
  - b. Route all cables attached to the printer through a rear opening of the system unit and place the printer (with its filler panel, if it is a single-station printer) on the system unit.
  - c. Make the side of the printer overlap the tab on the side of the system unit. (wide systems only)
  - d. If you have additional fillers to install, go to “Installing the Fillers” on page 19.
  - e. If a fence or I/O tray is installed, lift the system unit rear cover and attach any cables from the printer to the system unit. (If a power brick was disconnected at the beginning of the installation or is needed because a standard USB cable is being used, attach the power brick.)
8. If you are using a power brick, power on the printer by connecting the power brick supply cable to a properly wired and grounded power source and powering it on.
9. For single-station SureMark printers, turn on the power on/off switch on the printer.
10. For thermal/impact printers, locate the ribbon cartridge and install it in the printer. (See “Ribbon Loading” on page 49.) Be sure that the ribbon is routed through the printhead correctly.
11. Load the paper roll into the printer. See “Paper Loading” on page 51 for thermal/impact SureMark printers or “Paper Loading” on page 63 for single-station SureMark printers.
12. Installation is now complete. Go to Chapter 5, “Testing and Problem Analysis – Models TI5 and TG5” on page 55 for thermal/impact printers or Chapter 7, “Testing and Problem Analysis – Models TF7 and TM7” on page 67 for single-station printers and run the offline tests.

## Using the Wall Mounting Feature

Because of their light weight and small footprint, the single-station SureMark printers can be mounted on a wall. This is a useful feature when counter space is limited.

To use the printer with the wall mounting feature:

1. Position the mounting bracket on a wall that has no dangerous objects, such as electrical wires or pipes, hidden beneath the wall surface.

**Note:** Position the bracket so that the installed printer will not extend more than 10 cm (4 in.) into a walk, hall, corridor, passageway or aisle.

2. Attach the bracket securely to the wall with four 6-mm (0.25-in.) screws. The screws are not provided. You should use fasteners that are suitable for the type of wall construction, such that the bracket is securely attached to the wall. For walls that are constructed of gypsum wallboard on wood or metal studs, use four good-quality medium-capacity or high-capacity hollow-wall anchors.
3. Route the communication cable up the wall surface or through the bracket.
4. Connect the cables to the printer.
5. Place the SureMark printer on the two bracket posts. Slide the printer down until a click sounds.

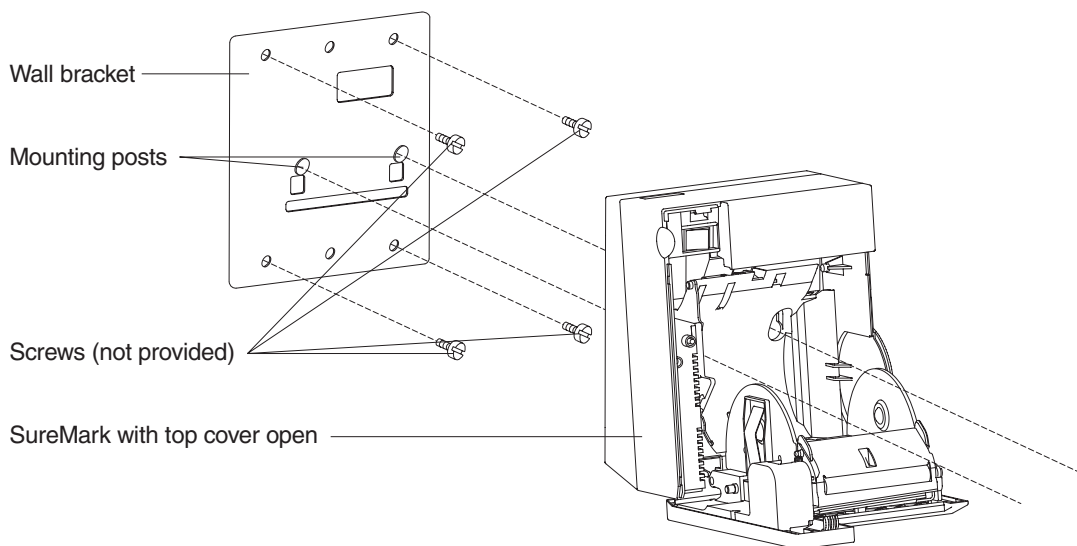


Figure 11. Mounting a Single-Station SureMark on a Wall

## Installing the Fillers

### Installing Fillers for RS-232/RS-485 Printers

**Notes:**

1. On an integrated unit, pull out on the locking lever at the left side of system unit.
2. Ensure that the side of each filler overlaps the tab on the side of the system unit.

To install fillers:

1. Power off the system and disconnect the RS-232 power supply (if connected). See Figure 4 on page 12.
2. If you have a video display on an integrated system:
  - a. Move the display on its arm to the side and remove any tape holding the alignment ring.
  - b. Remove the knockout section of the display filler.
  - c. Align the display filler with the alignment ring and slide the filler onto the ring. Press the display filler into place. See Figure 12 on page 20.
3. If you do not have a video display, place the display filler on the system unit. **Do not remove** the knockout section. See Figure 12 on page 20.
4. If you have a short keyboard, place the keyboard filler beside the keyboard. See Figure 12 on page 20.
5. Place the printer filler beside the display filler. **Make sure you route the printer cable to the side, as shown in Figure 12 on page 20.**

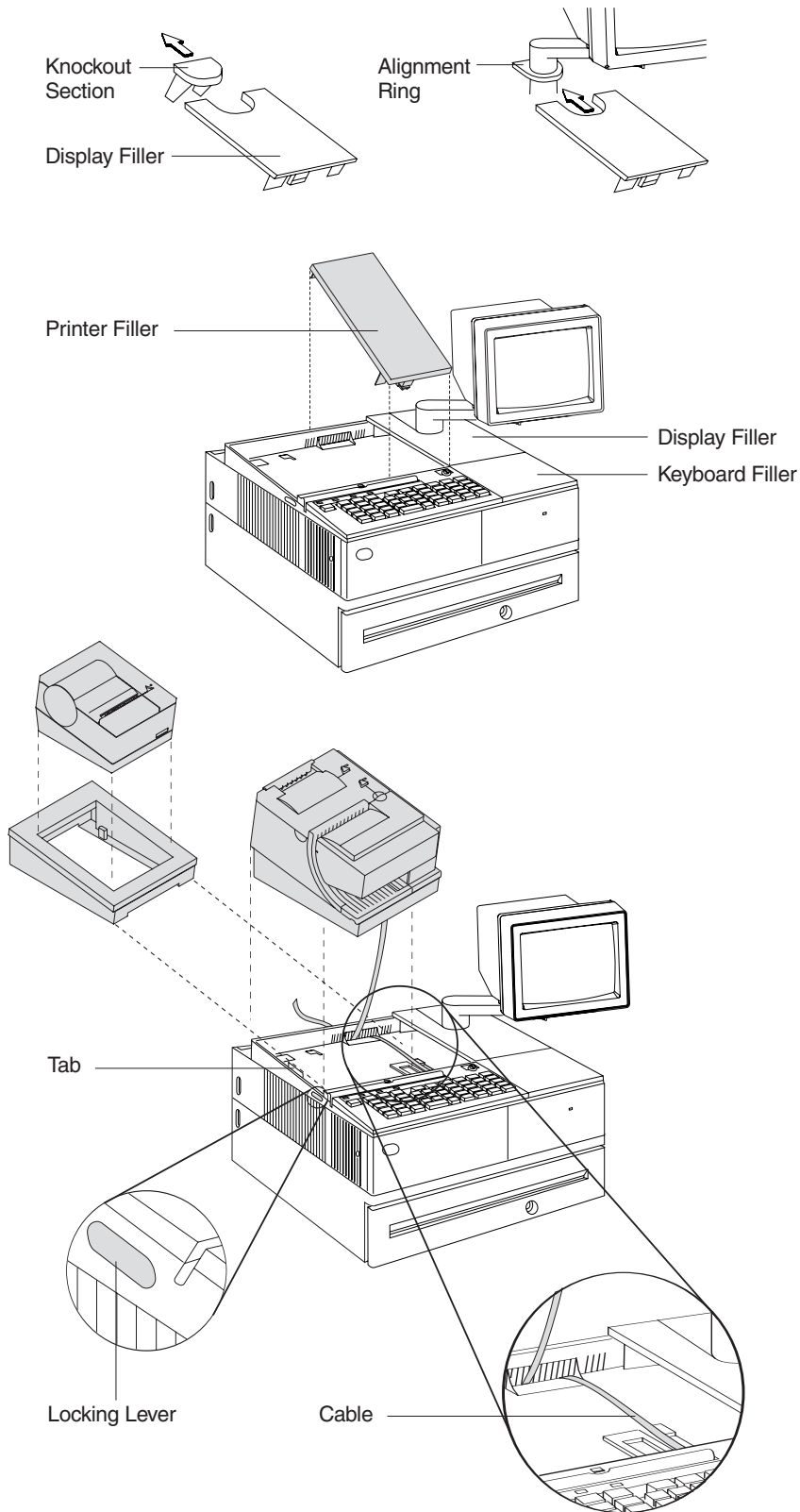


Figure 12. Installing the Fillers for RS-232/RS-485 Systems

## Installing Fillers for USB Printers

1. Disconnect the power brick from the printer, if one is connected.
2. Place the display filler appropriate for the video display on the system unit. **Do not remove** the knockout section unless you have an integrated video mount. See Figure 13 on page 22.
3. If you have a short keyboard, place the keyboard filler beside the keyboard. See Figure 13 on page 22.
4. Place the printer filler beside the display filler. **Make sure you route the keyboard cable to the side, as shown in Figure 13 on page 22.**

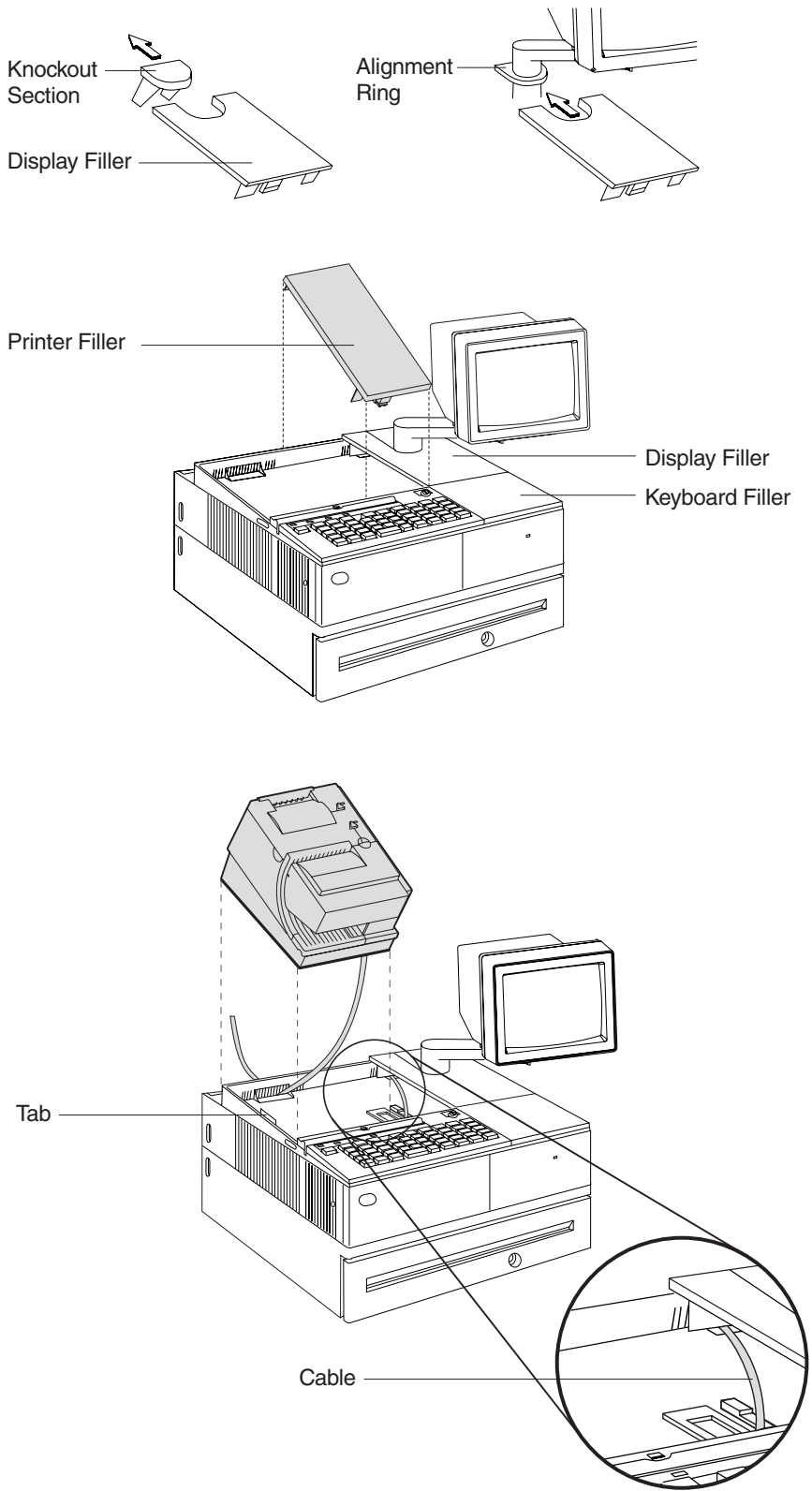


Figure 13. Installing the Fillers for USB Systems. (SurePOS 700 Series system is shown as an example.)

## RS-232 Communication Mode Selections

Switch settings described in this section apply only when the printer is connected to the system with the RS-232 cable. The switch is accessible without removing the printer covers. (See Figure 4 on page 12 to see how to access the switch.)

### Baud Rate Selection

SureMark printers support two RS-232 baud rates, 9600 and 19 200. The baud rate is selected using switch 1 on the RS-232 settings switch. Set the switch as follows:

**Switch 1 OFF** 9600 baud

**Switch 1 ON** 19 200 baud

The printer normally ships with switch 1 in the OFF position, which selects the 9600 baud rate.

### RS-232 Communications Protocol Selection

SureMark printers support RS-232 protocol using either DTR/DSR or XON/XOFF to control data transmission. XON/XOFF mode uses system and printer software to control the flow of data.

Use switch 2 on the RS-232 settings switch to select the mode. Switch settings are:

**Switch 2 OFF** DTR/DSR control

**Switch 2 ON** XON/XOFF control (must use with a 3-wire interface)

The printer normally ships with switch 2 in the OFF position, which selects DTR/DSR control.

#### **DTR/DSR Control**

**DSR Definition:** DSR is an output from the printer. It indicates when the printer is ready to receive data.

**DTR Definition:** DTR is an input to the printer. It indicates to the printer that the system is ready to receive data.

**DSR Operation:** A DSR signal becomes inactive when the printer is not ready to receive data (for example, at power-on reset or when its buffer is full).

**DTR Operation:** A DTR signal becomes inactive when the system is not ready to receive data (for example, at power-on reset or when its buffer is full).

### **XON/XOFF Control**

**XON Definition:** = DC1 (X'11')

**XOFF Definition:** = DC3 (X'13')

During XON/XOFF control, the printer transmits an XON every 3 seconds after a power on reset (POR) completes to indicate the printer is ready to receive data. When the first message is received, the printer stops transmitting the XON signal. The printer transmits an XOFF when the RS-232 input buffer is 80% full after which it transmits one XON when the buffer is 20% full.

### **XON/XOFF Transparent Mode Operation**

This is the default mode. See “Message from the Printer” on page 160 for the format of printer to system messages, which include a byte count, status bytes, and optional extended status bytes or user data.

XON and XOFF signals are always transmitted independently and are not inside any part of the message, including the byte count, status bytes, or user data. When a message includes optional user data, the byte count (bytes 1 and 2) can include X'10', X'11', or X'13'. When X'10', X'11', or X'13' occur in transparent XON/XOFF mode, the byte count is bit-exclusive-OR'ed with X'21' and is prefixed by the DLE (X'10') character to become:

<b>Value in Message</b>	<b>Becomes</b>
<b>X'10'</b>	X'1031'
<b>X'11'</b>	X'1030'
<b>X'13'</b>	X'1032'

User data with X'10', X'11', or X'13' is also treated this way in transparent XON/XOFF mode. The byte count is not incremented for such extra characters.

### **Determining XON/XOFF Control**

You can determine whether XON/XOFF control is being used by sending the extended address command and checking the feature byte, bit 3. If this bit is set, the printer is in XON/XOFF mode. (See “Extended Address Command – Request Printer ID” on page 107.

### **Disabling XON/XOFF Transparent Mode**

You can disable transparent XON/XOFF mode as described in “Real-Time Requests” on page 156. When disabled, X'10', X'11', or X'13' can occur within messages. However, because such values are actual count bytes or data bytes and are not XON or XOFF characters (DLE, XON, and XOFF characters do not occur within messages), no transform takes place. The values are not bit-exclusive-OR'ed with X'21' because no transform occurs for such values within messages as it does during transparent XON/XOFF mode. DLE, XON, or XOFF occur only before or after a message.



## **USB Communication Mode**

No switches or special commands are required for USB communication. With the USB interface card and cables in place, the system automatically detects the printer when it is attached and performs any necessary setup. The printer operates at data rates up to 12 Mbps.

---

## **USB Selection**

Universal serial bus (USB) is an industry standard communication interface. It is used to attach devices, such as printers, displays, and keyboards, to personal computers or IBM POS systems that have USB ports. The standard USB port (with a power brick) is used to attach the SureMark to personal computers. The powered USB port is used to attach the SureMark to IBM POS systems. See Figure 8 on page 15 for the thermal/impact SureMark printers and Figure 9 on page 16 for the single-station SureMark printers.



## Chapter 3. SureMark Installation, Service, and Utility Software

Software Adjustments (Models TI5 and TG5 Only) . . . . .	27
Using the 4690 Operating System . . . . .	27
Using IBM Point-of-Sale Device Diagnostics . . . . .	28
Using Reference/Service Diskettes (RS-485 or RS-232 Only) . . . . .	28
4610 DBCS Installation Utility Diskette . . . . .	31
DBCS Code Page Download . . . . .	31
4610 DBCS Installation Utility Diskette Code Page Download . . . . .	31
DBCS Code Page Download – POSS for Windows (RS-485 and USB only)	33
DBCS User-Defined Character Download . . . . .	35
Firmware Update . . . . .	36
4610 DBCS Installation Utility Diskette for Updating SureMark Firmware . . . . .	36
Using POSS For Windows for Updating SureMark Firmware (RS-485 and USB Only) . . . . .	37
Using 4690 OS 4610 Utility to Update SureMark Firmware . . . . .	38
Updating 4610 Firmware Using RS-232 Attachment Cable . . . . .	38
Limitation on Updating Firmware . . . . .	39
Emulating the IBM Model 3 or Model 4 Printers . . . . .	39
Enabling Emulation Using 4610 DBCS Installation Utility Diskette . . . . .	39
Enabling Emulation Using 4690 On-Line Terminal Diagnostics . . . . .	40
Limitations for Emulation . . . . .	40
Printing Saved Data . . . . .	41
Printing Buffer Data – Thermal/Impact SureMark Models TI5 and TG5	41
Printing Buffer Data – Single-Station SureMark Printers . . . . .	41
Emulating an Epson Single-Station Printer (Single-Station SureMark Only) . . . . .	41
Enabling Epson Emulation . . . . .	42
Limitations for Epson Emulation . . . . .	42
Changing the Printer Mode between DBCS and SBCS . . . . .	42
Proportional Font Conversion Utility . . . . .	43
Resources on the Internet . . . . .	43

This chapter describes how to make software adjustments using the 4690 OS, IBM POS Device Diagnostics (POSS for Windows, RS-485 and USB only), or diskettes and other resources that are available from the Retail Store Solutions Web site. See “Resources on the Internet” on page 43 for more information.

### Software Adjustments (Models TI5 and TG5 Only)

Depending on your operating system and whether the printer is operating in SBCS or DBCS mode, you can use the following to make software adjustments to a SureMark printer:

- 4690 Operating System
- IBM POS Device Diagnostics
- Reference/service diskettes

### Using the 4690 Operating System

**Note:** This procedure is applicable only in SBCS mode, when DBCS is supported by customer engagement, or with 4690 OS V2R4, when it is available.

1. Start Utility Mode by pressing **S1**, typing **9 5**, and then pressing **S2**.
2. When “enter request” is displayed, enter the keying sequence from the table for the procedure you want to do.

3. Press **S2** to advance through the various parts of the printer adjustment steps.
4. Type **9 9** and then press **S2** to exit.

*Table 2. Adjustment Procedures Using 4690 Operating System*

Procedure	Keying Sequence
Print Current Adjustment Values - see Figure 14 on page 30.	7, 2, 1, S2
Character Alignment Procedure - see Figure 14 on page 30.	7, 2, 2, S2
DI Front Load Print Line Adjustment - see Figure 14 on page 30.	7, 2, 3, S2
Backlash Adjustment (Landscape)	7, 2, 5, S2
Engineering Use Only	7, 2, 7, S2
Hardware Setup Option	7, 2, 8, S2
Update Printer Firmware	7, 2, 9, S2

## Using IBM Point-of-Sale Device Diagnostics

This utility is for RS-485 and USB only.

1. Start the IBM Point-of-Sale Device Diagnostics application from the Windows Start menu.
2. Click **4610 Printer**.
3. Click **Device Utility**.
4. Select the appropriate tab for the desired adjustment:

*Table 3. Adjustment Procedures Using the Point-of-Sale Device Diagnostics*

Procedure	Tab
Character Alignment	Adjustments
DI Front Load Adjustment	Adjustments
Backlash Adjustment (Landscape)	Adjustments
Engineering Use Only	Read MCT
Firmware Update	Firmware Update
Reset Thermal Print Head Statistics	Reset Stats
Reset CR Motor Statistics	Reset Stats
Reset Impact Print Head Statistics	Reset Stats
Reset DI Motor Statistics	Reset Stats
Reset Transport Motor Statistics	Reset Stats

## Using Reference/Service Diskettes (RS-485 or RS-232 Only)

1. Load the reference/service diskette. See the hardware service manual for your system for reference/service diskette procedures.
2. Select **Test Menu**.
3. Select **Run POS Device Tests** for an RS-485 connection. Select **RS232 4610 Printer Test** for an RS-232 connection.
4. If another system is attached, select the system whose printer you want to adjust. This is unnecessary when there is no other system attached.
5. Select **Printer Utilities**.
6. Select the adjustment you want to make from the menu.

updated March 18, 2002

- Print current adjustment values - see Figure 14 on page 30.
- Character alignment procedure - see Figure 14 on page 30.
- DI front load print line adjustment - see Figure 14 on page 30.
- Document landscape adjustment - see Figure 14 on page 30.
- Engineering use only
- Change 4610 Model Configuration
- Reset printer statistics

**Note:** Because the first four adjustments affect only the document insert station, they are not displayed as selectable options if the printer is a single-station SureMark.

7. Follow the instructions that are printed on the printer or displayed on the screen.
8. Press **S1** (Esc on the Enhanced A/N Keyboard) to return to the previous menu.

CURRENT ADJUSTMENT VALUES  
H 5 = Character alignment  
TL5 = Top line front insert  
BL3 = Bottom line top insert

TL1 TL2 TL3 TL4 TL5 TL6 TL7 TL8 TL9

Measure from the top edge of this paper to the top of each print line. Press the key (1-9) that corresponds to the print line that is closest to 5MM.

CHARACTER ALIGNMENT PROCEDURE

H	1
H	1
H	2
H	2
H	3
H	3
H	4
H	4
H	5
H	5
H	6
H	6
H	7
H	7
H	8
H	8
H	9
H	9

Press the key (1-9) that corresponds to the pair of H's that appear to be most aligned

5 = selected line

Figure 14. Adjustment and Alignment Printouts

---

## 4610 DBCS Installation Utility Diskette

This utility is for both RS-232 and RS-485 operation. It includes:

- The latest level of firmware for the printer
- A README file that describes how to use the utility program.
- A utility program that performs the following functions:
  - Update printer firmware
  - Configure the printer model
  - Create, edit, and download SBCS user-defined character font, logo image, and messages
  - Edit and download DBCS code pages and DBCS user-defined character font
  - Convert fonts and logo files from impact to thermal
- Sample files for the utility program:
  - An SBCS user-defined character file
  - A message file
  - A logo file
- Utility program to enable/disable Model 4 Printer emulation (SBCS mode only)
- Utility program to change the printer mode between DBCS and SBCS

---

## DBCS Code Page Download

SureMark models TI5, TG5, TF7, and TM7 can receive a DBCS code page from an attached host system connected by an RS-485 cable (cable 7), an RS-232 cable, or a USB cable.

The following mediums can be used to download a DBCS code page:

- 4610 DBCS Installation Utility Diskette code page download (RS-485 or RS-232 connection)
- POSS for Windows DBCS code page download (RS-485 or USB connection)
- 4690 OS V2R4 font download, when available

After downloading the latest level software from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43), use the appropriate procedure that follows to download a DBCS code page.

## 4610 DBCS Installation Utility Diskette Code Page Download

Use the 4610 DBCS Installation Utility Diskette to download a DBCS code page to a SureMark that is connected to a system unit by either an RS-232 or RS-485 cable.

To download a diskette font, perform the following steps:

1. Download the fonts diskette from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43).
2. Download the latest level of the 4610 DBCS Installation Utility Diskette from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43). Place the file that you download, which is 4610dbcs.exe, in a temporary directory. Run 4610dbcs.exe in a DOS window to create the diskette. If you are using Windows NT, you might need to use FORCEDOS.
3. Insert the 4610 DBCS Installation Utility Diskette in drive A.
4. Power on the system unit to which the SureMark is connected.
5. Select **Run Printer Utility** for the RS-232 or RS-485 connection.
6. Follow the displayed instructions to complete the font download.

- a. Press **Enter** (OK) at the logo screen.
- b. Select the connection type (RS-485 or RS-232).  
For the RS-232 connection, also select the following:
  - Communications port (COM1, COM2, COM3, COM4)
  - Baud rate (9600 or 19 200)
  - Control flow (DTR/DSR or XON/XOFF)
  - IRQ test

Refer to the communication mode selection switches located at the bottom rear of the SureMark printer when making the above selection.

- c. Press **Enter** (OK).
- d. Select the printer model, then select **Enter** (OK).
- e. Select **F10** (Menu).
- f. Select **O** (Operations).
- g. Select **F** (Download Fonts).
- h. If you want to selectively download code pages, go to Step 6j. Otherwise, select one of the font sets from the font set menu, then select **D** (Download). Use this option with POSS for Windows, OPOS, or JavaPOS drivers.

The following DBCS font files are downloaded to the printer when you select **Yes** (you can change the list of files in a:\utility\fontset.dat before selecting Yes):

- DBCS for thermal printhead
  - DBCS for impact printhead
  - SBCS for user-defined thermal code page 1
  - SBCS for user-defined impact code page 1
  - DBCS user-defined character for thermal printhead
  - DBCS user-defined character for impact printhead
- i. When prompted, insert the appropriate DBCS Font Diskette in drive A (see "Resources on the Internet" on page 43 for information about downloading the diskette), then select **OK**.  
Go to Step 7.
  - j. Select **S** (Selective Download).

**Note:** If you are using the 4610 DBCS Installation Utility Diskette with a printer that will be used with POSS for Windows, OPOS, or JavaPOS drivers, then **do not use** the selective download. If you use the selective download with those drivers, the drivers will not recognize what DBCS code page has been downloaded.

- k. Select **E** (Erase EPROM).
  - l. Select the code set (SBCS or DBCS), code page, station (Thermal or Impact), and characters (Normal or User-Defined).
  - m. Select **B** (Browse) and specify the font file, if required.
  - n. Select **D** (Download).
  - o. Select **Yes**. When prompted, insert the appropriate DBCS Font Diskette in drive A (see "Resources on the Internet" on page 43 for information about downloading the diskette), then select **OK**.
  - p. Go to Step 7.
7. After the font download has completed,



- a. Press **Done** for confirmation if Download (Step 6h on page 32) was used. Press **OK** for confirmation if Selective Download (Step 6j on page 32) was used.
  - b. Press **C** (Close) to close the dialog.
  - c. Press **Alt-X** (Exit) to exit the menu.
  - d. Press **Enter** to exit the utility.
8. When prompted, reinsert the 4610 DBCS Installation Utility Diskette, then press **Enter**.
  9. Remove the diskette from drive A.
  10. Press **Ctrl-Alt-Delete** to reboot the system.

## DBCS Code Page Download – POSS for Windows (RS-485 and USB only)

DBCS fonts must be manually loaded into the SureMark printer. The process requires files that are downloaded from the IBM Retail Store Solutions Web site, including the 4610CVNT.EXE and AIPFNT46.EXE programs. For details, refer to the *POSS Programming Reference and User's Guide*.

**Note:** This utility requires POS Suite V1.0.0 or greater. POS Suite includes POSS for Windows.

1. Download the latest DBCS font files from the IBM Retail Store Solutions Web site to the same directory in which POSS for Windows is installed, which is usually the C:\POS\BIN directory. To access the files on the Web:
  - a. Go to the IBM Retail Store Solutions Web site at <http://www.ibm.com/solutions/retail/store>
  - b. Select **Support** at the left edge of the main page.
  - c. Under IBM SurePOS Systems and Peripherals, select **IBM SureMark Printer**.
  - d. Select the link to the Model TI5 and TG5 support page.
  - e. Select the font files that you want to download.

The files for each DBCS code page are shown in Table 4.

Table 4. Font Files for DBCS Code Pages

Code Page	File Name	Codeset	Station	Where to Download
932 Japan Gothic Style	jpngh16.fnt	SBCS	Impact	Impact code page 1
	jpngz16.fnt	DBCS	Impact	Impact DBCS
	jpngh24.fnt	SBCS	Thermal	Thermal code page 1
	jpngz24.fnt	DBCS	Thermal	Thermal DBCS
	judcz16.fnt	DBCS	Thermal	Impact DBCS UDC
	judcz24.fnt	DBCS	Thermal	Thermal DBCS UDC
932 Japan Mincho Style	jpnmh16.fnt	SBCS	Impact	Impact code page 1
	jpnmz16.fnt	DBCS	Impact	Impact DBCS
	jpnmh24.fnt	SBCS	Thermal	Thermal code page 1
	jpnmz24.fnt	DBCS	Thermal	Thermal DBCS
	judcz16.fnt	DBCS	Thermal	Impact DBCS UDC
	judcz24.fnt	DBCS	Thermal	Thermal DBCS UDC

Table 4. Font Files for DBCS Code Pages (continued)

Code Page	File Name	Codeset	Station	Where to Download
949 Korea	kormh16.fnt kormz16.fnt kormh24.fnt kormz24.fnt kudcz16.fnt kudcz24.fnt	SBCS DBCS SBCS DBCS DBCS DBCS	Impact Impact Thermal Thermal Thermal Thermal	Impact code page 1 Impact DBCS Thermal code page 1 Thermal DBCS Impact DBCS UDC Thermal DBCS UDC
1381 Chinese PRC (Simplified)	prcmh16.fnt prcmz16.fnt prcmh24.fnt prcmz24.fnt pudcz16.fnt pudcz24.fnt	SBCS DBCS SBCS DBCS DBCS DBCS	Impact Impact Thermal Thermal Thermal Thermal	Impact code page 1 Impact DBCS Thermal code page 1 Thermal DBCS Impact DBCS UDC Thermal DBCS UDC
950 Chinese Taiwan (Traditional)	rocmh16.fnt (Note 1) rocmz16.fnt rocmh24.fnt rocmz24a.fnt (Note 2) rocmz24b.fnt (Note 2) rudcz16.fnt rudcz24.fnt	SBCS DBCS SBCS DBCS DBCS DBCS DBCS	Impact Impact Thermal Thermal Thermal Thermal Thermal	Impact code page 1 Impact DBCS Thermal code page 1 Thermal DBCS Thermal DBCS Impact DBCS UDC Thermal DBCS UDC
950 Chinese Taiwan (Traditional)	rocmh16b.fnt (Note 1) rocmz16.fnt rocmh24.fnt rocmz24a.fnt (Note 2) rocmz24b.fnt (Note 2) rudcz16.fnt rudcz24.fnt	SBCS DBCS SBCS DBCS DBCS DBCS DBCS	Impact Impact Thermal Thermal Thermal Thermal Thermal	Impact code page 1 Impact DBCS Thermal code page 1 Thermal DBCS Thermal DBCS Impact DBCS UDC Thermal DBCS UDC

**Notes:**

- a. The file rocmh16b.fnt contains bold fonts and the file rocmh16.fnt contains normal fonts.
- b. The file rocmz24a.fnt contains the BIG-5 code set and the IBM Selected non-Chinese character set (first byte A1-F9 and second byte 40-7E, A1-FE). The file rocmz24b.fnt contains the IBM Selected non-Chinese/Chinese character set (first byte F2-F9 and second byte 81-A0).
2. Download the 4610CVNT.EXE program and the configuration files that it uses. To access the program and its files:
  - a. Go to the IBM Retail Store Solutions Web site at <http://www.ibm.com/solutions/retail/store>
  - b. Select **Support** at the left edge of the main page.
  - c. Under SurePOS Peripherals, select **IBM SureMark Printer**.
  - d. Select the link to the Model TI5 and TG5 support page.
  - e. Select **Font Utility Package** to download the zipped file that contains the program and the configuration files.
  - f. Unzip the program and the configuration files into the same directory that contains the font files that you previously downloaded.
3. Enter the 4610CVNT config\_file command to create the font file that will be loaded into the printer. *config\_file* is the name of the appropriate configuration file from the following list:

**JPN932.CFG**

Code page 932, Japan, Gothic style

**JPNMS932.CFG**

Code page 932, Japan, Mincho style

**KORMS949.CFG**

Code page 949, Korea

**CHNM1381.CFG**

Code page 1381, Chinese – PRC

**CHNM950N.CFG**

Code page 950, Chinese – Taiwan, normal impact SBCS

**CHNM950B.CFG**

Code page 950, Chinese – Taiwan, bold impact SBCS

4. The font file is created. The file name is XXX.FON, where XXX is the same as the configuration file. For example, when you run the 4610CVNT program with JPNMS932.CFG, the font file is JPNMS932.FON.
5. Enter the following command to download the font set to the printer (AIPFNT46.EXE should be in the same directory in which POSS for Windows is installed, which is usually C:\POS:\BIN)

```
AIPFNT46 -s slot_number -p port_number -f font_file
```

where:

**slot\_number**

The SureMark slot number. This is usually 1.

**port\_number**

The SureMark port number. This is usually 17.

**font\_file**

The name of the file created by the 4610CVNT.EXE program.

6. Wait a while. The SureMark font download takes several minutes.

---

## DBCS User-Defined Character Download

To create a new character, use the 4610 DBCS Installation Utility Diskette with a SureMark that is connected to a system unit by either an RS-232 or RS-485 cable. The system unit must have a diskette drive, a PC keyboard, and a display.

To download a user-defined character:

1. Download the latest level of the 4610 DBCS Installation Utility Diskette from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43).
2. Insert the 4610 DBCS Installation Utility Diskette in drive A.
3. Power on the system unit to which the SureMark is connected.
4. Select **Run Printer Utility** for the RS-232 or RS-485 connection.
5. Follow the displayed instructions to complete the font download.
  - a. Press **Enter** (OK) at the logo screen.
  - b. Select the connection type (RS-485 or RS-232).

For the RS-232 connection, also select the following:

    - Communications port (COM1, COM2, COM3, COM4)
    - Baud rate (9600 or 19 200)
    - Control flow (DTR/DSR or XON/XOFF)

Refer to the communication mode selection switches located at the bottom rear of the SureMark printer when making the above selection.

- c. Press **Enter** (OK).
- d. Select **F10** (Menu).
- e. Select **E** (Edit).
- f. Select **D** (Edit Font File).
- g. Insert the font diskette, which includes the DBCS UDC font files. The DBCS UDC font file names for each code page and type of station are shown in Table 5.

Table 5. UDC Font File Names for DBCS Code Pages

Code Page	File Name	Station
932 (Japan)	judcz16.fnt judcz24.fnt	Impact Thermal
949 (Korea)	kudcz16.fnt kudcz24.fnt	Impact Thermal
1381 (PRC)	pudcz16.fnt pudcz24.fnt	Impact Thermal
950 (Taiwan)	rudcz16.fnt rudcz24.fnt	Impact Thermal

- h. Select a font file and press **Enter** (OK).
  - i. Edit the font and save it.
6. To download the file, see “DBCS Code Page Download” on page 31.

---

## Firmware Update

The SureMark printer has the capability to receive firmware updates from the host system unit to which it is attached for RS-485, RS-232, or USB connections.

The following mediums can be used to update the SureMark firmware:

- 4610 DBCS Installation Utility Diskette Firmware Update
- POSS for Windows 4610 Printer Firmware Update Program
- 4690 OS 4610 Utility
- Alternative SureMark firmware update method via RS-232 attachment cable

Use the appropriate procedure that follows to update the SureMark firmware, after downloading the latest level software from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43).

### 4610 DBCS Installation Utility Diskette for Updating SureMark Firmware

To update the firmware in SureMark configurations, use the 4610 DBCS Installation Utility Diskette with a SureMark that is connected to a system unit by an RS-232 or RS-485 cable. The system unit must have a diskette drive, a PC keyboard, and a display.

To update the firmware:

1. Download the latest level 4610 DBCS Installation Utility Diskette from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43).
2. Insert the 4610 DBCS Installation Utility Diskette in drive A.
3. Power on the system unit that has the SureMark attached by an RS-232 or RS-485 cable.

4. Select **Run Printer Utility** for RS-485 or RS-232 connection.
5. Follow the displayed messages to complete the firmware update.
  - a. Press **Enter** (OK) at the logo screen.
  - b. Select the connection type (RS-485 or RS-232).

For the RS-232 connection, also select the following:

- Communications port (COM1, COM2, COM3, COM4)
- Baud rate (9600 or 19 200)
- Control flow (DTR/DSR or XON/XOFF)

Refer to the communication mode selection switches, which are located at the bottom rear of the SureMark printer, when making the above selection.

- c. Press **Enter** (OK) to proceed.
- d. Select **F10** (Menu).
- e. Select **O** (Operations).
- f. Select **A** (Advanced Options).
- g. Select **U** (Update Firmware).
- h. Press **Enter** twice to select the desired firmware image file (usually only the latest firmware image file is available for selection).
- i. Press **Enter** (Yes) again to commit to firmware update.
- j. The Information screen will display the firmware update percent completed.

**Note:** The SureMark flash update will take several minutes. Do **not** power off the host system or SureMark printer after the update has started.

6. After the firmware update is complete, the SureMark printer will be reset.
  - a. Press **Enter** (OK) to confirm.
  - b. Press **Alt-X** (Exit).
  - c. Press **Enter** to exit.
7. Remove the diskette from drive A.
8. Press **Ctrl-Alt-Delete** to reboot the system.

## Using POSS For Windows for Updating SureMark Firmware (RS-485 and USB Only)

If you use a Windows operating system with the SureMark, you can use the POSS for Windows 4610 Printer Firmware Update program (AIPFLD46.EXE) to update SureMark firmware. For additional information, refer to the *POSS Programming Reference and User's Guide*.

**Note:** This utility requires POS Suite V1.0.0 or greater. POS Suite includes POSS for Windows.

1. Download the latest SureMark firmware update image file from the IBM Retail Store Solutions Web site (see "Resources on the Internet" on page 43) to the C:\POS\BIN directory. The file is AIP46MC5.HEX for models T15, TG5, TF7, and TM7. Because the file in the directory is more current than the old file, the firmware will be automatically updated when the system is powered off, then powered on.
2. To update the SureMark firmware manually, enter the following command:  
`AIPFLD46.EXE -S slot_number -P port_number -F microcode_file [-Q]`

where:

**slot\_number**

The SureMark slot number, which is usually 1. The slot number must be specified with decimal values only; hexadecimal values are not accepted.

**port\_number**

The SureMark port number, which is usually 17. The port number must be specified with a decimal value.

**microcode\_file**

Must be C:\POS\BIN\AIP46MC5.HEX.

**-Q** Quiet mode installation (no progress information)

3. The SureMark flash update will take several minutes.

**Note:** USB printers connected to one of the SurePOS 700 Series systems can also use the IBM Point-of-Sale Device Diagnostics, which is included in the POS Suite, to update firmware. See *IBM SurePOS 700 Series System Reference* for information about the IBM Point-of-Sale Device Diagnostics.

## Using 4690 OS 4610 Utility to Update SureMark Firmware

4690 OS users with SureMark printers that use RS-485 or USB connections to attach to medialess systems can update SureMark firmware (flash) by using the 4690 OS 4610 Utility Program function of 4690 OS.

**Note:** 4690 OS level 9910 or greater is required to use this utility.

1. To invoke the utility, press **Ctrl S1, 95, Ctrl S2**.
2. Press **729, Ctrl, S2** at the ENTER REQUEST prompt.
3. Press **1, Ctrl S2** to continue.
4. Message T7175 will display to confirm that the flash update has started.
5. The SureMark flash update will take several minutes. Message "T9514 Enter Request" displays after the 4610 flash update completes.
6. Enter **99, Ctrl S2** to end the SureMark utility.

## Updating 4610 Firmware Using RS-232 Attachment Cable

To use the 4610 DBCS Installation Utility Diskette to update SureMark firmware for configurations that do **not** have a diskette drive and display and PC keyboard, you must provide a temporary RS-232 attachment to a host PC that does have a diskette drive.

Before starting the firmware update, you must obtain the following parts:

- RS-232 attachment cable, either 2 meters in length (P/N 86H2192) or 4 meters in length (P/N 86H2195).
- SureMark Power Supply (for RS-232 configurations only), P/N 42H1176.

If the SureMark is currently attached to a host system unit that does not support a diskette drive, use the following procedure to temporarily connect the SureMark to a host PC that has a diskette drive, RS-232 port, PC keyboard and display.

1. Disconnect the SureMark (RS-485 #7) attachment cable and temporarily connect an RS-232 attachment cable to the SureMark.
2. Connect the SureMark via the RS-232 port connector to an alternate host PC that has a diskette drive.

3. Follow the procedure in “4610 DBCS Installation Utility Diskette for Updating SureMark Firmware” on page 36, starting with Step 1, to complete the printer firmware update.
4. Reconnect the SureMark to the original host system unit using the original attachment cables.

## Limitation on Updating Firmware

The following limitation must be considered when updating firmware on the SureMark printer:

- SureMark firmware update cannot be performed if the printer currently has Model 4 emulation enabled. If emulation is enabled, temporarily disable Model 4 emulation, then start the SureMark firmware update. After the firmware update is complete, re-enable Model 4 emulation. See “Emulating the IBM Model 3 or Model 4 Printers” for additional information.

---

## Emulating the IBM Model 3 or Model 4 Printers

**Note:** This procedure only applies to SBCS mode.

It is possible to emulate the IBM Model 3 or Model 4 printer with the SureMark printer. You must change the configuration to enable the SureMark to emulate the Model 3 or Model 4 printers.

The following mediums can be used to set up Model 3 or Model 4 emulation:

- For systems with diskette drives, use the 4610 DBCS Installation Utility Diskette (see “Enabling Emulation Using 4610 DBCS Installation Utility Diskette”). Download the latest level diskette from the Retail Store Solutions Web site (see “Resources on the Internet” on page 43).
- For medialess systems using the 4690 OS, use the 4690 OS Online Terminal Diagnostics (see “Enabling Emulation Using 4690 On-Line Terminal Diagnostics” on page 40).

## Enabling Emulation Using 4610 DBCS Installation Utility Diskette

The following information is also available in the 4610MOD4.TXT file on the diskette.

**Notes:**

1. All SureMark firmware levels for models TI5, TG5, TF7, and TM7 support emulation.
2. 4610 DBCS Installation Utility Diskette V1.00 or later is required.

To set up Model 3 or Model 4 emulation using the 4610 DBCS Installation Utility Diskette:

1. Insert the 4610 DBCS Installation Utility Diskette in drive A.
2. Power on the system unit.
3. Select **MOD4** when the menu is displayed.
4. Perform the specified steps to either enable or disable emulation.

**To enable when emulation is currently disabled:**

1. Select one of the following:
  - Model 4 emulation with Offline mode disabled
  - Model 4 emulation with Offline mode enabled



The printer is reconfigured.

2. Press **Ctrl-Alt-Delete** to reboot the system. The system IPLs.

**To disable when emulation is currently enabled:**

1. Select **Disable Model 4 emulation**.
2. Press **Ctrl-Alt-Delete** to reboot the system. The system IPLs.

## Enabling Emulation Using 4690 On-Line Terminal Diagnostics

**Note:** 4690 OS Version 1 level 9740 or greater is required to use this utility.

To set up Model 3 or Model 4 emulation using the 4690 On-Line Terminal Diagnostics:

1. To invoke the utility, press **Ctrl S1, 95 Ctrl S2**.
2. At the ENTER REQUEST prompt, press **728, Ctrl, S2**. This brings up the function to switch the mode of the printer.
3. Perform the specified steps to either enable or disable emulation. The operating system recognizes the current state of printer emulation and displays the appropriate prompts.

**To enable emulation:**

1. Select **T13**.
2. At the **Activate Model 3/4 Emulation 1=N, 2=Y, S2** prompt, enter **2** to enable Model 3/4 emulation.
3. At the **Using EJ in Offline Mode? 1=N, 2=Y, S2** prompt, select **Y** if you want to store all the journal data in the printer's flash memory.

**To disable emulation:**

1. At the **Disable Mod 3/4 Emulation 1=N, 2=Y, S2** prompt, enter **2** to disable Model 3/4 emulation.

## Limitations for Emulation

The following limitations must be considered when using the SureMark printer to emulate the Model 3 or Model 4 printer.

- Emulation mode is supported only in SBCS mode.
- Printing the face of checks requires application changes (franking the back of checks should not).
- Printing wide documents may require changes. The document station on the Model 4 printer supports 86 characters, the SureMark supports 47 characters.
- Journal commands can be ignored or stored in the printer's flash memory. This needs to be decided when the printer is initially configured.
- There is no top document registration (documents must be inserted from the front).
- User-defined special characters are not supported.
- Emulation mode does not support the Model 4A double-byte character set.
- For RS-485, emulation mode is currently only supported on 4690 OS and DOS systems. For USB, emulation mode is currently only supported on 4690 OS. Emulation is not supported for RS-232.

|  
|  
|



## Printing Saved Data

When the printer is offline in Model 3/4 emulation mode and the option for storing data to the printer was selected, it is possible to fill up the printer flash memory. When the memory is full, a printer error indicates the journal station is out of paper. You can empty the printer buffer by printing out the data that is stored in the flash memory. The data prints on the customer receipt station. The data in the buffer is erased only after the last line of data is printed.

### Printing Buffer Data – Thermal/Impact SureMark Models TI5 and TG5

To print the buffer data from the beginning:

1. Press and hold both buttons. When the printer ready indicator begins blinking, release both buttons.
2. Press and release both buttons again.

#### Notes:

1. If the SureMark printer encounters an error (for example, the paper runs out or the cover is opened) while printing the data, the data remains intact.
2. To stop printing the data, open and close the ribbon cover. When you are ready to print the data, use the procedure above to restart printing from the beginning.
3. To stop printing and restart at the current position, open and close the paper cover. Printing immediately restarts.

### Printing Buffer Data – Single-Station SureMark Printers

To print the buffer data from the beginning:

1. Open the top cover. The LED will flash quickly.
2. Press and hold the paper feed button for 5 seconds.
3. The LED will show one short blink, accompanied by a beep, followed by a 1-second pause.
4. Press and hold the paper feed button for 5 seconds.
5. The LED will change to a long blink. The beeper will sound continuously.
6. Close the cover to begin printing the electronic journal data.

#### Notes:

1. If the SureMark printer encounters an error (for example, the paper runs out or the cover is opened) while printing the data, the data remains intact.
2. To stop printing the data, open the top cover, turn the printer power switch ON, turn the printer power switch OFF, and close the top cover. When you are ready to print the data, use the procedure above to restart printing from the beginning.
3. To stop printing and restart at the current position, open and close the top cover. Printing immediately restarts.
4. Pressing and releasing the paper feed button a third time before closing the top cover will cause the printer to return to normal mode.

---

## Emulating an Epson Single-Station Printer (Single-Station SureMark Only)

Emulation of an Epson single-station printer is supported on the single-station SureMark printers in SBCS mode.

## Enabling Epson Emulation

To enable emulation of an Epson single-station printer on a single-station SureMark printer, you must set switch 3 on the main logic card. See Figure 15.

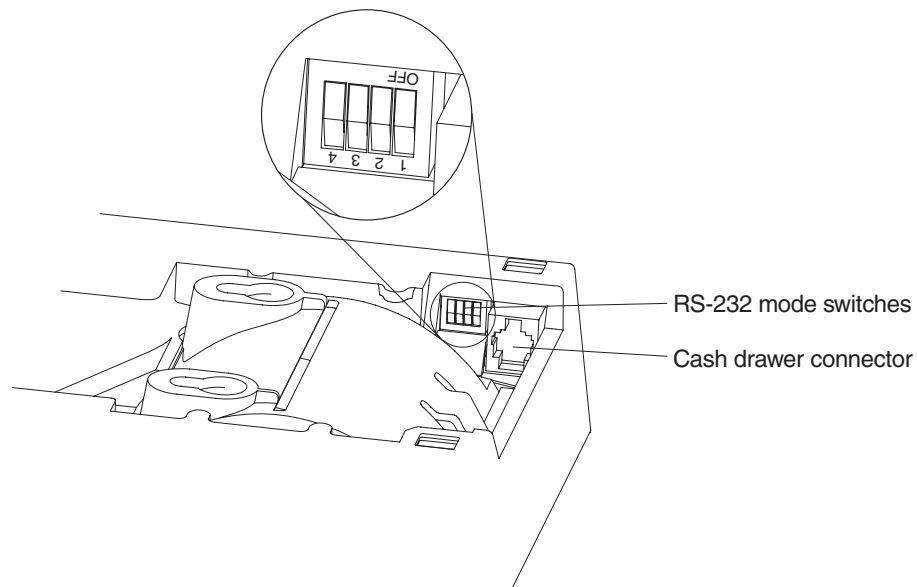


Figure 15. Switch for Epson Emulation

## Limitations for Epson Emulation

The following limitations must be considered when using the SureMark printer to emulate an Epson single-station printer.

- Logos and downloadable characters are supported in emulation mode. However, because the Epson printer prints at 150 dpi and the SureMark prints at 200 dpi, the emulated printout will be smaller.
- Emulation of page mode is not supported on the SureMark.
- Epson supports the *Select paper sensor to stop printing* command. IBM does not support a low paper sensor.

---

## Changing the Printer Mode between DBCS and SBCS

To disable DBCS printing (that is, to enter SBCS mode), use the 4610 DBCS Installation Utility Diskette.

**Note:** This procedure requires 4610 DBCS Installation Utility Diskette V1.00 or later.

1. Insert the 4610 DBCS Installation Utility Diskette in drive A.
2. Power on the system unit.
3. Select **Change Printer Mode** when the menu is displayed.
4. Perform the specified steps to change the printer mode.

**To set to DBCS Mode:**

- a. Select **DBCS Mode**.
- b. Press **Ctrl-Alt-Delete** to reboot the system. The system IPLs.

**To set to SBCS Mode:**

- a. Select **SBCS Mode**.

- b. Press **Ctrl-Alt-Delete** to reboot the system. The system IPLs.

---

## Proportional Font Conversion Utility

As part of its support for proportional fonts, IBM provides three TrueType fonts and a utility that you can use to convert the fonts to files that the SureMark printer can use.

The application and instructions for downloading the converted fonts are available from the Retail Store Solutions Web site. See “Resources on the Internet” for more information.

**Note:** You might have TrueType fonts other than those supplied by IBM on your system. Before using the conversion utility to convert and download any non-IBM fonts for use by the SureMark printer, you **must** confirm that you have received authorization from the owner of the fonts to convert and download the fonts.

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## Resources on the Internet

The IBM Retail Store Solutions Web site at <http://www.ibm.com/solutions/retail/store> contains publications for the SureMark Printer. The Web site also provides access to diskettes, drivers, and miscellaneous documentation, such as README files and OEM paper certification information.

Select **Support** at the left on the main page of the Web site, then select **IBM SureMark Printer**. The displayed page contains links both to documentation and to diskettes and drivers that you can download for the SureMark printers.



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## **Part 2. Models TI5 and TG5**

This part contains operational, testing, and problem determination information for SureMark Models TI5 and TG5 is a thermal/impact printer with DBCS support.



## Chapter 4. Operation (Models T15 and TG5)

Operating Controls and Indicators . . . . .	47
Ribbon Loading . . . . .	49
Paper Loading . . . . .	51
Thermal Printhead Cleaning . . . . .	53

**Note:** All covers **must** be installed on the SureMark printer during operation.

### Operating Controls and Indicators

There are two triangular-shaped buttons and two LED indicators located on top of the printer. The buttons serve multiple functions.

When the topmost indicator is on continuously, the printer is powered ON and ready for printing. When the indicator blinks, one of the following conditions exists:

- The printer is out of paper.
- The cover is open.
- The printer is offline.
- The printer has a nonrecoverable home error.

The second LED is the Document Present indicator. It lights when a document is inserted far enough into the document insert (DI) station to reach the DI sensor. When this LED blinks, the DI station is waiting for you to insert a document.

The topmost button is the customer receipt (CR) paper feed button. Press this button to advance the CR paper. The lower button is the document feed button. Press this button to advance the document.

If you press both buttons at the same time and then release them, the document insert throat opens. The throat must be open to insert a document from the side. Press and then release both buttons again to close the throat.

Both buttons are also used to test the printer. See "Offline Tests" on page 56 for additional button functions.

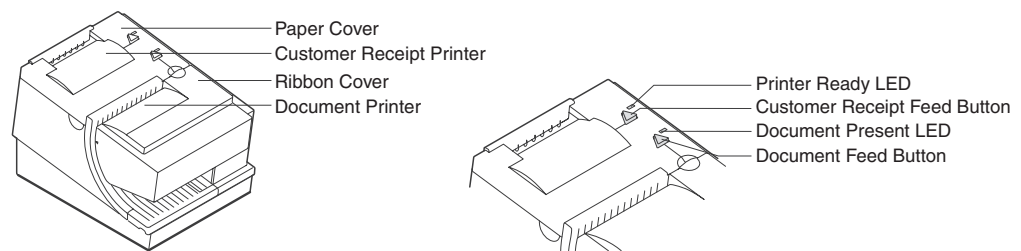


Figure 16. SureMark Printer - Indicators, Controls, and Printing Stations (Models T15 and TG5)

The printer is capable of printing information on an inserted document. Figure 17 on page 48 shows how to side load a document to align it exactly where you want it to be printed.

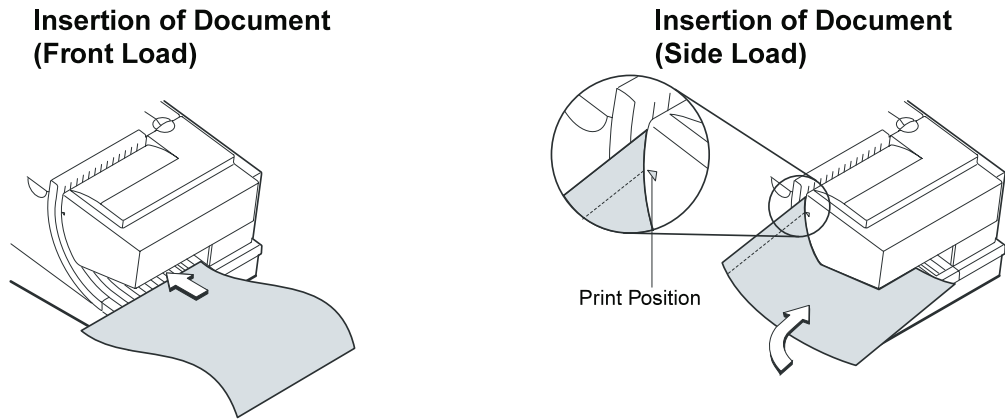


Figure 17. Inserting Documents

Figure 18 and Figure 19 on page 49 show the printable area on an inserted document for both portrait and landscape.

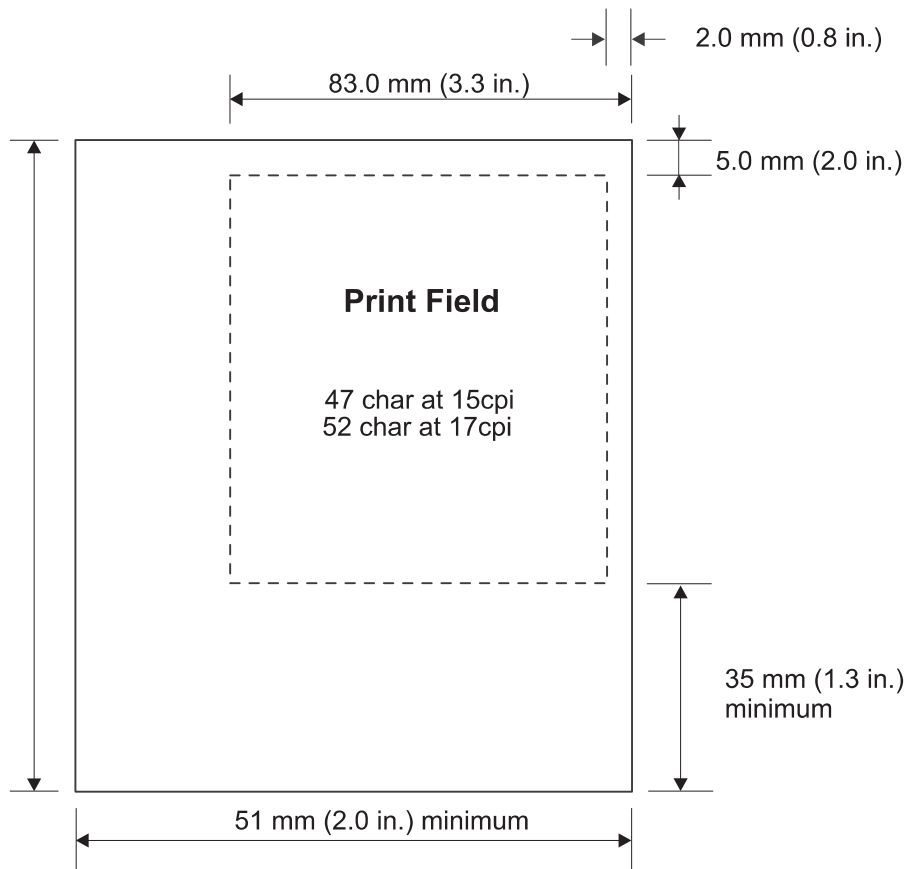


Figure 18. Printable Area of an Inserted Document (Portrait)



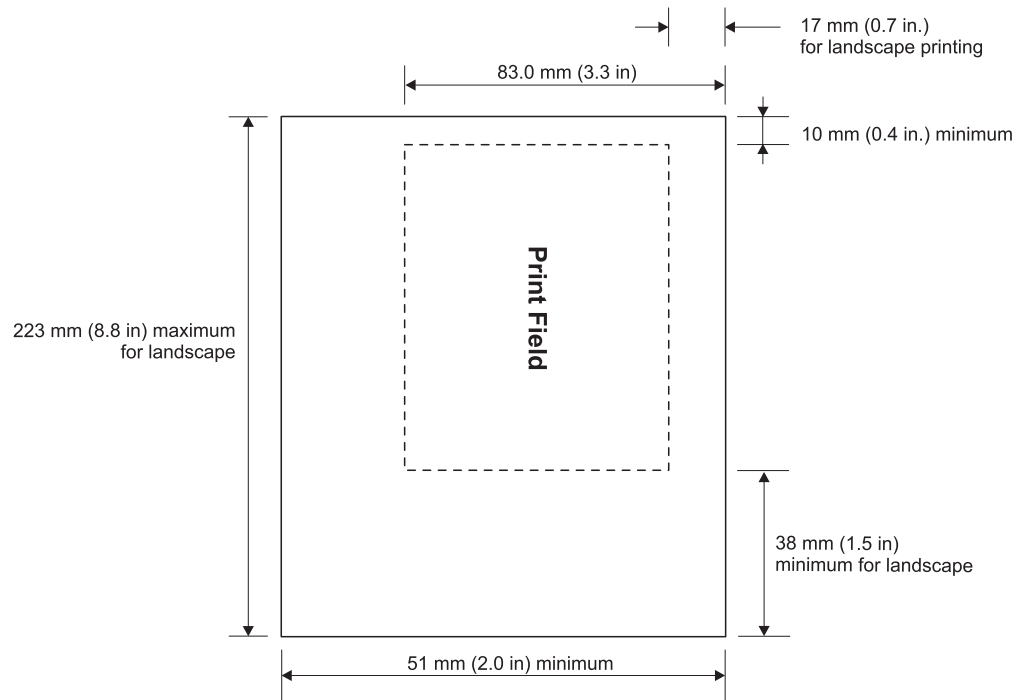


Figure 19. Printable Area of an Inserted Document (Landscape)

---

## Ribbon Loading

1. Open the ribbon cover. As the cover is opened, the printhead moves to a position where you can easily load a ribbon.

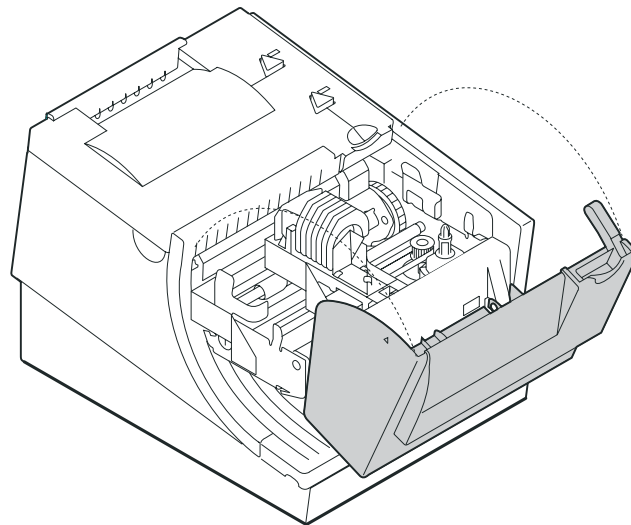


Figure 20. Opening the Ribbon Cover

2. If there is already a ribbon cartridge installed, remove it by lifting it straight up.

**Note:** You might need to grab the body of the cartridge rather than the top to remove it.

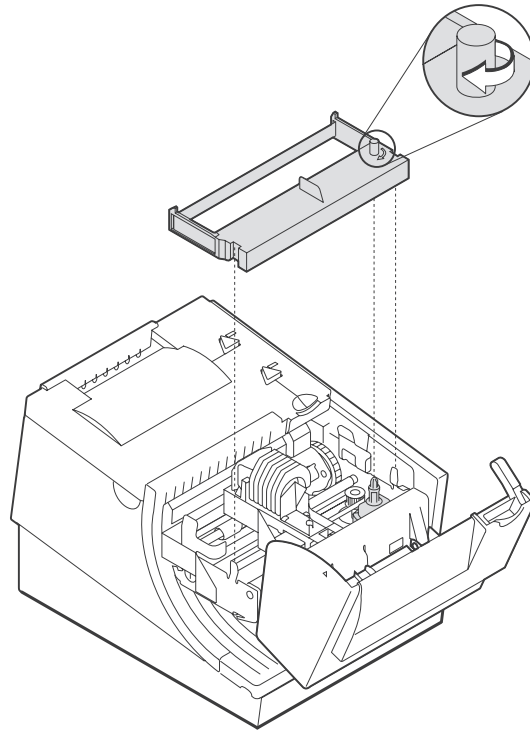


Figure 21. Ribbon Cartridge Loading

3. Maintain ribbon tension by turning the ribbon cartridge knob as shown in Figure 21. Lower the cartridge into position until the notches on its sides snap into place on the printer guides. Once the cartridge is in place, turn the knob until the ribbon slides into place between the printhead and the ribbon shield. See Figure 22 for correct ribbon positioning.

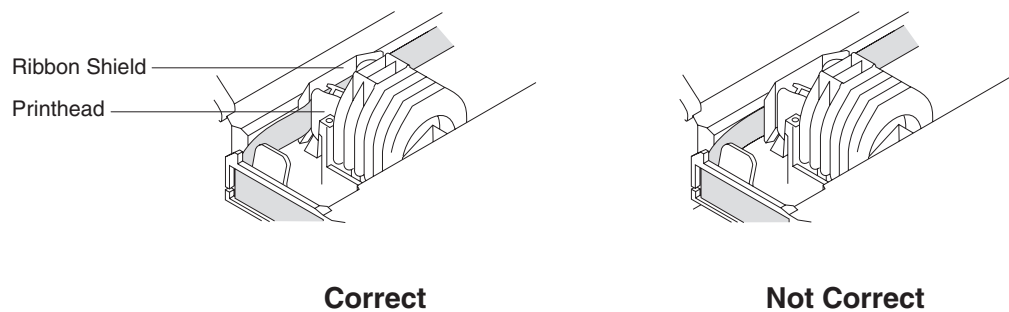


Figure 22. Ribbon Path around the Printhead

4. Close the ribbon cover.

## Paper Loading

1. Open the paper cover.
2. If there is any unused paper or if there is an empty paper roll core in the paper roll bucket inside the printer, remove it before inserting a new paper roll. You can throw the core in the trash can.

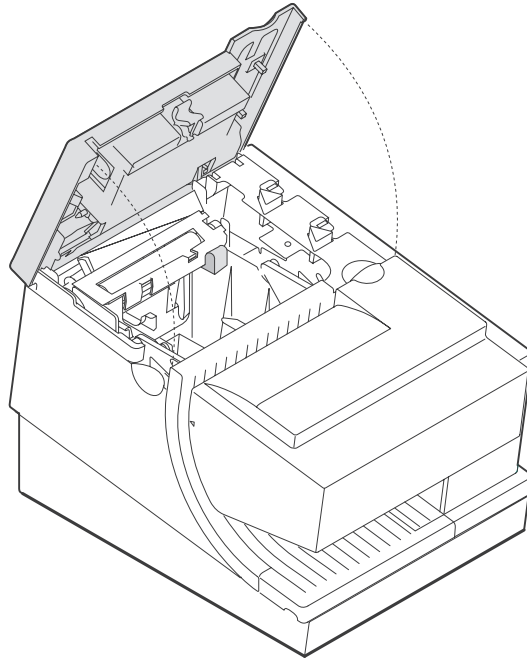


Figure 23. Paper Cover – Models T15 and TG5

- Note:** Refer to the label on the inside of the paper cover for a diagram of how to load paper.
3. See Figure 24 on page 52 and place the paper roll into the paper roll bucket as shown. The leading edge of the paper should come from the direction of the front of the printer and go across the top of the roll as shown in the diagram. If it feeds from the bottom of the roll, nothing will be printed on the paper.
- Note:** The thermal printhead will not print on paper with glue on it. If the new paper roll was sealed by glue, tear off the 6 to 8 inches of paper with glue on it before loading it. Or, you can advance the paper after loading to get rid of the glued paper.

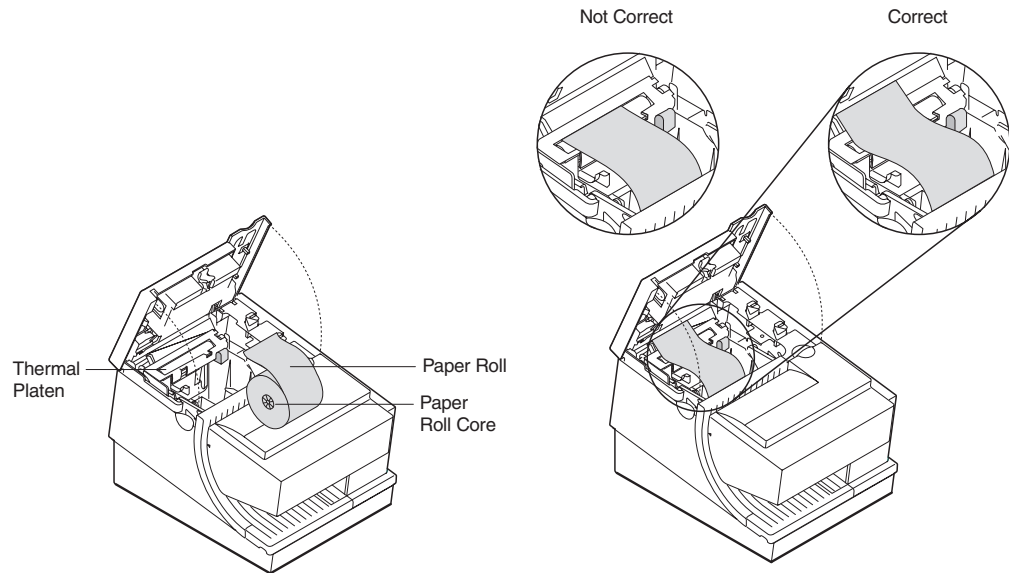


Figure 24. Paper Loading Path –: Models T15 and TG5

4. Place the leading edge of the paper over the metal guide. See Figure 24.
5. Close the paper cover.
6. Press the customer receipt feed button to advance the paper to verify that the paper is feeding correctly. Feed 30 cm (about 1 ft) of paper through to test for correct alignment.

**Attention:** Do not pull the receipt paper out of the printer with the paper access cover closed. This disengages the paper feed. The paper feed motor must then catch up before the printer can feed the paper, which causes missing lines or partial lines of print. Use the customer receipt feed button to advance the receipt and all lines will print.

## Thermal Printhead Cleaning

The thermal printhead can be cleaned whenever print quality deteriorates.

1. Open the paper cover.
2. Using a cotton swab soaked in isopropyl alcohol, gently wipe the printhead several times on its print line and on the surrounding area. See Figure 25.
3. Wipe off any residual alcohol with a dry swab.

If print quality does not improve after cleaning the thermal printhead, call for service.

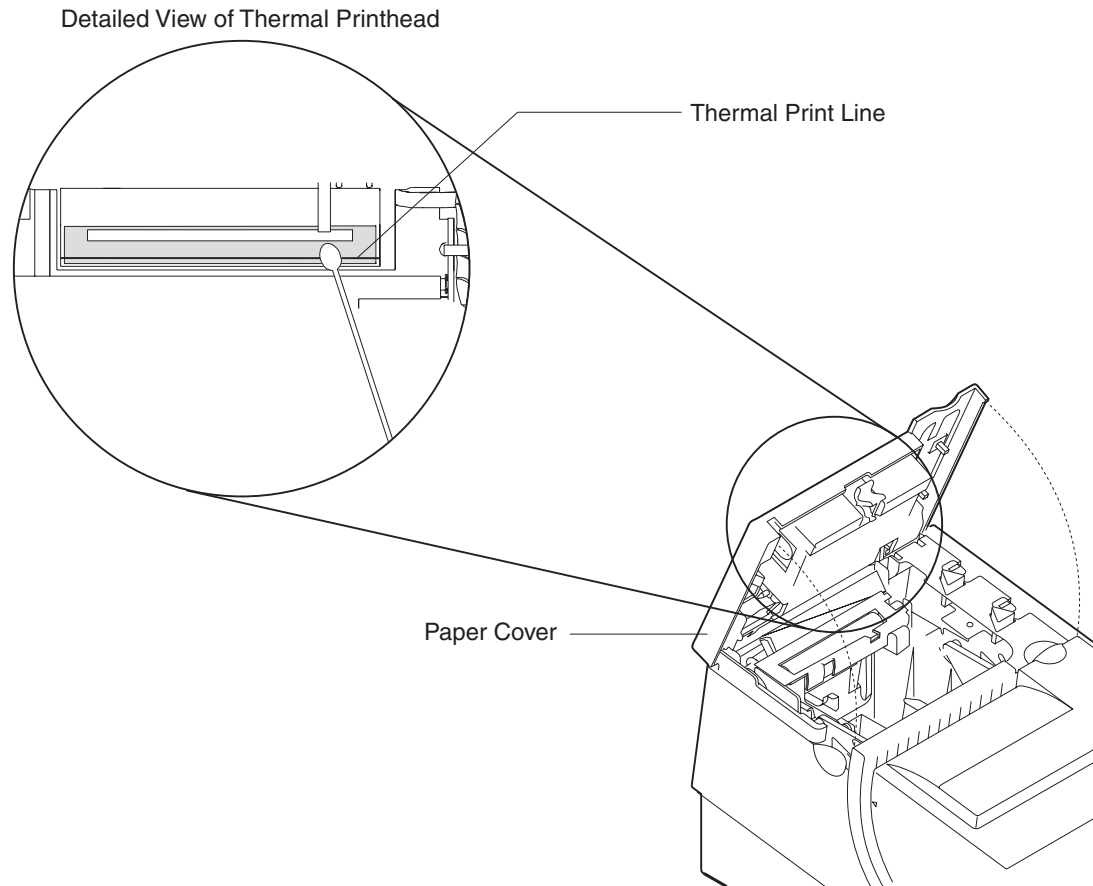


Figure 25. Printhead and Print Line Area – Models T15 and TG5



---

## Chapter 5. Testing and Problem Analysis – Models T15 and TG5



To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



To avoid shock hazard:

- The power cord must be connected to a properly wired and earthed receptacle.
- Any equipment to which this product will be attached must also be connected to properly wired receptacles.

**Note:** For translations of these safety notices, see *IBM Safety Information — Read This First*, GA27–4004.

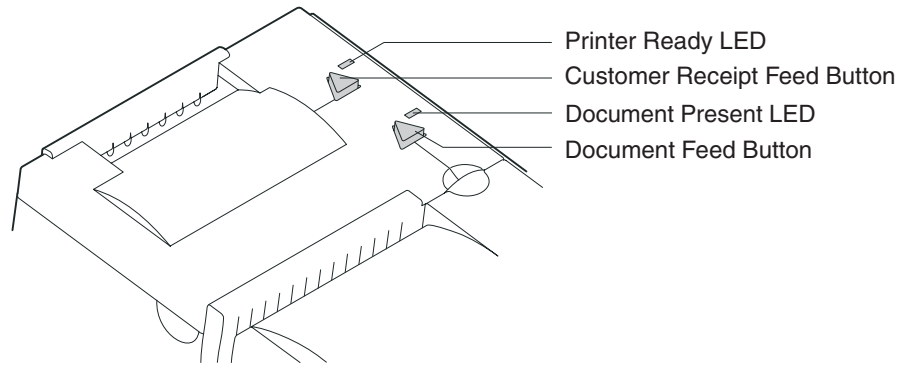
---

### Testing the Printer

When you power on the SureMark printer, it runs a power-on self-test (POST). If the POST finds no errors, the printer is ready for operation. Follow this procedure to determine if there are errors.

**Note:** Never connect or disconnect the printer when power is applied (when LEDs are on).

1. If the printer is powered on, power off the printer and power it on again.
  - If the printer is attached to the system with the RS-232 cable or the standard USB cable with a power brick, disconnect the power cord, then reconnect the power cord to a properly wired and grounded power source.
  - If the printer is attached to the system with the RS-485 cable, power off the POS system, and then power on the system, which also powers on the printer.
  - If the printer is attached to the system with a powered USB cable, the USB-attached printer can be hot-plugged.



2. Check the status of the Printer Ready indicator:

**Printer ready indicator ON:**

The Power On Self Test completed successfully.

**Printer ready indicator OFF or blinking:**

The POST failed.

3. If the POST fails or if you suspect problems with your system, see “Problem Determination” on page 59.
4. See “Offline Tests” and run the offline tests. If the offline tests fail or you suspect problems with your system, see “Problem Determination” on page 59.

---

## Offline Tests

The following offline tests are used as diagnostic tools to ensure the printer is operating correctly.

### Customer Receipt Test

1. Press and hold both buttons to enter offline mode. When the printer ready indicator begins blinking, release both buttons.
2. Press and release the customer receipt feed button to start this test.
3. See Figure 26 on page 57 and verify that your printer has printed correct information for your model and configuration:
  - Double-byte enabled for Models TI5 and TG5
  - RS-232 or RS-485 serial interface or USB interface
  - Applicable parameters for RS-232 communications:
    - 9600 or 19 200 baud rate
    - DTR/DSR or XON/XOFF control
  - A solid line should appear as the last line of the test pattern.

If any characters that appear in Figure 26 on page 57 are missing from the test pattern you print, or if the solid line is missing, go to “Problem Determination” on page 59.

### Document Insert Test

1. Insert a document in the document insert station. The document present indicator should come on.

If the document present indicator does not come on, realign the document.

If pressing the document feed button does not feed the document, go to “Problem Determination” on page 59.





6. The feature enabled lines will appear only when the feature is installed.
7. These lines break at different points for the test pattern printed in the document insert (DI) station.
8. This section contains printer usage statistics that you can use for problem determination.
9. The line across the bottom should be solid with no blank spaces.

## Resetting the Printer - Offline

1. Press and hold both buttons (Customer Receipt Feed button and Document Feed button) to enter offline mode. Release both buttons when the Printer Ready indicator begins to blink.
2. Open the customer receipt cover, then close it. The printer resets.

## Problem Determination

Any problems that arise with a SureMark printer are either software errors or hardware failures. This section contains information to help you determine the cause of a problem and how to solve it.

If the SureMark printer fails, use Table 6 to identify and report the problem. Follow the procedures described in the table. If you cannot identify and solve the problem, call your service representative.

Table 6. Troubleshooting – Models TI5 and TG5

If the problem is...	Here's what to do...
Printer ready indicator is off.	<ul style="list-style-type: none"> <li>• If connected to a system using the RS-485 communication port, check that the system is powered on and cable 7 is connected.</li> <li>• If using the RS-232 communication port or a USB port with a power brick, check that the brick power supply is connected to the printer and plugged into an ac power source.</li> <li>• If using USB communication with a powered USB cable, check that the system is powered on.</li> </ul>
Printer ready indicator is blinking.	<ul style="list-style-type: none"> <li>• Check that the customer receipt station has paper loaded correctly. Close the cover and push the Customer Receipt Feed button to feed a small amount of paper.</li> <li>• Check the document insert station printhead and paper path for any obstructions.</li> <li>• Check that the paper and ribbon covers are closed.</li> </ul>
Customer receipt station is feeding paper, but is not printing.	<ul style="list-style-type: none"> <li>• Ensure that the paper roll is not upside down. Go to "Paper Loading" on page 51.</li> <li>• Clean the printhead. See "Thermal Printhead Cleaning" on page 53.</li> </ul>
Document insert station is not printing	<ul style="list-style-type: none"> <li>• Check the paper path.</li> <li>• Check to see if the ribbon is installed correctly.</li> <li>• Change the ribbon, go to "Ribbon Loading" on page 49.</li> </ul>

### Notes:

1. Record all symptoms before calling for service.
2. If you receive software error messages, refer to the application program's software manual.
3. Call your service representative.



---

## **Part 3. Models TF7 and TM7**

This part contains operational, testing, and problem determination information for SureMark models TF7 and TM7. These models are the single-station SureMark printers with DBCS support.



## Chapter 6. Operation (Models TF7 and TM7)

Operating Controls and Indicators . . . . .	63
Paper Loading . . . . .	63
Thermal Printhead Cleaning . . . . .	66

**Note:** All covers **must** be installed on the SureMark printer during operation.

### Operating Controls and Indicators

There is one triangular-shaped button and one light-emitting diode (LED) indicator located on top of the printer.

When the LED indicator is on continuously, the printer is powered on and ready for printing. When the indicator blinks, one of the following conditions exists:

- The printer is offline (offline testing is enabled).
- The printer is out of paper.
- The cover is open.
- The cutter is jammed.

See "Offline Test" on page 68 for additional button functions.

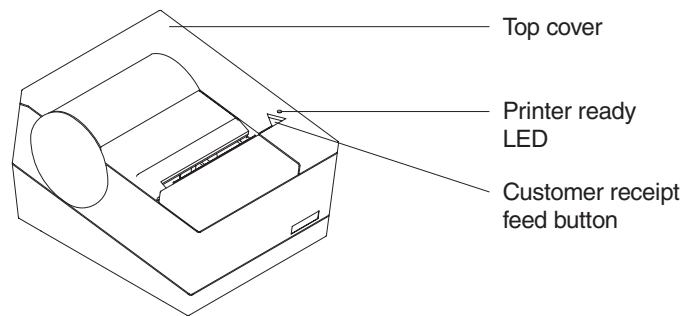


Figure 27. SureMark Printer - Indicator, Control, and Printing Station (Models TF7 and TM7)

### Paper Loading

1. Open the paper cover.
2. If there is any unused paper or if there is an empty paper roll core in the paper roll holder inside the printer, remove it before inserting a new paper roll. You can throw the core in the trash can.
3. If the printer is configured for "snap in" paper loading (two white spheres are present behind the metal springs), then place the paper roll onto the paper roll holder as shown in Figure 28 on page 64; otherwise, drop the roll into the bucket. The leading edge of the paper should come from the direction of the back of the printer and go across the bottom of the roll as shown in the diagram.

**Note:** The thermal printhead will not print on paper with glue on it. If the new paper roll was sealed by glue, tear off the 15 to 20 cm (6 to 8 in.) of paper with glue on it before loading it. Or, you can advance the paper after loading to get rid of the glued paper.

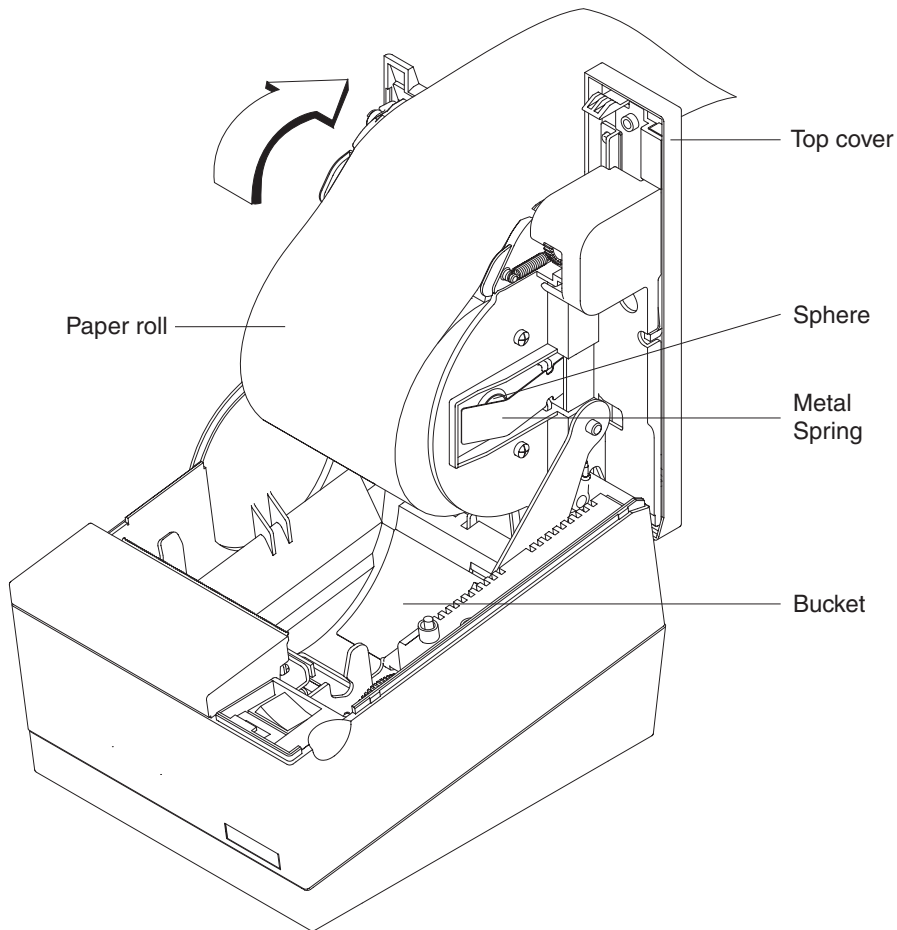


Figure 28. Paper Loading Path

4. Pull the end of the paper up over the paper roll and toward the back of the printer.

**Note:** Refer to the label on the inside of the bottom cover for a diagram of how to load paper.

5. Close the paper cover.
6. Press the customer receipt feed button to advance the paper and verify that the paper is feeding correctly. Feed 30 cm (about 1 ft) of paper through to test for correct alignment.



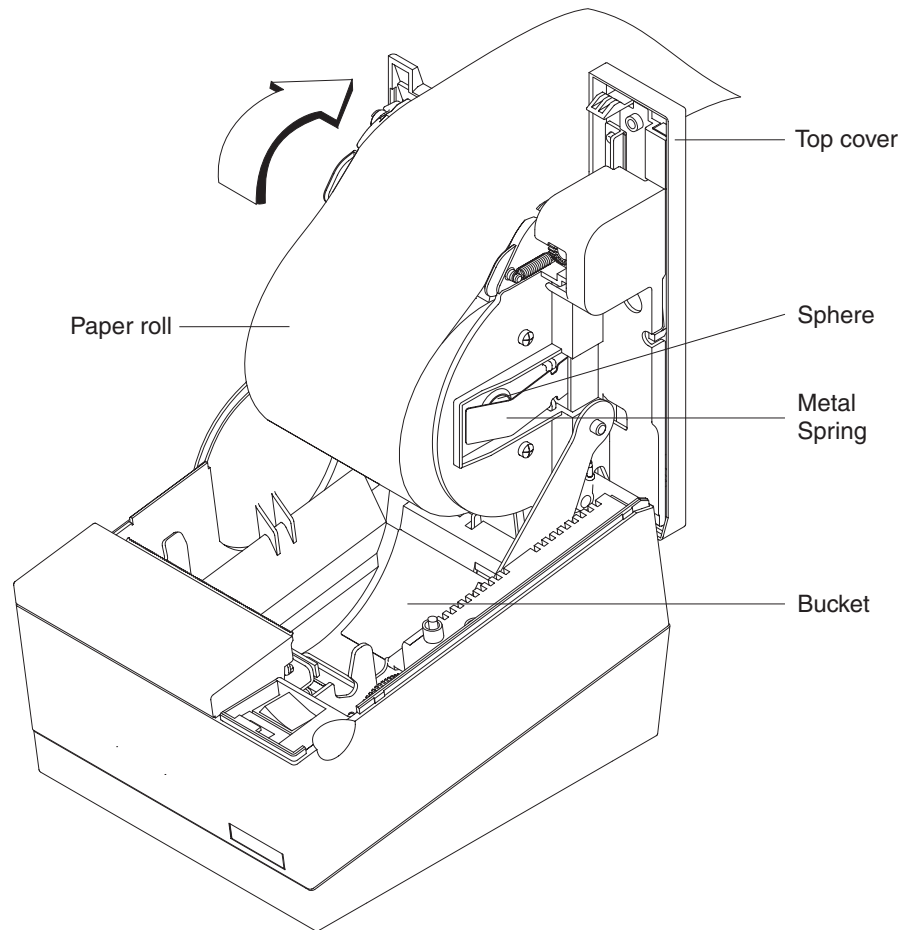


Figure 29. Paper Loading Path (Models TF7 and TM7)

**Attention:** Do not pull the receipt paper out of the printer with the paper access cover closed. This might cause partial lines of print. Use the customer receipt feed button to advance the receipt.

## Thermal Printhead Cleaning

The thermal printhead can be cleaned whenever print quality deteriorates.

1. Open the paper cover.
2. Using a cotton swab soaked in isopropyl alcohol, gently wipe the printhead several times on its print line and on the surrounding area. See Figure 30.
3. Wipe off any residual alcohol with a dry swab.

If print quality does not improve after cleaning the thermal printhead, call for service.

Detail View of Thermal Print Head

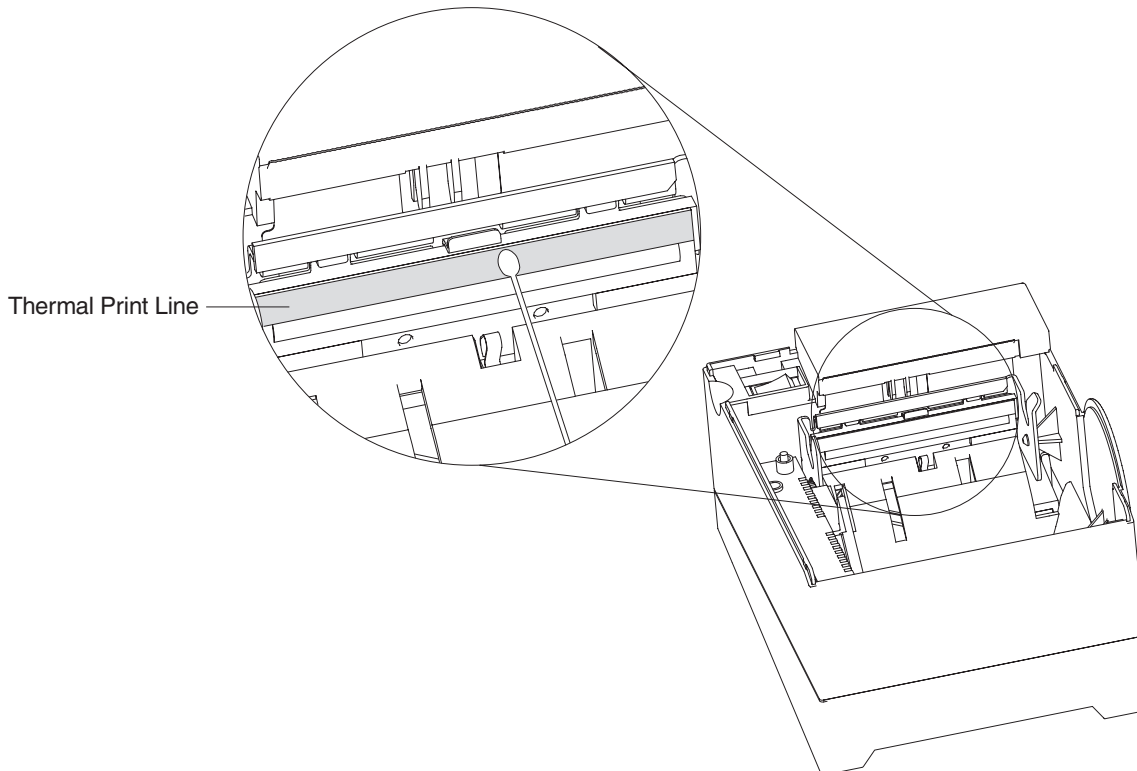


Figure 30. Printhead and Print Line Area (Models TF7 and TM7)

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## Chapter 7. Testing and Problem Analysis – Models TF7 and TM7



To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.



To avoid shock hazard:

- The power cord must be connected to a properly wired and earthed receptacle.
- Any equipment to which this product will be attached must also be connected to properly wired receptacles.

**Note:** For translations of these safety notices, see *IBM Safety Information — Read This First*, GA27-4004.

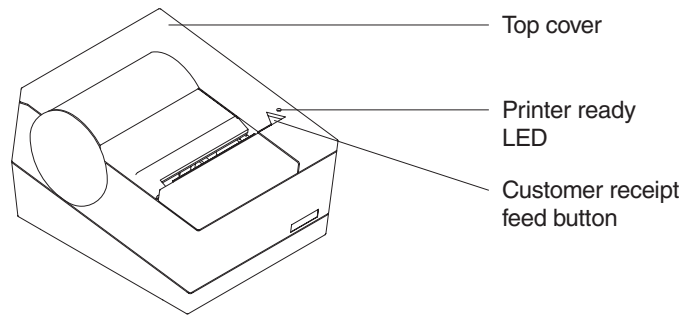
---

### Testing the Printer

When you power on the SureMark printer, it runs a power-on self-test (POST). If the POST finds no errors, the printer is ready for operation. Follow this procedure to determine if there are errors.

**Note:** Never connect or disconnect the printer when power is applied (when the LED is on).

1. If the printer is powered on, power **OFF** the printer and power it on again.
  - If the printer is attached to the system with the RS-232 cable or the standard USB cable with a power brick, disconnect the power cord, then reconnect the power cord to a properly wired and grounded power source.
  - If the printer is attached to the system with the RS-485 cable, power **OFF** the POS system, and then power on the system, which also powers on the printer.
  - If the printer is attached to the system with a powered USB cable, the USB attached printer can be hot-plugged.
  - For single-station printers, use the printer's power on/off switch that is located under the top cover. Power **OFF** the printer, then power **ON** the printer



2. Check the status of the Printer Ready indicator:

**Printer Ready indicator ON:**

The power-on self test completed successfully.

**Printer Ready indicator OFF or blinking:**

The POST failed.

3. If the POST fails or if you suspect problems with your system, see “Problem Determination” on page 70.
4. See “Offline Test” and run the offline test. If the offline test fails or you suspect problems with your system, see “Problem Determination” on page 70.

---

## Offline Test

An offline printing test is provided as a diagnostic tool to ensure the printer is operating correctly.

1. Open the top cover.
2. Press and hold the paper feed button for 5 seconds. The LED indicator will make one quick flash followed by a pause. The beeper will make a short single tone periodically.
3. Release the paper feed button.
4. Close the top cover.
5. See Figure 31 on page 69 and verify that your printer has printed correct information for your model and configuration:
  - Double-byte enabled
  - RS-232, RS-485 or USB serial interface
  - Applicable parameters for RS-232 communications:
    - 9600 or 19 200 baud rate
    - DTR/DSR or XON/XOFF control
  - A solid line should appear as the last line of the test pattern.

If any characters that appear in Figure 31 on page 69 are missing from the test pattern you print, or if the solid line is missing, go to Table 7 on page 70.



## Resetting the Printer - Offline

To reset the printer:

1. Open the top cover.
2. Power off the printer using the power on/off switch that is located in the right front corner of the printer.
3. Power on the printer.

## Problem Determination

Any problems that arise with a SureMark printer are either software errors or hardware failures. This section contains information to help you determine the cause of a problem and how to solve it.

If the SureMark printer fails, use Table 7 to identify and report the problem. Follow the procedures described in the table. If you cannot identify and solve the problem, call your service representative.

*Table 7. Troubleshooting – Models TF7 and TM7*

If the problem is...	Here's what to do...
Printer ready indicator is OFF.	<ul style="list-style-type: none"> <li>• Check that the printer power switch, which is located under the top cover, is set ON.</li> <li>• If connected to a system using the RS-485 communication port, check that the system is powered on and cable 7 is connected.</li> <li>• If using the RS-232 communication port or a USB port with a power brick, check that the brick power supply is connected to the printer and plugged into an ac power source.</li> <li>• If using USB communication with a powered USB cable, check that the system is powered ON.</li> </ul>
Printer ready indicator is blinking.	<ul style="list-style-type: none"> <li>• Check that the customer receipt station has paper loaded correctly. Close the cover and push the Customer Receipt Feed button to feed a small amount of paper.</li> <li>• Check that the cover is closed.</li> </ul>
Customer receipt station is feeding paper, but is not printing.	<ul style="list-style-type: none"> <li>• Ensure that the paper roll is in correctly. Go to "Paper Loading" on page 51.</li> <li>• Clean the printhead. See "Thermal Printhead Cleaning" on page 53.</li> </ul>

### Notes:

1. Record all symptoms before calling for service.
2. If you receive software error messages, refer to the application program's software manual.
3. Call your service representative.

updated March 18, 2002

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## **Part 4. Appendixes**





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## Appendix A. Consumable Supplies

Paper Specifications . . . . .	73
Thermal Paper . . . . .	73
Document Insert Forms (Models TI5 and TG5 Only) . . . . .	74
Single and Multipart Form Specifications . . . . .	75
Print Ribbons (Models TI5 and TG5 Only) . . . . .	75

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### Paper Specifications

**Attention:** Using an inferior grade of paper can affect print quality and the life of printheads and the printer mechanism. See “Resources on the Internet” on page 43 for information about OEM paper certifications for the SureMark.

#### Thermal Paper

The paper used in the thermal receipt station must meet the following requirements:

**Width** 79.5 ± 0.5 mm (3.13 ± 0.02 in.)

**Outside Diameter**

80 mm (3.15 in.) maximum for SureMark Models TI5 and TG5

90 mm (3.54 in.) maximum for single-station SureMark printers

**Thickness**

0.057 ± 0.008 mm (0.00224 ± 0.0003 in.)

0.065 ± 0.005 mm (0.00256 ± 0.0002 in.)

0.075 ± 0.005 mm (0.00295 ± 0.0002 in.)

**Weight**

55 ± 3 g/m<sub>2</sub> (14.7 ± 0.8 lb)

The paper must be wound with the printing side facing out and with the outer edge glued to prevent unraveling. The paper should not be attached to the core in any manner. There should be 1.5 to 2.1 m (5 to 7 ft.) of red stripe at the end of the roll.

**Note:** Non-topcoated thermal paper can be recycled along with other paper products. They can also be incinerated and sent to landfills with no more effect on the environment than regular office paper waste.

**Important**

Printer reliability and performance are directly related to the quality of the supplies used by the customer. The published parameters for printer performance are established using supplies that meet the specifications listed above.

Thermal paper with post-processing, such as (but not limited to) watermarks, coupons, or advertisements printed on the front or back of the paper, is not covered by IBM's specifications. Some inks and printing processes will work acceptably, while others will not. Printer problems that are caused by supplies that do not meet IBM's specifications may result in a billable service call, regardless of the existence of a service contract.

## **Document Insert Forms (Models TI5 and TG5 Only)**

The printers will accommodate single and multipart forms.

### Single and Multipart Form Specifications

Specification	Value
Minimum width:	50 mm (2 in.)
Maximum thickness of multipart forms:	0.47 mm (0.0185 in.)
Maximum thickness of front sheet, multipart forms:	0.08 mm (0.003 in.)
Minimum thickness of single-part form:	0.10 mm (0.004 in.)

**Note:** Test all forms in the printer to ensure acceptable performance prior to buying a significant quantity. There should be no binding holes or other holes within 10 mm (0.4 in.) from the right edge of the form.

### Print Ribbons (Models TI5 and TG5 Only)

The ribbon is an *Epson ERC-35* or equivalent.

**Attention:** Using an inferior grade of ribbon can affect print quality and the life of printheads and the printer mechanism.



## Appendix B. Technical Information

General Description . . . . .	77
Specifications . . . . .	77
Memory Units . . . . .	79
Immediate Commands . . . . .	79
Voltage Conversion Circuitry . . . . .	79
RS-485 Serial I/O Parameters . . . . .	80
Cash Drawer Connector Pin Assignments . . . . .	80
RS-232 Connector Pin Assignments . . . . .	80
RS-232 Parameters . . . . .	81
USB Connector Pin Assignments . . . . .	81
Code Page Definitions . . . . .	82
Generic Code Page . . . . .	83
Code Page 437 . . . . .	84
Code Page 858 . . . . .	85
Code Page 860 . . . . .	86
Code Page 863 . . . . .	87
Code Page 865 . . . . .	88
Code Page 932 . . . . .	89
Code Page 949 . . . . .	90
Code Page 950 . . . . .	91
Code Page 1381 . . . . .	92
Character Fonts . . . . .	93
Thermal Printing Font . . . . .	93
Impact Printing Fonts (Models TI5 and TG5 Only) . . . . .	94

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### General Description

All SureMark printers print the customer receipt using the thermal printhead. For SureMark printers that include a document insert station, documents are printed using the impact head. No SureMark printer contains a journal print station.

Thermal printing occurs by placing a heating element against a thermally sensitive paper. By energizing the elements, dots are formed. Thermal printers print dot rows horizontally across the page – 576 dots make up a single dot row across the paper. Printing continues row by row until the entire character is formed.

Impact printing utilizes a standard ballistic printhead. Each wire is fired against an inked ribbon which places a dot on the paper.

SureMark printers contain all the circuitry, processing hardware, and software for operating a thermal and, except for models TF7 and TM7, an impact printer mechanism. SureMark printers do not contain a power supply. However, they do contain voltage conversion circuitry to allow connection to a standard IBM system interface or to an RS-232 24-volt power supply. (See “Power Requirements” on page 8 for specific power supply specifications.)

---

### Specifications

The information in the Document Insert Station column of Table 8 on page 78 applies only to SureMark Models TI5 and TG5. There is no document insert station on models TF7 and TM7.

Table 8. Station Characteristics

Characteristic	Customer Receipt Station	Document Insert Station
Speed (see note following table)	SBCS characters: 39.2 lps at 6 lpi, SBCS characters: 52 lps at 8 lpi DBCS characters: 50 lps at 7.7 lpi	4.3 lps
Paper Width	TI5/TG5 – 80 mm (3.15 in.) TF7/TM7 – 90 mm (3.54 in.)	
Print Width (Resident Code Page)	34 SBCS characters at 12 cpi, 44 SBCS characters at 15 cpi, 48 SBCS characters at 17 cpi, 57 characters at 20 cpi	37 SBCS characters at 12 cpi, 47 SBCS characters at 15 cpi, 52 SBCS characters at 17 cpi
Print Width (DBCS Code Page)	38 SBCS characters per line 19 DBCS characters per line	Korea: 43 SBCS characters per line 21 DBCS characters per line Others: 24 SBCS characters per line 12 DBCS characters per line
Pitch (Resident SBCS Code Page)	12, 15, 17, 20 cpi	12, 15, 17 cpi

**Note:** In order to conserve power, SureMark models TI5, TG5, TF7, and TM7 reduce their throughput when printing high print densities, such as logo messages or full black lines. Because these types of print messages are used on a limited basis, the overall performance when printing a customer receipt is not noticeably affected.

The reduced print speed is based on the number of print dots that are turned on for a given print line, which is defined as dot utilization. Dot utilization is typically low for normal character printing and up to 100% for full black line printing. The SureMark printer operates at 52 lps at low dot utilization, and at slower speeds as the dot utilization increases.

Table 9. Sound Characteristics

Type	Description	LwAd		LpAm		<LpA>m	
		Operating (bels)	Idling (bels)	Operating (dB)	Idling (dB)	Operating (dB)	Idling (dB)
SureMark TI5	Printer	5.7	N/A	61.5	N/A	47	N/A

**Notes:**

**LwAd** The declared upper limit of the sound power level for a random sample of machines.

**LpAm** The mean value of the A-weighted sound pressure levels at the operator position (if any) for a random sample of machines.

**<LpA>m**

The mean value of the A-weighted sound pressure levels at the one-meter (bystander) positions for a random sample of machines.

**N/A** Indicates *not applicable*.

All measurements were made in accordance with ISO 7779 and reported in conformance with ISO 9296.

---

## Memory Units

**Random access memory (RAM)** is used for storing the image data for the thermal printhead and program code. It is also used for storing incoming data from the communication port.

**Flash memory** is used for many purposes, including:

- Character set storage (1600 KB on Models TI5 and TG5, 1100 KB on models TF7 and TM7)
- Personalized message storage (8 KB)
- Logo or APA message storage (64 KB)
- Flash memory data storage (300 KB on Models TI5 and TG5, 80 KB on models TF7 and TM7)
- Program code (256 KB)

Personalized messages are those messages that are printed on each receipt in a POS environment. Storing these messages in the flash memory greatly reduces the data transmission time to the printer and the processing time of that data by the microprocessor. This is also true of graphics or APA messages, which require a significant amount of transmission and processing time.

Flash memory can also be used as a storage place for customer data. This data could be journal data.

---

## Immediate Commands

SureMark models TI5, TG5, TF7, and TM7 have 16 KB of memory to store incoming commands and data.

Most commands will be received and then executed sequentially. However, several commands execute immediately upon receipt. These commands are:

- “Download Graphics (Logo) Commands” on page 109
- “Predefine Messages” on page 111
- “Download User-Defined Characters” on page 112
- “Extended Address Command – Request Printer ID” on page 107
- “Real-Time Requests” on page 156.

---

## Voltage Conversion Circuitry

The printer requires two voltages. The printheads and motors use +24 V dc. Powering the logic circuitry requires +5 V dc. Printer input voltage is one of the following:

<b>Communication Mode</b>	<b>Power Requirement</b>
<b>RS-485</b>	+38 V dc or +24 V dc, and +5 V dc
<b>RS-232</b>	+24 V dc
<b>USB</b>	+24 V dc

In each case, a single dc-to-dc converter converts voltage to +24 V dc and +5 V dc. An autoswitch circuit on the interface card senses the operating mode (RS-485, RS-232, powered USB, or standard USB with power brick) and routes input voltages appropriately.

- When operating in RS-485 mode, the +38 V dc is converted to +24 V dc and the +5 V dc is passed straight through.
- When operating in RS-232 or USB mode or RS-485 mode in Japan, the +24 V dc is passed through and is also converted to +5 V dc.

**Note:** Both voltage sources should not be connected to the printer at the same time, even if one of the sources is powered off. System damage could occur under these conditions.

---

## RS-485 Serial I/O Parameters

<b>Printer Address:</b>	35
<b>AWAIT-60H</b>	extra stop bits (after printer address)
<b>BWAIT-48H</b>	extra bits/byte (after printer data bytes)

For more information about serial I/O communications, see *4680 Store Systems Serial I/O Channel Attachment Information*, which is available from IBM Industry Corporate Relations.

---

## Cash Drawer Connector Pin Assignments

The SureMark printers have a single cash drawer connector. This connector can drive either a single cash drawer (see “Description of Models” on page 4 for the cable part number) or two cash drawers using a special cable. The connector also provides a status line which indicates if one of the cash drawers is open.

Drive voltage for each cash drawer solenoid is 24 V dc at a current of 1 ampere.

Connector pins are assigned as follows:

<b>Pin</b>	<b>Signal</b>
1	Not Connected
2	Solenoid 1 Driver
3	Cash Drawer Status
4	+24 V dc
5	Solenoid 2 Driver
6	Ground

The cash drawer solenoids should be connected between pins 4 and 2 for cash drawer 1 and between pins 4 and 5 for cash drawer 2. A “Y” cable is required to bring out all the appropriate lines to attach the two units.

The cash drawer status line has a 10k resistor pull-up connected to the +5 V dc.

**Note:** The drawer sensor should switch pin 6 to pin 3 when the drawer is open.

---

## RS-232 Connector Pin Assignments

SureMark printers contain a 9-pin D-shell connector port for RS-232 communication. This port is on the interface card, accessible under the printer without removing printer covers. The connector has the following pin functions:

<b>Pin</b>	<b>Signal</b>
1	Not Connected
2	Transmit



- 3 Receive
- 4 DTR (Not connected on 3-wire cable)
- 5 Signal Ground
- 6 DSR (Not connected on 3-wire cable)
- 7 Not Connected
- 8 Not Connected
- 9 Not Connected

See “Description of Models” on page 4 for the cable part number.

## RS-232 Parameters

### Protocol

DTR/DSR mode or XON/XOFF mode. Dip switch selectable.

### Baud rate

9600 or 19 200, selectable by DIP switch

**Start** 1 bit

**Data** 8 bits

**Parity** None

**Stop** 1 bit

Table 10. 9-pin to 9-pin RS-232 Connector Layout

System Description	Printer Description
Pin 2 - Rx (input)	Pin 2- Tx (Output)
Pin 3 - Tx (Output)	Pin 3 - Rx (Input)
Pin 4 - DTR (Output)	Pin 4 - DTR (Input)
Pin 5 - Gnd	Pin 5 - Gnd
Pin 6 - DSR (Input)	Pin 6 - DSR (Output)
Pin 8 - CTS (Input)	Pin 6 - DSR (Output)

Table 11. 25-pin to 25-pin RS-232 Connector Layout

System Description	Printer Description
Pin 2 - Tx (Output)	Pin 3 - Rx (Input)
Pin 3 - Rx (Input)	Pin 2 - Tx (Output)
Pin 5 - CTC (Input)	Pin 6 - DSR (Output)
Pin 6 - DSR (Input)	Pin 6 - DSR (Output)
Pin 7 - Gnd	Pin 5 - Gnd
Pin 20 - DTR (Output)	Pin 4 - DTR (Input)

## USB Connector Pin Assignments

SureMark printers contain a USB port, if the USB feature is installed. This port is on the interface card, accessible under the printer without removing printer covers. Connection to the port can be with either the standard USB Type B connector, which requires a 24-volt power brick, or with the powered USB connector, which contains 24-volt power lines within the communications cable.

The standard USB Type B connector has the following pin functions:

Pin	Signal
1	Vbus (+5 V dc)

	2	Minus data
	3	Plus data
	4	Ground

| The powered USB connector has the following pin functions:

	<b>Pin</b>	<b>Signal</b>
	1	Ground (+24 V dc)
	2	+24 V dc
	3	Ground (Vbus)
	4	Plus data
	5	Minus data
	6	Vbus +5 V dc
	7	+24 V dc
	8	Ground (+24 V dc)

| See “Description of Models” on page 4 for the cable part numbers.

---

## Code Page Definitions

The SureMark printer has a resident character set that supports these code pages:

- Generic
- 437 (US)
- 858 (International)
- 860 (Portuguese)
- 863 (Canadian French)
- 865 (Norwegian)

You can download one of the following double-byte character set (DBCS) code pages using the 4610 DBCS Installation Utility Diskette:

- 932 (Japanese)
- 949 (Korean)
- 950 (Chinese – Traditional)
- 1381 (Chinese – Simplified)

You can also download three user-defined character sets for thermal printing and one character set for impact printing using the 4610 DBCS Installation Utility Diskette. See “Resources on the Internet” on page 43 for more information.

## Generic Code Page

Hex 1st 2nd →	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0		0	@	P	.	p	Ç	É	á	.	.	H.		Õ
_1	!	1	A	Q	a	q	ü	æ	í	↑	.	l	ð	μ
_2	"	2	B	R	b	r	é	Æ	ó	↓	.		Đ	Ɔ
_3	#	3	C	S	c	s	â	ô	ú	←	.	.	Ê	Ɔ
_4	\$	4	D	T	d	t	ä	ö	ñ	→	.	.	Ë	Ú
_5	%	5	E	U	e	u	à	ò	Ñ	Á:	.	.	È	Û
_6	&	6	F	V	f	v	å	û	Ğ	Â	ã	.	í	Ù
_7	'	7	G	W	g	w	ç	ù	ğ	À	Ã	.	î	ý
_8	(	8	H	X	h	x	ê	ÿ	ı	İ	ℓ	.	ï	Ý
_9	)	9	I	Y	i	y	ë	Ö	°	‡	ƒ	.	ì	±
_A	*	:	J	Z	j	z	è	Ü	Pt		⊥	.	Ó	÷
_B	+	;	K	[	k	{	ï	ø	¥	⌈	⌋	.	β	.
_C	,	<	L	\	l		î	£	§	⌋	†	.	Ô	⌈
_D	-	=	M	]	m	}	ì	Ø	i	¢	=	.	Ò	■
_E	.	>	N	^	n	~	Ä	Ş	.	€	‡	.		
_F	/	?	O	_	o	.	Å	ş	α	★	⊙	.	õ	▶

Figure 32. Printer's Resident Character Set - Generic Code Page

## Code Page 437

Hex 1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	.	0	@	P	.	p	Ç	É	á	.	.	.	.	.
_1	!	1	A	Q	a	q	ü	æ	í	.	.	.	β	±
_2	"	2	B	R	b	r	é	Æ	ó	.	.	.	.	.
_3	#	3	C	S	c	s	â	ô	ú	.	.	.	.	.
_4	\$	4	D	T	d	t	ä	ö	ñ	.	.	.	.	.
_5	%	5	E	U	e	u	à	ò	Ñ	.	.	.	.	.
_6	&	6	F	V	f	v	å	û	.	.	.	.	μ	÷
_7	'	7	G	W	g	w	ç	ù	.	.	.	.	.	.
_8	(	8	H	X	h	x	ê	ÿ	ı	.	ℓ	.	.	.
_9	)	9	I	Y	i	y	ë	Ö	.	†	ƒ	.	.	.
_A	*	:	J	Z	è	z	è	Ü	.		±	.	.	.
_B	+	;	K	[	k	{	ï	ç	.	ƒ	ƒ	.	.	.
_C	,	<	L	\	l	l	î	£	.	ƒ	ƒ	.	.	.
_D	-	=	M	]	m	}	ì	.	i	.	=	.	.	.
_E	.	>	N	^	n	~	Ä	.	.	.	†	.	.	H
_F	/	?	O	-	o	.	Å	.	.	.	.	.	.	I

Figure 33. Code Page 437

## Code Page 858

Hex 1st 2nd →	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	.	0	@	P	.	p	Ç	É	á	.	.	ø	Ó	.
_1	!	1	A	Q	a	q	ü	æ	í	.	.	Ð	β	±
_2	"	2	B	R	b	r	é	Æ	ó	.	.	Ê	Ô	.
_3	#	3	C	S	c	s	â	ô	ú	.	.	Ë	Ò	.
_4	\$	4	D	T	d	t	ä	ö	ñ	.	.	È	õ	.
_5	%	5	E	U	e	u	à	ò	Ñ	Á	.	€	Õ	.
_6	&	6	F	V	f	v	å	û	Ğ	Â	.	Í	μ	÷
_7	'	7	G	W	g	w	ç	ù	ğ	À	.	Î	ρ	.
_8	(	8	H	X	h	x	ê	ÿ	ı	İ	ℓ	Ï	ρ	.
_9	)	9	I	Y	i	y	ë	Ö	.	‡	ƒ	.	Ú	.
_A	*	:	J	Z	j	z	è	Ü	.		‡	.	Û	
_B	+	;	K	[	k	{	ï	ø	.	ƒ	ƒ	.	Ù	.
_C	,	<	L	\	l		î	£	.	ƒ	ƒ	.	ý	.
_D	-	=	M	]	m	}	ì	Ø	i	ç	=	.	Ý	.
_E	.	>	N	^	n	~	Ä	Ş	.	.	‡	ì	.	H
_F	/	?	O	-	o	.	Å	ş	.	.	α	.	.	I

Figure 34. Code Page 858

## Code Page 860

Hex 1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	.	0	@	P	.	p	Ç	É	á	.	.	.	.	.
_1	!	1	A	Q	a	q	ü	À	í	.	.	.	β	±
_2	"	2	B	R	b	r	é	È	ó	.	.	.	.	.
_3	#	3	C	S	c	s	â	ô	ú	.	.	.	.	.
_4	\$	4	D	T	d	t	ã	õ	ñ	.	.	.	.	.
_5	%	5	E	U	e	u	à	ò	Ñ	.	.	.	.	.
_6	&	6	F	V	f	v	Á	Ú	.	.	.	.	μ	÷
_7	'	7	G	W	g	w	ç	ù	.	.	.	.	.	.
_8	(	8	H	X	h	x	ê	ì	¿	.	ℓ	.	.	.
_9	)	9	I	Y	i	y	Ê	Õ	Ò	‡	ƒ	.	.	.
_A	*	:	J	Z	j	z	è	Ü	.		±	.	.	.
_B	+	;	K	[	k	{	ì	ç	.	ƒ	π	.	.	.
_C	,	<	L	\	l	l	Ô	£	.	ƒ	‡	.	.	.
_D	-	=	M	]	m	}	ì	Ù	i	.	=	.	.	.
_E	.	>	N	^	n	~	Ã	.	.	.	‡	.	.	H
_F	/	?	O	_	o	.	Â	Ó	.	.	.	.	.	I

Figure 35. Code Page 860

## Code Page 863

Hex 1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	.	0	@	P	.	p	Ç	É	.	.	.	.	.	.
_1	!	1	A	Q	a	q	ü	È	.	.	.	.	β	±
_2	"	2	B	R	b	r	é	Ê	ó	.	.	.	.	.
_3	#	3	C	S	c	s	â	ô	ú	.	.	.	.	.
_4	\$	4	D	T	d	t	Â	Ë	.	.	.	.	.	.
_5	%	5	E	U	e	u	à	Ï	.	.	.	.	.	.
_6	&	6	F	V	f	v	.	û	.	.	.	.	μ	÷
_7	'	7	G	W	g	w	ç	ù	.	.	.	.	.	.
_8	(	8	H	X	h	x	ê	α	î	.	ℓ	.	.	.
_9	)	9	I	Y	i	y	ë	Ô	.	†	ƒ	.	.	.
_A	*	:	J	Z	j	z	è	Ü	.		±	.	.	.
_B	+	;	K	[	k	{	ï	ç	.	∩	π	.	.	.
_C	,	<	L	\	l	l	î	£	.	∩	†	.	.	.
_D	-	=	M	]	m	}	=	Ù	.	.	=	.	.	.
_E	.	>	N	^	n	~	À	Û	.	.	†	.	.	H
_F	/	?	O	_	o	.	.	.	.	.	.	.	.	I

Figure 36. Code Page 863

## Code Page 865

Hex 1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	.	0	@	P	.	p	Ç	É	á	.	.	.	.	.
_1	!	1	A	Q	a	q	ü	æ	í	.	.	.	β	±
_2	"	2	B	R	b	r	é	Æ	ó	.	.	.	.	.
_3	#	3	C	S	c	s	â	ô	ú	.	.	.	.	.
_4	\$	4	D	T	d	t	ä	ö	ñ	.	.	.	.	.
_5	%	5	E	U	e	u	à	ò	Ñ	.	.	.	.	.
_6	&	6	F	V	f	v	å	û	.	.	.	.	μ	÷
_7	'	7	G	W	g	w	ç	ù	.	.	.	.	.	.
_8	(	8	H	X	h	x	ê	ÿ	ı	.	Ł	.	.	.
_9	)	9	I	Y	i	y	ë	Ö	.	ł	ł	.	.	.
_A	*	:	J	Z	j	z	è	Ü	.	ł	ł	.	.	.
_B	+	;	K	[	k	{	ï	ø	.	ł	ł	.	.	.
_C	,	<	L	\	l	l	î	£	.	ł	ł	.	.	.
_D	-	=	M	]	m	}	ì	Ø	i	.	=	.	.	.
_E	.	>	N	^	n	~	Ä	.	.	.	ł	.	.	H
_F	/	?	O	-	o	.	Å	.	α	.	.	.	.	I

Figure 37. Code Page 865



## Code Page 932

Hex 1st → 2nd ↘	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
0		0	@	P	`	p			£	—	タ	ミ		
1	!	1	A	Q	a	q			。	ア	チ	ム		
2	"	2	B	R	b	r			「	イ	ツ	メ		
3	#	3	C	S	c	s			」	ウ	テ	モ		
4	\$	4	D	T	d	t			、	エ	ト	ヤ		
5	%	5	E	U	e	u			・	オ	ナ	ユ		
6	&	6	F	V	f	v			ヲ	カ	ニ	ヨ		
7	'	7	G	W	g	w			ァ	キ	ヌ	ラ		
8	(	8	H	X	h	x			イ	ク	ネ	リ		
9	)	9	I	Y	i	y			ウ	ケ	ノ	ル		
A	*	:	J	Z	j	z			エ	コ	ハ	レ		
B	+	;	K	[	k	{			オ	サ	ヒ	ロ		
C	,	<	L	¥	l				ヤ	シ	フ	ワ		
D	-	=	M	]	m	}			ユ	ス	ハ	ン		ㇿ
E	.	>	N	^	n	~			ヨ	セ	ホ	〃		\
F	/	?	O	_	o				ツ	ソ	マ	。		~

Figure 38. Code Page 932

**Notes:**

1. The single-byte characters in this code page are mapped to the user-defined code page (user-defined thermal code page 1 and user-defined impact code page 1).
2. The shaded portion is interpreted as the first byte of a double-byte character.

## Code Page 949

Hex1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0		0	@	P	`	p								
_1	!	1	A	Q	a	q								
_2	"	2	B	R	b	r								
_3	#	3	C	S	c	s								
_4	\$	4	D	T	d	t								
_5	%	5	E	U	e	u								
_6	&	6	F	V	f	v								
_7	'	7	G	W	g	w								
_8	(	8	H	X	h	x								
_9	)	9	I	Y	i	y								
_A	*	:	J	Z	j	z								
_B	+	;	K	[	k	{								
_C	,	<	L	W	l									
_D	-	=	M	]	m	}								
_E	.	>	N	^	n	~								
_F	/	?	O	_	o									

Figure 39. Code Page 949

**Notes:**

1. The single-byte characters in this code page are mapped to the user-defined code page (user-defined thermal code page 1 and user-defined impact code page 1).
2. The shaded portion is interpreted as the first byte of a double-byte character.

## Code Page 950

Hex 1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0		0	@	P	`	p								
_1	!	1	A	Q	a	q								
_2	"	2	B	R	b	r								
_3	#	3	C	S	c	s								
_4	\$	4	D	T	d	t								
_5	%	5	E	U	e	u								
_6	&	6	F	V	f	v								
_7	'	7	G	W	g	w								
_8	(	8	H	X	h	x								
_9	)	9	I	Y	i	y								
_A	*	:	J	Z	j	z								
_B	+	;	K	[	k	{								
_C	,	<	L	\	l									
_D	-	=	M	]	m	}								
_E	.	>	N	^	n	~								
_F	/	?	O	_	o									

Figure 40. Code Page 950

**Notes:**

1. The single-byte characters in this code page are mapped to the user-defined code page (user-defined thermal code page 1 and user-defined impact code page 1).
2. The shaded portion is interpreted as the first byte of a double-byte character.

## Code Page 1381

Hex1st 2nd	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0		0	@	P	`	p	£							
_1	!	1	A	Q	a	q	¬							
_2	"	2	B	R	b	r	¥							
_3	#	3	C	S	c	s	-							
_4	\$	4	D	T	d	t	¡							
_5	%	5	E	U	e	u								
_6	&	6	F	V	f	v								
_7	'	7	G	W	g	w								
_8	(	8	H	X	h	x								
_9	)	9	I	Y	i	y								
_A	*	:	J	Z	j	z								
_B	+	;	K	[	k	{								
_C	,	<	L	\	l									
_D	-	=	M	]	m	}								
_E	.	>	N	^	n	~								
_F	/	?	O	_	o									

Figure 41. Code Page 1381

**Notes:**

1. The single-byte characters in this code page are mapped to the user-defined code page (user-defined thermal code page 1 and user-defined impact code page 1).
2. The shaded portion is interpreted as the first byte of a double-byte character.

## Character Fonts

This section describes font capabilities. For more information about font-related commands, see:

- “Download User-Defined Characters” on page 112
- “Set Print Station” on page 128
- “Set Print Mode” on page 125
- “Set Code Page” on page 129
- “Set Inter-Character Spacing” on page 129
- “Select User-Defined or Resident Character Sets” on page 129

## Thermal Printing Font

There are three font sizes for the resident character set on Models TI5, TG5, TF7, and TM7:

- Font A is 10 dots (wide) × 20 dots (high) with the last 2-dot row used for descenders (1.25-mm × 2.5-mm character height including descenders, 1.25 mm × 2.25 mm excluding descenders).
- Font B is 12 dots (wide) × 24 dots (high) with the last 2-dot row used for descenders (1.5-mm × 3.0-mm character height including descenders, 1.5 mm × 2.75 mm excluding descenders).
- Font C is 8 dots (wide) × 16 dots (high) with the last 2-dot row used for descenders (1.0 mm × 2.0 mm character height including descenders, 1.0 mm × 1.75 mm excluding descenders).

There are two character sizes for a DBCS code page:

- A double-byte character is 24 dots (wide) × 24 dots (high) or 3.0-mm × 3.0-mm character height.
- A single-byte character is 12 dots (wide) × 24 dots (high) or 1.5-mm × 3.0-mm character height.

The number of characters printed per inch depends on the character size, the inter-character spacing, and the chosen font. For example:

- For SBCS resident code page:
  - 17 cpi ⇒ 10-dot wide character + 2-dot space (font A) ⇒ 48 characters per line on 80-mm paper or 33 characters per line on 58-mm paper
  - 15 cpi ⇒ 10-dot wide character + 3-dot space (font A) ⇒ 44 characters per line on 80-mm paper or 30 characters per line on 58-mm paper
  - 12 cpi ⇒ 12-dot wide character + 5-dot space (font B) ⇒ 34 characters per line on 80-mm paper or 23 characters per line on 58-mm paper
  - 20 cpi ⇒ 8-dot wide character + 2-dot space (font C) ⇒ 57 characters per line on 80-mm paper or 40 characters per line on 58-mm paper
- For DBCS code page:
  - For DBCS characters: 6.7 cpi ⇒ 24-dot-wide character + 6-dot space ⇒ 19 characters per line on 80-mm paper or 13 characters per line on 58-mm paper
  - For SBCS characters: 13.5 cpi ⇒ 12-dot wide character + 3-dot space ⇒ 38 characters per line on 80-mm paper or 26 characters per line on 58-mm paper

You can choose the character size of three user-defined character sets (code pages) within the following parameters:

- $8 \leq \text{dot width} \leq 16$
- $16 \leq \text{dot height} \leq 32$  (must be a multiple of 2)

The parameter ranges for characters in proportional fonts are:

- $8 \leq \text{dot width} \leq 32$
- $8 \leq \text{dot height} \leq 32$

**Notes:**

1. Any of the thermal printing fonts can be scaled up to eight times the defined width and eight times the defined height. The scaling factor for the width does not have to equal the scaling factor for the height. For example, you could specify twice the width and five times the height.
2. For 80-mm paper, the cash receipt print line is 72 mm (2.83 in.) long. There are 576 dots per line and 203 dots per inch.
3. For 58-mm paper, the cash receipt print line is 50 mm (1.97 in.) long. There are 400 dots per line and 203 dots per inch. (This paper width is supported only on Models TF7 and TM7. Support is available by an RPQ.)

**Impact Printing Fonts (Models TI5 and TG5 Only)**

The resident character set has a font of 7 half-dots (wide)  $\times$  9 dots (high). There are no descenders.

- Font A prints 150 half-dots per inch = resident character size is 1.2 mm  $\times$  2 mm.
- Font B prints 120 half-dots per inch = resident character size is 1.5 mm  $\times$  2 mm.

For DBCS code page 949:

- A double-byte character is 16 half-dots (wide)  $\times$  9 dots (high).
- A single-byte character is 8 half-dots (wide)  $\times$  9 dots (high).

For DBCS code page 932, 950, and 1381:

- A double-byte character is 16 full-dots (wide)  $\times$  16 dots (high).
- A single-byte character is 16 half-dots (wide)  $\times$  16 dots (high).

The number of characters printed per inch depends on the character size, the inter-character spacing, and the chosen font. For example:

- For SBCS resident code page:
  - 17 cpi  $\Rightarrow$  font A with 7 half-dot-wide character + 2 half-dot space  $\Rightarrow$  52 characters per line
  - 15 cpi  $\Rightarrow$  font A with 7 half-dot-wide character + 3 half-dot space  $\Rightarrow$  47 characters per line
  - 12 cpi  $\Rightarrow$  font B with 7 half-dot-wide character + 3 half-dot space  $\Rightarrow$  37 characters per line
- For DBCS code page:
  - For DBCS code page 949: 16 half-dot-wide character + 6 half-dot space
    - Font A: 150 half-dots per inch  $\Rightarrow$  21 characters per line
    - Font B: 120 half-dots per inch  $\Rightarrow$  17 characters per line
  - For SBCS code page 949: 8 half-dot-wide character + 3 half-dot space
    - Font A: 150 half-dots per inch  $\Rightarrow$  43 characters per line
    - Font B: 120 half-dots per inch  $\Rightarrow$  34 characters per line
  - For DBCS code pages 932, 950, 1381: 16 full-dot-wide character + 6 half-dot space
    - Font A: 150 half-dots per inch  $\Rightarrow$  12 characters per line
    - Font B: 120 half-dots per inch  $\Rightarrow$  9 characters per line

updated March 18, 2002

- For SBCS code pages 932, 950, 1381: 8 full-dot wide character + 3 half-dot space

Font A: 150 half-dots per inch  $\Rightarrow$  24 characters per line

Font B: 120 half-dots per inch  $\Rightarrow$  19 characters per line

You can choose the character size of the one user-defined character set (code page) within the following parameters:

- $4 \leq \text{half-dot width} \leq 16$
- $4 \leq \text{dot height} \leq 16$

**Notes:**

1. Any of the impact printing fonts can be printed double-wide, double-high, or both double-wide and double-high. For better print quality with double-high characters, set the printer to unidirectional print mode. See “Set or Cancel Unidirectional Printing” on page 135.
2. User-defined characters greater than 9 dots high cannot be printed in landscape mode.
3. The document print line is 80.35 mm (3.16 inches) long. There are 474 half-dots per line for font A, and 379 half-dots per line for font B.
4. You can print in two densities on the impact printer: 120 half-dots per inch or 150 half-dots per inch. Refer to the description of bits 0 and 1 in “Set Print Mode” on page 125 for information about changing the density.





## Appendix C. RS-232 Programming Information

RS-232 Commands Summary by Function . . . . .	100
Alphabetized RS-232 Commands Summary . . . . .	104
System Commands . . . . .	107
Exercise Program . . . . .	107
Verify Previous Commands Completed . . . . .	107
Status Request . . . . .	107
Extended Address Command – Request Printer ID . . . . .	107
Preset or Onetime-Set Commands . . . . .	109
Download Graphics (Logo) Commands . . . . .	109
Example: n1 = 2 & n2 = 2 . . . . .	110
Predefine Messages . . . . .	111
Download User-Defined Characters . . . . .	112
Thermal Code Page . . . . .	113
Proportional Font . . . . .	114
Impact Code Page . . . . .	116
Download Double-Byte Characters . . . . .	117
Thermal Printhead (s=0) . . . . .	118
Impact Printhead (s=1) . . . . .	119
Flash Storage Write . . . . .	121
Erase Flash EPROM Sector . . . . .	121
Send Checksum of Flash EPROM Sector . . . . .	122
Microcode Tolerance (MCT) Information - Loading . . . . .	122
Microcode Tolerance (MCT) Information - Request . . . . .	123
DBCS Address Vectors . . . . .	125
Setup Commands . . . . .	125
Set Print Mode . . . . .	125
Set or Cancel Double-Wide Mode . . . . .	126
Set or Cancel Double-High Mode . . . . .	127
Set or Cancel Underline Mode . . . . .	127
Set or Cancel Overline Mode . . . . .	127
Set or Cancel Invert Mode . . . . .	127
Set or Cancel Emphasized Printing . . . . .	128
Set or Cancel High Quality Print Mode . . . . .	128
Set Print Station . . . . .	128
Select User-Defined or Resident Character Sets . . . . .	129
Set Code Page . . . . .	129
Set Inter-Character Spacing . . . . .	129
Set Inter-Character Spacing – DBCS . . . . .	130
Set or Cancel Rotated Characters . . . . .	130
Set Print Station Parameters . . . . .	130
Select 1/8-Inch Line Spacing . . . . .	131
Select 1/6-Inch Line Spacing . . . . .	131
Select Color Printing . . . . .	132
Set Line Spacing Using Minimum Units . . . . .	132
Set Sheet Eject Length . . . . .	133
Set Horizontal Tab Positions . . . . .	133
Set Left Margin Position . . . . .	133
Set Relative Position . . . . .	134
Align Positions . . . . .	134
Set or Cancel Unidirectional Printing . . . . .	135
Set Error Recovery Function . . . . .	136
Define Document Wait Time . . . . .	136
Status Sent to System . . . . .	137

Select Character for Reprinted Lines . . . . .	137
Reinitialize the Printer . . . . .	138
Enable or Disable the Feed Buttons (Models TI5 and TG5 Only) . . . . .	138
Enable or Disable the Beeper (Models TF7 and TM7 Only) . . . . .	139
Enable or Disable Upside-Down Printing . . . . .	139
Select Character Size for Scalable Fonts . . . . .	140
Fix Font Matrix . . . . .	141
Print Logo Inline . . . . .	141
Enable or Disable Two-Color Printing . . . . .	141
Bar Code Commands . . . . .	142
Print Bar Code . . . . .	142
Print Bar Code Examples . . . . .	145
Select Horizontal Size of Bar Code . . . . .	145
Select Bar Code Height . . . . .	146
Select Printing Position of Human Readable Information (HRI) . . . . .	146
Select Font for HRI . . . . .	146
Print PDF417 Bar Code . . . . .	147
Select PDF417 ECC (Error Correction Codewords) Level . . . . .	147
Select Aspect Ratio PDF417 Bar Code . . . . .	148
Enable PDF417 Truncation . . . . .	148
Print Character Commands . . . . .	148
Print and Line Feed . . . . .	148
Print and Line Feed . . . . .	149
Print, Form Feed, and Cut the Paper (FF) . . . . .	149
Print and Feed Paper n lines . . . . .	149
Print and Feed Paper Using Minimum Units . . . . .	149
Print Graphic Messages . . . . .	150
Select and Print a Graphics (Logo) Command . . . . .	150
Print Predefined Graphics (Logo) Command . . . . .	151
Print Predefined Messages . . . . .	152
Miscellaneous Commands . . . . .	152
Tab to Next Tab Stop . . . . .	152
Return Home (Select Printhead Location) . . . . .	153
Paper Cut/DI Eject . . . . .	153
Generate Drive Pulse for Cash Drawer . . . . .	153
Retrieve the Flash Storage . . . . .	154
Retrieve Size of User Flash Storage . . . . .	154
Retrieve Printer Usage Statistics . . . . .	154
Asynchronous (Real-Time) Commands . . . . .	155
Real-Time Requests . . . . .	156
Data Buffer Management and Batch Printing . . . . .	157
Reset Line Count . . . . .	157
Disable Line Count . . . . .	157
Hold Printing Until Buffer is Released . . . . .	157
Document Handling . . . . .	157
Portrait Mode . . . . .	158
Landscape Mode . . . . .	158
Landscape Printing Commands . . . . .	159
Status Summary . . . . .	160
Message from the Printer . . . . .	160
Status Byte 1 . . . . .	160
Status Byte 2 . . . . .	161
Status Byte 3 . . . . .	161
Status Byte 4 . . . . .	162
Status Byte 5 . . . . .	162
Status Byte 6 . . . . .	162

updated March 18, 2002

Status Byte 7 . . . . .	162
Status Byte 8 . . . . .	162

This appendix applies only to SureMark printers that attach to a POS system with an RS-232 cable connection.

If you use the RS-485 or USB interfaces, refer to 4610 driver documentation in the appropriate book for your operating system:

Operating System	IBM Publication
4690 OS Version 2 DBCS	IBM 4690 OS API Specification for IBM 4610 Printers
DOS	IBM Point-of-Sale Subsystem for DOS Programming Reference
OS/2, Windows NT, Windows 95, and Windows 3.1x	IBM Point of Sale Subsystem Programming Reference and User's Guide

The 4690 OS manual is available on the current maintenance diskette for the IBM 4690 Operating System. Current versions of all three manuals are available on the Internet. See "Resources on the Internet" on page 43 for more information.

## RS-232 Commands Summary by Function

Table 12. RS-232 Commands Organized by Function

Description	Command	Page
<b>System Commands</b>		
Exercise Program	ESC x or X'1B78'	107
Status request	ESC v or X'1B76'	107
Extended address command-request printer ID	GS   SOH or X'1D49;01' This is an IMMEDIATE command.	107
Verify previous commands completed	X'1B;00;80;00'	107
<b>Preset or Onetime-Set Commands</b>		
Download graphics (logo) commands	GS * <i>logo_num n1 n2 data</i> or X'1D2A'; <i>logo_num;n1;n2;data</i>	109
Predefine messages	GS : <i>message_num data</i> GS : or X'1D3A; <i>message_num;data;</i> X'1D3A'	111
Download user-defined characters	ESC & <i>s n m data</i> or X'1B26; <i>s;n;m;data</i> '	112
Thermal code page	MCT commands	113
Proportional font	ESC & <i>s n m data</i> or X'1B;26; <i>s;n;m;data</i> '	114
Impact code page	MCT commands	116
Download double-byte characters	ESC ( <i>s n data</i> or X'1B28; <i>s;n;data</i> '	117
Flash storage write	ESC ' <i>n1 n2 data</i> or X'1B27; <i>n1;n2;data</i> '	121
Erase flash EPROM sector	ESC # <i>n</i> or X'1B23; <i>n</i> '	121
Send checksum of flash EPROM sector	ESC " <i>n</i> or X'1B22; <i>n</i> '	122
Microcode tolerance (MCT) information - loading	ESC M <i>n h l</i> or X'1B4D; <i>n</i> '.	122
Microcode tolerance (MCT) information - request	ESC S <i>n</i> or X'1B53; <i>n</i> '	123
DBCS address vectors	ESC S <i>n</i> or X'1B53; <i>n</i> '	125
<b>Setup Commands</b>		
Set print mode	ESC ! <i>n</i> or X'1B21; <i>n</i> '	125

Table 12. RS-232 Commands Organized by Function (continued)

Description	Command	Page
Set or cancel double-wide mode	ESC W <i>n</i> :ehp1. or X'1B57;n'	126
Set or cancel double-high mode	ESC h <i>n</i> or X'1B68;n'	127
Set or cancel underline mode	ESC – <i>n</i> or X'1B2D;n':	127
Set or cancel overline mode	ESC x'5F' <i>n</i> or X'1B5F;n'	127
Set or cancel invert mode	ESC H <i>n</i> or X'1B48;n'	127
Set or cancel emphasized printing	ESC G <i>n</i> or X'1B47;n'	128
Set or cancel high quality print mode	ESC / <i>n</i> or X'1B;2F;n'	128
Set print station	ESC c 0 <i>n</i> or X'1B6330;n'	128
Select user-defined or resident character sets	ESC % <i>n</i> or X'1B25;n'	129
Set code page	ESC t <i>n</i> or X'1B74;n'	129
Set inter-character spacing	ESC SP <i>n</i> or X'1B20;n'	129
Set inter-character spacing - DBCS	ESC T <i>n</i> or X'1B;52;n'	130
Set or cancel rotated character	ESC V <i>n</i> or X'1B56;n'	130
Set print station parameters	ESC c 1 <i>n</i> or X'1B6331;n'	130.
Select 1/8-inch line spacing	ESC 1 or X'1B31'.	131
Select 1/6-inch line spacing	ESC 2 or X'1B32'	131
Select color printing	ESC r <i>n</i> or X'1B;72;n'	132
Set line spacing using minimum units	ESC 3 <i>n</i> or X'1B33;n'	132
Set sheet eject length	ESC C <i>n</i> or X'1B43;n'	133
Set horizontal tab positions	ESC D [ <i>n1 n2</i> ] NUL NUL or X'1B44[ <i>n1 n2</i> ]0000'	133
Set left margin position	ESC \$ <i>n1 n2</i> or X'1B24;n1;n2'	133
Set relative position	ESC \ <i>n1 n2</i> or X'1B5C;n1;n2'	134
Align positions	ESC a <i>n</i> or X'1B61;n'.	134
Set or cancel unidirectional printing	ESC U <i>n</i> or X'1B55;n'	135
Set error recovery function	ESC c 4 <i>n</i> or X'1B63;34;n'	135
Define document wait time	ESC f <i>x y</i> or X'1B66;x;y'	136
Status sent to system	ESC ) <i>n</i> or X'1B29;n'	137
Select character for reprinted lines	ESC + <i>n</i> or X'1B2B;n'	137
Reinitialize the printer	ESC @ or X'1B40'.	137
Enable/disable the feed buttons	ESC c 5 <i>n</i> X'1B;63;35;n'	138.
Enable/disable the beeper	ESC BEL <i>n1 n2</i> or X'1B;07;n1;n2'	138
Enable/disable upside-down printing	ESC { <i>n</i> or X'1B 7B <i>n</i> '	139
Select character size for scaleable fonts	GS ! <i>n</i> or X'1D;21;n'	140
Fix font matrix	ESC : <i>n</i> or X'1B 3A <i>n</i> '	141
Print logo inline	GS J <i>d n1 n2 data</i> or X'1D 4A <i>d n1 n2 data</i> '	141
Enable/disable two-color printing	GS ; <i>n</i> or X'1D 3B <i>n</i> '	141
<b>Bar Code Commands</b>		
Print bar code	GS k <i>n</i> NUL or X'1D6B;n;data;00'	142
Select horizontal size of bar code	GS w <i>n</i> or X'1D77;n'	145

Table 12. RS-232 Commands Organized by Function (continued)

Description	Command	Page
Select bar code height	GS h <i>n</i> or X'1D68;n'	146
Select printing position of human-readable information (HRI)	GS H <i>n</i> or X'1D48;n'	146
Select font for HRI	GS f <i>n</i> or X'1D66;n'	146
Print PDF417 Bar Code	GS P <i>data</i> NUL or X'1D;50;data;00'	147
Select PDF417 Error Correction Codewords Level	GS R <i>n</i> or X'1D;52;n1;n2'	147
Select Aspect Ratio PDF417 Bar Code	GS S <i>r;c</i> or X'1D;53;r;c'	148
Enable PDF417 Truncation	GS T <i>n</i> or X'1D;54;n'	148
<b>Print Character Commands</b>		
Print and line feed	LF or X'0A'	148
Print and line feed	CR or X'0D'	149
Print, form feed, and cut the paper (FF)	FF or X'0C'	149
Print and feed paper <i>n</i> lines	ESC d <i>n</i> or X'1B64;n'	149
Print and feed paper using minimum units	ESC J <i>n</i> X'1B4A;n'	149
<b>Print Graphic Messages</b>		
Select and print a graphics (logo) command	ESC * <i>d w h data</i> or X'1B2A;d;w;h;data'	150
Print predefined graphics (logo) command	GS / <i>m logo_num</i> or X'1D2F;m;logo_num'	151
Print predefined messages	GS ^ <i>message_num</i> or X'1D5E;message_num'	152.
<b>Miscellaneous Commands</b>		
Tab to next tab stop	HT or X'09'	152
Return home (select printhead location)	ESC < <i>n</i> or 1B3C;n	153
Paper cut/DI eject	ESC i or ESC m -- X'1B69' or X'1B;6D'	153
Generate drive pulse for cash drawer	ESC p <i>m n1 n2</i> or X'1B70;m;n1;n2'	153.
Retrieve the flash storage	ESC 4 <i>n1 n2</i> X'1B34;n1;n2'	154
Retrieve size of user flash storage	ESC 4 x '03 FF FF FF' or X'1B;34;03;FF;FF;FF'	154
Retrieve printer usage statistics	X'1B 51 xx'	154
<b>Asynchronous (Real-Time) Commands</b>		

updated March 18, 2002

Table 12. RS-232 Commands Organized by Function (continued)

Description	Command	Page
Real-time requests	DLE ENQ <i>n</i> or X'1005 <i>n</i> '	156
	<b>n</b> <b>Description</b>	
	<b>31</b> Release print buffer	
	<b>32</b> Cancel print buffer	
	<b>33</b> Undefined	
	<b>34</b> EC request; send status	
	<b>35</b> Undefined	
	<b>36</b> Undefined	
	<b>37</b> Undefined	
	<b>38</b> Undefined	
	<b>40</b> Reset printer	
	<b>41</b> Enable unsolicited status	
	<b>42</b> Disable unsolicited status	
<b>43</b> Disable transparent XON/XOFF		
<b>Data Buffer Management and Batch Printing</b>		
Reset line count	ESC 6 or X'1B36'	157
Disable line count	ESC 8 <i>n</i> or X'1B;38' <i>n</i>	157
Hold printing until buffer is released	ESC 7 or X'1B37'	157

## Alphabetized RS-232 Commands Summary

Table 13. RS-232 Commands in Alphabetical Order

Description	Command	Page
Align positions	ESC a <i>n</i> or X'1B61;n'	134
DBCS address vectors	ESC S <i>n</i> or X'1B53;n'	125
Disable line count	ESC 8 <i>n</i> or X'1B;38'n	157
Define document wait time	ESC f x y or X'1B66;x;y'	136
Download double-byte characters	ESC ( <i>s n data</i> or X'1B28;s;n;data'	117
Download graphics (logo) commands	GS * <i>logo_num n1 n2 data</i> or X'1D2A;logo_num;n1;n2;data'	109
Download user-defined characters	ESC & <i>s n m data</i> or X'1B26;s;n;m;data'	112
Enable PDF417 truncation	GS T <i>n</i> or X'1D;54;n'	148
Enable or disable the beeper	ESC BEL <i>n1 n2</i> or X'1B;07;n1;n2'	138
Enable or disable the feed buttons	ESC c 5 <i>n</i> X'1B;63;35;n'	138.
Enable or disable two-color printing	GS ; <i>n</i> or X'1D 3B <i>n'</i>	141
Enable or disable upside-down printing	ESC { <i>n</i> or X'1B 7B <i>n'</i>	139
Erase flash EPROM sector	ESC # <i>n</i> or X'1B23;n'	121
Exercise program	ESC x or X'1B;78'	107
Extended address command-request printer ID	GS   or X'1D49;01'	107
Fix font matrix	ESC : <i>n</i> or X'1B 3A <i>n'</i>	141
Flash storage write	ESC ' <i>n1 n2 data</i> or X'1B27;n1;n2;data'	121
Generate drive pulse for cash drawer	ESC p <i>m n1 n2</i> or X'1B70;m;n1;n2'	153
Hold printing until buffer is released	ESC 7 or X'1B37'	157
Microcode tolerance (MCT) information - loading	ESC M <i>n h l</i> or X'1B4D;n;h;l'	122
Microcode tolerance (MCT) information - request	ESC S <i>n</i> or X'1B53;n'	123
Paper cut/DI eject	ESC i or ESC m or X'1B69' or X'1B;6D'	153
Predefine messages	GS : <i>message_num data</i> GS : or X'1D3A;message_num;data;1D3A'	111
Print and feed paper <i>n</i> lines	ESC d <i>n</i> or X'1B64;n'	149
Print and feed paper using minimum units	ESC J <i>n</i> or X'1B4A;n'	149
Print and line feed	LF or X'0A'	148
Print and line feed	CR or X'0D'	149
Print bar code	GS k <i>n NUL</i> or X'1D6B;n;data;00'	142
Print logo inline	GS J <i>d n1 n2 data</i> or X'1D 4A d <i>n1 n2 data'</i>	141
Print PDF417 bar code	GS P <i>data NUL</i> or X'1D;50;data;00'	147
Print predefined graphics (logo) command	GS / <i>m logo_num</i> or X'1D2F;m;logo_num'	151
Print predefined messages	GS ^ <i>message_num</i> or X'1D5E;message_num'	152



Table 13. RS-232 Commands in Alphabetical Order (continued)

Description	Command	Page																										
Print, form feed, and cut the paper (FF)	FF or X'0C'	149																										
Proportional font	ESC & <i>s n m data</i> or X'1B;26;s;n;m;data'	114																										
Real-time requests	DLE ENQ <i>m</i> or X'1005n'  <table border="0" style="width: 100%;"> <tr> <td style="width: 5%;"><b>n</b></td> <td><b>Description</b></td> </tr> <tr> <td><b>31</b></td> <td>Release print buffer</td> </tr> <tr> <td><b>32</b></td> <td>Cancel print buffer</td> </tr> <tr> <td><b>33</b></td> <td>Undefined</td> </tr> <tr> <td><b>34</b></td> <td>EC request; send status</td> </tr> <tr> <td><b>35</b></td> <td>Undefined</td> </tr> <tr> <td><b>36</b></td> <td>Undefined</td> </tr> <tr> <td><b>37</b></td> <td>Undefined</td> </tr> <tr> <td><b>38</b></td> <td>Undefined</td> </tr> <tr> <td><b>40</b></td> <td>Reset printer</td> </tr> <tr> <td><b>41</b></td> <td>Enable unsolicited status</td> </tr> <tr> <td><b>42</b></td> <td>Disable unsolicited status</td> </tr> <tr> <td><b>43</b></td> <td>Disable transparent XON/XOFF</td> </tr> </table>	<b>n</b>	<b>Description</b>	<b>31</b>	Release print buffer	<b>32</b>	Cancel print buffer	<b>33</b>	Undefined	<b>34</b>	EC request; send status	<b>35</b>	Undefined	<b>36</b>	Undefined	<b>37</b>	Undefined	<b>38</b>	Undefined	<b>40</b>	Reset printer	<b>41</b>	Enable unsolicited status	<b>42</b>	Disable unsolicited status	<b>43</b>	Disable transparent XON/XOFF	156
<b>n</b>	<b>Description</b>																											
<b>31</b>	Release print buffer																											
<b>32</b>	Cancel print buffer																											
<b>33</b>	Undefined																											
<b>34</b>	EC request; send status																											
<b>35</b>	Undefined																											
<b>36</b>	Undefined																											
<b>37</b>	Undefined																											
<b>38</b>	Undefined																											
<b>40</b>	Reset printer																											
<b>41</b>	Enable unsolicited status																											
<b>42</b>	Disable unsolicited status																											
<b>43</b>	Disable transparent XON/XOFF																											
Reinitialize the printer	ESC @ or X'1B40'	137																										
Reset line count	ESC 6 or X'1B36'	157																										
Retrieve printer usage statistics	X'1B 51 xx'	154																										
Retrieve size of user flash storage	ESC 4 x '03 FF FF FF' or X'1B;34;03;FF;FF;FF'	154																										
Retrieve the flash storage	ESC 4 <i>n1 n2</i> or X'1B34;n1;n2'	154																										
Return home (select printhead location)	ESC < <i>n</i> or X'1B3C;n'	153																										
Select and print a graphics (logo) command	ESC * <i>d w h data</i> or X'1B2A;d;w;h;data'	150																										
Select aspect ratio PDF417 bar code	GS S <i>r;c</i> or X'1D;53;r;c'	148																										
Select bar code height	GS h <i>n</i> or X'1D68;n'	146																										
Select character for reprinted lines	ESC + <i>n</i> or X'1B2B;n'	137																										
Select character size for scaleable fonts	GS ! <i>n</i> or X'1D;21;n'	140																										
Select color printing	ESC r <i>n</i> or X'1B;72;n'	132																										
Select font for HRI	GS f <i>n</i> or X'1D66;n'	146																										
Select horizontal size of bar code	GS w <i>n</i> or X'1D77;n'	145																										
Select PDF417 ECC Level	GS R <i>n</i> or X'1D;52;n1;n2'	147																										
Select printing position of human-readable information (HRI)	GS H <i>n</i> or X'1D48;n'	146																										
Select user-defined or resident character sets	ESC % <i>n</i> or X'1B25;n'	129																										
Select 1/6-inch line spacing	ESC 2 or X'1B32'	131																										

Table 13. RS-232 Commands in Alphabetical Order (continued)

Description	Command	Page
Select 1/8-inch line spacing	ESC 1 or X'1B31'	131
Send checksum of flash EPROM sector	ESC " n or X'1B22;n'	122
Set code page	ESC t n or X'1B74;n'	129
Set error recovery function	ESC c 4 n or X'1B63;34;n'	135
Set horizontal tab positions	ESC D [n1 n2] NUL NUL or X'1B44[n1n2]0000'	133
Set inter-character spacing	ESC SP n or X'1B20;n'	129
Set inter-character spacing – DBCS	ESC T n or X'1B;52;n'	129
Set left margin position	ESC \$ n1 n2 or X'1B24;n1;n2'	133
Set line spacing using minimum units	ESC 3 n or X'1B33;n'	132
Set or cancel double-high mode	ESC h n or X'1B68;n'	127
Set or cancel double-wide mode	ESC W n or X'1B57;n'	126
Set or cancel emphasized printing	ESC G n or X'1B47;n'	128
Set or cancel high quality print mode	ESC / n or X'1B;2F;n'	128
Set or cancel invert mode	ESC H n or X'1B48;n'	127
Set or cancel overline mode	ESC x'5F' n or X'1B5F;n'	127
Set or cancel rotated character	ESC V n or X'1B56;n'	130
Set or cancel underline mode	ESC – n or X'1B2D;n'	127
Set or cancel unidirectional printing	ESC U n or X'1B55;n'	135
Set print mode	ESC ! n or X'1B21;n'	125
Set print station parameters	ESC c 1 n or X'1B63;31;n'	130
Set print station	ESC c 0 n or X'1B63;30;n'	128
Set relative position	ESC \ n1 n2 or X'1B5C;n1;n2'	134
Set sheet eject length	ESC C n or X'1B43;n'	133
Status request	ESC v or X'1B76'	107
Status sent to system	ESC ) n or X'1B29;n'	137
Tab to next tab stop	HT or X'09'	152
Thermal code page	MCT commands	113
Verify previous commands completed	X'1B;00;80;00'	107

## System Commands

### Exercise Program

**RS-232 Syntax:**

ESC x or X'1B;78'

**Purpose:**

This tests printing functions of the printer. A test message is printed. (See Figure 26 on page 57.) If there is a document in the printer, the test message prints on the document. Otherwise, it prints at the customer receipt station.

**Error Conditions:**

Home Error (on document station only)  
Cash Receipt Print Error

### Verify Previous Commands Completed

**RS-232 Syntax:**

X'1B;00;80;00'

**Purpose:**

This command can be used to ensure that all commands preceding it have been completed. The application would just wait for the status return with status byte 5, bit 1 set.

**Remarks:**

The printer status is returned in status bytes 1–8. Status byte 5, bit 1 is set after this request has been executed. See “Status Summary” on page 160 for more information.

**Error Conditions:**

None.

### Status Request

**RS-232 Syntax:**

ESC v or X'1B;76'

**Purpose:**

The printer status is sent to the system. This command will be processed in the order it was received.

**Remarks:**

The printer status is returned in status bytes 1–8. See “Status Summary” on page 160 for more information.

**Error Conditions:**

None.

### Extended Address Command – Request Printer ID

**RS-232 Syntax:**

GS | SOH or X'1D;49;01'

**Purpose:**

This will return 8 bytes of printer status plus 5 bytes of printer-specific information.

Status byte 5, bit 0 is set to 1 when responding to the extended address command. (See “Status Summary” on page 160.)

**where:**

**Byte 1**

Device type = 30

**Byte 2**

Device ID.

**00** Models T11 and T12 (impact DI/thermal CR)

**01** Models T13 and T14

**02** Models T15 and TG5, or Models T13 and T14 with 2-MB option

**03** Models TM6 and TF6 (512K; thermal CR)

**04** Models T13 and T14 with the 8-MB option

**05** Models TM6 and TF6 with the 8-MB option

**06** Reserved

**07** Models TF7 and TM7

**Byte 3**

Features.

**Bit 0** Set to 1 when MICR is present

**Bit 1** Set to 1 when check flipper is present

**Bit 2** Set to 1 when byte 2 is set to 02

**Bit 3** Set to 1 when printer is in XON/XOFF mode

**Bit 4** Set to 1 when printer is in DBCS mode

**Bit 5** Set to 1 when the 2-MB option is used for user flash memory, instead of being used for DBCS storage

**Bit 6** Set to 1 when the printer has capability of printing two colors.

**Bit 7** Set to 1 when the printer is in Model 4 emulation mode.

**Byte 4**

Second byte of features

**Bit 0** Set to 1 when printer is setup for 58-mm paper. (Only valid for models TF7 and TM7.)

**Byte 5**

EC level = EC level of loaded code

**Error Conditions:**

None.

**Remarks:**

This is an IMMEDIATE command.

## Preset or Onetime-Set Commands

The SureMark printer has commands to specialize and tune each printer to improve its usability, performance, and uniqueness. This flexibility is provided through the use of flash erasable programmable read-only memory (flash EPROM) and an electrically erasable programmable read-only memory (EEPROM). Data in these memory devices will stay valid until it is redefined. This information only needs to be defined once because it will remain for the life of the printer or until it is redefined.

To verify that data was previously stored in the printer, the system can request a checksum on data stored in each sector.

Flash EPROM has 5 sectors. To rewrite information in a sector, you must first erase the sector.

- For logo commands and predefined messages, erasing the sector is necessary only to replace a logo or predefined message number, or when the length of the logo or message exceeds space available in that sector.
- For user flash memory, erasing the sector is necessary only when writing to an address that has already been written to.
- For user-defined thermal and impact characters, new characters can be added if they have the same matrix as characters already in the character set. If new character sets are added, the flash memory does not have to be erased. To replace characters, you must first erase the sector.

### Sector Function

- |   |   |
|---|---|
| 1 | Download graphics (logo) commands   |
| 2 | Predefined (canned) messages  |
| 3 | Two user-defined impact character sets                                    |
| 4 | User-defined thermal character sets – four fixed matrix or 2 proportional |
| 5 | User flash memory   |
| 6 | DBCS character storage  |

The EEPROM stores microcode tolerances (MCT) values.

## Download Graphics (Logo) Commands

### RS-232 Syntax:

`GS * logo_num n1 n2 data or X'1D;2A;logo_num;n1;n2;data'`

### where:

#### logo\_num

The logo number being stored.

$1 \leq \text{logo\_num} \leq 40$

**n1** One-eighth the number of dots in the horizontal direction (width =  $8 \times n1$ ).

$1 \leq n1 \leq 72$  for a thermal logo.

$1 \leq n1 \leq 59$  for an impact logo.

**n2** One-eighth the number of dots in the vertical direction (height =  $8 \times n2$ ).

$1 \leq n2 \leq 255$  for a thermal logo.





1. X'1D3A06'
2. 'Welcome to Our Store' X'0D'
3. X'1D5E03' (This prints the message that has been stored at location 3. The message cannot have a X'1D5Exx' in it, because that would be more than one level of nesting.)
4. 'Is Your Cashier Today' X'0D'
5. X'1D3A'

Using the stored message and the above commands, the resulting text will be:

```
Welcome to Our Store
Jane Doe Is Your Cashier Today
```

- These commands **cannot** be included in the predefined message:
  - “Define Document Wait Time” on page 136.
  - “Select Character for Reprinted Lines” on page 137.
  - “Set Sheet Eject Length” on page 133.
  - “Select and Print a Graphics (Logo) Command” on page 150.
- This command should be sent only when the data buffer is empty. See the description of bit 6 in “Status Byte 2” on page 161.

**Error Conditions:**

Flash EPROM load error - Verify the sector was erased before downloading the messages.

Memory sector is full - This sector can store up 8 KB of message data. After that the sector is full.

## Download User-Defined Characters

**RS-232 Syntax:**

ESC & *s n m data* or X'1B26;s;n;m;data'

**where:**

- s** The character set being defined.
- |          |                                  |
|----------|----------------------------------|
| <b>1</b> | User-defined thermal code page 1 |
| <b>2</b> | User-defined thermal code page 2 |
| <b>3</b> | User-defined thermal code page 3 |
| <b>4</b> | User-defined thermal code page 4 |
| <b>5</b> | User-defined impact code page 1  |
| <b>6</b> | User-defined impact code page 2  |
- n** The beginning ASCII address of the characters being defined.
- m** The ending ASCII address of the characters being defined.
- data** The slice data for the defined characters. Note the number of bytes is determined by which code page is being defined and the character matrix of that code page.

**Purpose:**

To define a matrix pattern for user-definable code pages stored in flash EPROM.

**Remarks:**



- Once characters are downloaded to the printer, they remain valid until you redefine them. This is true even if power to the printer is removed.
- Before the characters are defined, the sector of the flash EPROM which stores this data must be erased. (See “Erase Flash EPROM Sector” on page 121.) Also, the character matrix for the code page must have already been defined. (See Table 15 on page 123, MCT# 3, 4, and 5.)
- Flash EPROM sector 4 contains all user-defined code pages for the thermal printhead. To redefine a code page, you must erase and reprogram all of them.
- Flash EPROM sector 3 contains both user-defined code pages for the impact printhead. To redefine a code page, you must erase and reprogram both of them.
- Thermal height must be even.
- There is no way to redefine one character only. You must redefine a whole code page.
- If the parameter **s**, **n**, or **m** is out of range, the command is discarded and the remaining data is processed as print data.
- This command should be sent only when the data buffer is empty. See the description of bit 6 in “Status Byte 2” on page 161.
- ASCII characters 0 through 31 are reserved for RS-232 functions and cannot be defined.

### Thermal Code Page

You define the character matrix for each code page with MCT #2, MCT #3, MCT #23, and MCT #24 for thermal code pages 1, 2, 3, and 4, respectively. See Table 15 on page 123.

The number of data bytes per character loaded is  $2 \times \text{the character height}$ . The total number of data bytes for this command is  $2 \times \text{the character height} \times (1+m-n)$ .

#### Example: 10 wide $\times$ 20 high

slice # row #	1	2	3	4	5	6	7	8	9	10	Data	bytes
1	X	X	.	.	.	.	.	.	X	X	1	2
2	X	X	.	.	.	.	.	.	X	X	3	4
3	X	X	.	.	.	.	.	.	X	X	5	6
4	X	X	.	.	.	.	.	.	X	X	7	8
5	X	X	.	.	.	.	.	.	X	X	9	10
6	X	X	.	.	.	.	.	.	X	X	11	12
7	X	X	.	.	.	.	.	.	X	X	13	14
8	X	X	.	.	.	.	.	.	X	X	15	16
9	X	X	X	X	X	X	X	X	X	X	17	18
10	X	X	X	X	X	X	X	X	X	X	19	20
11	X	X	X	X	X	X	X	X	X	X	21	22
12	X	X	.	.	.	.	.	.	X	X	23	24
13	X	X	.	.	.	.	.	.	X	X	25	26
14	X	X	.	.	.	.	.	.	X	X	27	28
15	X	X	.	.	.	.	.	.	X	X	29	30
16	X	X	.	.	.	.	.	.	X	X	31	32
17	X	X	.	.	.	.	.	.	X	X	33	34
18	X	X	.	.	.	.	.	.	X	X	35	36
19	X	X	.	.	.	.	.	.	X	X	37	38
20	X	X	.	.	.	.	.	.	X	X	39	40

Bit #  $\rightarrow$  (MSB) 7 6 5 4 3 2 1 0 7 6 (LSB)

**Defined as:**

```
X'1B26014848 C0C0C0C0C0C0C0C0C0C0C0C0C0C0C0FFFC0FFFC0F
C0C0C0C0C0C0C0C0C0C0C0C0C0C0C0C0C0'
```

The above statement defines character X'48' as an 'H'.

**Note:** The number of data bytes = 2 × dot height (20) = 40 bytes.

**Proportional Font****RS-232 Syntax:**

```
ESC & s n m data or X'1B;26;s;n;m;data'
```

**where:**

- s** The character set being defined.
  - 1** User-defined thermal code page 1.
  - 3** User-defined thermal code page 3.
- n** The beginning ASCII address of the characters being defined.
- m** The ending ASCII address of the characters being defined.
- data** The height and width of the character, and the matrix pattern for the data. The number of data bytes is  $(m-n+1) \times (2+wb \times 32)$ . *wb* is defined in the MCT command.

**Purpose:**

To download and print proportional fonts (True Type fonts) in the thermal station. Each character in the code page has its own unique width and height. The matrix must be within the following ranges:

**Width**  $8 \leq \text{width} \leq 32$

**Height**  
 $8 \leq \text{width} \leq 32$

**Remarks:**

- Proportional and standard fonts may be used on the same line. If both types of fonts are used on a line, you would probably use proportional fonts for the description and resident fonts for the amounts.
- For alignment, a command that will allow right and left alignment on the same line may be used. This will allow the user to align a column (decimal point) on the right, and still be left-aligned. (See “Align Positions” on page 134.)
- Once characters are downloaded to the printer, they remain valid until you redefine them. This is true even if power to the printer is removed.
- Before the characters are defined, the sector of the flash EPROM which stores this data must be erased. (See “Erase Flash EPROM Sector” on page 121.)
- There is no way to redefine one character only. You must redefine a whole code page.
- If the parameter **s**, **n**, or **m** is out of range, the command is discarded and the remaining data is processed as print data.
- This command should be sent only when the data buffer is empty. See the description of bit 6 in “Status Byte 2” on page 161.



		row #
0000111100000000	0F00	1
0001111110000000	1F80	2
0011111111000000	3FC0	3
0111000011100000	70E0	4
0110000001100000	6060	5
1100000000110000	C030	6
1100000000110000	C030	7
1100000000110000	C030	8
1100000000110000	C030	9
1100000000110000	C030	10
1100000000110000	C030	11
1100000000110000	C030	12
1111111111110000	FFF0	13
1111111111110000	FFF0	14
1100000000110000	C030	15
1100000000110000	C030	16
1100000000110000	C030	17
1100000000110000	C030	18
1100000000110000	C030	19
1100000000110000	C030	20
1100000000110000	C030	21
1100000000110000	C030	22
0000000000000000	0000	23
0000000000000000	0000	24
0000000000000000	0000	25
0000000000000000	0000	26
0000000000000000	0000	27
0000000000000000	0000	28
0000000000000000	0000	29
0000000000000000	0000	30
0000000000000000	0000	31
0000000000000000	0000	32

Figure 42. Proportional Font Example

## Impact Code Page

You define the character matrix for each code page with MCT #4 for impact code page 1 and MCT #5 for impact code page 2. See Table 15 on page 123.

If the matrix defines the characters as 9 dots high or less, a print line will be printed in one pass of the printhead. When the matrix is defined as greater than 9 dots high, it takes two passes of the printhead per print line.

Landscape printing is limited to characters with a height of 9 dots or less. If user-defined characters are to be used in landscape print mode, they must be less than 10 dots high.

The number of data bytes per character loaded is  $2 \times \text{character width}$ . The total number of data bytes for this command is  $2 \times \text{character width} \times (1+m-n)$ . Each slice is defined with two bytes; the most significant bit (MSB) of each slice is the bottom of the character.

When defining wire patterns, the same wire does *not* fire in consecutive, primary (P) and secondary (S) positions. (The printer does not check for errors in defining the character.) If the character is defined with dots in consecutive positions only one of the dots is fired.)

**Example: 11 half-dots wide (or 5.5 full dots) × 9 high**

slice # →	1		2		3		4		5		6
Bit # ↓	P	S	P	S	P	S	P	S	P	S	P
7 (MSB)	.	.	.	.	.	X	.	.	.	.	.
0 (LSB)	.	.	.	.	X	.	X	.	.	.	.
1	.	.	.	X	.	.	.	X	.	.	.
2	.	.	X	.	.	.	.	.	X	.	.
3	.	X	.	.	.	.	.	.	.	X	.
4	X	.	X	.	X	.	X	.	X	.	X
5	X	.	.	.	.	.	.	.	.	.	X
6	X	.	.	.	.	.	.	.	.	.	X
7 (MSB)	X	.	.	.	.	.	.	.	.	.	X
Data Byte	2	4	6	8	10	12	14	16	18	20	22
Data Byte	1	3	5	7	9	11	13	15	17	19	21

**Defined as:**

X'1B26034141FO00080014000200110000081100020014000800F000'

The above statement defines character X'41' as an 'A'.

**Note:** The number of data bytes = 2 × dot width (11) = 22 bytes.

**Error Conditions:**

Flash EPROM load error - Verify the sector was erased before downloading images.

## Download Double-Byte Characters

**RS-232 Syntax:**

ESC ( s n data or X'1B;28;s;n;data'

**where:**

- s** The character set being defined.
  - 0** Character set for the thermal station (must be 24x24 matrix)
  - 1** Character set for the impact station (must be either 16x16 matrix or 9x16 matrix)
- n** The number of characters being downloaded.
- data** The address of the character being loaded (2 bytes) followed by the character data.
  - For the impact station, there are 32 bytes per character – 2 bytes for each slice (dot wide). The total number of data bytes = n \* 34.
  - For the thermal station, there are 72 bytes per character – 3 bytes for each row (dot high). The total number of data bytes = n \* 74.

**Purpose:**

To define a matrix pattern for double-byte characters stored in the flash EPROM.

**Remarks:**

- Once the characters are downloaded to the printer, they will remain valid until the user redefines them. This is true even if you power off the printer.

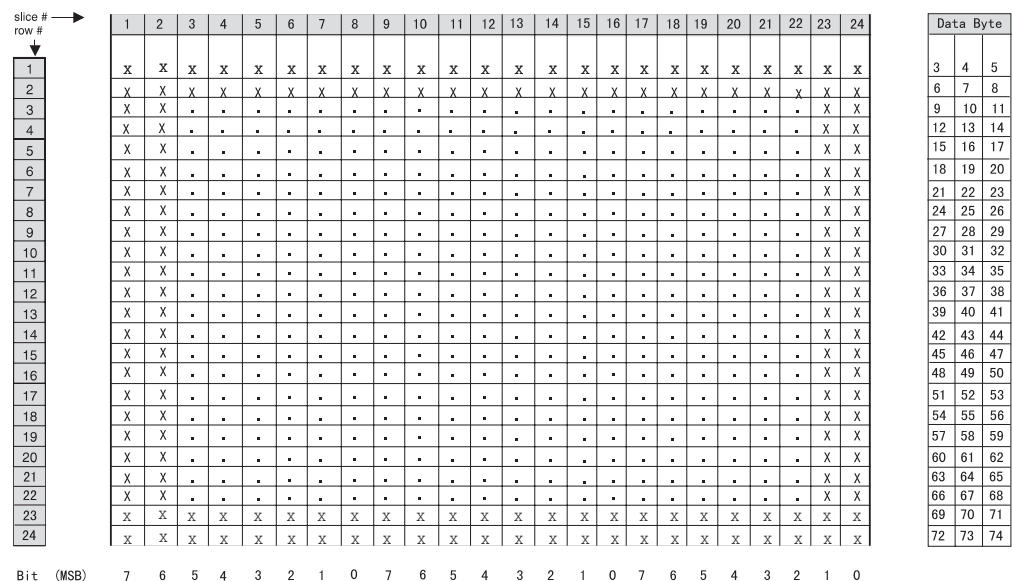
- You must erase the sector of the flash EPROM where this data is stored before you define the characters. (See “Erase Flash EPROM Sector” on page 121.) You must also predefine the character matrix for the impact DBCS code. (See “Microcode Tolerance (MCT) Information - Request” on page 123.)
- The flash EPROM sector 6 contains the double-byte character set for both the thermal and impact printheads. To redefine a character for an address that is already downloaded, you must erase and reprogram all double-byte characters.
- To define a character for an address that is not yet downloaded, you can download a character using this command.
- The inter-character spacing should not be included in the character matrix – it is set by a different command.
- The address range that can be defined is shown in Table 14.

Table 14. Address Ranges for DBCS Code Pages

Code Page	Address Range	Total Characters
932 – Japan	First byte: F0–F9; second byte: 40–7E, 80–FC (for example: F040–F07E, F080–F0FC, ... F940–F97E, F980–F9FC)	1880
949 – Korea	C9A1–C9FE, FEA1–FEFE	188
950 – Traditional Chinese	FA40–FA7E, FAA1–FAFE	157
1381 – Simplified Chinese	First byte: 8D–A0; second byte: A1–FE (for example: 8DA1–8DFE, 8EA1–8EFE, ... A0A1–A0FE)	1880

### Thermal Printhead (s=0)

The height and width of these characters are always 24 dots = 3 mm. The first two data bytes specify the address of the character being defined. Starting from the third data byte, the data bytes contain the character matrix information consisting of three bytes per row for 24 rows.



**For example:**

Data that defines a character at X'8141' as a large box is:  
X'1B;28;00;01;81;41;FF;FF;FF;FF;FF;FF;  
C0;00;03;C0;00;03;C0;00;03;C0;00;03;C0;00;03;C0;00;03;  
C0;00;03;C0;00;03;C0;00;03;C0;00;03;C0;00;03;C0;00;03;  
C0;00;03;C0;00;03;C0;00;03;C0;00;03;C0;00;03;C0;00;03;  
C0;00;03;C0;00;03;FF;FF;FF;FF;FF;FF'

**Impact Printhead (s=1)**

The width of these characters is always 16. However, the height of the impact printhead, which is defined by MCT #1 (see "Microcode Tolerance (MCT) Information - Request" on page 123), is defined as 9 or 16.

The first two data bytes specify the address of the character being defined. Starting from the third data byte, the data bytes contain the slice information. Each slice contains two data bytes.

The printer does not check the height of the downloaded character at the time of the image download.

**Example of 9 x 16 printing:**

When the code page is set for the 9x16 matrix:

- The characters are printed in one pass of the printhead.
- The characters **must** follow the rules of the impact printhead; the same wire cannot fire in consecutive positions; primary (P) and secondary (S). The printer will not check for character definition errors. If the character is defined with dots in consecutive positions, only one of the dots will be fired.
- The height of these characters is 2.2 mm. The width of the characters is 2.7 mm when printed at 150 half-dots per inch (15 cpi), and 3.4 mm when printed at 120 half-dots per inch (12 cpi).

In the tables below:

- 0** The "don't care" dot positions whose data will **not** be printed.
- .** The position where the dot will **not** be printed.
- X** The position where the dot will be printed.

Slice # Bit #	1		2		3		4		5		6		7		8	
	P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S
0 (LSB)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 (MSB)	.	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X
0 (LSB)	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X	.
1	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X
2	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
3	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X
4	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
5	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X
6	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X	.
7 (MSB)	.	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X
Date Byte	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Date Byte	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33

**For example:**

Data that defines a character at X'8141' as a large box is:  
X'1B;28;01;01;81;41;55;00;AA;80;41;00;  
80;80;41;00;80;80;41;00;80;80;41;00;80;80;41;00;80;80;41;00;  
80;80;55;00;AA;80'

**Example of 16 x 16 printing:**

When the code page is set for the 16x16 matrix:

- A character is printed in two passes of the printhead. The top 8 rows are printed on the first pass of the printhead and the bottom 8 rows are printed on the second pass for bi-directional printing.
- The printer prints these characters only at the primary positions of the impact print head. The secondary positions will be left blank.
- The height of these characters is 4 mm. The width of the characters is 5.4 mm when printed at 150 half-dots per inch (15 cpi), and 6.8 mm when printed at 120 half-dots per inch (12 cpi).
- Landscape printing is not allowed.

**For example:**

Data that defines a character at X'8141' as a large box is:  
X'1B;28;01;01;81;41;FF;FF;FF;FF; C0;03;C0;03;C0;03;C0;03;C0;03;C0;03;  
C0;03;C0;03;C0;03;C0;03;C0;03;C0;03;FF;FF;FF;FF'



slice # row #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
4	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
5	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
6	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
7	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
8	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
9	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
10	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
11	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
12	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
13	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
14	X	X	.	.	.	.	.	.	.	.	.	.	.	.	X	X
15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Date Byte	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Date Byte	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33

## Flash Storage Write

### RS-232 Syntax:

ESC ' m add data or X'1B;27;m;add;data'

### where:

**m** = number of data bytes to store

**Add** = 3-byte address where data bytes are to be stored

### Error Conditions:

Flash EPROM load error - Verify the sector was erased before downloading images.

### Remarks:

The valid address range for each SureMark depends on the model number and which memory option, if any, is installed. Use "Retrieve Size of User Flash Storage" on page 154 to determine the valid range for your printer.

The command is rejected when the address is out of range.

The flash EPROM is guaranteed for a minimum life of 100,000 write/erase commands by the Flash manufacturer.

## Erase Flash EPROM Sector

### RS-232 Syntax:

ESC # n or X'1B;23;n'

### where:

n =

**01** Sector 1 - downloaded graphics

**02** Sector 2 - predefined messages

**03** Sector 3 - user-defined impact character set

**04** Sector 4 - user-defined thermal character sets

- 05 Sector 5 - flash storage
- 06 Sector 6 - DBCS character storage
- 07 - FF  
Reserved

**Purpose:**

To erase the flash EPROM before downloading the data into the printer.

**Remarks:**

The command should only be sent to the printer when the buffer is empty (status byte 2, bit 6). No other commands should be sent until this command is complete.

Status byte 3, bit 7 (command complete bit) is set to show erasing is finished and the command is complete.

The flash EPROM is guaranteed for a minimum life of 100,000 write/erase commands by the Flash manufacturer.

## Send Checksum of Flash EPROM Sector

**RS-232 Syntax:**

ESC " *n* or X'1B;22;*n*'

**where:**

*n* =

- 01 Sector 1 - downloaded graphics
- 02 Sector 2 - predefined messages
- 03 Sector 3 - user-defined impact character set
- 04 Sector 4 - user-defined thermal character sets
- 05 Sector 5 - flash storage
- 06 Thermal double-byte character sets
- 07 Impact double-byte character sets

**Purpose:**

To verify data integrity of the data loaded in the flash EPROM in the printer. A 2-byte checksum is returned.

## Microcode Tolerance (MCT) Information - Loading

**RS-232 Syntax:**

ESC M *n h l* or X'1B;4D;*n*;*h*;*l*'

**where:**

- n** Microcode tolerance (MCT) that is being adjusted
- h** The high-order byte of MCT data
- l** The low-order byte of MCT data

**Purpose:**

The microcode tolerance (MCT) information is used to make adjustments to the printer's microcode. MCT data is nonvolatile data stored in the printer EPROM that is specific to a printer. For example, an MCT parameter can be defined to adjust for mechanical tolerances which cause a print line to not be centered on a receipt. Another would be for adjusting for the number of motor steps to the first print position on a document. This data remains intact until changed by the user.

**Remarks:**

Table 15 lists the MCT values by the parameter (n). The table includes the default, the minimum, and the maximum values of each MCT.

If you try to set an MCT value out of its defined range, it is set to the closest limit (the minimum or maximum value) or rejected.

**Error Conditions:**

EPROM load error

## Microcode Tolerance (MCT) Information - Request

**RS-232 Syntax:**

ESC S *n* or X'1B;53;*n*'

**where:**

- n** Microcode tolerance (MCT) information that is being requested

**Purpose:**

To enable reading microcode tolerance (MCT) information from EEPROM.

**Remarks:**

- MCT data is sent over the serial line in status bytes 9 and 10. See Table 15 for the values of parameter *n*.
- MCT write command values that are out of range cause the command to be rejected. (See bit 7 of "Status Byte 1" on page 160.)

Table 15. MCT Command Definitions

DEC	HEX	MCT	Default	Min	Max
1	1	DBCS code page  <b>Byte 1:</b> Reserved, set to X'FF' <b>Byte 2:</b> Matrix for the impact code page <ul style="list-style-type: none"> <li>• 0 = 16 x 16 code page</li> <li>• 1 = 9 x 19 code page</li> </ul>	X'FF00'	X'FF00'	X'FF01'
2	2	Matrix of user-defined thermal code page 1  <b>Byte 1:</b> Dot row width <b>Byte 2:</b> Dot row height	X'0A14'  (10x20)	X'0810'	X'1020'  (16x32)

Table 15. MCT Command Definitions (continued)

DEC	HEX	MCT	Default	Min	Max
3	3	Matrix of user-defined thermal code page 2 <b>Byte 1:</b> Dot row width <b>Byte 2:</b> Dot row height	X'0A14' (10x20)	X'0810'	X'1020' (16x32)
4	4	Matrix of user-defined impact code page 1 <b>Byte 1:</b> Half-dot row width <b>Byte 2:</b> Dot row height	X'0707' (07x07)	X'0404'	X'1010' (16x16)
5	5	Matrix of user-defined impact code page 2 <b>Byte 1:</b> Half-dot row width <b>Byte 2:</b> Dot row height	X'0707' (07x07)	X'0404'	X'1010' (16x16)
6-22	6-16	Reserved - <b>IMPORTANT: Changing these values might damage the printer.</b>			
23	17	Matrix of user-defined thermal code page 3 <b>Byte 1:</b> Dot row width <b>Byte 2:</b> Dot row height	X'0A14' (10x20)	X'0810'	X'1020' (16x32)
24	19	Matrix of user-defined thermal code page 4 <b>Byte 1:</b> Dot row width <b>Byte 2:</b> Dot row height	X'0A14' (10x20)	X'0810'	X'1020' (16x32)
30	1E	RS-232 options <b>Bit 13:</b> (DI portrait mode only) <ul style="list-style-type: none"> <li>• 1 = Line feeds NOT executed until DI ready. (Epson Mode)</li> <li>• 0 = Line feeds are executed without regard for the state of DI ready. (IBM mode)</li> </ul> <b>Bit 14:</b> <ul style="list-style-type: none"> <li>• 1 = Normal operations</li> <li>• 0 = Switch order of font A/B</li> </ul> <b>Bit 15:</b> <ul style="list-style-type: none"> <li>• 0 = Disable CR, 0D hex in CR station. No line feeds in DI.</li> <li>• 1 = Normal operations.</li> </ul>	X'FFFF'	N/A	N/A
31-50	1F-32	Reserved - <b>IMPORTANT: Changing these values might damage the printer.</b>			
51	33	DBCS address vector 1	X'80FF'	X'0000'	X'FFFF'
52	34	DBCS address vector 2	X'0000'	X'0000'	X'FFFF'
53	35	DBCS address vector 3	X'0000'	X'0000'	X'FFFF'
54-127	36-FF	Reserved - <b>IMPORTANT: Changing these values might damage the printer.</b>			

## DBCS Address Vectors

### RS-232 Syntax:

ESC S *n* or X'1B;53;*n*'

### where:

- n** Specifies the DBCS address vector.
- 33 for address vector 1
  - 34 for address vector 2
  - 35 for address vector 3

### Purpose:

To determine the address ranges that are assumed for the DBCS and SBCS code pages.

### Remarks:

- The DBCS address vector value is sent over the serial line in status bytes 9 and 10.
- The vector ranges should be stored in the printer at the time of download.
- All ranges are for DBCS addresses. SBCS addresses are assumed to be those outside the defined vector ranges.
- The unused vector ranges are set to 00,00.

### Example:

Assume there will be 2 vector ranges required: 82–9F and E9–FC. An example of how print data is interpreted follows.

### Hex data sent:

"89;30;E9;A0;A0;40;41;82;41;0A"

### Interpreted as:

- 8930 from the DBCS code page
- E9A0 from the DBCS code page
- A0, 40, and 41 from the SBCS code page
- 8241 from the DBCS code page
- 0A is an end of line and line feed command.

## Setup Commands

Setup commands change character font, inter-character spacing, and the target print station.

## Set Print Mode

### RS-232 Syntax:

ESC ! *n* or X'1B;21;*n*'

### where:

- n** Specifies print characteristics, such as user-defined thermal and impact code pages.

Bit # ↓	Function	Bit=0	Bit=1	Thermal	Impact
LSB 0	Char/Page 0	See Below	See Below	yes	yes
1	Char/Page 1	See Below	See Below	yes	yes
2	Overline	Cancel	Set	yes	no
3	Emphasized	Cancel	Set	yes	yes

Bit # ↓ Function	Bit=0	Bit=1	Thermal	Impact
4 Double-high	Cancel	Set	yes	yes
5 Double-wide	Cancel	Set	yes	yes
6 Inverted Mode	Cancel	Set	yes	no
MSB 7 Underlined	Cancel	Set	yes	no

Table 16. Fonts for Models T15, TG5, TF7, and TM7

Bit 0	Bit 1	User-Defined Thermal Code Page	User-Defined Impact Code Page @ Density	Resident Thermal	Resident Impact
0	0	Code Page 1	Code Page 1 @ 150 half-dots per inch	Font A	Font A
1	0	Code Page 2	Code Page 1 @ 120 half-dots per inch	Font B	Font B
0	1	Code Page 3	Code Page 2 @ 150 half-dots per inch	Font C	Font A
1	1	Code Page 4	Code Page 2 @ 120 half-dots per inch	Reserved	Font B

**Default:**

n = 00

**Remarks:**

- For thermal printing with resident character sets:  
 Font A = 10-dots (wide) × 20 dots (high) or 1.25 mm × 2.5 mm  
 Font B = 12-dots (wide) × 24 dots (high) or 1.5 mm × 3.0 mm  
 Font C = 8-dots (wide) × 16 dots (high) or 1.0 mm × 2.0 mm
- For impact printing:  
 Font A = dot density of 150 half-dots per inch (resident characters = 1.2 mm × 2.5 mm).  
 Font B = dot density of 120 half-dots per inch (resident characters = 1.5 mm × 2.5 mm).  
 Emphasized printing enable and disable, and font A or font B selection must be at the beginning of a print line to be recognized.  
 User-defined characters greater than 9 dots high cannot be printed double high in landscape mode.  
 Double-high and emphasized characters are not valid in landscape mode.
- Invert cannot be used with overline or underline.
- See “Character Fonts” on page 93, “Download User-Defined Characters” on page 112, “Set Print Station” on page 128, and “Select User-Defined or Resident Character Sets” on page 129 for related information.

**Example:**

Print mode set to font B, emphasized and underlined enabled (n = 89 hex).

## Set or Cancel Double-Wide Mode

**RS-232 Syntax:**

ESC W n or X'1B;57;n'

**where:**

n=00 Cancel double-wide mode

**n=01** Set double-wide mode

**Default:**

n = 00

## Set or Cancel Double-High Mode

**RS-232 Syntax:**

ESC h *n* or X'1B;68;*n*'

**where:**

**n=00** Cancel double-high mode

**n=01** Set double-high mode

**Default:**

n = 00

**Purpose:**

For better print quality with double-high characters in the document station.

**Remarks:**

See "Set or Cancel Unidirectional Printing" on page 135.

## Set or Cancel Underline Mode

**RS-232 Syntax:**

ESC - *n* or X'1B;2D;*n*'

**where:**

**n=00** Cancel underline mode

**n=01** Set underline mode

**Default:**

n = 00

**Remarks:**

This is valid in the customer receipt station only.

## Set or Cancel Overline Mode

**RS-232 Syntax:**

ESC x'5F' *n* or X'1B;5F;*n*'

**where:**

**n=00** Cancel overline mode

**n=01** Set overline mode

**Default:**

n = 00

**Remarks:**

This is valid in the customer receipt station only.

## Set or Cancel Invert Mode

**RS-232 Syntax:**

ESC H *n* or X'1B;48;*n*'

**where:**

**n=00** Cancel Invert Mode

**n=01** Set Invert Mode

**Default:**

n = 00

**Remarks:**

This is valid in the customer receipt station only.

## Set or Cancel Emphasized Printing

**RS-232 Syntax:**

ESC G *n* or X'1B;47;n'

**where:**

**n=00** Cancel Emphasized Mode

**n=01** Set Emphasized Mode

**Default:**

n = 00

**Remarks:**

This must be at the beginning of a print-line in the document portrait station. It is enabled for the entire line.

## Set or Cancel High Quality Print Mode

**RS-485 Syntax:**

X'1B;2F;n'

**RS-232 Syntax:**

ESC *n* or X'1B;2F;n'

**where:**

**n=00** Cancel high quality mode

**n=01** Set high quality mode

**Default:**

n = 00

**Remarks:**

When high quality mode is set, the printing will slow down to one-half speed in the cash receipt station. The slower speed increases the quality of the printing.

## Set Print Station

**RS-232 Syntax:**

ESC c 0 *n* or X'1B;6330;n'

**where:**

**n** Specifies the print station.

Bit # ↓ Station

LSB 0 Reserved

1 Customer Receipt Station

2 Document Station - Portrait Mode

3 Document Station - Landscape Mode



- 4 Reserved
- 5 Reserved
- 6 Reserved
- 7 Reserved

**Default:**

n = 02

**Remarks:**

See “Document Handling” on page 157.

Only one station can be set at a time. If you select more than one station, the command is ignored.

## Select User-Defined or Resident Character Sets

**RS-232 Syntax:**

ESC % n or X'1B;25;n'

**where:**

**n=00** Select resident character sets

**n=01** Select user-defined character sets

**Default:**

n = 00

**Remarks:**

See “Character Fonts” on page 93 and “Download User-Defined Characters” on page 112.

## Set Code Page

**RS-232 Syntax:**

ESC t n or X'1B;74;n'

**where:**

**n=00** Code Page 437 - United States

**n=01** Code Page 858 - Multilingual

**n=02** Code Page 863 - Canadian-French

**n=03** Code Page 860 - Portugal

**n=04** Code Page 865 - Norway

**n=05** Printer's Generic Code Page

**Default:**

n = 01

**Remarks:**

Changing code pages is valid only for resident single-byte character sets. Double-byte character sets must be downloaded. If user-defined character sets are enabled, this command will not do anything.

## Set Inter-Character Spacing

**RS-232 Syntax:**

ESC SP n or X'1B20;n'

**where:**

**n** The number of dot-spaces in the thermal print station or half-dot spaces in the impact print station.

**Default:**

n = 03

**Maximum:**

n = 08

**Remarks:**

If you select double-width printing, the space to the right of each character is doubled.

## Set Inter-Character Spacing – DBCS

**RS-232 Syntax:**

ESC T n or X'1B;52;n'

**where:**

**n** The number of dot-spaces in the thermal print station or half-dot spaces in the impact print station.

**Default:**

n = 06

**Maximum:**

n = 20 hex (32 decimal)

**Remarks:**

If you select double-width printing, the spacing on the right side of each character is doubled.

## Set or Cancel Rotated Characters

**RS-232 Syntax:**

ESC V n or X'1B56;n'

**where:**

**n=00** Cancel Rotated Characters

**n=01** Set Rotated Character

**n=02** Code Page 863 - Canadian-French

**Default:**

n = 00

**Remarks:**

Rotation is 90 degrees clockwise. This command is supported only in the thermal print station.

## Set Print Station Parameters

**RS-232 Syntax:**

ESC c 1 n or X'1B6331;n'

**where:**

**n** Specifies the print station.

Bit # ↓ Station

- LSB 0 Reserved
- 1 Customer Receipt Station
- 2 Document Station - Portrait Mode
- 3 Document Station - Landscape Mode
- 4 Reserved
- 5 Reserved
- 6 Reserved
- 7 Reserved

**Purpose:**

This command is used for setting the line spacing, margins, and tabs.

**Remarks:**

More than one station can be selected at the same time if the settings are common to all of the selected stations.

**Default:**

n = 02 (customer receipt station)

## Select 1/8-Inch Line Spacing

**RS-232 Syntax:**

ESC 1 or X'1B31'

**Remarks:**

In the thermal (receipt) station this would set line feeding to 25 steps/line.

In the impact (document - portrait) station this would be set to 6 steps/line.

In the impact (document - landscape) station this would be set to 16 steps/line.

This command should be sent after "Set Print Station Parameters" on page 130.

**Note:** For DI portrait printing, characters having a height of more than 9 dots (DBCS 16x16 dots) require a two-pass print, with paper fed in-between the lines (4 steps). The actual lines-per-inch will be adjusted. For example, if the printer is set to 1/6-inch line spacing, the printer will line feed 8 steps in-between each line, and the 4 steps inside of the line. The result is 10 steps per line or 4 lines per inch.

## Select 1/6-Inch Line Spacing

**RS-232 Syntax:**

ESC 2 or X'1B32'

**Remarks:**

In the thermal (receipt) station this would set line feeding to 34 steps/line.

In the impact (document - portrait) station this would be set to 8 steps/line.

In the impact (document - landscape) station this would be set to 21 steps/line.

This command should be sent after "Set Print Station Parameters" on page 130.

**Note:** For DI portrait printing, characters having a height of more than 9 dots (DBCS 16x16 dots) require a two-pass print, with paper fed

in-between the lines (4 steps). The actual lines-per-inch will be adjusted. For example, if the printer is set to 1/6-inch line spacing, the printer will line feed 8 steps in-between each line, and the 4 steps inside of the line. The result is 12 steps per line or 4 lines per inch.

## Select Color Printing

### RS-232 Syntax:

ESC r *n* or X'1B;72;*n*;

### where:

**n** =

- |           |                                      |
|-----------|--------------------------------------|
| <b>00</b> | Cancel color printing                |
| <b>01</b> | Enable full-character color printing |
| <b>02</b> | Enable half-character color printing |

### Default:

n = 00

### Purpose:

To enable half-character or full-character color printing, or to disable color printing.

### Remarks:

- You can enable and disable full-character color printing within a print line. This enables you to print one word in a different color.
- This command can be used up to 8 times in a line when full-character color printing is used.
- Half-character color printing is only supported at the beginning of a print line.
- If both bit 1 and bit 0 of *n* are set (n=03), only half-character color printing will be enabled.

### Limitations:

- This command is only valid if the Enable Color Printing command (see "Enable or Disable Two-Color Printing" on page 141) is sent first.
- When color paper is enabled, depending on the paper, the printer might be limited to printing at 15 lps when printing 8 lpi.

## Set Line Spacing Using Minimum Units

### RS-232 Syntax:

ESC 3 *n* or X'1B33;*n*;

### where:

**n** Specifies line feed steps.

In the customer receipt station, 1 inch = 204 steps and 1 mm = 8 steps. Thermal must be an even number.

In the document portrait station, 1 inch = 48 steps and 1 mm = 1.9 steps.

In the document landscape station, 1 inch = 127 steps and 1 mm = 5 steps.

## Set Sheet Eject Length

**RS-232 Syntax:**

ESC C *n* or X'1B43;*n*'

**where:**

**n** Specifies the number of line feed steps using minimum units moved when a *FF* is sent in the receipt station.

In the document station, an eject will feed until the document has exited the lower document sensors - this length is not used.

**Default:**

*n* = X'A0' (160 decimal)

**Maximum:**

255 steps (X'FF')

This value is stored in the EEPROM in the printer so that it is not lost when the printer is reset.

## Set Horizontal Tab Positions

**RS-232 Syntax:**

ESC D [*n1 n2*] NUL NUL or X'1B44[*n1n2*]0000'

**where:**

**n1** The high-order-byte dot offset for the horizontal tab.

**n2** The low-order-byte dot offset for the horizontal tab.

**Default:**

There is a tab every 100 dots.

**Remarks:**

This command should be sent after "Set Print Station Parameters" on page 130.

Up to 5 tab positions can be stored. All 5 *n1 n2* value pairs can be included in one command. Values must be entered in hex.

A tab is calculated from the left margin position.

Tab values must be in ascending order.

Example: To set 3 tab positions - at the 100, 150 and 300 dot positions:

- X'1B4400640096012C0000'

See "Tab to Next Tab Stop" on page 152.

## Set Left Margin Position

**RS-232 Syntax:**

ESC \$ *n1 n2* or X'1B24;*n1;n2*'

**where:**

**n1** The high-order byte of the dot offset from the beginning of the print line.

**n2** The low-order byte of the dot offset from the beginning of the print line.

**Default:**

$n1 = 0, n2 = 0$

**Remarks:**

In the customer receipt station, 1 mm = 8 dots.

In the document station, 1 inch = 150 half-dots (75 dots).

$n1$  and  $n2$  are hex values. Use this formula to get the decimal equivalent:  
 $(n1 \times 256) + n2$ .

If the number exceeds the printable area, it is ignored.

The maximum value for the customer receipt station is 576. The maximum value for the document insert station is 474.

In the customer receipt station, this number is rounded back to a factor of 8.

This command should be sent after "Set Print Station Parameters" on page 130.

## Set Relative Position

**RS-232 Syntax:**

ESC <5C>h  $n1$   $n2$  or X'1B5C; $n1$ ; $n2$ '

**where:**

**n1** The high-order byte of the dot offset from the left margin.

**n2** The low-order byte of the dot offset from the left margin.

**Default:**

$n1 = 0, n2 = 0$

**Remarks:**

In the thermal station, 1 mm = 8 dots.

In the impact station, 1 in. = 75-dots (150 half-dots).

$n1$  and  $n2$  are hex values. Use this formula to get the decimal equivalent:  
 $(n2 \times 256) + n1$

To move the position to the left, use a negative number.

Example: *To move N dots to the right*  $\Rightarrow 65536 - N$ .

If this number plus the left margin exceeds the printable area it is ignored.

See "Set Left Margin Position" on page 133.

In the customer receipt station, this number is rounded back to a factor of 8.

## Align Positions

**RS-232 Syntax:**

ESC a  $n$  or X'1B61; $n$ '

**where:**

**n=00** Align Left

**n=01** Align Center

**n=02** Align Right

## 04 Align Column Right

### Default:

n = 00

### Remarks:

- Values 00, 01, and 02 are only valid at the beginning of a line.
- Tabs are only valid when printing is aligned to the left. If tabs are used when left alignment is not used, results can be unpredictable. (See “Tab to Next Tab Stop” on page 152.)
- Alignment is relative to the left margin.
- To use the Align Column Right command:
  1. Send the characters that you want to be left aligned.
  2. Send the Align Column Right command.
  3. Send the characters that you want to be right aligned.
  4. Send an end of line command, for example X'0A' or X'0D'.

The printer will return to left aligned after the line is printed.

### Limitations for n=04:

- The command is only valid in the cash receipt station.
- The command is ignored if the printer is not left aligned when the command is received.
- If the Align Column Right command is received but the line is filled before an EOL is received, the filled line is treated as an EOL. There are usually a few dot positions available, but not enough for a full character. The column alignment will occur on the few dot positions available.

## Set or Cancel Unidirectional Printing

### RS-232 Syntax:

ESC U n or X'1B55;n'

### where:

n=00 Cancels unidirectional printing

n=01 Sets unidirectional printing

### Default:

n = 00

### Remarks:

This is valid in the document station in portrait mode only, when there must be two passes of the printhead to print one print line.

Example: double-high or emphasized print.

When unidirectional mode is set to double-high characters, it takes three passes of the printhead.

In bidirectional mode, printing double-high characters takes only two passes of the printhead.

Unidirectional printing takes longer but increases the quality of the print.

## Set Error Recovery Function

### RS-232 Syntax:

ESC c 4 n or X'1B63;34;n'

**where:**

**n** Selects the function.

Bit # ↓	Function	Bit=0	Bit=1
LSB 0	Reserved	N/A	N/A
1	Reserved	N/A	N/A
2	Release Print Buffer after Error Correction	Release	Hold
32	Automatic retry on a Home Error	Enabled	Not Enabled
4	Hold buffer when waiting for a document	Release	Hold
5	Hold buffer after a flip error	Release	Hold

**Default:**

n = 00

**Remarks:**

When set to **not** automatically release the print buffer after error correction (bit #2), the printer does not execute commands until it receives a "Real-Time Requests" on page 156 command to cancel or release the print buffer.

When automatic retry on a home error is selected, the printer will try to reset the printhead to a known location, then reprint the line on which the error occurred. If the printer is unable to reset the printhead, operator intervention is needed.

An error will be sent back to the system and the LED will blink.

## Define Document Wait Time

**RS-232 Syntax:**

ESC f x y or X'1B66;x;y'

**where:**

**x** Time the printer should wait, from receiving a print line for the document station until the document is inserted.

If the document has not been detected by the time the wait time ends, a document error is sent to the system. The system continues to wait for a document to be inserted.

Wait Time = x \* 0.5 seconds

**y** Delay from the time the document is detected until it is *grabbed* by the printer (start of document printing):

- Side insertion - closes the document throat.
- Front insertion - pulls the document into the printer and feeds it to its top of form.

Delay = y × 0.1 seconds

**Defaults:**

x = 02 y = 03

**Remarks:**

If y = 0, the printer does not grab the document. The operator must use the document feed button to pull the document into the printer.

If x = 0, the printer **never** sends error status if no print data is sent to the document station.



This value is stored in the EEPROM in the printer so that it is not lost when the printer is reset.

## Status Sent to System

### RS-232 Syntax:

ESC ) *n* or X'1B29;*n*'

### where:

**n** Select function.

Bit # ↓	Function	Bit=0	Bit=1
LSB 0	Print Buffer Empty/Full	Yes	No
1	Reserved	Yes	No
2	Front Document Sensor Change	Yes	No
3	Top Document Sensor Change	Yes	No
4	After status byte 6 is incremented or status byte 3, bit 7, is set	Yes	No
5	Cash Draw Sensor Change	Yes	No
6	Key In Use	Yes	No
7	Cover Open	Yes	No

### Remarks:

Bit 4 can be used in place of the Command Complete. When the buffer is empty, the system can assume that everything stored in the printer has been completed. To enable these status messages, unsolicited status must be enabled. See "Asynchronous (Real-Time) Commands" on page 155.

## Select Character for Reprinted Lines

### RS-232 Syntax:

ESC + *n* or X'1B2B;*n*'

### where:

**n** The ASCII representation of the character printed in the first character position on the print line when recovering from a home error. This occurs in impact print stations only.

### Default:

*n* = X'2A' (This is an asterisk (\*) in most code pages.)

### Remarks:

The value is stored in EEPROM to prevent loss when the printer is reset. The default value after the reset is the value last sent.

## Reinitialize the Printer

### RS-232 Syntax:

ESC @ or X'1B40'

### Purpose:

Reinitialize all printer settings to their default values and reset the impact printhead.

### Remarks:

Commands in the print buffer are **not** lost when this command is issued. The settings that are reinitialized follow (all numbers are in hex):

<b>Setting</b>	<b>Default Value</b>
Print mode	00
Print station selected	02
User-defined/resident character sets	01
Code page	02
Intercharacter spacing (SB)	03
Rotated characters	00
Station for line spacing	02
Line spacing all stations	Six LPI
Tab positions	Every 100 dots
Left margin	00
Relative position	00
Align positions	00
Unidirectional printing	00
Horizontal size of bar code	03
Vertical size of bar code	A2
Position of HR	00
Font for HRI	00

**Error Conditions:**

None

**Enable or Disable the Feed Buttons (Models TI5 and TG5 Only)****RS-485 Syntax:**

X'1B;63;35;n'

**RS-232 Syntax:**

ESC c 5 n or X'1B;63;35;n'

**where:****n=0** Enables feed buttons**n=1** Disables feed buttons**Default:**

n = 0

**Purpose:**

To disable the feed buttons while in the middle of a transaction.

**Remarks:**

If the printer is set to have the buttons disabled, the offline tests will also be disabled.

**Enable or Disable the Beeper (Models TF7 and TM7 Only)****RS-232 Syntax:**

ESC BEL n1 n2 or X'1B 07 n1 n2'

**where:****n1** Enables or disables beeper.**X'00'** Disable beeper.**X'01'–X'FE'**

Timed enable beeper.

**X'FF'** Enable beeper.

**n2** Sets the beeper volume and tone.

**Bits 0–3**

The note. Bit 0 is the LSB.

**Bits 4–5**

The octave.

**Bits 6** Reserved.

**Bit 7** Volume. 0 = loud, 1 = soft.

Value (Bits 0–3)	Note	Value (Bits 0–3)	Note	Value (Bits 4–5)	Octave
0000 – 0	C	1000 – 8	G#	00 – 0	1
0001 – 1	C#	1001 – 9	A	01 – 1	2
0010 – 2	D	1010 – A	A#	10 – 2	3
0011 – 3	D#	1011 – B	B	11 – 3	4
0100 – 4	E	1100 – C	Rest / Silence		
0101 – 5	F	1101 – D	Reserved		
0110 – 6	F#	1110 – E	Reserved		
0111 – 7	G	1111 – F	1 KHz (normal beep)		

**Default:**

n = X'00'

**Purpose:**

To enable or disable the beeper.

**Remarks:**

- Any value other than X'00' or X'FF' is treated as an amount of time that the beeper is to be enabled. The time is calculated as  $n1 \times 0.1$  seconds.
- To stop a beep command early, send the Disable Beeper command.
- Timed beeps can be chained together. They can also be downloaded as canned messages.
- A value of  $n2=X'2F'$  is recommended for the most audible tone.

## Enable or Disable Upside-Down Printing

This command is supported only for the thermal station.

**RS-232 Syntax:**

ESC { n or X'1B 7B n'

**where:**

**n** Enables or disables upside-down printing.

**X'00'** Disable upside-down printing.

**X'01'** Enable upside-down printing.

**Default:**

n = 00

**Purpose:**

When the printer is wall-mounted, the front of the printer points up. Therefore, the print data appears upside down when data is printed normally. This command allows the data to be right-side up as it comes out of the printer.

**Remarks:**

- When upside-down printing is enabled, the last line of data must be sent to the print first.
- This command is valid only at the beginning of a print line.

## Select Character Size for Scalable Fonts

This command is supported only for the thermal station.

**RS-232 Syntax:**

GS ! *n* or X'1D;21;*n*'

**where:**

**n** Defines the height and width of a character. The four least significant bits (LSBs) specify the height and the four most significant bits (MSBs) specify the width of the character. See Table 17.

For example, if *n*=X'14' the scaled character will be twice the defined width and five times the defined height.

Table 17. Width and Height for Scalable Fonts

Four MSBs (in hex)	Character Width	Four LSBs (in hex)	Character Height
0	As defined	0	As defined
1	2 × defined width	1	2 × defined height
2	3 × defined width	2	3 × defined height
3	4 × defined width	3	4 × defined height
4	5 × defined width	4	5 × defined height
5	6 × defined width	5	6 × defined height
6	7 × defined width	6	7 × defined height
7	8 × defined width	7	8 × defined height

**Default:**

*n* = 00

**Purpose:**

To select the size of a character.

**Remarks:**

- This command is valid only in the thermal print station.
- Bits 3 and 8 of *n* are ignored.
- The *Set Print Mode* command (see “Set Print Mode” on page 125) can also select the character height (double high and double wide). The last command that is received is the effective command.

## Fix Font Matrix

### RS-232 Syntax:

ESC : *n* or X'1B 3A *n*'

### where:

**n** The character width to which all proportional characters will be adjusted. The range of valid values is  $7 < n < 33$ . Use X'00' to disable this command and print proportional characters normally.

### Default:

*n* = 00

### Purpose:

To fix the matrix of proportional fonts. This command will be used mostly to align numbers and decimal points.

### Remarks:

- This command is valid only on proportional user-defined fonts.
- If the character is larger than the width defined by this command, then the right side of the character will be truncated.
- If the character is smaller than the width defined by this command, then the character will be centered in the space.

## Print Logo Inline

This command is supported only for the thermal station.

### RS-232 Syntax:

GS J *d n1 n2 data* or X'1D 4A *d n1 n2 data*'

### where:

**d** Relative height of the character.  
**0** Single high  
**1** Double high  
**n1** MSB of the logo width.  
**n2** LSB of the logo width.  
**data** The data to form the graphics image.

### Purpose:

To print a small logo inline with characters.

### Remarks:

- *n1* and *n2* indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated as  $n1 \times 256 + n2$ .
- The logo is 24 dot rows high. If printed in double-high mode, the logo will be 48 rows high.
- The number of data bytes to form the image is figured by  $\{((n1 \times 256 + n2) - 1) / 8 + 1\} \times 24$ .
- Like user-defined characters, if the image is only 14 dots wide, the last two dots should be zero to complete the byte. When printed, the image will be only 14 dots wide.

## Enable or Disable Two-Color Printing

This command is supported only for the thermal station.

**RS-232 Syntax:**GS ; *n* or X'1D 3B *n*'**where:****n****X'0'** Disable two-color printing.**X'1'** Enable color printing using print parameter set 1.**X'2'–X'FF'**

Select the print parameters to be defined.

**Purpose:**

To enable two-color printing and select the print parameters that are best suited for the paper selected.

**Remarks:**

- New parameters will be defined as new color papers become available.
- The speed of printing will change depending on the print parameters. When print parameter set 1 is used, the print speed will be 15 lines per second.

Bar code commands are valid in the thermal print station only.

---

## Bar Code Commands

### Print Bar Code

**RS-232 Syntax:**GS *k n* NUL or X'1D6B;*n*;*data*'**where:****n** Barcode. Values are:**00** UPC-A**01** UPC-E**02** JAN13 (EAN-13)**03** JAN8 (EAN-8)**04** CODE 39**05** ITF**06** CODABAR**07** CODE 128C**08** CODE 93**09** CODE 128A, 128B, and 128C (this command is supported only for Models TI3, TI4, TG3, TG4, TF6, and TM6)**data** For *n*=00 through *n*=08, the ASCII representation of the characters to be printed.For *n*=09, the hexadecimal representation of the characters to be printed.**Remarks:**

- Valid at the beginning of a line only.

- This command will increment status byte 6.
- Printing will not start until X'00' is received, or the end of a data packet in RS-485.
- Data after any invalid character for a particular bar code will be discarded. The printer will continue to wait for X'00'.
- If X'00' or an invalid character is received before the required number of data bytes, zeros will be inserted following the data until the required number is reached (for UPC-A, UPC-E, JAN13, and JAN8).
- Excess characters will be discarded.
- A check digit will be generated if one is not supplied for UPC-A, JAN13, and JAN8.
- Check digits will be figured and added for Code 128C and Code 93.
- For UPC-E, the printer will expand the data, generate a check digit and parse the data before generating the bar code (6 or 7 digits are executed). If 7 digits are received and digit 1 is 0, the last 6 digits are used.  
If digit 1 is not 0, digit 1 is used and the digit 7 is ignored.
- For CODABAR, a stop and start character is required.
- A leading zero will be added to the data for ITF bar codes if the data received has an odd number of bytes.
- If a bar code width is greater than the paper width, the right of the bar code is truncated, making the bar code unreadable.
- Barcodes printed on the document station are printed at a dot density of 150 dpi.
- Barcodes will always be printed in black, regardless of color printing settings.
- CR station must be selected. If the DI station is selected, the command is ignored and no error is reported.

Table 18. Code 128 character set

Value		Code			Value		Code		
Decimal	Hex	Set A	Set B	Set C	Decimal	Hex	Set A	Set B	Set C
0	0	SP	SP	00	55	37	W	W	55
1	1	!	!	01	56	38	X	X	56
2	2	“	“	02	57	39	Y	Y	57
3	3	#	#	03	58	3A	Z	Z	58
4	4	\$	\$	04	59	3B	[	[	59
5	5	%	%	05	60	3C	\	\	60
6	6	&	&	06	61	3D	]	]	61
7	7	‘	‘	07	62	3E	^	^	62
8	8	(	(	08	63	3F	_	_	63
9	9	)	)	09	64	40	MUL	‘	64
10	A	*	*	10	65	41	SOH	a	65
11	B	+	+	11	66	42	STX	b	66
12	C	‘	‘	12	67	43	ETX	c	67
13	D	-	-	13	68	44	EOT	d	68
14	E	.	.	14	69	45	ENO	e	69

Table 18. Code 128 character set (continued)

Value		Code			Value		Code		
Decimal	Hex	Set A	Set B	Set C	Decimal	Hex	Set A	Set B	Set C
15	F	/	/	15	70	46	ACK	f	70
16	10	0	0	16	71	47	BEL	g	71
17	11	1	1	17	72	48	BS	h	72
18	12	2	2	18	73	49	HT	i	73
19	13	3	3	19	74	4A	LF	j	74
20	14	4	4	20	75	4B	VT	k	75
21	15	5	5	21	76	4C	FF	l	76
22	16	6	6	22	77	4D	CR	m	77
23	17	7	7	23	78	4E	SO	n	78
24	18	8	8	24	79	4F	SI	o	79
25	19	9	9	25	80	50	DLE	p	80
26	1A	:	:	26	81	51	DC1	q	81
27	1B	;	;	27	82	52	DC2	r	82
28	1C	<	<	28	83	53	DC3	s	83
29	1D	=	=	29	84	54	DC4	t	84
30	1E	>	>	30	85	55	NAK	u	85
31	1F	?	?	31	86	56	SYN	v	86
32	20	@	@	32	87	57	ETB	w	87
33	21	A	A	33	88	58	CAN	x	88
34	22	B	B	34	89	59	EM	y	89
35	23	C	C	35	90	5A	SUB	z	90
36	24	D	D	36	91	5B	ESC	{	91
37	25	E	E	37	92	5C	FS		92
38	26	F	F	38	93	5D	GS	}	93
39	27	G	G	39	94	5E	RS	~	94
40	28	H	H	40	95	5F	US	DEL	95
41	29	I	I	41	96	60	FNC3	FNC3	96
42	2A	J	J	42	97	61	FNC2	FNC2	97
43	2B	K	K	43	98	62	SHIFT	SHIFT	98
44	2C	L	L	44	99	63	CODE C	CODE C	99
45	2D	M	M	45	100	64	CODE B	FNC4	CODE B
46	2E	N	N	46	101	65	FNC4	CODE A	CODE A
47	2F	O	O	47	102	66	FNC1	FNC1	FNC1
48	30	P	P	48	103	67	START CODE A		
49	31	Q	Q	49	104	68	START CODE B		
50	32	R	R	50	105	69	START CODE C		
51	33	S	S	51					
52	34	T	T	52					
53	35	U	U	53					



Table 18. Code 128 character set (continued)

Value		Code			Value		Code		
Decimal	Hex	Set A	Set B	Set C	Decimal	Hex	Set A	Set B	Set C
54	36	V	V	54					

## Print Bar Code Examples

### UPC-A

Command = 1D 6B  
 n = 00  
 Data = 30 33 31 33 32 33 31 32 30 37 38 (hex)

### UPC-E

Command = 1D 6B  
 n = 01  
 Data = 34 39 30 36 39 30 00 (hex)

### JAN13 (EAN-13)

Command = 1D 6B  
 n = 02  
 Data = 34 39 31 32 33 34 35 36 37 38 39 30 00 (hex)

### JAN8 (EAN-8)

Command = 1D 6B  
 n = 03  
 Data = 34 39 31 32 33 34 35 36 00 (hex)

### CODE 39

Command = 1D 6B  
 n = 04  
 Data = 30 31 32 33 34 35 36 37 00 (hex)

### ITF

Command = 1D 6B  
 n = 05  
 Data = 31 32 33 34 35 36 37 38 39 30 31 32 00 (hex)

### CODABAR

Command = 1D 6B  
 n = 06  
 Data = 42 39 30 2E 2B 3A 2F 24 2D 43 00 (hex)

### CODE 128C

Command = 1D 6B  
 n = 07  
 Data = 35 34 35 35 35 36 35 37 35 38 35 39 00 (hex)

### CODE 93

Command = 1D 6B  
 n = 08  
 Data = 31 32 33 34 35 36 00 (hex)

### Reserved

09 - FF

## Select Horizontal Size of Bar Code

### RS-232 Syntax:

GS w n or X'1D77;n'

### where:

**n** The horizontal magnification of the line width in the bar code, ( $2 \leq n \leq 4$ ).

**Default:**

$n = 03$

**Note:** The last valid value is kept when an invalid value is sent.

## Select Bar Code Height

**RS-232 Syntax:**

GS h *n* or X'1D68;n'

**where:**

**n** The dot height of the bar code, ( $1 \leq n \leq 255$ ).

**Default:**

$n = X'A2'$  (162 decimal)

## Select Printing Position of Human Readable Information (HRI)

**RS-232 Syntax:**

GS H *n* or X'1D48;n'

**where:**

**n** The print position:

**00** Not Printed

**01** Above the bar code

**02** Below the bar code

**03** Both above and below the bar code.

**Default:**

$n = 00$

**Remarks:**

Human readable information is normal text associated with the bar code.

**Note:** The last valid value is kept when an invalid value is sent.

## Select Font for HRI

**RS-232 Syntax:**

GS f *n* or X'1D66;n'

**where:**

**n** The font for the HRI

**00** Font A

**01** Font B

**Default:**

$n = 00$

**Remarks:**

Only resident character sets are used:

- Font A = 10-dots (W) × 20 dots (H) or 1.25 mm × 2.5 mm
- Font B = 12-dots (W) × 24 dots (H) or 1.5 mm × 3.0 mm

**Note:** The last valid value is kept when an invalid value is sent.

## Print PDF417 Bar Code

### RS-232 Syntax:

GS P *data* NUL or X'1D;50;data;00'

### where:

**data** The ASCII representation of the characters to be printed.

### Remarks:

Valid only at the beginning of a line. Printing will not start until a X'00' is received.

This command will increment status byte 6.

The maximum number of characters to be encoded is 1000.

### Error Conditions:

If an image cannot be printed, status byte 7, bit 2 will be set. This may happen when the image is too big to print. Try decreasing the ECC level.

## Select PDF417 ECC (Error Correction Codewords) Level

### RS-232 Syntax:

GS R *n* or X'1D;52;n1;n2'

### where:

**n1** The high-order byte of the ECC level.

**n2** The low-order byte of the ECC level.

### Default:

n1 = 00

n2 = 15

### Range:

$0 \leq n1n2 \leq 400$  decimal (170 hex)

### Remarks:

For  $0 \leq n1n2 \leq 8$ , the ECC level is assumed as that particular security level. The security level determines the number of error correction codewords added to the symbol.

### Error Correction

Security Level	Codewords
0	0
1	2
2	6
3	14
4	30
5	62
6	126
7	254
8	510

For  $9 \leq n_1 n_2 \leq 400$ , the ECC level is assumed as a percentage of the codewords in the bar code.

## Select Aspect Ratio PDF417 Bar Code

### RS-232 Syntax:

GS S *r;c* or X'1D;53;*r;c*'

### where:

**r** The height dimension for the ratio;  $1 \leq r \leq 9$ .

**c** The width dimension for the ratio;  $1 \leq c \leq 9$ .

### Default:

$r = 1, c = 2$

### Remarks:

This is not an exact ratio. The image will get as close as possible to the ratio. However, the maximum width of an image is 12 columns and the maximum height is 90 rows.

## Enable PDF417 Truncation

### RS-232 Syntax:

GS T *n* or X'1D;54;*n*'

### where:

**n** Whether to enable truncation.

0 = Disable truncation.

1 = Enable truncation.

### Default:

$n = 0$

### Remarks:

Truncated PDF generates a symbol with the right row indicator and stop pattern replaced by a single width bar. There is a slight degradation in decode performance if truncation is enabled, which allows more data to fit in the image width.

---

## Print Character Commands

These commands should be sent after ASCII data is sent to the printer and is being held in the print buffer. Any of these commands will increment the line count by 1. (See "Status Byte 6" on page 162 and "Reset Line Count" on page 157.)

## Print and Line Feed

### RS-232 Syntax:

LF or X'0A'

### Purpose:

Prints data in the print buffer and feeds the paper by a preset amount.

## Print and Line Feed

**RS-232 Syntax:**

CR or X'0D'

**Purpose:**

Prints data in the print buffer and feeds the paper by a preset amount.

**Remarks:**

There is an MCT to enable or disable this command. The default is to disable or ignore the CR command.

## Print, Form Feed, and Cut the Paper (FF)

**RS-232 Syntax:**

FF or X'0C'

**Purpose:**

Prints data in the print buffer and feeds the paper in the customer receipt (CR) station or document insert (DI) station by a preset amount, until the document exits the feed rollers. If a cutter is available at the station (CR station only), it cuts the paper.

## Print and Feed Paper n lines

**RS-232 Syntax:**

ESC d n or X'1B64;n'

**where:**

**n** Specifies the number of line feeds.

**Purpose:**

Prints data in the print buffer and feeds the paper by the amount specified in this command.

## Print and Feed Paper Using Minimum Units

**RS-232 Syntax:**

ESC J n or X'1B4A;n'

**where:**

**n** Specifies the line feed steps.

In the receipt station: 1 in. = 204 steps (1 mm = 8 steps).

In the document portrait station: 1 in. = 48 steps (1 mm = 1.9 steps).

In the document landscape station: 1 in. = 127 steps (1 mm = 5 steps).

**Purpose:**

Prints data in the print buffer and feeds the paper by the amount specified in this command.

## Print Graphic Messages

### Select and Print a Graphics (Logo) Command

**RS-232 Syntax:**

ESC \* *d w h data* or X'1B2A;d;w;h;data'

**where:**

- d** Dot density.
- 00** Normal Print - 200 dpi in the receipt station, 150 dpi in the document station.
- Note:** In the document station, this takes three passes of the printhead for a logo that is 8 dots high.
- 01** Double wide - 100 dpi in the receipt station, 75 dpi in the document station.
- Note:** In the document station, this takes one pass of the printhead for a logo that is 8 dots high.
- 02** Double wide and high - 100 dpi in the receipt station, 75 dpi in the document station. Every dot row in the vertical direction will be printed twice.
- w** One-eighth the number of dots in the horizontal direction, (width =  $8 \times w$ )
- $1 \leq w \leq 72$  for a thermal logo.  
 $1 \leq w \leq 59$  for an impact logo.
- In the receipt station,  $1 = 8 \text{ dots} = 1 \text{ mm}$ .  
 In the document station,  $6 = 48 \text{ dots} = 1 \text{ inch}$ .
- h** One-eighth the number of dots in the vertical direction, (height =  $8 \times h$ ).
- $1 \leq h \leq 255$  for a thermal logo.  
 $1 \leq h \leq 5$  for an impact logo.
- data** The data to form the graphics image.
- The number of data bytes for the image is  $(h \times w) \times 8$ . See "Download Graphics (Logo) Commands" on page 109 for an example of the data.

**Purpose:**

To print all-points-addressable print messages.

**Remarks:**

The margin will be ignored if this causes the logo to overrun the line length.

These messages can be positioned on the page using the commands for setting positions.

Not supported in document landscape mode.

This command supports a total of 2000 bytes only. To print graphics on the Model T15 printer when the data is greater than 2000 bytes:

1. Hold the buffer.

2. Send all the data.
3. Release the buffer.

The left margin will be rounded down to a factor of 8. For example, if the margin = 74, the logo starts at 72.

Retries are not attempted on print errors.

Valid at the beginning of the line only.

When printing in the document station, a line feed command must be sent to advance the paper past the last line of the logo.

If the parameter *d*, *w*, or *h* is out of the defined range for this command, the command is discarded and the remaining data is processed as print data.

This command will increment status byte 6.

If this message is printed on a regular basis, consider downloading it to save communication time. (See "Download Graphics (Logo) Commands" on page 109.)

The data buffer in the Model TI3 and Model TI4, which is 16 KB, can be used for signature capture.

## Print Predefined Graphics (Logo) Command

### RS-232 Syntax:

`GS / m logo_num or X'1D2F;m;logo_num'`

### where:

**m** The dot-density:

**00** Normal Print - 200 dpi in the receipt station, 150 dpi in the document station.

**Note:** In the document station, this takes three passes of the printhead for a logo that is 8 dots high.

**01** Double wide - 100 dpi in the receipt station, 75 dpi in the document station.

**Note:** In the document station, this takes one pass of the printhead for a logo that is 8 dots high.

**02** Double wide and high - 100 dpi in the receipt station, 75 dpi in the document station. Every dot row in the vertical direction will be printed twice.

### logo\_num

The number associated with the logo that is stored.

$1 \leq \text{logo\_num} \leq 40$

### Purpose:

To print predefined all-points-addressable print messages.

**Remarks:**

The margin is ignored if it causes the logo to overrun the line length. Printing this message in the document station at 150 dpi will take three passes of the printhead.

These messages can be positioned on the page using the commands for setting positions.

Valid at the beginning of the line only.

This command is not valid in landscape mode.

This command will increment status byte 6.

Retries will not be attempted on print errors.

In the document portrait station, a line feed command must be sent to advance the paper past the last line of the logo.

See “Download Graphics (Logo) Commands” on page 109.

## Print Predefined Messages

**RS-232 Syntax:**

GS ^ *message\_num* or X'1D5E;message\_num'

**where:****message\_num**

The number associated with the stored predefined message.

$1 \leq \text{message\_num} \leq 25$

**Purpose:**

To print predefined print messages.

**Remarks:**

Valid at the beginning of the line only.

Retries will not be attempted on print errors.

**Attention:** Stored commands can increment status byte 6. See “Predefine Messages” on page 111.

---

## Miscellaneous Commands

### Tab to Next Tab Stop

**RS-232 Syntax:**

HT or X'09'

**Purpose:**

Moves the print position to the next tab stop.

**Remarks:**

See “Set Horizontal Tab Positions” on page 133.

Tabs are valid when printing is aligned to the left only. If the tabs are used when alignment is not left, results can be unpredictable. (See “Align Positions” on page 134.)



## Return Home (Select Printhead Location)

### RS-232 Syntax:

ESC < *n* or X'1B3C;n'

### where:

<b>n</b>	The print-head position:
<b>00</b>	Document home position
<b>01</b>	Open document throat position. The DI station throat will automatically be closed if the CR station is exercised.
<b>02</b>	Reserved
<b>03</b>	Left home position
<b>04</b>	Refined document home position. This can be used to recover from a home error.
<b>05</b>	Register document <ul style="list-style-type: none"><li>• Close throat if open</li><li>• Advance paper forward to first position</li></ul>
<b>06-FF</b>	Reserved

### Purpose:

To move the printhead to the desired location.

### Remarks:

Valid at the beginning of the line only. Valid in impact print stations only.

## Paper Cut/DI Eject

### RS-232 Syntax:

ESC *i* or ESC *m* or X'1B69 or 1B;6D'

### Purpose:

To cut the paper in the customer receipt (CR) station.

### Remarks:

- This command is the equivalent of a form feed (0C) in the document insert (DI) station but does not feed the customer receipt in the CR station.
- ESC *i* or X'1B69' *does not* increment status byte 6.
- ESC *m* or X'1B6D' *does* increment status byte 6.

## Generate Drive Pulse for Cash Drawer

### RS-232 Syntax:

ESC *p m n1 n2* or X'1B70;m;n1;n2'

### where:

<b>m</b>	The cash drawer number - 0 or 1.
<b>n1</b>	Pulse width on time × 2 milliseconds.
<b>n2</b>	Pulse width off time × 2 milliseconds.

### Purpose:

To open one of the cash drawers attached to the printer.

**Remarks:**

Printing will be suspended while a cash drawer is being opened.

## Retrieve the Flash Storage

**RS-232 Syntax:**

ESC 4 *m add* or X'1B34;m;add'

**where:**

**m** One-byte count of the bytes to be returned

**add** Three-byte address of the first byte to be returned

**Purpose:**

Retrieve data from user flash storage.

**Remarks:**

One byte will be returned if a byte count of X'00' is specified.

The valid address range for each SureMark depends on the model number and which memory option, if any, is installed. Use "Retrieve Size of User Flash Storage" to determine the valid address range for your printer.

## Retrieve Size of User Flash Storage

**RS-232 Syntax:**

ESC 4 x '08 FF FF FF' or X'1B;34;08;FF;FF;FF'

**Purpose:**

Retrieve the size of the user flash storage in the printer.

**Remarks:**

The size of the user flash storage will be returned in 8 bytes after the printer status bytes. The data will be in the form of ASCII decimal data.

Models T15 and TG5 have 296K bytes available, and should return a value of 303103.

Models TF7 and TM7 have 813K bytes available, and should return a value of 826623.

## Retrieve Printer Usage Statistics

**RS-232 Syntax:**

X'1B 51 xx'

**where:**

**xx** The hex value of the requested statistic. See Table 19 on page 155.

**Purpose:**

To send printer usage statistics from the printer to the host.

**Remarks:**

- The usage statistics are sent over the serial line in status bytes 9 and 10. See Table 19 on page 155 for the values of parameter xx.

Use this procedure to retrieve printer usage statistics from the printer:

1. Reset the printer. (This is an optional step. It ensures that the most recent counts will be retrieved.)

**RS-232 Syntax:**  
X'10 05 40'

2. Execute the Retrieve Printer Usage Statistics command.
3. Multiply the returned value by the factor given in Table 19 to get the actual printer statistic.

Table 19. Retrievable Usage Data

Hex Value	Usage Data Being Tracked	Factor
80	FRU Card/Invalid usage numbers (set to X'0164' at the factory, not set for FRU logic cards)	N/A
81	Number of paper cuts	32
82	High byte of the number of characters printed on the CR (thermal) station (see note 1)	None
83	Low byte of the number of characters printed on the CR (thermal) station (see note 1)	None
84	Number of steps performed by the CR paper feed motor (200 steps per inch of paper)	50 000
85	Number of times the customer receipt cover was opened	None
86	Number of failed paper cuts – single-station printers only	None
87	Number of characters printed at the DI (impact) station – thermal/impact printers only (see note 1)	1 000
88	Number of steps performed by the DI paper feed motor – thermal/impact printers only	50 000
89	Number of DI transport motor starts – thermal/impact printers only	5 000
8A	Number of home errors – thermal/impact printers only	None
8B	Number of times the DI cover was opened – thermal/impact printers only	None
8C	Number of forms that were inserted into the DI station – thermal/impact printers only	100
8D	Number of MICR reads – Model T14 only	15
8E	Number of high-interference MICR reads – Model T14 only	8
8F	Number of failed MICR reads – Model T14 only	8
90	Number of check flips performed – Model T14 only	16
91	Number of check flip failures – Model T14 only	8

Note 1: The number of printed characters is based on the number of dots that were printed, assuming 64 dots per character.

---

## Asynchronous (Real-Time) Commands

These commands are processed as soon as they are received. They do not go into the printer buffer.

**Note:** These commands are not recognized when they occur in the middle of another command. For example, sending this command after the second byte of a 3-byte command, as in ESC J n.

## Real-Time Requests

### RS-232 Syntax:

DLE ENQ *m* or X'1005:n'

### where:

**m** Specifies the ASCII command character

**n** Specifies the hexadecimal command character

m	n	Description
1	31	Release the print buffer for printing. This should be sent after an error has occurred and the print buffer is held. If an error occurred during the transaction that was being held, the printer sends back the line number with the error and the error status. The system can then decide to cancel or continue printing after the error is corrected. The system uses this command to continue printing after the error is corrected.
2	32	Cancel print buffer. This clears the print buffer of all data.  In RS-232 mode, the user must wait for buffer empty status (status byte 2, bit 6) before sending any more commands. <b>Note:</b> A status message is returned immediately after execution of this command.
3	33	Undefined.
4	34	EC request - transmit printer status. Sends the printer's status to the system. This command does not go into the printer's data buffer but is processed immediately.  The printer status is returned in status bytes 1–8. See "Status Summary" on page 160 for more information.  Status byte 5, bit 1, will be set after the EC request has been executed.
5-8	35-38	Undefined
@	40	Reset the printer. The printer stops what it is doing and goes through its reset routine. The print buffer is canceled and all commands erased. All printer settings go back to default values.
A	41	Enable unsolicited status. <b>Note:</b> A status message is returned immediately after execution of this command.
B	42	Disable unsolicited status
C	43	Disable transparent XON/XOFF

### Purpose:

To process a command immediately.

### Remarks:

Either the *Release print buffer* or the *Cancel print buffer* command must be used in these situations:

- When recovering from a cash receipt print error
- After clearing an unrecoverable home error

After the printer resets, it defaults to *not* sending status unless requested. If an error occurs, the printer appears hung, unless a status is requested. If unsolicited status is enabled, the printer sends the error to the system as soon as it occurs.

**Note:** If transparent XON/OFF is disabled, X'10', X'11', and X'13' can be imbedded in returned status and data. (See "XON/XOFF Control" on page 24.) To re-enable the printer, the printer must be reset.

---

## Data Buffer Management and Batch Printing

### Reset Line Count

**RS-232 Syntax:**

ESC 6 or X'1B36'

**Purpose:**

Resetting the line count lets the system track the print line where an error occurs.

**Remarks:**

The line count is incremented at every print command. The count is sent in every status message to the system. The count can go to 256 (X'0FF'), when it rolls back to 0. (See "Print Character Commands" on page 148.)

### Disable Line Count

**RS-232 Syntax:**

ESC 8 *n* or X'1B;38'*n*

**Purpose:**

To temporarily not increment the line count. This can be used when printing predefined messages, if the number of lines embedded in the message is unknown.

### Hold Printing Until Buffer is Released

**RS-232 Syntax:**

ESC 7 or X'1B37'

**Purpose:**

If the system cannot send data to the printer at a speed needed to keep the printer in constant motion, it can hold the printer queue until it sends all data lines for a transaction.

**Remarks:**

The printer must be printing one line while processing the next line. If the printer is unable to completely process a line, the print speed reduces to half.

The line count is reset when the buffer is held.

---

## Document Handling

Use the side load capability for documents that must be positioned to begin printing at a particular location on the document. (There is an arrow on the side of the cover to indicate where printing begins.) Use front load for all other cases.

## Portrait Mode

This is a suggested way of document handling:

### 1. ESC f (x) (y): Set up document wait time

**x** Time the printer should wait from receiving a print line for the document station until the document is inserted.

If the document has not been detected by the time the wait time ends, a document error is sent to the system but the system continues to wait for a document to be inserted.

**y** Delay from the time the document is detected until it is *grabbed* by the printer (the start of document printing):

- Side insertion - closes the document throat.
- Front insertion - pulls the document into the printer and feeds it to the Top of Form.

### 2. ESC c 0 X'04': Select document station - normal print mode:

The document present indicator blinks until a document is detected, when it stays on continuously.

- If the document is inserted from the front, it is fed to the first print position after the document wait time. Then commands in the printer buffer begin executing.
- If the document is inserted from the side, printing starts at the location where it was inserted.

The document throat must be open to insert the document from the side. Manually, open the throat by pressing and then releasing both buttons.

You can also open it with these commands - ESC q or ESC < X'01'.

If a document is not detected within the wait time (specified in the ESC f command), the printer sends error status to the system, and continues to wait.

**Note:** The system can either cancel the print buffer, thereby deleting all data in the print buffer, or wait for a document to be inserted.

The printer appears to be hung until an action is taken.

### 3. Send print lines to be printed in this station.

#### 4. Final handling.

You have an option on final handling, finish printing and either eject the document or open the document throat to allow manual removal of the document:

##### 4a. FF: Print and Eject Document.

Finish printing and eject the document.

##### 4b. ESC q or ESC < X'01': Open Document Throat

Finish printing and release the document from the printer's rollers.

**Note:** The document station stays selected - the printer will wait for another document until the station is changed.

## Landscape Mode

Notes on landscape printing:

- Lines you send to print start at the bottom of the form, against the right stop, and continue to the top of the form, to a maximum of 80 mm from the bottom of the

form. This is because the bottom of the form is known (against the right stop) and the top of the form is unknown to the printer.

- Different lengths of paper allow different print-line lengths. Therefore, the application must know the size of the print line.
- The printer calculates the length of a document it is to print. To do that, it must feed the document up past the bottom sensor and back to the top sensor. (On a 5-inch document this takes 2 seconds.)
- When landscape mode is used, the document should be inserted so that the right edge is at the top of the printer, and the bottom edge is against the printer's right wall.
- To position the printing in landscape mode to the correct position, the system must send line feeds. The printer assumes that the top of form for a document in landscape mode is the far left edge of the document (to a maximum of 80 mm from the bottom of the form).
- Line feeding is 5 steps per mm or 21 steps per line, at 6 lpi.
- All landscape printing must be done with one printing pass. Therefore:
  - Double-high printing is not allowed.
  - User-defined characters greater than 9 dots high are not allowed.
  - DBCS characters are not allowed.
- There is no error recovery for landscape printing.

## Landscape Printing Commands

### 1. ESC f (x) (y): Set up document wait time

Same as for portrait mode.

### 2. ESC c 0 X'08': Select document station - landscape print mode:

**A** If the document was not previously loaded:

- The document present indicator blinks until a document is detected.
- Once detected, the document will be *grabbed* by the printer and fed to the right margin on the document. Because the document is inserted on its side, this is at the top of the printer.
- If a document is not detected within the wait time (specified in the ESC f command), the printer sends error status to the system, and continues to wait.

The system can either cancel the print buffer, deleting all data in the print buffer, or wait for a document to be inserted.

The printer appears to be hung until an action is taken.

**B** If the document was previously loaded, the printer feeds the paper to the right margin on the document.

### 3. Send print lines to be printed in this station.

The number of characters that can be printed on a line depends on the width of the document. The print area is:

- 63 mm high, starting 17 mm from the bottom of the document
- The entire width of the document less 34 mm from the right edge and 10 mm from the left edge

### 4. Final handling.

You have an option on final handling, finish printing and either eject the document or open the document throat to allow manual removal of the document:

**4a. FF: Print and Eject Document.**

Finish printing and eject the document.

**4b. ESC q or ESC < X'01': Open Document Throat**

Finish printing and release the document from the printer's rollers.

**Note:** The document station stays selected. The printer will wait for another document until the station is changed.

## Status Summary

Status is sent to the system for:

- Cash receipt print error. The cover is open or out of paper.
- Printer buffer empty. If enabled, see "Status Sent to System" on page 137.
- Document sensor state changed. If enabled, see "Status Sent to System" on page 137.
- Cash drawer sensor change. If enabled, see "Status Sent to System" on page 137.
- Command has timed out. The printer is waiting for additional bytes to complete the command.
- Nonrecoverable home error.
- Document not inserted after document station was selected.
- Document has exited sensor before document print is finished.
- Flash EPROM load error.
- Memory sector is full.
- Flash storage is full.
- Printer ID request (extended address command).
- MCT read command.
- Flash read command.
- Print buffer being held.
- Ribbon cover sensor change.
- Document feed error.

## Message from the Printer

A message from the printer has this format:

**Bytes Contents**

- 1 - 2** Data count (X'000A' to X'00FF'). The data count includes the two data-count bytes.
- 3 - 10** Status bytes 1-8. See the descriptions of each byte in the sections that follow.
- 11 - n** Either 5 bytes of additional status from the "Extended Address Command – Request Printer ID" on page 107 command, or up to 246 bytes of user data that can include:
  - User flash data
  - MCT data

## Status Byte 1

Bit	Description
0 (LSB)	Command complete (immediate command and flash storage commands). Set to 1 when the command is complete, except for "Erase Flash EPROM Sector" on page 121, for which it is set to 1 when the command is sent. (See bit 7 of "Status Byte 3" on page 161.)



Bit	Description
1	Cash receipt right home position. Set to 1 when the printhead is in the customer receipt right home position.
2	Left home position. Set to 1 when the printhead is in the left home position.
3	Document right home position. Set to 1 when the printhead is in the document right home position.
4	Reserved. Always 0.
5	Ribbon cover open. Set to 1 when the ribbon cover is open.
6	Cash receipt print error. Paper cover is open, the customer receipt station is out of paper, or the cutter is jammed in the closed position.
7 (MSB)	Command reject.

## Status Byte 2

Bit	Description
0 (LSB)	Document ready. Set to 0 when the document insert station is ready for printing. This occurs when both document sensors detect the document and the document has been fed to the first print position.
1	Document present under the front sensor. Set to 0 when a document is under the front document sensor.
2	Document present under the top sensor. Set to 0 when a document is under the top document sensor.
3	Reserved. Always equals 1.
4	Print buffer held. Set to 1 when the print buffer is being held. Cleared when buffer released.
5	Open throat position. Set to 1 when the printhead is in the open throat position.
6	Buffer empty. Set to 1 when no print data and no commands are in the buffer.
7 (MSB)	Buffer Full. Set when only 1K bytes are available in the buffer.

## Status Byte 3

Bit	Description
0 (LSB)	Memory sector is full.
1	Home error.
2	Document error. The document was not inserted after the document station was selected, and the wait subsequently timed out.
3	Flash EPROM load error or MCT load error.
4	Reserved. Always equals 0.
5	User flash storage sector is full.
6	Firmware error. CRC on the firmware failed. The printer is running out of the boot sector. Only system commands and firmware commands are accepted.
7 (MSB)	Command complete ("Erase Flash EPROM Sector" on page 121, and whenever a physical line is printed). Set to 1 when the command is complete or a physical line is printed.

## Status Byte 4

Contains the printer engineering code (EC) level with all status messages.

## Status Byte 5

Bit	Description
0 (LSB)	Printer ID Request/Extended Address command. Set to 1 when responding to a Printer ID request.
1	EC Level. Set to 1 when responding to an EC level request.
2	Reserved.
3	MCT Read. Set to 1 when responding to an MCT read command.
4	User flash read. Set to 1 when responding to a flash read command.
5	Reserved. Defaults to 1.
6	Reserved.
7 (MSB)	Reserved.

## Status Byte 6

Contains the current line count.

## Status Byte 7

Bit	Description
0 (LSB)	Reserved.
1	Reserved.
2	Reserved.
3	Cash drawer status (0 if cash drawer status (port pin 3) at ground).
4	Print key pressed (1 = pressed).
5	Reserved. Defaults to 1.
6	Station selected. Set to 1 when document insert station is selected.
7 (MSB)	Reserved.

## Status Byte 8

Reserved for future use.

---

## Appendix D. Uploading Electronic Journal Data

This section describes the procedure for uploading electronic journal (EJ) data while the SureMark is in Model 4 emulation mode.

To put the SureMark into the mode for starting the EJ upload, the SureMark must receive a print command with a unique message. The message will include the line number where the upload should start. Because the starting line number is specified, if the printer is reset during the upload, the application will not have to restart from the beginning. The application can send a command to start at the last line that was sent.

When the EJ upload is enabled, all MICR commands will be interpreted as EJ upload.

The commands that are related to uploading EJ data, which are described in the sections that follow, are:

1. Enable the upload
2. Disable the upload
3. Upload the data
4. Request the size of the EJ space
5. Erase the EJ in the printer

---

### Enable the Upload of EJ Data

**Command Syntax:**

X'010100010C'^EJ RQ *n1 n2*

**where:**

**n1** The line number, which is specified as six decimal ASCII numbers.

**n2** 25 undefined bytes

**Example:**

X'010100010C'^EJ RQ 00405X'0000000000000000.....' or  
X'010100010C5E454A205251203030303430450000000000.....'

---

### Disable the Upload of EJ Data

**Command Syntax:**

X'010100010C'^EJ Disable *n1*

**where:**

**n1** 27 undefined bytes

**Example:**

X'010100010C5E454A204449.....'

---

### Upload the EJ Data

**Command Syntax:**

X'0117'

**Remarks:**

In response to this command, the printer will send four status bytes, then 43 bytes of print data, followed by the line number.

The line number will be sent as decimal ASCII numbers.

---

## Request the Size of the EJ Space

**Command Syntax:**

X'0101xxxxx'^EJSize *n1*

**where:**

**n1**      30 undefined bytes

**Example:**

X'010100010C5E454A204449.....'

**Remarks:**

When the next MICR read command is sent after this command is sent, the SureMark will send the number of lines that are stored in the printer's memory. It will also send the total number of lines that can be stored in the printer's memory. The printer will then return to normal operation and process MICR commands as MICR commands.

---

## Erase the EJ Data in the Printer

**Command Syntax:**

X'0101xxxxx'^EJERase *n1*

**where:**

**n1**      30 undefined bytes

---

## Appendix E. Proportional Fonts

This section describes the procedure for converting and downloading proportional fonts. It also gives recommendations that will simplify implementing proportional fonts on a receipt.

---

### Preparing the Fonts

Downloading proportional fonts to the SureMark is a 2-step process:

1. Convert a TrueType font to the SureMark proportional font format. Use the IBM Font Converter program, fontconvert.exe, to convert the fonts.
2. Download the converted font file to the printer.

---

### Implementing Proportional Fonts

The variable width of proportional fonts can make it difficult to layout a receipt using traditional methods. You can simplify the process of laying out the format of a receipt by using the alignment and tab features of the SureMark printer.

The following topics show how to use the alignment and tab features with proportional fonts. Command descriptions are given in RS-232 command format. For the command syntax when you use a printer driver, please consult the driver documentation.

A single proportional character set requires two user-defined code pages. Therefore, the printer allows the following combination of user-defined and proportional character sets to be stored in the printer.

Number of Proportional Character Sets	Number of User-Defined Character Sets
0	4
1	2
2	0

Selecting code page 2 when a proportional character set is defined for code page 1 (or selecting code page 4 when proportional characters are defined in code page 3) will result in unreadable characters being printed. See the Select Print Mode command (“Set Print Mode” on page 125) for more information on selecting code pages.

A proportional character set is enabled using the Select User-Defined Characters command. See “Select User-Defined or Resident Character Sets” on page 129.

### Layout Using Align Commands

A common requirement for receipt layout includes aligning item prices. This is commonly accomplished using fixed field lengths for item descriptions or counting characters. Using proportional fonts makes this method of alignment practically impossible.

The simplest method to align prices is to use the Align Column Right command (see “Align Positions” on page 134) with the Fix Font Matrix command (see “Fix Font Matrix” on page 141).

- Unlike other Align Position commands, the Align Positions-Align Column Right command can be sent in the middle of a print line. Print characters sent before the alignment command will be left aligned, while characters sent after the alignment command will be right aligned.
- The Fix Font Matrix command forces proportional characters to print using a single width defined by the command. This essentially negates the proportional characteristic of the font, while still allowing the user to utilize the custom font.

The following sequence assumes proportional characters have been downloaded and selected for printing. The following sequence should be used for each item line. The printer output would resemble the following:

```
Candy Bar      $ .45
Fountain Soda  $ 1.11
```

1. Print the item description. For the first item, this is the ASCII data *Candy Bar*.
2. Issue the Set Alignment command with  $n=4$  (Right Align Column). The command syntax is X'1B 61 04'.
3. Issue the Fix Font Matrix command with  $n=\text{dot width of the widest number used}$ . The command syntax is X'1B 3A xx'.

**Note:** Finding the optimum value of  $xx$  for this command will vary depending on the proportional character set being used, and may require some experimentation.

4. Print the item price. For the first item, this is the ASCII data *\$ .45*.
5. Issue the Fix Font Matrix command with  $n=0$ , which disables the fixed font matrix. The command syntax is X'1B 3A 00'.
6. Issue the Print and Line Feed command. Use the command syntax X'0A' or X'0D'.

## Layout using Set Tab Position

There are situations where the customer might not want the price right aligned, or requires an additional column (for example, a column for quantity). In such a case, using tabs is the best method to guarantee alignment. Tab positions that you define during the set-up operation (see "Set Horizontal Tab Positions" on page 133) will remain intact until the printer is reset or reinitialized. Once tabs are set-up, all that is required is to send a tab character X'09' to move to the next tab position. It is still recommended that the Fix Font Matrix be used, if alignment of the individual characters in a field is important (for example, to align the decimal points of prices).

The following Set Tab Positions command will define tab positions for 3 columns: item description, quantity and price. The command assumes that the font width is approximately 10 dots. This procedure assumes that proportional characters have been downloaded and selected for printing, and that the item description will be left aligned.

```
X'1B 44 01 90 01 D6 00 00'
```

The following sequence should be used for each item line. The printer output would resemble the following:

```
Candy Bar      03 $ 1.00
Fountain Soda  10 $11.10
```

1. Print the item description. For the first item, this is the ASCII data *Candy Bar*.
2. Issue the Tab command. The command syntax is X'09'.

updated March 18, 2002

3. Issue the Fix Font Matrix command with  $n$ =dot width of the widest number used. The command syntax is X'1B 3A xx'.

**Note:** Finding the optimum value of  $xx$  for this command will vary depending on the proportional character set being used, and may require some experimentation.

4. Print the quantity. For the first item, this is the ASCII data *03*.
5. Issue the Tab command. The command syntax is X'09'.
6. Print the price. For the first item, this is the ASCII data *\$1.00*.
7. Issue the Fix Font Matrix command with  $n=0$ , which disables the fixed font matrix. The command syntax is X'1B 3A 00'.
8. Issue the Print and Line Feed command. Use the command syntax X'0A' or X'0D'.





## Appendix F. Emulation Support for Epson Single-Station Printer

Commands Supported in Emulation Mode . . . . .	169
Commands with Limited Support in Emulation Mode . . . . .	171
Commands Not Supported in Emulation Mode . . . . .	172
Connectivity Differences . . . . .	172

The SureMark single-station printers in SBCS mode can emulate an Epson single-station printer. Emulation mode provides full support for most Epson commands. However, some commands are supported partially and a few commands are not supported at all. This section describes the commands that have each of the three levels of support and also lists the connectivity differences between an Epson single-station printer and the SureMark single-station printers.

### Commands Supported in Emulation Mode

The commands listed in Table 20 are supported in Epson emulation mode. However, there will be some differences in the printed output, because of different dot pitches in the print heads and the minimum distance that the paper feed motors can move the paper. These differences will appear when there are a number of printed lines, and the method of aligning the data is different.

Examples of the printed differences that might occur:

- Logos will appear smaller in emulation mode. The logo will still contain the same number of dots in the width and height. However, because the SureMark print head has a finer dot pitch, the logo will appear smaller. If text is aligned around the logo, the text on receipts that are printed in emulation mode might not line up the same as receipts that are printed on the Epson printer.
- If one line is aligned using spaces and another line is aligned using the relative position commands, the data might appear misaligned. The commands, such as the relative position and margin commands, that use the minimum unit of motion values are based on a fraction of an inch, which eliminates the differences in the dot pitch. Tabs and spaces are subject to pitch differences.

Table 20. Commands Supported in Epson Emulation Mode

Hex Command	ASCII Command	Description
9	HT	Tab
0A	LF	Line feed
0C	FF	Print and return to standard mode
0D	CR	Print and carriage return
1B 20 n	ESC SP n	Set right-side character spacing
1B 21 n	ESC ! n	Select print mode
1B 24 nL nH	ESC \$ nL nH	Set absolute print position
1B 25 n	ESC % n	Select or cancel user-defined character set
1B 26 y c1 c2...	ESC & y c1 c2...	Define user-defined characters
1B 2A m nL nH dl..k	ESC * m nL nH dl..k	Select bit-image mode
1B 32	ESC 2	Select default line spacing

Table 20. Commands Supported in Epson Emulation Mode (continued)

Hex Command	ASCII Command	Description
1B 33 n	ESC 3 n	Set line spacing
1B 3D n	ESC = n	Set peripheral device
1B 3F n	ESC ? n	Cancel user-defined characters
1B 40	ESC @	Initialize printer
1B 45 n	ESC E n	Turn emphasized mode on or off
1B 47 n	ESC G n	Turn double-strike mode on or off
1B 4A n	ESC J n	Print and feed paper
1B 52 n	ESC R n	Select an international character set
1B 53	ESC S	Select standard mode
1B 56 n	ESC V n	Turn 90° clockwise rotation mode on or off
1B 5C nL nH	ESC \ nL nH	Set relative print position
1B 61 n	ESC a n	Select alignment
1B 63 33 n	ESC c 3 n	Select paper sensor to output paper end signals
1B 63 35 n	ESC c 5 n	Enable or disable panel buttons
1B 64 n	ESC d n	Print and feed n lines
1B 70 m t1 t2	ESC p m t1 t2	Generate pulse
1B 7B n	ESC { n	Turn upside-down printing mode on or off
1C 67 32 m a1 a2 a3 a4...	FS g 2 m a1 a2 a3 a4...	Read from user NV memory
1C 70 n m	FS p n m	Print NV bit image
1D 21 n	GS ! n	Select character size
1D 2A xydl ...d(x*y*8)	GS * xydl ...d(x*y*8)	Define user-defined bit image
1D 2F m	GS / m	Print user-defined bit image
1D 3A	GS :	Start or end user-defined message
1D 42 n	GS B n	Turn white/black reverse printing mode
1D 48 n	GS H n	Select printing position for HRI characters
ID 49 n	GS I n	Transmit printer ID
ID 4C nL nH	GS L nL nH	Set left margin
1D 50 x y	GS P x y	Set horizontal and vertical motion units
1D 56 m n	GS V m n	Select cut mode and cut paper
ID 57 nL nH	GS nL nH	Set printing area width
1D 61 n	GS a n	Enable or disable automatic status back
1D 66 n	GS f n	Select font for HRI characters
1D 68 n	GS h n	Select bar code height
1D 72 n	GS r n	Transmit status

## Commands with Limited Support in Emulation Mode

The commands listed in Table 21 are supported in a limited manner in Epson emulation mode. The table describes the limitation on each command.

Table 21. Commands with Limited Support in Epson Emulation Mode

Command		Description of Limitation
10 04 n	Real-time status transmission	A status byte will be returned when the command is sent. The following status bits will not be supported. <ul style="list-style-type: none"> <li>• Offline status bit 6</li> <li>• Error status bits 5 and 6</li> <li>• Paper roll status bits 2 and 3 (near end of paper) - Bit will be set when out of paper</li> </ul>
1B 2D n	Turn underline mode on/off	There is no thickness option available. A value of n=1, 2, 49 or 50 will enable underline mode.
1B 44 m1...nk 00	Set horizontal tab positions	The number of tab positions is limited to 5.
1B 63 34 n	Select paper sensor to stop printing	The command will be accepted, but it has no function. There is no paper low sensor on the SureMark. The printer will only return out of paper status.
1B 74 n	Select character code table	All characters on all code pages are not supported. The Katakana code page is not supported.
1D 5E r t m	Execute user-defined message	Does not support the mode where the user-defined message is printed when the paper advance button is pressed.
1D 77 n	Set bar code width	The maximum width is 4 dots on the SureMark. Widths of 5 and 6 will be forced to 4 dots.
1C 67 31 m a1 a2 a3 a4...	Write to user NV memory	If received during user-defined message definition, this command will be embedded in the NV memory. Epson will stop the definition and store the data in NV memory.  The user is required to erase the NV memory before the address can be overwritten.
1C 71 n [xL xH yL yH...	Define NV bit image	The width is limited to 576 dots wide and 255 rows high.

---

## Commands Not Supported in Emulation Mode

In Epson emulation mode, the SureMark printer supports all Epson commands except the page mode commands and smoothing. Table 22 lists the commands that are not supported.

*Table 22. Commands Not Supported in Epson Emulation Mode*

Hex Command	ASCII Command	Description of Limitation
18	CAN	Cancel print data in page mode
1B 0C	ESC FF	Print data in page mode
1B 4C	ESC L	Select page mode
1B 54 n	ESC T n	Select print direction in page mode
1B 57 xL xH yL yH ...	ESC W xL xH yL yH...	Set printing area in page mode
1D 24 nL nH	GS \$ nL nH	Set absolute vertical print position in page mode
1D 5C nL nH	GS \ nL nH	Set relative vertical print position in page mode
1D 62 n	GS b n	Turn smoothing mode on or off

---

## Connectivity Differences

The connectivity differences between an Epson single-station printer and the SureMark single-station printers are:

- The Epson printer offers a parallel interface that the SureMark printer does not support.
- The following RS-232 modes of communication, which are supported by the Epson single-station printer, are not supported by the SureMark printer:
  - 2.4K and 4.8K baud
  - 7 bits of data
  - Parity
  - More than one stop bit
  - 25-pin D shell
- To attach the printer to a standard PC serial port:
  - The Epson single-station printer requires a Null Modem cable.
  - The SureMark requires a standard 9-pin D-shell RS-232 cable.

---

## Appendix G. Notices

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

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Elektromagnetische Verträglichkeit

### **Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995 (bzw. der EMC EG Richtlinie 89/336)**

Dieses Gerät ist berechtigt in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die IBM Deutschland Informations systeme GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2:

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

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EN 50082-1 Hinweis:

"Wird dieses Gerät in einer industriellen Umgebung betrieben (wie in EN 50082-2 festgelegt), dann kann es dabei eventuell gestört werden. In solch einem Fall ist der Abstand bzw. die Abschirmung zu der industriellen Störquelle zu vergrößern."

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## Index

### Numerics

- 4610 DBCS Installation Utility Diskette 31
- 4610CVNT.EXE program 34

### A

- AIP46MC5.HEX file 37
- AIPFNT46.EXE program 35
- align positions command 134
- application program requirements 9
- asynchronous commands 155

### B

- bar code commands
  - enable PDF417 truncation 148
  - print bar code 142
  - print PDF417 bar code 147
  - select aspect ratio PDF417 bar code 148
  - select bar code height 146
  - select font for HRI 146
  - select horizontal size of bar code 145
  - select PDF417 ECC level 147
  - select printing position of HRI 146
- bar codes, supported 10
- batch printing command 157
- baud rate selection, RS-232 23

### C

- cancel high quality print mode 128
- cash drawer drive pulse command 153
- cash drawer pin assignments 80
- changing printer mode, DBCS to SBCS 42
- character fonts 93
- cleaning
  - thermal printhead (models TF7 and TM7) 66
  - thermal printhead (Models TI5 and TG5) 53
- code page
  - code page 1381 92
  - code page 437 84
  - code page 858 85
  - code page 860 86
  - code page 863 87
  - code page 865 88
  - code page 932 89
  - code page 949 90
  - code page 950 91
  - generic 83
  - resident 82
  - resident SBCS 9
- code page command, set 129
- commands, immediate 79
- communication interfaces 6
- communication mode selection
  - RS-232 23
  - USB 25

- consumable supplies 73
- controls, printer
  - models TF7 and TM7 63
  - models TI5 and TG5 47
- conversion utility, proportional fonts 43

### D

- data buffer management command 157
- data buffer management commands
  - disable line count 157
  - hold printing 157
  - reset line count 157
- DBCS address vectors 125
- DBCS code page
  - available DBCS 10
  - download 31
  - font files 33
  - UDC font files 36
- DBCS code page download
  - 4610 DBCS Installation Utility Diskette 31
  - POSS for Windows 33
- DBCS user-defined character download 35
- define document wait time command 136
- dimensions, physical 7
- disable feed buttons 138
- disable line count command 157
- disable the beeper 138
- disable two-color printing 141
- disable upside-down printing 139
- diskettes
  - related x
- document handling
  - landscape mode 158
  - portrait mode 158
- document insert forms 74
- double-high mode command, set or cancel 127
- double-wide mode command, set or cancel 126
- download DBCS code page
  - 4610 DBCS Installation Utility Diskette 31
  - POSS for Windows 33
- download double-byte characters command 117
- download graphics (logo) commands 109
- download user-defined characters command 112
- DTR and DSR
  - control description 23
  - selection 23

### E

- EC request command 156
- electronic emission notices 173
- electronic journal data, upload during emulation 163
- emphasized printing command, set or cancel 128
- emptying printer buffer 41
- emulating Epson single-station printer
  - commands with limited support 171

- emulating Epson single-station printer *(continued)*
  - connectivity differences 172
  - enabling 42
  - fully-supported commands 169
  - limitations 42
  - overview 41
  - unsupported commands 172
- emulating Mod 3 or 4 printer
  - enabling with 4610 DBCS Installation Utility Diskette 39
  - enabling with 4690 On-Line Terminal Diagnostics 40
  - limitations 40
  - upload electronic journal data 163
- enable feed buttons 138
- enable the beeper 138
- enable two-color printing 141
- enable upside-down printing 139
- erase flash EPROM sector command 121
- error recovery command, set 135
- exercise program command 107
- extended address command 107

## F

- feed paper using minimum units command 149
- fillers, installing
  - for RS-232/RS-485 printers 19
  - for USB printers 21
- firmware, updating
  - 4610 DBCS Installation Utility Diskette 36
  - 4690 OS utility program 38
  - limitation 39
  - POSS for Windows 37
  - via RS-232 attachment 38
- fix font matrix 141
- flash memory
  - printing 41
  - usage 79
- flash storage write command 121
- fonts
  - character 93
  - files for DBCS code pages 33
  - impact printing 94
  - thermal printing 93
  - UDC files for DBCS code pages 36
- fonts, character 93
- form feed, and cut command 149

## G

- general description 77
- generic code page 83

## H

- hardware requirements 8
- hold printing command 157
- horizontal tabs command, set 133
- humidity requirements 7

- immediate commands 79
- impact code page 116
- indicators, printer
  - models TF7 and TM7 63
  - models TI5 and TG5 47
- information, planning 5
- installation, Model TI5
  - fillers for USB printers 21
  - for RS-232/RS-485 communication 12
  - for USB communication 15
  - power-on self-test, models TI5 and TG5 55
  - preparation 11
  - problem determination, Models TI5 and TG5 59
  - testing, Models TI5 and TG5 55
  - unpacking 11
- installation, models TF7 and TM7
  - power-on self-test, models TF7 and TM7 67
  - problem determination, models TF7 and TM7 70
  - testing, models TF7 and TM7 67
- installing filler
  - for RS-232/RS-485 printer 19
- introduction 3
- invert command, set or cancel 127

## L

- landscape printing commands 159
- left margin command, set 133
- limitations 6
- line spacing, minimum units 132
- line spacing, select 1/6 131
- line spacing, select 1/8 131

## M

- memory units 79
- microcode tolerance (MCT)
  - loading command 122
  - request command 123
- miscellaneous commands
  - generate drive pulse for cash drawer 153
  - paper cut/DI eject 153
  - retrieve flash storage 154
  - retrieve size of user flash storage 154
  - select printhead location 153
  - tab to next tab 152
- model description 4
- multipart form specifications 75

## N

- notices
  - electronic emission 173
  - FCC statement 173
  - safety information xi

updated March 18, 2002

## O

- offline test, model TI5
  - customer receipt test 56
  - document insert test 56
- offline test, models TF7 and TM7
  - customer receipt 68
  - test pattern 69
- onetime-set commands 109
- operating system requirements 9
- overline mode command, set or cancel 127
- overview 3

## P

- paper specifications 73
- paper width 77
- parameters, serial RS-485 80
- physical dimensions 7
- pin assignments
  - cash drawer connector 80
  - RS-232 connector 80
  - USB connector 81
- planning information 5
- power requirements 8
- predefine messages command 111
- predefined messages command 152
- preset commands
  - DBCS address vectors 125
  - download double-byte characters 117
  - download graphics (logo) 109
  - download user-defined characters 112
  - erase flash EPROM sector 121
  - flash storage write 121
  - MCT information – loading 122
  - MCT information – request 123
  - predefine messages 111
  - proportional font 114
  - send checksum of flash EPROM sector 122
- print and feed n lines command 149
- print and line feed command (CR) 149
- print and line feed command (LF) 148
- print character commands 148
- print head cleaning, thermal head 53
- print logo inline 141
- print mode command, set 125
- print predefined graphics (logo) command 151
- print station command, set 128
- print station parameters command, set 130
- print width 77
- printer, model TI5
  - indicators and controls 47
  - installing for RS-232/RS-485 12
  - installing for USB 15
  - installing RS-232/RS-485 fillers 19
  - installing USB fillers 21
  - operation 47
  - paper loading 51
  - ribbon loading 49
  - ribbon specifications 75

- printer, models TF7 and TM7
  - indicators and controls 63
  - operation 63
  - paper loading 63
- printhead cleaning, thermal
  - models TF7 and TM7 66
  - Models TI5 and TG5 53
- printing flash memory 41
- printing saved data 41
- problem determination, model TI5
  - customer receipt test 56
  - messages 59
  - symptoms 59
- problem determination, models TF7 and TM7
  - customer receipt test 68
  - symptoms 70
- programming information 100
- proportional font command 114
- proportional fonts
  - conversion utility 43
  - implementing 165
  - layout using alignment 165
  - layout using tabs 166
- publications
  - CD-ROM x
  - Web site x
- publications, related x

## R

- real-time commands 155
- real-time status request command 156
- reinitialize the printer command 137
- related publications and diskettes x
- relative position command, set 134
- release print buffer command 156
- request printer ID command 107
- requirements
  - application programs 9
  - hardware 8
  - humidity 7
  - operating system 9
  - power 8
  - software 9
  - temperature 7
- reset line count command 157
- reset printer 156
- resetting the printer
  - models TF7 and TM7 70
  - Models TI5 and TG5 59
- resident SBCS code pages 9
- Retail Store Solutions Web site 43
- retrieve flash storage command 154
- retrieve flash storage size command 154
- retrieve printer usage statistics command 154
- ribbon loading 49
- ribbons, print 75
- rotated characters command, set or cancel 130
- RS-232 commands 100
  - 1/6-in. line spacing, select 131
  - 1/8-in. line spacing, select 131

RS-232 commands (*continued*)

- align positions 134
- asynchronous 155
- batch printing 157
- character for reprinted line, select 137
- data buffer management 157
- define document wait time 136
- disable line count 157
- document handling 157
- download double-byte characters 117
- download graphics (logo) 109
- download user-defined characters 112
- EC request 156
- emphasized printing, set or cancel 128
- enable or disable the beeper 138
- enable or disable two-color printing 141
- enable or disable upside-down printing 139
- enable PDF417 truncation 148
- erase flash EPROM sector 121
- exercise program 107
- extended address command 107
- feed buttons 138
- feed minimum units 149
- feed n lines 149
- fix font matrix 141
- flash storage write 121
- form feed and cut 149
- generate drive pulse for cash drawer 153
- high quality print mode 128
- hold printing 157
- impact code page 116
- landscape printing 159
- line spacing, minimum units 132
- microcode tolerance, loading 122
- microcode tolerance, request 123
- onetime-set 109
- paper cut/DI eject 153
- predefine messages 111
- preset 109
- print and line feed (CR) 149
- print and line feed (LF) 148
- print bar code 142
- print character 148
- print font, select HRI 146
- print logo inline 141
- print mode, set 125
- print PDF417 bar code 147
- print position, select HRI 146
- print predefined logo 151
- print predefined messages 152
- print station, set 128
- printhead home position, select 153
- proportional font 114
- real-time request 156
- real-time status request 156
- reinitialize 137
- release print buffer 156
- request ID 107
- reset 156
- reset line count 157
- retrieve flash storage 154

RS-232 commands (*continued*)

- retrieve flash storage size 154
- retrieve printer usage statistics 154
- RS-232 parameters 81
- select and print logo 150
- select aspect ratio PDF417 bar code 148
- select character sets 129
- Select Character Size for Scalable Fonts 140
- select color printing 132
- select PDF417 ECC level 147
- send checksum flash EPROM sector 122
- send status to system 137
- set bar code height 146
- set bar code horizontal size 145
- set code page 129
- set error recovery 135
- set horizontal tabs 133
- set inter-character spacing 129
- set inter-character spacing – DBCS 130
- set left margin 133
- set or cancel double-high mode 127
- set or cancel double-wide mode 126
- set or cancel invert 127
- set or cancel overline mode 127
- set or cancel rotated characters 130
- set or cancel underline mode 127
- set relative position 134
- set sheet eject length 133
- setup 125
- station parameters 130
- status byte 1 160
- status byte 2 161
- status byte 3 161
- status byte 4 162
- status byte 5 162
- status byte 6 162
- status byte 8 162
- status request 107
- status summary 160
- tab to next tab 152
- thermal code page 113
- unidirectional printing, set or cancel 135
- verify previous commands completed 107
- RS-232 communication mode selections 23
- RS-232 pin assignments 80
- RS-485
  - parameters, serial 80

**S**

- saved data, printing 41
- select
  - 1/6-in. line spacing, select 131
  - 1/8-in. line spacing command 131
  - character for reprinted line command 137
  - character sets command 129
  - HRI (bar code) font 146
  - HRI (bar code) position 146
  - print graphics (logo) command 150
  - select printhead home position command 153
  - Select Character Size for Scalable Fonts 140

updated March 18, 2002

- select color printing command 132
- send checksum flash EPROM sector command 122
- send status to system command 137
- set high quality print mode 128
- set horizontal tabs command 133
- set inter-character spacing – DBCS command 130
- set inter-character spacing command 129
- setup commands
  - align positions 134
  - define document wait time 136
  - enable or disable the beeper 138
  - enable or disable the feed buttons (models TI5 and TG5) 138
  - enable or disable two-color printing 141
  - enable or disable upside-down printing 139
  - fix font matrix 141
  - print logo inline 141
  - reinitialize the printer 137
  - select 1/6–inch line spacing 131
  - select 1/8–inch line spacing 131
  - select character for reprinted lines 137
  - select character size for scalable fonts 140
  - select color printing 132
  - select user-defined or resident character set 129
  - set code page 129
  - set error recovery function 135
  - set horizontal tab positions 133
  - set inter-character spacing 129
  - set inter-character spacing – DBCS 130
  - set left margin position 133
  - set line spacing using minimum units 132
  - set or cancel double-high mode 127
  - set or cancel double-wide mode 126
  - set or cancel emphasized printing 128
  - set or cancel high quality print mode 128
  - set or cancel invert mode 127
  - set or cancel overline mode 127
  - set or cancel rotated characters 130
  - set or cancel underline mode 127
  - set or cancel unidirectional printing 135
  - set print mode 125
  - set print station 128
  - set print station parameters 130
  - set relative position 134
  - set sheet eject length 133
  - status sent to system 137
- sheet eject length command, set 133
- single form specifications 75
- software adjustments
  - updating firmware 36
  - using 4690 operating system 27
  - using POS Device Diagnostics 28
  - using reference/service diskette 28
- software requirements 9
- specifications
  - cash drawer pins 80
  - document insert forms 74
  - fonts 93
  - memory 79
  - multipart forms 75
  - paper 73

- specifications (*continued*)
  - paper width 77
  - pitch 77
  - print ribbons 75
  - print width 77
  - RS-232 pins 80
  - RS-485 serial I/O 80
  - single form 75
  - speed 77
  - thermal paper 73
  - USB pins 81
- speed, print 77
- status
  - request 107
  - summary 160
- status byte 1 160
- status byte 2 161
- status byte 3 161
- status byte 4 162
- status byte 5 162
- status byte 6 162
- status byte 8 162
- status request command 107
- supplies, where to order 73
- system commands
  - exercise program 107
  - extended address command 107
  - request printer ID 107
  - status request 107
  - verify previous commands completed 107

## T

- tab to next tab stop command 152
- technical information 77
- temperature requirements 7
- testing the SureMark
  - models TF7 and TM7 67
  - Models TI5 and TG5 55
- thermal code page 113
- thermal paper specifications 73
- trademarks 176
- TrueType fonts conversion utility 43

## U

- UDC font file names 36
- underline mode command, set or cancel 127
- unidirectional printing command, set or cancel 135
- unpacking the printer 11
- upload electronic journal data during emulation 163
- USB communication mode 25
- USB pin assignments 81

## V

- verify previous commands completed 107
- voltage conversion circuitry 79

## **W**

- wall mounting feature, single-station printers 18
- where to order supplies 73

## **X**

- XON and XOFF
  - control description 24
  - selection 23

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DBCS User's Guide

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