

# Advanced Function Presentation: Printer Information

G544-3290-04





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**Note!**

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This publication is intended to help you identify differences between IBM printers and the software used to drive the printers.

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Advanced Function Common Control Unit	AFCCU
Advanced Function Presentation	AFP
Advanced Function Printing	AFP
	AIX
	AIX/6000
Application System/400	AS/400
Bar Code Object Content Architecture	BCOCA
BookMaster	
(Enterprise Systems Connection)	ESCON
(Graphical Data Display Manager)	GDDM
Intelligent Printer Data Stream	IPDS
(International Business Machines)	IBM
Micro Channel	
(Mixed Object Document Content Architecture)	MO:DCA
(Multiple Virtual System)	MVS
Operating System/2	OS/2
Operating System/400	OS/400
Page Printer Data Stream	PPDS
Personal System/2	PS/2
Presentation Manager	
PrintManager	
Print Services Facility	PSF
(Print Services Facility/6000)	PSF/6000
Proprinter	
Quietwriter	
RISC System/6000	RS/6000
Systems Application Architecture	SAA
System/370	S/370
System/390	S/390
(Virtual Machine)	VM
(Virtual Storage Extended)	VSE

(Virtual Telecommunications Access Method) VTAM

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## Summary of Changes

Vertical bars in the left margins of this publication show changes from the previous edition. Since the last printing, the following information has been added, deleted, or changed:

- Information about AFP on OS/400, which in OS/400 3.1.0 developed into the Print Services Facility for OS/400 (PSF/400) feature, has been added throughout.
- References to Remote PrintManager 2.0 have been removed and replaced with PSF Direct, a feature on PSF/2 and PSF/6000 that provides a similar function.
- References to Remote PrintManager 3.0 have been removed and replaced with Distributed Print Facility (DPF), a feature on PSF/2 that provides a similar function.
- The term *fully described font* has been replaced by the more familiar term *raster font*.
- New composite tables showing the unprintable areas and the supported data streams have been added.
- Information about new printer attachments (TCP/IP, ESCON serial channel) has been added.
- Information about the following new printers or models has been added:
  - 3130 Advanced Function Printer
  - 3900-0W1 Advanced Function Printer
  - 3900 Advanced Function Duplex Printing System
  - 3900 Advanced Function Wide Duplex Printing System
  - 3912 Page Printer
  - 3916 Page Printer
  - 3930 Page Printer
  - 3935 Advanced Function Printer
  - 4230 Printer Model 5I3
  - LaserPrinter 4039 Series
  - 6408 Line Matrix Printer
  - 6412 Line Matrix Printer
- Appendix B, which lists printer resident fonts, has been added.



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## Chapter 1. Introducing AFP Printers

This publication provides specific information about printers supported by Advanced Function Presentation (AFP) printer-driver software on the following hardware platforms: System/370 and System/390, PS/2, AS/400, RISC System/6000, and PS/55.

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### About This Publication

This publication assumes that you understand AFP printers, have basic programming knowledge, and are familiar with writing applications for AFP printer-driver software on your operating system.

Use this publication if you are submitting print jobs to printers supported by AFP software running on the MVS, VM, VSE, OS/2, OS/400, or AIX/6000 operating systems. The publication does not contain specific information about printing on the OS/2-J1.3 operating system.

### Finding Additional Information about Printing

- For information about printing with Print Services Facility/MVS, Print Services Facility/VM, and Print Services Facility/VSE, refer to the PSF programming guides for your operating system.
- For information about printing with Print Services Facility for OS/2, refer to *How to PSF/2*.
- For more information about printing with Print Services Facility for OS/400, refer to *AS/400 Printer Device Programming*.
- For more information about printing with Print Services Facility for AIX, refer to *IBM Print Services Facility for AIX: Print Administration* and *IBM Print Services Facility for AIX: Print Submission*.
- For information about printing with Workstation PrintManager (WPM) on the OS/2-J1.3 operating system running on PS/55, refer to the publications listed under "Personal System/55" on page 541.
- For more information about a particular printer, refer to your printer publications.

### Understanding Terms Used in This Publication

This publication uses the following names, usually in the abbreviated form. Other abbreviated terms and names are listed in “Notices” on page xxv.

Distributed Print Function of PSF/2	DPF
Graphical Data Display Manager	GDDM
Overlay Generation Language/370	OGL/370
Page Printer Formatting Aid/370	PPFA/370
Personal System/55	PS/55
Print Services Facility	PSF
Print Services Facility/MVS	PSF/MVS
Print Services Facility/VM	PSF/VM
Print Services Facility/VSE	PSF/VSE
Print Services Facility for OS/2	PSF/2
Print Services Facility for OS/400	PSF/400
Print Services Facility for AIX	PSF/6000
RISC System/6000	RS/6000 <sup>1</sup>

The following are generic terms used in this publication, with a description of how those terms apply to your system:

- **File**

- In PSF/MVS, a member of a partitioned data set or a sequential data set
- In PSF/VM, a CMS file
- In PSF/VSE, a member in a library.sublibrary
- In PSF/2, a collection of related data
- In PSF/400, an object that defines a set of related records
- In PSF/6000, a collection of related data

- **Library**

- In PSF/MVS, a partitioned data set or a series of concatenated data sets
- In PSF/VM, a collection of CMS files, generally with the same file type
- In PSF/VSE, a library.sublibrary
- In PSF/2, a directory, a list of files
- In PSF/400, an object on disk that serves as a directory to other objects
- In PSF/6000, a directory, a list of files

The following are descriptions of new functions mentioned in the publication.

Figure 1 on page 3 then compares the functions provided by PSF Direct, DPF, and RPM 2.0.

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<sup>1</sup> The abbreviation RS/6000 is used only to fit into the small columns in the tables; it is not an official abbreviation.



## Distributed Print Function (DPF)

Distributed Print Function (DPF) is a component of PSF/2 that you can use to print jobs sent from PSF/MVS, PSF/VM, PSF/VSE, and PSF/400. DPF receives PSF data and resources for spooling and printing and sends print files to printers attached to PSF/2 on a Local Area Network (LAN). DPF also stores PSF/MVS and PSF/VSE resources in the DPF resource library, so that the host does not have to send the resources each time documents are spooled. Through DPF, PSF/2 provides a function similar to that Remote PrintManager (RPM) Version 3.0 provided under DOS.

## PSF Direct

PSF Direct is a function in PSF/2 and PSF/6000 that is similar to the pass-through function of PrintManager (RPM) 2.0. PSF Direct enables another PSF program (PSF/MVS, PSF/VM, PSF/VSE, and PSF/400) to print remotely, using the LU 6.2 SNA protocol, on PSF/2 or PSF/6000 printers, bypassing the OS/2 or RISC/6000 spool. The operator of the originating system controls printing on the PSF/2 and PSF/6000 printers as though the printers were attached to the originating system.

Because of increased storage and outline fonts resident in the printers containing the Advanced Function Common Control Unit (AFCCU, described below), PSF Direct does not provide resource caching (storing) at the *print server*. Support for resident fonts is provided by the PSF/MVS, PSF/VM, PSF/VSE, or PSF/400 programs.

Figure 1. Comparison of PSF Direct, DPF, and RPM

Functions	PSF Direct on PSF/2 and PSF/6000	DPF on PSF/2	RPM 2.0	RPM 3.0
PSF/MVS, PSF/VM, PSF/VSE, and PSF/400	x	x	x	(except PSF/400)
Basic N_UP (PSF/MVS, PSF/VSE, and PSF/400 only)	x		x	
Enhanced N_UP (PSF/MVS and PSF/VSE only)	x			
MVS Invoke command (PSF/MVS only)	x			
Printer-resident fonts	x			
Downloaded outline fonts (PSF/MVS only)	x			
Resource caching at PC		x	x	x
Spool to spool (deferred printing)		x		x
Host operator control of remote IPDS printers	x		x	
PC administrator control of printers		x		x
Communication protocol from Host	SNA	SNA	SNA	SNA
Number of printers per print server	16	10	1	1
Number of hosts per print server	4	4	1	1
Number of host sessions per print server	16	10	1	1

For more detailed explanations of DPF and PSF Direct, refer to *IBM Print Services Facility for OS/2: An Installation Cookbook for System/370 and Token Ring Networks*.

### **Advanced Function Common Control Unit (AFCCU)**

Some printers shipped after January, 1994 contain the Advanced Function Common Control Unit (AFCCU). The AFCCU, which is a RISC-based processor containing the Mechanism Interface Card (MIC), provides the following features:

- APA character downloading
- Fonts
  - Single-byte and double-byte code pages
  - Double-byte fonts: Japanese, Traditional Chinese, Simplified Chinese, Korean, and Thai
  - Downloaded raster and outline fonts
  - Resident outline fonts: IBM AFP Expanded Core fonts
  - Resolution-independent support of 240-, 300-, and higher-pel printheads
  - Standard features
    - Advanced Function Image and Graphics (AFIG)
    - Decompression Performance Enhancement (DPE)
    - Improved Memory Performance (IMP)
    - Scaling Performance Enhancement for Compressed Images
  - Permanent storage for the IBM Core Interchange fonts
- Support for a touch-screen control panel for the user interface
- Support for electronic forms
- Support for image printing
- Support for the following IPDS towers: PTOCA, IM, IOCA, GOCA, and BCOCA
- Printer attachments
  - System/370 parallel channel attachment
  - ESCON fiber-optic serial-channel attachment
  - Token Ring (TCP/IP)
  - Ethernet (TCP/IP)

Not all attachments are available with all printers, and other attachments are available, depending on the operating system. See the printer attachment tables later in this chapter.

- Data Streams
  - IPDS
  - ASCII
    - PCL5
    - PostScript Level 2
    - Data Stream Sniffing
- Advanced Function Finishing Control
- Pre- and post-processing support

The AFCCU printers described in this publication are:

- 3130 Advanced Function Printer Model 01S, Model 02S, and Model 02D (3130)
- 3900-0W1 Advanced Function Printer (3900-0W1)
- 3900 Advanced Function Duplex Printing System (3900 Duplex)
- 3900 Advanced Function Wide Duplex Printing System (3900 DW)
- 3935 Advanced Function Printer (3935)

## Differences Between Operating Systems

In general, the printer-specific information is described without regard to any one system or platform; however, some printer information is different for certain operating systems. When these differences occur, they are marked in the text with the following names in bold type:

**PSF/MVS**

**PSF/VM**

**PSF/VSE**

**PSF/2**

**PSF/400**

**PSF/6000**

## What the Chapters of This Publication Contain

This publication contains the following chapters:

- Chapter 1, “Introducing AFP Printers” contains tables summarizing the printer characteristics, the releases of the PSF programs that drive the printers, and the attachment modes for supported printers. The terms used in the tables are defined in the glossary. Tables supplied at the beginning of each printer chapter supply additional information about each printer.
- Chapter 2, “3130 Advanced Function Printer” through Chapter 27, “6408 and 6412 Line Matrix Printers” describe information for specific printers. Each chapter describes printer characteristics, the printable area, selecting the printing media, fonts, data types, storage, and pre- and post-processing devices.
- Appendix A, “Compatibility, Conversion, and Performance” provides information about:
  - Compatibility with impact printers
  - IBM 3800 page printers operating in compatibility mode
  - Converting jobs from a 3800 line printer to a page printer
  - Differences in addressing pels between Intelligent Printer Data Stream (IPDS) printers and the 3800
  - Compatibility with the IBM 6670
  - Compatibility with the IBM 4250
  - Compatibility among PSF-supported page printers
  - Reassignment of printing to alternate printers
  - Performance considerations
- Appendix B, “Printer-Resident Fonts” lists the resident fonts provided by the printers supported in AFP.
- Appendix C, “Related Publications” lists titles and order numbers for referenced publications and lists publications about specific printers.

---

### Listing the Printers Described in This Publication

This publication describes the following printers, usually referring to them only by the printer number:

3130 Advanced Function Printer Model 01S, Model 02S, and Model 02D (3130)  
3800 Printing Subsystem Model 3, Model 6, and Model 8 (3800)  
3812 Page Printer Model 2 (3812)  
3816 Page Printer Model 01S and Model 01D (3916)  
3820 Page Printer (3820)  
3825 Page Printer (3825)  
3827 Page Printer (3827)  
3828 Advanced Function MICR Printer (3828)  
3829 Advanced Function Printer (3829)  
3831 Page Printer Model 001 (available only in Japan) (3831)  
3835 Page Printer Model 001 (3835-001)  
3835 Advanced Function Printer Model 002 (3835-002)  
3900 Advanced Function Printer Model 001 (3900-001)  
3900-0W1 Advanced Function Printer (3900-0W1)  
3900 Advanced Function Duplex Printing System (3900 Duplex)  
3900 Advanced Function Wide Duplex Printing System (3900 DW)  
3912 Page Printer Model AS1 and Model NS1 (3912)  
3916 Page Printer Model AS1 and Model NS1 (3916)  
3930 Page Printer Model 02S, Model 02D, Model 03S, and Model 03D (3930)  
3935 Advanced Function Printer (3935)  
LaserPrinter 4019 Model E01 and Model 001 <sup>2</sup>  
LaserPrinter 4028 Model AS1 and Model NS1  
LaserPrinter 5E Model 4029-010 <sup>2</sup>  
LaserPrinter 6 Model 4029-020 <sup>2</sup>  
LaserPrinter 10 Model 4029-030 <sup>2</sup>  
LaserPrinter 10L Model 4029-040 <sup>2</sup>  
LaserPrinter 4039 Model 10D <sup>2</sup>  
LaserPrinter 4039 Model 10R Duplex <sup>2</sup>  
LaserPrinter 4039 Model 12L *plus* <sup>2</sup>  
LaserPrinter 4039 Model 12R *plus* <sup>2</sup>  
LaserPrinter 4039 Model 16L *plus* <sup>2</sup>  
4224 Printer Model 1xx and Model 2xx  
4230 Printer Model 102, Model 202, Model 211, Model 111, Model 413, and Model 513  
4234 Printer Model 07, Model 08, Model 011, and Model 012  
6408 Line Matrix Printer Model CTA  
6412 Line Matrix Printer Model CTA

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<sup>2</sup> These are not Intelligent Printer Data Stream (IPDS) printers but are supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. PSF/MVS, PSF/VM, PSF/VSE, and PSF/400 then support the printers through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct function of PSF/2 and PSF/6000. The printers accept 1-way communication from the host and do not return information regarding error conditions, availability of resources, or device status.

## Supported PSF Software

The following is a list of the levels of the PSF printer-driver software supported by IBM as of the printing of this publication. Customers may be using other levels, but these levels are the ones IBM currently supports.

- PSF/MVS 2.1.0
    - APAR OW04104 (Support for the 64xx printers)
    - APAR OW08127 (Support for the 3130 printer)
    - APAR OY51438 (Distributed Print Function)
    - APAR OY66024 (Support for the 3912, 3916, and 3930 printers)
    - APAR OY67182 (Support for the 3935 printer)
    - APAR OY67184 (Support for the 3900 follow-on printers)
  - PSF/MVS 2.1.1
    - APAR OW04104 (Support for the 64xx printers)
    - APAR OW08127 (Support for the 3130 printer)
    - APAR OW08338 (PSF Direct)
    - APAR OY66024 (Support for the 3912, 3916, and 3930 printers)
    - APAR OY67182 (Support for the 3935 printer)
    - APAR OY67184 (Support for the 3900 follow-on printers)
  - PSF/MVS 2.2.0
    - APAR OW08127 (Support for the 3130 printer)
    - APAR OW04104 (Support for the 64xx printers)
    - APAR OW08338 (PSF Direct)
  - PSF/VM 2.1.0
    - APAR PN23680 (Distributed Print Function)
    - APAR PN58974 (Support for the 3900 follow-on printers)
    - APAR PN62804 (PSF Direct)
    - PUT9302 (Support for the 3130, 3912, 3916, and 3930 printers)
  - PSF/VM 2.1.1
    - APAR PN23680 (Distributed Print Function)
    - APAR PN58974 (Support for the 3900 follow-on printers)
    - APAR PN62804 (PSF Direct)
    - PUT9302 (Support for the 3130, 3912, 3916, and 3930 printers)
  - PSF/VSE 2.2.0 and 2.2.1 with Distributed Print Function
    - APAR DY42988 (Support for the 3912, 3916, and 3930 printers)
    - APAR DY43012 (Support for the 3935 printer)
    - APAR DY43296 (Support for the 3900 follow-on printers)
    - APAR DY43428 (PSF Direct)
  - PSF/2 2.00 with Distributed Print Function
  - PSF/2 2.00 with PSF Direct
  - AFP in OS/400 2.2.0
    - Cum tape C4270220 (Distributed Print Function)
    - APAR SA33540 (Support for the 3935 printer)
  - AFP in OS/400 2.3.0
    - Cum tape C4193230 (Support for the 3935 printer)
    - APARs SA35768 and SA37965 (Support for the 3900 follow-on printers)
  - AFP in OS/400 3.0.5
    - Cum tape C4263305 (Support for the 3935 printer)
    - APARs SA36697 and SA40547 (Support for the 3900 follow-on printers)
- In OS/400 3.1.0, the PSF product became a separately orderable feature rather than part of the OS/400 operating system.
- PSF/400 3.1.0
    - APAR SA40831 (PSF Direct)

## Introduction

- APAR SA40545 (Support for the 3130 printer)
- PSF/6000 1.2.0
  - APAR IX46492 (PSF Direct)

## Printer Characteristics and PSF-Supported Functions

When you prepare an application to be printed on a PSF-supported printer, you should consider certain printer characteristics. Although the printers have many capabilities and functions in common, some differences exist. This publication describes printer characteristics and functions that are important when you are:

- Preparing an application for use on only one type of printer
- Deciding which printer to use for an application
- Preparing an application that can be printed on more than one type of printer

This publication does not include every difference among printers, only those that may affect using the printer with PSF. For example, forms feed from left to right in a 3820 but from right to left in a 3825. This difference is not important to PSF and is not described. For more information about a specific printer or for information about other printer characteristics, refer to the printer publications.

Printer characteristics as shown in Figure 2, Figure 3, and Figure 4 are supported similarly by PSF programs that support the printer on the different operating systems. An example of a printer characteristic is the medium on which the printer prints: continuous forms or cut-sheet. The printer hardware determines the medium, and PSF uses what is provided.

In contrast, PSF-supported functions can differ across operating systems and releases. For example, some releases of the PSF licensed programs support graphics and bar codes, whereas earlier releases do not.

## Printer Characteristics

Figure 2, Figure 3 on page 10, and Figure 4 on page 12 summarize some of the printer characteristics described in this publication.

Figure 2 (Page 1 of 2). Printer Characteristics. Table 1 of 3.

Printers and their characteristics	3130 -01S -02S, -02D	3800-3, -6, -8	3812-2	3816 -01S -01D	3820	3825	3827	3828	3829	3831
Continuous forms		x								x
Cut-sheet	x		x	x	x	x	x	x	x	
Alternate media source	x		x	x	x	x	x	x	x	
Alternate media destination	x									
Media source by copy	x									
Manual forms feed										
Envelope printing										
MICR printing								x		
Duplex printing	-02D only			-01D only	x	x	x	x	x	

Figure 2 (Page 2 of 2). Printer Characteristics. Table 1 of 3.

Printers and their characteristics	3130 -01S -02S, -02D	3800-3, -6, -8	3812-2	3816 -01S -01D	3820	3825	3827	3828	3829	3831
Forms flash		x								
Double-byte fonts	A	-8, -6 B			x	x	x	x	x	x
Outline fonts	x									
N_UP Printing	C					C	C	C	C	
Color selection			D	D						
Print-quality levels										
Gray-scale image			x	x						
Operator-adjustable forms		x				x	x	x	x	x
Exception highlighting										
Print-error markers	x	x			x	x	x	x	x	x
Print-error vectors			x	x						
Disabled mechanisms	x					x	x	x	x	
Printhead resolution (pels per inch)	240 and 300 E	240	240	240	240	240 F	240	480E G	480E G	240
Maximum printing rate (impressions per minute, ipm)	30	215 (-3, -8) 134 (-6)	12	24	20	58	92	92	92	22
Maximum impressions per month (duty cycles)	200 000	4.5 million (-3,-8) 2.8 million (-6)	40 000	80 000	100 000	1 million	2 million	2 million	2 million	70 000

**Notes:**

**ipm** Impressions per minute, for 8.5 by 11 inch sheets. Refer to your printer publications for specific information on printing rates.

**A** With the Double-byte Character Set (DBCS) Font Package and the 540MB hard drive.

**B** Only with RPQ #8A5008, which is available in a limited distribution area.

**C** Supports basic N\_UP printing by PSF/MVS 2.2.0, PSF/VSE 2.2.1, and PSF/400 3.1.0, with the correct levels of both printer microcode and PSF software. The 3130 supports both basic and enhanced N\_UP printing.

**D** Color selection is the ability to specify a color other than black to achieve more than one color of printed data. The 4224-1C2 and -2C2 support selection of up to 8 colors, depending on the type of ribbon installed in the printer. Other printers support the selection of black or the *color of the medium*, which can cause white lettering on a background that has been shaded black, for example.

**E** Selected by an operator-controlled switch.

**F** With 240-pel addressability enhanced.

**G** 480E is 2-by-240 pels enhanced.

## Introduction

Figure 3 (Page 1 of 2). Printer Characteristics. Table 2 of 3.

Printers and their characteristics	3835 -001 -002	3900 -001	3900 -0W1	3900 DW	3900 Duplex	3912 3916 -AS0 -AS1 -NS0 -NS1	3930 -02S -02D -03S -03D	3935
Continuous forms	x	x	x	x	x			
Cut sheet						x	x	x
Alternate media source						x	x	x
Alternate media destination								x
Media source by copy								x
Manual forms feed						x		
Envelope printing						x		
MICR Printing	A	B	B	B	B			
Duplex printing				x	x	x	x	x
Forms flash								
Double-byte fonts	x	x	x	x	x		x	x
Outline fonts			x	x	x	C	C	x
N_UP Printing	D	D	E	E	E			E
Color selection							F	
Print-quality levels								
Gray-scale image							x	
Operator-adjustable forms	x	x	x	x	x			
Exception highlighting								
Print-error markers	x	x	x	x	x			x
Print-error vectors							x	
Disabled mechanisms	x	x	x	x	x			x
Printhead resolution (pels per inch)	240	240	240	240	240	300 (600 with Post-Script)	240 (-02S, -02D); 300 (-03S, -03D)	300
Maximum printing rate (impressions per minute, ipm)	88 (-001) 91 (-002)	229	229	150 (simplex) 300 (duplex)	150 (simplex) G 300 (duplex)	12 16	30	35



Figure 3 (Page 2 of 2). Printer Characteristics. Table 2 of 3.

Printers and their characteristics	3835-001-002	3900-001	3900-0W1	3900-DW	3900-Duplex	3912-3916-AS0-AS1-NS0-NS1	3930-02S-02D-03S-03D	3935
Maximum impressions per month (duty cycles)	1.8 million (1.3 million feet)	5.6 million (4 million feet)	5.6 million (4 million feet) H	7.3 million (5.2 million feet) I	7.3 million (5.2 million feet)	3912, 50 000; 3916, 75 000	150 000	200 000

**Notes:**

- ipm** impressions per minute, for 8.5 by 11 inch sheets. Refer to your printer publications for specific information on printing rates.
- A** For the 3835-001, only with the 3835 MICR Printing RPQ. For the 3835-002, only with the Advanced Function Post Processing Interface Feature #4720.
- B** With a MICR post-processing device and with the Advanced Function Post Processing Interface Feature #4720.
- C** PostScript and PCL outline fonts, only when printing in PostScript-emulation or PCL5-emulation mode.
- D** Supports basic N\_UP printing, with the correct levels of both printer microcode and PSF software.
- E** Supports both basic and enhanced N\_UP printing, with the correct levels of both printer microcode and PSF software (PSF/MVS 2.2.0 APAR OW03243, PSF/VSE 2.2.1 APAR DY43519, and PPFA/370 1.1.0 APAR PN54401). PSF/400 3.1.0 supports basic N\_UP only, however, on this printer.
- F** The ability to specify a color other than black to achieve more than one color of printed data. The 4224-1C2 and -2C2 support selection of up to 8 colors, depending on the type of ribbon installed in the printer. Other printers support the selection of black or the *color of the medium*, which can cause white lettering on a background that has been shaded black, for example.
- G** With feature 4241 installed on 3900-D01 and feature 4242 installed on 3900-D02, the maximum printing rate in Dual Simplex Mode can be up to 229 ipm.
- H** Printing two 8.5 by 11-inch pages side-by-side (multiple-up printing), the maximum can be 8.7 million impressions per month.
- I** Printing two 8.5 by 11-inch pages side-by-side (multiple-up printing), the maximum can be 11.3 million impressions per month.

# Introduction

Figure 4 (Page 1 of 2). Printer Characteristics. Table 3 of 3.

Printers and their characteristics	4019 -E01 -001	4028 -AS1 AS/400 RS/6000 -NS1 S/390 PS/2 RS/6000	4029 -010 -020 -030 -040	4039 -10D -10R -12L -12R -16L	4224 -1xx AS/400 -2xx S/390	4230 -111 -102 -413 AS/400 -211 -202 -513 S/390	4234 -08 -12 AS/400 -07 -011 S/390	64xx -CTA
Continuous forms					x	x	x	x
Cut sheet	x	x	x	x	A	A		
Alternate media source	x	x	x	x	B	B		
Alternate media destination								
Media source by copy								
Manual forms feed	x	x	x	x	A	A		
Envelope printing	x	x	x	x				
MICR Printing								
Duplex printing				C				
Forms flash								
Double-byte fonts								
Outline fonts				S				
N_UP Printing								
Color selection		D			D	D		x
Print-quality levels					x	x	x	x
Gray-scale image		x	E	x				
Operator-adjustable forms					x	x		x
Exception highlighting Print-error markers Print-error vectors		x						
Disabled mechanisms								
Printhead resolution (pels per inch)	300	300	300	300 600	144	144	144	120 x 144
Maximum printing rate (impressions per minute, ipm)	5-10 F	10	5-10 G	H	I	J	K	L

Figure 4 (Page 2 of 2). Printer Characteristics. Table 3 of 3.

Printers and their characteristics	4019 -E01 -001	4028 -AS1 AS/400 RS/6000 -NS1 S/390 PS/2 RS/6000	4029 -010 -020 -030 -040	4039 -10D -10R -12L -12R -16L	4224 -1xx AS/400 -2xx S/390	4230 -111 -102 -4I3 AS/400 -211 -202 -5I3 S/390	4234 -08 -12 AS/400 -07 -011 S/390	64xx -CTA
Maximum impressions per month (duty cycles)	20 000	20 000	M	N	O	P	Q	R

**Notes:**

- ipm** Impressions per minute, for 8.5 by 11 inch sheets. Refer to your printer publications for specific information on printing rates.
- cps** Characters per second
- lpm** Lines per minute
- ppm** Pages per minute
- A** With the optional Document-Insertion Device or the Automatic Sheet Feed Device.
- B** With the optional Automatic Sheet Feed Device.
- C** Models 10D and 10R only.
- D** Color selection is the ability to specify a color other than black to achieve more than one color of printed data. The 4224-2C2 and -2C2 support selection of up to 8 colors, depending on the type of ribbon installed in the printer. Other printers support the selection of black or the *color of the medium*, which can cause white lettering on a background that has been shaded black, for example.
- E** Supported by the printer but not supported by PSF.
- F** The 4019-E01 prints 5 ppm; the 4019-001 prints 10 ppm.
- G** The 4029-010 prints 5 ppm; the 4029-020 prints 6 ppm; the 4029-030 prints 10 ppm; the 4029-040 prints 10 ppm.
- H** The 4039-10D and -10R print up to 10 pages per minute (ppm); the 4039-12L and -12R print up to 12 ppm; the 4039-16L prints up to 16 ppm, depending on the print-head resolution.
- I** The 4224 prints between 200 and 600 cps in Data Processing (DP) quality, between 100 and 300 cps in Data Processing Text (DPT) quality, and between 50 and 150 cps in Near Letter Quality (NLQ), depending on the model.
- J** The 4230 prints between 375 and 480 cps in Fast Draft quality, between 300 and 400 cps in DP quality, between 150 and 200 cps in DPT quality, and between 75 and 100 cps in NLQ, depending on the model.
- K** Depending on the model, the 4234 prints:
- Up to 800 lpm in draft quality
  - Up to 600 lpm in DP quality
  - Up to 200 lpm in near letter quality
- L** Depending on the print quality selected:
- The 6408 prints from 320 lpm to 800 lpm.
  - The 6412 prints from 480 lpm to 1200 lpm.
- M** The 4029-010 and the 4029-020 print 1000 to 12 000 impressions per month; the 4029-030 and the 4029-040 print 2000 to 20 000 impressions per month.
- N** 4039 impressions per month (imp):
- 4039-10D: up to 12 500 (duplex impressions)
  - 4039-10R: up to 25 000
  - 4039-12R: up to 35 000
  - 4039-12L: up to 50 000
  - 4039-16L: up to 75 000
- O** In data processing (DP) quality, the 4224-1xx prints approximately 6000 impressions per month; the 4224-2xx prints approximately 9500 impressions per month.
- P** The 4230 prints approximately 10 000 impressions per month in DP quality.
- Q** The 4234 prints approximately 30 000 impressions per month in DP quality.
- R** 64xx impressions per month:
- The 6408 prints an average of 30 000 impressions per month, to a maximum of 75 000 impressions per month.
  - The 6412 prints an average of 60 000 impressions per month, to a maximum of 150 000 impressions per month.
- S** Only when running in PostScript-emulation or PCL5-emulation mode.

## PSF-Supported Font Technologies

Figure 5 summarizes the PSF-supported font technologies by printer. Additional information about resident fonts is provided in Appendix B, "Printer-Resident Fonts." Although raster fonts are sometimes called fully described fonts, and downloaded fonts are sometimes called host fonts, this publication uses the terms raster and downloaded fonts.

Figure 5 (Page 1 of 2). Font Technologies Supported by AFP Printers

Printer	Single-Byte Raster 1	Single-Byte Outline	Single-Byte Symbol Set	Double-Byte Raster 2	Double-Byte Outline
<b>3130</b> 4	Downloaded 3, 11	Downloaded <b>Resident</b> 10 12		Downloaded <b>Resident</b>	Downloaded <b>Resident</b> (available Sept., 1995)
<b>3800</b>	Downloaded 5			Downloaded Models -6, -8 5	
<b>3812</b>	Downloaded <b>Resident</b> 6				
<b>3816</b>	Downloaded <b>Resident</b> 6				
<b>3820</b>	Downloaded			Downloaded <b>Resident</b> (RPQ 8A5014, MVS and VSE only)	
<b>3825</b>	Downloaded			Downloaded	
<b>3827</b>	Downloaded			Downloaded	
<b>3828</b>	Downloaded			Downloaded	
<b>3829</b>	Downloaded			Downloaded	
<b>3831</b>	Downloaded			Downloaded	
<b>3835-001</b> <b>3835-002</b>	Downloaded			Downloaded	
<b>3900-001</b>	Downloaded			Downloaded	
<b>3900-0W1</b> 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
<b>3900</b> Duplex 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
<b>3900 Wide</b> Duplex 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
<b>3912</b> <b>3916</b> 7	Downloaded <b>Resident</b>	9			
<b>3930</b>	Downloaded <b>Resident</b> 6	9		Downloaded	

Figure 5 (Page 2 of 2). Font Technologies Supported by AFP Printers

Printer	Single-Byte Raster 1	Single-Byte Outline	Single-Byte Symbol Set	Double-Byte Raster 2	Double-Byte Outline
3935 4 11	Downloaded	Downloaded <b>Resident</b> 10 12		Downloaded	
4019	Downloaded				
4028	Downloaded <b>Resident</b>				
4029	Downloaded	9			
4039 7	Downloaded	9			
4224			8		
4230			8		
4234			8		
64xx			8		

**Notes:**

- 1 A font in which the characters are defined by a 1-byte code point. A single-byte coded font has only one coded font section.
- 2 A font in which the characters are defined by 2 bytes; the first defining a coded font section, and the second defining a code point. Double-byte coded fonts are required to support languages requiring more than 256 graphic characters. Two bytes are required to identify each graphic character.
- 3 The AFP font publications describe downloaded fonts.
- 4 AFCCU printers contain essentially the same resident fonts, including a subset of the 4028 resident fonts. The 3130, however, ships double-byte resident raster fonts that are not shipped with the other AFCCU printers.
- 5 The 3800 is the only AFP printer that uses fonts only in unbounded-box format.
- 6 The 3812, 3816, and 3930 printers contain the same resident fonts, except for the additional 3930 PPDS fonts.
- 7 In non-IPDS mode, the 3912 and 3916 printers use the same resident fonts as the 4039.
- 8 See the individual chapters describing each printer. Included in each chapter is a table mapping printer-resident symbol sets to a similar PSF font.
- 9 These printers use resident outline fonts only when operating in PostScript-emulation mode or PCL5-emulation mode.
- 10 The fonts in the AFP Font Collection (the host equivalents of the AFCCU single-byte resident outline fonts) are already marked before being shipped; therefore, on PSF/MVS and PSF/VSE, you do not have to mark them using the APSRMARK and APTRMARK utilities.
- 11 On PSF/MVS 2.2.0 with APAR OW08340 applied, you can activate many of the AFCCU resident outline fonts by using marked host raster fonts.
- 12 The default font on the AFCCU printers is Courier Roman Medium 12 pitch (10 point), using code page 500, version 2. The GRID for the default font is FGID=416, GCSGID=1269, CPGID=500, and font width=120.

## PSF-Supported Data Types

If a release of PSF supports a data type, later releases support it, also. Only the lowest level of a release supporting a data type is shown, followed by a +. In some cases, support is contingent on the necessary APARs being applied. Coordinate the information in this table with the information in the other tables in this chapter. Support by PSF Direct has no effect on support for data types.

Figure 6 and Figure 7 summarize the PSF-supported data types described in this publication.

Figure 6 (Page 1 of 3). PSF-Supported Data Types. Table 1 of 2.

Printers	PTOCA PT1 Text	PTOCA PT2 Text	IM Image
3130	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3800	PSF/MVS 2.1.0+, PSF/VM 2.1.0+,		PSF/MVS 2.1.0+, PSF/VM 2.1.0+,
3812	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3816	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3820	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+
3825	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
3827	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
3828	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+

Figure 6 (Page 2 of 3). PSF-Supported Data Types. Table 1 of 2.

Printers	PTOCA PT1 Text	PTOCA PT2 Text	IM Image
3829	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
3831	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
3835	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
3900-001	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
3900-0W1	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+
3900 DW	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+ with DPF, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+ with DPF, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+ with DPF, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+
3900 Duplex	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+
3912 3916	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3930	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+

## Introduction

Figure 6 (Page 3 of 3). PSF-Supported Data Types. Table 1 of 2.

Printers	PTOCA PT1 Text	PTOCA PT2 Text	IM Image
3935	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
4019	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
4028	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
4029	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
4039	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
4224	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+
4230	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+
4234	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+
64xx	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.1+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.1+, AFP in OS/400 2.2.0+,	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.1+, AFP in OS/400 2.2.0+



Figure 7 (Page 1 of 3). PSF-Supported Data Types. Table 2 of 2.

Printers	IOCA FS10 Image ●●●●●	GOCA DR/2V0 Graphics	BCOCA BCD1 Bar Codes
3130	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3800			
3812	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3816	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3820			
3825	● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	
3827	● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	
3828	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	
3829	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	
3831			
3835	●● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	●● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	
3900-001	● ●●● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	● ●●● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	

## Introduction

Figure 7 (Page 2 of 3). PSF-Supported Data Types. Table 2 of 2.

Printers	IOCA FS10 Image ●●●●	GOCA DR/2V0 Graphics	BCOCA BCD1 Bar Codes
3900-0W1	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+
3900 DW	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+ with DPF, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+ with DPF, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+ with DPF, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+
3900 Duplex	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.3.0+ with DPF, PSF/6000 1.2.0+
3912 3916	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3930	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
3935	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
4019	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
4028	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+, PSF/6000 1.2.0+
4029	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	●●●● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+

Figure 7 (Page 3 of 3). PSF-Supported Data Types. Table 2 of 2.

Printers	IOCA FS10 Image ●●●●	GOCA DR/2V0 Graphics	BCOCA BCD1 Bar Codes
4039	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	●●●● PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, PSF/2 2.00+, AFP in OS/400 2.2.0+ with DPF, PSF/6000 1.2.0+
4224		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+
4230		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+
4234		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.0+, AFP in OS/400 2.2.0+
64xx		PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.1+, AFP in OS/400 2.2.0+	PSF/MVS 2.1.0+, PSF/VM 2.1.0+, PSF/VSE 2.2.1+, AFP in OS/400 2.2.0+
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>● Supported only with the Advanced Function Image and Graphics Feature (AFIG) #4200 or RPQ.</li> <li>●● With 3835-001, the AFIG feature is required; with 3835-002, support is standard.</li> <li>●●● For 3900 printers shipped after June 25, 1993, the AFIG feature is standard.</li> <li>●●●● Supported only with the PCL5 Emulation option.</li> <li>●●●●● IOCA FS10 supports the following compression algorithms: IBM MMR, uncompressed, and G4 MMR. Some printers support a subset of these compression algorithms; other printers support additional algorithms. See the chapters on each printer for details.</li> </ul>			

## **PSF-Supported Data Streams**

Figure 8 on page 23 lists both the input and output data streams supported by the PSF printer drivers on the various platforms. An I indicates support for an input data stream; an O, an output data stream; an I/O, both data streams.

Figure 8. PSF-Supported Data Streams

Data Stream	PSF/2	PSF/400	PSF/6000	PSF/MVS PSF/VM PSF/VSE
ASCII	I		I	
ditroff			I	
IPDS	I/O	I <sup>2</sup> /O	I/O	O
Line data		I	I <sup>1</sup>	I
MO:DCA-P	I	I	I/O	I
OS/2 metafile	I			
PostScript Level 1	I		I	
SCS		I <sup>2</sup>		
HP PCL4/5	O		O	
PPDS	O		O	
<b>Notes:</b>				
1.Using the function of AFP Conversion and Indexing Facility.				
2.The OS/400 operating system transforms IPDS and SCS to AFPDS before calling PSF/400.				

## PSF Licensed Programs and Supported Printers

Figure 9, Figure 10, and Figure 11 show which versions and releases of the PSF printer-driver programs support which printers. Any additional APARs or PTFs needed for support are shown, also.

Figure 9. PSF Licensed Programs and Supported Printers. Table 1 of 3.

	<b>3130 -01S -02S -02D</b>	<b>3800 -3, -6 -8</b>	<b>3812 -2</b>	<b>3816 -01S -01D</b>	<b>3820</b>	<b>3825</b>	<b>3827</b>	<b>3828</b>	<b>3829</b>	<b>3831</b>
PSF/MVS 2.1.0	OW08127, OY67182	x	x	x	x	x	x	x	x	x
PSF/MVS 2.1.1	OW08127, OY67182	x	x	x	x	x	x	x	x	x
PSF/MVS 2.2.0	x	x	x	x	x	x	x	x	x	x
PSF/VM 2.1.0	PUT9302	x	x	x	x	x	x	x	x	x
PSF/VM 2.1.1		x	x	x	x	x	x	x	x	x
PSF/VSE 2.2.0	DY43437	1	x	x	x	x	x	x	x	x
PSF/VSE 2.2.1	DY43437	1	x	x	x	x	x	x	x	x
PSF/2 2.00			x	x	x	x	x	2	x	x
PSF/2 with DPF 3			x	x	x	x	x	2	x	x
PSF Direct on PSF/2 4			x	x	x	x	x	2	x	x
AFP in OS/400 2.2.0	SA33540, 6		x	x	x	5	5	SA- 30835, 5	5	5
AFP in OS/400 2.3.0	cum tape C4193230, 6		x	x	x	5	5	SA- 30835, 5	5	5
AFP in OS/400 3.0.5	cum tape C4263305, 6		x	x	x	5	5	5	5	5
PSF/400 3.1.0	SA40545		x	x	x	5	5	5	5	5
PSF/6000 1.2.0	x		x	x		x	x	2	x	x
PSF Direct on PSF/6000 4	x		x	x		x	x	2	x	x

Figure 9. PSF Licensed Programs and Supported Printers. Table 1 of 3.

	<b>3130</b> <b>-01S</b> <b>-02S</b> <b>-02D</b>	<b>3800</b> <b>-3, -6</b> <b>-8</b>	<b>3812</b> <b>-2</b>	<b>3816</b> <b>-01S</b> <b>-01D</b>	<b>3820</b>	<b>3825</b>	<b>3827</b>	<b>3828</b>	<b>3829</b>	<b>3831</b>
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**Notes:**

If a release of PSF supports a printer, later releases support it, also. Only the lowest level of a release supporting a printer is shown.

1. Does not support 3800-8.
2. Supports 3828 MICR fonts but does not provide MICR font security.
3. DPF requires the appropriate APARs or level of software:
  - PSF/MVS 2.1.x with APAR OY51438
  - PSF/MVS 2.2.0
  - PSF/VM 2.1.0 with APAR PN23680
  - PSF/VSE 2.2.0
  - AFP on OS/400 2.2.0 with cum tape C4270220
4. PSF Direct requires the appropriate APARs or level of software:
  - PSF/MVS 2.1.x with APAR OW08338
  - PSF/MVS 2.2.0 with APAR OW08338
  - PSF/VM 2.1.0 with APAR PN62804
  - PSF/VSE 2.2.0 with APAR DY43428
  - PSF/2 2.00
  - PSF/400 3.1.0 with APAR SA40831
  - PSF/6000 1.2.0 with APAR IX46492

To be supported by PSF Direct, a printer must also be supported by PSF Direct and by the host PSF printer driver.

5. Supported as a channel-attached printer through DPF and PSF Direct.
6. Supported only when operating in 3935-emulation mode.

## Introduction

Figure 10 (Page 1 of 2). PSF Licensed Programs and Supported Printers. Table 2 of 3.

	3835 -001 -002	3900 -001	3900 0W1	3900 DW	3900 Duplex	3912 3916 -NS1 S/390 -NS0 -NS1 OS/2 RS/6000 -AS1 AS/400 -AS0 -AS1 OS/2 RS/6000	3930 -02S -02D S/390 AS/400 RS/6000 -03S -03D AS/400 RS/6000	3935
PSF/MVS 2.1.0	x	x	OY67184	OY67184	OY67184	OY66024	OY66024	OY67182
PSF/MVS 2.1.1	x	x	OY67184	OY67184	OY67184	OY66024	OY66024	OY67182
PSF/MVS 2.2.0	x	x	x	x	x	x	x	x
PSF/VM 2.1.0	x	x	PN63992	PN63992	PN63992	PUT9302	PUT9302	PUT9302
PSF/VM 2.1.1	x	x	PN63992	PN63992	PN63992	x	x	x
PSF/VSE 2.2.0	x	x	DY43296	DY43296	DY43296	DY42988	DY42988	DY43012
PSF/VSE 2.2.1	x	x	DY43296	DY43296	DY43296	DY42988	DY42988	DY43012
PSF/2 2.00	x	x	x		x	x	x	x
PSF/2 2.00 with DPF 3	x	x	x	x	x	x	x	x
PSF Direct on PSF/2 4	x	x	x	x	x	x	x	x
AFP in OS/400 2.2.0	1, 6	2, 6				x	x	SA33540
AFP in OS/400 2.3.0	1, 6	2, 6	2, 5	2, 5	2, 5	x	x	cum tape C4193230
AFP in OS/400 3.0.5	6	2, 6	2, 5	2, 5	2, 5	x	x	cum tape C4263305
PSF/400 3.1.0	6	2, 6	2, 6	2, 6	2, 6	x	x	x
PSF/6000 1.2.0	x	x	x	x	x	x	x	x



Figure 10 (Page 2 of 2). PSF Licensed Programs and Supported Printers. Table 2 of 3.

	3835 -001 -002	3900 -001	3900 0W1	3900 DW	3900 Duplex	3912 3916 -NS1 S/390 -NS0 -NS1 OS/2 RS/6000 -AS1 AS/400 -AS0 -AS1 OS/2 RS/6000	3930 -02S -02D S/390 AS/400 RS/6000 -03S -03D AS/400 RS/6000	3935
PSF Direct on PSF/6000 4	x	x	x	x	x	x	x	x

**Notes:**

If a release of PSF supports a printer, later releases support it also. Only the lowest level of a release supporting a printer is shown.

1. Supports 3835 but supports MICR printing only with an APAR applied.
2. An appropriate configuration is required when attaching to an AS/400. Contact your IBM marketing representative for more information.
3. DPF requires the appropriate APARs or level of software:
  - PSF/MVS 2.1.x with APAR OY51438
  - PSF/MVS 2.2.0
  - PSF/VM 2.1.0 with APAR PN23680
  - PSF/VSE 2.2.0
  - AFP on OS/400 2.2.0 with cum tape C4270220
  - AFP on OS/400 2.3.0
4. PSF Direct requires the appropriate APARs or level of software:
  - PSF/MVS 2.1.x with APAR OW08338
  - PSF/MVS 2.2.0 with APAR OW08338
  - PSF/VM 2.1.0 with APAR PN62804
  - PSF/VSE 2.2.0 with APAR DY43428
  - PSF/2 2.00
  - PSF/400 3.1.0 with APAR SA40831
  - PSF/6000 1.2.0 with APAR IX46492

To be supported by PSF Direct a printer must also be supported by PSF Direct and by the host PSF printer driver.

5. Supported as a channel-attached printer through DPF, with the correct PTF applied.
6. Supported as a channel-attached printer through DPF and PSF Direct, with the correct PTFs applied.

## Introduction

Figure 11. PSF Licensed Programs and Supported Printers. Table 3 of 3.

	<b>4019 -E01 -001</b>	<b>4028 -AS1 AS/400 RS/6000  -NS1 S/390 PS/2 RS/6000</b>	<b>4029 -010 -020 -030 -040</b>	<b>4039 -10D -10R -12 -16</b>	<b>4224 -1xx AS/400  -2xx S/390</b>	<b>4230 -111 -102 -413 AS/400  -211 -202 -513 S/390</b>	<b>4234 -08 -012 AS/400  -06 -011 S/390</b>	<b>64xx -CTA</b>
PSF/MVS 2.1.0	9, 10	x	9, 10	9, 10	1	2	3	OW04104
PSF/MVS 2.1.1	9, 10	x	9, 10	9, 10	1	2	3	OW04104
PSF/MVS 2.2.0	9, 10	x	9, 10	9, 10	1	2	3	OW04104
PSF/VM 2.1.0	9, 10	x	9, 10	9, 10	4	2	5	8
PSF/VM 2.1.1	9, 10	x	9, 10	9, 10	4	2	5	8
PSF/VSE 2.2.0	9, 10	x	9, 10	9, 10	1	2	3	
PSF/VSE 2.2.1	9, 10	x	9, 10	9, 10	1	2	3	8
PSF/2 2.00	6	x	6	6				
PSF/2 with DPF <b>9</b>	6	x	6	6				
PSF Direct on PSF/2 <b>10</b>	6	x	6	6		11		
AFP in OS/400 2.2.0	9	x	9	9	7	x	x	8
AFP in OS/400 2.3.0	9	x	9	9	7	x	x	8
AFP in OS/400 3.0.5	9	x	9	9	7	x	x	8
PSF/400 3.1.0	9, 10	x	9, 10	9, 10	7	x	x	8
PSF/6000 1.2.0	6	x	6	6				
PSF Direct on PSF/6000 <b>10</b>	6	x	6	6		11		

Figure 11. PSF Licensed Programs and Supported Printers. Table 3 of 3.

	<b>4019</b> <b>-E01</b> <b>-001</b>	<b>4028</b> <b>-AS1</b> <b>AS/400</b> <b>RS/6000</b> <b>-NS1</b> <b>S/390</b> <b>PS/2</b> <b>RS/6000</b>	<b>4029</b> <b>-010</b> <b>-020</b> <b>-030</b> <b>-040</b>	<b>4039</b> <b>-10D</b> <b>-10R</b> <b>-12</b> <b>-16</b>	<b>4224</b> <b>-1xx</b> <b>AS/400</b> <b>-2xx</b> <b>S/390</b>	<b>4230</b> <b>-111</b> <b>-102</b> <b>-4I3</b> <b>AS/400</b> <b>-211</b> <b>-202</b> <b>-5I3</b> <b>S/390</b>	<b>4234</b> <b>-08</b> <b>-012</b> <b>AS/400</b> <b>-06</b> <b>-011</b> <b>S/390</b>	<b>64xx</b> <b>-CTA</b>
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**Notes:**

If a release of PSF supports a printer later releases support it also. Only the lowest level of a release supporting a printer is shown.

1. Supports 4224-2xx with serial numbers AA001 and higher.
2. Supports 4230 only in 4224-Emulation mode.
3. Supports 4234-011 with serial numbers AA030 and higher.
4. See your IBM service representative for 4224-2xx printers shipped before 04/01/91.
5. See your IBM service representative for 4234-011 printers shipped before 03/31/91.
6. Supports 4019 4029 and 4039 (which are not Intelligent Printer Data Stream [IPDS] printers) by translating the Intelligent Printer Data Stream into the Personal Printer Data Stream (PPDS) or into the Hewlett Packard Printer Command Language (HP PCL).
7. Supports 4224-1xx with serial numbers AA001 and higher.
8. Supported only in 4234-emulation mode.
9. DPF requires the appropriate APARs or level of software:
  - PSF/MVS 2.1.x with APAR OY51438
  - PSF/MVS 2.2.0
  - PSF/VM 2.1.0 with APAR PN23680
  - PSF/VSE 2.2.0
  - AFP on OS/400 2.2.0 with cum tape C4270220
  - AFP on OS/400 2.3.0
10. PSF Direct requires the appropriate APARs or level of software:
  - PSF/MVS 2.1.x with APAR OW08338
  - PSF/MVS 2.2.0 with APAR OW08338
  - PSF/VM 2.1.0 with APAR PN62804
  - PSF/VSE 2.2.0 with APAR DY43428
  - PSF/2 2.00
  - PSF/400 3.1.0 with APAR SA40831
  - PSF/6000 1.2.0 with APAR IX46492

To be supported by PSF Direct a printer must also be supported by PSF Direct and by the host PSF printer driver.

11. Supported indirectly through PSF Direct to the extent that it is supported by PSF/MVS PSF/VM PSF/VSE and PSF/400.

## Attachment Modes for Supported Printers

Figure 12, Figure 13, and Figure 14 show the attachment modes for the printers supported by the PSF printer drivers.

Figure 12 (Page 1 of 2). Attachment Modes for Supported Printers. Table 1 of 3.

	3130 -01S -02S -02D	3800 -3 -6 -8	3812 -2	3816 -01S -01D	3820 SDLC	3820 Chan- nel	3825	3827	3828	3829	3831
PSF/MVS 2.1.0	9,10, 13,14	5	6,7,10, 14	6,7,10, 14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/MVS 2.1.1	9,10, 13,14	5	6,7,10, 14	6,7,10, 14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/MVS 2.2.0	9,10, 13,14	5	6,7,10, 14	6,7,10, 14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/VM 2.1.0	9,10, 13,14	5	6,7,10, 11,14	6,7,10, 11,14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/VM 2.1.1	9,10, 13,14	5	6,7,10, 11,14	6,7,10, 11,14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/VSE 2.2.0	9,10, 13,14	5	6,7,10, 14	6,7,10, 14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/VSE 2.2.1	9,10, 13,14	5	6,7,10, 14	6,7,10, 14	7,10,16	8,10,16	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14
PSF/2 2.00	15a		1,15b	1,15b	2	3	3	3	3	3	3
DPF on PSF/2 10	15a		1,15b	1,15b	2	3	3	3	3	3	3
PSF Direct on PSF/2	9,13 15a		1	1	2	3	3	3	3	3	3
AFP in OS/400 2.2.0	9		10,12	10,12	10,13	10	10, 14	10, 14	10, 14	10, 14	10, 14
AFP in OS/400 2.3.0	9, 10, 12, 13		10,12	10,12	10,13	10	10, 14	10, 14	10, 14	10, 14	10, 14
AFP in OS/400 3.0.5	9, 10 12, 13		10,12	10,12	10,13	10	10, 14	10, 14	10, 14	10, 14	10, 14
PSF/400 3.1.0	9,10,12, 13,14, 15a		10,12, 14,15b	10,12, 14,15b	10,13	10,16	10,14	10,14	10,14	10,14	10,14
PSF/6000 1.2.0	15a		15b	15b			3	3	3	3	3

Figure 12 (Page 2 of 2). Attachment Modes for Supported Printers. Table 1 of 3.

	3130 -01S -02S -02D	3800 -3 -6 -8	3812 -2	3816 -01S -01D	3820 SDLC	3820 Chan- nel	3825	3827	3828	3829	3831
PSF Direct on PSF/6000	15a		15b	15b			3	3	3	3	3

**Notes:**

1. Local SNA emulation. Requires the IBM Micro Channel Print Service Adapter in the PS/2 or the i-data 7913 IPDS Printer LAN Attachment.
2. Synchronous Data Link Control (SDLC). Requires the Multi-Protocol Adapter/A (standalone).
3. S/370 parallel channel emulation. Requires the System/370 Channel Emulator/A Adapter.
4. Parallel port or to the network using the IBM 4033 LAN Connection for Printers and Plotters.
5. S/370 parallel channel attachment. PSF/VSE does not support the 3800-8.
6. Local SNA attachment. An SNA control unit connects the printer to Virtual Telecommunication Access Method (VTAM).
7. An SNA control unit connected to a communication controller defined to VTAM; a control unit is not required for a 3820.
8. S/370 parallel channel attachment using VTAM.
9. SNA Token Ring.
10. Supported through the Distributed Print Function (DPF) on PSF/2. Any PSF/2 restrictions on printer support apply, also.
11. Local non-SNA attachment. A non-SNA control unit connects the printer to the host system.
12. Twinaxial.
13. SDLC. The printer is connected directly to the AS/400.
14. Supported with the PSF Direct function of PSF/2 or PSF/6000.
15. Transmission Control Protocol/Internet Protocol (TCP/IP). Additional software may be required.
  - a. TCP/IP Token-Ring or Ethernet.
  - b. TCP/IP Token-Ring or Ethernet, with the i-data 7913 IPDS LAN Printer Attachment.
16. Supported with the PSF Direct function of PSF/2.

## Introduction

Figure 13 (Page 1 of 2). Attachment Modes for Supported Printers. Table 2 of 3.

	<b>3835 -001 -002</b>	<b>3900 -001</b>	<b>3900 -0W1</b>	<b>3900 DW</b>	<b>3900 Duplex</b>	<b>3912 3916 -NS1 S/390 -NS0 -NS1 OS/2 RS/6000 -AS1 AS/400 -AS0 -AS1 OS/2 RS/6000</b>	<b>3930 -02S -02D S/390 AS/400 RS/6000 -03S -03D AS/400 RS/6000</b>	<b>3935</b>
PSF/MVS 2.1.0	5,10,14	5,10,14	5,10,14, 15	5,10,14, 15	5,10,14, 15	6,7,10, 14	6,7,10, 14	5,6,7, 10,14,17
PSF/MVS 2.1.1	5,10,14	5,10,14	5,10,14, 15	5,10,14, 15	5,10,14, 15	6,7,10, 14	6,7,10, 14	5,6,7, 10,14,17
PSF/MVS 2.2.0	5,10,14	5,10,14	5,10,14, 15	5,10,14, 15	5,10,14, 15	6,7,10, 14	6,7,10, 14	5,6,7, 10,14,17
PSF/VM 2.1.0	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14	6,7, 10,14	6,7, 10,14	5,6,7, 10,14
PSF/VM 2.1.1	5,10,14	5,10,14	5,10,14	5,10,14	5,10,14	6,7, 10,14	6,7, 10,14	5,6,7, 10,14
PSF/VSE 2.2.0	5,10,14	5,10,14	5,10, 14,15	5,10, 14,15	5,10, 14,15	6,7, 10,14	6,7, 10,14	5,6,7, 10,14,17
PSF/VSE 2.2.1	5,10,14	5,10,14	5,10, 14,15	5,10, 14,15	5,10, 14,15	6,7, 10,14	6,7, 10,14	5,6,7, 10,14,17
PSF/2 2.00	3	3	3,16a	3,16a	3,16a	1,4	1,4	16,18
DPF on PSF/2	3	3	3,16a	3,16a	3,16a	1,4	1,4	16,18
PSF Direct on PSF/2	3	3	3,16a	3,16a	3,16a	1,4	1,4	16,18
AFP in OS/400 2.2.0	10,14	10,14				10,12	10,12	17
AFP in OS/400 2.3.0	10,14	10,14	10	10	10	10,12	10,12	10,12, 13,17
AFP in OS/400 3.0.5	10,14	10,14	10	10	10	10,12	10,12	10,12, 13,17
PSF/400 3.1.0	10,14	10,14,	10,14 16a	10,14 16a	10,14 16a	10,12,14 16b	10,12,14 16b	10,12,13, 14,16a,17
PSF/6000 1.2.0	3	3	16a	16a	16a	4,16b, 18	4,16b, 16c,18	16a

Figure 13 (Page 2 of 2). Attachment Modes for Supported Printers. Table 2 of 3.

	3835 -001 -002	3900 -001	3900 -0W1	3900 DW	3900 Duplex	3912 3916 -NS1 S/390 -NS0 -NS1 OS/2 RS/6000 -AS1 AS/400 -AS0 -AS1 OS/2 RS/6000	3930 -02S -02D S/390 AS/400 RS/6000 -03S -03D AS/400 RS/6000	3935
PSF Direct on PSF/6000	3	3	16a	16a	16a	4,16b, 18	4,16b, 16c,18	16a

**Notes:**

1. Local SNA emulation. Requires the IBM Micro Channel Print Service Adapter in the PS/2 or the i-data 7913 IPDS Printer LAN Attachment.
2. Synchronous Data Link Control (SDLC). Requires the Multi-Protocol Adapter/A (standalone).
3. S/370 parallel channel emulation. Requires the System/370 Channel Emulator/A Adapter.
4. Parallel port or to the network using the IBM 4033 LAN Connection for Printers and Plotters.
5. S/370 parallel channel attachment. PSF/MVS requires feature #4110 or #9960.
6. Local SNA attachment. An SNA control unit connects the printer to Virtual Telecommunication Access Method (VTAM).
7. An SNA control unit connected to a communication controller defined to VTAM.
8. S/370 parallel channel attachment using VTAM.
9. Reserved.
10. Supported through the Distributed Print Function (DPF) of PSF/2. Any PSF/2 restrictions on printer support apply, also.
11. Local non-SNA attachment. A non-SNA control unit connects the printer to the host system.
12. Twinaxial.
13. SDLC.
14. Supported by the PSF Direct function of PSF/2 and PSF/6000.
15. ESCON fiber optic serial channel. PSF/MVS 2.1.0 and 2.1.1 require APAR OY67183 and feature #4131 or #9970. PSF/MVS 2.2.0 requires APAR OW04452. PSF/VSE 2.2.0 and 2.2.1 require APAR DY43441 and PFT UD49336.
16. Transmission Control Protocol/Internet Protocol (TCP/IP):
  - a. TCP/IP Token-Ring or Ethernet.
  - b. TCP/IP Token-Ring or Ethernet, with the i-data 7913 IPDS LAN Printer Attachment.
  - c. TCP/IP Ethernet, defining a remote queue.
17. SNA Token Ring.
18. Serial port on the RISC System/6000 or on a multiport asynchronous adapter or controller.
19. Connects to the Ethernet through an Ethernet backpack, using the correct microcode.

## Introduction

Figure 14. Attachment Modes for Supported Printers. Table 3 of 3.

	<b>4019 -E01 -001</b>	<b>4028 -AS1 AS/400 RS/6000 -NS1 PS/2 RS/6000 S/390</b>	<b>4029 -010 -020 -030 -040</b>	<b>4039 -10D -10R -12 -16</b>	<b>4224 -1xx AS/400 -2xx S/390</b>	<b>4230 -111 -102 -413 AS/400 -211 -202 -513 S/390</b>	<b>4234 -08 -011 AS/400 -07 -010 S/390</b>	<b>64xx -CTA</b>
PSF/MVS 2.1.0	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/MVS 2.1.1	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/MVS 2.2.0	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/VM 2.1.0	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/VM 2.1.1	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/VSE 2.2.0	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/VSE 2.2.1	5,8	3,4,5,8	5,8	5,8	3,4	3,4,8	3,4	3,4
PSF/2 2.00	1	2	1	1				
DPF on PSF/2	1	2	1	1				
PSF Direct on PSF/2	1	2	1	1		11		
AFP in OS/400 2.2.0	5	5,7	5	5	7	7	7	7
AFP in OS/400 2.3.0	5	5,7	5	5	7	7	7	7
AFP in OS/400 3.0.5	5	5,7	5	5	7	7	7	7
PSF/400 3.1.0	5,8	5,7,8,9	5,8	5,8	7	7,8,9	7	7,9
PSF/6000 1.2.0	1,10	9	1,10	1,10				
PSF Direct on PSF/6000	1,10	9	1,10	1,10		11		
<b>Notes:</b>								
<ol style="list-style-type: none"> <li>1. Parallel port or to the network using the IBM 4033 LAN Connection for Printers and Plotters.</li> <li>2. Local SNA emulation. Requires the IBM Micro Channel Print Service Adapter in the PS/2 or the i-data IPDS Printer LAN Attachment.</li> <li>3. Local SNA attachment. An SNA control unit connects the printer to Virtual Telecommunication Access Method (VTAM).</li> <li>4. An SNA control unit connected to a communication controller defined to VTAM.</li> <li>5. Supported through the Distributed Print Function (DPF) of PSF/2. Any PSF/2 restrictions on printer support apply, also.</li> <li>6. Local non-SNA attachment. A non-SNA control unit connects the printer to the host system.</li> <li>7. Twinaxial.</li> <li>8. Supported through PSF Direct on PSF/2 or PSF/6000.</li> <li>9. Transmission Control Protocol/Internet Protocol (TCP/IP) Token-Ring or Ethernet, with the i-data 7913 IPDS LAN Printer Attachment.</li> <li>10. Serial port on the RISC System/6000 or on a multiport asynchronous adapter or controller.</li> <li>11. Supported indirectly to the extent that it is supported by PSF/MVS, PSF/VM, PSF/VSE, and PSF/400.</li> </ol>								



## Unprintable Areas on The IBM Printing Systems Company Printers

Each printer chapter contains a graphic showing both the printable and the unprintable area for each printer. Some printers have areas in which data **cannot** be placed. If data is placed in these areas, the data is lost. Other printers have areas in which the print quality is degraded, but data is not lost. See the individual chapters for details about each printer's unprintable areas. Figure 15 and Figure 16 list the IBM IPDS printers and the areas in which IBM recommends that no data be placed, either because data cannot be printed or, if printed, because it will be degraded in print quality.

<i>Figure 15. Unprintable Areas on Cut-Sheet Printers</i>		
	<b>Unprintable Area From the Left and Right Edges of the Form</b>	<b>Unprintable Area From the Top and Bottom Edges of the Form</b>
<b>3130</b>	2.5 mm (0.1 inch) <sup>1</sup>	2.5 mm (0.1 inch) <sup>1</sup>
<b>3812</b>	3.175 mm (0.125 inch)	3.175 mm (0.125 inch)
<b>3816</b>	3.175 mm (0.125 inch)	3.175 mm (0.125 inch)
<b>3820</b>	2.54 mm (0.1 inch)	2.54 mm (0.1 inch)
<b>3825</b>	9 mm (0.36 inch)	9 mm (0.36 inch)
<b>3827</b>	2.54 mm (0.1 inch) on 8.5-by-11- and 11-by-14-inch forms	2.54 mm (0.1 inch) on 8.5-by-11-inch forms; 15.2 mm (0.6 inch) on 11-by-14-inch forms
<b>3828</b>	2.54 mm (0.1 inch)	2.54 mm (0.1 inch)
<b>3829</b>	2.54 mm (0.1 inch)	2.54 mm (0.1 inch)
<b>3912</b> <b>3916</b>	4.24 mm (0.167 inch); with XPA/PC RPQ: 2.03 mm (0.09 inch)	4.24 mm (0.167 inch); with XPA/PC RPQ: 2.03 mm (0.09 inch)
<b>3930</b>	PPDS: 6.35 mm (0.25 inch); HP PCL: 4.32 mm (0.17 inch); IPDS: 4.2 mm (0.165 inch)	PPDS: 4.32 mm (0.17 inch); HP PCL: 5.08 mm (0.2 inch); IPDS: 4.2 mm (0.165 inch)
<b>3935</b>	2.03 mm (0.08 inch)	5.1 mm (0.2 inch)
<b>4019</b>	PPDS: 6.35 mm (0.25 inch); HP PCL: 4.32 mm (0.17 inch) of the left edge and 8.4 mm (0.33 inch) of the right edge	PPDS: 4.32 mm (0.17 inch); HP PCL: 5.1 mm (0.2 inch)
<b>4028</b>	4.06 mm (0.16 inch)	4.06 mm (0.16 inch)
<b>4029</b>	4.23 mm (0.17 inch) of the left edge; 8.45 mm (0.33 inch) of the right edge.	5.08 mm (0.2 inch)
<b>4039</b>	4.23 mm (0.17 inch) of the left edge; 8.45 mm (0.33 inch) of the right edge.	5.08 mm (0.2 inch)
<b>4224</b>	Set with a printer configuration option.	Set with a printer configuration option.
<b>4230</b>	Set with a printer configuration option.	Set with a printer configuration option.
<b>Note:</b>		
1. You may experience print degradation within 2.5 mm (0.1 inch) of all 4 edges of the form.		

*Figure 16. Unprintable Areas on Continuous-Forms Printers*

	<b>Unprintable Area From the Leading Edge on Narrow Forms</b>	<b>Unprintable Area From the Leading Edge on Wide Forms</b>
<b>3800</b>	12.7 mm (0.5 inch)	12.7 mm (0.5 inch)
<b>3831</b>	4.32 mm (0.17 inch)	4.32 mm (0.17 inch)
<b>3835-001</b>	4.23 mm (0.17 inch) 1, 4	4.23 mm (0.17 inch) 1, 4
<b>3835-002</b>	4.23 mm (0.17 inch) 1, 4	4.23 mm (0.17 inch) 1, 4
<b>3900-001</b>	0 mm (0 inch) 1, 2, 3	0 mm (0 inch) 1, 2, 3
<b>3900-0W1</b>	0 mm (0 inch) 1, 2, 3	0 mm (0 inch) 1, 2, 3
<b>3900 DW</b>	0 mm (0 inch) 1, 2, 3, 5	0 mm (0 inch) 1, 2, 3, 5
<b>3900 Duplex</b>	0 mm (0 inch) 1, 2, 3, 5	0 mm (0 inch) 1, 2, 3, 5
<b>4224</b>	Set with a printer configuration option.	Set with a printer configuration option.
<b>4230</b>	Set with a printer configuration option.	Set with a printer configuration option.
<b>4234</b>	Set with a printer configuration option.	Set with a printer configuration option.
<b>64xx</b>	Set with a printer configuration option.	Set with a printer configuration option.
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. The tractor-feed strip is always 0.5 inches wide, whether on the short or long edge of the form. Assuming that the tractor-feed strip is perforated, the printer can print to the perforation on either side (left or right) of the form. In any case, the printer can print up to 12.7 mm (0.5 inch) from the outside edge of the form on either side (left or right).</li> <li>2. With roll-feed paper, data can be printed from perforation to perforation, but the print quality may be degraded within 1.27 mm (.05 inch) of the perforation.</li> <li>3. With box-feed (fan-fold) paper, the printer can print from perforation to perforation, but the print quality may be degraded within 12.7 mm (0.5 inch) of the perforation when printing solid fill or images and within 8.38 mm (0.33 inch) when printing text, bar codes, or OCR data.</li> <li>4. With box-feed (fan-fold) paper, the print quality may be degraded within 12.7 mm (0.5 inch) of a folded perforation when printing solid fill or images and within 8.38 mm (0.33 inch) when printing text, bar codes, or OCR data.</li> <li>5. In the case of duplex printing, notes 1, 2, and 3 apply to both the front and back sides of the form.</li> </ol>		

## Chapter 2. 3130 Advanced Function Printer

This chapter describes 3130 printer characteristics and PSF-supported functions. The 3130 is a cut-sheet printer that uses laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 30 impressions per minute. The 3130 has three models: 01S, 02S, and 02D. The 3130 uses the Advanced Function Common Control Unit (AFCCU), based on RISC technology, which provides as standard the Advanced Function Image and Graphics (AFIG) feature and the Decompression Performance Enhancement (DPE) feature.

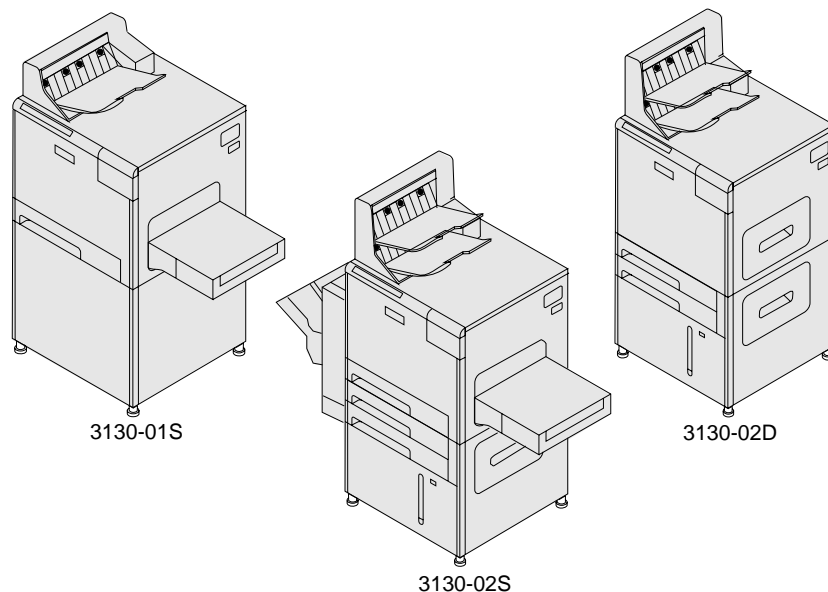


Figure 17. 3130 Printer

Figure 18 on page 38 summarizes the printer characteristics and PSF-supported functions for the 3130. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 18 (Page 1 of 2). 3130 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination	A		A		A	
Media source by copy	B					
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	C	C	C	C	C	C
Forms flash						
N_UP Printing	D		D		E	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms						
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240 and 300 F	240 and 300 F	240 and 300 F	240 and 300 F	240 and 300 F	240 and 300 F
Maximum printing rate (ipm)	30	30	30	30	30	30
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	G	G	G	G	G	G
Guaranteed print labeling	H	H				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 18 (Page 2 of 2). 3130 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline	x			I		I
Single-byte resident outline	J		J	I	x	I
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster	K		K	I	K, PTF	I
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supported by PSF/MVS 2.2.0 with APAR OW07348. Supported by PSF/VSE 2.2.1 with APAR DY43501. Supported by PSF/400 3.1.					
<b>B</b>	Prior to PSF/MVS 2.2.0, you could specify the media source in a copy group in a form definition; with 2.2.0, you can also specify the media source in a copy subgroup in the form definition. To use this function, APAR PN55431 must be applied to PPFA/370.					
<b>C</b>	Model 02D only.					
<b>D</b>	Supports both basic and enhanced N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>E</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>F</b>	Selected by an operator-controlled switch.					
<b>G</b>	Supported by the printer but not supported by PSF, except when using N_UP printing on PSF/MVS, PSF/VSE, or PSF/400.					
<b>H</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					
<b>I</b>	Supports resident and outline fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>J</b>	Activated on PSF/MVS and PSF/VSE by using the APSRMARK and APTRMARK utilities, respectively.					
<b>K</b>	With the Double-Byte Character Set (DBCS) Font package and the 540MB hard drive.					

## Default Media Origin

Figure 19 shows the default media origin for a 3130, which is the top-left corner of a form with the short sides at the top and bottom.

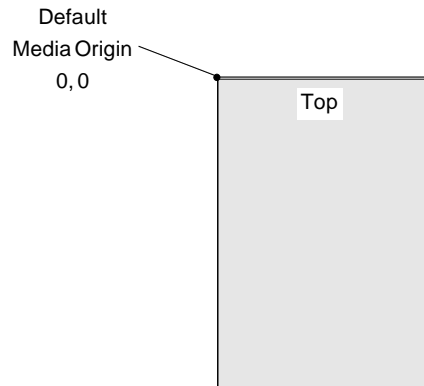


Figure 19. Default Media Origin on the 3130

## Printable Area

Although the 3130 can print to the edge of the paper, for best results, limit printing to within 2.5 mm (0.1 inch) of all edges of the form. Printing any closer to the edges of the form may result in degraded print quality and loss of characters. Figure 20 shows an example of the printable area of a form for a 3130. The printable area shown is 8.3 by 10.8 inches.

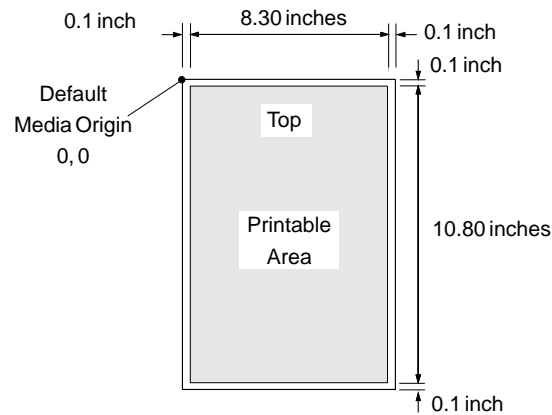


Figure 20. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3130

## Selecting the Printing Medium

The 3130 is a cut-sheet printer with a variety of medium sources, depending on the model and the options installed. In addition to printing on various sizes of standard paper up to 11-by-17 inches, the 3130 can print on preprinted paper, 3-hole punched paper, perforated paper, colored card stock, and adhesive labels.

Selecting the type of medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the primary source, BIN 2 for the secondary source, BIN 3 for the tertiary source, and so on.

**PSF/MVS** Specify the medium source in your form definition.

Prior to PSF/MVS 2.2.0, you could specify the medium source in a copy group in a form definition; with 2.2.0, you can also specify the medium source in a copy subgroup in the form definition. To use this function, APAR PN55431 must be applied to PPF370.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

---

## Alternate Media Destination

The 3130 printer supports selection of an alternate media destination. If an alternate destination is specified, but the printer does not support an alternate destination, or the destination is disabled, the printer sends the output to the printer default output bin. If the media loaded in the input bin is incompatible with the output bin, the job is held by the system.

**PSF/MVS** PSF/MVS 2.2.0 supports selection of an alternate media destination, if APAR OW07348 is applied.

**PSF/VSE** PSF/VSE 2.2.1 supports selection of an alternate media destination, if APAR DY43501 is applied.

**PSF/400** PSF/400 3.1.0 supports selection of an alternate media destination.

---

## Duplex Printing

The 3130 Model 02D supports duplex printing (printing on both sides of the sheet). The 3130 does not print on special media (labels, and card stock) in duplex mode.

---

## Fonts

The 3130 prints with single-byte downloaded raster fonts, with double-byte downloaded and resident raster fonts, and with single-byte downloaded and resident outline fonts. These fonts are in either 240-pel and 300-pel resolution, depending on the software being used to drive the printer. In some cases, support for different font technologies will be added in stages; check with your IBM marketing representative for availability dates.



The 3130 default font is Courier Roman Medium 12 pitch (10 point) (FGID 416, GCSGID 1269, CPGID 500, Font Width 120).

The double-byte font feature #4802 includes a 540MB hard drive, which replaces the standard 364MB hard drive.

For more information on 3130 resident fonts, see Appendix B, "Printer-Resident Fonts."

**PSF/MVS** To use the resident fonts, the system programmer must identify them to PSF using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3130 can print with fonts downloaded by PSF/MVS and stored in the DPF resources library. When using DPF, however, 3130 printer-resident fonts are not used.

**PSF/VM** You cannot use downloaded or resident outline fonts, but you can use downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3130 can print with fonts downloaded by PSF/VM. When using DPF, however, 3130 printer-resident fonts are not used.

**PSF/VSE** To use the resident fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3130 can print with fonts downloaded by PSF/VSE and stored in the DPF resources library. When using DPF, however, 3130 printer resident fonts are not used.

**PSF/2** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3130 can print with fonts downloaded by PSF/400. When using DPF, however, the 3130 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

The 3130 can print text in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 21.

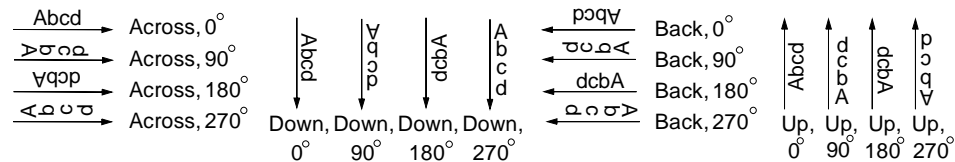


Figure 21. 3130 Inline Directions and Character Rotations for Downloaded Fonts

## Exception Highlighting

The 3130 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page.

The print-file submitter can suppress the reporting of data-check exceptions and the printing of markers for those exceptions.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter on the \* \$\$ LST statement or printer-parameter member to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK option on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

## Data Types

The 3130 supports text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 3130 can process PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 3130 can process IM image data.

## IOCA Image Data

The 3130 can process IOCA FS10 data. The 3130, which supports left-to-right and right-to-left bit ordering, supports the compression algorithms shown in Figure 22.

*Figure 22. Image Compression Algorithms for the 3130*

Algorithm	Hex code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 3130 can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3130 can print BCOCA BCD1 bar code data. Figure 23 summarizes the bar-code type and modifier combinations supported by the 3130.

Refer to your printer description or reference publication for more information.

Figure 23. Bar-Code Type and Modifier Combinations for the 3130

Type	Modifier
Code 128	X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'
Postnet	X'00' through X'03'

## Disabled Mechanisms

Three types of mechanisms can be disabled on the 3130:

- Any of the medium sources
- The duplex paper path
- Any of the offset stackers

When a mechanism first becomes disabled, PSF stops (or in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can choose to restart PSF for the 3130 even with the mechanism disabled. If a medium source is disabled, PSF selects the other medium source. If the duplex paper path is disabled, PSF prints files in simplex. If the offset stacker is disabled, PSF stacks the files without offsetting between files or between copy groups.

**PSF/400** For PSF/400, in addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

---

## Printer-Storage Management

Memory in the 3130 is dynamically allocated for microcode, microcode data structures, font tables, font patterns, cached overlays, and raster images. It also contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If PSF is unsuccessful, PSF stops printing the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used. and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

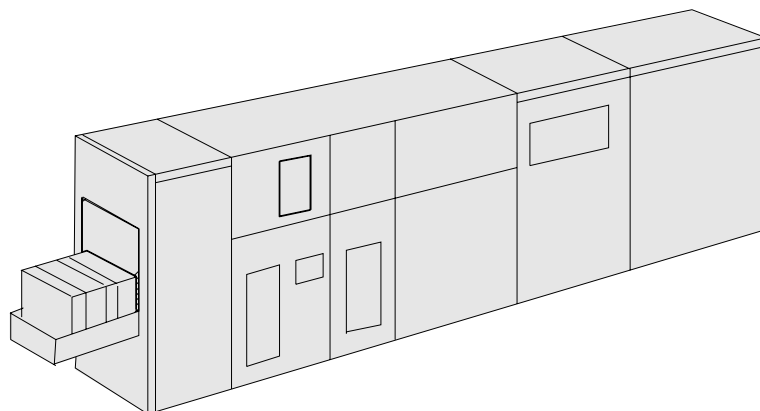
**PSF/VM** With PSF/VM, if the 3130 is defined as an RSCS printer, insufficient storage conditions can cause printing of the file to stop. RSCS sends a message describing the error condition.



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## Chapter 3. 3800 Printing Subsystem

This chapter describes 3800 printer characteristics and PSF-supported functions. The 3800 is a channel-attached, continuous-forms printer that uses electrophotographic technology to print text and images at up to 215 impressions per minute, depending on the model.



*Figure 24. 3800 Printer*

Figure 25 on page 50 summarizes the printer characteristics and PSF-supported functions for the 3800. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 25 (Page 1 of 2). 3800 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE
Continuous forms	x	x	Models 3 and 6
Cut-sheet			
Alternate media source			
Alternate media destination			
Media source by copy			
Manual forms feed			
Envelope printing			
MICR printing			
Duplex printing			
Forms flash	x	x	Models 3 and 6
N_UP Printing			
Color selection			
Print-quality levels			
Gray-scale image			
Operator-adjustable forms	x	x	Models 3 and 6
Exception highlighting: print-error markers	x	x	Models 3 and 6
Disabled mechanisms			
Printhead resolution (pels per inch)	240	240	240
Maximum printing rate (ipm)	215 (-3 and -8) 134 (-6)	215 (-3 and -8) 134 (-6)	215 (-3) 134 (-6)
<b>PSF-Supported Functions</b>			
Page overlays			
Direct printing	x		
Distributed Print Function			
PSF Direct			
Changeable media origin			
Guaranteed print labeling			
<b>Data Types</b>			
PTOCA PT1 text	x	x	Models 3 and 6
PTOCA P2 text			
IM image	x	x	Models 3 and 6
IOCA FS10 image			
GOCA DR/2V0 graphics			
BCOCA BCD1 bar codes			



Figure 25 (Page 2 of 2). 3800 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE
<b>Fonts</b>			
Single-byte downloaded raster	x	x	Models 3 and 6
Single-byte resident raster			
Single-byte downloaded outline			
Single-byte resident outline			
Single-byte resident symbol sets			
Double-byte downloaded raster	Models 6 A and 8	Models 6 A and 8	Model 6 A
Double-byte resident raster			
Double-byte downloaded outline			
Double-byte resident outline			
<b>Notes:</b>			
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.		
<b>A</b>	Only with RPQ #8A5008, which is available in a limited distribution area.		
<b>ipm</b>	Impressions per minute.		

## Default Media Origin

Figure 26 shows the default media origin for a 3800 for both narrow forms and wide forms. The default media origin is the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. The media origin cannot be changed.

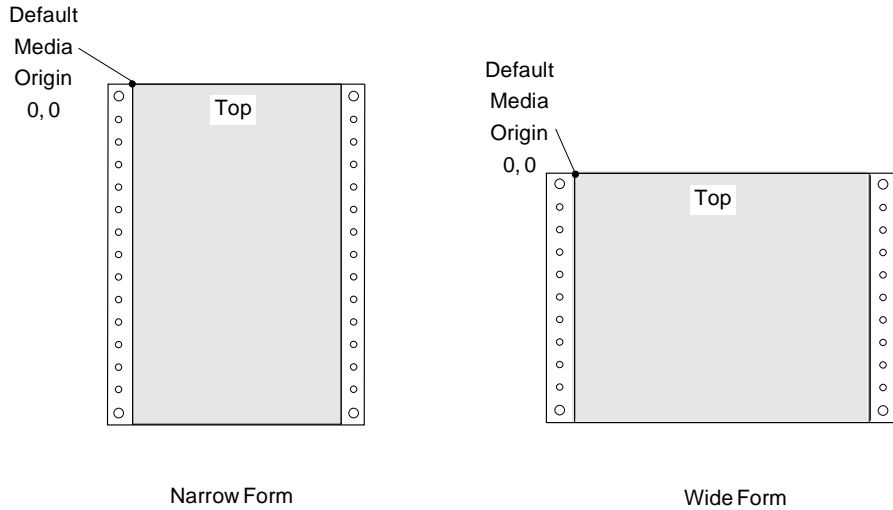


Figure 26. Default Media Origin on the 3800

## Printable Area on the 3800

The areas that are not printable for common-use and International Organization for Standardization (ISO) form sizes are the top and bottom 0.5 inch of a form. For forms used on the 3800 Model 3 or 3800 Model 6 printers with the ISO Paper Sizes Additional Feature installed, the areas that are not printable are the top 0.67 inch and bottom 0.33 inch of the form. You should not place data in the areas that are not printable. Figure 27 shows examples of printable areas of a form for a 3800. The printable area for narrow forms is 8.5 by 10 inches. The printable area for wide forms is 11 by 7.5 inches.

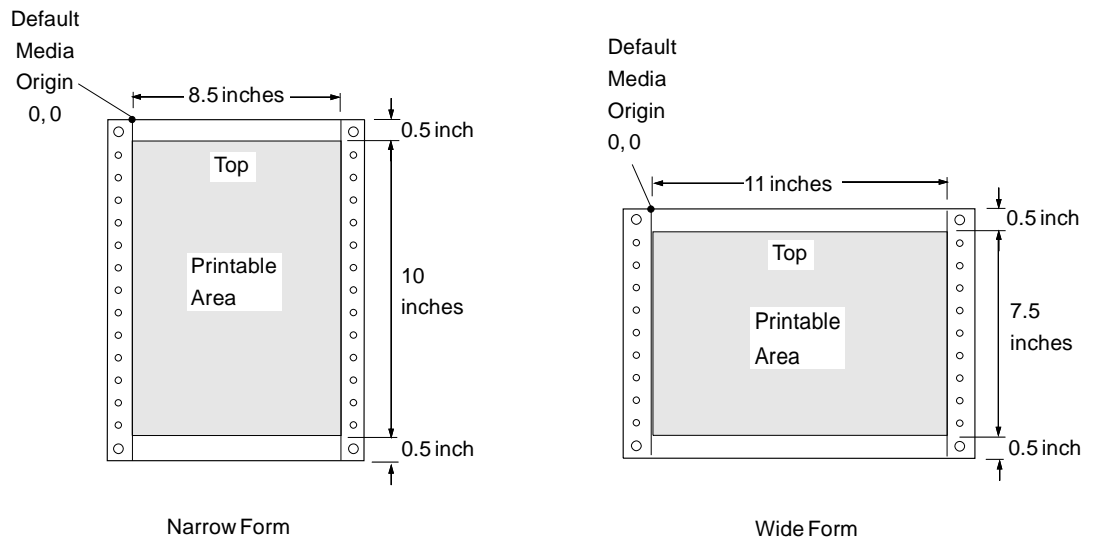


Figure 27. Printable Area for 9.5 by 11-Inch and 12 by 8.5-Inch forms on the 3800

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## Selecting the Printing Medium on the 3800

The 3800 is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded into the 3800 by using the FORMS or SYSOUT parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 3800 by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 3800 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter in the \* \$\$ LST statement.

---

## Duplex Printing

The 3800 does not print on both sides of a sheet.

PSF processes the duplex control for a 3800 by treating two consecutive pages of data as a pair. The first page of data is processed as the front of the sheet, and the second page of data is processed as the back of the sheet. A pair of pages is not determined by page numbers but is determined when the copy group is selected. If you request more than one copy of a page, all the front pages are printed, followed by all the back pages.

---

## Using Forms Flash

The 3800 line printers have a facility for printing forms flash with a print file. This facility is also available on the 3800 page printers. By using the forms-flash frame, you can print forms, grids, designs, and constant data on a form as it is being processed through the printer. This capability can be used in addition to using overlays. You must load a frame holding the forms flash into the printer before printing begins. The system does not verify that the requested forms-flash frame has been inserted. For information about designing, making, or obtaining forms-overlay negatives, refer to *3800 Printing Subsystem Forms Design Reference Guide*.

---

## Fonts

The 3800 prints with single-byte or double-byte downloaded raster fonts. The 3800 Model 3 prints with only single-byte fonts. The 3800 Model 6 prints with only single-byte fonts unless RPQ #8A5008 is installed.<sup>3</sup> The RPQ enables the 3800 Model 6 to print with double-byte fonts. The 3800 Model 8, available only in select countries, can print with both single-byte and double-byte fonts. The 3800 uses a different font format from that of the other page printers.

**PSF/MVS** Both single-byte and double-byte fonts must be in unbounded-box format for the 3800. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

---

<sup>3</sup> This RPQ is available in a limited distribution area. For more information, contact your IBM marketing representative.

**PSF/VM** Single-byte fonts must be in bounded-box format for the 3800. Double-byte fonts must be in unbounded-box format. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** Both single-byte and double-byte fonts must be in unbounded-box format for the 3800. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

---

## Inline Directions and Character Rotations of Text

Text printed using single-byte fonts can be printed in three inline directions on a 3800. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 28.

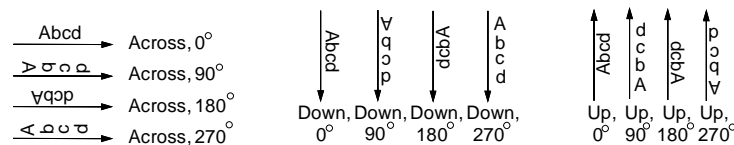


Figure 28. 3800 Inline Directions and Character Rotations for Single-Byte Fonts

Text printed using double-byte fonts can be printed in two inline directions on the 3800. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 29.

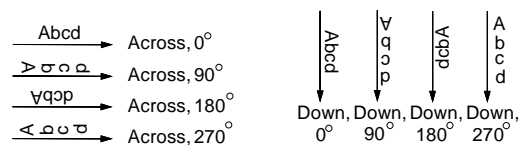


Figure 29. 3800 Inline Directions and Character Rotations for Double-Byte Fonts

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## Horizontal Adjustment

The most common use of horizontal adjustment on the 3800 is to allow the operator to align printing on preprinted forms or with the forms flash.

A horizontal adjustment value of from 0 to 20 pels can be specified in the form definition to allow the operator to adjust the starting position of printing on a page. (You can specify this adjustment using the PPFA ADJUST subcommand.) This value defines the maximum adjustment range available in the right and left horizontal directions. For example, if the horizontal adjustment value is 20 pels, the operator can adjust the starting position for printing up to 20 pels to the left (by specifying 0 to 19 pels) or up to 20 pels to the right (by specifying 21 to 40 pels).

The horizontal adjustment value does not perform the same function as the PPFA OFFSET subcommand in the form definition. The OFFSET subcommand positions the logical page the specified distance to the right of the media origin (the x axis or horizontal direction across the form) and down from the media origin (the y axis or vertical direction down the form).

The printable area is reduced when a value other than zero is specified for horizontal adjustment in the form definition. The available print width is reduced by

2 times the adjustment value, because the horizontal adjustment value is applied to both the left and right sides of the form.

**Note:** Data is lost if the logical page falls outside the reduced printable area. To avoid losing data, you must make the x-axis coordinate of the logical page origin greater than or equal to the horizontal adjustment value. (As was noted earlier, the position of the x-axis coordinate is specified in the OFFSET subcommand in the form definition.)

Refer to the *Execute Order Home State Set X Adjustment Range* command in *Reference Manual for the IBM 3800 Printing Subsystem Models 3 and 6* and *Reference Manual for the IBM 3800 Printing Subsystem Model 8* for more information.

Figure 30 shows that the maximum width of the print data can be 2400 pels when a horizontal adjustment value of zero is specified in the form definition.

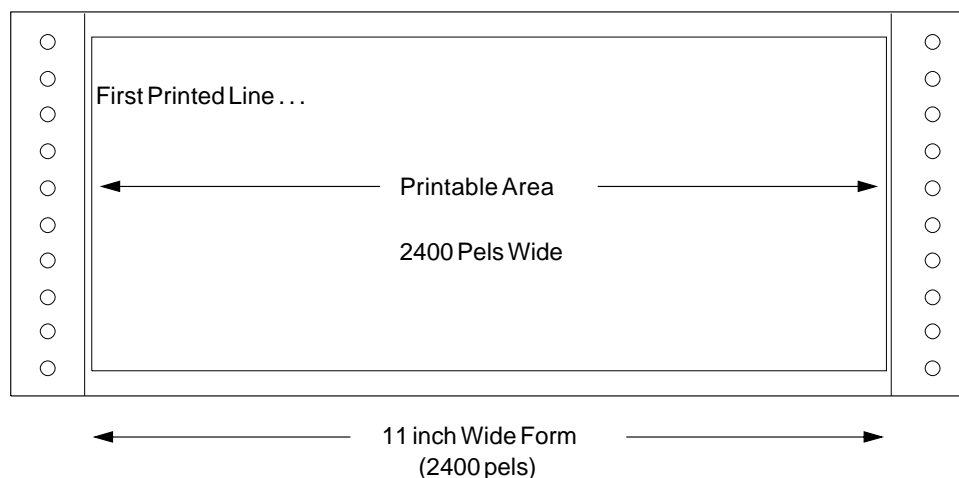


Figure 30. Data Position with Zero Horizontal Adjustment in the Form Definition. Operator adjustment is not allowed. The measurements are not to scale.

Figure 31 on page 56 shows how the printable area is reduced from 2400 pels to 2360 pels when a 20-pel horizontal adjustment value is specified in the form definition. If the form definition does not also specify an OFFSET of 20 pels, or if the 3800 horizontal adjustment value has been set to less than 20 pels, PSF will attempt to print at the leftmost position. The logical page of data will fall outside the printable area, and PSF will issue an error message and print printer-error markers (PEMs) at the left end of the print data. In Figure 31 on page 56, all other factors are the same as in Figure 30; that is, no OFFSET subcommand is specified in the form definition, and no operator adjustment has occurred.

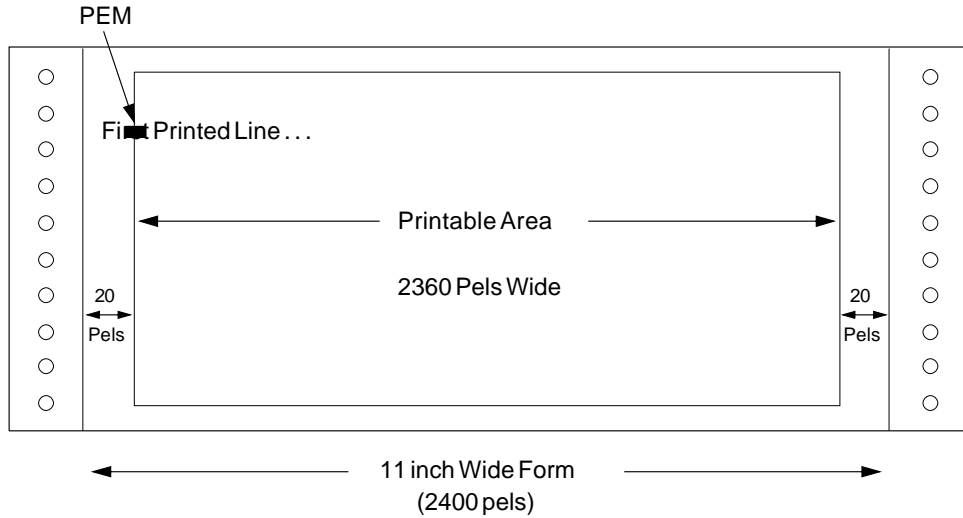


Figure 31. Data Position with 20-Pel Horizontal Adjustment in the Form Definition. No operator adjustment has been made, and measurements are not to scale.

In the example shown in Figure 32, the form definition specifies a horizontal adjustment of 20 pels to the right, and the operator has adjusted the printing position 20 pels to the right. As a result of moving the data to the right, the beginning of the line now falls within the valid printable area; however, characters at the right end of the line may fall outside the valid printable area, depending on the width of the print data.

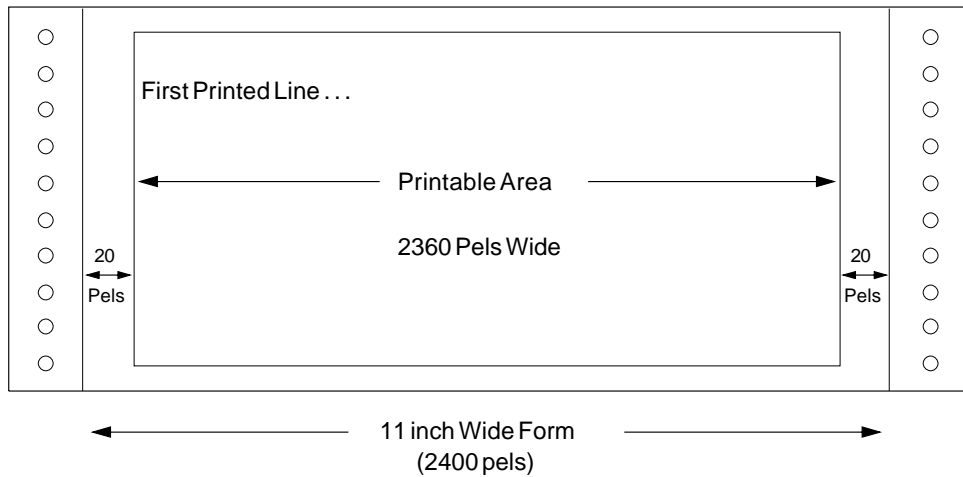


Figure 32. Data Position after a 20-Pel Operator Adjustment to the Right. Measurements are not to scale.

## Width of the Print Data

You must consider the physical width (x dimension) of the print data when you use horizontal adjustment.

For example, Figure 30 on page 55 shows that the x dimensions of the page (specified in the page definition), the form (excluding the carrier strips), and the print data are all 2400 pels. Figure 33 shows a situation in which the form definition specifies a horizontal adjustment of 20 pels, which reduces the printable area by 20 pels on both the left and right, leaving a printable area 2360 pels wide. The operator, however, has not made any horizontal adjustment, nor does the form definition contain an OFFSET subcommand. The printable area now starts at a point 20 pels to the right of the leftmost carrier strip and ends at a point 20 pels to the left of the rightmost carrier strip. If you attempt to print a 2400-pel line in this 2360-pel printable area, PSF will issue error messages and print PEMs, and 20 pels of data will be lost on both the left and right ends of the print line.

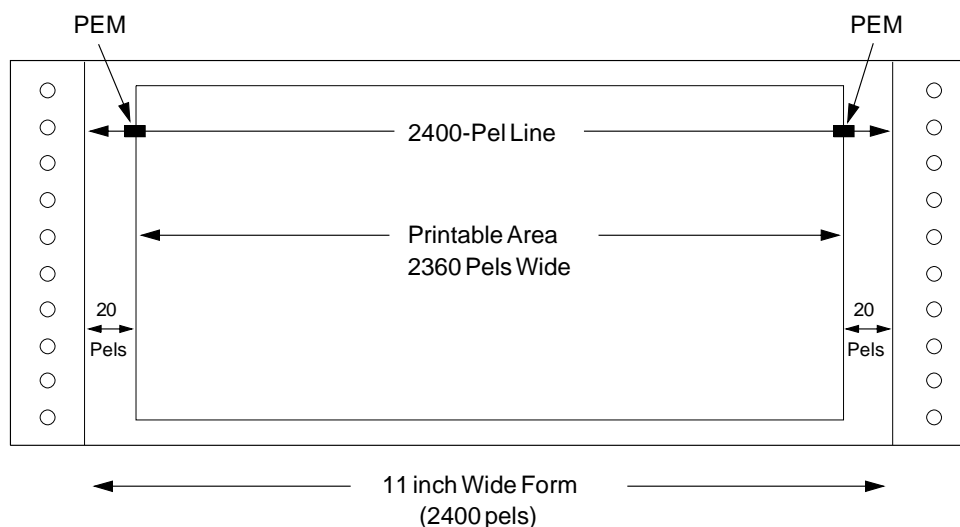


Figure 33. Printing a 2400-Pel Line in a 2360-Pel Printable Area. Measurements are not to scale.

Figure 34 on page 58 shows two possible situations when printing a 2360-pel print line in a printable area that is 2360 pels wide. If the operator sets the 3800 horizontal adjustment value to zero pels, or if the form definition specifies an OFFSET value of zero pels, the print position of the first character will be at point A, and PSF will print PEMs. If the operator sets the horizontal adjustment value at 20 pels at point B, or if the form definition specifies an OFFSET value of 20 pels, the data will print correctly with no errors.

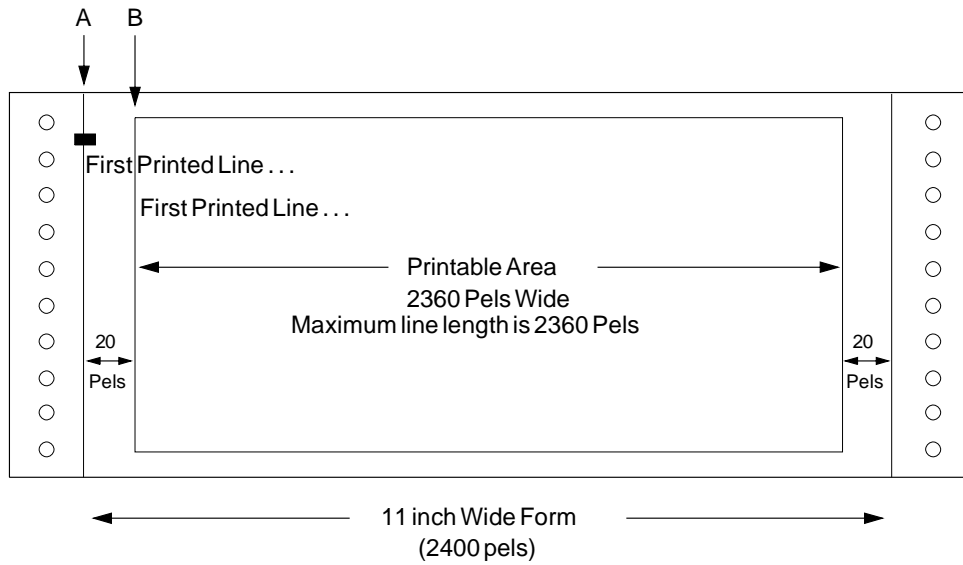


Figure 34. Maximum Data Width with 20-Pel Horizontal Adjustment in the Form Definition. Measurements are not to scale.

Figure 35 shows trying to print a line of print data that is 2400-pels wide in a printable area that is 2360 pels wide. Using the OFFSET subcommand or a 20-pel operator setting will place the first character at a position within the valid printable area, but the last character or characters of the print data may fall outside the printable area on the right end of the line. You must, therefore, use a valid combination of the width of the print data, the OFFSET subcommand, and the operator setting when using a horizontal adjustment other than zero on the 3800.

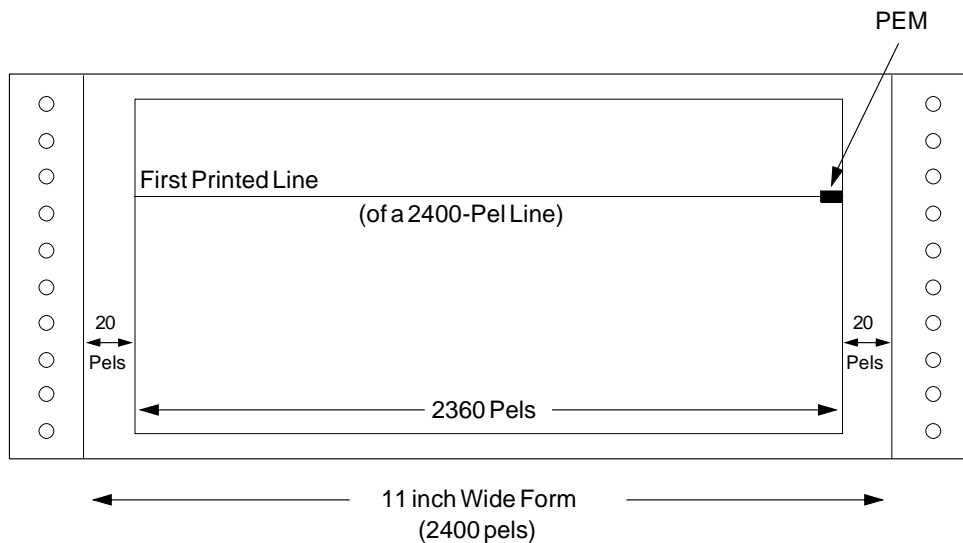


Figure 35. Printing a 2400-Pel Line in a 2360-Pel Printable Area Using a 20-Pel Offset or Adjustment. Measurements are not to scale.



## Detailed Example of Horizontal Adjustment with PSF/MVS

PSF sends the printer the maximum horizontal adjustment value as specified in the form definition. The operator can then adjust the data position within the limits of that maximum value. The maximum value is changed only if a new form definition with a different maximum value becomes active; that is, when PSF begins processing a new data set. When a new form definition becomes active, the maximum value is changed, and the operator-set value is discarded. However, if a new form definition has the same maximum value as the previous form definition, the operator-set value remains unchanged.

For example, a data set is to be printed using a form definition with a horizontal adjustment of 20 pels. Part of the data set is run, and the operator shifts the data position 15 pels to the left to align the variable data with the forms flash. The operator next issues the JES2 \$B command to backspace the printer and start the job at the beginning of the data set. Before the data set starts to print again, PSF prints a printer-backspaced message using a new form definition named on the MSGDS output card in the PSF start-up procedure. This new form definition specifies a horizontal adjustment value of 0. Therefore, the operator-set value is discarded, and when the original data set is restarted, that value is no longer in effect, and the data is misaligned.

To avoid this problem, establish one or more PSF start-up procedures to be used when horizontal adjustment is required. In each procedure, all the form definitions should specify the same nonzero horizontal adjustment as does the form definition being used for the original data set. If this procedure had been used in the preceding example, a new form definition would not cause the operator-set value to be discarded, and the 15-pel adjustment would still apply when the data set was started.

**Note:** When you include a raster overlay on a page, the overlay uses the active horizontal adjustment value. The operator *must not* move the printer's adjustment value to the left, or PSF will issue message APS828I, because the raster overlay's horizontal adjustment will then be larger than that of the page in which it is included. After issuing message APS828I, PSF attempts to reprint the page in error. If the error occurs a second time, PSF stops processing the data set. You can avoid receiving this error message by including the overlay as a non-raster overlay or by telling the operator not to change the horizontal adjustment value for the page.

---

## Exception Highlighting

The 3800 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside of the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported.

---

## Data Types

The 3800 accepts a different printer command stream from the other AFP printers. The 3800 can process text data and IM image data.

### Text Data

The 3800 processes text data. The 3800 printer command stream for PTOCA PT1 Text is functionally equivalent to the command stream for the other AFP printers. When these data types are input to PSF for printing on a 3800, the output is the same as the output from the other AFP printers that support the PTOCA PT1 Text.

### IM Image Data

The 3800 processes image data. The 3800 printer command stream for IM image data is functionally equivalent to the command stream for the other AFP printers. When these data types are input to PSF for printing on a 3800, the output is the same as the output from the other AFP printers that support IM image data.

---

## Printer-Storage Management

The 3800 can have as many as four major printer-storage areas:

- **Control storage:** Contains microcode, tables, control blocks that define pages to be printed, control information, suppression data, page segments, and overlays.
- **Raster pattern storage:** Contains font patterns and raster images.
- **Accumulator:** Contains one raster overlay or accumulated pages. The accumulator is an optional storage area available for a 3800.
- **Compressed pattern storage:** Contains raster patterns for double-byte fonts and is available only for a 3800 Model 8 or for a 3800 Model 6 with RPQ #8A5008 installed.<sup>4</sup>

Generally, printer storage is adequate to process a page of data. Some pages may require resources that are greater than the available printer storage. In that case, PSF deletes any resources that are not needed for the current page, retransmits the page data, and tries to reprint the data. If unsuccessful, recovery is as follows:

- If a page requires more resources than can fit in printer storage, printing of the file stops. Printing continues with the next print file.
- If the resources are successfully loaded, but the page data does not fit in printer storage, only the current page is skipped. Printing continues with the next page of the print file.

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<sup>4</sup> This RPQ is available in a limited distribution area. For more information, contact your IBM marketing representative.

- If more than one raster overlay is specified for a print file, the first is stored in the accumulator as the raster overlay, and all others are processed as coded overlays.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used, and resubmit the print file. Eliminating one character set or one code page from the print job or simplifying an overlay may allow the page to be printed.

A 3800 with an accumulator installed can store a partial page of data in the accumulator if control storage or raster pattern storage is full while a page is being processed. When control storage or raster pattern storage is full, printer performance is reduced, and any raster overlay that was stored in accumulator storage is deleted.

---

## Storage Expansion Feature

If the 3800 has the Storage Expansion Feature installed (feature #4400 or feature #9400), errors detected in overlays by the printer are reported differently from how errors are reported for all other AFP printers. The 3800 reports the error when the overlay is received at the printer; the other AFP printers report the error when the overlay is composed on the page.

---

## Preprocessing and Postprocessing Devices

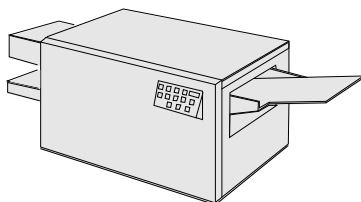
**Note:** When attaching the BESTE Bunch Color Imprinter or Folder/Job Separator to the 3800, you must install RPQ 8A5019.



---

## Chapter 4. 3812 Page Printer

This chapter describes 3812 printer characteristics and PSF-supported functions. The 3812 is a table-top, cut-sheet printer that uses a laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 12 impressions per minute.



*Figure 36. 3812 Printer*

After February 17, 1995, features of the 3812 will no longer be marketed.

Figure 37 on page 64 summarizes the printer characteristics and PSF-supported functions for the 3812. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 37 (Page 1 of 2). 3812 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing						
Forms flash						
N_UP Printing						
Color selection	x	x	x	x	x	x
Print-quality levels						
Gray-scale image	x	x	x	x	x	x
Operator-adjustable forms						
Exception highlighting: print-error vectors	x	x	x	x	x	x
Disabled mechanisms						
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	12	12	12	12	12	12
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	A	A	A	A	A	A
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	B	B	B	B	B	B
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 37 (Page 2 of 2). 3812 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster	x	x	x	C	x	D
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supported by the printer but not supported by PSF.					
<b>B</b>	Does not support the G4 MMR compression algorithm.					
<b>C</b>	Supports resident fonts only in native mode, not through the Distributed Print Function (DPF).					
<b>D</b>	Supports resident fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					

## Default Media Origin

Figure 38 shows the default media origin for a 3812, which is the top-left corner of a sheet with the short sides at the top and bottom. The printer supports changing the media origin, but PSF does not.

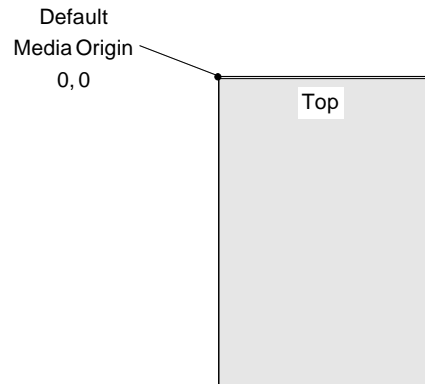


Figure 38. Default Media Origin on the 3812

## Printable Area

Printing within 0.125 inch of any edge of the sheet may result in degraded print quality in the border area. Figure 39 shows an example of the printable area of a sheet for a 3812. The printable area shown is 8.25 by 10.75 inches. used specifies a page position of 0.125 across and 0.125 down, which means that the full printable area is available.

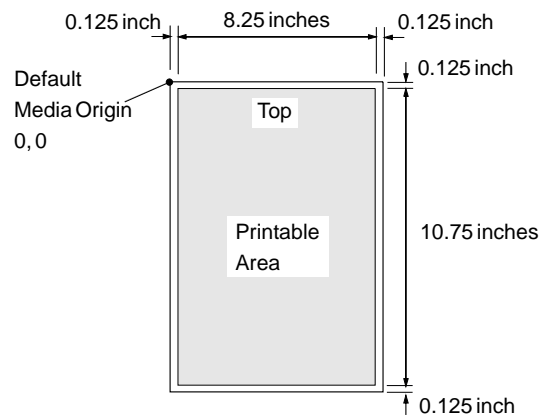


Figure 39. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3812



## Selecting the Printing Medium

The 3812 is a cut-sheet printer with two medium sources: the primary cassette and the alternate cassette. The cassettes can contain any of the sizes of media on which the printer can print. The 3812 can also print on adhesive labels, which must be loaded in the alternate cassette.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the source.

## Specifying the Medium Source

Specify BIN 1 for the primary cassette and BIN 2 for the alternate cassette.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter on the OUTPUT statement or the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command. The FORM option is not used for the 3812 by PSF/VM if the 3812 is defined as an RSCS printer.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the

FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

---

## Fonts

The 3812 prints with downloaded or resident single-byte raster fonts. The 3812 resident fonts are listed in Appendix B, "Printer-Resident Fonts."

**PSF/MVS** To use the resident raster fonts, the system programmer must identify them to PSF using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3812 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. When using DPF, however, 3812 printer resident fonts are not used.

**PSF/VM** With PSF/VM 1.3.0 or later, the 3812 is supported with RSCS or with the Group4 Printer Driver Machine (PDM) program.

When a 3812 is defined as an RSCS printer, only resident raster fonts can be used. PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts so that PSF has a correspondence between the host fonts available to it and the resident raster fonts available for printing.

When a 3812 is defined as a Group4 printer, both downloaded or resident raster fonts can be used. PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts. If a host font is not mapped to a resident font, or if the resident font identifier in the table is not present in the printer, PSF downloads the host font to the printer. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3812 can print with fonts downloaded by PSF/VM. When using DPF, however, 3812 printer resident fonts are not used.

**PSF/VSE** To use the resident raster fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3812 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. When using DPF, however, 3812 printer resident fonts are not used.

**PSF/2** PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts. If a host font is not mapped to a resident font, or if the resident font identifier in the table is not present in the printer, PSF downloads the host font to the printer. To use the resident raster fonts, you must add the fonts to the resource library using the RLADD RESOURCE command. To access the resource library, use either the Resource Librarian accessed through the OS/2 command prompt or the easy-to-use Presentation Manager interface. PSF/2 does not support resident fonts when using the Distributed Print Function. Refer to the online *PSF/2 Technical Reference* for more information about using resident fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3812 can print with fonts downloaded by PSF/400. When using DPF, however, the 3812 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use resident fonts in native mode, but you can use downloaded raster fonts. PSF supports resident fonts to the extent they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 3812 is using resident fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0° and 180°, as shown in Figure 40.

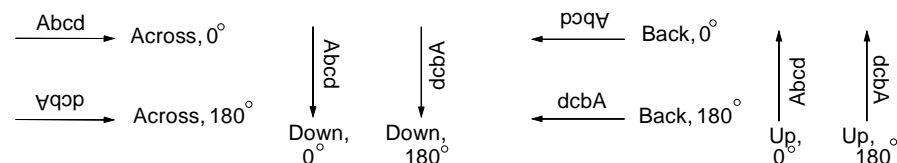


Figure 40. 3812 Inline Directions and Character Rotations for Resident Fonts

If the 3812 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 41.

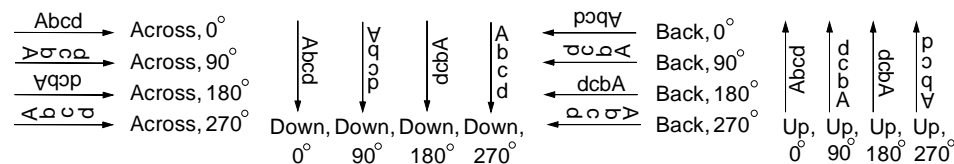


Figure 41. 3812 Inline Directions and Character Rotations for Downloaded Fonts

---

## Selecting Color

The 3812 supports selection of three colors: black, the color of the medium, and the printer default color.

---

## Gray-Scale Image

The 3812 can print images in shades of gray as well as in black.

---

## Exception Highlighting

The 3812 uses print-error vectors to highlight several printer exceptions. Figure 42 on page 71 contains an example of exception highlighting. In addition to highlighting data-check exceptions, the 3812 also uses this technique to highlight other data-stream exceptions.

The reporting of data-check exceptions and the printing of print-error vectors for those exceptions can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter on the \* \$\$ LST statement or printer-parameter member to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

```

08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 34
01 540 0001 01 FIN JHF 4 LABOR COST ANALYSIS
0005 24 E 0607
0010 11 01 06 02 07
0020 12 29 01 02 01 - 02 01 - 02 02 03
0030 34 1 1 L REPORT 540 PRODUCED =RPDATE=
0031 34 1 1 R
0040 34 2 1 L LABOR
0041 34 2 1 R RRENT ANALYSIS =PAGEN
0050 34 3 2 L ACTUAL COM
0051 34 3 2 R 0 LAST YEAR ACTUAL
0060 34 4 3 L MONTH - =MEDATE=
0061 34 4 3 R YEAR-TO-DATE
0070 34 5 1 L LAST YEAR VARIANCE
0071 34 5 1 R LAST YEAR VARIANCE
0072 34 6 2 L ACTUAL ACTUAL DOLLARS LAST YEAR PCT. VARIANC AC
0073 34 6 2 R ITLES ACTUAL ACTUAL DOLLARS
0080 34 9 1 L =UNTNO= =UNIT TITLE= ACTUAL ACTUAL DOLLARS
0081 34 9 1 R
0090 56 1 1 2 L 701003
0095 56 1 1 2 L 702004
0100 56 1 1 2 L 703108
0105 56 1 1 2 L 703207
0120 56 1 1 2 L 705004
0122 56 1 1 2 L 705007
0124 56 1 1 2 L 707802
0125 56 1 1 2 L 708909
0130 56 1 1 2 L 921007
0140 56 2 3 5 TOTAL LABOR

```

Figure 42. Exception Highlighting on the 3812

## Data Types on the 3812

The 3812 can process text data, IM image data, IOCA image data, graphics data, and bar code data.

### Text Data

The 3812 can process PTOCA PT1 and PTOCA PT2 text data.

### IM Image Data

The 3812 can process IM Image Data.

### IOCA Image Data

The 3812 can process IOCA FS10 data but does not support the G4 MMR compression algorithm. The 3812, which supports only left-to-right bit ordering, supports the compression algorithms shown in Figure 43.

Figure 43. Image Compression Algorithms for the 3812	
Algorithm	Hex code
IBM MMR	X'01'
Uncompressed	X'03'
RL4	X'06'

## Graphics Data

The 3812 can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3812 can process bar code data. Figure 44 summarizes the bar-code type and modifier combinations supported by the 3812. Refer to your printer description or reference publication for more information.

<i>Figure 44. Bar-Code Type and Modifier Combinations for the 3812</i>	
Type	Modifier
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

---

## Printer-Storage Management

The two printer-storage areas for the 3812 are:

- **Control storage:** Contains microcode, tables, control blocks that define pages to be printed, control information, suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops the printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

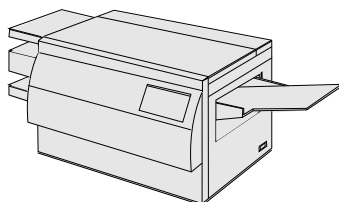
Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see "Font Pruning" on page 369.

**PSF/VM** With PSF/VM, if the 3812 is defined as an RSCS printer, insufficient storage conditions cause printing of the file to stop. RSCS issues a message describing the error condition.

---

## Chapter 5. 3816 Page Printer

This chapter describes the characteristics of the 3816 printer and PSF-supported functions. The 3816 is a table-top, cut-sheet printer that uses light-emitting diode and electrophotographic technology to print text, images, graphics, and bar codes at up to 24 impressions per minute.



*Figure 45. 3816 Printer*

Figure 46 on page 74 summarizes the printer characteristics and PSF-supported functions for the 3816. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 46 (Page 1 of 2). 3816 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	A	A	A	A	A	A
Forms flash						
N_UP Printing						
Color selection	x	x	x	x	x	x
Print-quality levels						
Gray-scale image	x	x	x	x	x	x
Operator-adjustable forms						
Exception highlighting: print-error vectors	x	x	x	x	x	x
Disabled mechanisms						
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	24	24	24	24	24	24
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	B	B	B	B	B	B
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	C	C	C	C	C	C
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x



Figure 46 (Page 2 of 2). 3816 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster	x	x	x	D	x	E
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Model 01D only					
<b>B</b>	Supported by the printer but not supported by PSF.					
<b>C</b>	Does not support the G4 MMR compression algorithm.					
<b>D</b>	Supports resident fonts only in native mode, not through the Distributed Print Function (DPF).					
<b>E</b>	Supports resident fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					

---

## Default Media Origin

Figure 47 shows the default media origin for a 3816, which is the top-left corner of a form with the short sides at the top and bottom. The printer supports changing the media origin, but PSF does not.

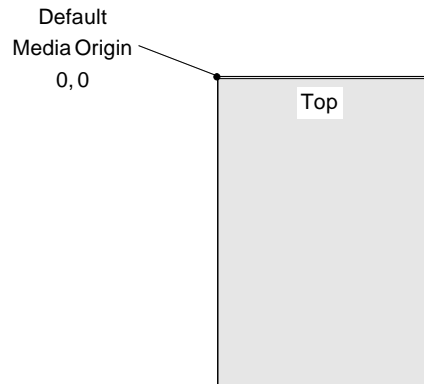


Figure 47. Default Media Origin on the 3816

---

## Printable Area

Printing within 0.125 inch of any edge of the form may result in reduced print quality in the border area. Figure 48 shows an example of the printable area of a form for a 3816. The printable area shown is 8.25 by 10.75 inches.

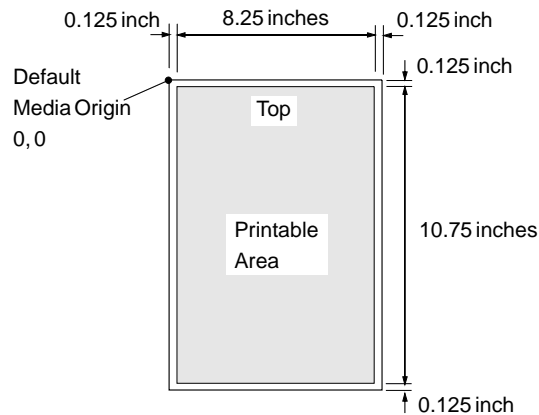


Figure 48. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3816

## Selecting the Printing Medium

The 3816 is a cut-sheet printer with two medium sources: the primary cassette and the alternate cassette. The cassettes can contain any of the sizes of media on which the printer can print. The 3816 can also print adhesive labels, which must be loaded in the alternate cassette.

Selecting the type of medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the primary cassette and BIN 2 for the alternate cassette.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command. The FORM option is not used for the 3816 by PSF/VM if the 3816 is defined as an RSCS printer.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the

FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

---

## Duplex Printing

The 3816 Model 01D supports duplex printing (printing on both sides of the sheet), but the 3816 Model 01S does not.

PSF processes the duplex control for a 3816 Model 01S by printing two consecutive pages of data as a pair. The first page of data is processed as the front of the sheet, and the second page is processed as the back of the sheet. A pair of pages is not determined by page numbers but is determined when the copy group is selected. If you request more than one copy of a page, all the front pages are printed, followed by all the back pages.

**Note:** When the 3816 Model 01D detects an asynchronous exception on a page that is to be printed on the back side of a sheet, the exception is not reported if the same asynchronous exception or a different asynchronous exception was also detected on the page that is to be printed on the front side of the sheet. Instead, the occurrence count for the exception reported for the front side of the sheet is incremented to reflect the exception on the back side of the sheet.

---

## Fonts

The 3816 prints with single-byte downloaded or resident raster fonts. The 3816 resident fonts are listed in Appendix B, "Printer-Resident Fonts."

**PSF/MVS** To use the resident raster fonts, the system programmer must identify them to PSF using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3816 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. When using DPF, however, 3816 printer resident fonts are not used.

**PSF/VM** With PSF/VM 1.3.0, the 3816 is supported with RSCS or with the Group4 Printer Driver Machine (PDM) program.

When a 3816 is defined as an RSCS printer, only resident raster fonts can be used. PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts so that PSF has a correspondence between the host fonts available to it and the resident raster fonts available for printing.

When a 3816 is defined as a Group4 printer, both downloaded or resident raster fonts can be used. PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts. If a host font is not mapped to a resident font, or if the resident font identifier in the table is not present in the printer, PSF downloads the host font to the printer. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3816 can print with fonts downloaded by PSF/VM. When using DPF, however, 3816 printer resident fonts are not used.

**PSF/VSE** To use the resident raster fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3816 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. When using DPF, however, 3816 printer resident fonts are not used.

**PSF/2** PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts. If a host font is not mapped to a resident font, or if the resident font identifier in the table is not present in the printer, PSF downloads the host font to the printer. To use the resident raster fonts, you must add the fonts to the resource library using the RLADD RESOURCE command. To access the resource library, use either the Resource Librarian accessed through the OS/2 command prompt or the easy-to-use Presentation Manager interface. PSF/2 does not support resident fonts when using the Distributed Print Function. Refer to the online *PSF/2 Technical Reference* for more information about using resident fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3816 can print with fonts downloaded by PSF/400. When using DPF, however, the 3816 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use resident fonts in native mode, but you can use downloaded raster fonts. PSF supports resident fonts to the extent that they are supported by the host PSF driving the printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 3816 is using resident fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0° and 180°, as shown in Figure 49.



Figure 49. 3816 Inline Directions and Character Rotations for Resident Fonts

If the 3816 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 50.

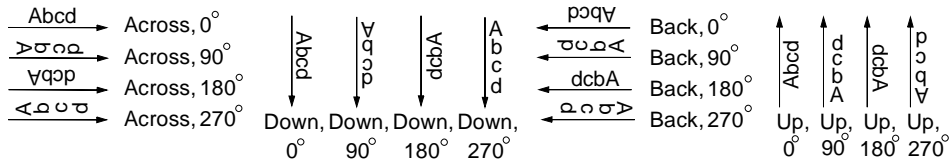


Figure 50. 3816 Inline Directions and Character Rotations for Downloaded Fonts

## Selecting Color

The 3816 supports selection of three colors: black, the color of the medium, and the printer default color.

## Gray-Scale Image

The 3816 can print images in shades of gray as well as in black.

---

## Exception Highlighting

The 3816 uses vectors to highlight several printer exceptions. Figure 51 on page 82 contains an example of exception highlighting used by the 3816. In addition to highlighting data-check exceptions, the 3816 also uses this technique to highlight other data-stream exceptions.

The reporting of data-check exceptions and the printing of vectors for those exceptions can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter on the \* \$\$ LST statement or printer-parameter member to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

|  
|  
|  
|  
**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

|  
|  
|  
**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

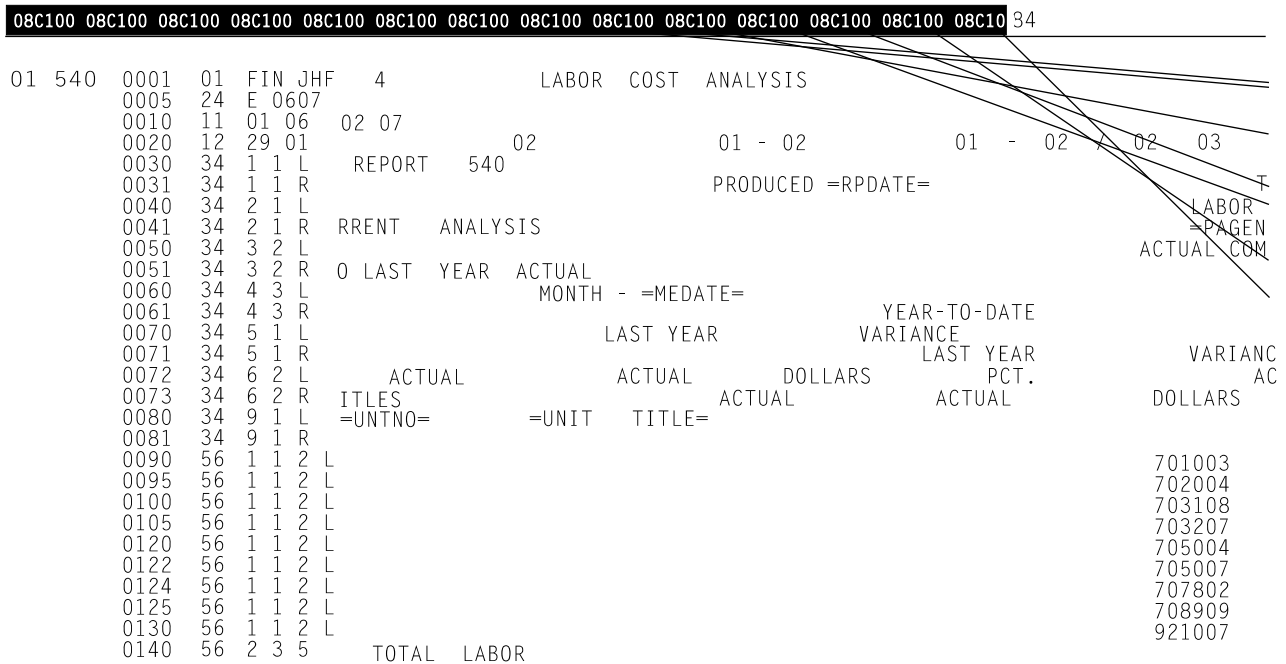


Figure 51. Exception Highlighting on the 3816

## Data Types

The 3816 supports text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 3816 can process PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 3816 can process IM image data.

## IOCA Image Data

The 3816 can process IOCA FS10 data but does not support the G4 MMR compression algorithm. The 3816, which supports only left-to-right bit ordering, supports the compression algorithms shown in Figure 52.

<i>Figure 52. Image Compression Algorithms for the 3816</i>	
Algorithm	Hex code
IBM MMR	X'01'
Uncompressed	X'03'
RL4	X'06'



## Graphics Data

The 3816 can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3816 can print BCOCA BCD1 bar code data. Figure 53 summarizes the bar-code type and modifier combinations supported by the 3816.

Refer to your printer description or reference publication for more information.

<i>Figure 53. Bar-Code Type and Modifier Combinations for the 3816</i>	
<b>Type</b>	<b>Modifier</b>
Postnet <sup>5</sup>	X'00' through X'03'
Code 128 <sup>5</sup>	X'01' through X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

<sup>5</sup> Printable only by printers with serial number 70000 or greater or by printers with RPQ #S02134 applied.

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## Printer-Storage Management

The two major printer-storage areas for the 3816 are:

- **Control storage:** Contains microcode, tables, and control blocks that define pages to be printed; contains control information; stores suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If PSF is unsuccessful, PSF stops printing the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

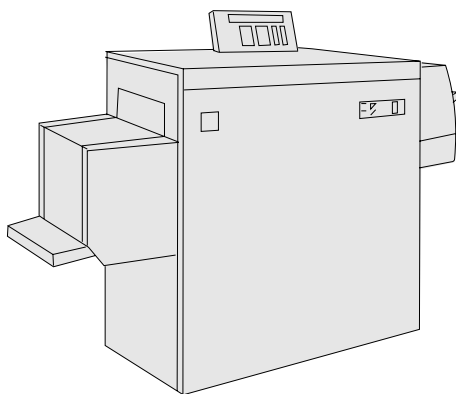
Ensure that your font pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

**PSF/VM** With PSF/VM, if the 3816 is defined as an RSCS printer, insufficient storage conditions can cause printing of the file to stop. RSCS sends a message describing the error condition.

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## Chapter 6. 3820 Page Printer

This chapter describes 3820 printer characteristics and PSF-supported functions. The 3820 is a cut-sheet printer that uses laser and electrophotographic technology to print text and images at up to 20 impressions per minute.



*Figure 54. 3820 Printer*

Figure 55 on page 86 summarizes the printer characteristics and PSF-supported functions for the 3820. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 55 (Page 1 of 2). 3820 Summary

<b>Printer Characteristics</b>	<b>PSF/MVS</b>	<b>PSF/VM</b>	<b>PSF/VSE</b>	<b>PSF/2</b>	<b>PSF/400</b>
Continuous forms					
Cut-sheet	x	x	x	x	x
Alternate media source	x	x	x	x	x
Alternate media destination					
Media source by copy					
Manual forms feed					
Envelope printing					
MICR printing					
Duplex printing	x	x	x	x	x
Forms flash					
N_UP Printing					
Color selection					
Print-quality levels					
Gray-scale image					
Operator-adjustable forms					
Exception highlighting: print-error markers	x	x	x	x	x
Disabled mechanisms					
Printhead resolution (pels per inch)	240	240	240	240	240
Maximum printing rate (ipm)	20	20	20	20	20
<b>PSF-Supported Functions</b>					
Page overlays	x	x	x	x	x
Direct printing					
Distributed Print Function	x	x	x	x	x
PSF Direct A	x	x	x	x	x
Changeable media origin					
Guaranteed print labeling					
<b>Data Types</b>					
PTOCA PT1 text	x	x	x	x	x
PTOCA PT2 text					
IM image	x	x	x	x	x
IOCA FS10 image					
GOCA DR/2V0 graphics					
BCOCA BCD1 bar codes					

Figure 55 (Page 2 of 2). 3820 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400
<b>Fonts</b>					
Single-byte downloaded raster	x	x	x	x	x
Single-byte resident raster					
Single-byte downloaded outline					
Single-byte resident outline					
Single-byte resident symbol sets					
Double-byte downloaded raster	x	x	x	x	x
Double-byte resident raster	x (with RPQ #8A5014)	B	x (with RPQ #8A5014)	B	B
Double-byte downloaded outline					
Double-byte resident outline					
<b>Notes:</b>					
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.				
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.				
<b>A</b>	PSF Direct on PSF/6000 does not support the 3820.				
<b>B</b>	Supported by the printer but not supported by PSF.				

---

## Default Media Origin

Figure 56 shows the default media origin, which is the top-left corner of a sheet with the short sides at the top and bottom. The media origin cannot be changed.

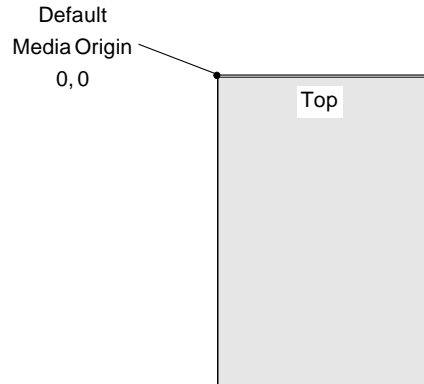


Figure 56. Default Media Origin on the 3820

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## Printable Area

You can print on the entire sheet, although IBM recommends that the printable area be defined to exclude 3 mm (0.12 inch) on all four sides, which allows for form alignment variations in the printer. Printing within 10 mm (0.40 inch) of any edge of the form may result in reduced print quality in the border area. Figure 57 shows an example of the printable area of a form for a 3820. The printable area shown is 8.3 by 10.8 inches.

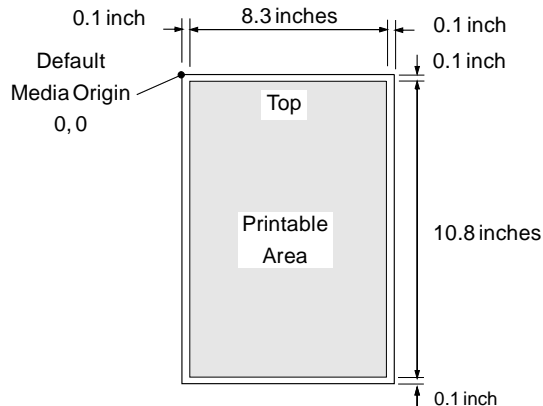


Figure 57. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3820

## Selecting the Printing Medium

The 3820 is a cut-sheet printer that has two medium sources: a bin and a cassette. The bin contains only standard-size medium, which is either letter-size or A4 size and is set by the IBM service representative. The cassette can contain any of the sizes of media on which the printer can print. If you are printing on adhesive labels, you must load them in the bin.

Selecting the type of medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the bin and BIN 2 for the cassette.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the bin and cassette of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

---

## Duplex Printing

When you use standard-size forms in a 3820, duplex printing is supported.

---

## Fonts

The 3820 prints with single-byte and double-byte downloaded raster fonts. The 3820 double-byte resident raster fonts are available only with RPQ #8A5014 on PSF/MVS and PSF/VSE.

**PSF/MVS** If RPQ #8A5014 <sup>6</sup> is installed, the 3820 can print with double-byte resident raster fonts. To use the resident raster fonts, the system programmer must identify them to PSF using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3820 prints only with fonts downloaded by PSF/MVS and residing in the DPF resources library; when using DPF, the 3820 does not use resident fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If RPQ #8A5014 <sup>6</sup> is installed, the 3820 can print with double-byte resident raster fonts. To use the resident raster fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3820 prints only with fonts downloaded by PSF/VSE and residing in the DPF resources library. When using DPF, however, the 3820 does not use resident fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

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<sup>6</sup> This RPQ is available in a limited distribution area. For more information, contact your IBM marketing representative.



## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on a 3820. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 58.

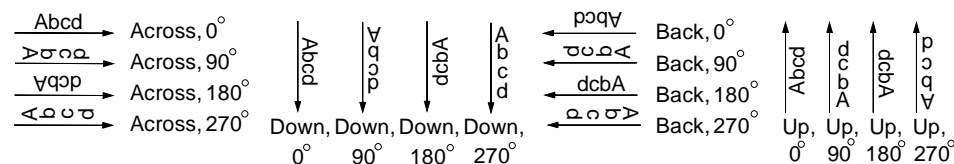


Figure 58. 3820 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

## Exception Highlighting

The 3820 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the **DATAACK** parameter on the JCL **OUTPUT** statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the **DATAACK** option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the **DATAACK** parameter in the \* \$\$ **LST** statement or printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the **DATAACK** parameter on the **APRINT** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the **DATAACK** parameter, specify either the **CONTENT** or the **ABSOLUTE** option on the **FIDELITY** parameter in the printer file. The **CONTENT** option permits an AFP file with errors to print; the **ABSOLUTE** option does not.

---

## Data Types

The 3820 can process text data and IM image data.

### Text data

The 3820 can process PTOCA PT1 text data.

### IM Image Data

The 3820 can process IM image data.

---

## Printer-Storage Management

The two printer-storage areas for the 3820 are:

- **Control storage:** Contains microcode, tables, control blocks that define pages to be printed, control information, suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If PSF is unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

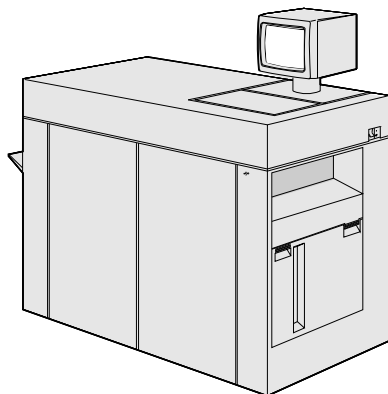
If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that the font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Chapter 7. 3825 Page Printer

This chapter describes 3825 printer characteristics and PSF-supported functions. The 3825 is a channel-attached, cut-sheet printer that uses laser and electrophotographic technology to print text, images, and graphics at up to 58 impressions per minute.



*Figure 59. 3825 Printer*

Figure 60 on page 94 summarizes the printer characteristics and PSF-supported functions for the 3825. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 60 (Page 1 of 2). 3825 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP Printing	A		A		A	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240 B	240 B	240 B	240 B	240 B	240 B
Maximum printing rate (ipm)	58	58	58	58	58	58
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	C	C	C	C	C	C
Guaranteed print labeling	x	x				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 image	D	D	D	D	D	D
GOCA DR/2V0 graphics	D	D	D	D	D	D
BCOCA BCD1 bar codes						

Figure 60 (Page 2 of 2). 3825 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>B</b>	With 240-pel addressability enhanced.					
<b>C</b>	Supported by the printer but not supported by PSF, except when using N_UP printing on PSF/MVS, PSF/VSE, and PSF/400.					
<b>D</b>	Supported only with the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 installed.					

---

## Default Media Origin

Figure 61 shows the default media origin, which is the top-left corner of a sheet with the short sides at the top and bottom. The printer supports changing the media origin, but PSF does not.

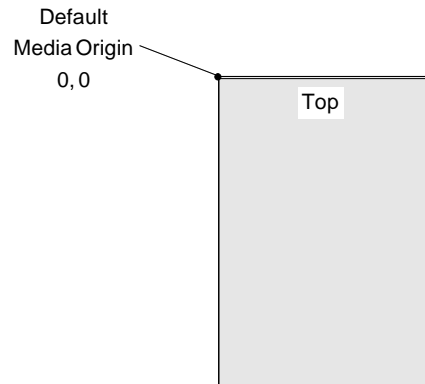


Figure 61. Default Media Origin on the 3825

---

## Printable Area

Consider the following when designing printing applications for the 3825:

- IBM recommends a 9 mm (0.36 inch) border on all four sides of the sheet for best print quality. Figure 62 on page 97 shows the recommended 9 mm (0.36 inch) border for the printable area of an 8.5-by-11-inch form.
- You may notice a reduction in print quality if:
  - Your application is designed to print closer to the edge of the form, between 5.7 mm (0.23 inch) and 9 mm (0.36 inch)
  - You are printing on index stock or labels and try to print beyond a border of 12.7 mm (0.50 inch)
  - You are printing on a B4-size form and try to print beyond a border of 17 mm (0.66 inch) along the left edge of the form
- You may notice loss of print if:
  - Your application is designed to print beyond a 5.7-mm (0.23 inch) border
  - You are printing on a B4-size form and try to print within 9 mm (0.36 inch) of the left edge of the form

The printable area shown is 7.78 by 10.28 inches.

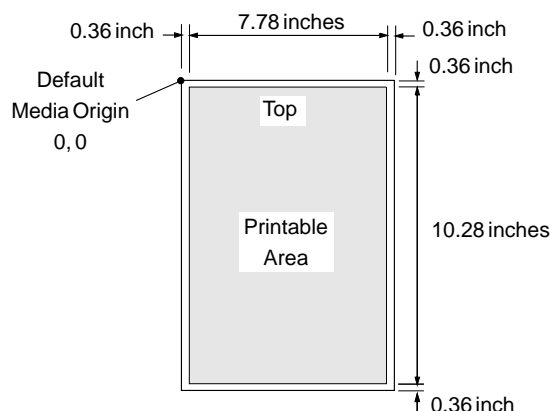


Figure 62. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3825

## Selecting the Printing Medium

The 3825 is a cut-sheet printer with two medium sources: the top medium source and the bottom medium source. The top source can contain any of the sizes of media on which the printer can print. The bottom source can contain only *standard-size* forms. Standard-size forms are either letter-size or A4-size and are configured by your installation.

With RPQ #8B4229 in the US and RPQ #8B4231 in non-US countries, the 3825 can have a third medium source that holds 500 sheets of letter-size and A4-size forms. With these RPQs, the AUTOCHANGE feature described below is not supported.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the bottom medium source, BIN 2 for the top medium source, and BIN 3 for the third medium source. If the operator selects the AUTOCHANGE feature of the printer, media from one source can be used when the other source is empty. If the operator selects AUTOCHANGE when the media in the two sources are not the same, your output may print on the wrong medium.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter on the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in each medium source of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter of the \* \$\$ LST statement. You may also need to specify a form name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

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## Duplex Printing

For all form sizes up to 215.9 mm (8.5 inches wide), duplex printing is supported. For form weight restrictions on duplexing, refer to your printer reference.



## Fonts

The 3825 prints with single-byte or double-byte downloaded raster fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3825 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3825 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3825. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 63.

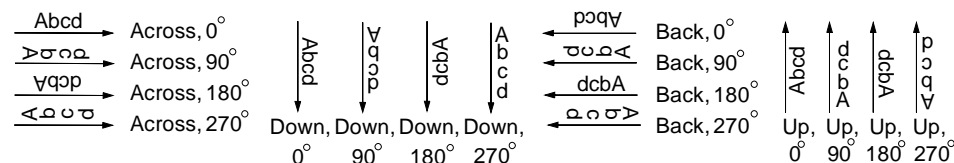


Figure 63. 3825 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

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## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3825 printer operator can adjust the placement of the page image on the medium. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800 printer, the form definition parameter defining the maximum permissible adjustment is not used for the 3825.

---

## Exception Highlighting

The 3825 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST or printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK option on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

## Data Types

The 3825 can process text data, IM image data, IOCA image data, and graphics data.

### Text Data

The 3825 can process PTOCA PT1 text data.

### IM Image Data

The 3825 can process IM image data.

### IOCA Image Data

The 3825 can process IOCA FS10 image if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed.

For improved decompression performance, install the Decompression Performance Enhancement RPQ # 8B4233. Feature #4200 is a prerequisite for this RPQ. The DPE RPQ can dramatically improve printer throughput for images compressed using the G3 MR (CCITT Group 3), G4 MMR (CCITT Group 4), and IBM MMR compression algorithms, if the images do not require scaling or resolution correction.

The 3825, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 64.

<b>Algorithm</b>	<b>Hex code</b>
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

### Graphics Data

The 3825 can process GOCA DR/2V0 graphics data if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed.

---

## Disabled Mechanisms

Three mechanisms can be disabled on the 3825:

- The top or bottom medium source
- The duplex paper path
- The offset stacker

When a mechanism first becomes disabled, PSF stops (or in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can choose to restart PSF for the 3825 even with the mechanism disabled. If a medium source is disabled, PSF selects the other medium source. If the duplex paper path is disabled, PSF prints files in simplex. If the offset stacker is disabled, PSF stacks the files without offsetting between files or between copy groups.

**PSF/400** For PSF/400, in addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

---

## Printer-Storage Management

The three printer-storage areas for the 3825 are:

- **Control storage:** Contains microcode, font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the file. Eliminating one character set or one code page from the print job or simplifying an overlay may allow the page to be printed.

Ensure that the font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

---

## Print-Quality Enhancement

The 3825 uses a print-quality enhancement function that smooths character edges.

When print jobs contain images or degrees of shading, you may need to experiment to reach optimum print quality. For example, if you are using *Overlay Generation Language/370*, IBM recommends that you use SCREEN shade patterns rather than STANDARD shade patterns. Particularly for light shading, consider using no less than a 6% SCREEN pattern. After testing your printing application on the 3825, you may prefer a 9% SCREEN pattern or a 12% SCREEN pattern.

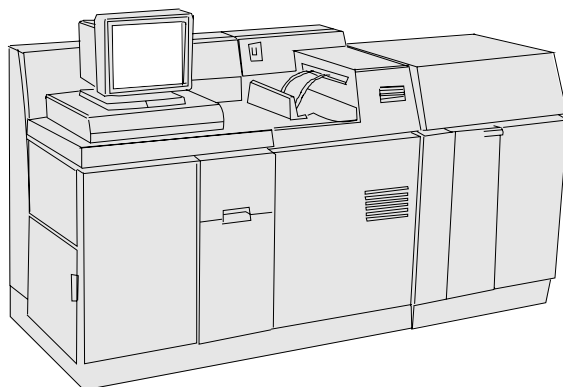
For more information on how to specify shade patterns, refer to *Overlay Generation Language/370: User's Guide and Reference*.



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## Chapter 8. 3827 Page Printer

This chapter describes 3827 printer characteristics and PSF-supported functions. The 3827 is a channel-attached, cut-sheet printer that uses a light-emitting diode printhead and electrophotographic technology to print text, images, and graphics at up to 92 impressions per minute.



*Figure 65. 3827 Printer*

Figure 66 on page 106 summarizes the printer characteristics and PSF-supported functions for the 3827. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 66 (Page 1 of 2). 3827 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP Printing	A		A		A	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	92	92	92	92	92	92
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	B	B	B	B	B	B
Guaranteed print labeling	x	x				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 image	C	C	C	C	C	C
GOCA DR/2V0 graphics	C	C	C	C	C	C
BCOCA BCD1 bar codes						



Figure 66 (Page 2 of 2). 3827 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b> Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.						
<b>ipm</b> Impressions per minute, for 8.5 by 11-inch sheets.						
<b>A</b> Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.						
<b>B</b> Supported by the printer but not supported by PSF, except when using N_UP printing on PSF/MVS, PSF/VSE, and PSF/400.						
<b>C</b> Supported by printers with the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 installed.						

---

## Default Media Origin

Figure 67 shows the default media origin, which is the top-left corner of the form with the short sides at the top and bottom. The printer supports changing the media origin, but PSF does not.

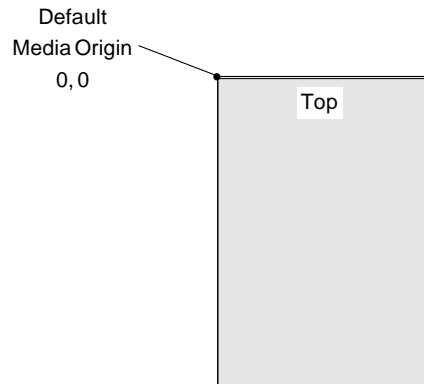


Figure 67. Default Media Origin on the 3827

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## Printable Area

The top-to-bottom printable area of a page is restricted only by the length of the form and the size of the printhead installed in your printer. If the printhead is smaller than the length of the form, the printable area is centered within the form. For example, for a form 14 inches long and for a 12.8-inch printhead, the top and bottom margins are both 0.6 inch. Refer to your printer publication for more information on available printhead sizes.

Although the 3827 can print edge-to-edge (within the printhead limits) from left to right, some print loss can be caused by registration, skew, and variations in form size. This print loss can occur when printing within 0.1 inch of the edge of the form. To avoid this print loss, consider using the printable area defined in the PSF-supplied form definitions designed for all printers other than the 3800.

Figure 68 shows an example of the printable area on a form that is 11 inches long. You can print edge-to-edge, but IBM recommends that the printable area be defined to exclude 0.1 inch on all four sides, which allows for form-alignment variations in the printer. The printable area shown is 8.3 by 10.8 inches.

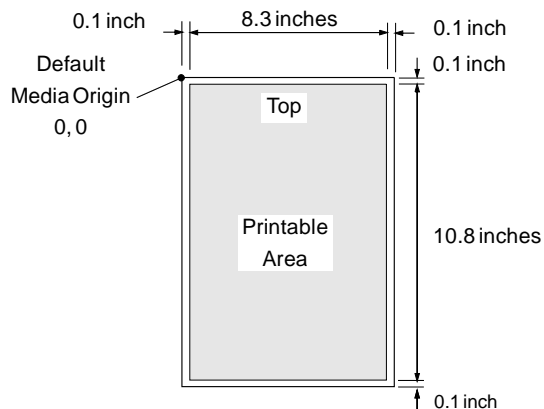


Figure 68. Recommended Printable Area for an 8.5 by 11-Inch Form on the 3827

Figure 69 shows an example of the printable area on a form that is 14 inches long and for a printhead that is 12.8 inches wide. You can print edge-to-edge, but IBM recommends that the printable area be defined to exclude 0.1 inch on all four sides, which allows for form-alignment variations in the printer.

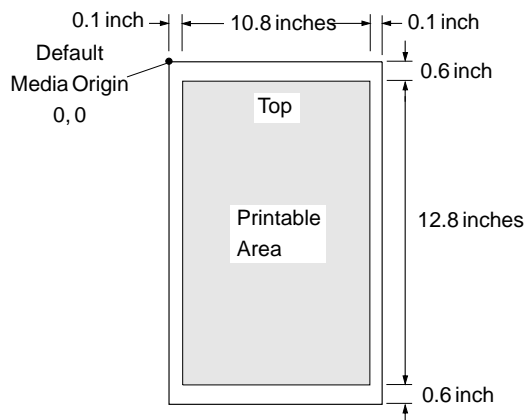


Figure 69. Example of the Printable Area on the 3827

---

## Selecting the Printing Medium

The 3827 is a cut-sheet printer with two medium sources: the upper medium source and the lower medium source. Both sources can contain any of the sizes of media on which the printer can print. If you are printing on adhesive labels, you must load them in the upper medium source.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the lower medium source and BIN 2 for the upper medium source. If the operator has defined the contents of the two medium sources to be the same, medium from one source can be used when the other source is empty. If all the characteristics of the media loaded in the two sources are not the same, your output may print on the wrong medium.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in each medium source of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium

sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter of the \* \$\$ LST statement. You may also need to specify a form with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

---

## Duplex Printing

For all form sizes used with the 3827, you can print duplex only from the lower medium source.

If you want to print duplex from the upper source, order RPQ #8A5051.

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## Fonts

The 3827 prints with single-byte or double-byte downloaded raster fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3827 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3827 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3827. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 70.

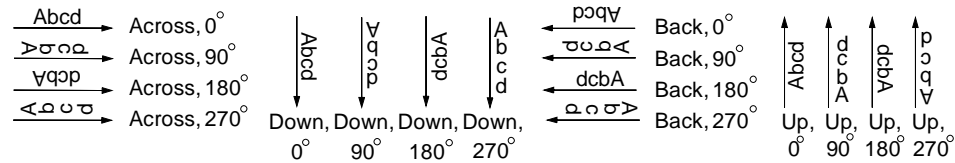


Figure 70. 3827 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3827 printer operator can adjust the placement of the page image on the medium. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce positioning errors. Unlike the 3800 printer, the form definition parameter defining the maximum adjustment is not used for the 3827.

## Exception Highlighting

The 3827 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer

file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

---

## Data Types

The 3827 can process text data, IM image data, IOCA image data, and graphics data.

### Text Data

The 3827 can process PTOCA PT1 text data.

### IM Image Data

The 3827 can process IM image data.

### IOCA Image Data

The 3827 can process IOCA FS10 images, if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed. For improved decompression performance, install the Decompression Performance Enhancement Feature (DPE) #4202. Feature #4200 is a prerequisite for feature #4202. The DPE feature can dramatically improve printer throughput for images compressed using the G3 MR (CCITT Group 3), G4 MMR (CCITT Group 4), and IBM MMR compression algorithms, if the images do not require scaling or resolution correction.

The 3827, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 71.

<i>Figure 71. Image Compression Algorithms for the 3827</i>	
<b>Algorithm</b>	<b>Hex code</b>
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

### Graphics Data

The 3827 can process GOCA DR/2V0 graphics data, if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed.

---

## Disabled Mechanisms

PSF can bypass either the lower or upper medium source if it becomes disabled.

When the medium source becomes disabled, PSF stops (or in the case of PSF/VM, drains), as it does for any permanent printer error. However, the operator can restart PSF for the 3827 with the single disabled medium source, and PSF will select the other (operable) medium source.

**PSF/400** For PSF/400, in addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

---

## Printer-Storage Management

The three printer-storage areas for the 3827 are:

- **Control storage:** Contains microcode, some font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains the print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one character set or one code page from the print job or simplifying an overlay may allow the page to be printed.

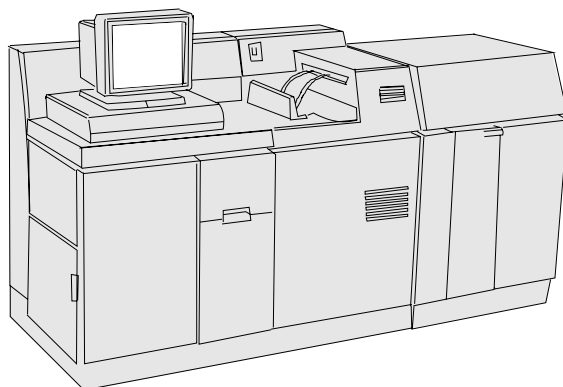
Ensure that your font pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.



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## Chapter 9. 3828 Advanced Function MICR Printer

This chapter describes 3828 printer characteristics and PSF-supported functions. The 3828 is a channel-attached, cut-sheet printer that uses a light-emitting diode printhead and electrophotographic technology to print text, images, and graphics at up to 92 impressions per minute.



*Figure 72. 3828 Printer*

Figure 73 on page 116 summarizes the printer characteristics and PSF-supported functions for the 3828. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 73 (Page 1 of 2). 3828 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing	x	x	x	x	x	x
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP Printing	A		A		A	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	480E B	480E B	480E B	480E B	480E B	480E B
Maximum printing rate (ipm)	92	92	92	92	92	92
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	C	C	C	C	C	C
Guaranteed print labeling	D	D				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 IO image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes						

Figure 73 (Page 2 of 2). 3828 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>B</b>	480E is 2-by-240 pels enhanced.					
<b>C</b>	Supported by the printer but not supported by PSF, except when using N_UP printing on PSF/MVS, PSF/VSE, or PSF/400.					
<b>D</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					

## Default Media Origin

Figure 74 shows the default media origin, which is the top-left corner of the form with the short sides at the top and bottom. The printer supports changing the media origin, but PSF does not.

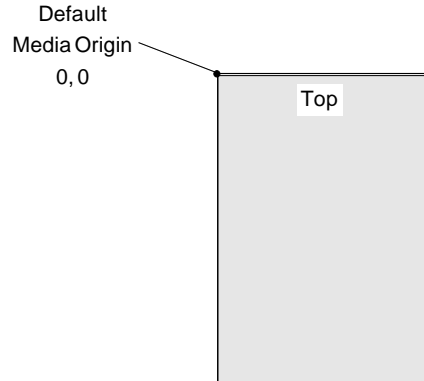


Figure 74. Default Media Origin on the 3828

## Printable Area

The 3828 uses a 14-inch printhead. You can print edge-to-edge from left to right and top to bottom on all form sizes supported (up to 8.5-by-14 inches). Although the 3828 can print edge-to-edge from left to right, some print loss can be caused by registration, skew, and variations in form size. Consider using the printable area defined in the PSF-supplied form definitions for all printers other than the 3800.

Figure 75 shows an example of the printable area on a form that is 11 inches long. You can print edge-to-edge, but IBM recommends that the printable area be defined to exclude 0.1 inch on all four sides, which allows for form-alignment variations in the printer. The printable area shown is 8.3-by-10.8 inches.

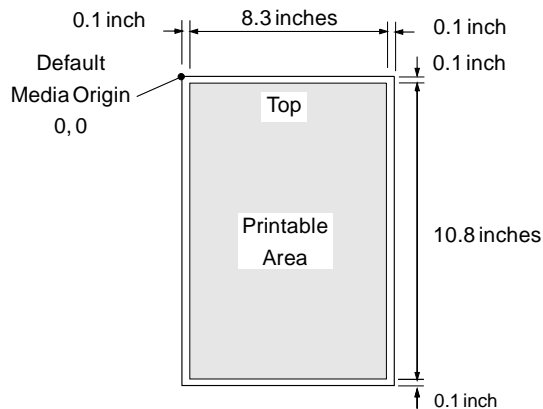


Figure 75. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3828

## Selecting the Printing Medium

The 3828 is a cut-sheet printer with two medium sources: the upper medium source and the lower medium source. Both sources can contain any of the sizes of media on which the printer can print. If you are printing on adhesive labels, you must load them in the upper medium source.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the lower medium source and BIN 2 for the upper medium source. If the operator has defined the contents of the two sources to be the same, a medium from one source can be used when the other source is empty. If all the characteristics of the media loaded in the medium sources are not the same, your output may print on the wrong medium.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in each medium source of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the two medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium

sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

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## Duplex Printing

For all form sizes used with the 3828, you can print in duplex from the upper and lower medium sources.

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## MICR Printing

The 3828 uses magnetic toner for all printing.

**PSF/400** PSF/400 supports MICR printing on the 3828 only with the appropriate PTFs applied to version levels prior to V3R0.5. After V3R0.5, no PTF is required.

- V2R2, PTF SF14343
- V2R3, PTF SF14516

---

## Fonts

The 3828 prints with single-byte or double-byte downloaded raster fonts, including MICR fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3828 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3828 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

---

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3828. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 76.

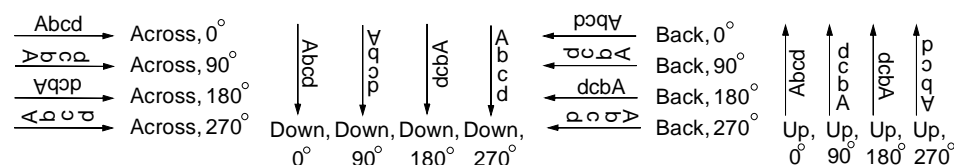


Figure 76. 3828 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

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## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3828 operator can adjust the page image on the medium. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800, the form definition parameter that defines the maximum permissible adjustment is not used for the 3828.

---

## Exception Highlighting

The 3828 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the `DATAACK` parameter on the `JCL OUTPUT` statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the `DATAACK` option on the `PSF` command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the `DATAACK` parameter in the `* $$ LST` or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

---

## Data Types

The 3828 can process text data, IM image data, IOCA image data, and graphics data.

### Text Data

The 3828 can process PTOCA PT1 text data.

### IM Image Data

The 3828 can process IM image data.

### IOCA Image Data

The 3828 can process IOCA FS10 images.

The 3828, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 77.

<i>Figure 77. Image Compression Algorithms for the 3828</i>	
<b>Algorithm</b>	<b>Hex Code</b>
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

### Graphics Data

The 3828 can process GOCA DR/2V0 graphics data.

---

## Disabled Mechanisms

PSF can bypass either the lower or upper medium source if it becomes disabled. When the medium source becomes disabled, PSF stops (in the case of PSF/VM, drains), as it does for any permanent printer error. However, the operator can restart PSF for the 3828 even with a single disabled medium source, and PSF will select the other (operable) medium source.



**PSF/400** For PSF/400, in addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

---

## Printer-Storage Management

The three printer-storage areas for the 3828 are:

- **Control storage:** Contains microcode, font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains the print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one character set or one code page from the print job or simplifying an overlay may allow the page to be printed.

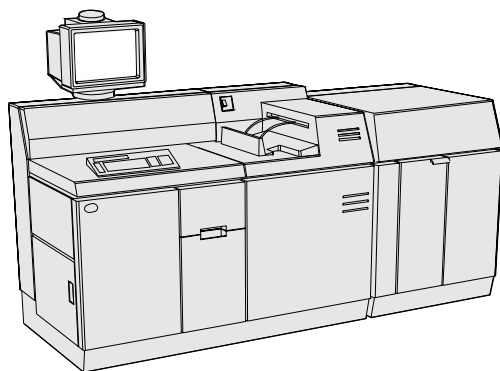
Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.



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## Chapter 10. 3829 Advanced Function Printer

This chapter describes 3829 printer characteristics and PSF-supported functions. The 3829 is a channel-attached, cut-sheet printer that uses a light-emitting diode and electrophotographic technology to print text, images, and graphics at up to 92 impressions per minute.



*Figure 78. 3829 Printer*

Figure 79 on page 126 summarizes the printer characteristics and PSF-supported functions for the 3829. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 79 (Page 1 of 2). 3829 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP Printing	A		A		A	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	480E B	480E B	480E B	480E B	480E B	480E B
Maximum printing rate	92	92	92	92	92	92
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	C	C	C	C	C	C
Guaranteed print labeling	D	D				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes						

Figure 79 (Page 2 of 2). 3829 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>B</b>	480E is 2-by-240 pels enhanced.					
<b>C</b>	Supported by the printer but not supported by PSF, except when using N_UP printing on PSF/MVS, PSF/VSE, or PSF/400.					
<b>D</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					

## Default Media Origin

Figure 80 shows the default media origin, which is the top-left corner of the form with the short sides at the top and bottom. The printer supports changing the media origin, but PSF does not.

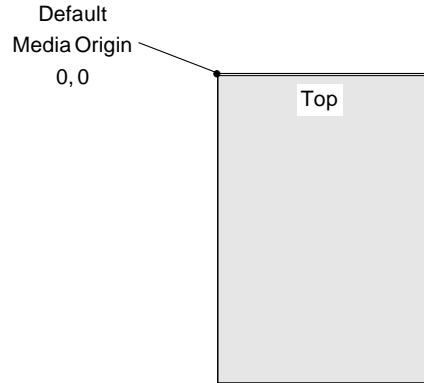


Figure 80. Default Media Origin on the 3829

## Printable Area

The 3829 uses a 14-inch printhead. You can print edge-to-edge from left to right and top to bottom on all form sizes supported (up to 8.5 by 14 inches).

Although the 3829 can print edge-to-edge from left to right, some print loss can be caused by registration, skew, and variations in form size. Consider using the printable area defined in the PSF-supplied form definitions for all printers other than the 3800.

Figure 81 shows an example of the printable area on a form that is 11 inches long. You can print edge-to-edge, but IBM recommends that the printable area be defined to exclude 0.1 inch on all four sides, which allows for form-alignment variations in the printer. The printable area shown is 8.3 by 10.8 inches.

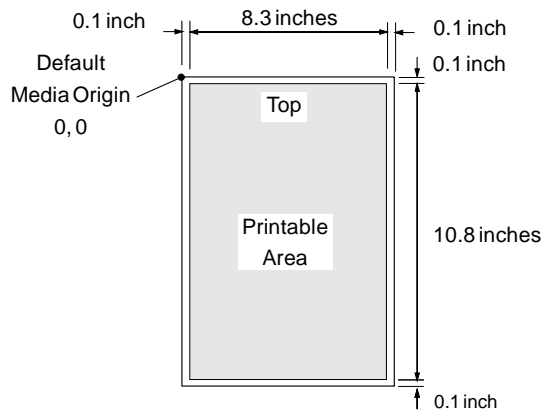


Figure 81. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3829

## Selecting the Printing Medium

The 3829 is a cut-sheet printer with two medium sources: the upper medium source and the lower medium source. Both sources can contain any of the sizes of media on which the printer can print. If you are printing on adhesive labels, you must load them in the upper medium source.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the lower medium source and BIN 2 for the upper medium source. If the operator has defined the contents of the two medium sources to be the same, medium from one source can be used when the other source is empty. If all the characteristics of the media loaded in the two sources are not the same, your output may print on the wrong medium.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in each medium source of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium

sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter of the \* \$\$ LST statement. You may also need to specify a form with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

---

## Duplex Printing

For all form sizes used with the 3829, you can print duplex from the upper and lower medium sources.

---

## Fonts

The 3829 prints with single-byte or double-byte downloaded raster fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3829 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3829 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.



## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3829. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 82.

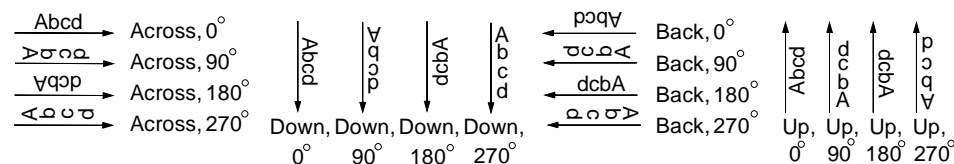


Figure 82. 3829 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3829 printer operator can adjust the placement of the page image on the medium. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce positioning errors. Unlike the 3800 printer, the form definition parameter defining the maximum adjustment is not used for the 3829.

## Exception Highlighting

The 3829 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

---

## Data Types

The 3829 can process text data, IM image data, IOCA image data, and graphics data.

### Text Data

The 3829 can process PTOCA PT1 text data.

### IM Image Data

The 3829 can process IM image data.

### IOCA Image Data

The 3829 can process IOCA FS10 images. For improved decompression performance, install the Decompression Performance Enhancement (DPE) Feature #4202. The DPE feature can dramatically improve printer throughput for images compressed using the G3 MR (CCITT Group 3), G4 MMR (CCITT Group 4), and IBM MMR compression algorithms, if the images do not require scaling or resolution correction.

The 3829, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 83.

<i>Figure 83. Image Compression Algorithms for the 3829</i>	
<b>Algorithm</b>	<b>Hex code</b>
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

### Graphics Data

The 3829 can process GOCA DR/2V0 graphics data.

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## Disabled Mechanisms

PSF can bypass either the lower or upper medium source if it becomes disabled.

When the medium source becomes disabled, PSF stops (or in the case of PSF/VM, drains), as it does for any permanent printer error. However, the operator can restart PSF for the 3829 with the single disabled medium source, and PSF will select the other (operable) medium source.

---

## Printer-Storage Management

The three printer-storage areas for the 3829 are:

- **Control storage:** Contains microcode, some font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains the print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one character set or one code page from the print job or simplifying an overlay may allow the page to be printed.

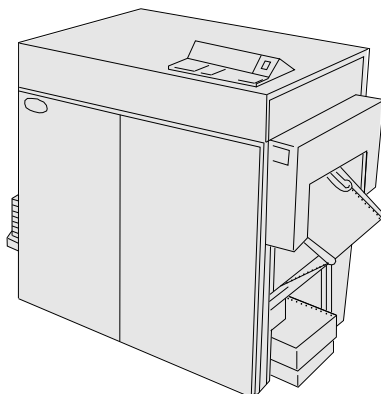
Ensure that your font pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.



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## Chapter 11. 3831 Page Printer

This chapter describes 3831 printer characteristics and PSF-supported functions. The 3831 is available only in Japan. The 3831 is a channel-attached, continuous-forms printer that uses a laser and electrophotographic technology to print text and images at up to 22 impressions per minute.



*Figure 84. 3831 Printer*

Figure 85 on page 136 summarizes the printer characteristics and PSF-supported functions for the 3831. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 85 (Page 1 of 2). 3831 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms	x	x	x	x	x	x
Cut-sheet						
Alternate media destination						
Alternate media source						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing						
Forms flash						
N_UP printing						
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms						
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	22	22	22	22	22	22
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	x	x	x	x	x	x
Guaranteed print labeling	A	A				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 image						
GOCA DR/2V0 graphics						
BCOCA BCD1 bar codes						

Figure 85 (Page 2 of 2). 3831 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch forms in landscape presentation (wide-leading-edge forms).					
<b>A</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-28-STD, for the B1 level designation for printed output.					

## Default Media Origin

For a 3831, the default media origin is determined by the leading edge of the form. Figure 86 shows the default media origin for narrow forms, which is at the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. However, for wide forms, the default media origin is at the top-right corner of the form, 0.5 inch from the outside edge of the carrier strip.

The media origin can be changed. For more information, see Appendix A, "Compatibility, Conversion, and Performance."

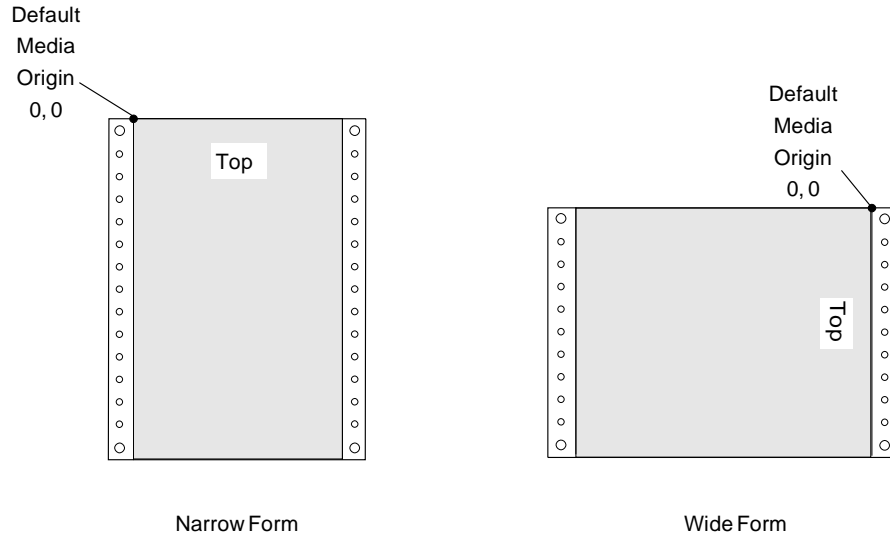


Figure 86. Default Media Origin on the 3831

## Printable Area

The printable area depends on the size of the form used. The areas that are not printable for common-use and ISO form sizes are the top and bottom 0.17 inch of a form. You should not place data in the areas that are not printable.

Figure 87 on page 139 shows examples of the printable areas of a form for a 3831. Notice that the media origin is located in different corners for wide and narrow forms. The printable area for the narrow form is 8.5 by 10.66 inches. The printable area for the wide form is 11 by 8.16 inches. Note that the coordinates of the page position are reversed from the narrow form (0,0.17) to the wide form (0.17,0). This reversal is necessary because of the difference in media origin for the two forms.



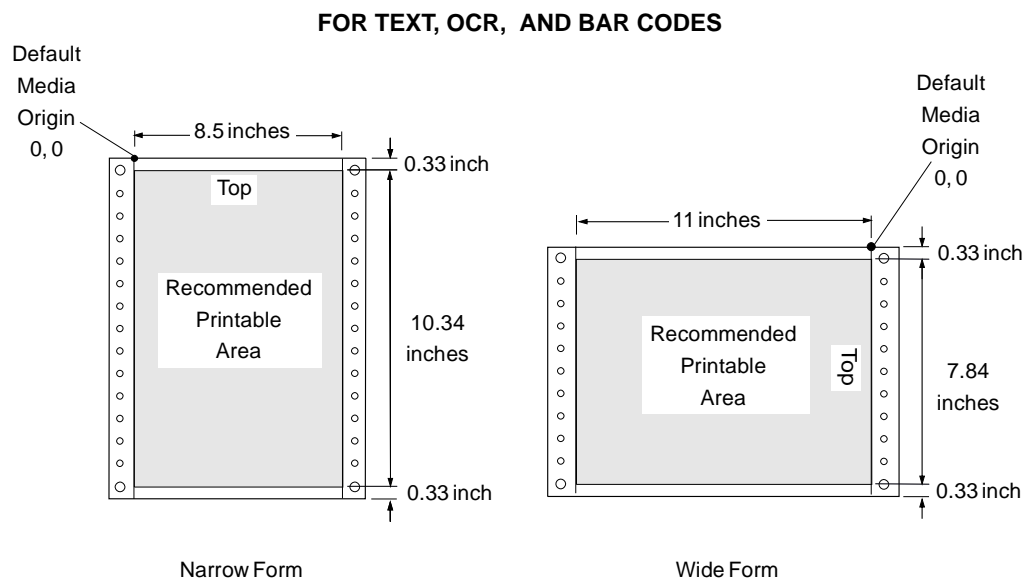


Figure 87. Printable Area for a 9.5-by-11-Inch (Narrow) and a 12-by-8.5-Inch (Wide) Form on 3831

## Selecting the Printing Medium

The 3831 is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded in the 3831 by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded in the 3831 by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded in the 3831 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 3831 by using the FORMTYPE parameter in the printer file.

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the printer. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

## Fonts

The 3831 prints with single-byte or double-byte downloaded raster fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3831 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3831 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3831. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 88.

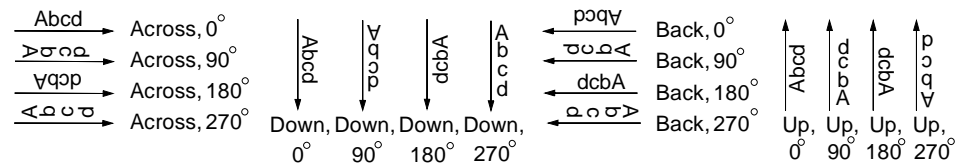


Figure 88. 3831 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

---

## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3831 printer operator can adjust the placement of the image on the page. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Unlike the 3800, the form-definition parameter that defines the maximum adjustment is not used for the 3831.

---

## Exception Highlighting

The 3831 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

---

## Data Types

The 3831 can process text data and IM image data.

## Text Data

The 3831 can process PTOCA PT1 text data.

## IM Image Data

The 3831 can process IM image data.

---

## Printer-Storage Management

The three printer-storage areas for the 3831 are:

- **Control storage:** Contains microcode, font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Chapter 12. 3835 Page Printer and 3835 Advanced Function Printer

This chapter describes 3835 Model 001 and Model 002 characteristics and PSF-supported functions. The 3835 is a channel-attached, continuous-forms printer that uses a laser and electrophotographic technology to print text, images, and graphics at up to 91 impressions per minute, depending on the model. Standard on the 3835-002 is 240 pels-per-inch resolution with the Print Quality Enhanced (PQE) function, which smooths edges on diagonal lines, protects fine details, improves the fidelity of images, and allows for adjustment of the boldness of text and the darkness of images.

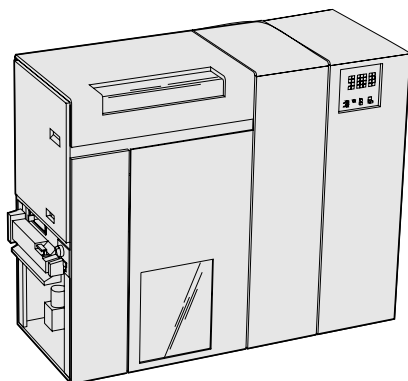


Figure 89. 3835 Printer

Figure 90 on page 144 summarizes the printer characteristics and PSF-supported functions for the 3835. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 90 (Page 1 of 2). 3835 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms	x	x	x	x	x	x
Cut-sheet						
Alternate media source						
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing	A	A	A	A	A	A
Duplex printing						
Forms flash						
N_UP Printing	B		B		B	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)						
3835-001	88	88	88	88	88	88
3835-002	91	91	91	91	91	91
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	x	x	x	x	x	x
Guaranteed print labeling	x -001; C -002	x -001; C -002				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 image	D -001 x -002	D -001 x -002	D -001 x -002	D -001 x -002	D -001 x -002	D -001 x -002
GOCA DR/2V0 graphics	D -001 x -002	D -001 x -002	D -001 x -002	D -001 x -002	D -001 x -002	D -001 x -002
BCOCA BCD1 bar codes						

Figure 90 (Page 2 of 2). 3835 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch forms in landscape presentation (wide-leading-edge forms).					
<b>A</b>	On the 3835-001, only with the 3835 MICR Printing RPQ, which allows MICR printing through a post-processing device. On the 3835-002, with the Advanced Function Post Processing Interface Feature #4720.					
<b>B</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>C</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					
<b>D</b>	On the 3835-001, supported only with the IBM Advanced Function Image and Graphics Feature (AFIG) #4200. On the 3835-002, support is standard.					

## Default Media Origin

For a 3835, the default media origin is determined by the leading edge of the form. Figure 91 shows the default media origin for narrow forms, which is at the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. However, for wide forms, the default media origin is at the top-right corner of the form, 0.5 inch from the outside edge of the carrier strip.

The media origin can be changed. For more information, see Appendix A, “Compatibility, Conversion, and Performance.”

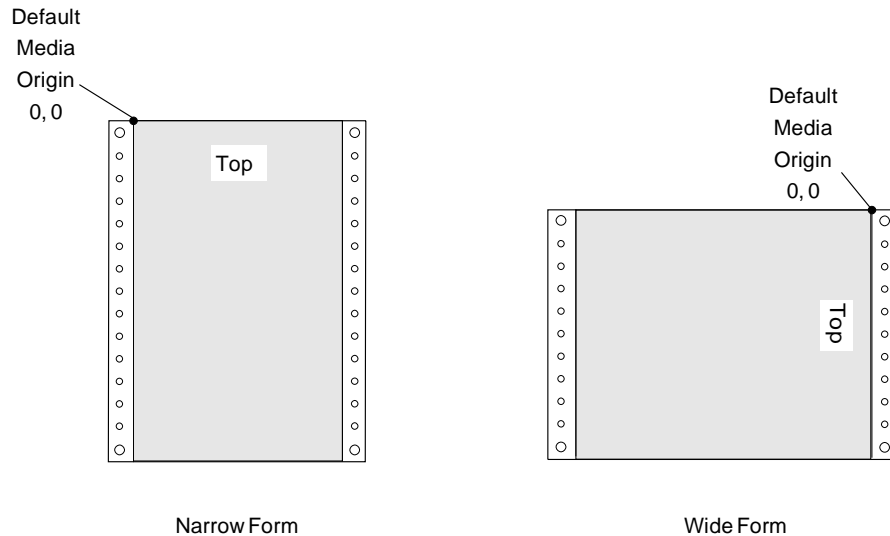


Figure 91. Default Media Origin on the 3835

## Printable Area

The printable area depends on the size of the form used. The areas that are not printable for common-use and ISO form sizes are 4.2 mm (0.17 inch) of a form from a perforation. You should not place data in the areas that are not printable.

Figure 92 on page 147 shows examples of the printable areas of a form for a 3835. Notice that the media origin is located in different corners for wide and narrow forms. The printable area for the narrow form is 8.5 by 10.66 inches. The printable area for the wide form is 11 by 8.16 inches.

On the 3835-001, degraded print quality may result from printing image data within 12.7 mm (0.5 inch) of a perforation and from printing text or bar code data within 8.5 mm (0.33 inch) of a perforation.

On the 3835-002, degraded print quality may result from printing within 12.7 mm (0.5 inch) of a perforation for solid area fill, logo, or image data and within 8.5 mm (0.33 inch) of a perforation for text or bar code data. With roll-feed paper on the 3835-002, no change in print quality should be apparent within 2 mm of the perforation.



## FOR TEXT, OCR, AND BAR CODES

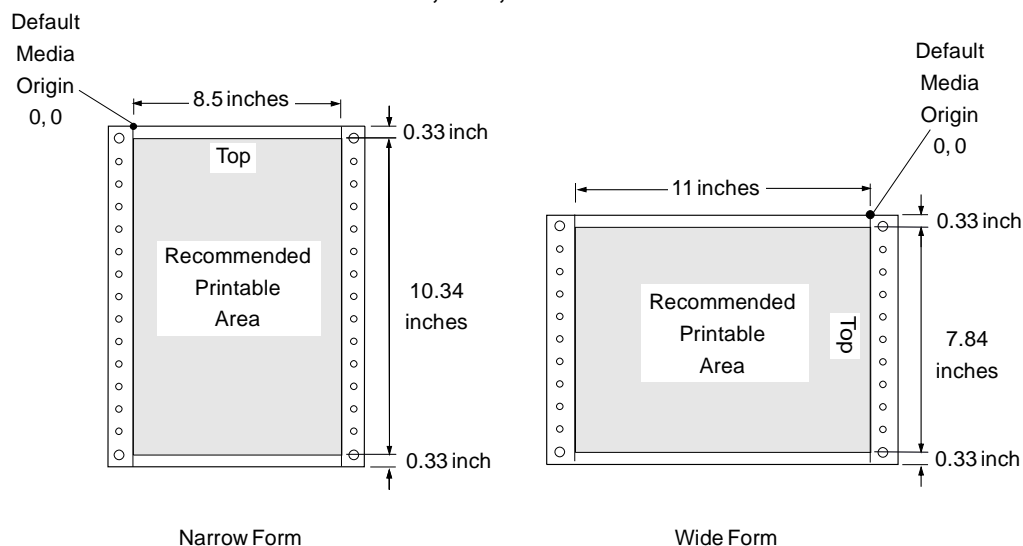


Figure 92. Printable Area for a 9.5 by 11-Inch (Narrow) and a 12 by 8.5-Inch (Wide) Form on 3835

## Selecting the Printing Medium

The 3835 is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded into the 3835 by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 3835 by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 3835 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 3835 by using the FORMTYPE parameter in the printer file.

**PSF/6000** Different queues may be defined to correspond to different forms loaded in the printer. If so, you may need to specify a queue name with the **eng** command or in a SMIT panel.

---

## MICR Printing

On 3835-001, to print text data using magnetic ink character recognition (MICR) fonts, you must use the 3835 MICR Printing Interface RPQ (RPQ #8B4400, with the Pre/Post-processing RPQ #8A5022 as a prerequisite), which sends the form through an attached TROY MICR printer.

On 3835-002, to print text data using MICR fonts, you must use the Advanced Function Post-processing Interface Feature #4720, which sends the form through an attached TROY MICR printer.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/2** PSF/2 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

PSF/2 (through the Distributed Print Function) has an option to not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/400** PSF/400 supports MICR printing on the 3835 only with the appropriate PFTs applied to version levels prior to V3R0M5. After V3R0M5, no PTF is required.

- V2R2, PTF SF14343
- V2R3, PTF SF14516

PSF/400 does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/6000** PSF/6000 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

## Fonts

The 3835 can print with single-byte or double-byte downloaded raster fonts, including MICR fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3835 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3835 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3835. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 93.

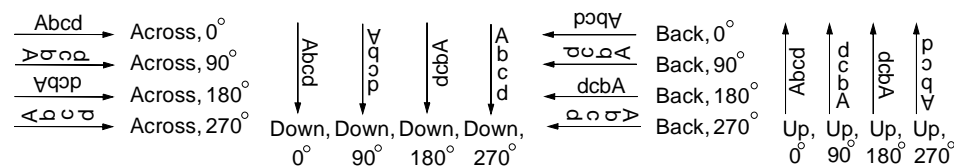


Figure 93. 3835 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

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## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3835 operator can adjust the placement of the image on the page. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Unlike the 3800, the form definition parameter that defines the maximum adjustment is not used for the 3835.

---

## Exception Highlighting

The 3835 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

## Data Types

The 3835 can process text data, IM image data, IOCA image data, and graphics data.

## Text Data

The 3835 can process PTOCA PT1 text data.

## IM Image Data

The 3835 can process IM image data.

## IOCA Image Data

The 3835-001 can process IOCA FS10 image data, if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed. The 3835-002 processes IOCA FS10 image data as a standard Feature.

For improved decompression performance, install the Decompression Performance Enhancement (DPE) Feature #4202. Feature #4200 is a prerequisite for feature #4202. The DPE feature can dramatically improve printer throughput for images compressed using the G3 MR (CCITT Group 3), G4 MMR (CCITT Group 4), and IBM MMR compression algorithms, if the images do not require scaling or resolution correction.

The Scaling Performance Enhancement (SPE), available on September 9, 1994, is a free upgrade to DPE. SPE is included in the Version 13 microcode for the 3835-002. SPE improves printer throughput when you are decompressing images that are not 240-pel in resolution or that have been rescaled at specific ratios.

The 3835, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 94.

<i>Figure 94. Image Compression Algorithms for the 3835</i>	
<b>Algorithm</b>	<b>Hex Code</b>
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 3835-001 can process GOCA DR/2V0 graphics data if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed. The 3835-002 processes GOCA DR/2V0 graphics data as a standard Feature.

---

## Disabled Mechanisms

One mechanism can be disabled on the 3835: MICR post-processing.

**PSF/MVS and PSF/VSE** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and abends. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/VM** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and drains. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/400** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and holds the file. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/2 and PSF/6000** If MICR post-processing becomes disabled during printing, PSF terminates the print file and continues processing the next file without using MICR post-processing.

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## Printer-Storage Management

The three printer-storage areas for the 3835 are:

- **Control storage:** Contains microcode, font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

Additional pattern storage is available with the following Features:

- The Pattern Storage Feature #4030, which provides an additional 2 MB of pattern storage.<sup>up 5</sup>
- The Pattern Storage Feature #4040, which provides an additional 4 MB of pattern storage. You can order three copies of this feature to provide the maximum of 16 MB of pattern storage.
- The Pattern Storage Feature #4060, which provides the maximum of 16 MB of pattern storage.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Pre/Post-Processing Devices

You can attach up to 3 pre/post-processing devices to the 3835. You can install up to three 4710 features or one 4720 and two 4710 features.

### PSF/MVS

- With installation of APAR OY56083, the attachment of a post-processing device, and installation of the Advanced Function Post-processing Interface Feature #4720, with the 3835-002, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially created form definition and the JCL FORMS parameter.

- With installation of APAR OY49641 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VSE

- With installation of APAR DY42336, the attachment of a post-processing device, and with installation of the Advanced Function Post-processing Interface Feature #4720, with the 3835-002, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JECL FORMS parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VM

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of APAR PN20587 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/2 and PSF/400**

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/6000**

- With the attachment of a post-processing device and installation of the Advanced Function Post-processing Interface Feature #4720, with the 3835-002, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition invoked with the `-oforndef=formdefname` parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

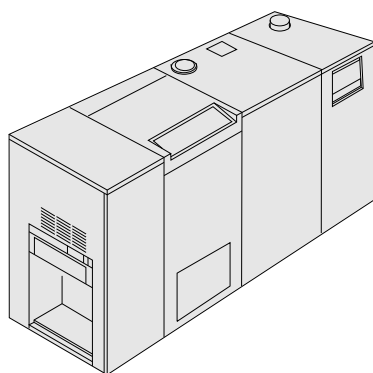


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## Chapter 13. 3900 Advanced Function Printer Model 001

This chapter describes 3900 printer characteristics and PSF-supported functions. The 3900 is a channel-attached, continuous-forms printer that uses a laser and electrophotographic technology to print text, images, and graphics at up to 229 impressions per minute.

3900 Advanced Function Printers with Enhanced Print Quality (available after February 25, 1994) have a new developer system that improves their overall print quality. They also have 240 pels-per-inch resolution and the Print Quality Enhanced (PQE) function, which smooths edges on diagonal lines, protects fine details, improves the fidelity of images, and allows for adjustment of the boldness of text and the darkness of images.



*Figure 95. 3900 Printer*

Figure 96 on page 156 summarizes the printer characteristics and PSF-supported functions for the 3900. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 96 (Page 1 of 2). 3900 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms	x	x	x	x	x	x
Cut-sheet						
Alternate media source						
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing	A	A	A	A	A	A
Duplex printing						
Forms flash						
N_UP printing	B		B		B	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	229	229	229	229	229	229
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	x	x	x	x	x	x
Guaranteed print labeling	C	C				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text						
IM image	x	x	x	x	x	x
IOCA FS10 image	D	D	D	D	D	D
GOCA DR/2V0 graphics	D	D	D	D	D	D
BCOCA BCD1 bar codes						

Figure 96 (Page 2 of 2). 3900 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte raster downloaded	x	x	x	x	x	x
Single-byte raster resident						
Single-byte outline downloaded						
Single-byte outline resident						
Single-byte resident symbol sets						
Double-byte raster downloaded	x	x	x	x	x	x
Double-byte raster resident						
Double-byte outline downloaded						
Double-byte outline resident						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch forms in landscape presentation (wide-leading-edge forms).					
<b>A</b>	Supported by any 3900 shipped after October 30, 1992 with the Advanced Function Post-processing Interface Feature #4720, or by a 3900 shipped before October 30, 1992 and upgraded with RPQ #8B3917.					
<b>B</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>C</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					
<b>D</b>	Supported only with the IBM Advanced Function Image and Graphics Feature (AFIG) #4200, which replaces the IBM Advanced Function Image and Graphics RPQ #8B3907 used for earlier models. On 3900 printers shipped after July 16, 1993, the AFIG feature is standard.					

## Default Media Origin

For a 3900, the default media origin is determined by the leading edge of the form. Figure 97 shows the default media origin for narrow forms, which is at the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. However, for wide forms, the default media origin is at the top-right corner of the form, 0.5 inch from the outside edge of the carrier strip.

The media origin can be changed. For more information, see Appendix A, “Compatibility, Conversion, and Performance.”

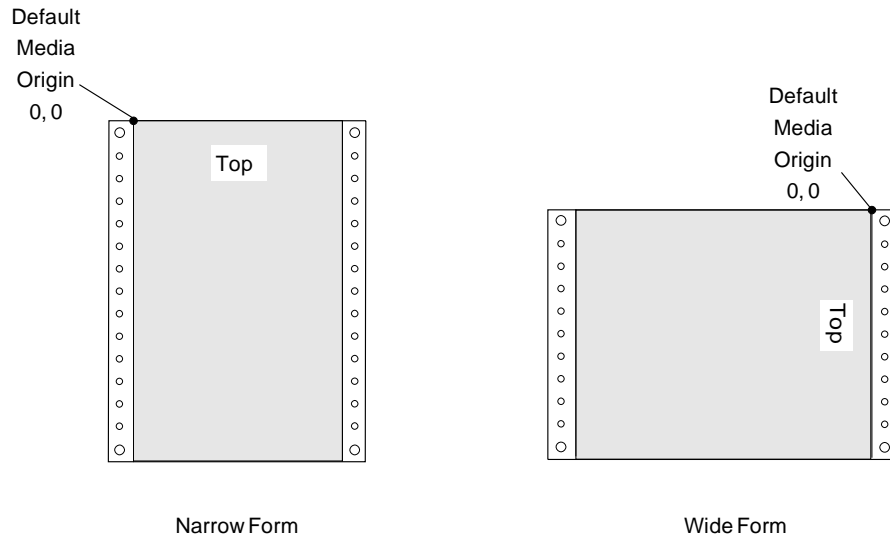


Figure 97. Examples of the Default Media Origin on the 3900

## Printable Area

The printable area depends on the size of the form being used. The 3900 can print from perforation to perforation when using roll forms. However, when printing on folded forms, the printing may be degraded in areas near a folded perforation, an internal perforation, or any cut in the form because of the “tenting” (*fold memory*) of the form.

Figure 98 on page 159 shows examples of the printable areas of a roll form for a 3900. Notice that the media origin is located in different corners for wide and narrow forms. The printable area for the narrow form is 8.5 by 11 inches. The printable area for the wide form is 11 by 8.5 inches.

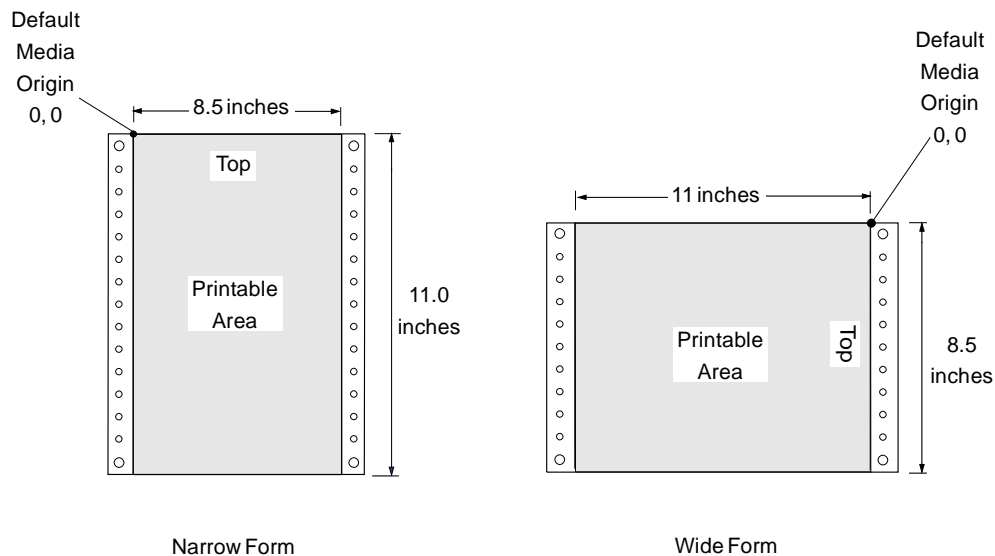


Figure 98. Printable Area for 9.5 by 11-Inch (Narrow) and a 12 by 8.5-Inch (Wide) Roll Forms on 3900

Figure 99 shows examples of the printable areas of folded forms for a 3900. Notice that the media origin is located in different corners for wide and narrow forms. The printable area for the narrow form is 8.5 by 10.66 inches. The printable area for the wide form is 11 by 8.16 inches.

**FOR TEXT, OCR, AND BAR CODES**

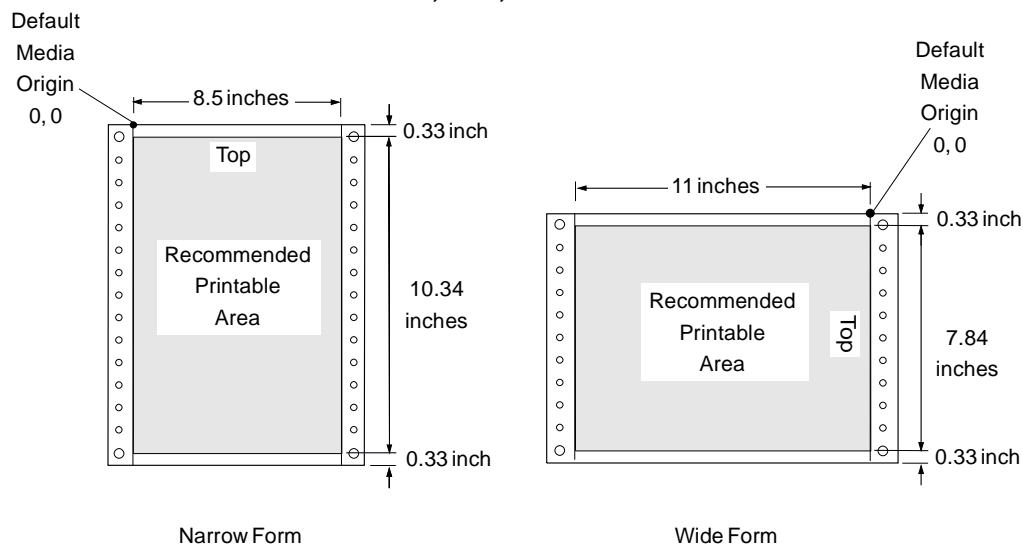


Figure 99. Printable Area for 9.5 by 11-Inch (Narrow) and a 12 by 8.5-Inch (Wide) Folded Forms on 3900

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## Selecting the Printing Medium

The 3900 is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded into the 3900 by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 3900 by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 3900 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 3900 by using the FORMTYPE parameter in the printer file.

**PSF/6000** Different queues may be defined to correspond to different forms loaded in the printer. If so, you may need to specify a queue name with the **eng** command or in a SMIT panel.

---

## MICR Printing

To print text data using magnetic ink character recognition (MICR) with the 3900, you must use the Advanced Function Post-processing Interface Feature #4720, which sends the form through an attached MICR post-processing device. You can upgrade printers shipped before October 30, 1992 with RPQ #8B3917.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/2** PSF/2 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

PSF/2 (through the Distributed Print Function) has an option to not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/400** PSF supports MICR printing on the 3900 only with the appropriate PFTs applied to version levels prior to V3R0.5. After V3R0.5, no PTF is required.

- V2R2, PTF SF14343
- V2R3, PTF SF14516

PSF/400 does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/6000** PSF/6000 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

## Fonts

The 3900 prints with single-byte or double-byte downloaded raster fonts.

**PSF/MVS** If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3900. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 100.

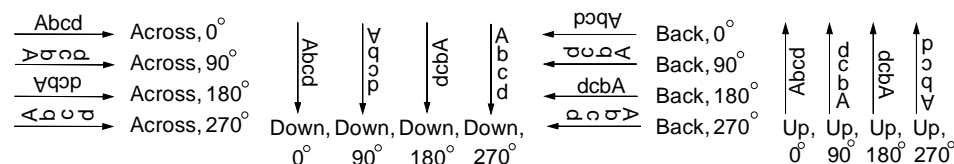


Figure 100. 3900 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

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## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3900 operator can adjust the placement of the image on the page. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800, the form definition parameter that defines the maximum adjustment is not used for the 3900.

---

## Exception Highlighting

The 3900 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.



## Data Types

The 3900 can process text data, IM image data, IOCA image data, and graphics data.

## Text Data

The 3900 can process PTOCA PT1 text data.

## IM Image Data

The 3900 can process IM image data.

## IOCA Image Data

The 3900 can process IOCA FS10 image data if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed. This feature replaces the IBM Advanced Function Image and Graphics RPQ #8B3907, which was used for earlier models. For 3900s shipped after July 16, 1993, the AFIG feature is standard on the printer.

For improved decompression performance, install the Decompression Performance Enhancement (DPE) Feature #4202. Feature #4202 is a prerequisite for feature #4202. The DPE feature can dramatically improve printer throughput for images compressed using the G3 MR (CCITT Group 3), G4 MMR (CCITT Group 4), and IBM MMR compression algorithms, if the images do not require scaling or resolution correction.

The Scaling Performance Enhancement (SPE), available on September 9, 1994, is a free upgrade to DPE. SPE is included in the Version 13 microcode for the 3900-001. SPE improves printer throughput when you are decompressing images that are not 240 pel in resolution or that have been rescaled at specific ratios.

The 3900, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 101.

<i>Figure 101. Image Compression Algorithms for the 3900</i>	
<b>Algorithm</b>	<b>Hex Code</b>
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 3900 can process GOCA DR/2V0 graphics data if the IBM Advanced Function Image and Graphics Feature (AFIG) #4200 is installed. This feature replaces the IBM Advanced Function Image and Graphics RPQ #8B3907, which was used for earlier models. For 3900 printers shipped after June 25, 1993, the AFIG feature is standard on the printer.

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## Disabled Mechanisms

Two mechanisms can be disabled on the 3900: offset stacking, if the post-processor responds to an offset request, and MICR post-processing.

Offset stacking is available for PSF/MVS 2.1.0 with APAR OY49641 and for PSF/VM 2.1.0 with APAR PN20587. Offset stacking is available with PSF/VSE 2.2.0, PSF/2 1.1, and PSF/6000 1.1. When the offset device first becomes disabled, PSF stops (in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can choose to restart PSF for the 3900, even with offset stacking disabled. When the offset device is disabled, PSF stacks the files without offsetting between files or between copy groups.

**PSF/MVS, PSF/VM, and PSF/VSE** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and abends. PSF/VM drains instead of abending. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/400** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and holds the file. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

In addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

**PSF/2 and PSF/6000** If MICR post-processing becomes disabled during printing, PSF terminates the print file and continues processing the next file without using MICR post-processing.

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## Printer-Storage Management

The three printer-storage areas for the 3900 are:

- **Control storage:** Contains microcode, font tables, cached overlays, and microcode data structures
- **Pattern storage:** Contains font patterns and raster images
- **Page buffer storage:** Contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Pre/Post-Processing Devices

You can attach up to 3 pre/post-processing devices to the 3900-001. You can install up to three 4710 features or one 4720 and two 4710 features.

### PSF/MVS

- With installation of APAR OY56083, the attachment of a post-processing device, and installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JCL FORMS parameter.

- With installation of APAR OY49641 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VSE

- With installation of APAR DY42336, the attachment of a post-processing device, and with installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JECL FORMS parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VM

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of APAR PN20587 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/2**

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/400**

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, and with PTF SF14343 on V2R2 or PTF SF14516 on V2R3, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/6000**

- With the attachment of a post-processing device and installation of the Advanced Function Post-processing Interface Feature #4720, with the 3835-002, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition invoked with the `-oforndef=formdefname` parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

## Chapter 14. 3900-0W1 Advanced Function Printer

This chapter describes the 3900-0W1 printer characteristics and PSF-supported functions. The 3900-0W1 is a channel- and/or LAN-attached, continuous-forms printer that uses a laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 229 impressions per minute (ipm). The 3900-0W1 has an 18-inch wide paper path and a 17-inch wide print width, which permits printing of two (N\_UP 2) 8.5-by-11 inch or two ISO A4 pages on a single side of a sheet. The 3900-0W1 uses the Advanced Function Common Control Unit (AFCCU), based on RISC technology, which provides as standard the Advanced Function Image and Graphics (AFIG) feature and the Decompression Performance Enhancement (DPE) feature.

3900-0W1 has 240 pels-per-inch resolution and the Print Quality Enhancement (PQE) function, which smooths edges on diagonal lines, protects fine details, improves the fidelity of images, and allows for adjustment of the boldness of text and the darkness of images.

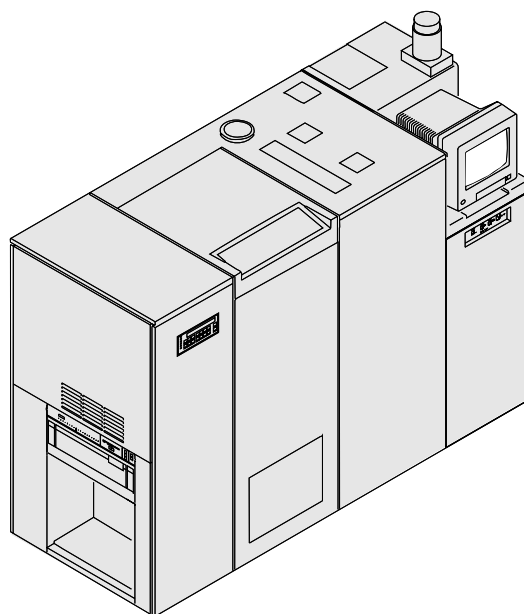


Figure 102. 3900-0W1 Printer

Figure 103 on page 168 summarizes the printer characteristics and PSF-supported functions for the 3900-0W1. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 103 (Page 1 of 2). 3900-0W1 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms	x	x	x	x	x	x
Cut-sheet						
Alternate media source						
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing	A	A	A	A	A	A
Duplex printing						
Forms flash						
N_UP Printing	B		B		C	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	229 D	229 D	229 D	229 D	229 D	229 D
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	x	x	x	x	x	x
Guaranteed print labeling	E	E				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 103 (Page 2 of 2). 3900-0W1 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline	x			F		F
Single-byte resident outline	G		G	F	x	F
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch forms in landscape presentation (wide-leading-edge forms).					
<b>A</b>	With a MICR post-processing device attached and with the Advanced Function Post-processing Interface Feature #4720 installed.					
<b>B</b>	Supports both basic and enhanced N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>C</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>D</b>	235 ipm for ISO A4.					
<b>E</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					
<b>F</b>	Supports resident and outline fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>G</b>	Activated on PSF/MVS and PSF/VSE by using the APSRMARK and APTRMARK utilities, respectively.					

## Default Media Origin

For a 3900-0W1, the default media origin is determined by the leading edge of the form. Figure 104 shows the default media origin for narrow forms, which is at the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. However, for wide forms, the default media origin is at the top-right corner of the form, 0.5 inch from the outside edge of the carrier strip.

The media origin can be changed. For more information, see Appendix A, "Compatibility, Conversion, and Performance."

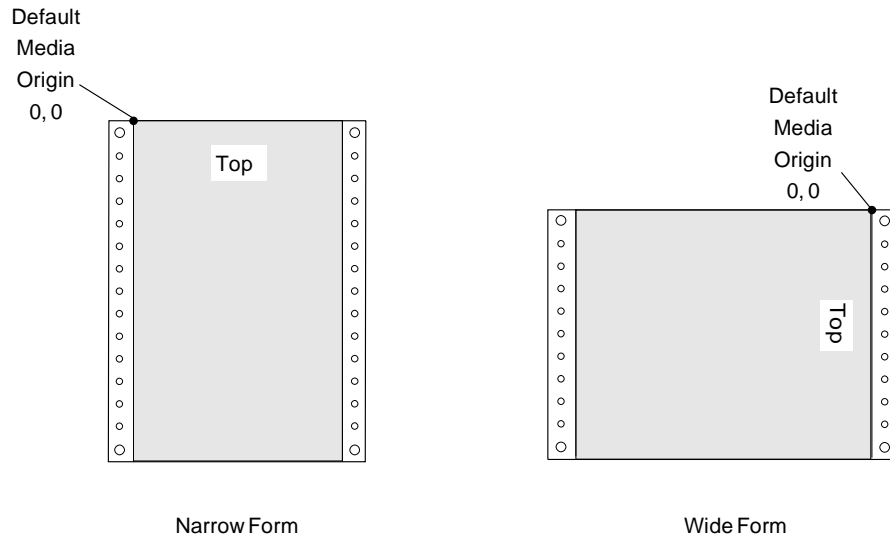


Figure 104. Examples of the Default Media Origin on the 3900-0W1



# Printable Area

The printable area depends on the size of the form being used. The 3900-0W1 can print from perforation to perforation when using roll forms. When printing on folded forms, however, the printing may be degraded in areas near a folded perforation, an internal perforation, or any cut in the form because of the “tenting” (*fold memory*) of the form.

Figure 105 shows examples of the printable areas of a standard, letter-size roll form for a 3900-0W1. Notice that the media origin is located in different corners for wide and narrow forms. Although the maximum printable area for narrow forms is 8.5 by 17 inches, and the maximum printable area for wide forms is 17 by 17 inches, the examples show the printable area for letter-size forms.<sup>7 8</sup>

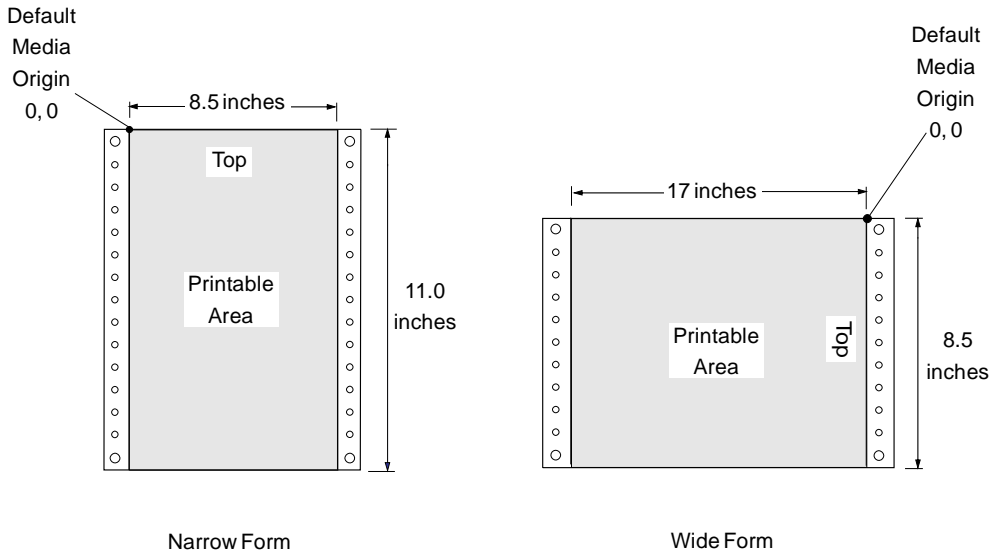


Figure 105. Roll Forms on the 3900-0W1. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 18 by 8.5-inch (wide) roll forms.

<sup>7</sup> The maximum length supported by the on-board stacker is 14 inches. If 17-inch forms are printed, you need post-processing equipment to handle the output.

<sup>8</sup> An RPQ is available to enable printing of 28-inch forms. This RPQ requires installation of the additional 64MB memory feature.

Figure 106 and Figure 107 show examples of the recommended printable areas for folded forms for a 3900-0W1. Notice that the media origin is located in different corners for wide and narrow forms. The recommended printable area for the narrow form is 8.5 by 10.34 inches for text, OCR, or bar code data and 8.5 by 10.0 inches for images or solid-fill data. The recommended printable area for the wide form is 11 by 7.84 inches for text, OCR, or bar code data and 11 by 7.5 for images or solid-fill data. The printer can print to the perforation on the leading and trailing edges of the form; however, the print quality within 0.33 inch of the perforation may be degraded.

**FOR TEXT, OCR, AND BAR CODES**

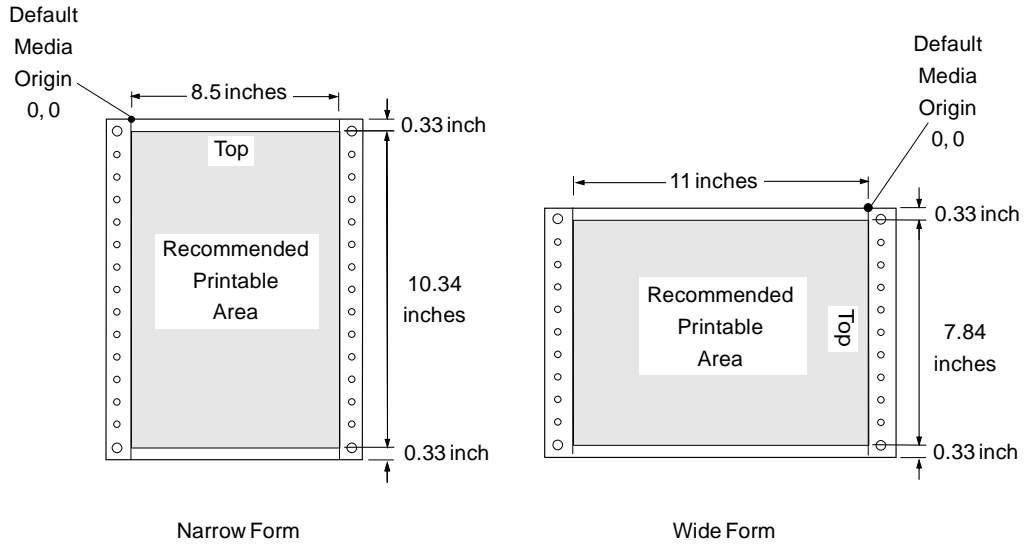


Figure 106. Folded Forms on the 3900-0W1. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 12 by 8.5-inch (wide) folded forms for printing text, OCR, and bar code data.

**FOR SOLIDFILL AND IMAGES**

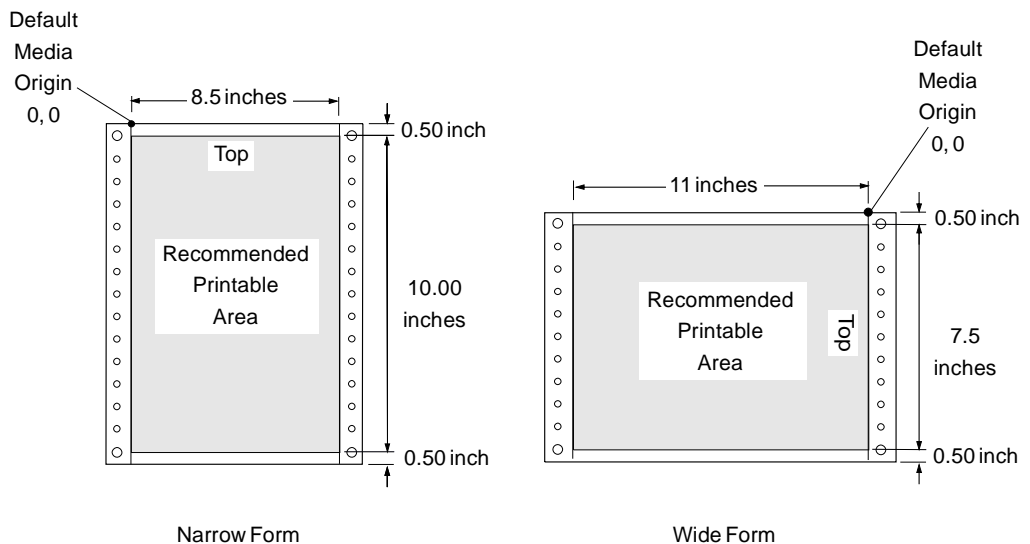


Figure 107. Folded Forms on the 3900-0W1. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 12 by 8.5-inch (wide) folded forms for printing solid-fill data and images.

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## Selecting the Printing Medium

The 3900-0W1 is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded into the 3900-0W1 by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 3900-0W1 by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 3900-0W1 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 3900-0W1 by using the FORMTYPE parameter in the printer file.

**PSF/6000** Different queues may be defined to correspond to different forms loaded in the printer. If so, you may need to specify a queue name with the **eng** command or in a SMIT panel.

---

## MICR Printing

To print text data using magnetic ink character recognition (MICR) with the 3900-0W1, you must use the Advanced Function Post-processing Interface feature #4720, which sends the form through an attached MICR post-processing device.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/2** PSF/2 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

PSF/2 (through the Distributed Print Function) has an option to not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/400** PSF/400 supports MICR printing on the 3900 only with the appropriate PTFs applied to version levels prior to V3R0.5. After V3R0.5, no PTF is required.

- V2R2, PTF SF14343
- V2R3, PTF SF14516

PSF/400 does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/6000** PSF/6000 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

---

## Fonts

The 3900-0W1 prints with single-byte or double-byte downloaded raster fonts and with single-byte downloaded and resident outline fonts.

The 3900-0W1 contains the following resident fonts: IBM Core Interchange fonts and a subset of the 4028 Compatibility Resident fonts. The 3900-0W1 resident fonts are listed in Appendix B, "Printer-Resident Fonts." The 3900-0W1 default resident font is Courier Roman Medium 12 pitch (10 point).

**PSF/MVS** To use the resident outline fonts, the system programmer must identify them to PSF using the APSRMARK utility.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900-0W1 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library, but it cannot print with resident fonts. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** You cannot use downloaded or resident outline fonts, but you can use downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** To use the resident outline fonts, the system programmer must identify them to PSF using the APTRMARK utility.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900-0W1 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library, but it cannot print with resident fonts. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900-0W1 can print with fonts downloaded by PSF/400. When using DPF, however, the 3900-0W1 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3900. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 108.

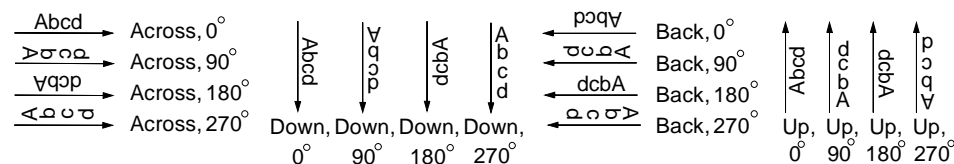


Figure 108. 3900-0W1 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3900-0W1 operator can adjust the placement of the image on the page. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800, the form-definition parameter that defines the maximum adjustment is not used for the 3900-0W1.

## Exception Highlighting

The 3900-0W1 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer

file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

---

## Data Types

The 3900-0W1 can process text data, IM image data, IOCA image data, graphics data, and bar code data.

### Text Data

The 3900-0W1 can process PTOCA PT1 and PT2 text data.

### IM Image Data

The 3900-0W1 can process IM image data.

### IOCA Image Data

The 3900-0W1 can process IOCA FS10 image data.

The 3900-0W1, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 109.

*Figure 109. Image Compression Algorithms for the 3900-0W1*

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

### Graphics Data

The 3900-0W1 can process GOCA DR/2V0 graphics data.

### Bar Code Data

The 3900-0W1 can process BCOCA BCD1 bar code data. Figure 110 contains a summary of the bar-code type and modifier combinations supported by the 3900-0W1.

Refer to your printer description or reference publication for more information.

Figure 110. Bar-Code Type and Modifier Combinations for the 3900-0W1

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'

## Disabled Mechanisms

Two mechanisms can be disabled on the 3900-0W1: offset stacking, if the postprocessor responds to an offset request, and MICR printing.

Offset stacking is available for PSF/MVS 2.1.0 with APAR OY49641 and for PSF/VM 2.1.0 with APAR PN20587. Offset stacking is available with PSF/VSE 2.2.0, PSF/2, and PSF/6000. When the offset device first becomes disabled, PSF stops (in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can restart PSF for the 3900-0W1, even with offset stacking disabled, and PSF stacks the files without offsetting between files or between copy groups.

**PSF/MVS, PSF/VM, and PSF/VSE** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and abends. PSF/VM drains instead of abending. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/400** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and holds the file. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

In addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

**PSF/2 and PSF/6000** If MICR post-processing becomes disabled during printing, PSF terminates the print file and continues

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## Printer-Storage Management

Memory in the 3900-0W1 is dynamically allocated for microcode, microcode data structures, font tables, font patterns, cached overlays, and raster images. It also contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used, and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.



## Pre/Post-Processing Devices

You can attach up to 3 pre/post-processing devices to the 3900-0W1. You can install up to three 4710 features or one 4720 and two 4710 features.

### PSF/MVS

- With installation of APAR OY56083, the attachment of a post-processing device, and installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

Support of the SMM subset of this feature requires APAR OY67183.

These functions are accessed by using a specially-created form definition and the JCL FORMS parameter.

- With installation of APAR OY49641 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VM

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of APAR PN20587 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VSE

- With installation of APAR DY42336, the attachment of a post-processing device, and with installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JECL FORMS parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/2 and PSF/400**

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720 and the appropriate APARs, you can print using magnetic ink character recognition (MICR) fonts. PSF does not support the SMM subset of this feature.
- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/6000**

- With the attachment of a post-processing device and installation of the Advanced Function Post-processing Interface Feature #4720, with the 3835-002, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition invoked with the `-oforndef=formdefname` parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

## Chapter 15. 3900 Advanced Function Duplex Printing System

This chapter describes 3900 Duplex printer characteristics and PSF-supported functions. The 3900 Duplex is a channel- and/or LAN-attached, continuous-forms printer that uses a laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 300 impressions per minute. The 3900 Duplex uses the Advanced Function Common Control Unit (AFCCU) based on RISC technology, which provides as standard the Advanced Function Image and Graphics (AFIG) feature and the Decompression Performance Enhancement (DPE) feature.

The 3900 Duplex has 240 pels-per-inch resolution and the Print Quality Enhancement (PQE) function, which smooths edges on diagonal lines, protects fine details, improves the fidelity of images, and allows for adjustment of the boldness of text and the darkness of images.

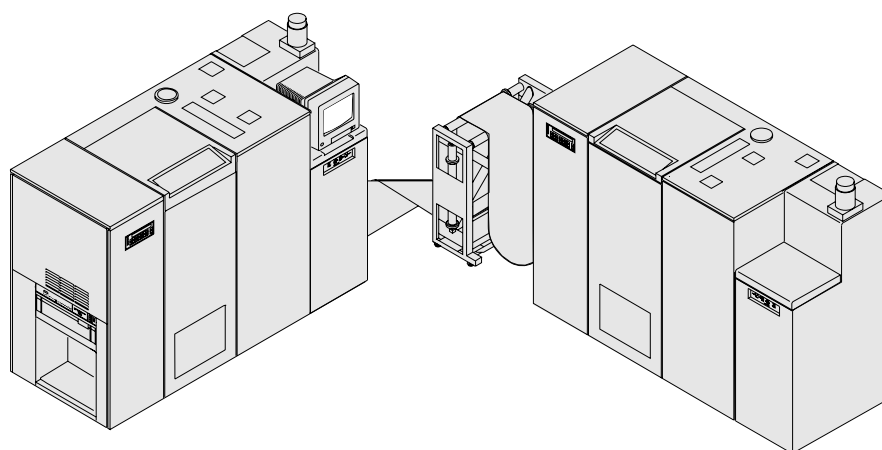


Figure 111. 3900 Duplex Printer

Figure 112 on page 182 summarizes the printer characteristics and PSF-supported functions for the 3900 Duplex. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 112 (Page 1 of 2). 3900 Duplex Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms	x	x	x	x	x	x
Cut-sheet						
Alternate media source						
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing	A	A	A	A	A	A
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP Printing	B		B		C	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	D	D	D	D	D	D
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	x	x	x	x	x	x
Guaranteed print labeling	E	E				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 112 (Page 2 of 2). 3900 Duplex Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline	x			F		F
Single-byte resident outline	G		G	F	x	F
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch forms in landscape presentation (wide-leading-edge forms).					
<b>A</b>	With a MICR post-processing device attached and with the Advanced Function Post-processing Interface feature #4720 installed.					
<b>B</b>	Supports both basic and enhanced N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>C</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>D</b>	Up to 300 ipm (308 ipm, ISO A4) in duplex mode; up to 150 ipm (154 ipm, ISO A4) in simplex mode with either or both print engines in Dual Simplex Mode (DSM). Up to 229 ipm in DSM if Feature 4241 is installed on Model D01 and if Feature 4242 is installed on Model D02. These features will be available on March 31, 1995.					
<b>E</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-28-STD, for the B1 level designation for printed output.					
<b>F</b>	Supports resident and outline fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>G</b>	Activated on PSF/MVS and PSF/VSE by using the APSRMARK and APTRMARK utilities, respectively.					

## Default Media Origin

For a 3900 Duplex, the default media origin is determined by the leading edge of the form. Figure 113 shows the default media origin for narrow forms, which is at the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. However, for wide forms, the default media origin is at the top-right corner of the form, 0.5 inch from the outside edge of the carrier strip.

The media origin can be changed. For more information, see Appendix A, "Compatibility, Conversion, and Performance."

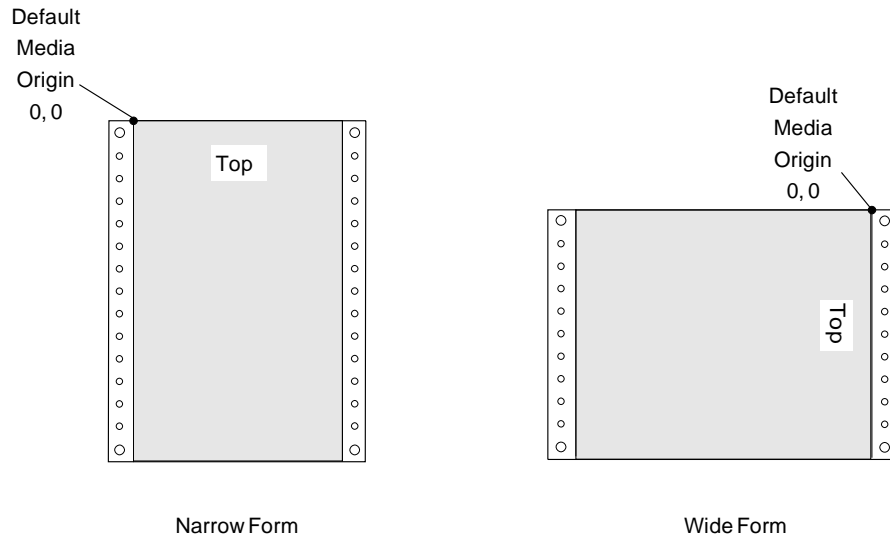


Figure 113. Examples of the Default Media Origin on the 3900 Duplex

## Printable Area

The printable area depends on the size of the form being used. The 3900 Duplex can print from perforation to perforation when using roll forms. However, when printing on folded forms, the printing may be degraded in areas near a folded perforation, an internal perforation, or any cut in the form because of the “tenting” (*fold memory*) of the form.

Figure 114 on page 185 shows examples of the printable areas of a standard, letter-size roll form for a 3900 Duplex. Notice that the media origin is located in different corners for wide and narrow forms. Although the maximum printable area for narrow forms is 8.5 by 17 inches, and the maximum printable area for wide forms is 15 by 17 inches, the examples show the printable area for letter-size forms.

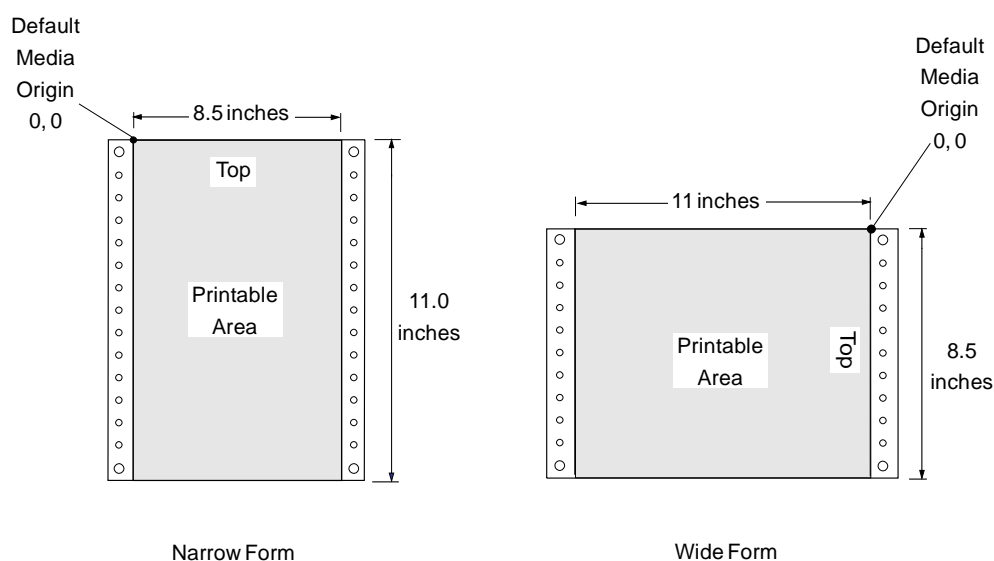


Figure 114. Roll Forms on the 3900 Duplex. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 11 by 8.5-inch (wide) roll forms.

Figure 115 and Figure 116 show examples of the recommended printable areas of folded forms for a 3900 Duplex. Notice that the media origin is located in different corners for wide and narrow forms. The recommended printable area for the narrow form is 8.5 by 10.34 inches for text, OCR, and bar code data and 8.5 by 10.0 inches for solid-fill data and images. The recommended printable area for the wide form is 11 by 7.84 inches for text, OCR, and bar code data and 11 by 7.5 inches for images or solid-fill data. The printer can print to the perforation on the leading and trailing edges of the form; however, the print quality within .05 inch of the perforation may be degraded.

<sup>9</sup> The maximum length supported by the on-board stacker is 14 inches. If 17-inch forms are printed, you need post-processing equipment to handle the output.

<sup>10</sup> An RPQ is available to enable printing of 22-inch forms. This RPQ requires installation of the additional 64MB memory feature.

**FOR TEXT, OCR, AND BAR CODES**

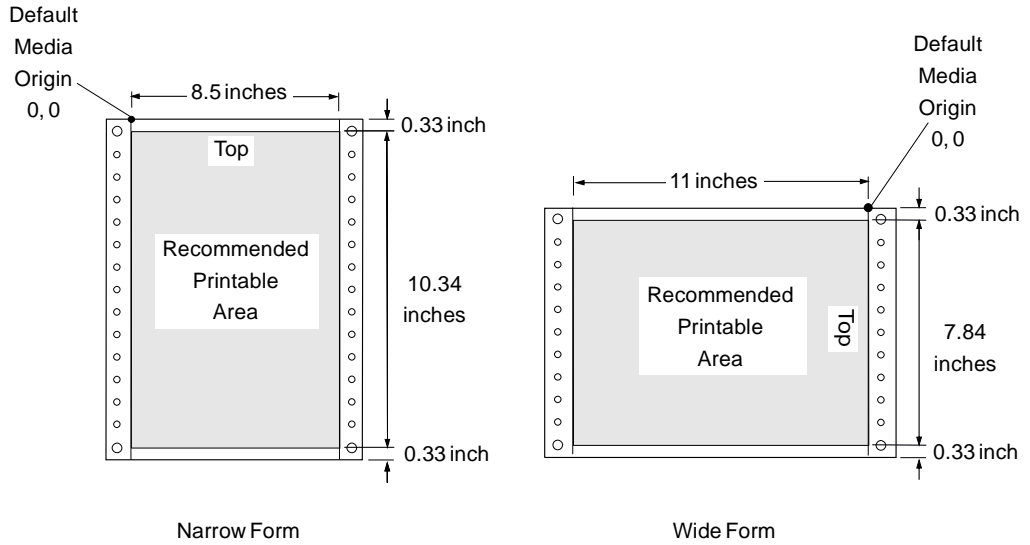


Figure 115. *Folded Forms on the 3900 Duplex. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 12 by 8.5-inch (wide) forms for printing Text, OCR, and Bar Code Data*

**FOR SOLIDFILL AND IMAGES**

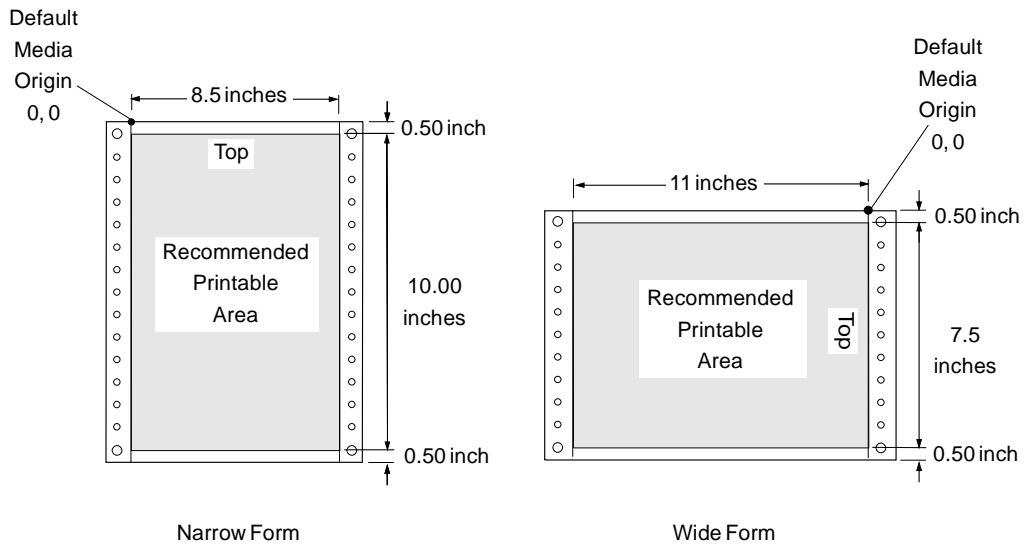


Figure 116. *Folded Forms on the 3900 Duplex. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 12 by 8.5-inch (wide) forms for printing images and solid-fill data.*



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## Selecting the Printing Medium

The 3900 Duplex is a continuous-forms printer that can print on fanfold paper, roll-feed paper, preprinted forms, and on some labels.

**PSF/MVS** Specify the form to be loaded into the 3900 Duplex by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 3900 Duplex by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 3900 Duplex by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 3900 Duplex by using the FORMTYPE parameter in the printer file.

**PSF/6000** Different queues may be defined to correspond to different forms loaded in the printer. If so, you may need to specify a queue name with the **enq** command or in a SMIT panel.

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## Duplex Printing

The 3900 Duplex consists of two 3900-001 simplex machines connected in series. The 3900 Duplex printer can print up to 300 impressions per minute (ipm) (308, ISO A4) in duplex mode. Each printer can print up to 150 ipm (154, ISO A4) in Dual Simplex Mode (DSM). When features 4241 and 4242 are installed, each print engine can print up to 229 ipm in DSM.

Printing on label stock in duplex mode is **not** supported.

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## MICR Printing

To print text data using magnetic ink character recognition (MICR) with the 3900 Duplex, you must use the Advanced Function Post-processing Interface Feature #4720, which sends the form through an attached MICR post-processing device. You can upgrade printers shipped before October 30, 1992 with RPQ #8B3917.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/2** PSF/2 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

PSF/2 (through the Distributed Print Function) has an option to **not** print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is

disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/400** PSF/400 supports MICR printing on the 3900 Duplex only with the appropriate PFTs applied to version levels prior to V3R0.5. After V3R0.5, no PTF is required.

- V2R2, PTF SF14343
- V2R3, PTF SF14516

PSF/400 does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/6000** PSF/6000 cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

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## Fonts

The 3900 Duplex is a relative-metric printer that prints with 300-pel single-byte or double-byte downloaded raster fonts and with 300-pel downloaded or resident Type-1 (scalable) outline fonts.

The 3900 Duplex resident fonts include the IBM Core Interchange font set plus support for a subset of the 4028 Compatibility Resident font set, for specific pitch and point sizes. All of these fonts are resident Type-1 outline fonts. The 3900 Duplex resident fonts are listed in Appendix B, "Printer-Resident Fonts."

The 3900 Duplex, whose hard disk contains these fonts, has a default font of Courier Roman Medium 12 pitch (10 point, Code Page 500, FGID 416, GCSGID 1269, CPGID 500, font width 120).

**PSF/MVS** To use the resident fonts, you must use the APSRMARK utility to identify (mark) the fonts for PSF. Refer to *Print Services Facility/MVS: System Programming Guide* for instructions on using APSRMARK.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 Duplex can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** You cannot use downloaded or resident outline fonts, but you can use downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** To use the resident fonts, you must use the APTRMARK utility to identify (mark) the fonts for PSF. Refer to *Print Services Facility/VSE: System Programming Guide* for instructions on using APTRMARK.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 Duplex can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 Duplex can print with fonts downloaded by PSF/400. When using DPF, however, the 3900 Duplex does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3900 duplex. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 117.

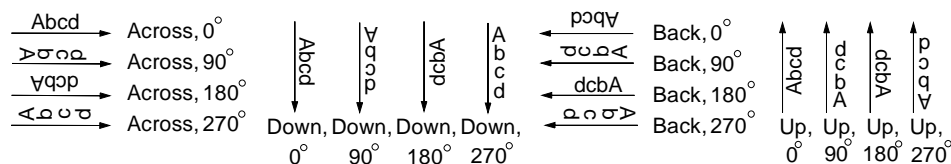


Figure 117. 3900 Duplex Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3900 Duplex operator can adjust the placement of the image on the page. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800, the form definition parameter defining the maximum adjustment is not used for the 3900 Duplex.

---

## Exception Highlighting

The 3900 Duplex uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

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## Data Types

The 3900 Duplex can process text data, IM image data, IOCA image data, graphics data, and bar code data.

### Text Data

The 3900 Duplex can process PTOCA PT1 and PTOCA PT2 text data.

### IM Image Data

The 3900 Duplex can process IM image data.

## IOCA Image Data

The 3900 Duplex can process IOCA FS10 image data.

The 3900 Duplex, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 118.

*Figure 118. Image Compression Algorithms for the 3900 Duplex*

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 3900 Duplex can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3900 Duplex can process BCOCA BCD1 bar code data. Figure 119 contains a summary of the bar-code type and modifier combinations supported by the 3900 Duplex.

Refer to your printer description or reference publication for more information.

*Figure 119. Bar-Code Type and Modifier Combinations for the 3900 Duplex*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'

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## Disabled Mechanisms

Two mechanisms can be disabled on the 3900 Duplex: offset stacking, if the post-processor responds to an offset request, and MICR printing.

When the offset stacking device first becomes disabled, PSF stops (in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can restart PSF, even with offset stacking disabled. When the offset stacking device is disabled, PSF stacks the files without offsetting between files or between copy groups.

**PSF/MVS, PSF/VM, and PSF/VSE** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and abends. PSF/VM drains instead of abending. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/400** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and holds the file. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

In addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

**PSF/2 and PSF/6000** If MICR post-processing becomes disabled during printing, PSF terminates the print file and continues processing the next file without using MICR post-processing.

---

## Printer-Storage Management

Memory in the 3900 Duplex is dynamically allocated for microcode, microcode data structures, font tables, font patterns, cached overlays, and raster images. It also contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used, and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

## Pre/Post-processing Devices

You can attach up to 3 pre/post-processing devices to each engine of the 3900 Duplex. You can install up to three 4710 features or one 4720 and up to two 4710 features. One pre/post-processing interface (4710) is standard on each print engine of the duplex system.

### PSF/MVS

- With installation of APAR OY56083, the attachment of a post-processing device, and installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JCL FORMS parameter.

- With installation of APAR OY49641 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VSE

- With installation of APAR DY42336, the attachment of a post-processing device, and with installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JECL FORMS parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VM

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of APAR PN20587 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/2 and PSF/400**

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720 and the appropriate APARs, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

**PSF/6000**

- With the attachment of a post-processing device and installation of the Advanced Function Post-processing Interface Feature #4720, with the 3900 Duplex, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition invoked with the `-oforndef=formdefname` parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.



## Chapter 16. 3900 Advanced Function Wide Duplex Printing System

This chapter describes the 3900 Wide Duplex printer characteristics and PSF-supported functions. The 3900 Wide Duplex is a channel and/or LAN-attached, continuous-forms printer that uses laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 229 impressions per minute (ipm) in simplex mode and up to 300 ipm in duplex mode. The 3900 Wide Duplex has an 18-inch wide paper path with a 17-inch wide print width, which permits printing of two 8.5-by-11 inch or two ISO A4 pages on a single side of a sheet. The 3900 Wide Duplex uses the Advanced Function Common Control Unit (AFCCU) based on RISC technology, which provides as standard the Advanced Function Image and Graphics (AFIG) feature and the Decompression Performance Enhancement (DPE) feature.

The 3900 Wide Duplex also has 240 pels-per-inch resolution and the Print Quality Enhancement (PQE) function, which smooths edges on diagonal lines, protects fine details, improves the fidelity of images, and allows for adjustment of the boldness of text and the darkness of images.

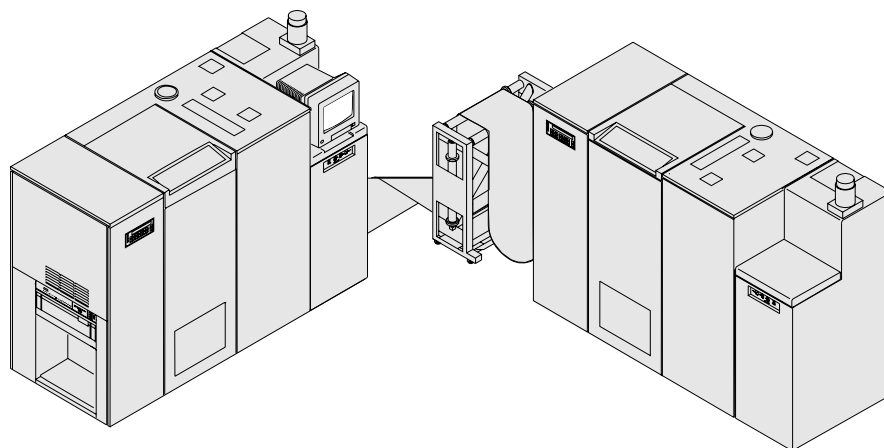


Figure 120. 3900 Wide Duplex Printer

Figure 121 on page 196 summarizes the printer characteristics and PSF-supported functions for the 3900 Wide Duplex. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 121 (Page 1 of 2). 3900 Wide Duplex Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms	x	x	x	x	x	x
Cut-sheet						
Alternate media source						
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing	A	A	A	A	A	A
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP Printing	B		B		C	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms	x	x	x	x	x	x
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	240	240	240	240	240	240
Maximum printing rate (ipm)	D	D	D	D	D	D
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	x	x	x	x	x	x
Guaranteed print labeling	E	E				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 121 (Page 2 of 2). 3900 Wide Duplex Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline	x			F		F
Single-byte resident outline	G		G	F	x	F
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11 inch forms in landscape presentation (wide-leading-edge forms).					
<b>A</b>	With a MICR post-processing device attached and with the Advanced Function Post-processing Interface feature #4720 installed.					
<b>B</b>	Supports both basic and enhanced N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>C</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>D</b>	Up to 300 ipm (308 ISO A4) in duplex mode and up to 150 ipm (154 ISO A4) in simplex mode.					
<b>E</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					
<b>F</b>	Supports resident and outline fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>G</b>	Activated on PSF/MVS and PSF/VSE by using the APSRMARK and APTRMARK utilities.					

## Default Media Origin

For a 3900 Wide Duplex, the default media origin is determined by the leading edge of the form. Figure 122 shows the default media origin for narrow forms, which is at the top-left corner of the form, 0.5 inch from the outside edge of the carrier strip. However, for wide forms, the default media origin is at the top-right corner of the form, 0.5 inch from the outside edge of the carrier strip.

The media origin can be changed. For more information, see Appendix A, “Compatibility, Conversion, and Performance.”

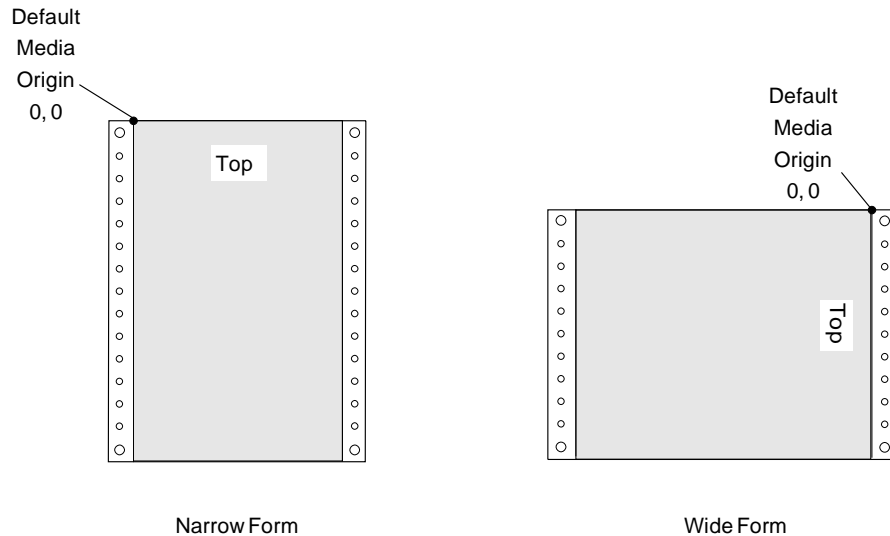


Figure 122. Examples of the Default Media Origin on the 3900 Wide Duplex

## Printable Area

The printable area depends on the size of the form being used. The 3900 Wide Duplex can print from perforation to perforation when using roll forms. When printing on folded forms, however, the printing may be degraded in areas near a folded perforation, near an internal perforation, or near any cut in the form because of the “tenting” (*fold memory*) of the form.

Figure 123 on page 199 shows examples of the printable areas of a standard, letter-size roll form for a 3900 Wide Duplex. Notice that the media origin is located in different corners for wide and narrow forms. Although the maximum printable area for the narrow form is 8.5 by 17 inches, and the maximum printable area for the wide form is 17 by 17 inches, the examples show the printable area for letter-size forms. <sup>11 12</sup>

<sup>11</sup> The maximum length supported by the on-board stacker is 14 inches. If 17-inch forms are printed, you need post-processing equipment to handle the output.

<sup>12</sup> An RPQ is available to enable printing of 28-inch forms. This RPQ requires installation of the additional 64MB memory feature.

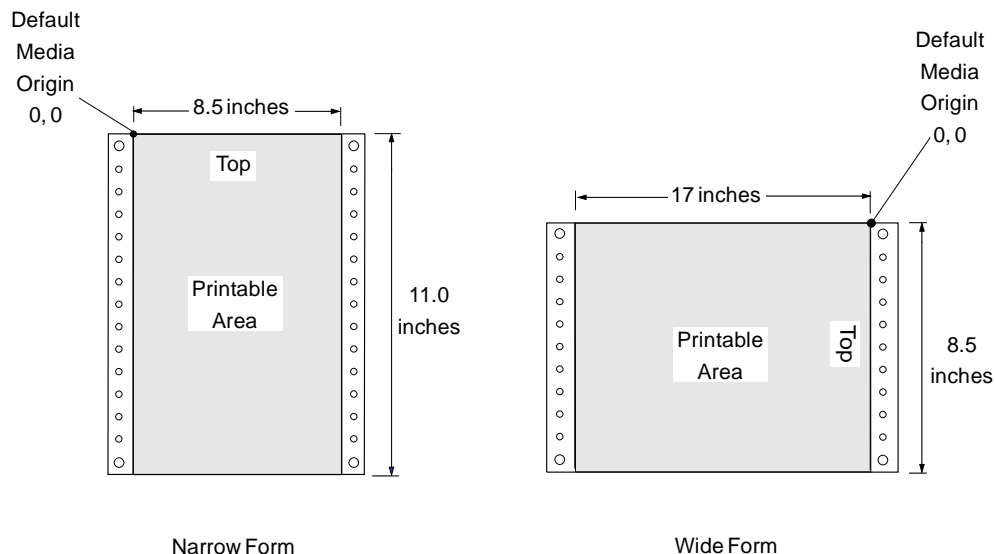


Figure 123. Rolls Forms on the 3900 Wide Duplex. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 18 by 8.5-inch (wide) forms.

Figure 124 and Figure 125 show examples of the recommended printable areas of folded forms for a 3900 Wide Duplex. Notice that the media origin is located in different corners for wide and narrow forms. The recommended printable area for the narrow form is 8.5 by 10.34 inches for text, OCR, or bar code data and 8.5 by 10.0 inches for solid-fill data and images. The recommended printable area for the wide form is 11 by 7.84 inches for text, OCR, or bar code data and 11 by 7.5 for images or solid-fill data. The printer can print to the perforation on the leading and trailing edges of the form; however, the print quality within 0.33 inch of the perforation may be degraded.

**FOR TEXT, OCR, AND BAR CODES**

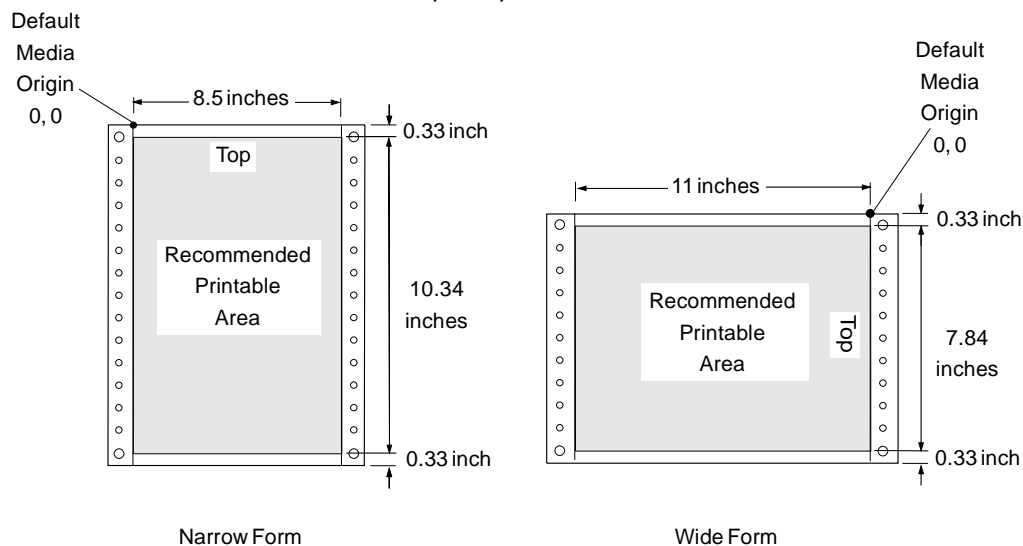


Figure 124. Folded Forms on the 3900 Wide Duplex. These are the recommended printable areas on 9.5 by 11-inch (narrow) and 18 by 8.5-inch (wide) forms for printing text, OCR, and bar code data.

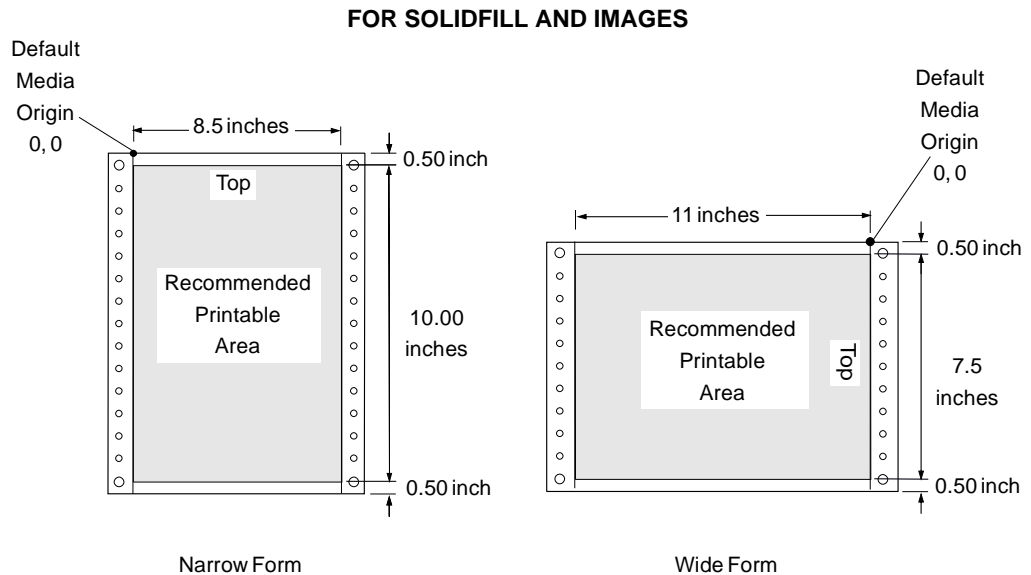


Figure 125. *Folded Forms on the 3900 Wide Duplex. These are the recommended printable areas on 9.5 by 11-inch (narrow) and a 12 by 8.5-inch (wide) forms for printing images and solid-fill data.*

## Selecting the Printing Medium

The 3900 Wide Duplex is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded into the 3900 Wide Duplex by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 3900 Wide Duplex by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 3900 Wide Duplex by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 3900 Wide Duplex by using the FORMTYPE parameter in the printer file.

**PSF/6000** Different queues may be defined to correspond to different forms loaded in the printer. If so, you may need to specify a queue name with the **eng** command or in a SMIT panel.

---

## MICR Printing

To print text data using magnetic ink character recognition (MICR) with the 3900 Wide Duplex, you must use the Advanced Function Post-processing Interface feature #4720, which sends the form through an attached MICR post-processing device.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/2** PSF cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

PSF/2 (through the Distributed Print Function) has an option to not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/400** PSF/400 supports MICR printing on the 3900 Duplex only with the appropriate PFTs applied to version levels prior to V3R0.5. After V3R0.5, no PTF is required.

- V2R2, PTF SF14343
- V2R3, PTF SF14516

PSF/400 does not print MICR fonts on a non-MICR printer or on a printer on which MICR post-processing is disabled. If you are trying to print MICR on a non-MICR printer, PSF issues a message and terminates the file.

**PSF/6000** PSF cannot detect when a job requiring MICR fonts is sent to a non-MICR printer. It does not issue an error message but continues printing, which may be a security problem for jobs using MICR fonts.

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## Fonts

The 3900 Wide Duplex prints with single-byte or double-byte downloaded raster fonts. It also prints with downloaded or resident outline fonts.

The 3900 Wide Duplex contains the following resident fonts: IBM Core Interchange font set plus a subset of the 4028 Compatibility Resident font set. The 3900 Wide Duplex resident fonts are listed in Appendix B, "Printer-Resident Fonts."

**PSF/MVS** To use the resident fonts, the system programmer must identify them to PSF using the APSRMARK utility.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 Wide Duplex can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** You cannot use downloaded or resident outline fonts, but you can use downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** To use the resident fonts, the system programmer must identify them to PSF using the APTRMARK utility.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 Wide Duplex can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3900 Wide Duplex can print with fonts downloaded by PSF/400. When using DPF, however, the 3900 Wide Duplex does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

Text printed with single-byte and double-byte fonts can be printed in four inline directions on the 3900. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 126.

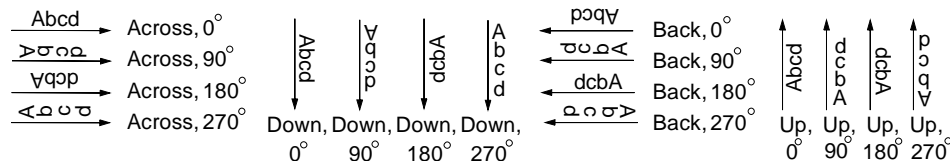


Figure 126. 3900 Wide Duplex Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts



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## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3900 Wide Duplex operator can adjust the placement of the image on the page. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800, the form definition parameter defining the maximum adjustment is not used for the 3900 Wide Duplex.

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## Exception Highlighting

The 3900 Wide Duplex uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK parameter on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

## Data Types

The 3900 Wide Duplex can process text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 3900 Wide Duplex can process PTOCA PT1 and PT2 text data.

## IM Image Data

The 3900 Wide Duplex can process IM image data.

## IOCA Image Data

The 3900 Wide Duplex can process IOCA FS10 image data.

The 3900 Wide Duplex, which supports left-to-right and right-to-left bit ordering, uses the compression algorithms shown in Figure 127.

*Figure 127. Image Compression Algorithms for the 3900 Wide Duplex*

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08' Is CCITT now TSS?
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 3900 Wide Duplex can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3900 Wide Duplex can process BCOCA BCD1 bar code data. Figure 128 contains a summary of the bar-code type and modifier combinations supported by the 3900 Wide Duplex.

Refer to your printer description or reference publication for more information.

*Figure 128. Bar-Code Type and Modifier Combinations for the 3900 Wide Duplex*

<b>Type</b>	<b>Modifier</b>
Postnet	X'00' through X'03'
Code 128	X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'

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## Disabled Mechanisms

Two mechanisms can be disabled on the 3900 Wide Duplex: offset stacking, if the postprocessor responds to an offset request, and MICR printing.

Offset stacking is available for PSF/MVS 2.1.0 with APAR OY49641 and for PSF/VM 2.1.0 with APAR PN20587. Offset stacking is available with PSF/VSE 2.2.0, PSF/2, and PSF/6000.

When the offset device first becomes disabled, PSF stops (in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can choose to restart PSF for the 3900 Wide Duplex, even with offset stacking disabled. When the offset device is disabled, PSF stacks the files without offsetting between files or between copy groups.

**PSF/MVS, PSF/VM, and PSF/VSE** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and abends. PSF/VM drains instead of abending. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

**PSF/400** If MICR post-processing becomes disabled during printing, the printer sends a NACK, and PSF issues a message and holds the file. If MICR post-processing is disabled before PSF is started, and the file contains MICR data, PSF issues a message and terminates the file.

In addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

**PSF/2 and PSF/6000** If MICR post-processing becomes disabled during printing, PSF terminates the print file and continues processing the next file without using MICR post-processing.

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## Printer-Storage Management

Memory in the 3900 Wide Duplex is dynamically allocated for microcode, microcode data structures, font tables, font patterns, cached overlays, and raster images. It also contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used, and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Pre/Post-Processing Devices

You can attach up to 3 pre/post-processing devices to the 3900 Wide Duplex. You can install up to three 4710 features or one 4720 and two 4710 features.

### PSF/MVS

- With installation of APAR OY56083, the attachment of a post-processing device, and installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JCL FORMS parameter.

- With installation of APAR OY49641 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VM

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of APAR PN20587 and the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/VSE

- With installation of APAR DY42336, the attachment of a post-processing device, and with installation of the Advanced Function Post-processing Interface Feature #4720, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

These functions are accessed by using a specially-created form definition and the JECL FORMS parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

### PSF/2

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720, you can print using magnetic ink character recognition (MICR) fonts.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

#### **PSF/400**

- With the attachment of a post-processing device and with installation of the Advanced Function Post-processing Interface Feature #4720 and the appropriate PTF, you can print using magnetic ink character recognition (MICR) fonts.
- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

#### **PSF/6000**

- With the attachment of a post-processing device and installation of the Advanced Function Post-processing Interface Feature #4720, with the 3835-002, you can do the following to your printed output:
  - Print fixed information such as color plates, logos, and letterheads
  - Cut the output at preset locations
  - Print using magnetic ink character recognition (MICR) fonts
  - Perforate the output

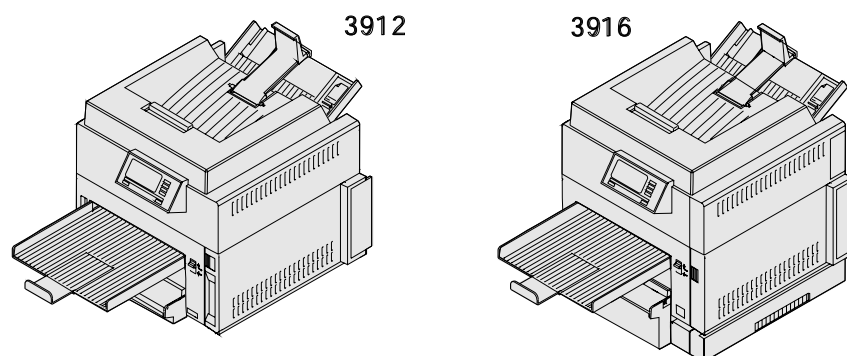
These functions are accessed by using a specially-created form definition invoked with the `-oforndef=formdefname` parameter.

- With installation of the Pre/Post-processing Interface Feature #4710, you can attach devices that provide function such as stacking output, inserting envelopes, and feeding roll paper. You can also attach a post-processing device that can burst, trim, and stack output.

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## Chapter 17. 3912 and 3916 Page Printers

This chapter describes 3912 and 3916 printer characteristics and PSF-supported functions. The 3912 and 3916 are desktop, cut-sheet printers that use laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 12 impressions per minute for the 3912 and up to 16 impressions per minute for the 3916. When both the 3912 and 3916 function the same, they are referred to as the 391x printer.



*Figure 129. 3912 and 3916 Printers*

Figure 130 on page 210 summarizes the printer characteristics and PSF-supported functions for the 391x printers. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 130 (Page 1 of 2). 391x Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed	x	x	x	x	x	x
Envelope printing	A	A	A	A	A	A
MICR printing						
Duplex printing	B	B	B	B	B	B
Forms flash						
N_UP Printing						
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms						
Exception highlighting:						
Disabled mechanisms						
Printhead resolution (pels per inch)	300 C	300 C	300 C	300 C	300 C	300 C
Maximum printing rate (ipm)	12	12	12	12	12	12
3912	16	16	16	16 D	16	16 D
3916						
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	E	E	E	E	E	E
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x



Figure 130 (Page 2 of 2). 391x Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster	x		x	F	x	F
Single-byte downloaded outline						
Single-byte resident outline				G		G
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5-by-11-inch sheets.					
<b>A</b>	With the optional Envelope+ feeder installed.					
<b>B</b>	With the Duplex Option installed.					
<b>C</b>	300 when printing in PostScript-emulation or PCL5-emulation mode. 600 when printing in PostScript mode. The print quality is enhanced through Print Quality Enhancement Technology (PQET).					
<b>D</b>	8 ipm at 600-pel resolution in PostScript mode.					
<b>E</b>	Supported by the printer but not supported by PSF.					
<b>F</b>	Supported only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>G</b>	Only when operating in PostScript-emulation mode or PCL5-emulation mode.					

## Default Media Origin

PSF supports the 391x in several data stream modes, but this chapter describes support only for the 391x printers operating in the Intelligent Printer Data Stream (IPDS) mode.

For 391x printers attached to PSF/2 or PSF/6000 through a serial or parallel port, the 391x printers function similarly to the 4039 printer. See Chapter 23, "LaserPrinter 4039" for information about the 4039 printer.

When PSF supports the 391x in Print Page Format, the default media origin is the inside edge of the unprintable area, in the upper left corner of the printable area. In Whole Page Format, the media origin is in the upper left corner of the unprintable area, which is the upper left corner of the sheet.

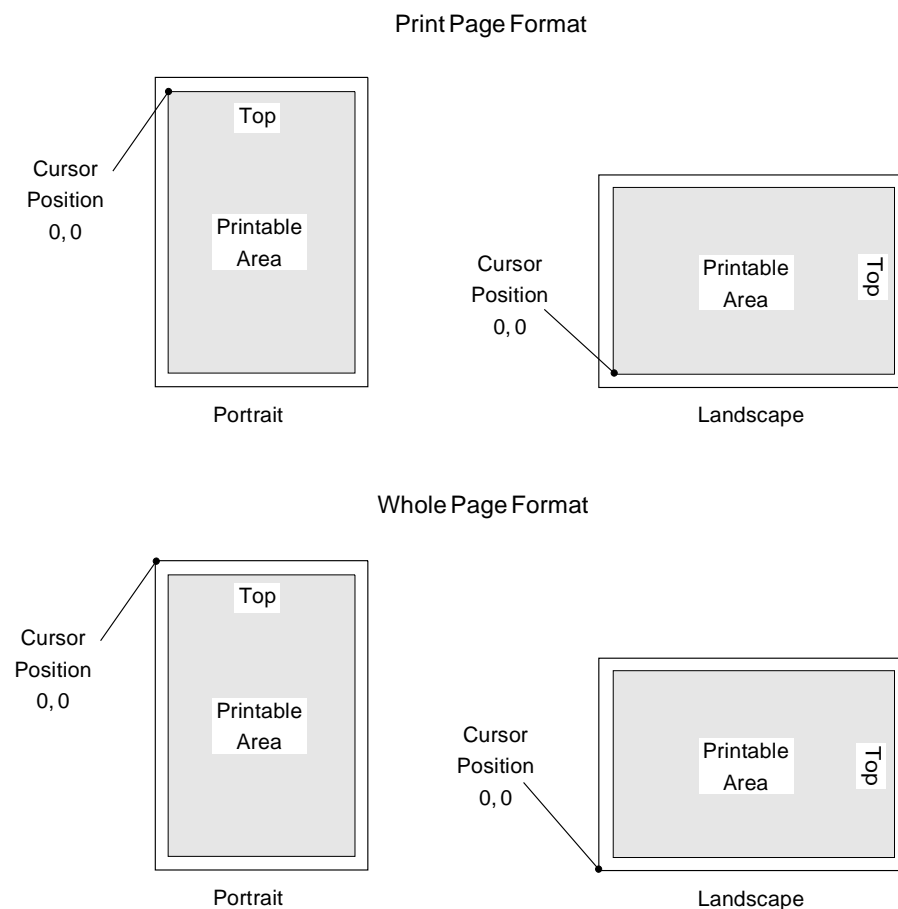


Figure 131. Default Media Origin (Cursor Position) for Pages on the 391x

## Envelopes

Figure 132 shows the media origin for two envelopes for the 391x. For envelopes, front or back, the media origin is as shown in the diagram.

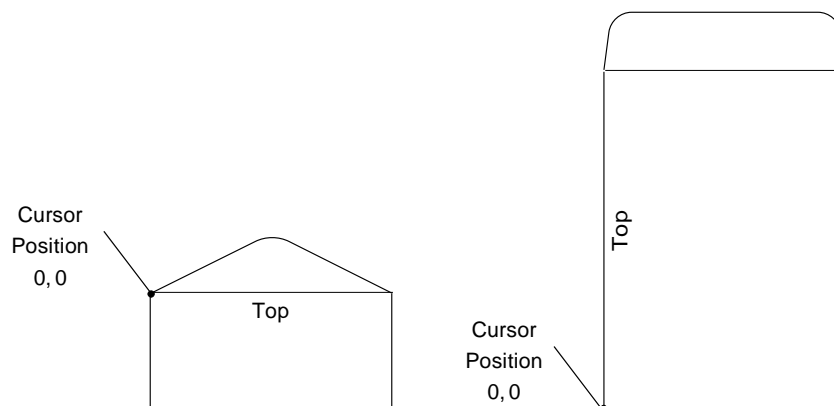


Figure 132. Media Origin for Envelopes on the 391x

## Printable Area

The 391x cannot print in certain unprintable areas near the edges of the form. The size of these unprintable areas depends on the data stream mode in which the printer is operating. In IPDS mode, the printer cannot print any closer than 4.24 mm (0.167 inch) of any edge of the form. For optimum print quality, avoid printing within 8.64 mm (0.34 inch) from the top and bottom edges of the sheet in portrait orientation, and avoid printing within 8.64 mm (0.34 inch) from the left and right edges of the sheet in landscape orientation.

With the XPA/PC RPQ 8B4024, the 391x printer supports an expanded printable area, as shown in the right side of Figure 133. The RPQ reduces the unprintable area on all sides to 0.09 inch and slightly compresses characters and spaces. For best results, IBM recommends that you use the expanded printable area only when necessary. Use the normal printable area for most of your jobs.

Figure 133 shows an example of the printable area of a form. The printable area shown is 8.17 by 10.66 inches.

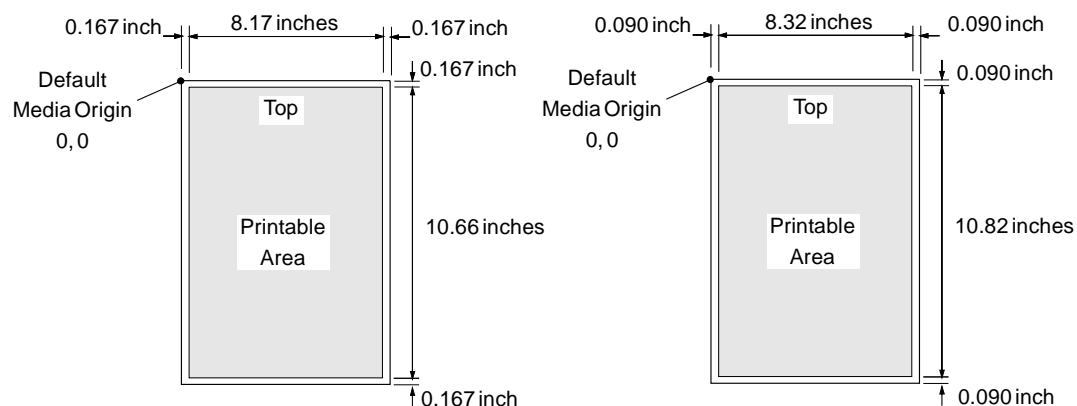


Figure 133. Printable Area in IPDS Mode on the 391x

## Envelopes

The printable area of an envelope can be different for each size you select. For optimum results, print no closer than 10.16 mm (0.4 inch) from the top edge and 38.1 mm (1.5 inch) from the bottom edge of an envelope in portrait orientation. Print no closer than 10.16 mm (0.4 inch) from the left edge and 38.1 mm (1.5 inch) from the right edge of an envelope in landscape orientation. Refer to your printer reference for additional information about printing on envelopes.

---

## Selecting the Printing Medium

The 391x are cut-sheet printers with several media sources, depending on the model and options selected.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify Tray 1 for the standard paper tray, Tray 2 for the optional second drawer, Feeder for the Envelope+ Feeder or the 100-sheet auxiliary tray, and Manual Feed to manually feed paper.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names can be defined to correspond to different combinations of media loaded in the medium sources. If

so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue with the **enq** command or in a SMIT panel.

## Medium Size and Configuration

The medium loaded for your 391x must match the medium size in the 391x configuration. If these sizes do not match, a printer error code indicates that this mismatch must be corrected by either changing the medium at the printer or by changing the configuration to match the medium.

---

## Fonts

The 391x are relative-metric printers that print in IPDS mode with 300-pel single-byte downloaded or resident raster fonts. In IPDS mode, the printers can print with a subset of the 4028 resident raster fonts, which are listed in Appendix B, "Printer-Resident Fonts." In PostScript-emulation mode, the printers can print with 39 PostScript resident Type-1 outline fonts. In PCL5 emulation mode, the printers can print with 7 resident PCL5 raster fonts and with 13 resident outline fonts.

PSF supports 300-pel fixed or relative metric fonts. PSF converts the fonts to support either relative-metric or fixed-metric fonts. With the S/390 PSF programs, you can use a host-based utility to convert 240-pel fonts to 300-pel fonts. Refer to the system programming guide for your operating system for information on using this utility.

**PSF/MVS** To use the resident raster fonts, the system programmer must identify them to PSF using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 391x can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. When using DPF, however, resident fonts are not used. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** You cannot print with resident fonts, but you can print with downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** To use the resident raster fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 391x can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. When using DPF, however, printer resident fonts are not used.

**PSF/2** You cannot use resident fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. When operating in PostScript-emulation mode or PCL5-emulation mode, the 391x can use single-byte resident outline fonts. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 391x can print with fonts downloaded by PSF/400. When using DPF, however, the 391x does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use resident fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. When operating in PostScript-emulation mode or PCL5-emulation mode, the 391x can use single-byte resident outline fonts. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 391x printers are using downloaded fonts, they can print text in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 134.

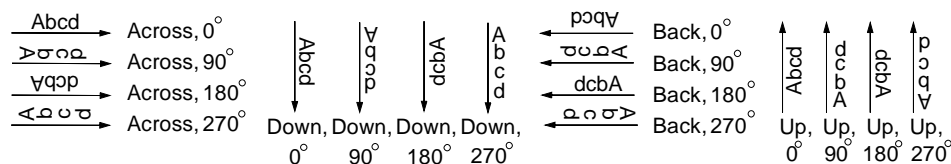


Figure 134. 391x Inline Directions and Character Rotations for Downloaded Fonts

## Data Types

The 391x can process text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 391x can print PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 391x can print IM image data.

The printers have a printhead resolution of 300 pels per inch. If you try to print an IM image created for a printer with a different printhead resolution, the results may not be what you expect. PSF requests that the printer scale the image. See Appendix A, “Compatibility, Conversion, and Performance” on page 341 for more information.

## IOCA Image Data

The 391x can print IOCA FS10 image data. The printers, which support right-to-left and left-to-right bit ordering, use the compression algorithms shown in Figure 135.

Figure 135. Image Compression Algorithms for the 391x

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 391x can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 391x can process BCOCA BDC1 bar code data. Figure 136 contains a summary of the bar-code type and modifier combinations supported.

Refer to your printer description or reference manual for more information.

*Figure 136. Bar-Code Type and Modifier Combinations for the 391x*

<b>Type</b>	<b>Modifier</b>
Postnet	X'00' through X'03'
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'



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## Printer-Storage Management

The printer-storage areas for the 391x are:

- **Control storage:** Contains microcode, tables, control blocks that define pages to be printed, control information, storage for suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

If sufficient storage is not available, the printer cannot delete resources that are no longer needed; therefore, printing of the entire print file stops. You must press the READY key to start the printer and enable it to start printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

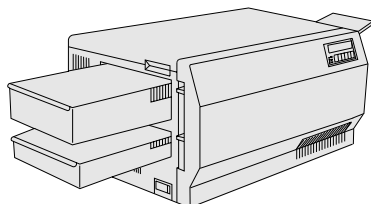
Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.



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## Chapter 18. 3930 Page Printer

This chapter describes 3930 printer characteristics and PSF-supported functions. The 3930 is a table-top, cut-sheet printer that uses light-emitting diode and electrophotographic technology to print text, images, graphics, and bar codes at up to 30 impressions per minute.



*Figure 137. 3930 Printer*

For 3930 printers shipped after February 17, 1995, the High Performance Feature is standard on models 03S and 03D.

Figure 138 on page 222 summarizes the printer characteristics and PSF-supported functions for the 3930. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 138 (Page 1 of 2). 3930 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	A	A	A	A	A	A
Forms flash						
N_UP Printing						
Color selection	x	x	x	x	x	x
Print-quality levels						
Gray-scale image	x	x	x	x	x	x
Operator-adjustable forms						
Exception highlighting: print-error vectors	x	x	x	x	x	x
Disabled mechanisms						
Printhead resolution (pels per inch)	B	B	B	B	B	B
Maximum printing rate (ipm)	30	30	30	30	30	30
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	C	C	C	C	C	C
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 138 (Page 2 of 2). 3930 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster	x		x	D	x	D
Single-byte downloaded outline						
Single-byte resident outline				E		E
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Models 02D and 03D only.					
<b>B</b>	240 pels for Models 02S and 02D; 300 pelsfor Models 03S and 03D.					
<b>C</b>	Supported by the printer but not supported by PSF.					
<b>D</b>	Supported only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>E</b>	Only when printing in PostScript-emulation or PCL5-emulation mode.					

## Default Media Origin (Cursor Position)

PSF supports the 3930 in three data stream modes: IBM Personal Printer Data Stream (PPDS) mode, HP PCL Emulation Mode, and in Intelligent Printer Data Stream (IPDS) mode, depending on the model and on the operating platform. PSF supports 3930-02S and -02D in IPDS mode and supports 3930-03S and -03D in PPDS or PCL mode.

## IBM PPDS Mode

When PSF supports the 3930 in IBM PPDS mode, you have two page formats from which to select: Print Page Format and Whole Page Format. Figure 139 shows the cursor positions for a portrait and landscape page in both IBM PPDS Print Page Format and Whole Page Format. The placement of the cursor position depends on the format you are using. In Print Page Format, the cursor position is the inside edge of the unprintable area in the upper left corner of the page. In Whole Page Format, the cursor position is in the upper left corner of the form. For AFP printing, IBM recommends that you use Whole Page Format.

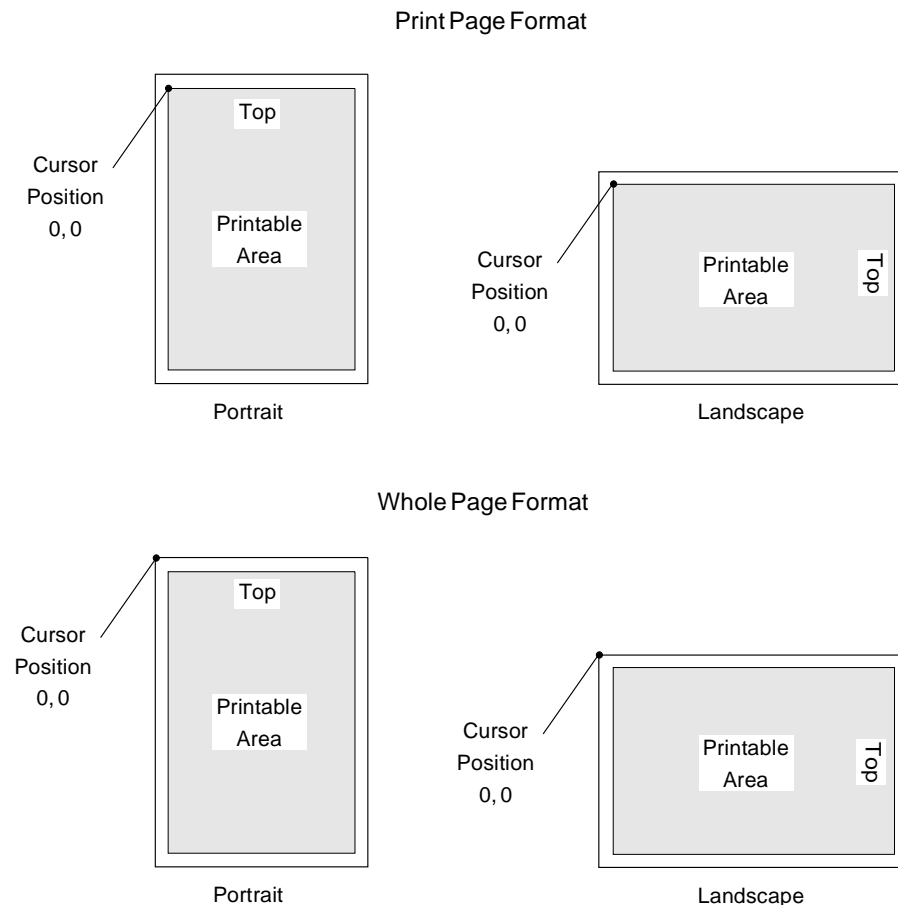


Figure 139. Cursor Position for Pages in IBM PPDS Mode on the 3930

## HP PCL Emulation Mode

When PSF supports the 3930 in HP PCL Emulation Mode, the cursor position is the inside edge of the left unprintable area and the top of the page, as shown in Figure 140.

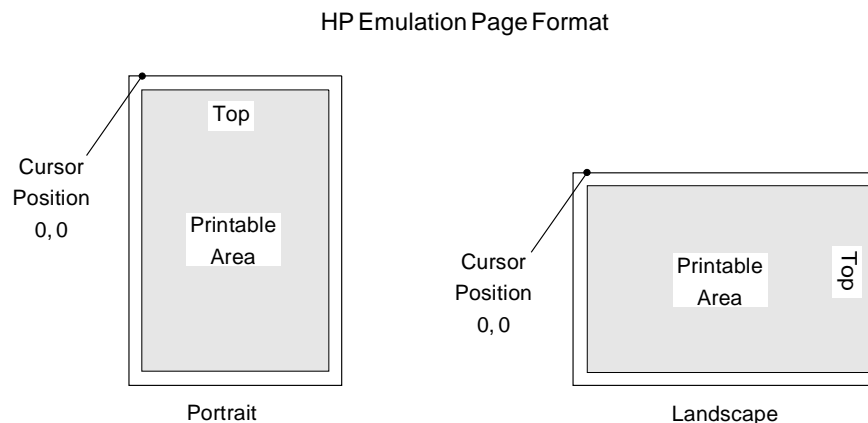


Figure 140. Cursor Position for Pages in HP PCL Emulation Mode on the 3930

## IBM IPDS Mode

Figure 141 shows the default media origin for a 3930, which is the top-left corner of a form with the short sides at the top and bottom.

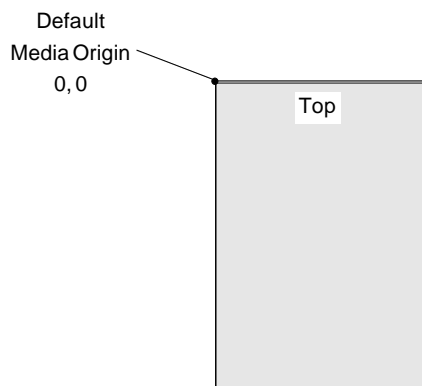


Figure 141. Default Media Origin on the 3930

## Printable Area

The 3930 cannot print in certain unprintable areas near the edges of the form. The size of these unprintable areas depends on the data stream mode in which your printer is printing. The following sections describe these areas.

## IBM PPDS Mode

### A4-Size Forms

Printing within 4.23 mm (0.17 inch) from the top and bottom edges of the form and within 3.30 mm (0.13 inch) from the left and right edges of the form is not possible.

For optimum results, print no closer than 8.47 mm (0.33 inch) from the top or bottom edges of a form in portrait orientation and no closer than 8.47 mm (0.33 inch) from the left or right edges of a form in landscape orientation.

### All Other Sizes of Forms

Printing within 6.35 mm (0.25 inch) from the left or right edges of the form and within 4.31 mm (0.17 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form. Figure 142 shows an example of the printable area of a form for a 3930 for sizes other than A4. The printable area shown is 8 by 10.66 inches.

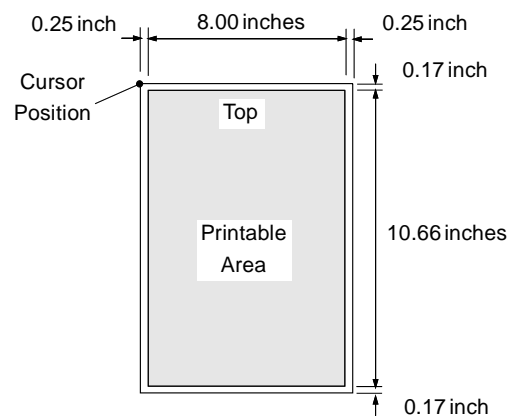


Figure 142. Printable Area for Form Sizes Other Than A4 in IBM PPDS Mode on the 3930



## HP PCL Emulation Mode

### A4-Size Forms

Printing within 4.23 mm (0.17 inch) from the top and bottom edges of the form and within 3.30 mm (0.13 inch) from the left and right edges of the form is not possible.

For optimum results, print no closer than 8.47 mm (0.33 inch) from the top or bottom edges of a form in portrait orientation and no closer than 8.47 mm (0.33 inch) from the left or right edges of a form in landscape orientation.

### All Other Sizes of Forms

Printing within 4.23 mm (0.17 inch) from the left edge of the form, 8.45 mm (0.33 inch) from the right edge, and within 5.08 mm (0.2 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form in portrait position and 8.47 mm (0.33 inch) from the left and right edges in landscape position. Figure 143 shows an example of the printable area of a form for a 3930 for sizes other than A4. The printable area shown is 8 by 10.60 inches.

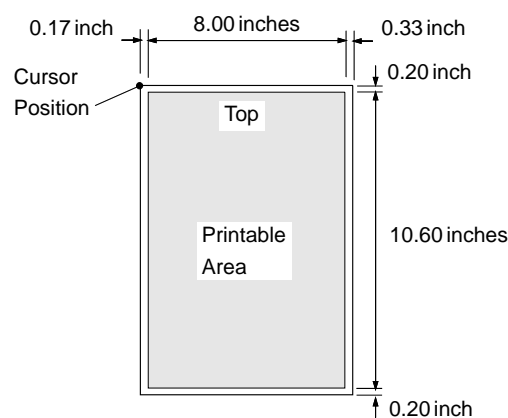


Figure 143. Printable Area for Form Sizes Other Than A4 in HP Emulation Mode on the 3930

## IPDS Mode

In IPDS mode, the 3930 printable area is limited within 4.2 mm (0.165 inch) of any edge of the form. Printing any closer to the edge of the form may result in degraded print quality and loss of characters. Figure 144 shows an example of the printable area of a form for a 3930. The printable area shown is 8.17 by 10.67 inches.

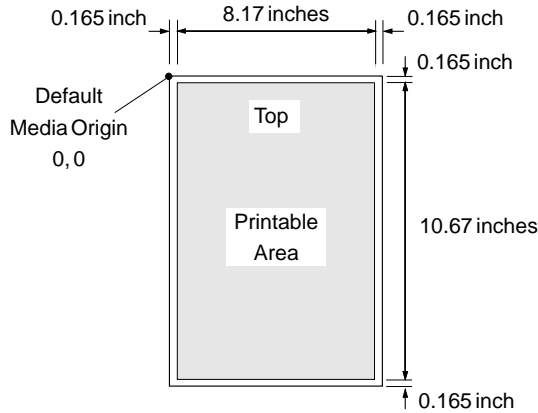


Figure 144. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3930

## Selecting the Printing Medium

The 3930 is a cut-sheet printer with two medium sources: the primary cassette and the alternate cassette. The standard cassettes can contain any of the sizes of media on which the printer can print. The 3930 can also print on paper-backed transparencies, card stock, and cut sheets containing adhesive labels. These types of media must be loaded in the primary cassette.

Selecting the type of medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the primary cassette and BIN 2 for the alternate cassette.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

---

## Duplex Printing

The 3930 Model 02D and Model 03D support duplex printing (printing on both sides of the sheet), but only on letter-size, legal-size, and A4-size paper. The 3930 does not print in duplex mode on special media (transparencies, labels, and card stock).

---

## Fonts

The 3930 prints with single-byte downloaded or resident raster fonts and with double-byte downloaded raster fonts. The resident fonts in the Models 02S and 02D includes all of the fonts both downloaded to and resident in the 3812 and the 3816, including all of their diskettes. The 3930 resident fonts are listed in Appendix B, "Printer-Resident Fonts."

To use double-byte fonts, you must download them from IBM licensed font programs and must order and install a feature for double-byte character sets for either coaxial or twinaxial attachment.

The standard operating diskettes in the Models 03S and 03D contain 7 raster fonts and 13 PCL5-compatible, 300-pel outline fonts. These models also support 35 outline fonts equivalent to the PostScript 35, which are available on the PostScript Interpreter Feature #9223 diskettes. The 3930 can use outline fonts only when operating in PostScript-emulation or PCL5-emulation mode.

**PSF/MVS** To use the resident raster fonts, the system programmer must identify them to PSF using the APSRMARK utility.

You must also install APAR OW02108, and the printer microcode level must be at least 5.01 or higher. APAR OW02108 contains 5 APSRMARK jobs to activate the different sets of resident fonts. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts.

The IBM Core Interchange fonts are available in 240-pel raster format on diskettes (Feature #4850). To use the core fonts, you must install the 85MB Hard Drive Feature #9225 to load the fonts into the printer from the diskettes. You can use the core fonts only on Models 02S and 02D.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3930 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. When using DPF, however, 3930 printer-resident fonts are not used.

**PSF/VM** You cannot use resident fonts, but you can use downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3930 can print with fonts downloaded by PSF/VM. When using DPF, however, 3930 printer resident fonts are not used.

**PSF/VSE** To use the resident raster fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3930 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. When using DPF, however, 3930 printer resident fonts are not used.

**PSF/2** You cannot use resident raster fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3930 can print with fonts downloaded by PSF/400. When using DPF, however, the 3930 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use resident raster fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 3930 is using resident fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0° and 180°, as shown in Figure 145.



Figure 145. 3930 Inline Directions and Character Rotations for Resident Fonts

If the 3930 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 146.

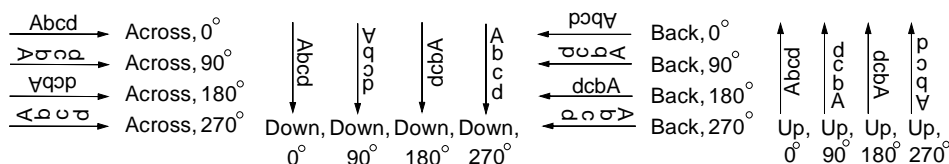


Figure 146. 3930 Inline Directions and Character Rotations for Downloaded Fonts

## Selecting Color

The 3930 supports selection of three colors: black, the color of the medium, and the printer default color.

## Gray-Scale Image

The 3930 can print images in shades of gray as well as in black.

---

## Exception Highlighting

The 3930 uses vectors to highlight several printer exceptions. Figure 147 on page 233 contains an example of exception highlighting used by the 3930. In addition to highlighting data-check exceptions, the 3930 also uses this technique to highlight other data-stream exceptions.

The print-file submitter can suppress the reporting of data-check exceptions and the printing of vectors for those exceptions.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter on the \* \$\$ LST statement or printer-parameter member to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/2** Use the DATAACK option on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

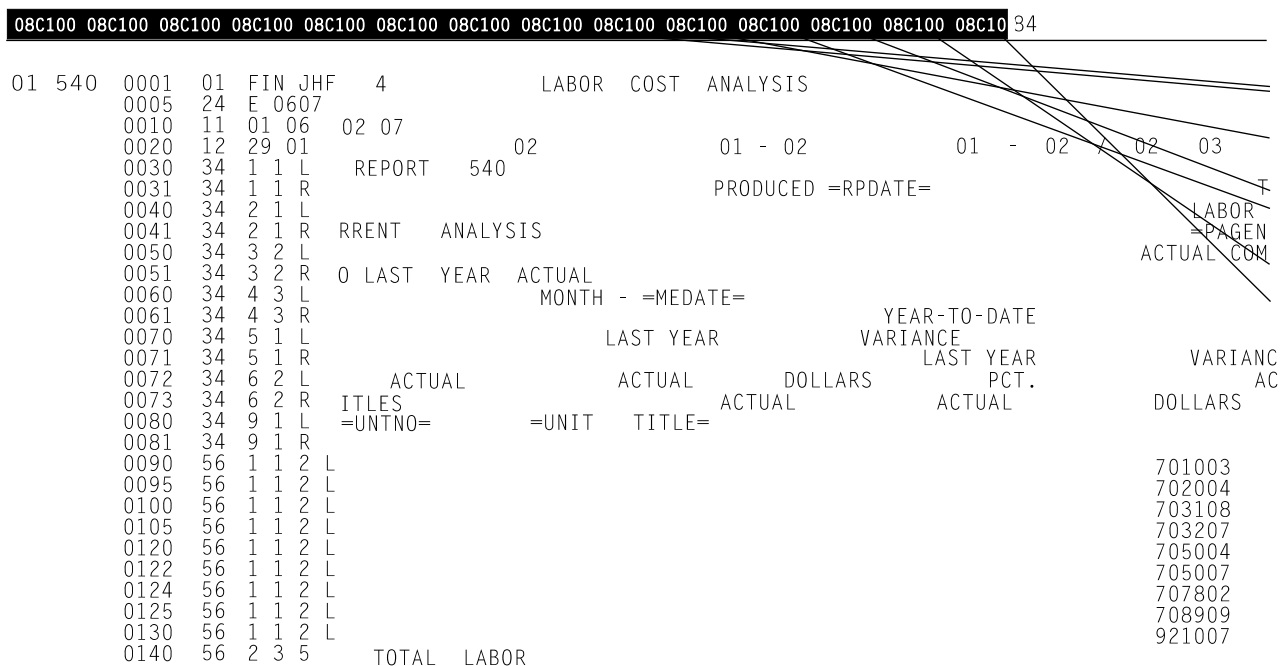


Figure 147. Exception Highlighting on the 3930

## Data Types

The 3930 supports text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 3930 can process PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 3930 can process IM image data.

## IOCA Image Data

The 3930 can process IOCA FS10 data but does not support the G4 MMR compression algorithm. The 3930, which supports only left-to-right bit ordering, supports the compression algorithms shown in Figure 148.

Figure 148. Image Compression Algorithms for the 3930	
Algorithm	Hex code
IBM MMR	X'01'
Uncompressed	X'03'
RL4	X'06'

## Graphics Data

The 3930 can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3930 can print BCOCA BCD1 bar code data. Figure 149 summarizes the bar-code type and modifier combinations supported by the 3930.

Refer to your printer description or reference publication for more information.

*Figure 149. Bar-Code Type and Modifier Combinations for the 3930*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'01' through X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

## Printer-Storage Management

Two major printer-storage areas for the 3930 are:

- **Control storage:** Contains microcode, tables, and control blocks that define pages to be printed; contains control information; stores suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

As of August 30, 1994, the 3930 Model 02S and Model 02D support overlay caching for coaxial- and twinaxial-attached printers, which allows up to 20 overlays to be stored in printer memory. Caching overlays can improve printer performance, because they do not have to be created each time they are used.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing the entire print file, and continues printing the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments,



| overlays, and fonts that are used and resubmit the print file. Eliminating one font  
| from the print job or simplifying an overlay may allow the page to be printed.

| Ensure that your font pruning function is active to save printer raster-pattern  
| storage. For more information about font pruning, see “Font Pruning” on page 369.

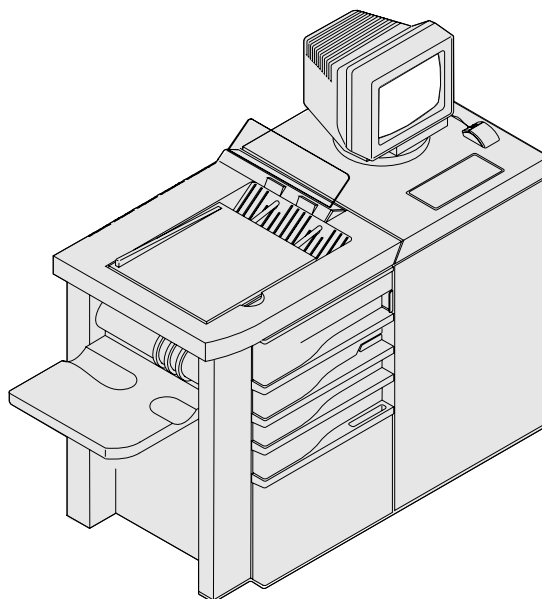
| **PSF/VM** If the 3930 is defined as an RSCS printer, insufficient storage conditions  
| can cause printing of the file to stop. RSCS sends a message describing the error  
| condition.



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## Chapter 19. 3935 Advanced Function Printer

This chapter describes 3935 printer characteristics and PSF-supported functions. The 3935 is a cut-sheet, duplex-capable printer that uses laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 35 impressions per minute. The 3935 uses the Advanced Function Common Control Unit (AFCCU), based on RISC technology, which provides as standard the Advanced Function Image and Graphics (AFIG) feature and the Decompression Performance Enhancement (DPE) feature. improves their overall print quality. The 3935 also has the Print Quality Enhanced (PQE) function, which smooths edges on diagonal lines, protects fine details, improves the fidelity of images, and allows for adjustment of the boldness of text and the darkness of images.



*Figure 150. 3935 Printer*

Figure 151 on page 238 summarizes the printer characteristics and PSF-supported functions for the 3935. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 151 (Page 1 of 2). 3935 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut-sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination	x		x		x	
Media source by copy	A					
Manual forms feed						
Envelope printing						
MICR printing						
Duplex printing	x	x	x	x	x	x
Forms flash						
N_UP printing	B		B		C	
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms						
Exception highlighting: print-error markers	x	x	x	x	x	x
Disabled mechanisms	x	x	x	x	x	x
Printhead resolution (pels per inch)	300	300	300	300	300	300
Maximum printing rate (ipm)	35	35	35	35	35	35
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing	x					
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	D	D	D	D	D	D
Guaranteed print labeling	E	E				
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 151 (Page 2 of 2). 3935 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline	x			F		F
Single-byte resident outline	G		G	F	x	F
Single-byte resident symbol sets						
Double-byte downloaded raster	x	x	x	x	x	x
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Prior to PSF/MVS 2.2.0, you could specify the media source for a copy group in a form definition; with 2.2.0, you can also specify the media source in a copy subgroup in the form definition. To use this function, APAR PN55431 must be applied to PPFA/370.					
<b>B</b>	Supports both basic and enhanced N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>C</b>	Supports basic N_UP printing, with the correct levels of both printer microcode and PSF software.					
<b>D</b>	Supported by the printer but not supported by PSF, unless using N_UP printing on either PSF/MVS, PSF/VSE, or PSF/400.					
<b>E</b>	Can accept the Define User Area command and can print with guaranteed print labeling but has not been certified as part of a trusted computing base by the U. S. Department of Defense Trusted Computer System Evaluation Criteria, DOD 5200-.28-STD, for the B1 level designation for printed output.					
<b>F</b>	Supports resident and outline fonts only to the extent that they are supported by the host PSF driving a printer through PSF Direct.					
<b>G</b>	Activated on PSF/MVS and PSF/VSE by using the APSRMARK and APTRMARK utilities, respectively.					

## Default Media Origin

Figure 152 shows the default media origin, which is the top-left corner of a sheet with the short sides at the top and bottom.

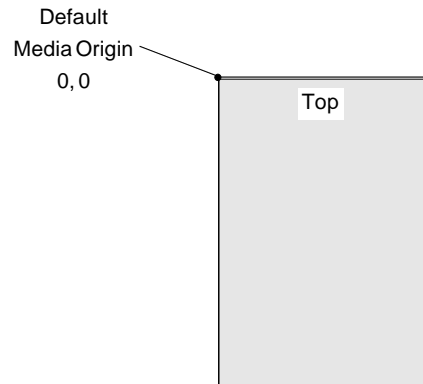


Figure 152. Default Media Origin on the 3935

## Printable Area

Although the 3935 can print to the edge of the form, IBM recommends a 5 mm (0.2 inch) border on the leading and trailing edge of the sheet and 2 mm (0.08 inch) on the side edges of the sheet for the best print quality. Figure 153 shows the recommended borders for the printable area of an 8.5-by-11-inch form. The printable area shown is 8.34 by 10.60 inches.

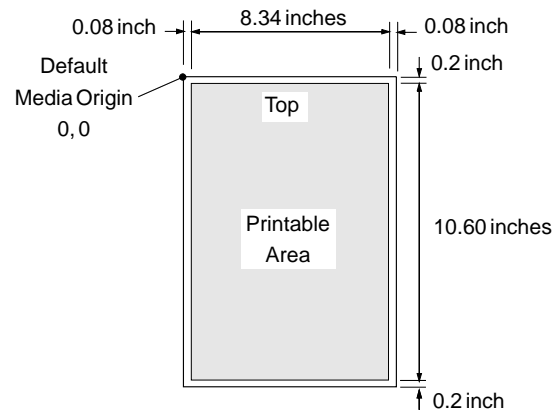


Figure 153. Recommended Printable Area for an 8.5-by-11-Inch Form on the 3935

## Selecting the Printing Medium

The 3935 is a cut-sheet printer with four medium sources: trays 1, 2, 3, and 4. Tray 1 can hold one of two fixed sizes of paper; the other trays hold non-adjustable cassettes, each containing a specific size of paper. The 3935 can print on preprinted paper, some adhesive labels, and some transparencies.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for Tray 1, BIN 2 for Tray 2, BIN 3 for Tray 3, and BIN 4 for Tray 4. If the operator selects the AUTOCHANGE feature of the printer, media from one source can be used when the other source is empty. If the operator selects AUTOCHANGE when the media in the two sources are not the same, your output may print on the wrong medium.

**PSF/MVS** Specify the medium source in your form definition.

Prior to PSF/MVS 2.2.0, you could specify the medium source for a copy group in a form definition; with 2.2.0, you can also specify the medium source in a copy subgroup in the form definition. To use this function, APAR PN55431 must be applied to PPFA/370.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in each medium source of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If

so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter of the \* \$\$ LST statement. You may also need to specify a form name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

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## Alternate Media Destination

The 3935 printer supports selection of an alternate media destination. If an alternate destination is specified, but the printer does not support an alternate destination, or the destination is disabled, the printer sends the output to the printer default output bin. If the media loaded in the input bin is incompatible with the output bin, the job is held by the system.

**PSF/MVS** PSF/MVS 2.2.0 supports selection of an alternate media destination, if APAR OW07348 is applied.

**PSF/VSE** PSF/VSE 2.2.1 supports selection of an alternate media destination, if APAR DY43501 is applied.

**PSF/400** PSF/400 3.1.0 supports selection of an alternate media destination.

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## Duplex Printing

The 3935 can print in duplex on all form sizes up to 215.9 mm (8.5 inches wide). For the weight restrictions on forms when printing in duplex mode, refer to your printer reference.



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## Fonts

The 3935 is a relative-metric printer that prints with 300-pel single-byte and double-byte downloaded raster fonts and with 300-pel downloaded and resident Type-1 outline (scalable) fonts.

The 3935 fonts include the IBM Core Interchange font set plus support for a subset of the 4028 Compatibility Resident font set, for specific pitch and point sizes. All of these fonts are Type-1 outline fonts. The 3935 resident fonts are listed in Appendix B, "Printer-Resident Fonts."

The 3935, whose hard disk contains these fonts, has a default font of Courier Roman Medium 12 pitch (10 point, Code Page 500, FGID 416, GCSGID 1269, CPGID 500, font width 120).

**PSF/MVS** To use the resident fonts, the system programmer must identify them to PSF using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for instructions on using APSRMARK.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3935 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** You cannot use downloaded or resident outline fonts, but you can use downloaded raster fonts. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** To use the resident fonts, the system programmer must identify them to PSF using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for instructions on using APTRMARK.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3935 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/2 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 3935 can print with fonts downloaded by PSF/400. When using DPF, however, the 3935 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use downloaded or resident outline fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident and outline fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

The 3935 can print text with single-byte and double-byte fonts in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 154.

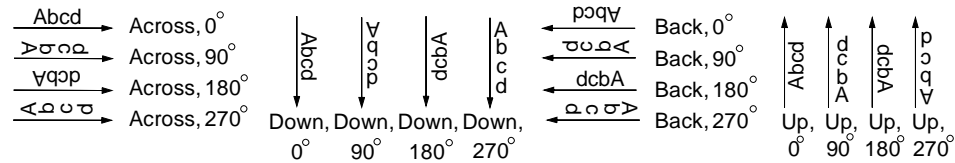


Figure 154. 3935 Inline Directions and Character Rotations for Single-Byte and Double-Byte Fonts

## Operator-Adjustable Forms

To align data printed on preprinted forms, the 3935 printer operator can adjust the placement of the page image on the medium. The adjustment range is  $\pm 20$  pels in both the horizontal and vertical directions. This adjustment affects the size of the valid printable area by moving its position on the form. Using this adjustment can produce off-the-page errors. Unlike the 3800 printer, the form definition parameter defining the maximum permissible adjustment is not used for the 3935.

## Exception Highlighting

The 3935 uses print-error markers to indicate where print-positioning errors occurred during page processing. Print-positioning errors are one class of data-check exceptions reported by the printer when an attempt is made to place print data outside the valid printable area of the page. The printing of print-error markers and the reporting of data-check exceptions to PSF can be suppressed by the print-file submitter.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST or printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/2** Use the DATAACK option on the APRINT command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

## Data Types

The 3935 can process text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 3935 can process PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 3935 can process IM image data.

## IOCA Image Data

The 3935 can process IOCA FS10 image data. The 3935, which supports left-to-right and right-to-left bit ordering, supports the compression algorithms shown in Figure 155.

*Figure 155. Image Compression Algorithms for the 3935*

Algorithm	Hex code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 3935 can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 3935 can process BCOCA BCD1 bar code data. Figure 156 contains a summary of the bar-code type and modifier combinations supported by the 3935.

Refer to your printer description or reference publication for more information.

Figure 156. Bar-Code Type and Modifier Combinations for the 3935

Type	Modifier
Code 128	X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'
Postnet	X'00' through X'03'

## Disabled Mechanisms

Three mechanisms can be disabled on the 3935:

- All four input medium sources
- The duplex paper path
- The output medium source

When a mechanism first becomes disabled, PSF stops (or in the case of PSF/VM, drains), as it does for any permanent hardware error. However, the operator can choose to restart PSF for the 3935 even with the mechanism disabled. If a medium source is disabled, PSF selects the other medium source. If the duplex paper path is disabled, PSF prints files in simplex. If the offset stacker is disabled, PSF stacks the files without offsetting between files or between copy groups.

**PSF/400** For PSF/400, in addition to the disabled-mechanism support, the FIDELITY parameter in the printer file determines whether a file prints. Refer to *AS/400 Printer Device Programming* for information about the FIDELITY parameter.

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## Printer-Storage Management

Memory in the 3935 is dynamically allocated for microcode, microcode data structures, font tables, font patterns, cached overlays, and raster images. It also contains print data for overlays, pages, and page segments, control blocks that define formatted pages to be printed, font tables, and a microcode trace area.

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding storage to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used, and resubmit the file. Eliminating one character set or one code page from the print job or simplifying an overlay may allow the page to be printed.

Ensure that the font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Print-Quality Enhancement

The 3935 uses a print-quality enhancement function that smooths character edges.

When print jobs contain images or degrees of shading, you may need to experiment to reach optimum print quality. For example, if you are using Overlay Generation Language/370, IBM recommends that you use SCREEN shade patterns rather than STANDARD shade patterns. Particularly for light shading, consider using no less than a 6% SCREEN pattern. After testing your printing application on the 3935, you may prefer a 9% SCREEN pattern or a 12% SCREEN pattern.

For more information on how to specify shade patterns, refer to *Overlay Generation Language/370: User's Guide and Reference*.



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## Chapter 20. LaserPrinter 4019

This chapter describes 4019 printer characteristics and PSF-supported functions. The 4019 is a desktop, cut-sheet printer that uses a laser and electrophotographic technology to print text, images, graphics, and bar codes at from 5 to 10 pages per minute, depending on the model.

The 4019 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream (IPDS) to the data stream required by the printer. PSF/MVS, PSF/VM, PSF/VSE, and PSF/400 then support the printer through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct function on PSF/2 and PSF/6000. The printer accepts 1-way communication from the host and does not return information regarding error conditions, availability of resources, or device status. The 4019 printer is described in this publication from **PSF's** point of view, not from the printer's point of view.

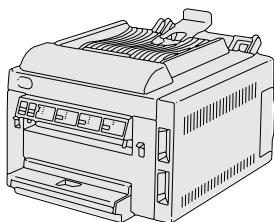


Figure 157. LaserPrinter 4019

Figure 158 on page 250 summarizes the printer characteristics and PSF-supported functions for the 4019. Most of the entries in the table and the other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 158 (Page 1 of 2). 4019 Summary

Printer Characteristics	PSF/MVS A	PSF/VM A	PSF/VSE A	PSF/2 B	PSF/400 A	PSF/6000 B
Continuous forms						
Cut sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed	x	x	x	x	x	x
Envelope printing	x	x	x	x	x	x
MICR printing						
Duplex printing						
Forms flash						
N_UP Printing						
Color selection						
Print-quality levels						
Gray-scale image						
Operator-adjustable forms						
Exception highlighting						
Disabled mechanisms						
Printhead resolution (pels per inch)	300	300	300	300	300	300
Maximum printing rate (ipm)	10	10	10	10	10	10
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin						
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics						
BCOCA BCD1 bar codes	x	x	x	x	x	x



Figure 158 (Page 2 of 2). 4019 Summary

Printer Characteristics	PSF/MVS A	PSF/VM A	PSF/VSE A	PSF/2 B	PSF/400 A	PSF/6000 B
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b> Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.						
<b>ipm</b> Impressions per minute, for 8.5 by 11-inch sheets.						
<b>A</b> Supported through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct function of PSF/2 and PSF/6000.						
<b>B</b> Supported by a software driver that converts the Intelligent Printer Data Stream to the data stream required by the printer.						

## Default Media Origin (Cursor Position)

PSF supports the 4019 in two data stream modes: IBM Personal Printer Data Stream (PPDS) mode<sup>13</sup> and in Hewlett-Packard Printer Command Language Emulation (HP PCL) mode.

### IBM PPDS Mode

When PSF supports the 4019 in IBM PPDS mode, you have two page formats from which to select: Print Page Format and Whole Page Format. Figure 159 shows the cursor positions for a portrait and landscape page in both IBM PPDS Print Page Format and Whole Page Format. The placement of the cursor position depends on the format you are using. In Print Page Format, the cursor position is the inside edge of the unprintable area in the upper left corner of the page. In Whole Page Format, the cursor position is in the upper left corner of the form. For AFP printing, IBM recommends that you use Whole Page Format.

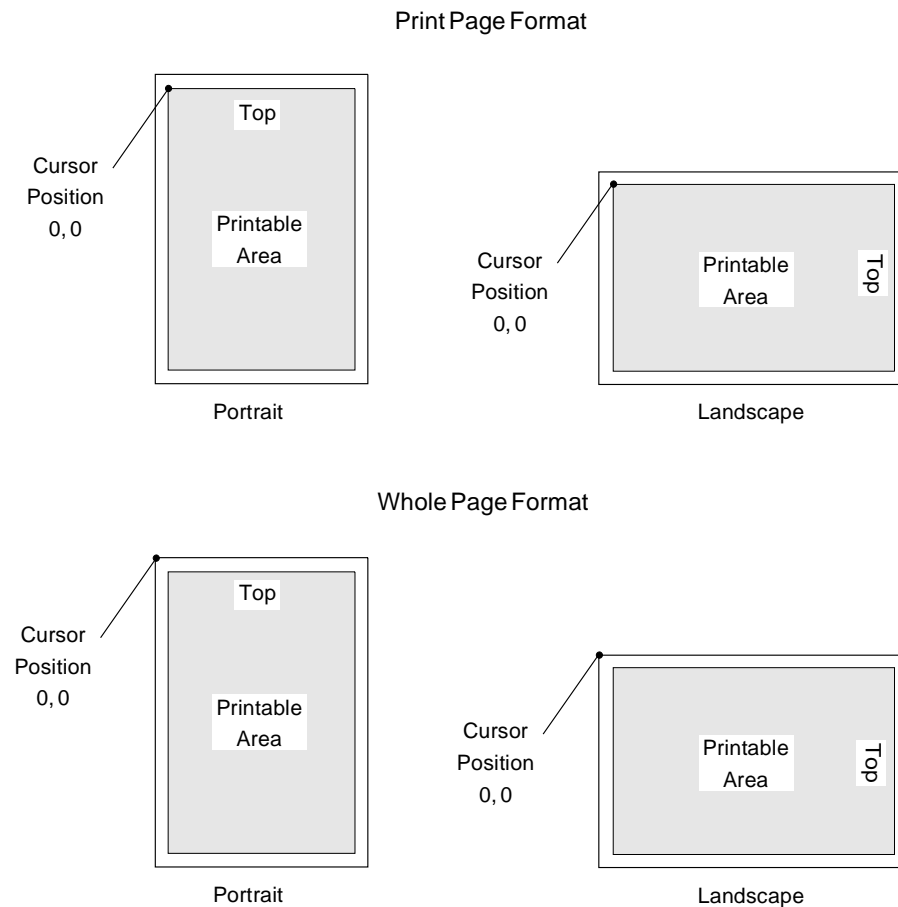


Figure 159. Cursor Position for Pages in IBM PPDS Mode on the 4019

<sup>13</sup> On 4019 printers manufactured before November, 1990, only HP PCL mode is available; on 4019 printers manufactured after November, 1990, both PPDS and HP PCL mode are available.

## HP PCL Emulation Mode

When PSF supports the 4019 in HP PCL Emulation Mode, the cursor position is the inside edge of the left unprintable area and the top of the page, as shown in Figure 160.

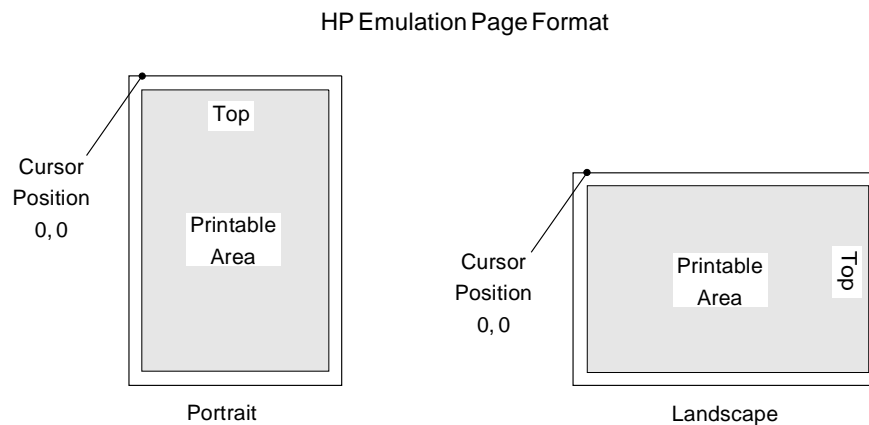


Figure 160. Cursor Position for Pages in HP PCL Emulation Mode on the 4019

## Envelopes

Figure 161 shows the cursor position for two envelopes for the 4019. The cursor position is the same for the front or back of the envelope.

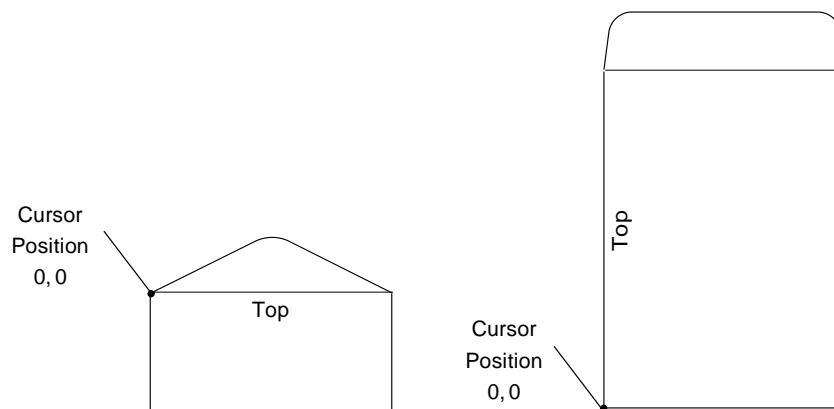


Figure 161. Cursor Position for Envelopes on the 4019

## Printable Area

The 4019 cannot print in certain unprintable areas near the edges of the form. The size of these unprintable areas depends on the data stream mode in which your printer is printing. The following sections describe these areas.

### IBM PPDS Mode

#### A4-Size Forms

Printing within 4.23 mm (0.17 inch) from the top and bottom edges of the form and within 3.30 mm (0.13 inch) from the left and right edges of the form is not possible.

For optimum results, print no closer than 8.47 mm (0.33 inch) from the top or bottom edges of a form in portrait orientation and no closer than 8.47 mm (0.33 inch) from the left or right edges of a form in landscape orientation.

#### All Other Sizes of Forms

Printing within 6.35 mm (0.25 inch) from the left or right edges of the form and within 4.31 mm (0.17 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form. Figure 162 shows an example of the printable area of a form for a 4019 for sizes other than A4. The printable area shown is 8 by 10.66 inches.

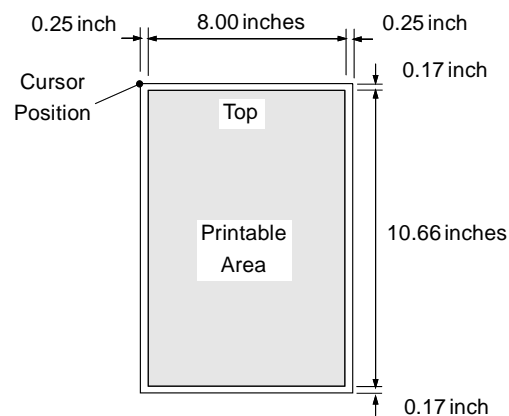


Figure 162. Printable Area for Form Sizes Other Than A4 in IBM PPDS Mode on the 4019

## HP PCL Emulation Mode

### A4-Size Forms

Printing within 4.23 mm (0.17 inch) from the top and bottom edges of the form and within 3.30 mm (0.13 inch) from the left and right edges of the form is not possible.

For optimum results, print no closer than 8.47 mm (0.33 inch) from the top or bottom edges of a form in portrait orientation and no closer than 8.47 mm (0.33 inch) from the left or right edges of a form in landscape orientation.

### All Other Sizes of Forms

Printing within 4.23 mm (0.17 inch) from the left edge of the form, 8.45 mm (0.33 inch) from the right edge, and within 5.08 mm (0.2 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form in portrait position and 8.47 mm (0.33 inch) from the left and right edges in landscape position. Figure 163 shows an example of the printable area of a form for a 4019 for sizes other than A4. The printable area shown is 8 by 10.60 inches.

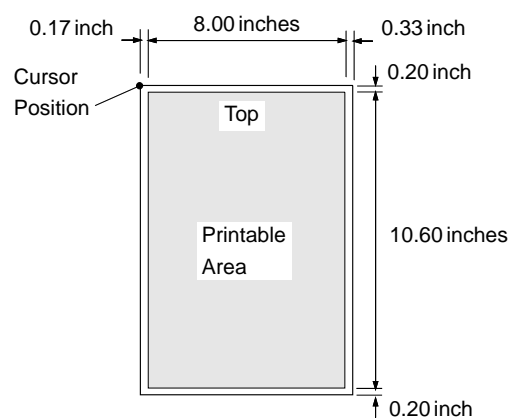


Figure 163. Printable Area for Form Sizes Other Than A4 in HP Emulation Mode on the 4019

## Envelopes

The printable area of an envelope can be different for each size you select. For optimum results, print no closer than 10.16 mm (0.4 inch) from the top edge and 38.1 mm (1.5 inch) from the bottom edge of an envelope in portrait orientation. Print no closer than 10.16 mm (0.4 inch) from the left edge and 38.1 mm (1.5 inch) from the right edge of an envelope in landscape orientation. Refer to your printer reference for additional information about printing on envelopes.

---

## Selecting the Printing Medium

The 4019 is a cut-sheet printer with two medium sources: tray 1 (the default source) and the manual feed tray. Tray 2, an optional 500-sheet tray, and an optional envelope feeder are also available.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for tray 1, BIN 2 for tray 2, BIN 100 for manual-feed, and BIN 65 for the envelope feeder.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**AS/400** Specify the medium source in your form definition, with the DRAWER parameter on the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names can be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the

FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**AS/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue with the **enq** command or in a SMIT panel.

## Medium Size and Configuration

The medium loaded for your 4019 must match the medium size in the 4019 configuration. If these sizes do not match, a printer error code indicates that this mismatch must be corrected by either changing the medium at the printer or by changing the configuration to match the medium.

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## Fonts

The 4019 is a relative-metric printer that prints with 300-pel single-byte downloaded raster fonts.

PSF supports 300-pel fixed or relative metric fonts. PSF converts the fonts to support either relative-metric or fixed-metric fonts. With the host PSF programs, you can use a host-based utility to convert 240-pel fonts to 300-pel fonts. Refer to the system programming guide for your operating system for information on using this utility.

**PSF/MVS** The 4019 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** The 4019 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 4019 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 164.

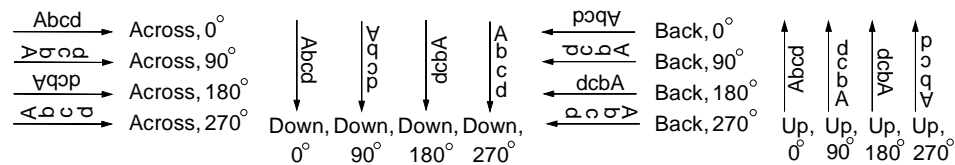


Figure 164. 4019 Inline Directions and Character Rotations for Downloaded Fonts

## Data Types

The 4019 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. When driven by PSF, the 4019 can print text data, IM image data, IOCA image data, and bar code data.

## Text Data

The 4019 can print PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 4019 can print IM image data.

The 4019 printer has a printhead resolution of 300 pels per inch. If you try to print an IM image created for a printer with a different printhead resolution, the results may not be what you expect. PSF requests that the printer scale the image. See Appendix A, "Compatibility, Conversion, and Performance" on page 341 for more information.

## IOCA Image Data

The 4019 can print IOCA FS10 image data. The 4019, which supports right-to-left and left-to-right bit ordering, uses the compression algorithms shown in Figure 165.

Figure 165. Image Compression Algorithms for the 4019

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'



## Bar Code Data

The 4019 can process BCOCA BDC1 bar code data. Figure 166 contains a summary of the bar-code type and modifier combinations supported by the 4019.

Refer to your printer description or reference manual for more information.

*Figure 166. Bar-Code Type and Modifier Combinations for the 4019*

<b>Type</b>	<b>Modifier</b>
Postnet	X'00' through X'03'
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

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## Printer-Storage Management

The two printer-storage areas for the 4019 are:

- **Control storage:** Contains microcode, tables, control blocks that define pages to be printed, control information, storage for suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

If sufficient storage is not available, the printer cannot delete resources that are no longer needed; therefore, printing of the entire print file stops. You must press the READY key to start the printer and enable it to start printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Printer Capabilities

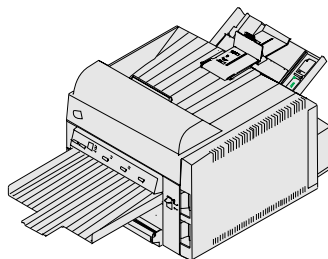
The capabilities of the 4019 are different from those of most of the other printers supported by PSF. The 4019 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. The 4019 is a 300-pel printer. Documents and resources created for use with a 240-pel printer may have to be reformatted or modified for use with the 4019. See Appendix A, “Compatibility, Conversion, and Performance” on page 341 for more information.

The 4019 does not manage printer resources the same way as do other AFP printers; it cannot delete resources when they are no longer needed. The 4019 has a smaller printable area than do other AFP printers and has more limited error recovery.

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## Chapter 21. LaserPrinter 4028

This chapter describes 4028 printer characteristics and PSF-supported functions. The 4028 is a desktop, cut-sheet printer that uses laser and electrophotographic technology to print text, images, graphics, and bar codes at up to 10 pages per minute.



*Figure 167. LaserPrinter 4028*

Figure 168 on page 262 summarizes the printer characteristics and PSF-supported functions for the 4028. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 168 (Page 1 of 2). 4028 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
Continuous forms						
Cut sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed	x	x	x	x	x	x
Envelope printing	x	x	x	x	x	x
MICR printing						
Duplex printing						
Forms flash						
N_UP Printing						
Color selection	x	x	x	x	x	x
Print-quality levels						
Gray-scale image	x	x	x	x	x	x
Operator-adjustable forms						
Exception highlighting: print-error vectors	x	x	x	x	x	x
Disabled mechanisms						
Printhead resolution (pels per inch)	300	300	300	300	300	300
Maximum printing rate (ipm)	10	10	10	10	10	10
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin	A	A	A	A	A	A
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	x	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 168 (Page 2 of 2). 4028 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2	PSF/400	PSF/6000
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster	x	x	x	x	x	
Single-byte downloaded outline						
Single-byte resident outline						
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supported by the printer but not supported by PSF.					

## Default Media Origin

Figure 169 shows the default media origin for a page and two envelopes for the 4028. For a page, the default media origin is the top-left corner of a sheet with the short sides at the top and bottom. For envelopes, front or back, the default media origin is as shown in the diagram. The media origin for envelopes cannot be changed.

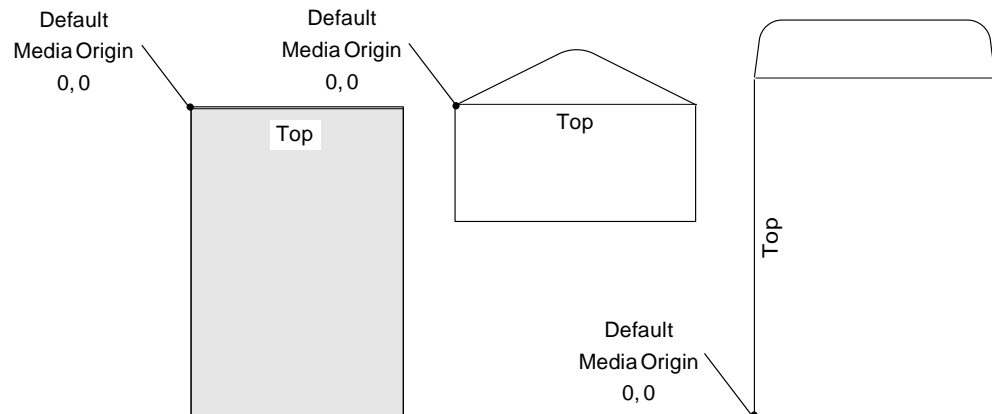


Figure 169. Default Media Origin for a Page and Envelopes on the 4028

For printers manufactured before July, 1991, Print Page Format is available with an Engineering Change (EC), which allows you to shift the default media origin down and right 0.16 inch. IBM does not recommend using this format for AFP applications but advises using Whole Page Format instead. With the EC, the valid printable area will, of course, be reduced in size. Figure 170 shows the media origin resulting from installing this EC. For printers manufactured after July, 1991, the 4028 supports both Whole Page Format and Print Page Format.

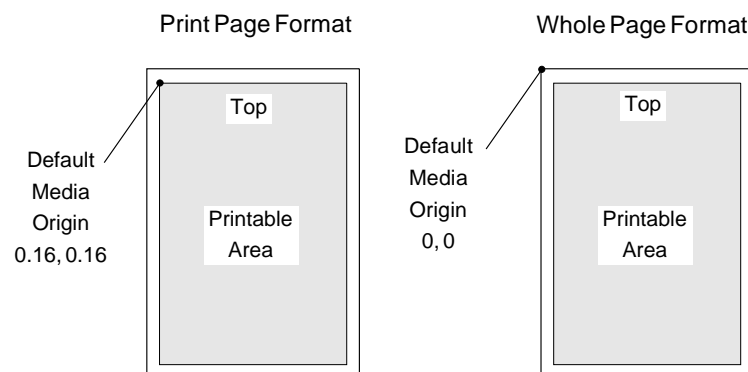


Figure 170. EC-Changed Media Origin for a Page on the 4028

## Printable Area

### A4-Size Forms

For A4-size forms, the unprintable borders for the left and right edges in portrait orientation, or the top and bottom edges in landscape orientation, are 3.39 mm (0.13 inch).

### All Other Sizes of Forms

Printing within 4.06 mm (0.16 inch) of any edge of the form is not possible. However, optimum print quality is ensured when the print area is set to 8.64 mm (0.34 inch) from the top and bottom of the form for portrait orientation (the left and right edges for landscape orientation). Figure 171 shows an example of the printable area of a form for a 4028 for sizes other than A4. The printable area shown is 8.18 by 10.68 inches.

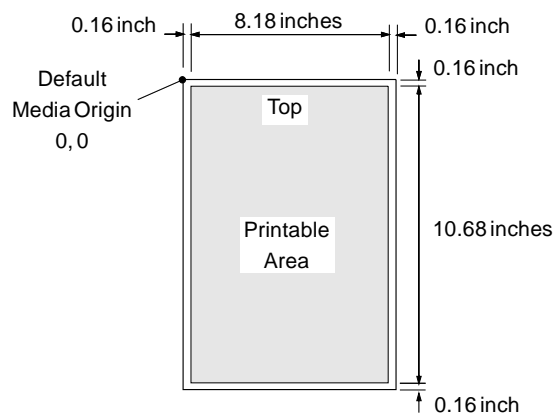


Figure 171. Printable Area for Form Sizes Other Than A4 on the 4028

### Envelopes

The printable area of an envelope can be different for each size you select. Refer to your printer reference for the printable areas for different sizes of envelopes. Basically, however, printing within 4.06 mm (0.16 inch) of any edge of an envelope is not possible. For optimum results, print no closer than 10.16 mm (0.4 inch) from the top edge and 38.1 mm (1.5 inch) from the bottom edge of envelopes. Use a left margin of at least 10.16 mm (0.4 inch).

---

## Selecting the Printing Medium

The 4028 is a cut-sheet printer with two standard medium sources: the 200-sheet tray and the manual feed tray (for sheets and envelopes). Other optional medium sources are also available, including an envelope feeder, trays for A5-size forms and legal forms, and 500-sheet capacity trays.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for the primary tray, BIN 2 for the secondary tray, BIN 100 for manual-feed, and BIN 65 for envelopes.

The printer can be configured to logically link the primary and secondary trays so that media from one source can be used when the other source is empty. In this configuration, BIN 2 is no longer a valid medium source; the linked trays are selected by specifying BIN 1.

| **PSF/MVS** Specify the medium source in your form definition.

| **PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

| **PSF/VSE** Specify the medium source in your form definition.

| **PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

| **PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

| **PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.



## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue name on the **enq** command or in a SMIT panel.

## Medium Size and Configuration

The medium loaded in the 4028 must match the medium size in the 4028 configuration. If these sizes do not match, a printer error code will indicate that this mismatch must be corrected by either changing the medium at the printer or by changing the configuration to match the medium. If the configuration is not correct, do not perform the corrective action until the printer code indicates that PSF (the host) has been notified of the condition. At this time, press the start-stop button on the printer, then quickly press code and configure to enter configuration mode. Refer to *IBM LaserPrinter 4028 Model NS1 Guide to Operations* or *IBM LaserPrinter 4028 Model AS1 Guide to Operations* for more information.

**Note:** Do not disable host notification of intervention-required conditions on the 4028, or the print results may not be what you expect.

---

## Fonts

The 4028 is a relative-metric printer that prints with 300-pel single-byte downloaded or resident raster fonts. The 4028 resident fonts are listed in Appendix B, "Printer-Resident Fonts."

PSF/MVS, PSF/VM, and PSF/VSE support 300-pel resolution fixed or relative metric fonts. PSF converts the fonts to support either relative metric or fixed metric fonts. The IBM Core Interchange fonts, which can be ordered free of charge, contain 300-pel fonts that are ready for use by the 4028. To use any of the compatibility fonts shipped with PSF, you must convert them from 240-pel fonts to 300-pel fonts using a host-based utility. Refer to the system programming guide for your operating system for information on using the utility.

**PSF/MVS** To enable you to use the resident raster fonts, PSF has already marked the 4028 font metrics using the APSRMARK utility. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using resident fonts. For additional information about 4028 fonts, refer to Washington Systems Center Flash 9114.

If you are using the Distributed Print Function (DPF) of PSF/2, the 4028 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. When using DPF, however, 4028 printer resident fonts are not used.

**PSF/VM** PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts. If a host font is not mapped to a resident font, or if the resident font identifier in the table is not present in the printer, PSF downloads the host font to the printer. Refer to *Print Services Facility/VM: System Programming Guide* for more information about using resident fonts. For additional information about 4028 fonts, refer to Washington Systems Center Flash 9117.

If you are using the Distributed Print Function (DPF) of PSF/2, the 4028 can print with fonts downloaded by PSF/VM. When using DPF, however, 4028 printer resident fonts are not used.

**PSF/VSE** To enable you to use the resident raster fonts, PSF has already marked the font metrics using the APTRMARK utility. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using resident fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 4028 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. When using DPF, 4028 printer resident fonts are not used.

**PSF/2** PSF provides a customer-modifiable table that maps host fonts to the resident raster fonts. If a host font is not mapped to a resident font, or if the resident font identifier in the table is not present in the printer, PSF downloads the host font to the printer. To use the resident raster fonts, you must add the fonts to the resource library using the RLADD RESOURCE command. To access the resource library use either the Resource Librarian accessed through the OS/2 command prompt or the easy-to-use Presentation Manager interface. Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

If you are using the Distributed Print Function (DPF) of PSF/2, the 4028 can print with fonts downloaded by PSF/400. When using DPF, however, the 4028 does not use printer resident fonts. Instead, resident fonts are mapped to downloaded fonts.

**PSF/6000** You cannot use resident fonts in native mode, but you can use downloaded raster fonts. PSF/6000 supports resident fonts to the extent that they are supported by the host PSF driving a printer through PSF Direct. Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 4028 is using resident fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0° and 180°, as shown in Figure 172.



Figure 172. 4028 Inline Directions and Character Rotations for Resident Fonts

If the 4028 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 173.

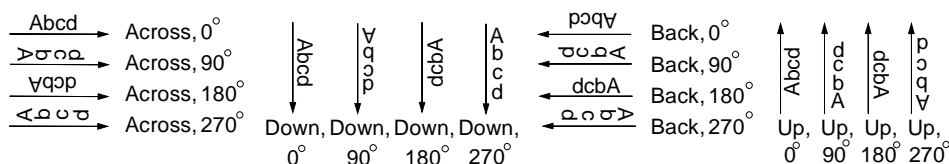


Figure 173. 4028 Inline Directions and Character Rotations for Downloaded Fonts

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## Selecting Color

The 4028 supports selection of three colors: black, the color of the medium, and the printer default color.

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## Gray-Scale Image

The 4028 can print images in shades of gray as well as in black.

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## Exception Highlighting

The 4028 uses vectors to highlight printer exceptions. Figure 174 on page 271 is an example of the exception highlighting used by the 4028. In addition to highlighting data-check exceptions, the 4028 highlights other data stream exceptions.

The print-file submitter can suppress the reporting of data-check exceptions and the accompanying print-error vectors.

**PSF/MVS** Use the DATAACK parameter on the JCL OUTPUT statement to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VM** Use the DATAACK option on the PSF command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/VSE** Use the DATAACK parameter in the \* \$\$ LST statement or in the printer-parameter member used to process your job to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/2** Use the DATAACK option on the APRINT command to specify whether print-positioning errors are to be reported and print-error vectors are to be printed in the output.

**PSF/400** To approximate the function of the DATAACK parameter, specify either the CONTENT or the ABSOLUTE option on the FIDELITY parameter in the printer file. The CONTENT option permits an AFP file with errors to print; the ABSOLUTE option does not.

**PSF/6000** Use the DATAACK option on the **enq** command to specify whether print-positioning errors are to be reported and print-error markers are to be printed in the output.

```

08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 08C100 34
01 540 0001 01 FIN JHF 4 LABOR COST ANALYSIS
0005 24 E 0607
0010 11 01 06 02 07
0020 12 29 01 02 01 - 02 01 - 02 02 03
0030 34 1 1 L REPORT 540 PRODUCED =RPDATE=
0031 34 1 1 R
0040 34 2 1 L LABOR
0041 34 2 1 R RRENT ANALYSIS =PAGE=
0050 34 3 2 L ACTUAL COM
0051 34 3 2 R 0 LAST YEAR ACTUAL
0060 34 4 3 L MONTH - =MEDATE=
0061 34 4 3 R YEAR-TO-DATE
0070 34 5 1 L LAST YEAR VARIANCE
0071 34 5 1 R LAST YEAR VARIANCE
0072 34 6 2 L ACTUAL ACTUAL DOLLARS LAST YEAR PCT. VARIANC AC
0073 34 6 2 R ITLES ACTUAL ACTUAL DOLLARS
0080 34 9 1 L =UNTNO= =UNIT TITLE= ACTUAL ACTUAL DOLLARS
0081 34 9 1 R
0090 56 1 1 2 L 701003
0095 56 1 1 2 L 702004
0100 56 1 1 2 L 703108
0105 56 1 1 2 L 703207
0120 56 1 1 2 L 705004
0122 56 1 1 2 L 705007
0124 56 1 1 2 L 707802
0125 56 1 1 2 L 708909
0130 56 1 1 2 L 921007
0140 56 2 3 5 TOTAL LABOR

```

Figure 174. Exception Highlighting on the 4028

## Data Types

The 4028 can process text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 4028 can process PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 4028 can process IM image data. The 4028 has a printhead resolution of 300 pels per inch. If you try to print an IM image created for a printer with a different printhead resolution, the results may not be what you expect. PSF requests that the printer scale the image. See Appendix A, "Compatibility, Conversion, and Performance" on page 341 for more information.

## IOCA Image Data

The 4028 can process IOCA FS10 image data. The 4028, which supports only left-to-right bit ordering, uses the compression algorithms shown in Figure 175.

<i>Figure 175. Image Compression Algorithms for the 4028</i>	
Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
RL4	X'06'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 4028 can process GOCA DR/2V0 graphics data.

## Bar Code Data

The 4028 can process BCOCA BDC1 bar code data. Figure 176 summarizes the bar-code type and modifier combinations supported by the 4028.

Refer to your printer description or reference manual for more information.

*Figure 176. Bar-Code Type and Modifier Combinations for the 4028*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

## Printer-Storage Management

The two printer-storage areas for the 4028 are:

- **Control storage:** Contains microcode, tables and control blocks that define pages to be printed, and control information; contains storage for suppression data, page segments, and overlays
- **Pattern storage:** Contains font patterns and raster images

If sufficient storage is not available, PSF deletes any resources that are not needed for the current page, transmits the page data again, and tries to reprint the data. If unsuccessful, PSF stops printing of the entire print file, and printing continues with the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Printer Capabilities

The capabilities of the 4028 are different from those of most of the other printers supported by PSF. The 4028 is a 300-pel printer. Documents and resources created for use with a 240-pel printer may have to be reformatted or modified for use with the 4028. See Appendix A, “Compatibility, Conversion, and Performance” on page 341 for more information.





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## Chapter 22. LaserPrinter 4029 Series

This chapter describes 4029 printer characteristics and PSF-supported functions. The 4029 is a desktop, cut-sheet printer that uses laser technology to print text, images, graphics, and bar codes at from 5 to 10 pages per minute, depending on the model.

The 4029 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream (IPDS) to the data stream required by the printer. PSF/MVS, PSF/VM, PSF/VSE, and PSF/400 then support the printer through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct function on PSF/2 and PSF/6000. The printer accepts 1-way communication from the host and does not return information regarding error conditions, availability of resources, or device status. The 4029 printer is described in this publication from **PSF's** point of view, not from the printer's point of view..

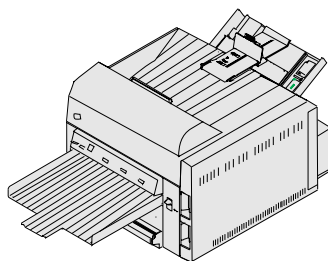


Figure 177. LaserPrinter 4029

Figure 178 on page 276 summarizes the printer characteristics and PSF-supported functions for the 4029. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 178 (Page 1 of 2). 4029 Summary

Printer Characteristics	PSF/MVS A	PSF/VM A	PSF/VSE A	PSF/2 B	PSF/400 A	PSF/ 6000 B
Continuous forms						
Cut sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media source by copy						
Manual forms feed	x	x	x	x	x	x
Envelope printing	x	x	x	x	x	x
MICR printing						
Duplex printing						
Forms flash						
N_UP Printing						
Color selection						
Print-quality levels						
Gray-scale image	C	C	C	C	C	C
Operator-adjustable forms						
Exception highlighting						
Disabled mechanisms						
Printhead resolution (pels per inch)	300	300	300	300	300	300
Maximum printing rate (ipm)	10	10	10	10	10	10
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin						
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	D	D	D	D	D	D
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 178 (Page 2 of 2). 4029 Summary

Printer Characteristics	PSF/MVS A	PSF/VM A	PSF/VSE A	PSF/2 B	PSF/400 A	PSF/ 6000 B
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster				E		E
Single-byte downloaded outline						
Single-byte resident outline				F		F
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>A</b>	Supported through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct function of PSF/2 and PSF/6000.					
<b>B</b>	Supported by a software driver that converts the Intelligent Printer Data Stream to the data stream required by the printer.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>C</b>	Supported by the printer but not supported by PSF.					
<b>D</b>	Supported only with the PCL5 Emulation option.					
<b>E</b>	Supported only in PCL4 and PPDS emulation mode.					
<b>F</b>	Supported only in PPDS emulation mode.					

## Default Media Origin (Cursor Position)

PSF supports the 4029 in two data stream modes: IBM Personal Printer Data Stream (PPDS) mode and in Hewlett-Packard Printer Command Language Emulation (HP PCL) mode.

### IBM PPDS Mode

When PSF supports the 4029 in IBM PPDS mode, you have two page formats from which to select: Print Page Format and Whole Page Format. Figure 179 shows the cursor positions for a portrait and landscape page in both IBM PPDS Print Page Format and Whole Page Format. The placement of the cursor position depends on the format you are using. In Print Page Format, the cursor position is the inside edge of the unprintable area in the upper left corner of the page. In Whole Page Format, the cursor position is in the upper left corner of the form. For AFP printing, IBM recommends that you use Whole Page Format.

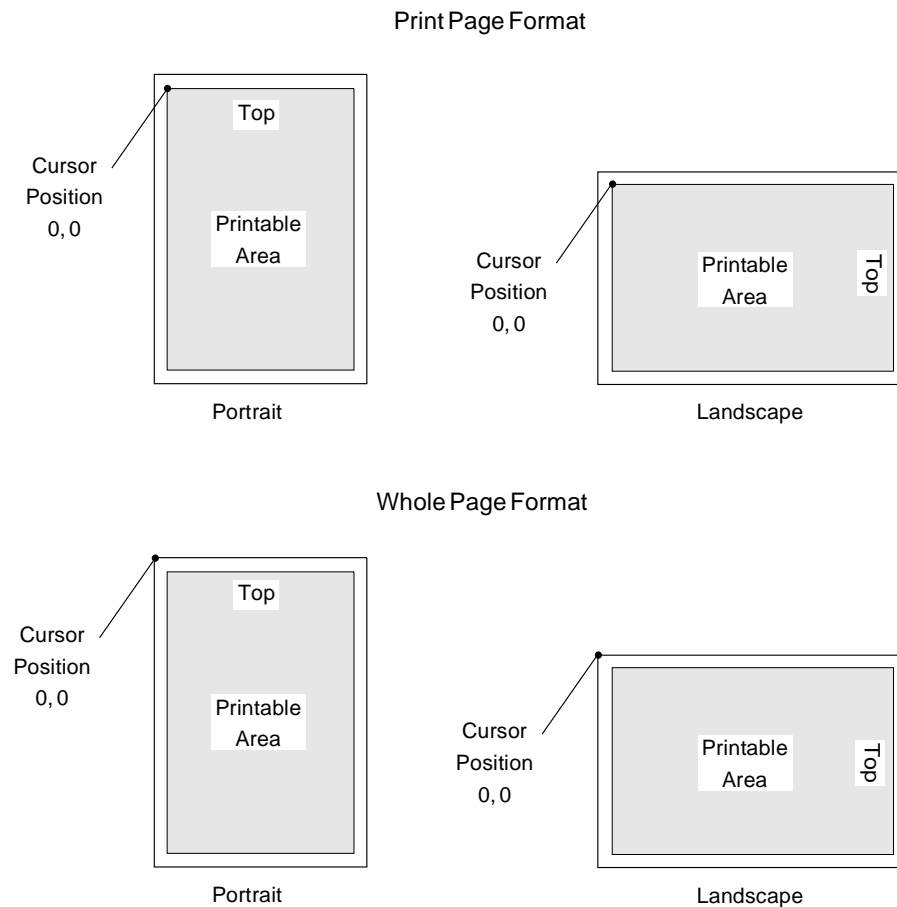


Figure 179. Cursor Position for Pages in IBM PPDS Mode on the 4029

## HP PCL Emulation Mode

When PSF supports the 4029 in HP PCL Emulation Mode, the cursor position is the inside edge of the left unprintable area and the top of the page, as shown in Figure 180.

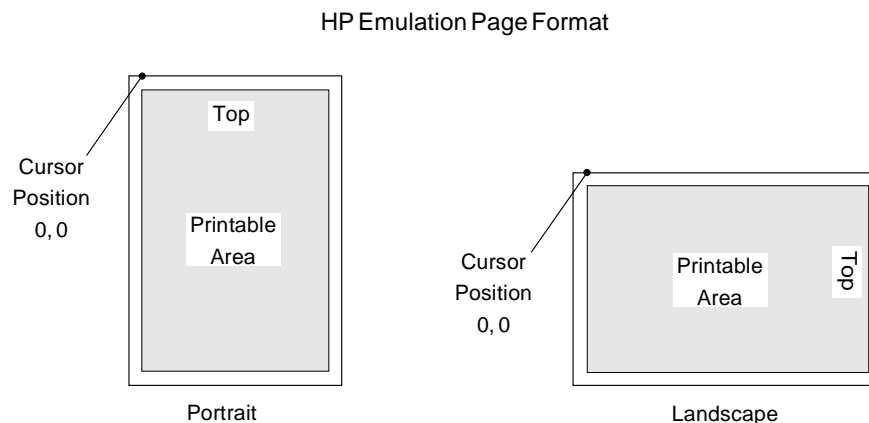


Figure 180. Cursor Position for Pages in HP PCL Emulation Mode on the 4029

## Envelopes

Figure 181 shows the cursor position for two envelopes for the 4029. For envelopes, front or back, the cursor position is as shown in the diagram.

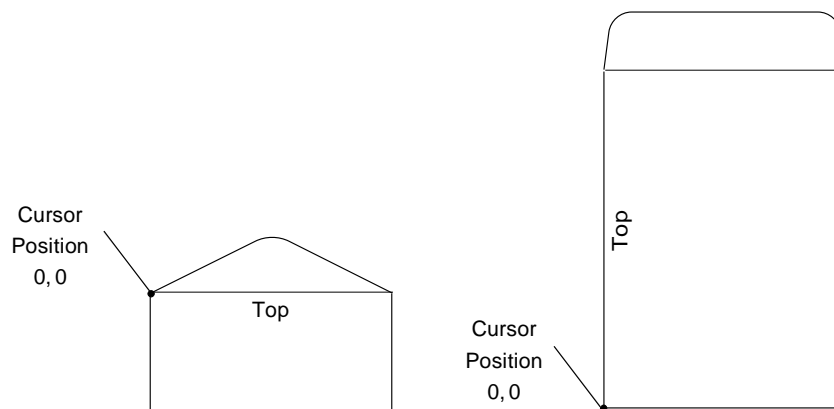


Figure 181. Cursor Position for Envelopes on the 4029

## Printable Area

The 4029 cannot print in certain unprintable areas near the edges of the form. The size of these unprintable areas depends on the data stream mode in which your printer is printing. The following sections describe these areas.

### IBM PPDS Mode

#### A4-Size Forms

Printing within 3.30 mm (0.13 inch) from the left or right edges of the form and within 4.31 mm (0.16 inch) of the top and bottom edges of the forms is not possible.

#### All Other Sizes of Forms

Printing within 6.35 mm (0.25 inch) from the left or right edges of the form and within 4.31 mm (0.17 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form. Figure 182 shows an example of the printable area of a form for a 4029 for sizes other than A4. The printable area shown is 8 by 10.66 inches.

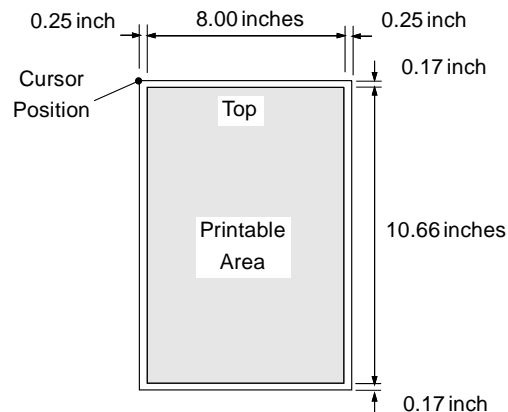


Figure 182. Printable Area for Form Sizes Other Than A4 for IBM PPDS Mode on the 4029

## HP PCL Emulation Mode

### A4-Size Forms

Printing within 4.23 mm (0.17 inch) from the top and bottom edges of the form and within 3.30 mm (0.13 inch) from the left and right edges of the form is not possible.

For optimum results, print no closer than 8.47 mm (0.33 inch) from the top or bottom edges of a form in portrait orientation and no closer than 8.47 mm (0.33 inch) from the left or right edges of a form in landscape orientation.

### All Other Sizes of Forms

Printing within 4.23 mm (0.17 inch) from the left edge of the form, 8.45 mm (0.33 inch) from the right edge, and within 5.08 mm (0.2 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form in portrait position and 8.47 mm (0.33 inch) from the left and right edges in landscape position. Figure 183 shows an example of the printable area of a form for a 4029 for sizes other than A4. The printable area shown is 8 by 10.60 inches.

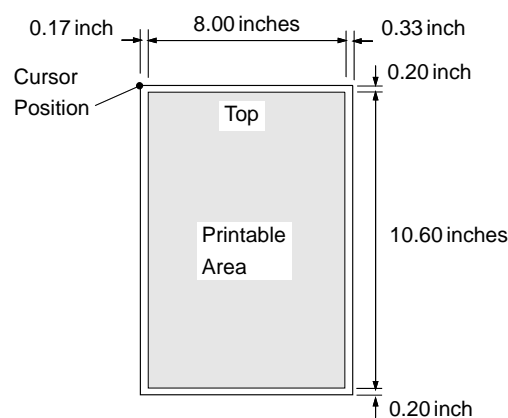


Figure 183. Printable Area for Form Sizes Other Than A4 in HP Emulation Mode on the 4029

## Envelopes

For most standard sized envelopes, printing within 6.35 mm (0.25 inch) from the left or right edges of the envelope and within 4.31 mm (0.16 inch) from the top or bottom edges of the envelope is not possible. For unusual sizes of envelopes, the printable area of an envelope can be different for each size you select. Refer to your printer reference for envelope printable areas.

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## Selecting the Printing Medium

The 4029 is a cut-sheet printer with two standard medium sources: the primary tray (200-sheet capacity) and the manual feed tray. Other optional medium sources are also available.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for tray 1, BIN 2 for the optional, 500-sheet tray, BIN 65 for the optional envelope feeder, and BIN 100 for the manual-feed tray.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter on the CRTPRTF, the OVRPRTF, or the CGHPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of medium loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the



FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**AS/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue with the **enq** command or in a SMIT panel.

---

## Fonts

The 4029 is a relative-metric printer that prints with 300-pel single-byte downloaded raster fonts in IPDS mode. In PCL4-emulation and PPDS-emulation mode, the 4029 supports resident raster fonts. In PPDS-emulation mode, the 4029 also supports resident outline fonts.

PSF supports 300-pel fixed or relative metric fonts. PSF converts the fonts to support either relative-metric or fixed-metric fonts. With the host PSFs you can use a host-based utility to convert 240-pel fonts to 300-pel fonts. Refer to the system programming guide for your operating system for information on using this utility.

**PSF/MVS** The 4029 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** The 4029 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 4029 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 184.

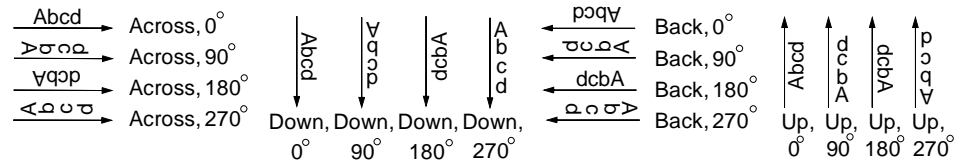


Figure 184. 4029 Inline Directions and Character Rotations for Downloaded Fonts

## Gray-Scale Image

The 4029 can print images in shades of gray as well as in black. When driven by PSF, however, the 4029 cannot print gray-scale images.

## Data Types

The 4029 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. When driven by PSF, the 4029 can print text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 4029 can print PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 4029 can print IM image data. The 4029 has a printhead resolution of 300 pels per inch. If you try to print an IM image created for a printer with a different printhead resolution, the results may not be what you expect. PSF requests that the printer scale the image. See Appendix A, "Compatibility, Conversion, and Performance" on page 341 for more information.

## IOCA Image Data

The 4029 can print IOCA FS10 image data. The 4029, which supports right-to-left and left-to-right bit ordering, uses the compression algorithms shown in Figure 185.

*Figure 185. Image Compression Algorithms for the 4029*

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 4029 can process GOCA DR/2V0 graphics data, if the PCL5 Emulation option is installed.

## Bar Code Data

The 4029 can process BCOCA BDC1 bar code data. Figure 186 summarizes the bar-code type and modifier combinations supported by the 4029.

Refer to your printer description or reference manual for more information.

*Figure 186. Bar-Code Type and Modifier Combinations for the 4029*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

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## Printer-Storage Management

The three printer-storage areas for the 4029 are:

- **Page Buffer Memory:** Contains an encoded page description for each page of data sent by the host and can contain more than one page of data
- **Swath Memory:** Temporarily contains the bitmap the printer uses to print a page
- **User Memory:** Contains downloaded fonts, macros, plotter data, font cache data, and temporary work buffers

If sufficient storage is not available, the printer cannot delete resources that are not needed for the current page; therefore, printing of the entire print file stops. You must press the READY key to start the printer and enable it to continue printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of the page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

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## Printer Capabilities

The capabilities of the 4029 are different from those of most of the other printers supported by PSF. The 4029 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. The 4029 is a 300-pel printer. Documents and resources created for use with a 240-pel printer may have to be reformatted or modified for use with the 4029. See Appendix A, “Compatibility, Conversion, and Performance” on page 341 for more information.

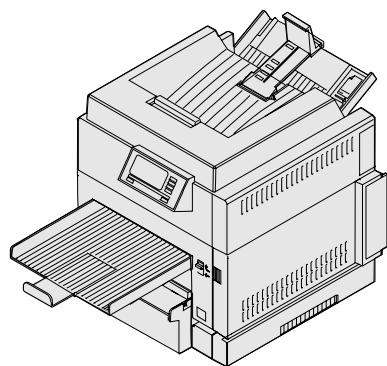
The 4029 does not manage printer resources the same way as do other AFP printers; it cannot delete resources when they are no longer needed. The 4029 has a smaller printable area than do other AFP printers and has more limited error recovery.

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## Chapter 23. LaserPrinter 4039

This chapter describes 4039 printer characteristics and PSF-supported functions. The 4039 is a desktop, cut-sheet printer that uses laser technology to print text, images, graphics, and bar codes at from 10 to 16 impressions per minute, depending on the model.

The 4039 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream (IPDS) to the data stream required by the printer (either PCL5 emulation or PostScript emulation). PSF/MVS, PSF/VM, PSF/VSE, and PSF/400 then support the printer through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct function on PSF/2 and PSF/6000. The printer accepts 1-way communication from the host and does not return information regarding error conditions, availability of resources, or device status. The 4029 printer is described in this publication from **PSF's** point of view, not from the printer's point of view.



*Figure 187. LaserPrinter 4039*

Figure 188 on page 288 summarizes the printer characteristics and PSF-supported functions for the 4039. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 188 (Page 1 of 2). 4039 Summary

Printer Characteristics	PSF/MVS A	PSF/VM A	PSF/VSE A	PSF/2 B	PSF/400 A	PSF/6000 B
Continuous forms						
Cut sheet	x	x	x	x	x	x
Alternate media source	x	x	x	x	x	x
Alternate media destination						
Media Source by Copy						
Manual forms feed	x	x	x	x	x	x
Envelope printing	x	x	x	x	x	x
MICR printing						
Duplex printing	C	C	C	C	C	C
Forms flash						
N_UP Printing						
Color selection						
Print-quality levels						
Gray-scale image	x	x	x	x	x	x
Operator-adjustable forms						
Exception highlighting						
Disabled mechanisms						
Printhead resolution (pels per inch)	300-600	300-600	300-600	300-600	300-600	300-600
Maximum printing rate (ipm)	D	D	D	D	D	D
<b>PSF-Supported Functions</b>						
Page overlays	x	x	x	x	x	x
Direct printing						
Distributed Print Function	x	x	x	x	x	
PSF Direct	x	x	x	x	x	x
Changeable media origin						
Guaranteed print labeling						
<b>Data Types</b>						
PTOCA PT1 text	x	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x	x
IM image	x	x	x	x	x	x
IOCA FS10 image	x	x	x	x	x	x
GOCA DR/2V0 graphics	E	E	E	E	E	E
BCOCA BCD1 bar codes	x	x	x	x	x	x

Figure 188 (Page 2 of 2). 4039 Summary

Printer Characteristics	PSF/MVS A	PSF/VM A	PSF/VSE A	PSF/2 B	PSF/400 A	PSF/6000 B
<b>Fonts</b>						
Single-byte downloaded raster	x	x	x	x	x	x
Single-byte resident raster						
Single-byte downloaded outline						
Single-byte resident outline				F		F
Single-byte resident symbol sets						
Double-byte downloaded raster						
Double-byte resident raster						
Double-byte downloaded outline						
Double-byte resident outline						
<b>Notes:</b>						
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.					
<b>ipm</b>	Impressions per minute, for 8.5 by 11-inch sheets.					
<b>A</b>	Supported through the Distributed Print Function (DPF) of PSF/2 and the PSF Direct Function of PSF/2 and PSF/6000.					
<b>B</b>	Supported by a software driver that converts the Intelligent Printer Data Stream to the data stream required by the printer.					
<b>C</b>	Supported by the 4039-10R and by other models with the duplex option installed.					
<b>D</b>	Reduced when printing with 600-pel resolution. <ul style="list-style-type: none"> <li>• Models 10D and 10R: up to 10 ppm</li> <li>• Models 12L and 12R: up to 12 ppm</li> <li>• Model 16L: up to 16 ppm</li> </ul>					
<b>E</b>	Supported only with the PCL5-emulation option.					
<b>F</b>	Only when operating in PostScript-emulation or PCL5-emulation mode.					

## Default Media Origin (Cursor Position)

PSF supports the 4039 in two data stream modes: PostScript Level 1 and in Hewlett-Packard Printer Command Language Emulation (HP PCL5) mode.

## PCL5-Emulation Mode

When PSF supports the 4039 in PCL5-emulation mode, the cursor position is the inside edge of the left unprintable area and the top of the page, as shown in Figure 189.

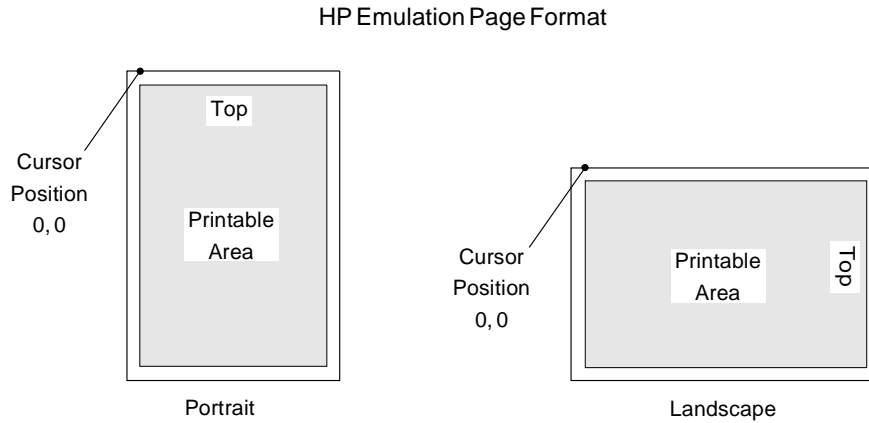


Figure 189. Cursor Position for Pages in PCL5-Emulation Mode on the 4039

## Envelopes

Figure 190 shows the cursor position for two envelopes for the 4039. For envelopes, front or back, the cursor position is as shown in the diagram.

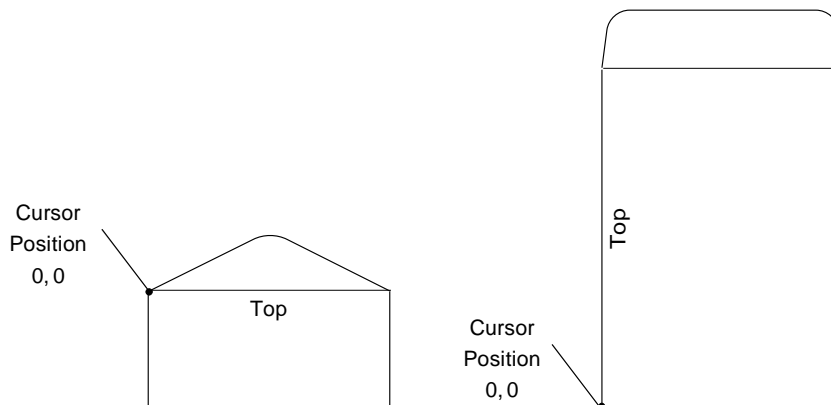


Figure 190. Cursor Position for Envelopes on the 4039



## Printable Area

The 4039 cannot print in certain unprintable areas near the edges of the form. The size of these unprintable areas depends on the data stream mode in which the printer is printing. The following sections describe these areas.

## PCL5-Emulation Mode

### A4-Size Forms

Printing within 4.2 mm (0.167 inch) from the top and bottom edges of the form and within 6.25 mm (0.25 inch) from the left and right edges of the form is not possible.

For optimum results, print no closer than 8.47 mm (0.33 inch) from the top or bottom edges of a form in portrait orientation and no closer than 8.47 mm (0.33 inch) from the left or right edges of a form in landscape orientation.

### All Other Sizes of Forms

Printing within 4.23 mm (0.17 inch) from the left edge of the form, 8.45 mm (0.33 inch) from the right edge, and within 5.08 mm (0.2 inch) from the top or bottom edges of the form is not possible. For optimal results, however, do not print closer than 8.47 mm (0.33 inch) from the top and bottom edges of the form in portrait position and 8.47 mm (0.33 inch) from the left and right edges in landscape position. Figure 191 shows an example of the printable area of a form for a 4039 for sizes other than A4. The printable area shown is 8 by 10.60 inches.

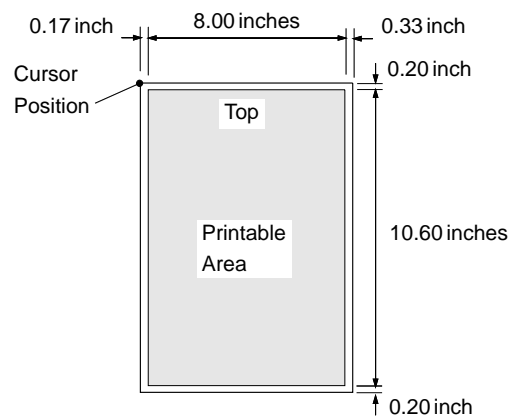


Figure 191. Printable Area for Form Sizes Other Than A4 in HP Emulation Mode on the 4039

## Envelopes

For most standard sized envelopes, printing within 6.35 mm (0.25 inch) from the left or right edges of the envelope and within 4.31 mm (0.16 inch) from the top or bottom edges of the envelope is not possible. For unusual sizes of envelopes, the printable area of an envelope can be different for each size you select. Refer to your printer reference for envelope printable areas.

## Selecting the Printing Medium

The 4039 is a cut-sheet printer with one standard, 500-sheet medium source: Tray 1. Other optional medium sources are also available to hold different sizes of paper, card stock, transparencies, envelopes, and labels.

Selecting the medium for a print job consists of two steps: specifying the medium source and specifying the contents of the medium source.

## Specifying the Medium Source

Specify BIN 1 for tray 1, BIN 2 for an optional second tray, BIN 65 for the optional Envelope+ feeder, and BIN 100 for the manual feed tray.

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter on the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

**PSF/6000** Specify the medium source in your form definition or with the **enq** command BIN option.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of medium loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class, destination, or form name with the CLASS, DEST, or FORM options of the SPOOL command.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the

FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**AS/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

**PSF/6000** Different queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a queue with the **enq** command or in a SMIT panel.

---

## Fonts

The 4039 is a relative-metric printer that prints with 300-pel single-byte downloaded raster fonts.

Depending on the model, the 4039 contains 39 Adobe Type 1 scalable PostScript fonts, 10 Truetype fonts, 13 to 36 scalable Intellifont PCL5 fonts, 2 to 14 PCL5 raster fonts, and an optional font-card adapter. These fonts are used when operating the printer in PostScript-emulation or PCL5-emulation mode.

PSF supports 300-pel fixed or relative metric fonts. PSF converts the fonts to support either relative-metric or fixed-metric fonts. With the S/390 PSFs you can use a host-based utility to convert 240-pel fonts to 300-pel fonts. Refer to the system programming guide for your operating system for information on using this utility.

**PSF/MVS** The 4039 can print with fonts downloaded by PSF/MVS and residing in the DPF resources library. Refer to *Print Services Facility/MVS: System Programming Guide* for more information about using fonts.

**PSF/VM** Refer to *Print Services Facility/VM: System Programming Guide* for more information about using fonts.

**PSF/VSE** The 4039 can print with fonts downloaded by PSF/VSE and residing in the DPF resources library. Refer to *Print Services Facility/VSE: System Programming Guide* for more information about using fonts.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** Refer to *AS/400 Printer Device Programming* for more information about using fonts.

**PSF/6000** Refer to *IBM Print Services Facility for AIX: Print Administration* for more information about using fonts.

## Inline Directions and Character Rotations of Text

When the 4039 is using downloaded fonts, text can be printed in four inline directions. For each direction, characters can be rotated 0°, 90°, 180°, or 270°, as shown in Figure 192.

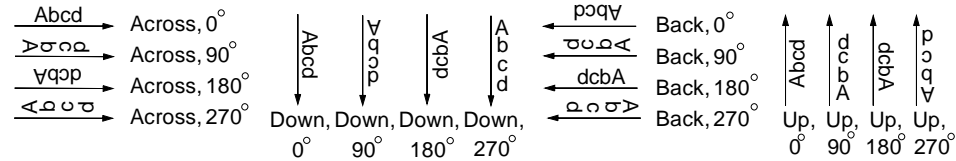


Figure 192. 4039 Inline Directions and Character Rotations for Downloaded Fonts

## Gray-Scale Image

The 4039 can print images in up to 100 shades of gray as well as in black. When driven by PSF, however, the 4039 cannot print gray-scale images.

## Data Types

The 4039 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. When driven by PSF, the 4039 can print text data, IM image data, IOCA image data, graphics data, and bar code data.

## Text Data

The 4039 can print PTOCA PT1 and PTOCA PT2 text data.

## IM Image Data

The 4039 can print IM image data. The 4039 has a printhead resolution of 300 pels per inch. If you try to print an IM image created for a printer with a different printhead resolution, the results may not be what you expect. PSF requests that the printer scale the image. See Appendix A, "Compatibility, Conversion, and Performance" on page 341 for more information.

## IOCA Image Data

The 4039 can print IOCA FS10 image data. The 4039, which supports right-to-left and left-to-right bit ordering, uses the compression algorithms shown in Figure 193.

*Figure 193. Image Compression Algorithms for the 4039*

Algorithm	Hex Code
IBM MMR	X'01'
Uncompressed	X'03'
ABIC	X'08'
G3 MR (CCITT Group 3)	X'81'
G4 MMR (CCITT Group 4)	X'82'

## Graphics Data

The 4039 can process GOCA DR/2V0 graphics data, if the PCL5 Emulation option is installed.

## Bar Code Data

The 4039 can process BCOCA BDC1 bar code data. Figure 194 summarizes the bar-code type and modifier combinations supported by the 4039.

Refer to your printer description or reference manual for more information.

*Figure 194. Bar-Code Type and Modifier Combinations for the 4039*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

---

## Printer-Storage Management

The three printer-storage areas for the 4039 are:

- **Page Buffer Memory:** Contains an encoded page description for each page of data sent by the host and can contain more than one page of data
- **Swath Memory:** Temporarily contains the bitmap the printer uses to print a page
- **User Memory:** Contains downloaded fonts, macros, plotter data, font cache data, and temporary work buffers

If sufficient storage is not available, the printer cannot delete resources that are not needed for the current page; therefore, printing of the entire print file stops. You must press the READY key to start the printer and enable it to continue printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of the page segments, overlays, and fonts that are used and resubmit the print file. Eliminating one font from the print job or simplifying an overlay may allow the page to be printed.

Ensure that your font-pruning function is active to save printer raster-pattern storage. For more information about font pruning, see “Font Pruning” on page 369.

---

## Printer Capabilities

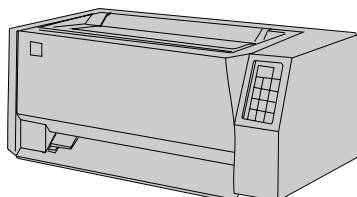
The capabilities of the 4039 are different from those of most of the other printers supported by PSF. The 4039 is not an Intelligent Printer Data Stream (IPDS) printer but is supported by PSF/2 and PSF/6000 through a software driver, which converts the Intelligent Printer Data Stream to the data stream required by the printer. The 4039 is a 300-pel printer. Documents and resources created for use with a 240-pel printer may have to be reformatted or modified for use with the 4039. See Appendix A, “Compatibility, Conversion, and Performance” on page 341 for more information.

The 4039 does not manage printer resources the same way as do other AFP printers; it cannot delete resources when they are no longer needed. The 4039 has a smaller printable area than do other AFP printers and has more limited error recovery.

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## Chapter 24. 4224 Printer

This chapter describes 4224 printer characteristics and PSF-supported functions. The 4224 is a tabletop, serial, dot-matrix, impact printer that prints text, images, graphics, and bar codes at up to 600 characters per second, depending on the model and print quality selected.



*Figure 195. 4224 Printer*

Figure 196 on page 298 summarizes the printer characteristics and PSF-supported functions for the 4224. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 196 (Page 1 of 2). 4224 Summary

<b>Printer Characteristics</b>	<b>PSF/MVS</b>	<b>PSF/VM</b>	<b>PSF/VSE</b>	<b>PSF/400</b>
Continuous forms	x	x	x	x
Cut sheet	A	A	A	A
Alternate media source	A	A	A	A
Alternate media destination				
Media source by copy				
Manual forms feed	A	A	A	A
Envelope printing				
MICR printing				
Duplex printing				
Forms flash				
N_UP Printing				
Color selection	x	x	x	x
Print-quality levels	x	x	x	x
Gray-scale image				
Operator-adjustable forms	x	x	x	x
Exception highlighting				
Disabled mechanisms				
Printhead resolution (pels per inch)	144	144	144	144
Maximum printing rate (cps)	600	600	600	600
<b>PSF-Supported Functions</b>				
Page overlays	x	x	x	x
Direct printing				
Distributed Print Function				
PSF Direct				
Changeable media origin				
Guaranteed print labeling				
<b>Data Types</b>				
PTOCA PT1 text	x	x	x	x
PTOCA PT2 text	x	x	x	x
IM image	x	x	x	x
IOCA FS10 image				
GOCA DR/2V0 graphics	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x



Figure 196 (Page 2 of 2). 4224 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/400
<b>Fonts</b>				
Single-byte downloaded raster				
Single-byte resident raster				
Single-byte downloaded outline				
Single-byte resident outline				
Single-byte resident symbol sets	B	B	B	B
Double-byte downloaded raster				
Double-byte resident raster				
Double-byte downloaded outline				
Double-byte resident outline				
<b>Note:</b>				
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.			
<b>cps</b>	Characters per second.			
<b>A</b>	With the Document Insertion Device or with the Automatic Sheet Feed Device.			
<b>B</b>	Included later in this chapter is a table mapping printer-resident symbol sets to similar PSF fonts.			

## Default Media Origin

As shown in Figure 197, the default media origin for the 4224 for both narrow and wide continuous forms is the top left corner of the form, 0.5 inch from the outside edge of the carrier strip. The media origin cannot be changed.

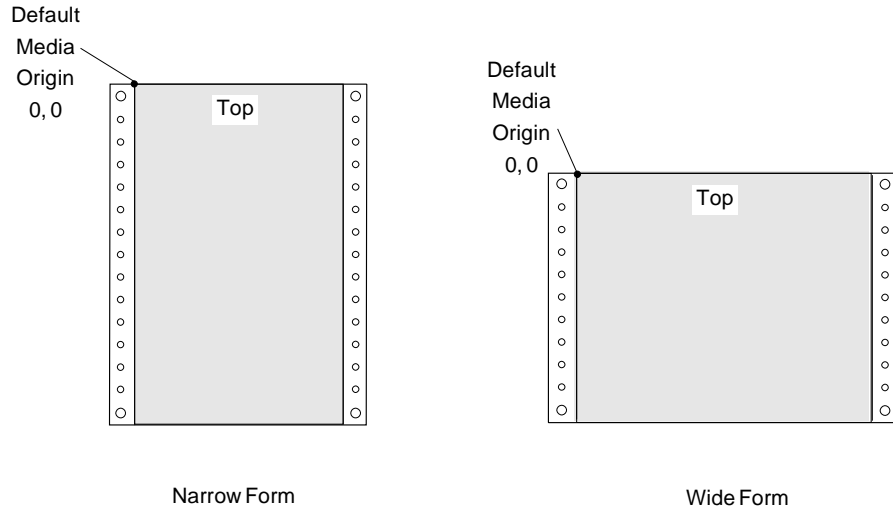


Figure 197. Default Media Origin for Continuous Forms on the 4224

As shown in Figure 198, the default media origin for cut-sheet forms is the top-left corner of the form. The media origin cannot be changed.

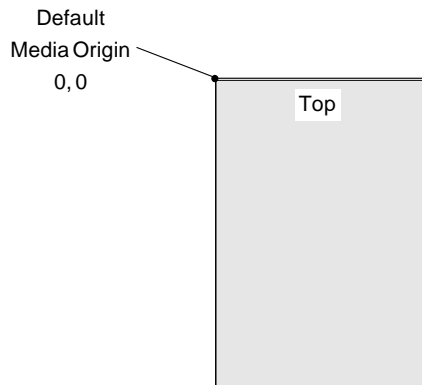


Figure 198. Default Media Origin for Cut-Sheet Forms on the 4224

## Printable Area

The size of the printable area must be set using a printer configuration option. If the defined printable area is not large enough to contain the page of data, a data-check exception (position check) occurs.

## Selecting the Printing Medium

The 4224 can use either continuous-forms or cut-sheet forms and has three standard medium sources: the Continuous-Forms Device, the Document-on-Demand Device (for continuous forms and documents on demand), and the Document-Insertion Device (for manually feeding cut-sheet forms).

For printers using the Document Insertion Device, only one medium source (bin 1) is available.

A fourth medium source, the Automatic Sheet Feed Device (ASF), is generally available in Europe, the Middle East, and Africa and is available with RPQ #8L0019 in the U.S.A. The ASF automatically feeds cut-sheet forms.

For printer models with the Automatic Sheet Feed Device (ASF) for handling cut-sheet forms, four medium sources are available: bin 1, bin 2, bin 3, and the manual bin. You can specify the medium source in your form definition or with the PSF (PSF/VM only) command BIN option. Specify BIN 1 for the default medium source, BIN 2 for the second source, BIN 3 for the third source, and BIN 100 for the Document Insertion Device, which allows you to manually insert cut-sheet forms.

## Specifying the Medium Source

The 4224 can print on either cut-sheet forms or continuous forms.

### Specifying Cut-Sheet Media

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

### Specifying Continuous-Forms Media

**PSF/MVS** Specify the form to be loaded into the 4224 by using the FORMS parameter in your JCL.

**PSF/VM** When the 4224 is connected as a GROUP4 printer, you can specify the form to be loaded into the 4224 by using the FORM option of the CP SPOOL command. You cannot use the FORM option when the 4224 is connected through the Remote Spooling Communications Subsystem (RSCS).

**PSF/VSE** Specify the form to be loaded into the printer by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/400** Specify the form to be loaded in the 4224 by using the FORMTYPE parameter in the printer file.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes or destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class or destination name with the CLASS or DEST options of the SPOOL command to ensure that the contents of each source are what you expect.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter on the \* \$\$ LST statement. You may also need to specify a forms name with either the FNO parameter or the FORMS parameter on the \* \$\$ LST statement. You can also specify the FORMS parameter in the printer-parameter member.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).

---

## Fonts

Although the 4224 can print with downloaded symbol sets, the 4224 prints only with single-byte resident symbol sets when driven by PSF.

Because of differences between font technologies, text printed with symbol sets will not have the same appearance as text printed with the raster fonts of the same names.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF provides modules containing font-resource tables that PSF uses to map the code pages and font character sets of host fonts to the global identifiers of printer-resident symbol sets. These tables are shown in the system programming guide for each operating system.

**PSF/400** If a resident symbol set is specified, and the symbol set is stored in the printer, PSF uses it; otherwise, PSF selects another resident symbol set that most closely matches the characteristics of the specified symbol set.

For more information about using fonts, refer to *AS/400 Printer Device Programming*.

---

## Inline Directions and Character Rotations of Text

The 4224 can print in two inline directions, as shown in Figure 199. In the ACROSS direction, characters are rotated 0°. In the BACK direction, characters are rotated 180°.

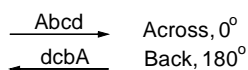


Figure 199. 4224 Inline Directions and Character Rotations

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## Operator-Adjustable Forms

To align data on preprinted forms, the 4224 operator can adjust the physical top and left margins, which will offset the page image on the printing medium. The horizontal (left margin) adjustment range is from -6.9 mm (-0.27 inches) to +38.35 mm (+1.51 inches). The vertical (top margin) adjustment range is from -30.5 mm (-1.2 inches) to +38.1 mm (+1.5 inches). This adjustment does not affect the size of the valid printable area; however, using this adjustment can produce positioning errors if the horizontal adjustment is too large for the form being used.

---

## Selecting Color

The 4224 Model 1C2 and Model 2C2 support selection of up to eight colors. The ribbon installed determines the colors that can be selected. Other models support selection of three colors: black, the color of the medium, and the printer default color.

For line data, color is specified in the page format of the page definition and can be specified for individual fields of data.

---

## Print-Quality Levels

The 4224 allows you to select different levels of print quality. Higher print quality corresponds to slower print speeds. To select a print-quality level, you use the QUALITY subcommand on the COPYGROUP command in the form definition created by Page Printer Formatting Aid (PPFA). Specify the values shown in Figure 200 on the QUALITY subcommand to get the correct print-quality level.

*Figure 200. 4224 Print-Quality Selection Values*

<b>Print-Quality Level</b>	<b>Hexadecimal Value Range</b>	<b>Decimal Value Range</b>
Reserved	X'00'	
DP Quality	X'01' through X'55'	1 through 85
DP Text Quality	X'56' through X'AA'	86 through 170
NLQ Quality	X'AB' through X'FE'	171 through 254
Printer Customized Default	X'FF'	255

Refer to your printer publication for specific information about the quality levels supported by your printer.

Not all symbol sets can be printed at all print-quality levels. Figure 201 identifies the print-quality levels that can be used for some of the 4224 symbol sets and suggests the name of a corresponding coded font that may be used for each symbol set. Refer to the 4224 publications for a list of 4224 symbol sets.

<i>Figure 201. 4224 Symbol Sets and Corresponding Coded Fonts</i>			
Symbol Sets	4224 Print Quality		
	DP	DP text	NLQ
APL10	X0AE10		
Courier Bold 10 Pitch		X0CB10	X0CB10
Courier Bold 12 Pitch		X0CB12	X0CB12
Courier Bold 15 Pitch		X0CB15	X0CB15
Courier Double Wide Italic 15 Pitch		X0CW15	X0CW15
Courier Double Wide 15 Pitch		X0CD15	X0CD15
Courier Italic 10 Pitch		X0CI10	X0CI10
Courier Italic 12 Pitch		X0CI12	X0CI12
Courier Italic 15 Pitch		X0CI15	X0CI15
Courier 10 Pitch		X0CR10	X0CR10
Courier 12 Pitch		X0CR12	X0CR12
Courier 15 Pitch		X0CR15	X0CR15
Essay Bold Mixed Pitch		X0EBR9	X0EBR9
Essay Italic Mixed Pitch		X0EIR9	X0EIR9
Essay Standard Mixed Pitch		X0ESR9	X0ESR9
Gothic Bold 10 Pitch	X0GB10		
Gothic Bold 12 Pitch	X0GB12		
Gothic Italic 12 Pitch	X0GI12		
Gothic Text 10 Pitch	X0GT10		
Gothic Text 12 Pitch	X0GT12		
Gothic Text 15 Pitch	X0GT15		
Katakana	X0KN10		
OCR-A			X0AOA
OCR-B			X0BOA
<b>Note:</b> If the 4224 resident font resource tables shipped with PSF are modified, the above coded font names may be different.			

PSF selects symbol sets according to the following hierarchy:

1. If you select a symbol set that matches the print quality specified in the form definition, PSF prints the file.
2. If you select a symbol set but do not specify a print quality, the print quality selected in the printer configuration or the printer default print quality is used.
3. If you select a symbol set that does not match the print quality specified, the printer attempts to print the text using a “best fit” font, which it selects. Some pages may be duplicated, and some information on the page in error may be missing.
4. If you select a symbol set that is not available on the 4224, PSF does not print the remainder of the file.
5. With PSF/400, if you select a symbol set that is not available on the 4224, and you specified absolute fidelity, PSF does not print the remainder of the file. If you specified content fidelity, PSF substitutes another symbol set and prints the file.

---

## Data Types

The 4224 can process text data, IM image data, graphics data, and bar code data.

### Text Data

The 4224 can process PTOCA PT1 and PTOCA PT2 text data.

### IM Image Data

The 4224 can process IM image data. The 4224 has a printhead resolution of 144 pels per inch. If you try to print a 240-pel image on a 144-pel printer, the image will be expanded by 66% (will be printed 1.66 times larger), and the image origin may move. To print images accurately on a 144-pel printer, you must create 144-pel images using a program such as Graphical Data Display Manager (GDDM) to create an image for 144 pels per inch. See Figure 240 on page 364 for an example of a 240-pel image printed on a 144-pel printer.

### Graphics Data

The 4224 can process GOCA DR2/V0 graphics data.

The 4224 does not correctly implement the scale-to-fit mapping for GOCA objects in all cases. Certain graphics objects using certain L-unit values print slightly smaller than they should. IBM recommends that the L-units per unit base value for the 4224 be a multiple of 1440, for more accurate scaling.



## Bar Code Data

The 4224 can process BCOCA BCD1 bar code data. Figure 202 contains a summary of the bar-code type and modifier combinations supported by the 4224.

Refer to your printer description or reference publication for more information.

*Figure 202. Bar-Code Type and Modifier Combinations for the 4224*

Type	Modifier
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

---

## Printer-Storage Management

The printer-storage areas for the 4224 are:

- **Print Objects and Resources:** Contains fonts, text, bar codes, images, graphics, page segments, and overlays
- **Printer Processing:** Shared between the controller and the attachment; manages the printing process

If sufficient storage is not available, PSF deletes resources that are not needed for the current page and resumes printing. If an insufficient storage problem occurs again, PSF stops printing the file and starts printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of the page segments and overlays that are used and resubmit the print file. Simplifying an overlay may allow the page to be printed.

---

## Printer Capabilities

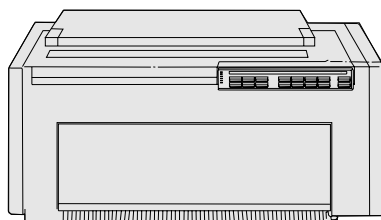
The capabilities of the 4224 are different from those of most of the other printers supported by PSF in the following ways:

- Differences in the contents of the character sets in the fonts provided by PSF and in the symbol sets resident in the 4224 may result in inconsistent printed output between the two types of fonts.
- Although the 4224 can print with downloaded symbol sets, it uses only resident symbol sets when driven by PSF.
- The PSF/MVS and PSF/VSE default fonts specified in the CHARS parameter in the PRINTDEV statement cause errors in which PSF issues messages saying “resource not found.” Change or override the CHARS parameter to use a 4224 symbol set.
- The 4224 prints both text and images in only 0° character orientation. All orientations other than 0° are supported for graphics. The 4224 does not support rotated fonts.
- The 4224 prints images with 144-pel resolution; see “IM Image Data” on page 306 for more information.
- The 4224 does not support multiple subgroups within a copy group in a form definition. Printing of multiple copies of individual pages within a subgroup is not supported.

---

## Chapter 25. 4230 Printer

This chapter describes 4230 printer characteristics and PSF-supported functions. The 4230 is a tabletop, serial, impact, matrix printer that prints text, images, graphics, and bar codes at up to 480 characters per second, depending on the model and print quality selected.



*Figure 203. 4230 Printer*

|  
|  
The 4230 is supported by the S/390 PSFs in 4224-emulation mode but is supported by OS/400 2.2.0 and PSF/400 3.1.0 in 4230 mode.

Figure 204 on page 310 summarizes the printer characteristics and PSF-supported functions for the 4230. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 204 (Page 1 of 2). 4230 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2 A	PSF/400
Continuous forms	x	x	x	x	x
Cut-sheet	B	B	B	B	B
Alternate media source	B	B	B	B	B
Alternate media destination					
Media source by copy					
Manual forms feed	B	B	B	B	B
Envelope printing					
MICR printing					
Duplex printing					
Forms flash					
N_UP Printing					
Color selection	x	x	x	x	x
Print-quality levels	x	x	x	x	x
Gray-scale image					
Operator-adjustable forms	x	x	x	x	x
Exception highlighting					
Disabled mechanisms					
Printhead resolution (pels per inch)	144	144	144	144	144
Maximum printing rate (cps)	480	480	480	480	480
<b>PSF-Supported Functions</b>					
Page overlays	x	x	x	x	x
Direct printing					
Distributed Print Function					
PSF Direct	x	x	x	x	x
Changeable media origin					
Guaranteed print labeling					
<b>Data Types</b>					
PTOCA PT1 text	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x
IM image	x	x	x	x	x
IOCA FS10 image					
GOCA DR/2V0 graphics	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x

Figure 204 (Page 2 of 2). 4230 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2 A	PSF/400
<b>Fonts</b>					
Single-byte downloaded raster					
Single-byte resident raster					
Single-byte downloaded outline					
Single-byte resident outline					
Single-byte resident symbol sets	C	C	C	C	C
Double-byte downloaded raster					
Double-byte resident raster					
Double-byte downloaded outline					
Double-byte resident outline					
<b>Note:</b>					
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.				
<b>cps</b>	Characters per second.				
<b>A</b>	Supported indirectly through the PSF Direct function to the extent that it is supported by PSF/MVS, PSF/VM, PSF/VSE, and PSF/400.				
<b>B</b>	With the Automatic Sheet Feed Device.				
<b>C</b>	Included later in this chapter is a table mapping printer-resident symbol sets to similar PSF fonts.				

## Default Media Origin

As shown in Figure 205, the default media origin for the 4230 for both narrow and wide continuous forms is the top left corner of the form, 0.5 inch from the outside edge of the carrier strip. The media origin cannot be changed.

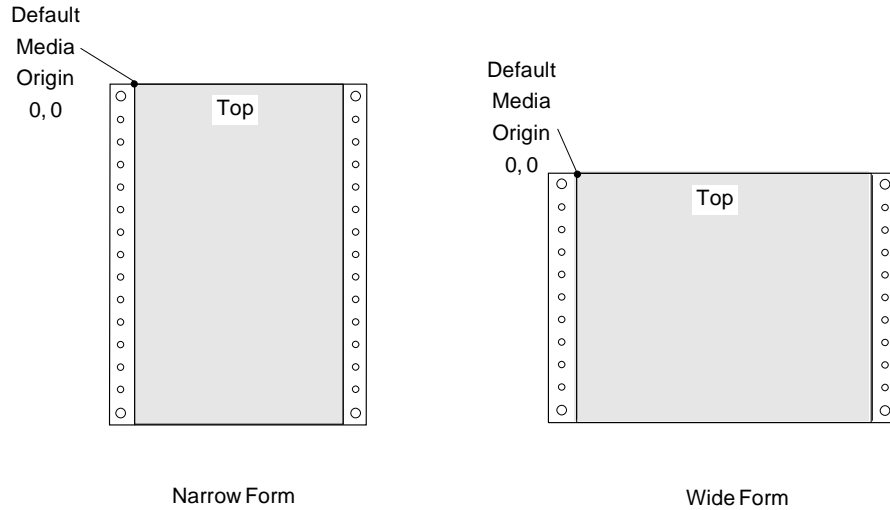


Figure 205. Default Media Origin for Continuous Forms on the 4230

As shown in Figure 206, the default media origin for cut-sheet forms is the top left corner of the form. The media origin cannot be changed.

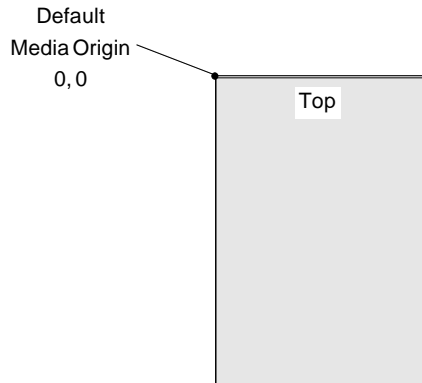


Figure 206. Default Media Origin for Cut-Sheet Forms on the 4230

## Printable Area

The size of the printable area is set using a printer configuration option. If the defined printable area is not large enough to contain the page of data, a data-check exception (position check) occurs.

## Selecting the Printing Medium

The 4230 can print on either continuous-forms or cut-sheet forms and can have up to four medium sources: the Continuous Forms Device, the Dual Purpose Forms Device (for continuous forms and document-on-demand [tear off]), the Document Insertion Device (for manually feeding cut-sheet forms), and the Automatic Sheet Feeder Device (ASF) (for automatic feeding of cut-sheet forms).

For printers using the Document Insertion Device, only one medium source (bin 1) is available.

For printer models with the Automatic Sheet Feed Device (ASF) for handling cut-sheet forms, four medium sources are available: bin 1, bin 2, bin 3, and the manual bin. You can specify the medium source in your form definition or with the PSF (PSF/VM only) command BIN option. Specify BIN 1 for the default medium source, BIN 2 for the second source, BIN 3 for the third source, and BIN 100 for the Document Insertion Device, which allows you to manually insert cut-sheet forms.

## Specifying the Medium Source

The 4230 can print on either cut-sheet forms or continuous forms.

### Specifying Cut-Sheet Media

**PSF/MVS** Specify the medium source in your form definition.

**PSF/VM** Specify the medium source in your form definition or with the PSF command BIN option.

**PSF/VSE** Specify the medium source in your form definition.

**PSF/2** Specify the medium source in your form definition or with the APRINT command BIN parameter.

**PSF/400** Specify the medium source in your form definition, with the DRAWER parameter of the CRTPRTF, the OVRPRTF, or the CHGPRTF command, or with the DDS DRAWER keyword.

### Specifying Continuous-Forms Media

**PSF/MVS** Specify the form to be loaded into the 4230 by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 4230 by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 4230 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 4230 by using the FORMTYPE parameter in the printer file.

## Specifying the Contents of the Medium Source

Your installation may have set up procedures for identifying different combinations of media loaded in the medium sources of the printer. If so, you may need to specify additional parameters to ensure that the contents of each medium source are what you expect.

**PSF/MVS** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the JCL CLASS parameter on the OUTPUT statement or with the SYSOUT parameter on the DD statement, a destination name with the DEST parameter on the OUTPUT or DD statement, or a form name with the FORMS parameter on the OUTPUT statement.

**PSF/VM** Different print classes or destination names may be defined to identify different combinations of media loaded in the medium sources. If so, you may need to specify a class or destination name with the CLASS or DEST options of the SPOOL command to ensure that the contents of each source are what you expect.

**PSF/VSE** Different print classes, destination names, or form names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a class name with the CLASS parameter or a destination name with the DEST parameter of the \* \$\$ LST statement; you may need to specify a form with the FNO parameter or the FORMS parameter on the \* \$\$ LST statement or in the printer-parameter member.

**PSF/2** Different destination names may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify a destination name with the DESTINATION parameter of the APRINT command.

**PSF/400** Different output queues may be defined to correspond to different combinations of media loaded in the medium sources. If so, you may need to specify the name of a different output queue with the Override Print File (OVRPRTF) command (to change the output queue for a single print job) or the Change Printer File (CHGPRTF) command (to permanently change the output queue for all subsequent print jobs).



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## Fonts

Although the 4230 can print with downloaded symbol sets, the 4230 prints only with single-byte resident symbol sets when driven by PSF.

Because of differences between font technologies, text printed with symbol sets will not have the same appearance as text printed with the raster fonts of the same names.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF provides modules containing font-resource tables that PSF uses to map the code pages and font character sets of host fonts to the global identifiers of printer-resident symbol sets. These tables are shown in the system programming guide for each operating system.

**PSF/2** Refer to the online *PSF/2 Technical Reference* for more information about using fonts.

**PSF/400** If a resident symbol set is specified, and the symbol set is stored in the printer, PSF uses it; otherwise, PSF selects another resident symbol set that most closely matches the characteristics of the specified symbol set.

For more information about using fonts, refer to *AS/400 Printer Device Programming*.

---

## Selecting Color

The 4230 supports selection of three colors: black, the color of the medium, and the printer default color.

---

## Inline Directions and Character Rotations of Text

The 4230 can print text in two inline directions, as shown in Figure 207. In the ACROSS direction, characters are rotated 0°. In the BACK direction, characters are rotated 180°.

$\xrightarrow{\text{Abcd}}$	Across, 0°
$\xleftarrow{\text{dcbA}}$	Back, 180°

Figure 207. 4230 Inline Directions and Character Rotations

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## Operator-Adjustable Forms

To align data on preprinted forms, the 4230 operator can adjust the physical top and left margins, which will offset the page image on the printing medium. The horizontal (left margin) adjustment range is from -6.9 mm (-0.27 inches) to +38.35 mm (+1.51 inches). The vertical (top margin) adjustment range is from -30.5 mm (-1.2 inches) to +38.1 mm (+1.5 inches). This adjustment does not affect the size of the valid printable area; however, using this adjustment can produce positioning errors if the horizontal adjustment is too large for the form being used.

---

## Print-Quality Levels

The 4230 allows you to select different levels of print quality. Higher quality corresponds to slower print speeds. To select a print-quality level, use the QUALITY subcommand on the COPYGROUP command in the form definition created by Page Printer Formatting Aid/370 (PPFA/370). To use Fast Draft Quality, you must enable it using a printer configuration menu on the operator panel. Refer to your printer publications on how to do this. If the printer is not configured, all requests to print using Fast Draft will automatically be printed in DP Quality. Specify the values shown in Figure 208 on the QUALITY subcommand to get the correct print-quality level.

*Figure 208. 4230 Print-Quality Selection Values*

<b>Print-Quality Level</b>	<b>Hexadecimal Value Range</b>	<b>Decimal Value Range</b>
Reserved	X'00'	
Fast Draft Quality	X'01' through X'2A'	1 through 42
DP Quality	X'2B' through X'55'	43 through 85
DP Text Quality	X'56' through X'AA'	86 through 170
NLQ Quality	X'AB' through X'FE'	171 through 254
Printer Customized Default	X'FF'	255

Not all symbol sets can be printed at all print-quality levels. Figure 209 identifies the print-quality levels that can be used for some of the 4230 symbol sets and suggests the name of a corresponding coded font that may be used for each symbol set. Refer to the 4230 publications for a list of 4230 symbol sets.

<i>Figure 209. 4230 Symbol Sets and Corresponding Coded Fonts</i>				
Symbol Sets	4230 Print Quality			
	Fast Draft	DP Quality	DP text	NLQ
APL10		X0AE10		
Courier Bold 10 Pitch			X0CB10	X0CB10
Courier Bold 12 Pitch			X0CB12	X0CB12
Courier Bold 15 Pitch			X0CB15	X0CB15
Courier Double Wide Italic 15 Pitch			X0CW15	X0CW15
Courier Double Wide 15 Pitch			X0CD15	X0CD15
Courier Italic 10 Pitch			X0CI10	X0CI10
Courier Italic 12 Pitch			X0CI12	X0CI12
Courier Italic 15 Pitch			X0CI15	X0CI15
Courier 10 Pitch			X0CR10	X0CR10
Courier 12 Pitch			X0CR12	X0CR12
Courier 15 Pitch			X0CR15	X0CR15
Essay Bold Mixed Pitch			X0EBR9	X0EBR9
Essay Italic Mixed Pitch			X0EIR9	X0EIR9
Essay Standard Mixed Pitch			X0ESR9	X0ESR9
Gothic Bold 10 Pitch	X0GB10	X0GB10		
Gothic Bold 12 Pitch	X0GB12	X0GB12		
Gothic Italic 12 Pitch	X0GI12	X0GI12		
Gothic Text 10 Pitch	X0GT10	X0GT10		
Gothic Text 12 Pitch	X0GT12	X0GT12		
Gothic Text 15 Pitch	X0GT15	X0GT15		
Katakana	X0KN10	X0KN10		
OCR-A				X0AOA
OCR-B				X0BOA

PSF selects symbol sets according to the following hierarchy:

1. If you select a symbol set that matches the print quality specified in the form definition, PSF prints the file.
2. If you select a symbol set but do not specify a print quality, the print quality selected in the printer configuration or the printer default print quality is used.
3. If you select a symbol set that does not match the print quality specified, the printer attempts to print the text using a “best fit” font, which it selects. Some pages may be duplicated, and some information on the page in error may be missing.
4. If you select a symbol set that is not available on the 4230, PSF does not print the remainder of the file.
5. With PSF/400, if you select a symbol set that is not available on the 4230, and you specified absolute fidelity, PSF does not print the remainder of the file. If you specified content fidelity, PSF substitutes another symbol set and prints the file.

---

## Data Types

The 4230 can process text data, IM image data, graphics data, and bar code data.

### Text Data

The 4230 can process PTOCA PT1 and PTOCA PT2 text data.

### IM Image Data

The 4230 can process IM image data. The 4230 has a printhead resolution of 144 pels per inch. If you try to print a 240-pel image on a 144-pel printer, the image will be expanded by 66% (will be printed 1.66 times larger), and the image origin may move. To print images accurately on a 144-pel printer, you must create 144-pel images using a program such as Graphical Data Display Manager (GDDM) to create an image for 144 pels per inch. See Figure 240 on page 364 for an example of a 240-pel image printed on a 144-pel printer.

### Graphics Data

The 4230 can process GOCA DR2/V0 graphics data.

## Bar Code Data

The 4230 can process BCOCA BCD1 bar code data as well as some other bar-code symbologies. Figure 210 contains a summary of the bar-code type and modifier combinations supported by the 4230.

Refer to your printer description or reference publication for more information.

*Figure 210. Bar-Code Type and Modifier Combinations for the 4230*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

## Printer-Storage Management

The two printer-storage areas for the 4230 are:

- **Print Objects and Resources:** Contains fonts, text, bar codes, images, graphics, page segments, and overlays
- **Printer Processing:** Shared between the controller and the attachment; manages the printing process

If sufficient storage is not available, PSF deletes resources that are not needed for the current page and resumes printing. If an insufficient storage problem occurs again, PSF stops printing the file and starts printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of page segments and overlays that are used and resubmit the print file. Simplifying an overlay may allow the page to be printed.

---

## Printer Capabilities

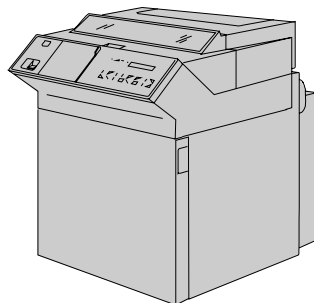
The capabilities of the 4230 are different from those of most of the other printers supported by PSF in the following ways:

- Differences in the contents of the character sets in the fonts provided by PSF and in the symbol sets resident in the 4230 may result in inconsistent printed output between the two types of fonts.
- Although the 4230 can print with downloaded symbol sets, it uses only resident symbol sets when driven by PSF.
- The PSF/MVS and PSF/VSE default fonts specified with the CHARS parameter in the PRINTDEV statement cause errors in which PSF issues messages saying “resource not found.” Change or override the CHARS parameter to use a 4230 symbol set.
- The 4230 prints both text and images in only 0° character orientation. All other orientations other than 0° are supported for graphics. The 4230 does not support rotated fonts.
- The 4230 prints images with 144-pel resolution; see “IM Image Data” on page 318 for more information.
- The 4230 does not support multiple subgroups within a copy group in a form definition. Printing of multiple copies of individual pages within a subgroup is not supported.

---

## Chapter 26. 4234 Printer

This chapter describes 4234 printer characteristics and PSF-supported functions. The 4234 is a continuous-forms, line matrix printer that uses dot-band technology to print text, images, graphics, and bar codes at up to 800 lines per minute, depending on the model and print quality selected.



*Figure 211. 4234 Printer*

Figure 212 on page 322 summarizes the printer characteristics and PSF-supported functions for the 4234. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 212 (Page 1 of 2). 4234 Summary

<b>Printer Characteristics</b>	<b>PSF/MVS</b>	<b>PSF/VM</b>	<b>PSF/VSE</b>	<b>PSF/400</b>
Continuous forms	x	x	x	x
Cut-sheet				
Alternate media source				
Alternate media destination				
Media source by copy				
Manual forms feed				
Envelope printing				
MICR Printing				
Duplex printing				
Forms flash				
N_UP Printing				
Color selection	x	x	x	x
Print-quality levels	x	x	x	x
Gray-scale image				
Operator-adjustable forms				
Exception highlighting				
Disabled mechanisms				
Printhead resolution (pels per inch)	144	144	144	144
Maximum printing rate (lpm)	800	800	800	800
<b>PSF-Supported Functions</b>				
Page overlays	x	x	x	x
Direct printing				
Distributed Print Function				
PSF Direct				
Changeable media origin				
Guaranteed print labeling				
<b>Data Types</b>				
PTOCA PT1 text	x	x	x	x
PTOCA PT2 text	x	x	x	x
IM image	x	x	x	x
IOCA FS10 image				
GOCA DR/2V0 graphics	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x



Figure 212 (Page 2 of 2). 4234 Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/400
<b>Fonts</b>				
Single-byte downloaded raster				
Single-byte resident raster				
Single-byte downloaded outline				
Single-byte resident outline				
Single-byte resident symbol sets	A	A	A	A
Double-byte downloaded raster				
Double-byte resident raster				
Double-byte downloaded outline				
Double-byte resident outline				
<b>Notes:</b>				
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.			
<b>lpm</b>	Lines per minute.			
<b>A</b>	Included later in this chapter is a table mapping printer-resident symbol sets to similar PSF fonts.			

---

## Default Media Origin

As shown in Figure 213, the default media origin for the 4234 for both narrow and wide forms is the top left corner of the form, 0.5 inch from the outside edge of the carrier strip. The media origin cannot be changed.

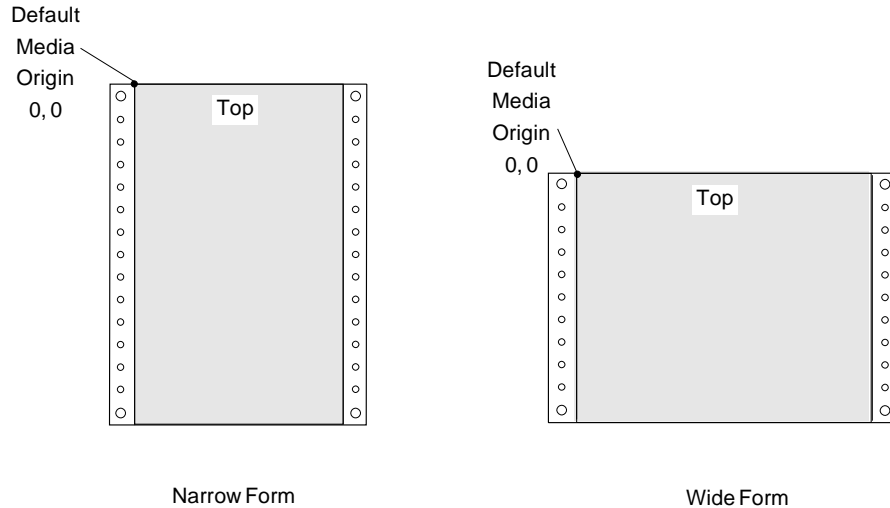


Figure 213. Default Media Origin for Continuous Forms on the 4234

---

## Printable Area

The size of the printable area is set with a printer configuration option. If the defined printable area is not large enough to contain the page of data, a data-check exception occurs.

---

## Selecting the Printing Medium

The 4234 is a continuous-forms printer.

**PSF/MVS** Specify the form to be loaded into the 4234 by using the FORMS parameter in your JCL.

**PSF/VM** When the 4234 is connected as a GROUP4 printer, you can specify the form to be loaded into the 4234 by using the FORM option of the CP SPOOL command. You cannot use the FORM option when the 4234 is attached through the Remote Spooling Communications Subsystem (RSCS).

**PSF/VSE** Specify the form to be loaded in the 4234 by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/400** Specify the form to be loaded in the 4234 by using the FORMTYPE parameter in the printer file.

---

## Fonts

Although the 4234 can print with downloaded symbol sets, the 4234 prints only with single-byte resident symbol sets when driven by PSF.

Because of differences between font technologies, text printed with symbol sets will not have the same appearance as text printed

**PSF/MVS, PSF/VM, and PSF/VSE** PSF provides modules containing font-resource tables that PSF uses to map the code pages and font character sets of host fonts to the global identifiers of printer-resident symbol sets. These tables are shown in the system programming guide for each operating system.

**PSF/400** If a resident symbol set is specified, and the symbol set is stored in the printer, PSF uses it; otherwise, PSF selects another resident symbol set that most closely matches the characteristics of the specified symbol set.

For more information about using fonts, refer to *AS/400 Printer Device Programming*.

---

## Selecting Color

The 4234 supports selection of three color: black, the color of the medium, and the printer default color.

---

## Inline Directions and Character Rotations of Text

The 4234 can print in two inline directions, as shown in Figure 214. In the ACROSS direction, characters are rotated 0°. In the BACK direction, characters are rotated 180°.

$\xrightarrow{\text{Abcd}}$	Across, 0°
$\xleftarrow{\text{dcBA}}$	Back, 180°

Figure 214. 4234 Inline Directions and Character Rotations

## Print-Quality Levels

The 4234 supports selection of different levels of print quality. Higher print quality corresponds to slower print speeds. To select a print quality level, you use the QUALITY subcommand on the COPYGROUP command in a form definition created with Page Printer Formatting Aid (PPFA). Specify the values shown in Figure 215 on the QUALITY subcommand to get the correct print quality level.

*Figure 215. 4234 Print Quality Selection Values*

<b>Print Quality Level</b>	<b>Hexadecimal Value Range</b>	<b>Decimal Value Range</b>
Reserved	X'00'	
Draft Quality	X'01' through X'55'	1 through 85
DP Quality	X'56' through X'AA'	86 through 170
NLQ Quality	X'AB' through X'FE'	171 through 254
Printer Customized Default	X'FF'	255

Refer to your printer publication for more information about the quality levels supported by your printer. Not all symbol sets can be printed at all print-quality levels. Figure 216 identifies the print-quality levels that can be used for some of the 4234 symbol sets and suggests the name of a corresponding coded font that may be used for each symbol set. Refer to the 4234 publications for a list of 4234 symbol sets.

<i>Figure 216. 4234 Symbol Sets and Corresponding Coded Fonts</i>			
Symbol Sets	4234 Print Quality		
	Draft	DP	NLQ
APL10		X0AE10	X0AE10
Courier Bold 10 Pitch			X0CB10
Courier Bold 12 Pitch			X0CB12
Courier Bold 15 Pitch			X0CB15
Courier Double Wide Italic 15 Pitch			X0CW15
Courier Double Wide 15 Pitch			X0CD15
Courier Italic 10 Pitch			X0CI10
Courier Italic 12 Pitch			X0CI12
Courier Italic 15 Pitch			X0CI15
Courier 10 Pitch			X0CR10
Courier 12 Pitch			X0CR12
Courier 15 Pitch			X0CR15
Essay Bold Mixed Pitch			X0EBR9
Essay Italic Mixed Pitch			X0EIR9
Essay Standard Mixed Pitch			X0ESR9
Gothic Text 10 Pitch	X0GT09	X0GT09 X0GT10	
Gothic Bold 10 Pitch	X0GB09	X0GB09 X0GB10	
Gothic Text 12 Pitch	X0GTE9	X0GTE9 X0GT12	
Gothic Bold 12 Pitch	X0GBE9	X0GBE9 X0GB12	
Gothic Italic 12 Pitch	X0GIE9	X0GIE9 X0GI12	
Gothic Text 15 Pitch	X0GT59	X0GT59 X0GT15	
Katakana		X0KN10	
OCR-A	X0AOA	X0AOA	X0AOA
OCR-B	X0BOA	X0BOA	X0BOA
<b>Note:</b> If the 4234 resident font resource tables shipped with PSF are modified, the above coded font names may be different.			

PSF selects symbol sets according to the following hierarchy:

1. If you select a symbol set that matches the print quality specified in the form definition, PSF prints the file.
2. If you select a symbol set but do not specify a print quality, the print quality selected in the printer configuration or the printer default print quality is used.
3. If you select a symbol set that does not match the print quality specified, the printer attempts to print the text using a “best fit” font, which it selects. Some pages may be duplicated, and some information on the page in error may be missing.
4. If you select a symbol set that is not available on the 4234, PSF does not print the remainder of the file.
5. With PSF/400, if you select a symbol set that is not available on the 4234, and you specified absolute fidelity, PSF does not print the remainder of the file. If you specified content fidelity, PSF substitutes another symbol set and prints the file.

---

## Data Types

The 4234 can process text data, IM image data, graphics data, and bar code data.

### Text Data

The 4234 can process PTOCA PT1 and PTOCA PT2 text data.

### IM Image Data

The 4234 can process IM image data. The 4234 has a printhead resolution of 144 pels per inch. If you try to print a 240-pel image on a 144-pel printer, the image will be expanded by 66% (will be printed 1.66 times larger), and the image origin may move. To print images accurately on a 144-pel printer, you must create 144-pel images using a program such as Graphical Data Display Manager (GDDM) to create an image for 144 pels per inch. See Figure 240 on page 364 for an example of a 240-pel image printed on a 144-pel printer.

### Graphics Data

The 4234 can process GOCA DR2/V0 graphics data.

## Bar Code Data

The 4234 can process BCOCA BCD1 bar code data. Figure 217 contains a summary of the bar-code type and modifier combinations supported by the 4234.

Refer to your printer description or reference publication for more information.

*Figure 217. Bar-Code Type and Modifier Combinations for the 4234*

Type	Modifier
Code 128	X'01' and X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

---

## Printer-Storage Management

The printer-storage areas for the 4234 are:

- **Print Objects and Resources:** Contains fonts, text, bar codes, images, graphics, page segments, and overlays
- **Printer Processing:** Shared between the controller and the attachment and manages the printing process

If sufficient storage is not available, PSF deletes resources that are not needed for the current page and resumes printing. If an insufficient storage problem occurs again, PSF stops printing the file and starts printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of page segments and overlays that are used and resubmit the print file. Simplifying an overlay may allow the page to be printed.

---

## Printer Capabilities

The capabilities of the 4234 are different from those of most of the other printers supported by PSF in the following ways:

- Differences in the contents of the character sets in the fonts provided by PSF and in the symbol sets resident in the 4234 may result in inconsistent printed output between the two types of fonts.
- Although the 4234 can print with downloaded symbol sets, it uses only resident symbol sets when driven by PSF.
- The PSF/MVS and PSF/VSE default fonts specified in the CHARS parameter in the PRINTDEV statement cause errors in which PSF issues messages saying “resource not found.” Change or override the CHARS parameter to use a 4234 symbol set.
- The 4234 prints both text and images in only 0° character orientation. All orientations other than 0° are supported for graphics. The 4234 does not use rotated fonts.
- The 4234 prints images with 144-pel resolution; see “IM Image Data” on page 328 for more information.
- The 4234 does not support multiple subgroups within a copy group in a form definition. Printing of multiple copies of individual pages within a subgroup is not supported.



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## Chapter 27. 6408 and 6412 Line Matrix Printers

This chapter describes 6408 and 6412 printer characteristics and PSF-supported functions. In this publication, these printers are called the 64xx printers, unless a functional difference between models occurs. The 64xx printers are continuous-forms, line-dot matrix, impact printers that use the shuttle-matrix print technology to print text, images, graphics, and bar codes at up to 800 lpm for the 6408 and up to 1200 lpm for the 6412.

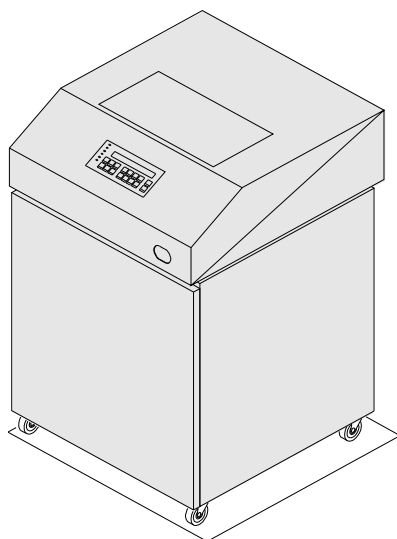


Figure 218. 6408 Printer



Figure 219. 6412 Printer

Figure 220 on page 332 summarizes the printer characteristics and PSF-supported functions for the 64xx. Most of the entries in the table and other printer characteristics are individually described in the sections following the table. The terms in the first column of the table are defined in the glossary.

Figure 220 (Page 1 of 2). 64xx Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2 A	PSF/400
Continuous forms	x	x	x	x	x
Cut-sheet					
Alternate media source					
Alternate media destination					
Media source by copy					
Manual forms feed					
Envelope printing					
MICR printing					
Duplex printing					
Forms flash					
N_UP Printing					
Color selection	x	x	x	x	x
Print-quality levels	x	x	x	x	x
Gray-scale image					
Operator-adjustable forms	x	x	x	x	x
Exception highlighting					
Disabled mechanisms					
Printhead resolution (pels per inch)	120 by 144	120 by 144	120 by 144	120 by 144	120 by 144
Maximum printing rate (lpm)	B	B	B	B	B
<b>PSF-Supported Functions</b>					
Page overlays	x	x	x	x	x
Direct printing					
Distributed Print Function					
PSF Direct	x	x	x	x	x
Changeable media origin					
Guaranteed print labeling					
<b>Data Types</b>					
PTOCA PT1 text	x	x	x	x	x
PTOCA PT2 text	x	x	x	x	x
IM image	x	x	x	x	x
IOCA FS10 image					
GOCA DR/2V0 graphics	x	x	x	x	x
BCOCA BCD1 bar codes	x	x	x	x	x

Figure 220 (Page 2 of 2). 64xx Summary

Printer Characteristics	PSF/MVS	PSF/VM	PSF/VSE	PSF/2 A	PSF/400
<b>Fonts</b>					
Single-byte downloaded raster					
Single-byte resident raster					
Single-byte downloaded outline					
Single-byte resident outline					
Single-byte resident symbol sets	C	C	C	C	C
Double-byte downloaded raster					
Double-byte resident raster					
Double-byte downloaded outline					
Double-byte resident outline					
<b>Notes:</b>					
<b>x</b>	Supported by some versions of PSF. See Figure 9 through Figure 11 in Chapter 1 for tables showing which PSF releases support which functions.				
<b>lpm</b>	Lines per minute.				
<b>A</b>	Supported indirectly through the PSF Direct function to the extent that it is supported by PSF/MVS, PSF/VM, PSF/VSE, and PSF/400.				
<b>B</b>	Depending on the print quality selected: The 6408 prints from 320 lpm to 800 lpm. The 6412 prints from 480 lpm to 1200 lpm.				
<b>C</b>	Included later in this chapter is a table mapping printer-resident symbol sets to similar PSF fonts.				

## Default Media Origin

As shown in Figure 221, the default media origin for the 64xx for both narrow and wide continuous forms is the top left corner of the form, 0.5 inch from the outside edge of the carrier strip. The media origin cannot be changed.

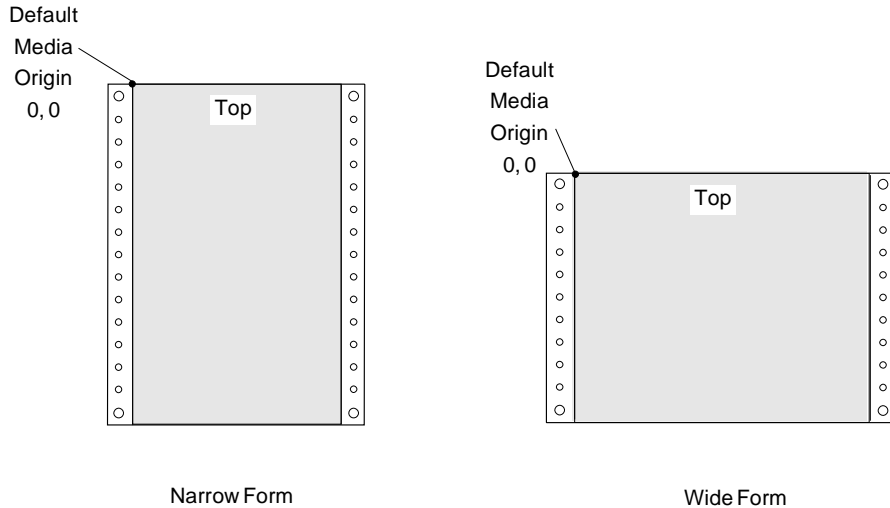


Figure 221. Default Media Origin for Continuous Forms on the 64xx

## Printable Area

The size of the printable area is set using a printer configuration option or by using the Set Media Size IPDS command. If the defined printable area is not large enough to contain the page of data, the 64xx stops printing, issues a negative acknowledgement reply (NACK), and enters home state.

## Selecting the Printing Medium

The 64xx prints on continuous-forms.

**PSF/MVS** Specify the form to be loaded into the 64xx by using the FORMS parameter in your JCL.

**PSF/VM** Specify the form to be loaded into the 64xx by using the FORM option of the CP SPOOL command.

**PSF/VSE** Specify the form to be loaded into the 64xx by using the FORMS parameter in the \* \$\$ LST statement or in the printer-parameter member, or you can use the FNO parameter of the \* \$\$ LST statement.

**PSF/2** Different destination names may be defined to correspond to different forms loaded in the printer. If so, specify the destination name with the DEST parameter of the APRINT command.

**PSF/400** Specify the form to be loaded in the 64xx by using the FORMTYPE parameter in the printer file.

---

## Fonts

The 64xx prints only with single-byte resident symbol sets.

Because of differences between font technologies, text printed with symbol sets may not have the same appearance as text printed with the raster fonts of the same names.

**PSF/MVS, PSF/VM, and PSF/VSE** PSF provides modules containing font-resource tables that PSF uses to map the code pages and font character sets of host fonts to the global identifiers of printer-resident symbol sets. These tables are shown in the system programming guide for each operating system.

**PSF/2** PSF/2 maps host fonts to the closest resident symbol sets. For more information about using fonts, refer to the online *PSF/2 Technical Reference*.

**PSF/400** If a resident symbol set is specified, and the symbol set is stored in the printer, PSF uses it; otherwise, PSF selects another resident symbol set that most closely matches the characteristics of the specified symbol set.

For more information about using fonts, refer to *AS/400 Printer Device Programming*.

---

## Selecting Color

The 64xx supports selection of three colors: black, the color of the medium, and the printer default color.

---

## Inline Directions and Character Rotations of Text

The 64xx can print text in two inline directions, as shown in Figure 222. In the ACROSS direction, characters are rotated 0° and 180°. In the BACK direction, characters are rotated 180°. The 64xx cannot print characters in 90° or 270° rotation.

$\xrightarrow{\text{Abcd}}$  Across, 0°  
 $\xleftarrow{\text{dcbA}}$  Back, 180°

Figure 222. 64xx Inline Directions and Character Rotations

## Operator-Adjustable Forms

Using the Set Top of Forms key on the operator panel, the operator can select where the first line of printing is relative to the top edge of the paper

To align data on preprinted forms, the 64xx operator can adjust the physical top and left margins, which offsets the page image on the printing medium. The horizontal (left margin) adjustment range is from –6.9 mm (–0.27 inches) to +38.35 mm (+1.51 inches). The vertical (top margin) adjustment range is from –30.5 mm (–1.2 inches) to +38.1 mm (+1.5 inches). This adjustment does not affect the size of the valid printable area; however, using this adjustment can produce positioning errors if the horizontal adjustment is too large for the form being used.

## Print-Quality Levels

The 64xx allows you to select different levels of print quality. A higher print-quality level corresponds to slower print speeds. To select a print-quality level, use the QUALITY subcommand on the COPYGROUP command in a form definition created using Page Printer Formatting Aid/370 (PPFA/370). You must enable Draft Quality by using a printer configuration menu on the operator panel. Refer to your printer publications on how to do this. If the printer is not configured, all requests to print using Draft Quality are automatically printed in DP Quality. Specify the values shown in Figure 223 on the QUALITY subcommand to get the correct print-quality level.

*Figure 223. 64xx Print-Quality Selection Values*

Print-Quality Level	Hexadecimal Value Range	Decimal Value Range
Reserved	X'00'	
Draft Quality	X'01' through X'55'	1 through 85
DP Quality	X'56' through X'AA'	86 through 170
NLQ Quality	X'AB' through X'FE'	171 through 254
Printer Customized Default	X'FF'	255

Not all symbol sets can be printed at all print-quality levels. Figure 224 identifies the print-quality levels that can be used for **some** of the 64xx symbol sets and suggests the name of a corresponding coded font that can be used for each symbol set. Refer to the 64xx publications for a more complete list of 64xx symbol sets.

*Figure 224. 64xx Symbol Sets and Corresponding Coded Fonts*

Symbol Sets	64xx Print Quality		
	Draft	DP	NLQ
APL 10		X0AE10	X0AE10
Courier Bold 10 Pitch			X0CB10
Courier Bold 12 Pitch			X0CB12
Courier Bold 15 Pitch			X0CB15
Courier Double Wide Italic 15 Pitch			X0CW15
Courier Double Wide 15 Pitch			X0CD15
Courier Italic 10 Pitch			X0CI10
Courier Italic 12 Pitch			X0CI12
Courier Italic 15 Pitch			X0CI15
Courier 10 Pitch			X0CR10
Courier 12 Pitch			X0CR12
Courier 15 Pitch			X0CR15
Essay Bold Mixed Pitch			X0EBTR
Essay Italic Mixed Pitch			X0EITR
Essay Standard Mixed Pitch			X0ESTR
Gothic Bold 10 Pitch	X0GB10	X0GB10	
Gothic Bold 12 Pitch	X0GB12	X0GB12	
Gothic Italic 12 Pitch	X0GI12	X0GI12	
Gothic Text 10 Pitch	X0GT10	X0GT10	
Gothic Text 12 Pitch	X0GT12	X0GT12	
Gothic Text 13 Pitch	X0GT13	X0GT13	
Gothic Text 13 Pitch	X0D224	X0D224	
Gothic Text 13 Pitch	X0D225	X0D225	
Gothic Text 13 Pitch	X0D226	X0D226	
Gothic Text 13 Pitch	X0D227	X0D227	
Gothic Text 15 Pitch	X0GT15	X0GT15	
Gothic Text 18 Pitch	X0GT18	X0GT18	
Katakana		X0KN10	X0KN10
Letter Gothic Bold 12 Pitch	X0LB12	X0LB12	X0LB12
OCR-A			X0AOA
OCR-B			X0OCRB

PSF selects symbol sets according to the following hierarchy:

1. If you select a symbol set that matches the print quality specified in the form definition, PSF prints the file.
2. If you select a symbol set but do not specify a print quality, the print quality selected in the printer configuration or the printer default print quality is used.
3. If you select a symbol set that does not match the print quality specified, the printer attempts to print the text using a “best fit” font, which it selects.
4. **PSF/MVS, PSF/VM, PSF/VSE, and PSF/2** If you select a symbol set that is not available on the 64xx, PSF does not print the remainder of the file.
5. With PSF/400, if you select a symbol set that is not available on the 64xx, and you specified absolute fidelity, PSF does not print the remainder of the file. If you specified content fidelity, PSF substitutes another symbol set and prints the file.

---

## Data Types

The 64xx can process text data, IM image data, graphics data, and bar code data.

### Text Data

The 64xx can process PTOCA PT1 and PTOCA PT2 text data.

### IM Image Data

The 64xx can process IM image data. Although the 64xx has a printhead resolution of 120-by-144 pels per inch, it can simulate a resolution of 144-by-144 pels per inch. If you try to print a 240-pel image on the 64xx, the image will be expanded by 66% horizontally and vertically, and the image origin may move. To print images accurately on a 144-pel printer, you must create 144-pel images using a program such as Graphical Data Display Manager (GDDM) to create an image at 144 pels per inch. See Figure 240 on page 364 for an example of a 240-pel image printed on a 144-pel printer.

### Graphics Data

The 64xx can process GOCA DR2/V0 graphics data.



## Bar Code Data

The 64xx can process BCOCA BCD1 bar code data as well as some other bar-code symbologies. Figure 210 on page 319 contains a summary of the bar-code type and modifier combinations supported by the 64xx.

Refer to your printer description or reference publication for more information.

*Figure 225. Bar-Code Type and Modifier Combinations for the 64xx*

Type	Modifier
Postnet	X'00' through X'03'
Code 128	X'02'
Codabar	X'01' and X'02'
3-of-9 Code	X'01' and X'02'
MSI	X'01' through X'09'
UPC/CGPC, Version A	X'00'
UPC/CGPC, Version E	X'00'
UPC, 2-Character Supplement	X'00'
UPC, 5-Character Supplement	X'00'
EAN 8 (includes JAN short)	X'00'
EAN 13 (includes JAN standard)	X'00'
2-of-5, Industrial	X'01' and X'02'
2-of-5, Matrix	X'01' and X'02'
Interleaved 2-of-5	X'01' and X'02'
EAN, 2 Digit Add-on	X'00'
EAN, 5 Digit Add-on	X'00'

## Printer-Storage Management

The printer-storage areas for the 64xx are:

- **Print Objects and Resources:** Contains fonts, text, bar codes, images, graphics, page segments, and overlays
- **Printer Processing:** Shared between the controller and the attachment; manages the printing process

If sufficient storage is not available, PSF deletes resources that are not needed for the current page and resumes printing. If an insufficient storage problem occurs again, PSF stops printing the file and starts printing the next file.

If a page cannot be printed, and adding additional memory to the printer is not an option, you should, where possible, reduce the number and the size of page segments and overlays that are used and resubmit the print file. Simplifying an overlay may allow the page to be printed.

---

## Printer Capabilities

The capabilities of the 64xx are different from those of most of the other printers supported by PSF in the following ways:

- Differences in the contents of the character sets in the fonts provided by PSF and in the symbol sets resident in the 64xx may result in inconsistent printed output between the two types of fonts.
- The 64xx prints only with resident symbol sets.
- The PSF/MVS and PSF/VSE default fonts specified with the CHARS parameter in the PRINTDEV statement cause errors in which PSF issues messages saying “resource not found.” Change or override the CHARS parameter to use a 64xx symbol set.
- The 64xx prints text and images in 0° and 180° character rotation and prints graphics in all four rotations. The 64xx does not print text in 90° or 270° rotation.
- The 64xx has a 120-by-140-pel printhead, but the printer microcode enables the 64xx to print with simulated 144-by-144-pel resolution. See “IM Image Data” on page 338 for more information.
- The 64xx does not support multiple subgroups within a copy group in a form definition, nor does it print multiple copies of individual pages within a subgroup.

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## Appendix A. Compatibility, Conversion, and Performance

With the page printers supported by PSF, you can use existing application programs (with little or no change) to print data created for printing on other IBM printers. The following sections describe considerations when migrating print data to page printers from:

- A non-IPDS impact printer
- An IBM 3800 in compatibility mode
- An IBM 3800 line printer
- An IBM 6670 Information Distributor
- An IBM 4250 Printer

In addition, compatibility among PSF-supported page printers is described.

---

### Compatibility with Non-IPDS Impact Printers

Most of the application data created for IBM non-IPDS impact printers (such as the 1403 or 3211) can be printed without change on page printers. However, some differences exist between page printers and impact printers, and some page-printer features can be used to compensate for these differences. This chapter describes the features and the differences you should consider when migrating data from an impact printer to a page printer.

### Length of Output Records

The maximum number of bytes of a record for an impact printer varies, depending on the printer. (For a 1403, the maximum is 132 bytes. For a 3211, the maximum is 150 bytes.) The maximum record length of a page-printer record is 32 767 bytes, greater than the maximum of any of the impact printers. Both impact printers and page printers truncate records that exceed their maximum record length.

**PSF/VM** When you use the PRINT command or PSF command with the SEND parameter specified (or defaulted to) for the FILE option to place print files on the spool, the maximum record length of the print file is equal to that defined for your virtual printer. When you use the PSF command with the LINK or SYSDISK parameter specified for the FILE option, the maximum record length for the print file is 32 758 bytes.

## Compatibility

## Underscoring

With impact printers, you can underscore by reprinting a line of text with a line of underscore characters.

With page printers, you can print underscored text with one of the existing underscored fonts supplied with PSF or with PTOCA PT2 on those printers that support it. In these fonts, each of the characters contains its own underscore. You can also use a licensed program to create fonts to design underscored characters, or you can create line-merging applications that produce underscored characters.

## Overprinting

With impact printers, you can print bold-faced characters by printing the same data more than once in the same position. With a page printer, overprinting identical data does not produce a heavier, darker image. Instead, you can use one of the bold fonts supplied with PSF, use one of the font licensed programs, or use a program to create fonts to design bold-faced characters.

Another overprinting application with impact printers is the printing of special composite characters. Composite characters can be printed with a page printer by merging one or more input data records to create one print line. Some composite characters are provided in the fonts supplied with PSF, and some are included in some of the font licensed programs. Composite characters can also be designed and added to a font in the font library.

## Folding

Folding is a function in impact printers that contain a universal character set (UCS) feature. The UCS feature causes printing in uppercase graphic characters when lowercase graphic characters are called for but are not available on the print chain. The folding function on an impact printer is activated by a Fold channel command and is deactivated by an Unfold channel command. Although the page printers do not recognize the Fold and Unfold channel commands, by associating code points with the desired character patterns in the particular fonts, you can obtain the folding effect. This can be done using a program to create fonts. PSF has a code page that does folding.

## Compatibility with Print Chains

Page printers are compatible with IBM impact printers because their fonts are comparable with and have the same names as the standard 1416 and 3216 print chains (as used on IBM 1403 and 3211 printers). PSF has some fonts that are compatible with standard print chains.

PSF does not have fonts equivalent to nonstandard 1416 and 3216 print chains. Any program using a nonstandard print chain must have a user-created font to correspond to the chain.

## Forms Control

### Impact Printers

For forms control on impact printers, you specify the FCB parameter.

**PSF/MVS** Forms control for impact printers is specified using the JCL FCB parameter. In the FCB for the 1403, the carriage tape is specified, and in the FCB for the 3211, the number of lines per inch or number of characters per line is specified.

**PSF/VM** Forms control for 3211 printers is specified by the CP LOADVFCB command, which allows you to use 3211 FCBs. In FCBs for the 3211, the number of lines per inch or the number of characters per line is specified.

**PSF/VSE** Forms control for impact printers is specified using the JECL FCB parameter. In the FCB for the 1403, the carriage tape is identified; in the FCB for the 3211, the number of lines per inch or the number of characters per line is specified.

### Page Printers

For forms control on the page printer, you specify a page definition for the same or similar forms control used for the impact printer.

**PSF/MVS** Use the FCB parameter in JCL for page printers to specify the page definition for the same or similar forms control for the impact printer. The PAGEDEF parameter on the JCL OUTPUT statement can also be used to select the page definition.

You cannot use the 3800 Conversion Services in Print Management Facility (PMF) to convert a 1403 or 3211 FCB to a page definition.

**PSF/VM** Use the PSF command PAGEDEF option to specify the page definition or use the SPOOL command FCB option, with the FCB name prefixed with P1, to specify an FCB that has been converted to a page definition.

You cannot use the 3800 Conversion Services in Print Management Facility (PMF) to convert a 1403 or 3211 FCB to a page definition.

**PSF/VSE** Use the FCB parameter in JECL for page printers to specify the page definition for the same or similar forms control for the impact printer. You can also use the PAGEDEF parameter on the \* \$\$ LST statement or in the printer-parameter member to select the page definition.

### 3800 in Compatibility Mode

The IBM 3800 Printing Subsystem Model 3, Model 6, and Model 8 provide compatibility-mode in which they operate like the 3800 Model 1 and Model 2 for text using single-byte fonts. Compatibility for the 3800 Model 2 double-byte font support is not provided. Compatibility-mode allows line-printer application programs written for a Model 1 or Model 2 to be run with little or no change on a Model 3, Model 6, or Model 8 printer. These 3800 page printers operating in compatibility mode produce the same output as that produced on a Model 1 or Model 2, but with an improved density of 240 by 240 picture elements per inch. For the purposes of this publication, therefore, 3800 line printers include the Model 1, Model 2, and the Model 3, Model 6, and Model 8 when operated in compatibility mode.

The 3800 page printers operating in compatibility mode also have an added function that allows for vertical line spacing of 10 lines per inch, which is in addition to the 6, 8, and 12 lines-per-inch spacings on Model 1 or Model 2. For information about operating a 3800 page printer in compatibility mode, refer to *IBM 3800 Printing Subsystem Model 3 Programmer's Guide: Compatibility*.

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### Compatibility with a 3800 Line Printer

When you are converting from a 3800 line printer to a PSF-supported page printer, you should determine the changes that are required and be aware of some differences that exist. For example, the maximum number of data bytes in a record for a 3800 line printer is 208, and the maximum number of data bytes for a page printer is 32768 bytes. Each printer truncates any records that exceed its maximum record size. Another difference is in the format of the sense-byte information. For more information, refer to your printer publication.

To print 3800 line-printer applications on a page printer, changes may be required to the following:

- 3800 line-printer modules.
- Application programs.
- **PSF/MVS** Job control language.
- **PSF/VM** Options specified with the SPOOL or PRINT commands. You may have to use the PSF command to place the file on the spool.
- **PSF/VSE** Job entry control language.

### 3800 Line Printer Modules

The 3800 modules must be converted to a form that is usable on the page printer.

**PSF/MVS** The Print Management Facility (PMF) conversion services can assist in this conversion. Refer to *Print Management Facility User's Guide and Reference* for details about the conversion services.

**PSF/VM** The PMF conversion services can assist in this conversion. Refer to *Print Management Facility User's Guide and Reference* for details about the conversion services.

## Converting Forms Control Buffer Modules (FCBs)

FCB modules created for 3800 line-printer applications must be converted to page definitions for page printers. IBM has already converted to page definitions some standard FCB modules previously available with the 3800 line printer; these page definitions are available with PSF. Exactly compatible page definitions are not given for cut-sheet printers because of differences in cut-sheet and continuous-forms form sizes. Figure 226 identifies which page definitions come with PSF to replace the standard 3800 FCB modules. Refer to the PSF user's programming guide or the PSF application programming guide for your operating system for a more complete list of page definitions supplied with PSF.

*Figure 226. Page Definitions for 3800 FCBs*

3800-1 FCB	3800-3 Page definition	For All Other Printers Page Definition	Forms Size	Height and Width Differences
FCB3STD1	P1STD1	P1B04963	Legal, Rotated	Page definition line count is 49 instead of 51 as in FCB. Page definition line length is 0.33 inch shorter than in the FCB.
FCB3STD2	P1STD2	P1D06063	B4, Rotated	Page Definition and FCB have the same line count. Page definition line length is 0.12 inch longer than in the FCB.
FCB3STD3	P1STD3	P1D08083	B4, Rotated	Page definition and FCB have the same line count. Page definition line length is 0.12 inch longer than in the FCB.
FCB36	P16	P1B04963	Legal, Rotated	Page definition line count is 49 instead of 51 as in FCB. Page definition line length is 0.33 inch shorter than in the FCB.
FCB38	P18	P1B06683	Legal, Rotated	Page definition line count is 66 instead of 68 as in the FCB. Page definition line length is 0.33 inch shorter than in the FCB.

**PSF/MVS** FCB modules created for 3800 line-printer applications can be converted to page definitions by using the PMF conversion services. However, a converted page definition contains only one page format.

**PSF/VM** FCB modules created for 3800 line-printer applications can be converted to page definitions by using the PMF conversion services. However, a converted page definition contains only one page format.

When converting FCB modules to page definitions or when building page definitions to replace FCB modules, you should use the same names (excluding the system prefix, P1) so that the name of the page definition is the same as the FCB name. By doing this, no changes to print job submission statements are required if 3800 line printer applications are processed on the PSF-supported page printers because PSF interprets the name of the FCB specified in the FCB parameter, prefixed with P1, as a page definition name.

For the 3800 line printer, the FCB defines only the length of a form. The same FCB could be used for different forms that have different widths. A page definition, however, defines the page width and length. Therefore, a page definition for each width needs to be created if the FCB is used for different form widths.

**PSF/MVS** The corresponding JCL statements for the page printer must refer to the page definition with the required width.

**PSF/VM** The corresponding SPOOL command FCB option or the PSF command PAGEDEF option for the page printer must refer to the page definition with the required width.

**PSF/VSE** The corresponding FCB parameter in the \* \$\$ LST statement or the printer-parameter member must refer to the page definition with the required width.

### Converting GRAPHMODs and LCSs

Graphic-character-modification modules (GRAPHMODs) and library character sets (LCSs) contain the raster patterns of characters and logos created for 3800 line printers. To print on a page printer, GRAPHMODs and LCSs must be converted to fonts, and the characters might have to be rescaled to the 240 by 240 pel density.

**PSF/MVS** Use the IBM licensed program, PMF. For more information about PMF, refer to *Print Management Facility User's Guide and Reference*.

**PSF/VM** Use the IBM licensed program, PMF. For more information about PMF, refer to *Print Management Facility User's Guide and Reference*.

### Converting COPYMODs

With the 3800 line printer, copy-modification modules (COPYMODs) are used to:

- Format functions using the format character set
- Add constant text to a copy of an output file
- Suppress text on a copy of an output file

With copy-modification modules, no direct conversion is done as with GRAPHMODs and LCSs. Overlays can add constant text to copies of an output file, which is the function of COPYMODs. To create and use an overlay:

1. Create a form definition with a copy group that specifies the name of the overlay.
2. Run the job, specifying the form definition.

Page definitions can also add constant text and suppress text on selected copies of line data.

IBM licensed programs that build overlays, form definitions, and page definitions are available. For more information, refer to *Guide to Advanced Function Presentation*.



## Application-Program Conversions

Generally, an application program sending output to a 3800 line printer needs no change to send output to a page printer. However, changes may be necessary if an application requires any of the following:

- Line-merging applications
- Copy-modification modules
- SETPRT macro or command

### Line-Merging Applications

If two or more lines of data are merged on a 3800 line printer to make one print line, the lines are combined so that the printable characters in the last line in the sequence are printed. With a page printer, if two or more lines of data that contain printable characters are printed in the same line space, the printed line results in two or more printed characters being superimposed.

If fonts of different pitch are used on the same line, or if the printing space for characters is not the same, line-merging applications created for a 3800 line printer may not produce the same results when printed on a page printer.

### Copy-Modification Modules

Copy-modification modules previously used with a 3800 line printer cannot be used with a page printer. Alternatives to using copy-modification modules are described in “Converting COPYMODs” on page 346.

### SETPRT Macro or Command

**PSF/MVS** The SETPRT macro is used with a 3800 line printer in compatibility mode to define or change printing specifications, such as selecting fonts and obtaining 3800 modules from SYS1.IMAGELIB.

**PSF/VM** A CMS SETPRT command used with a 3800 line printer in compatibility mode defines or changes printing specifications, such as selecting fonts and obtaining 3800 modules. The command embeds 3800 load commands in the printer spool file. PSF processes printer spool files with embedded load commands but treats the commands as data with invalid carriage-control characters.

Existing line-data applications that require the SETPRT macro or command can be processed on a page printer. However, newly created applications should take advantage of the capabilities offered through PSF and associated licensed programs to do similar functions. For example, use Page Printer Formatting Aid (PPFA) to define a page definition that contains a font list from which fonts can be selected for pages, records, or fields.

### MVS Job Control Language

With the exception of the MODIFY parameter and the OPTCD=U DCB subparameter, JCL parameters used to control data-set-processing requirements for the 3800 line printer give the same or similar results when used with a page printer. The following JCL parameters give different results from those produced on the 3800 line printer:

- FCB (forms control buffer)

The FCB parameter is interpreted by PSF as the name of a page definition. Do not eliminate FCB parameter specifications. If you assign printing that was being printed on a page printer to a 3800 line printer, the FCB parameter is required, and the PAGEDEF parameter is ignored if specified.

- MODIFY

The MODIFY parameter applies a copy-modification module (COPYMOD) to copies of a file printed on a 3800 line printer. This parameter is ignored for a page printer. Alternatives to using copy-modification modules are described in “Converting COPYMODs” on page 346.

- CHARS

With a CHARS parameter, you can specify as many as four font names with each name having from 1 to 4 characters. Any fonts specified with the CHARS parameter must reside in the font library assigned to PSF for that page printer.

- OPTCD=U DCB Subparameter

OPTCD=U should not be specified as a parameter on a DD statement to unblock data checks because it is ignored. The OUTPUT statement JCL DATAKEY keyword can be used to specify whether invalid character errors or print-positioning errors are blocked or unblocked.

Refer to *Print Services Facility/MVS: Application Programming Guide* for more information about which JCL parameters can be used for page printers.

### VM Commands and Options

With the exception of the MODIFY parameter, options used to control file-processing requirements for the 3800 line printer give the same or similar results when used with a page printer. The following options for the SPOOL and CHANGE commands give results different from those produced on the 3800 line printer:

- FCB (forms control buffer)

PSF interprets the FCB option as the name of a page definition. Do not eliminate specification of FCB options. If you assign printing created for a page printer to a 3800 line printer, the FCB option is required.

- MODIFY

The MODIFY option applies a copy-modification module (COPYMOD) to copies of a file printed on a 3800 line printer. A page printer ignores this option.

Refer to *Print Services Facility/VM: Application Programming Guide* for more information about the commands and options that can be used with page printers.

## VSE Job Entry Control Language

The following JECL parameters give different results from those produced on the 3800 line printer:

- FCB (forms control buffer)

The FCB parameter is interpreted by PSF as the name of a page definition. Do not eliminate FCB parameter specifications. Print job previously printed on a page printer require the FCB parameter when printed on a 3800 line printer.

- MODIFY

The MODIFY parameter applies a copy-modification module (COPYMOD) to copies of a data stream printed on a 3800 line printer. This parameter is ignored for a page printer.

- FNO

The FNO parameter is interpreted by PSF as the name of the printer-parameter member to be used when printing the LST queue entry. If no printer-parameter member exists, the FNO parameter is considered to be a form request.

Refer to *Print Services Facility/VSE: Application Programming Guide* for more information about the JECL parameters that can be used with page printers.

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## Compatibility between IPDS Printers and the 3800

This section explains pel addressing for text and rules. The two types of coordinate techniques for addressing the pels that make up a page are those for IPDS printers and for the 3800.

### Pel Addressing for Text

The page is logically divided into a grid of squares with each square containing **1 pel**. A pair of coordinates address one of these squares and therefore addresses 1 pel. The first coordinate in a coordinate pair is called the **inline coordinate**. The second coordinate is called the **baseline coordinate**.

#### Pel Addressing for IPDS Printers:

The coordinate system for IPDS printers uses coordinate pairs consisting of the inline and baseline position between pels.

This technique is called *between-the-pel* printing. All of the reference lines used to describe resource objects are lines passing between rows or columns of pels. See Figure 227 on page 350.

For a given square in the grid, a coordinate pair actually contains the inline and baseline positions of the corner of the square that has the **minimum inline position** and the **minimum baseline position** of the square's four corners. For example:

**In the (0°,90°) text orientation**

The coordinate pair used to address a pel consists of the inline and baseline positions of the upper left-hand corner of the square containing the pel.

<b>In the (90°,180°) text orientation</b>	A coordinate pair consists of the inline and baseline positions of the upper right-hand corner of a square.
<b>In the (180°,270°) text orientation</b>	A coordinate pair consists of the inline and baseline positions of the lower right-hand corner of a square.
<b>In the (270°,0°) text orientation</b>	A coordinate pair consists of the inline and baseline positions of the lower left-hand corner of a square.

### Pel Addressing for the 3800 Printer

The coordinate system for the 3800 printer uses coordinate pairs consisting of the inline and baseline position at the **center** of a pel. This technique is called *through-the-pel* printing. All of the reference lines used to describe resource objects are lines passing through rows or columns of pels as shown in Figure 227.



Figure 227. Pel Coordinates. Each square on the grid contains **1 pel**. The **x** is the inline (4), baseline (2) coordinate position.

### Pel Addressing for Rules

Under certain circumstances, a rule that is within the page on a 3800 printer may extend off the logical page by 1 pel on IPDS printers. This difference is because of the pel addressing differences just described, that IPDS printers use the between-the-pel printing technique, and the 3800 uses the through-the-pel printing technique. Figure 227 shows the difference between the techniques.

In the figure, the current print position is determined by an Absolute Move Inline (AMI) text control specifying an inline position of 4 pels and an Absolute Move Baseline (AMB) text control specifying a baseline position of 2 pels.

If these text controls are followed, for example, by a Draw Inline Rule (DIR) text control that specifies a rule 5 pels long and 3 pels thick, the results would be identical, as is shown in Figure 228 on page 351. The 3800 printer begins at a coordinate that is in the center of a pel. It tones that pel and the 4 pels to the right. It also tones the corresponding pels in the two rows below the coordinate. The IPDS printers begin at a coordinate that is between pels and tones the five pels to the right in each of the three rows below.

Coordinates (4,2)  
 Draw Inline Rule 5 Pels Long, 3 Pels Wide

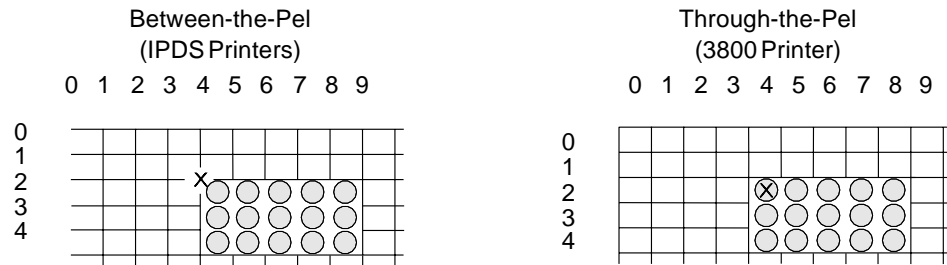


Figure 228. Positive Rule. Each square on the grid contains 1 pel. The x is the inline (4), baseline (2) coordinate position.

However, if these text controls were followed by a DIR text control that specifies a rule -5 pels long (that is, drawn opposite the inline direction) and -3 pels thick (drawn opposite the baseline direction), the results would be different, as is shown in Figure 229.

Coordinates (4,2)  
 Draw Inline Rule -5 Pels Long, -3 Pels Wide

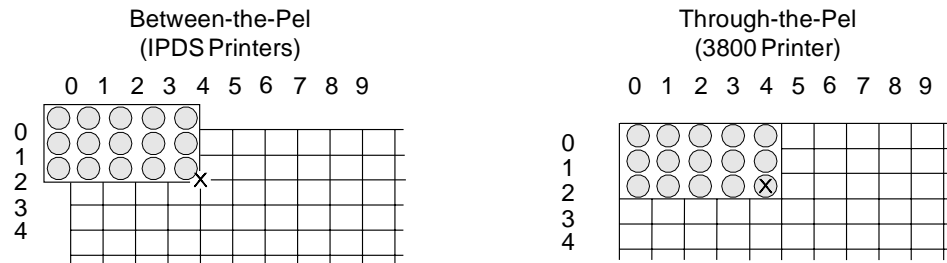


Figure 229. Negative Rule. Each square on the grid contains 1 pel. The x is the inline (4), baseline (2) coordinate position.

The 3800 printer begins at a coordinate that is in the center of a pel. It tones that pel and the 4 pels to the left. It also tones the corresponding pels in the two rows above the coordinate. The IPDS printers begin at a coordinate that is between pels and “try” to tone the 5 pels to the left in each of three rows above. The result is that the rule exceeds the top and left boundaries of the page.<sup>14</sup> To correct this error, change the coordinates to (5,3).

<sup>14</sup> This example assumes that the text orientation is the same as the orientation of the page. If it is not, other page boundaries may be exceeded.

---

### Compatibility with the IBM 6670 Information Distributor

You can print data created for an IBM 6670 Information Distributor on a page printer if the file does not contain controls that are invalid for a page printer. The controls in the 6670 data stream that are invalid for a page printer are operator control language (OCL) commands and instructions in word-processing control codes.

If the IBM licensed program 6670 Preprocessor (Program No. 5798-DKB) is used to create a data stream for your 6670, that program inserts OCL and word-processing controls into the printer data so the 6670 can format and print it. Usually, a page printer can print the original data, that is, the data as it existed before it was processed by the 6670 Preprocessor program.

The 6670 has two functions that can create different results on a page printer:

- Line Merge

A 6670 file containing merged lines may not produce the same results when printed on a page printer. With a page printer, you will be more likely to get results similar to those printed by a 6670 if you use a fixed-pitch font.

- Font Switching

Under certain circumstances, underscoring of data in the print file can cause a font switch to occur when printing on a 6670. Underscoring with page printers does not cause a font switch.

---

### Compatibility with the IBM 4250 Printer

The IBM 4250 Printer is also a page printer, but it is different from other page printers. For example, the IBM program that interfaces to a 4250 is Composed Document Printing Facility (CDPF), whereas the IBM program that interfaces to other IBM page printers is Print Services Facility (PSF). Two other differences are that the density of the printable points on a 4250 is 600 pels per inch and all data received by the printer is in raster-pattern form.

The IBM programs Document Composition Facility (DCF) and Document Library Facility (DLF) can create data streams for the 4250 or for the PSF-supported printers specifying the type of printer for which the data is being processed.

The print data streams for PSF are similar to CDPF data streams, but they are not identical. Therefore, if you are using other application programs that do not require the printer type to be specified so that the program can determine which type of data stream to create, you must verify that the controls for CDPF are supported by PSF. The data stream for the 4250 is defined in *Composed Document Print Facility: Data Stream Interface, Typographic Fonts Interface*, and the data stream for other page printers is defined in *Mixed Object Document Content Architecture Reference*.

---

## Compatibility among PSF-Supported Printers

The following sections describe compatibility considerations when routing jobs among PSF-supported printers.

### Page Presentation

Page presentation refers to the position of a printed page of data on a sheet. PSF supports two page presentations:

- **Portrait**, or narrow forms, in which the printed page is viewed with the shorter edges of the form at the top and the bottom of the page and the longer edges at the sides of the page
- **Landscape**, or wide forms, in which the printed page is viewed with the longer edges of the form at the top and the bottom of the page and the shorter edges at the sides of the page

PSF-supported printers have different default media origins. Because the media origin relates to the print direction (ACROSS, DOWN, BACK, and UP), it also is used in determining the page presentation. For continuous-forms printers, the ability to use forms that feed through the printer with either a narrow or a wide leading edge adds another factor to the determination of page presentation.

See Figure 230 on page 354, Figure 231 on page 355, and Figure 232 on page 356 for examples of media origins and print directions supported by PSF printers. Note that not all printers can print in all four print directions. The print directions in which each PSF-supported printer can print is described in each printer chapter of this publication.

# Compatibility

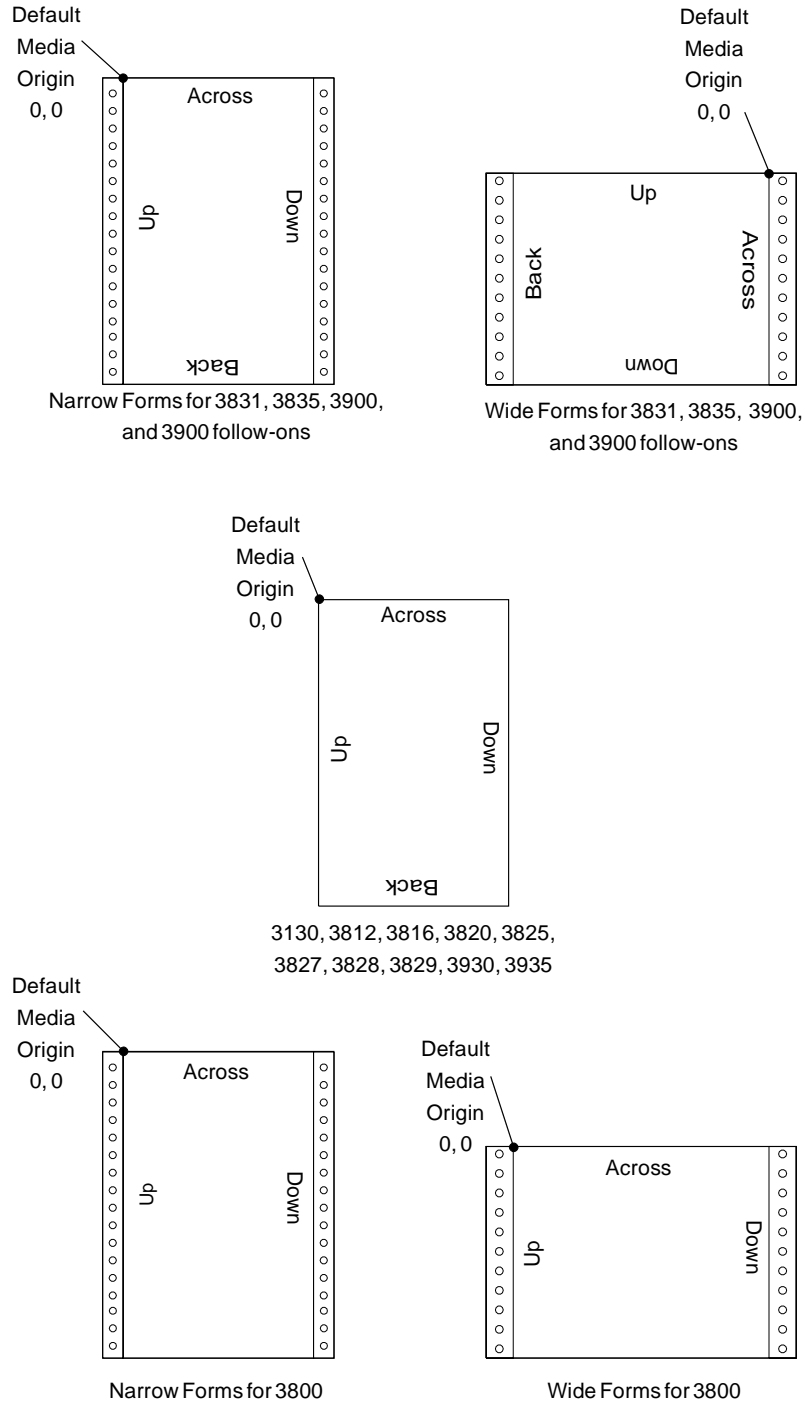
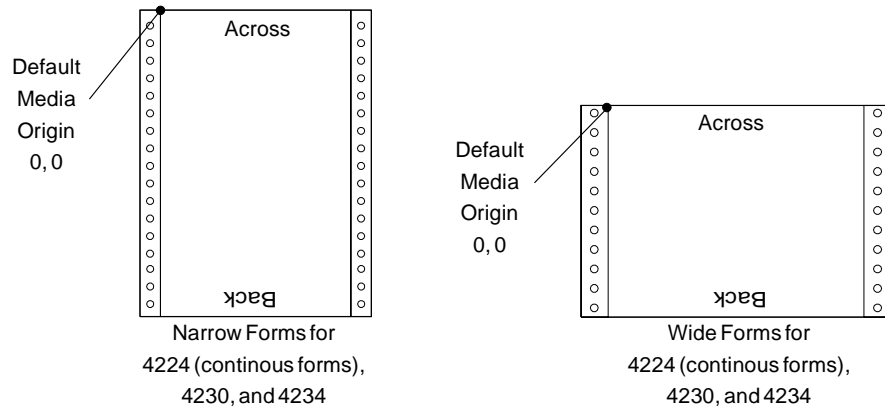
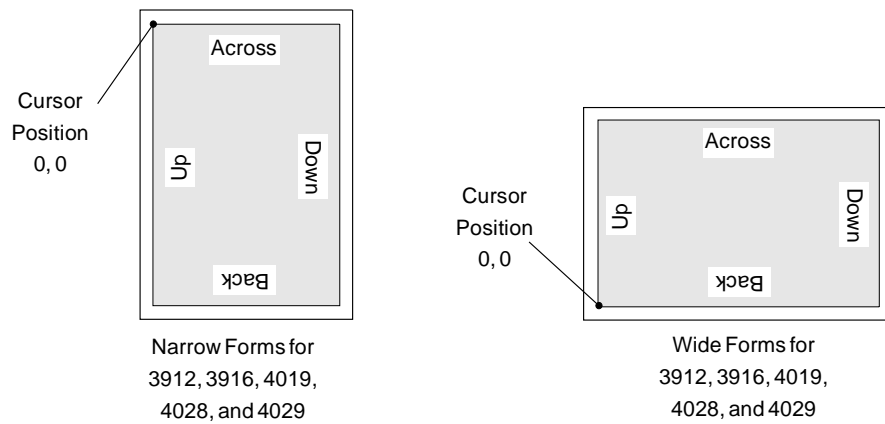


Figure 230. Media Origins and Print Directions for PSF-Supported Printers





Print Page Format



Whole Page Format

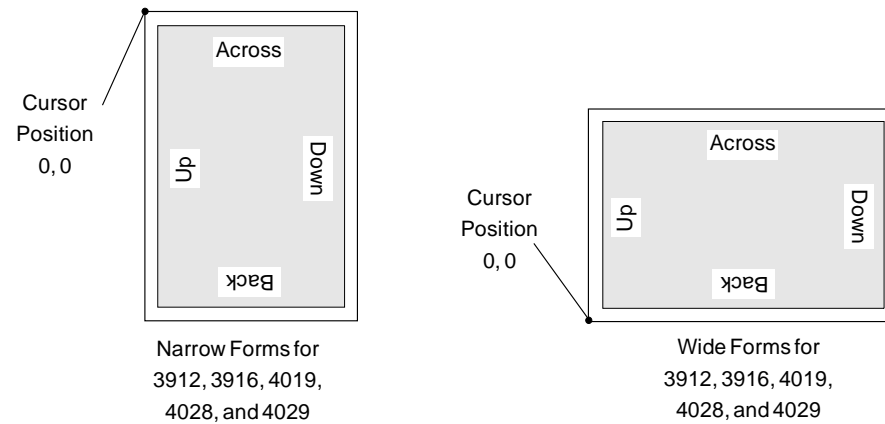
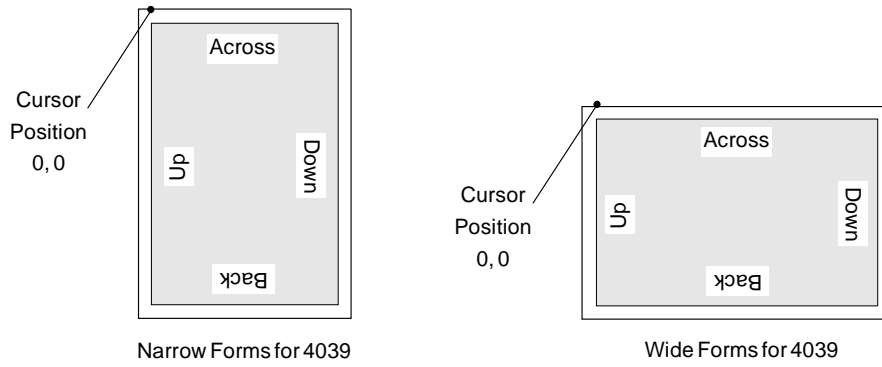


Figure 231. Media Origins and Print Directions for PSF-Supported Printers

HP Emulation Page Format



PCL5 Emulation Format

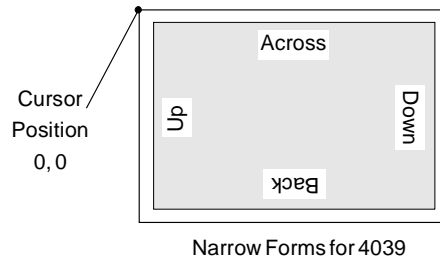


Figure 232. Media Origins and Print Directions for PSF-Supported Printers

Page-presentation and print-direction controls are included in the form definition to allow presentation compatibility across PSF-supported printers. The result of these controls is to change the media origin for the pages printed using the copy group containing the controls. Not all printers support changing of the media origin, which is described in each printer chapter of this publication. The print direction specified in the page definition or in the composed-text data does not need to be changed when a form definition containing these compatibility controls is used. Rather, the print direction in the page definition or composed-text data should be used to determine which print-direction control to specify in the form definition.

You can build form definitions for page-presentation compatibility using PPFA, PMF, or Print Services Access Facility (PSAF). For more information, refer to *Page Printer Formatting Aid/370 User's Guide and Reference*, *Print Management Facility User's Guide and Reference*, *Print Services Access Facility for MVS: User's Guide and Reference*, or *Print Services Access Facility for VM: User's Guide and Reference*.

### When Not to Use Compatibility Form Definitions

You do not need to use form definitions that contain page-presentation and print-direction controls when you are using:

- Only cut-sheet printers.
- Only narrow forms on a 3831, 3835, or 3900. See “Example: ACROSS Print Direction with Narrow Forms” on page 362.
- Only a 3800.
- Print data that is formatted in the BACK or UP direction, which is specified in the page definition or by the program formatting the data.

### When To Use Compatibility Form Definitions

You do need to use form definitions that contain page-presentation and print-direction controls when you are:

- Printing data that was formatted for a 3800 on a 3831, 3835, or a 3900. See “Example: ACROSS Print Direction with Wide Forms” on page 360.
- Using wide forms on a 3831, 3835, or 3900 when the print data is formatted in the DOWN print direction. See “Example: DOWN Print Direction with Wide Forms” on page 361.
- Using both narrow and wide forms on a 3831, a 3835, or a 3900. See “Example: DOWN Print Direction with Wide Forms” on page 361.

### Compatibility between a 3800 and a 3831, a 3835, or a 3900

PSF provides form definitions that you can use for page-presentation compatibility between a 3800 and a 3831, a 3835, or a 3900. Figure 233 on page 359 shows the output on the 3800 and on the other printers using these form definitions.

The examples in Figure 233 on page 359 assume that you are using the same forms on the printers; that is, not changing from wide to narrow forms between printers, or from narrow to wide forms between printers. However, you could change forms in any of the four examples without affecting the page presentation of your output as long as the print direction in the form definition matches the print direction in the page definition or composed-text data.

## Compatibility

If you migrate an application from one form to another, remember that the top and left margins change places. Because the 3831, 3835, and 3900 have an unprintable area at the margins, you should do one of the following, so that data is placed in the printable area of the forms to which you are migrating:

- Ensure that the placement of data in the page definition or composed-text data is within the printable area as specified in the form definition.
- Adjust the page position in the form definition.

**Note:** The compatibility form definitions shown in Figure 233 on page 359 specify a page position of 0.0 inch across and 0.5 inch down. This page position is within the printable area of the 3800 as well as that of the 3831, 3835, and 3900.

Two other sections of this chapter, “Example: ACROSS Print Direction with Wide Forms” on page 360 and “Example: DOWN Print Direction with Wide Forms” on page 361, also contain information relating to compatibility between the 3800 and the 3831, 3835, and 3900 printers.

If you want output formatted for the 3800 (as shown below) to look the same on the 3831, 3835, and 3900,

use this IBM-supplied form definition:

or create a form definition specifying

the direction specified in the page definition is:

F10101LA

Landscape Presentation  
Across Direction

ACROSS

F10101PD

Portrait Presentation  
Down Direction

DOWN

F10101PA

Portrait Presentation  
Across Direction

ACROSS

F10101LD

Landscape Presentation  
Down Direction

DOWN

NOTE: You can use these form definitions for printing on the 3800, 3831, 3835, and 3900.

Figure 233. PSF-Supplied Form Definitions.. These form definitions are for Compatibility Between the 3800 and the 3831, 3835, or 3900. Note that the second and fourth entries use data that is formatted in the DOWN print direction.

### Compatibility between Cut-Sheet Printers and a 3831, a 3835, and a 3900

PSF provides form definition F1C10110 for page-presentation compatibility between cut-sheet printers and a 3831, a 3835, or a 3900. See “Example: DOWN Print Direction with Wide Forms” on page 361 on how to use this form definition. “Example: ACROSS Print Direction with Narrow Forms” on page 362 contains an example of when page-presentation controls are not needed for printing the same file on cut-sheet and 3831, 3835, or 3900 printers.

A factor to consider if you are creating your own form definition for compatibility between cut-sheet printers and a 3831, a 3835, or a 3900 is the printable area of the printers. Because the 3831, 3835, and 3900 have an unprintable area at the margins, you should do one of the following to ensure that data is placed in the printable area of the forms to which you are migrating:

- Ensure that the placement of data as specified in the page definition or in the composed-text data is within the printable area as specified by the page position in the form definition.
- Adjust the page position in the form definition.

**Note:** The compatibility form definition, F1C10110, specifies a page position of 0.17 inch across and 0.17 inch down. This page position is within the printable area of the 3831, 3835, and 3900 and all cut-sheet printers.

#### Example: ACROSS Print Direction with Wide Forms

If your data is formatted in the ACROSS print direction for landscape page presentation, as is commonly used for a 3800, and will be printed on wide forms on a 3831, a 3835, or a 3900, you must use a form definition with correct page-presentation controls to produce readable output. If not, the print data may go beyond the valid printable area on the 3831, 3835, or 3900, as shown in Figure 234, because the hardware origin for the 3831, 3835, and 3900 is different from the hardware origin of the 3800.

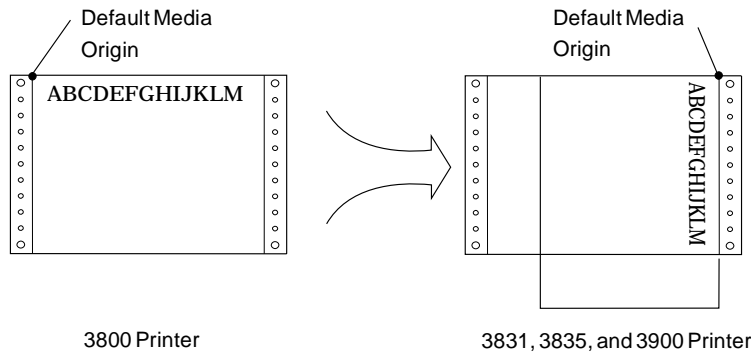


Figure 234. Valid-Printable-Area Error: 3831, 3835, or 3900 Output with Incorrect Form Definition

If, however, you use a form definition with the correct page-presentation controls, your output will be printed correctly, as shown in Figure 235 on page 361. In this example, you could use the PSF-supplied form definition, F10101LA, which specifies a landscape page presentation and an ACROSS print direction. This form definition can also be used for data formatted in an ACROSS print direction to print in the landscape page presentation on narrow forms. The page-presentation

controls are not required in this case, but you can now use this form definition regardless of whether the data is to print on wide forms or on narrow forms.

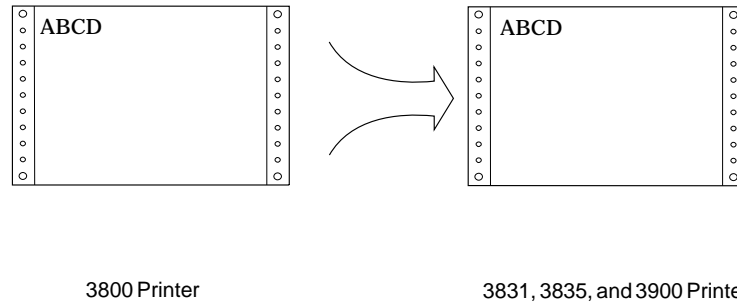


Figure 235. Using PSF Form Definition F10101LA to Prevent Valid-Printable-Area Errors

### Example: DOWN Print Direction with Wide Forms

If your data is formatted in the DOWN print direction for landscape page presentation on a cut-sheet printer or on 3800 narrow forms and will be printed on wide forms on a 3831, 3835, or 3900, you must use a form definition with correct page-presentation controls to produce readable output. If not, the data will be printed in the landscape page presentation; however, the data will be upside down, as shown in Figure 236, because the hardware origin for a 3831, 3835, or 3900 is located on the leading-left corner of the short side of the form, regardless of whether a narrow form or a wide form is used.

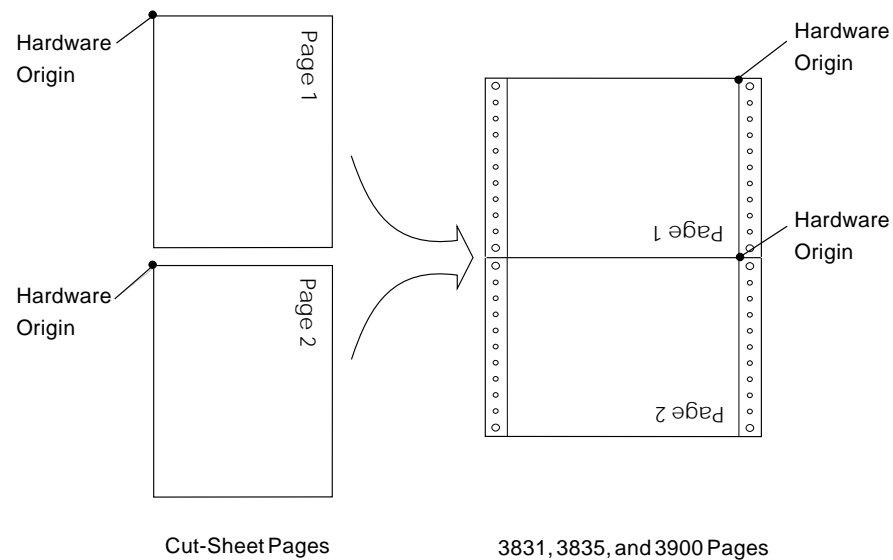


Figure 236. Upside-Down Printing: 3831, 3835, or 3900 Output with Incorrect Form Definition

If, however, you use a form definition with the correct page-presentation controls, your output will be printed correctly, as shown in Figure 237 on page 362. In this example, when migrating from a cut-sheet printer, you can use the PSF-supplied form definition, F1C10110, which specifies the landscape page presentation and the DOWN print direction. If you are migrating from 3800 narrow forms instead of cut sheets, you can use the PSF-supplied form definition, F10101LD, which specifies the landscape page presentation and the DOWN print direction.

## Compatibility

The F1C10110 form definition can also be used for data formatted in the DOWN print direction to print on narrow forms on a 3831, 3835, or 3900. The page-presentation controls are not required in this case, but you can now use this form definition regardless of whether the data is to print on wide forms or on narrow forms on the 3831, 3835, or 3900. See “Example: ACROSS Print Direction with Narrow Forms” for more information.

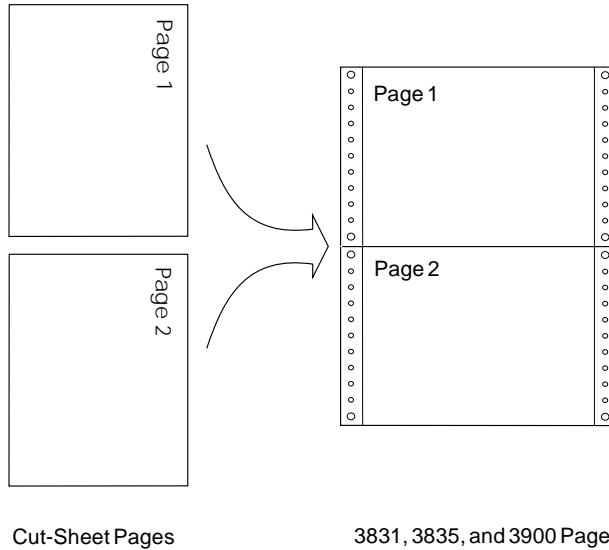


Figure 237. Using PSF Form Definition F1C10110 to Prevent Presentation Errors

### Example: ACROSS Print Direction with Narrow Forms

If your data is formatted in the ACROSS print direction for portrait page presentation on a cut-sheet printer and will be printed on narrow forms on a 3831, 3835, or 3900, the form definition you specify does not need to contain page-presentation controls to produce readable output on these printers. However, you must consider the differences in printable areas between the printers.

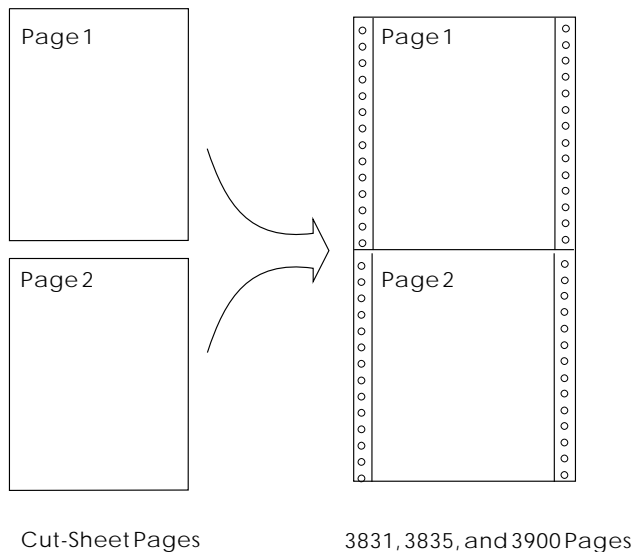


Figure 238. No Compatibility Form Definition Required

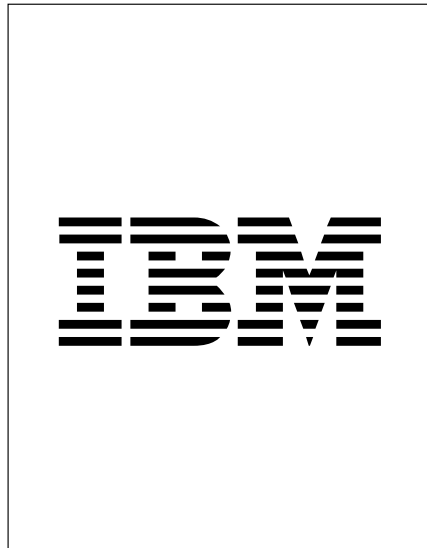


## IO-Image Resolution on the 3816 and 4028

The 3816 simplex, 3816 duplex, and 4028 printers do not always maintain the ratio of the horizontal size of the image to the vertical size of the image when they perform the scale-to-fit mapping for an IO-image. If the X and Y resolutions of the IO-image are different, and scale-to-fit mapping is used, these printers will not maintain the ratio of the X-dimension of the image to the Y-dimension of the image. However, when position-and-trim or center-and-trim mapping is used for an IO-image, the above printers will always maintain this ratio.

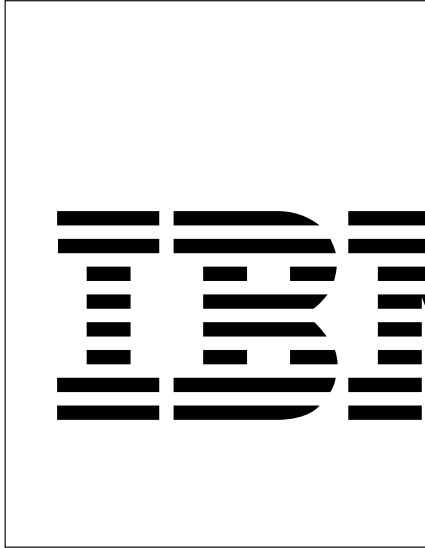
## Image Resolution on the 4224, 4230, and 4234

The 4224, 4230, and 4234 printers have a printhead resolution of 144 pels per inch. If you try to print an IM image created for a printer with a larger printhead resolution, the results may not be what you expect. This section shows problems you may encounter. Figure 239 shows a 240-pel IM image printed on a 240-pel printer.



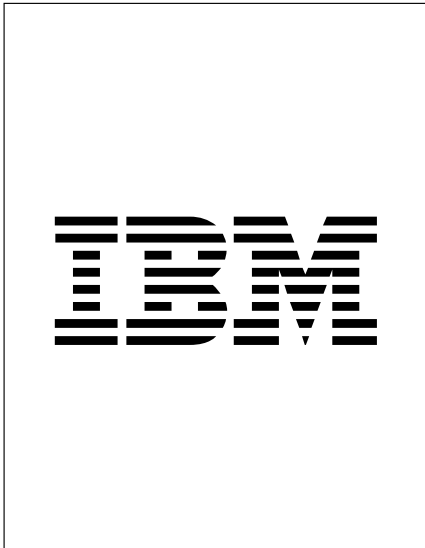
*Figure 239. Example of a 240-Pel IM Image Printed on a 240-Pel Printer*

If you try to print a 240-pel IM image on a 144-pel printer, the image will be expanded by 66% (1.66 times larger). Figure 240 on page 364 shows the same 240-pel IM image printed on a 144-pel printer. Note the expanded image.



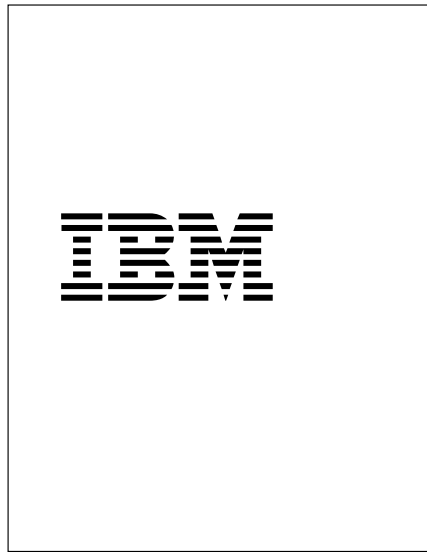
*Figure 240. Example of a 240-Pel IM Image Printed on a 144-Pel Printer*

To print images without distortion on 144-pel printers, you must create 144-pel IM images. Figure 241 shows an example of a 144-pel IM image printed on a 144-pel printer.



*Figure 241. Example of a 144-Pel IM Image Printed on a 144-Pel Printer*

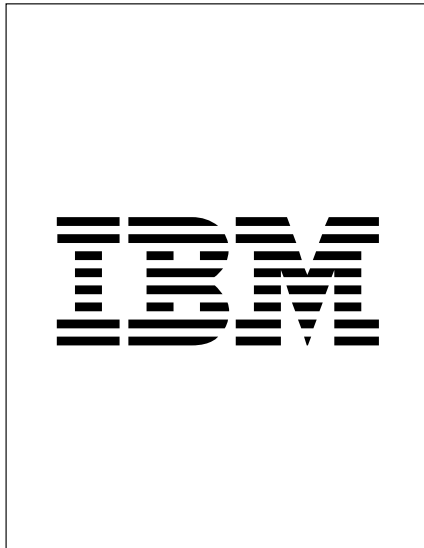
If you try to print a 144-pel IM image on a 240-pel printer, the image size decreases. Figure 242 shows the same 144-pel IM image printed on a 240-pel printer. Note the smaller image.



*Figure 242. Example of a 144-Pel IM Image Printed on a 240-Pel Printer*

### Image Resolution on the 4019, 4028, and 4029

The 4019, 4028, and 4029 printers have a printhead resolution of 300-pels per inch. If you try to print a 240-pel IM image on a 300-pel printer, you may get results similar to those of a 240-pel IM image printed on a 240-pel printer, because PSF tells the printer to scale the image. Due to the scaling, however, some images may not print as expected. Figure 243 shows a 240-pel IM image printed on a 300-pel printer.



*Figure 243. Example of a 240-Pel IM Image Printed on a 300-Pel Printer*

You can print 300-pel images, with results like the one shown in Figure 243, on any printer that supports IOCA images.

If you try to print a 300-pel IM image on a 144-pel printer that does not support IOCA data, the image will be expanded. If you try to print a 300-pel IM image on a 240-pel printer that does not support IOCA data, the image will be expanded.

## Reassigning Printing to Alternate Printers

**PSF/MVS** JES can reassign printing from a page printer to an impact printer or a line printer, from an impact printer to a page printer, and from a line printer to a page printer; however, the following restrictions apply:

- Both the CHARS and UCS parameters can be specified on a SYSOUT DD statement to be used by the selected printer. For example,

```
//OUT DD SYSOUT=A,CHARS=GS10,UCS=A11
```

is valid for either a 3800 Model 3 or a 3211. The special characters included in the GS10 set that are not on an A11 print chain are printed as blanks on a 3211. If the file is printed on a 3800 Model 3, the GS10 font is used. If the file is printed on an impact printer such as the 3211, the A11 print chain is used.

- If the UCS parameter is not specified for a file printed on an impact printer with the UCS, JES2 supplies the name of the print chain, which comes from the first CHARS parameter. If the CHARS parameter is also omitted, the installation default for UCS is used.
- If the CHARS parameter is not specified for a file that is printed on a page printer, JES2 supplies the name of the default font. If the UCS parameter is also omitted, the installation default for CHARS is used.
- If features unique to a page printer (such as FLASH for a forms overlay on a 3800) are specified, they are ignored on an impact printer.
- If any group value subparameters of the COPIES parameter are specified, they are ignored for an impact printer.
- If the length of a printed line is greater than the limit allowed by an impact printer, such as a 3211, the line is truncated. For example, if CHARS=DUMP is specified, the maximum length of the output line is 204 characters. However, if that line is printed on an impact printer, the length is truncated to the maximum line length of that printer.
- If any functions and features unique to a page printer are specified, they are ignored on a line printer.

**PSF/VM** Files on the CP print spool that are not converted by the SFCM can be directed to an alternate printer. To query the conversion status of files for a PDM, enter the following CP command for each destination name associated with the PDM:

```
CP QUERY PRINTER PSF DEST destname1
```

To redirect files that are converted but not yet printed, enter the following CP command for each file to change its CLASS, DEST, FORM, and conversion status:

```
CP CHANGE PRINTER spoolid CLASS newclass FORM newformname DEST  
newdestname UNCONV
```

After the unconverted files are identified, enter the following CP command for each file to change its CLASS, DEST, and FORM to match the selection criteria of the alternate printer:

```
CP CHANGE PRINTER spoolid CLASS newclass FORM newformname DEST newdestname
```

**PSF/VSE** Print jobs formatted for a line printer or impact printer can be printed on a page printer if you define default printer characteristics in the PRINTDEV statements in the PSF start-up JCL. Several PRINTDEV statements can be included for the same printer, each specifying different defaults depending on the form size, print direction, number of printed lines on each page, and the type style of the printed characters.

For example, if print jobs on the LST queue are to be printed with the following characteristics:

- Form size 14.875 inches wide by 11.0 inches long, 80 lines per page, printed across the wide part of the form with 12 pitch characters
- Form size 12.0 inches wide by 8.5 inches long, 75 lines per page, printed across the wide part of the form with 15 pitch characters
- Form size 9.5 inches wide by 11.0 inches long, 80 lines per page, printed across the narrow part of the form with 12 pitch characters,

the following PRINTDEV statements can be used in the PSF start-up JCL:

1. PRT1 PRINTDEV FORMDEF=0101LA, print across the wide edge of the form  
PAGEDEF=L08080, 14.88 x 11.0 forms- 80 Lines per page  
CHARS=GT12, 12 pitch font  
LOGDEST=LOCAL, print any files without a destination specified  
UNIT=cuu printer address
2. PRT2 PRINTDEV FORMDEF=0101LA, print across the wide edge of the form  
PAGEDEF=075A0, 12.0 x 8.5 forms- 75 Lines per page  
CHARS=GT15, 15 pitch font  
LOGDEST=LOCAL, print any files without a destination specified  
UNIT=cuu printer address
3. PRT3 PRINTDEV FORMDEF=0101PA, print across the narrow edge of the form  
PAGEDEF=08080, 9.5 x 11.0 forms- 80 Lines per page  
CHARS=GT12, 12 pitch font  
LOGDEST=LOCAL, print any files without a destination specified  
UNIT=cuu printer address

After submitting the PSF start-up JCL, the print jobs can be printed by issuing the VSE/POWER PSTART DEV,xxx command for the print job configuration you want. After these print jobs have completed, issue the VSE/POWER PSTOP DEV,xxx command, change the forms in the printer, then again issue the VSE/POWER PSTART DEV,xxx command for the next print job configuration. Refer to *Print Services Facility/VSE: System Programming Guide* for the correct syntax of the VSE/POWER commands.

If the print jobs that were formatted for a line printer or an impact printer specify an FCB, PSF does not use the PAGEDEF parameters specified in the PRINTDEV statements. Instead, PSF assumes that the FCB name is the name of the page definition to be used to format the print jobs. If PSF cannot find that page definition in the sublibraries, PSF does not print the job.

PSF supplies the following 3800 page definitions that correspond to FCB's: (P1)STD1, (P1)STD2, (P1)STD3, (P1)6, and (P1)8. If you use other FCB names, you must create an appropriate page definition with the same name (with the P1 prefix) for PSF to be able to print that print job. Refer to *Print Services Facility/VSE: Application Programming Guide* for more information about using FCB's and page definitions.

---

## Performance Considerations

One condition affecting the performance of a page printer is document complexity, which is determined by:

- The number and size of fonts, images, rules, page segments, and overlays (particularly fonts and images)
- The number of characters on a page
- The number of control sequences included
- The distribution of simple and complex pages within a document
- The use of duplex printing

To get the best performance from your printer, review the following considerations when composing documents for printing.

## Fonts and Text

Font usage and text density can affect performance. Consider doing the following to improve performance:

- Reduce the amount of text on a page.
- Reduce the number of fonts required by the print file.
- For the 3800 printers, select monospaced fonts when you do not have to use proportionally-spaced characters, because monospaced fonts require less time for processing.
- When printing text using both single-byte and double-byte fonts, performance improves if the single-byte characters can be incorporated into the double-byte font, so that font switching is eliminated or reduced.
- Reduce either the number of character groups in a font, the number of characters in a group, or both to reduce the required amount of printer storage and processing time.
- Specify the use of resident fonts if your printer supports them.
- Specify font pruning.

### Font Pruning

PSF reconstructs the raster pattern data and sends only the characters that are referenced by the requested code page when downloading a font to your printer.

Consider the following about font pruning:

- Font pruning can save printer raster-pattern storage, depending on the point size of the font.
- Your storage savings are offset by increased processing time.
- Your installation can indicate to PSF/MVS, PSF/VM, and PSF/VSE whether to prune fonts for a particular configuration. PSF/2 and PSF/6000 automatically prune fonts.
- The default is to prune non-3800 fonts.

Refer to the system programming guide for your operating system for information on using font pruning.

### IM Image Data

How IM images and page segments are defined can affect performance, depending on the printer and application. Consider doing the following to improve performance:

- Use the minimum number of pels when defining an image. You can do this by eliminating any surrounding white space and cropping the image to produce the smallest possible box size.
- Define images using the double-dot technique, whenever reduced image precision or clarity is acceptable, which reduces the amount of DASD storage and the time required to transmit and process an image.
- Use image cells to define raster patterns. Image cells are most efficient when the raster pattern is constructed with a small, repeatable source. For more information, refer to *Mixed Object Document Content Architecture Reference*.
- Use a single page segment containing multiple images rather than using multiple page segments, each containing a single image, because PSF processes the single page segment faster than it processes multiple page segments.
- Use hard page segments rather than soft page segments. This means that if you use the same page segment several times in a document, consider loading the page segment into the printer on the first use by including the Map Page Segment (MPS) structured field on the first page on which the page segment is included. This creates a hard page segment, which is sent to the printer only one time no matter how many times the page segment is included in the document. Page segments not named in an MPS structured field are called soft page segments, which are sent to the printer each time they are required in a document.

### IOCA Image Data

IOCA image data can affect performance. Consider the following when using IOCA image data:

- Scaling IOCA images can reduce printer throughput in some cases.
- Printing compressed IOCA images can reduce printer throughput in some cases. This depends on what data compression algorithms you use. However, host CPU cycles, DASD space, and channel traffic are reduced at the same time.

### Graphics Data

GOCA data can affect performance. Consider the following when comparing GOCA data to rasterizing a graphics object:

- Printing GOCA data eliminates the need to rasterize before printing, thus reducing host cycles.
- Printing GOCA data can reduce printer throughput in some cases, depending on size and complexity. Use IM or IOCA for smaller images and GOCA for larger images.
- Printing GOCA data can reduce host CPU cycles, DASD space, and channel traffic.



## Overlays

The contents of overlays can affect performance. Consider the following to improve performance:

- Except with dot-matrix line-printers, solid lines created with Draw Inline Rule and Draw Baseline Rule control sequences are processed faster than lines (whether solid, dashed, or dotted) created with image cells.
- Other images, such as included page segments, dotted and dashed lines, shaded areas, and user-defined patterns use more printer storage and processing time and contribute to document complexity. To reduce document complexity when you define an overlay, consider using solid lines rather than dashed or dotted lines.
- When printing complex overlays on the 3800 without the Storage Extension Feature (SEF), consider specifying raster overlays. Raster overlays are stored in the accumulator and do not use other storage. Only one raster overlay can reside in the printer at one time. The SEF provides similar overlay performance without specifying a raster overlay.

Raster overlays are supported only on the 3800. If an overlay is specified as raster for any other printer, no special processing is done.

### Performance on the 4019, 4029, and 4039

In terms of CPU cycles, printing on the 4019, 4029, and 4039 printers is more costly than printing the same data on an IPDS printer. The increased expense is due mainly to the extra transformation of the IPDS data stream to the printer data stream.

PSF does font pruning for the 4019, 4029, and 4039 printers, which means that PSF sends only the characters referenced in the code page to the printer, rather than sending all the characters in a character set. Font pruning increases CPU use but saves raster pattern storage in the printers and improves printer throughput.

Because the 4019, 4029, and 4039 printers use host memory to store all resources needed to process a page, they use more memory than IPDS printers do. Also, the transformation of the data stream uses extra memory.

### PSF/MVS Performance Improvements for Line Data

For PSF/MVS 2.2.0 with APAR OW07350 applied, the system programmer can code the COMPRESS keyword in the PRINTDEV statement to activate data compression of 5 contiguous blanks in line data, to improve printer throughput of SNA-attached printers. For more details, refer to *Print Services Facility/MVS: System Programming Guide*.



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## Appendix B. Printer-Resident Fonts

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### Font Terminology, Names of Font Groups, and Font Structure

The first few pages of this appendix describe font terminology, the names of groups of fonts, and font structure. The appendix then lists the fonts available in the printers that contain resident fonts.

After March 31, 1995, IBM will ship fonts in a product called the IBM AFP Font Collection. (Prior to March 31, 1995, IBM shipped fonts with the PSF programs, in various formats and combinations, depending on the PSF program, the operating platform, and the timeframe). To learn more about the AFP Font collection, refer to *IBM AFP Fonts: Font Summary* and to *IBM AFP Fonts: Licensed Program Specification*. The AFP Font Collection contains the following fonts:

- IBM Expanded Core Fonts
  - Boldface
  - BookMaster Latin1
  - BookMaster Specials
  - Courier
  - Courier APL2
  - Gothic Katakana
  - Gothic Text
  - Helvetica
  - IBM Logo
  - Letter Gothic
  - Monthob (Thai in 240dpi raster only)
  - OCR(OCR-A and OCR-B)
  - Prestige
  - Times New Roman
- IBM Compatibility Fonts
- IBM 4028 Font Metrics

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<sup>15</sup> A pel is a pixel, picture element, or dot. The sequence of dots that form a character is called a *raster pattern*. The number of dots per inch that a printer generates is called the *print resolution* or pel density. A resolution of 240 pels means that a printer prints 240 pels per inch both vertically and horizontally, or 57 600 pels per square inch (240 x 240).

## IBM Font Structure and Terminology

In IBM font terminology, a font has three components:

- Coded font
- Font character set
- Code page

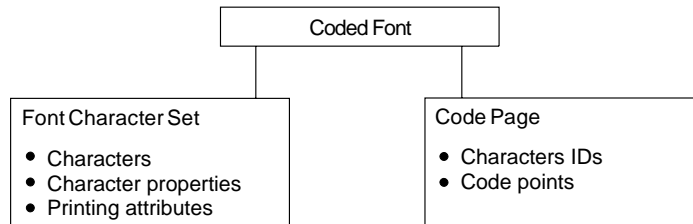


Figure 244. Font Components

**Note:** These terms have different meanings in Operating System/400 (OS/400) and are described in Figure 248 on page 378.

### Coded Font

A *coded font* translates your request for type (for example, text you previously entered at a computer terminal) into characters for printing. A coded font, which associates a specific code page with a specific font character, consists of two parts:

- References to specific font character sets
- References to specific code pages

A character must be included in the specified font character set and listed on the specified code page before it can be printed.

### Font Character Set

A *font character set* corresponds to the definition of a font; it contains the characters of a single type family, typeface, and type size. In addition, a font character set specifies *character properties* and printing attributes.

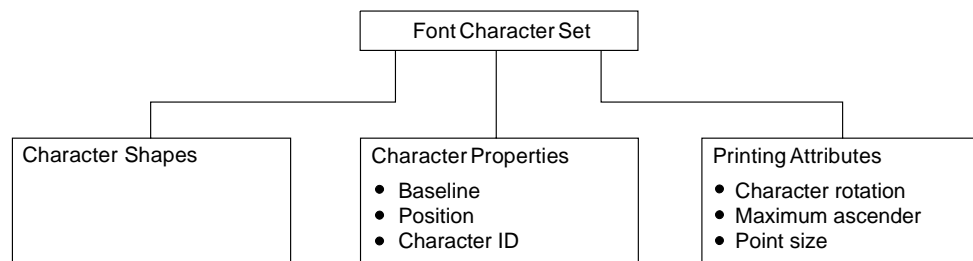


Figure 245. Composition of a Font Character Set

**Characters, Character Properties, and Printing Attributes:** Characters are the letters, numerals, punctuation marks, or other symbols of a font.

*Character properties* describe how a character is positioned relative to the characters around it. Some character properties include the following:

- The baseline of a character, showing its general alignment
- The dimensions of space in which the character is printed
- The position of the character within that space
- The identifier of the character (the character ID or graphic character ID)

Each character is assigned a character ID; for example, the character A (uppercase A) is assigned the character ID LA020000.

The purpose of a character ID is to distinguish the character from other, similar characters. For example, the following characters look similar; however, they are different and are assigned different character IDs:

Minus sign (-)	Character ID SA000000
Hyphen (-)	Character ID SP100000
Em dash (—)	Character ID SM900000

The *printing attributes* define how the font character set will be printed. Some printing attributes include rotation of characters, maximum ascender, and point size.

## Code Page

A *code page* maps each character of text to the characters in a font character set. Figure 246 shows how a code page maps text to the characters in a font character set. As you enter your text at a computer terminal, each keyboard character is translated into a *code point*. When the text is printed, each code point is matched to a character ID on the code page you specified. The character ID is then matched to the image (*raster pattern*) of the character in the font character set you specified. The image in the character set is the image that is printed in your text. To be a valid code page for a particular font character set, all character IDs in the code page must be included in that font character set.

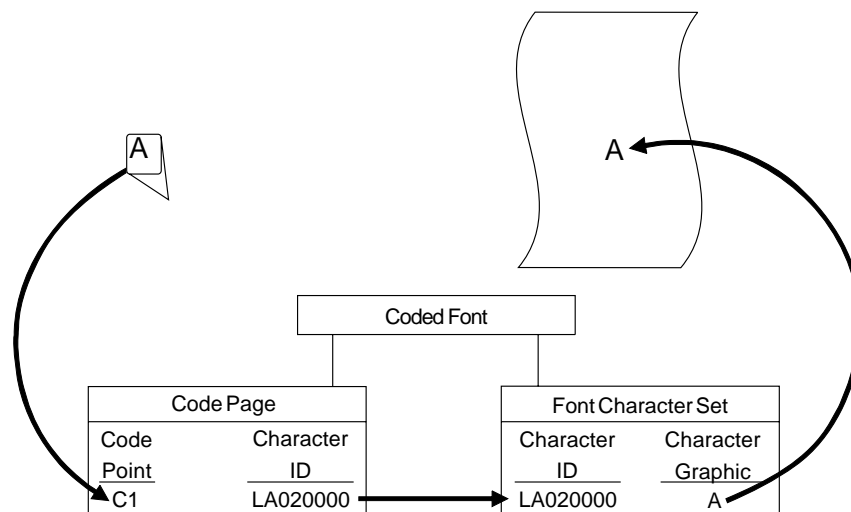


Figure 246. Translation of a Keyboard Character into a Printed Character

A character ID is an 8-byte character data string. A code point is an 8-bit binary number representing one of 256 potential characters (the maximum number of

characters available on a code page). Code points are usually shown as hexadecimal representations of their binary values.

Binary	11000001
Decimal	193
Hexadecimal	C1

Figure 247 shows an example of part of a code page. When the printer receives hexadecimal code point C1 for the code page shown (code page T1V10037), it prints an uppercase A (character ID LA020000). Baselines for each character on the example code page show the general alignment of characters.

### T1V10037 Country Extended: United States, Canada

CPGID	GCSGID	Undefined Code Point	Type
37	697	SP010000	ExpCore 4028 Compatibility Licensed Program

Hex Codes 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
<b>-0</b>	SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	μ SM170000	^ SD150000	{ SM110000	}	\ SM070000	0 ND100000
<b>-1</b>	SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
<b>-2</b>	â LA150000	ê LA150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
<b>-3</b>	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
<b>-4</b>	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
<b>-5</b>	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
<b>-6</b>	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000

Figure 247. Part of IBM Code Page T1V10037

### Different Code Pages

Code pages accommodate various national languages by using characters and special symbols appropriate to the language. Code pages can have identical character IDs assigned to different code points.

For example, the character é (lowercase e accent acute, character ID LE110000) has the following code point assignments in two different code pages:

- Hexadecimal code point 51 in code page T1V10037 (Country Extended: United States, Canada, Figure 247)
- Hexadecimal code point 5A in code page T1V10280 (Country Extended: Italy)

## Global Resource Identifier (GRID)

You will see the term *GRID* in the font tables, along with other acronyms such as CPGID, GCSGID, FGID, and so on. A GRID, or global resource identifier, is used by AFP printers to identify resident fonts and in OS/400 to identify fonts used in text.

A GRID identifies a font character-set (an 8-character name beginning with C0) and code-page (an 8-character name beginning with T1) combination. Font character sets contain the character shapes, and code pages map the code point used in text to obtain each character shape. A GRID consists of the following components:

- A graphic character set global identifier (GCSGID)
- A code page global identifier (CPGID)
- A font typeface global identifier (FGID)
- A font width (the width of the space character in 1/1440ths-inch units)

Character sets and code pages have separate GCSGIDs. A GCSGID merely identifies a list of characters, not whether the characters are large or small, plain or ornate, and so on. Not all printers or systems provide a GCSGID, meaning you might have to identify a code page by its CPGID alone.

## PSF/MVS-Specific Notes on Using Fonts

With PSF/MVS and PSF/VSE, to use printer-resident fonts, you must use the APSRMARK (MVS) and APTRMARK (VSE) utilities to mark the host equivalent fonts as PUBLIC, which tells the system to use the equivalent font stored in the printer, rather than downloading the host version of the font to the printer. If a host font is marked PRIVATE, PSF downloads it to the printer, because the printer does not contain the equivalent of the host PRIVATE font.

With shipment of the AFP Font Collection and relevant Outline Font APARs on March 31, 1995, the needs for marking fonts are as follows:

- If you are running PSF/MVS 2.2.0 with Outline Font APAR OW08340 and the AFP Font Collection, you do not need to run any APSRMARK jobs to mark either font character sets or code pages.
- If you are running PSF/MVS 2.1.0 or 2.1.1 with Outline Font APAR OW08340 and the AFP Font Collection, you need to run APSRMARK jobs on the font character sets and code pages, except for the 4028 Font Metrics, which are shipped already marked.
- If you are using fonts shipped prior to shipment of the AFP Font Collection and Outline Font APAR OW08340, and are running any level of PSF/MVS, you may need to run APSRMARK jobs to activate the printer resident fonts, except for the 4028 Font Metrics, which are already shipped premarked. You may not need to run APSRMARK to mark code pages, if they were shipped already marked.

## Font Terminology on the OS/400 Platform

Figure 248 lists the AFP font terminology and describes how it is used on the OS/400 platform.

*Figure 248. OS/400 Font Terminology*

<b>AFP Term</b>	<b>OS/400 AFP Implementation</b>	<b>OS/400 Print File Term</b>
Coded font	*FNTRSC object with CDEFNT attribute	Coded font
Font character set	*FNTRSC object with FNTCHRSET attribute	Font
Code page	*FNTRSC object with CDEPAG attribute	Character ID (CHRID) See note.

**Note:** This is not the character ID that identifies individual characters within a font character set. This is a control object that identifies a code page by two numbers representing a font character set ID and a code page ID.



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## Tables Listing Printer-Resident Fonts

This rest of this appendix contains tables listing fonts resident in specific printers. These fonts can be shipped on diskettes, cartridges, font cards, in printer microcode, or in some type of printer storage, depending on the printer. With PSF/MVS and PSF/VSE, you can mark these fonts using a utility to enable PSF to use them to process information. On PSF/MVS, the utility is called APSRMARK; on PSF/VSE, APTRMARK. PSF/VM, PSF/2, PSF/400, and PSF/6000 use tables to map resident fonts to the equivalent host fonts, providing access to the resident fonts on select printers.

### Notes:

1. The lists in this appendix of fonts resident in the printers may not be complete. Your printer may contain fonts not listed here. Also, your PSF libraries may contain host-equivalent fonts that are not resident in your printer. In either case, using fonts not listed in this section may produce unexpected results.
2. Some of the fonts listed in these tables are IBM font licensed programs, which may or may not be installed in your PSF font libraries. Before marking a font on PSF/MVS with APSRMARK or on PSF/VSE with APTRMARK, ensure that the host-equivalent font is available.
3. For some of the bold fonts listed, the bold printing is done by your printer. Refer to your printer publications for more information.
4. Some code pages or font character sets may not be available in your geographic area. For more information, see your IBM customer representative.
5. Fonts shipped with the IBM AFP Font Collection are already marked and do not have to be marked using APSRMARK or APTRMARK, thereby enabling you to use the fonts resident in the AFCCU printers.

## Abbreviations Used in the Tables

The tables throughout this appendix use the following abbreviations:

<b>DEC</b>	Decimal (a numbering system based on 10)
<b>FGID</b>	Font typeface global identifier
<b>FW</b>	Font width (the width of the space character in 1/1440ths-inch units)
<b>GCSGID</b>	Graphic character set global identifier
<b>GPGID</b>	Code page global identifier
<b>GRID</b>	Global resource identifier
<b>HEX</b>	Hexadecimal (a numbering system based on 16)
<b>IB</b>	Italic Bold
<b>IM</b>	Italic Medium
<b>Point</b>	Vertical height (number in 1/72 of an inch)
<b>PPDS</b>	Page Printer Data Stream
<b>PS</b>	Proportional Space Font
<b>RB</b>	Roman Bold
<b>RIDF</b>	Resource ID Format
<b>RL</b>	Roman Light
<b>RM</b>	Roman Medium
<b>RT</b>	Resource Type
<b>TYPO</b>	Typographic spacing (proportionally spaced, measured vertically in points [1/72 of an inch])

## Summary of AFP Printers and Supported Font Technologies

The following table shows the AFP-supported printers and the font technologies they support. The AFP font publications describe the downloaded fonts; the printer publications describe the fonts resident in each printer; this publication lists the resident fonts, to help you migrate print jobs from one printer to another.

Figure 249 (Page 1 of 2). Font Technologies Supported by AFP Printers

Printer	Single-Byte Raster 1	Single-Byte Outline	Single-Byte Symbol Set	Double-Byte Raster 2	Double-Byte Outline
<b>3130</b> 4	Downloaded 3, 11	Downloaded <b>Resident</b> 10 12		Downloaded <b>Resident</b>	Downloaded <b>Resident</b> (available Sept., 1995)
<b>3800</b>	Downloaded 5			Downloaded Models -6, -8 5	
<b>3812</b>	Downloaded <b>Resident</b> 6				
<b>3816</b>	Downloaded <b>Resident</b> 6				
<b>3820</b>	Downloaded			Downloaded <b>Resident</b> (RPQ 8A5014, MVS and VSE only)	
<b>3825</b>	Downloaded			Downloaded	
<b>3827</b>	Downloaded			Downloaded	
<b>3828</b>	Downloaded			Downloaded	
<b>3829</b>	Downloaded			Downloaded	
<b>3831</b>	Downloaded			Downloaded	
<b>3835-001</b> <b>3835-002</b>	Downloaded			Downloaded	
<b>3900-001</b>	Downloaded			Downloaded	
<b>3900-0W1</b> 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
<b>3900</b> Duplex 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
<b>3900 Wide</b> Duplex 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
<b>3912</b> <b>3916</b> 7	Downloaded <b>Resident</b>	9			
<b>3930</b>	Downloaded <b>Resident</b> 6	9		Downloaded	

Figure 249 (Page 2 of 2). Font Technologies Supported by AFP Printers

Printer	Single-Byte Raster 1	Single-Byte Outline	Single-Byte Symbol Set	Double-Byte Raster 2	Double-Byte Outline
3935 4	Downloaded 11	Downloaded <b>Resident</b> 10 12		Downloaded	
4019	Downloaded				
4028	Downloaded <b>Resident</b>				
4029	Downloaded	9			
4039 7	Downloaded	9			
4224			8		
4230			8		
4234			8		
64xx			8		

**Notes:**

- 1 A font in which the characters are defined by a 1-byte code point. A single-byte coded font has only one coded font section.
- 2 A font in which the characters are defined by 2 bytes; the first defining a coded font section, and the second defining a code point. Double-byte coded fonts are required to support languages requiring more than 256 graphic characters. Two bytes are required to identify each graphic character.
- 3 The AFP font publications describe downloaded fonts.
- 4 AFCCU printers contain essentially the same resident fonts, including a subset of the 4028 resident fonts. The 3130, however, ships double-byte resident raster fonts that are not shipped with the other AFCCU printers.
- 5 The 3800 is the only AFP printer that uses fonts only in unbounded-box format.
- 6 The 3812, 3816, and 3930 printers contain the same resident fonts, except for the additional 3930 PPDS fonts.
- 7 In non-IPDS mode, the 3912 and 3916 printers use the same resident fonts as the 4039.
- 8 See the individual chapters describing each printer. Included in each chapter is a table mapping printer-resident symbol sets to a similar PSF font.
- 9 These printers use resident outline fonts only when operating in PostScript-emulation mode or PCL5-emulation mode.
- 10 The fonts in the AFP Font Collection (the host equivalents of the AFCCU single-byte resident outline fonts) are already marked before being shipped; therefore, on PSF/MVS and PSF/VSE, you do not have to mark them using the APSRMARK and APTRMARK utilities.
- 11 On PSF/MVS 2.2.0 with APAR OW08340 applied, you can activate many of the AFCCU resident outline fonts by using marked host raster fonts.
- 12 The default font on the AFCCU printers is Courier Roman Medium 12 pitch (10 point), using code page 500, version 2. The GRID for the default font is FGID=416, GCSGID=1269, CPGID=500, and font width=120.

## Composite Resident Font Table

Figure 250 is a composite table containing the resident fonts available on the printers described in this publication. When a font ID is in parenthesis, you must also specify the font width. For additional information about each font, including any alternate FGIDs, see the individual printer font tables, which are listed later in this appendix.

Figure 250 (Page 1 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Adjutant 12	005F	0095					x		x
APL	0133	0307	x			x			
APL Bold	0142	0322	x			x			
APL 10	002D	0045		x				x	
APL 12	004C	0076	x			x	x		x
APL 20	0118	0280		x				x	
Aviv 20	011A	0282		x				x	
Barak Bold PS	00A8	0168						x	
Barak PS	00A7	0167		x				x	
Baskerville Bold Italic TYPO	21CB	8651					x		x
Baskerville Bold TYPO 10pt	214B	8523					x		x
Baskerville Bold TYPO 14pt	214B	8523					x		x
Baskerville Bold TYPO 18pt	214B	8523					x		x
Baskerville Italic TYPO	21B7	8631					x		x
Baskerville TYPO 6pt	2137	8503					x		x
Baskerville TYPO 8pt	2137	8503					x		x
Baskerville TYPO 10pt	2137	8503					x		x
Baskerville TYPO 12pt	2137	8503					x		x
Baskerville/Nasseem Bold Italic TYPO 12pt	22CB	8907					x		x
Baskerville/Nasseem Bold Italic TYPO 18pt	22CB	8907					x		x
Baskerville/Nasseem Bold Italic TYPO 24pt	22CB	8907					x		x
Baskerville/Nasseem Bold TYPO 12pt	224B	8779					x		x
Baskerville/Nasseem Bold TYPO 18pt	224B	8779					x		x
Baskerville/Nasseem Bold TYPO 24pt	224B	8779					x		x

Figure 250 (Page 2 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Baskerville/Nasseem Italic TYPO	22B7	8887					x		x
Baskerville/Nasseem TYPO	2237	8759					x		x
Boldface	4F00	20224	x			x			
Boldface Italic PS	009B	0155	x	x		x	x	x	x
Boldface PS	009F	0159	x			x	x		x
Boldface PS	00B0	0176						x	
Boldface/Barak PS	00A7	0167					x		x
Boldface/Nasseem Bold PS	224B	8779					x		
Boutros Typing Italic Bold	01AC	0428	x			x			
Boutros Typing Italic Medium	01A8	0424	x			x			
Boutros Typing Roman Bold	01A4	0420	x			x			
Boutros Typing Roman Medium	01A0	0416	x			x			
Century Schoolbook Bold Italic TYPO	42CB	17099					x		x
Century Schoolbook Bold TYPO 10pt	424B	16971					x		x
Century Schoolbook Bold TYPO 14pt	424B	16971					x		x
Century Schoolbook Bold TYPO 18pt	424B	16971							x
Century Schoolbook Italic TYPO	42B7	17079					x		x
Century Schoolbook TYPO 6pt	4237	16951					x		x
Century Schoolbook TYPO 8pt	4237	16951					x		x
Century Schoolbook TYPO 10pt	4237	16951					x		x
Century Schoolbook TYPO 12pt	4237	16951					x		x
Courier Bold 5	00F5	0245						x	
Courier Bold 10	002E	0046	x	x		x	x	x	x
Courier Bold 12	006C	0108		x			x	x	x
Courier Bold 17	00FD	0253						x	
Courier Italic Bold	01AC	0428	x			x			
Courier Italic Medium	01A8	0424	x			x			
Courier Italic 10	0012	0018	x	x		x	x	x	x
Courier Italic 12	005C	0092	x			x	x		x
Courier Roman Bold	01A4	0420	x			x			

Figure 250 (Page 3 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Courier Roman Medium	01A0	0416	x			x			
Courier 5	00F4	0244		x				x	
Courier 10	000B	0011	x	x		x	x	x	x
Courier 12	0055	0085	x	x		x	x	x	x
Courier 15	00DF	0223	x			x	x		x
Courier 17	00FC	0252	x	x		x		x	
Courier 17.1	00FE	0254	x	x		x	x	x	x
Courier/Nasseem Bold Italic 10	0040	0064					x		x
Courier/Nasseem Bold 7.9	010A	0266					x		x
Courier/Nasseem Bold 10	003F	0063					x		x
Courier/Nasseem Italic 7.9	010B	0267					x		x
Courier/Nasseem Italic 10	003E	0062					x		x
Courier/Nasseem Italic 12	0068	0104					x		x
Courier/Nasseem 10	003D	0061					x		x
Courier/Nasseem 12	0067	0103					x		x
Courier/Nasseem 15	00D5	0213					x		x
Courier/Nasseem 17.1	0117	0279					x		x
Courier/Shalom Bold 10	0032	0050					x		x
Courier/Shalom 10	0031	0049					x		x
Courier/Shalom 12	0062	0098					x		x
Courier/Shalom 15	00E2	0226					x		x
Cursive Bold Italic TYPO	A34B	41803					x		x
Cursive Bold Italic TYPO	A34B	41803					x		x
Cursive Italic TYPO	A337	41783					x		x
Cyrillic 22 10	000A	0010					x		x
Delegate 10	0002	0002					x		x
Document PS	00AF	0175		x				x	
Document PS	009F	0159							
Engravers' Old English TYPO 12pt	9237	37431					x		x
Engravers' Old English TYPO 14pt	9237	37431					x		x

Figure 250 (Page 4 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Engravers' Old English TYPO 18pt	9327	37431					x		x
Essay Bold PS	00A3	0163		x				x	
Essay Italic PS	00A2	0162		x			x	x	x
Essay Light PS	00AD	0173		x				x	
Essay PS	00A0	0160		x			x	x	x
Foundry Bold Italic PS	00C3	0195					x		x
Foundry Bold PS	00BF	0191					x		x
Foundry Italic PS	00C2	0194					x		x
Foundry PS	006E	0190					x		x
Futura Book Italic TYPO	83B7	33719					x		x
Futura Book TYPO 6pt	8337	33591					x		x
Futura Book TYPO 8pt	8337	33591					x		x
Futura Book TYPO 10pt	8337	33591					x		x
Futura Book TYPO 12pt	8337	33591					x		x
Futura Heavy Italic Bold TYPO	83C1	33729					x		x
Futura Heavy TYPO 10pt	8341	33601					x		x
Futura Heavy TYPO 14pt	8341	33601					x		x
Futura Heavy TYPO 18pt	8341	33601					x		x
Gothic Text	0130	0304	x			x			
Gothic Text Bold 10	0027	0039		x				x	
Gothic Text Bold 12	0045	0069		x				x	
Gothic Text Condensed 15	00E7	0231						x	
Gothic Text Italic 12	0044	0068		x				x	
Gothic Text TriPitch	00AE	0174						x	
Gothic Text 10	0028	0040		x				x	
Gothic Text 12	0042	0066		x				x	
Gothic Text 13	00CC	0204		x				x	
Gothic Text 15	00E6	0230		x				x	
Gothic Text 20	0119	0281		x				x	
Gothic Text 27	0122	0290		x				x	
Gothic (G16F)	D237	53815	x		x				
Gothic (G16K)	D237	53815	x						

Figure 250 (Page 5 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Gothic (G16P)	D237	53815	x						
Gothic (G16T)	D237	53815	x						
Gothic (G20F)	D235	53813	x						
Gothic (G24F)	D235	53813	x		x				
Gothic (G24K)	D235	53813	x						
Gothic (G32F)	D237	53815	x						
Gothic (G36F)	D237	53815	x						
Gothic (G40F)	D237	53815	x						
Gothic (G48F)	D237	53815	x						
Gothic (G64F)	D237	53815	x						
Gothic/Nasseem 20	011B	0283					x		x
Goudy Old Style Bold Italic TYPO	13CB	5067					x		x
Goudy Old Style Bold TYPO 10pt	134B	4939					x		x
Goudy Old Style Bold TYPO 14pt	134B	4939					x		x
Goudy Old Style Bold TYPO 18pt	134B	4939					x		x
Goudy Old Style Italic TYPO	13B7	5047					x		x
Goudy Old Style TYPO 6pt	1337	4919					x		x
Goudy Old Style TYPO 8pt	1337	4919					x		x
Goudy Old Style TYPO 10pt	1337	4919					x		x
Goudy Old Style TYPO 12pt	1337	4919					x		x
Helvetica Bold Italic TYPO	85CB	34251					x		x
Helvetica Bold TYPO 10pt	854B	34123					x		x
Helvetica Bold TYPO 14pt	854B	34123					x		x
Helvetica Bold TYPO 18pt	854B	34123					x		x
Helvetica Italic Bold	0903	2307	x			x			
Helvetica Italic Medium	0902	2306	x			x			
Helvetica Italic TYPO	85B7	34231					x		x
Helvetica Roman Bold	0901	2305	x			x			
Helvetica Roman Medium	0900	2304	x			x			



Figure 250 (Page 6 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Helvetica TYPO 6pt	8537	34103					x		x
Helvetica TYPO 8pt	8537	34103					x		x
Helvetica TYPO 10pt	8537	34103					x		x
Helvetica TYPO 12pt	8537	34103					x		x
Italics (I60F)	E2B7	58039	x						
ITC Boutros Modern Rokaa Italic Bold	0903	2307	x			x			
ITC Boutros Modern Rokaa Italic Medium	0902	2306	x			x			
ITC Boutros Modern Rokaa Roman Bold	0901	2305	x			x			
ITC Boutros Modern Rokaa Roman Medium	0900	2304	x			x			
ITC Boutros Setting Italic Bold	0907	2311	x			x			
ITC Boutros Setting Italic Medium	0906	2310	x			x			
ITC Boutros Setting Roman Bold	0905	2309	x			x			
ITC Boutros Setting Roman Medium	0904	2308	x			x			
Katakana Gothic	0130	0304	x			x			
Katakana Gothic 10	002C	0044		x				x	
Katakana 10	0015	0021					x		x
Katakana 12	004E	0078					x		x
Katakana 17.1	00F9	0249					x		x
Kateb 8	0109	0265		x				x	
Kateb 10	0021	0033		x				x	
Letter Gothic	0190	0400	x			x			
Letter Gothic Bold	0194	0404	x			x			
Letter Gothic Bold 12	006E	0110		x			x	x	x
Letter Gothic Italic 12	006D	0109					x		x
Letter Gothic 10	0024	0036					x		x
Letter Gothic 12	0057	0087		x			x	x	x
Letter Gothic 15	00DE	0222					x		x
Letter Gothic 17.1	00FF	0255					x		x
Letter Gothic 20	0119	0281	x			x	x		x
Letter Gothic 25	011D	0285					x		x
Letter Gothic/Aviv 20	011A	0282					x		x
Light Italic 12	005B	0091					x		x

Figure 250 (Page 7 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Modern PS	009E	0158					x		x
Math Symbol 10	001E	0030						x	
Math Symbol 12	0073	0115						x	
Mincho (M16F)	D137	53559	x						
Mincho (M24F)	D137	53559	x		x				
Mincho (M24K)	D137	53559	x						
Mincho (M26F)	D137	53559	x						
Mincho (M32F)	D137	53559	x		x				
Mincho (M32K)	D137	53559	x						
Mincho (M36F)	D137	53559	x						
Mincho (M36K)	D137	53559	x						
Mincho (M40F)	D137	53559	x		x				
Mincho (M40K)	D137	53559	x						
Mincho (M44F)	D137	53559	x						
Mincho (M48F)	D137	53559	x						
Mincho (M48K)	D137	53559	x						
Mincho (M52F)	D137	53559	x						
Mincho (M64F)	D337	53559	x						
Mincho (M64K)	D137	53559	x						
Mincho (Z24F)	D137	53559	x						
Ming (M24T)	D537	54583	x						
Ming (M32T)	D537	54583	x						
Ming (M40T)	D537	54583	x						
Narkiss Bold 8pt	(324B)	(12875)		x				x	
Narkiss Bold 10pt	(324B)	(12875)		x				x	
Narkiss Bold 12pt	(324B)	(12875)		x				x	
Narkiss Bold 16pt	(324B)	(12875)		x				x	
Narkiss Bold 24pt	(324B)	(12875)		x				x	
Narkiss 8pt	(3237)	(12855)		x				x	
Narkiss 10pt	(3237)	(12855)		x				x	
Narkiss 12pt	(3237)	(12855)		x				x	
Narkiss 16pt	(3237)	(12855)		x				x	
Narkiss 24pt	(3237)	(12855)		x				x	
Narkiss Tam Italic Bold	0903	2307	x			x			
Narkiss Tam Italic Medium	0902	2306	x			x			
Narkiss Tam Roman Bold	0901	2305	x			x			
Narkiss Tam Roman Medium	0900	2304	x			x			
Narkissim Italic Bold	0907	2311	x			x			

Figure 250 (Page 8 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Narkissim Italic Medium	0906	2310	x			x			
Narkissim Roman Bold	0905	2309	x			x			
Narkissim Roman Medium	0904	2308	x			x			
OCR A	0131	0305	x			x			
OCR A 10	0013	0019	x	x		x	x	x	x
OCR B	0132	0306	x			x			
OCR B 10	0003	0003	x	x		x	x	x	x
Official (O40F)	E137	57655	x						
Official (O60F)	E137	57655	x						
Olde World 12	0060	0096					x		x
Optima Bold Italic TYPO	82CB	33483					x		x
Optima Bold TYPO 10pt	8237	33335					x		x
Optima Bold TYPO 14pt	824B	33355					x		x
Optima Bold TYPO 18pt	824B	33355					x		x
Optima Italic TYPO	82B7	33463					x		x
Optima TYPO 6pt	8237	33335					x		x
Optima TYPO 8pt	8237	33335					x		x
Optima TYPO 10pt	824B	33355					x		x
Optima TYPO 12pt	8237	33335					x		x
Orator Bold 6.5	01B3	0435					x		x
Orator Bold 8.1	01B2	0434					x		x
Orator Bold 10	0026	0038		x				x	
Orator 10	0005	0005		x			x	x	x
Palatino Bold Italic TYPO	18CB	6347					x		x
Palatino Bold TYPO 10pt	184B	6219					x		x
Palatino Bold TYPO 14pt	184B	6219					x		x
Palatino Bold TYPO 18pt	184B	6219					x		x
Palatino Italic TYPO	18B7	6327					x		x
Palatino TYPO 6pt	1837	6199					x		x
Palatino TYPO 8pt	1837	6199					x		x
Palatino TYPO 10pt	1837	6199					x		x

Figure 250 (Page 9 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Palatino TYPO 12pt	1837	6199					x		x
Pi specials sans serif 8pt	(C237)	(49719)		x				x	
Presenter 10	0019	0025					x		x
Press Roman Bold Italic PS	00BD	0189					x		x
Press Roman Bold PS	00BB	0187					x		x
Press Roman Italic PS	00BC	0188					x		x
Press Roman PS	00BA	0186					x		x
Prestige	01B0	0432	x			x			
Prestige Bold	013E	0318	x			x			
Prestige Bold 10	003C	0060						x	
Prestige Bold 12	006F	0111	x	x		x	x	x	x
Prestige Italic	013F	0319	x			x			
Prestige Italic 12	0070	0112	x	x		x	x	x	x
Prestige PS	00A4	0164					x		x
Prestige 10	000C	0012	x	x		x	x	x	x
Prestige 12	0056	0086	x	x		x	x	x	x
Prestige 15	00DD	0221	x			x	x		x
Prestige 17.1	0100	0256	x			x	x		x
Roman Text 10	0029	0041		x				x	
R-Gothic (R36F)	D337	54071	x						
R-Gothic (R40F)	D337	54071	x						
R-Gothic (R48F)	D337	54071	x						
R-Gothic (R64F)	D337	54071	x						
Script 12	0054	0084		x			x	x	x
Serif Text Bold 12	0048	0072						x	
Serif Text Italic 10	002B	0043		x				x	
Serif Text Italic 12	0047	0071		x				x	
Serif Text 10	002A	0042		x				x	
Serif Text 12	0046	0070		x				x	
Serif Text 15	00E5	0229		x				x	
Shalom Bold Condensed 15	00E2	0226						x	
Shalom Bold Condensed 15	00EA	0234						x	
Shalom Bold 10	0032	0050						x	
Shalom Bold 12	0065	0101						x	
Shalom Bold 15	00D4	0212		x				x	
Shalom Condensed 15	00E2	0226		x				x	

Figure 250 (Page 10 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Shalom Italic Bold	01AC	0428	x			x			
Shalom Italic Medium	01A8	0424	x			x			
Shalom Roman Bold	01A4	0420	x			x			
Shalom Roman Medium	01A0	0416	x			x			
Shalom 10	0031	0049		x				x	
Shalom 12	0062	0098		x				x	
Shalom 15	00D3	0211		x				x	
Song (S26P)	D437	54327	x						
Song (S32P)	D437	54327	x						
Song (S40P)	D437	54327	x						
Sonoran Serif Bold 9pt	(114B)	(4427)		x				x	
Sonoran Serif Bold 10pt	041D	1053		x				x	
Sonoran Serif Bold 14pt	(114B)	(4427)		x				x	
Sonoran Serif Bold 16pt	0675	1653		x				x	
Sonoran Serif Bold 18pt	(114B)	(4427)						x	
Sonoran Serif Bold 20pt	0837	2103		x				x	
Sonoran Serif Bold 24pt	0837	2103		x				x	
Sonoran Serif Italic Bold 9pt	(11CB)	(4555)		x				x	
Sonoran Serif Italic Bold 10pt	(11CB)	(4555)		x				x	
Sonoran Serif Italic Bold 12pt	(11CB)	(4555)		x				x	
Sonoran Serif Italic Bold 18pt	(11CB)	(4555)		x				x	
Sonoran Serif Italic Bold 20pt	(11CB)	(4555)		x				x	
Sonoran Serif Italic 9pt	(11B7)	(4535)		x				x	
Sonoran Serif Italic 10pt	0420	1056		x				x	
Sonoran Serif Italic 11pt	(11B7)	(4535)		x				x	
Sonoran Serif 6pt	(1137)	(4407)		x				x	
Sonoran Serif 8pt	02EF	0751		x				x	
Sonoran Serif 9pt	(1137)	(4407)	x	x		x		x	
Sonoran Serif 10pt	041B	1051		x				x	
Sonoran Serif 11pt	(1137)	(4407)		x				x	

Figure 250 (Page 11 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Sonoran Serif 12pt	0547	1351		x				x	
Testimonial TYPO 12pt	1737	5943					x		x
Testimonial TYPO 14pt	1737	5943					x		x
Testimonial TYPO 18pt	1737	5943					x		x
Times New Roman Bold	0905	2309	x			x			
Times New Roman Italic Bold	0907	2311	x			x			
Times New Roman Italic Medium	0906	2310	x			x			
Times New Roman Medium	0904	2308	x			x			
Times Roman Bold Italic TYPO 10pt	16CB	5835	x			x	x		x
Times Roman Bold Italic TYPO 12pt	16CB	5835	x			x	x		x
Times Roman Bold TYPO 10pt	164B	5707	x			x	x		x
Times Roman Bold TYPO 12pt	164B	5707	x			x	x		x
Times Roman Bold TYPO 14pt	164B	5707	x			x	x		x
Times Roman Bold TYPO 18pt	164B	5707	x			x	x		x
Times Roman Bold TYPO 24pt	164B	5707	x			x	x		x
Times Roman Italic TYPO 10pt	16B7	5815	x			x	x		x
Times Roman Italic TYPO 12pt	16B7	5815	x			x	x		x
Times Roman TYPO 6pt	1637	5687	x			x	x		x
Times Roman TYPO 8pt	1637	5687	x			x	x		x
Times Roman TYPO 10pt	1637	5687	x			x	x		x
Times Roman TYPO 12pt	1637	5687	x			x	x		x
Title PS	009D	0157					x		x
Times Roman/Narkissim Bold TYPO 8pt	324B	12875					x		x
Times Roman/Narkissim Bold TYPO 10pt	324B	12875					x		x

Figure 250 (Page 12 of 12). Resident Fonts and the Printers That Support Them

Typeface, Pitch, and (if needed) Point (pt)	FGID HEX	FGID DEC	3130 AFCCU	3812 3816	3820	39xx AFCCU	3912 3916	3930	4028
Times Roman/Narkissim Bold TYPO 12pt	324B	12875					x		x
Times Roman/Narkissim Bold TYPO 18pt	324B	12875					x		x
Times Roman/Narkissim Bold TYPO 24pt	324B	12875					x		x
Times Roman/Narkissim TYPO 8pt	3237	12855					x		x
Times Roman/Narkissim TYPO 10pt	3237	12855					x		x
Times Roman/Narkissim TYPO 12pt	3237	12855					x		x
Yasmin Expanded PS	00A9	0169		x				x	
Yasmin PS	00A6	0166		x				x	

**Note:** The Prestige Proportional Spaced font (FGID 164) is **not** supported as a resident font.

## Fonts Resident in the 3812 and 3816 Printers

The following tables list fonts resident in the 3812 and 3816 printers. These resident fonts are similar to the fonts resident in the 3930 printer, although the 3930 contains 14 additional fonts available only in 3930 PPDS mode. When a font ID is in parenthesis, you must also specify the font width.

The MVS APSRMARK and the VSE APTRMARK jobs to mark the host equivalents of the 381x resident fonts are as follows:

*Figure 251. PSF/MVS APSRMARK and PSF/VSE APTRMARK Jobs for 381x Fonts*

381x Font Source	PSF/MVS Job	PSF/VSE Job
3270 IDS	APSWMSTD	APTSMSTD
DCF/GML	APSWGML	APTSMGML
Language Group 2	APSWMLG2	APTSMLG2
Language Group 3	APSWMLG3	APTSMLG3
Language Group 4	APSWMLG4	APTSMLG4
All of the fonts	APSWMGR4	none
5219 fonts	none	none

*Figure 252 (Page 1 of 4). 3812/3816 Resident Fonts. 3812/3816 resident fonts are available on 3270 IDS, DCF/GML, 5219 Emulation, or Language Groups (LG) diskettes, cartridges, or font cards.*

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	3270 IDS	DCF or GML	5219 or LG	Font Character Set
APL 10	002D	0045	0090	0144	x			C0S0AE10
APL 20	0118	0280	0048	0072	x			C0S0AE20
Aviv 20	011A	0282	0048	0072			x	
Barak PS	00A7	0167	0078	0120			x	C0H0BRK12
Boldface Italic PS	009B	0155	0078	0120	x			C0S0BITR C0S0BRTR
Courier Bold 10	002E	0046	0090	0144	x	x		C0S0CB10 C0S0OCB0
Courier Bold 12	006C	0108	0078	0120	x			C0S0CB12
Courier Italic 10	0012	0018	0090	0144	x			C0S0CI10
Courier 5	00F4	0244	0120	0288			x	
Courier 10	000B	0011	0090	0144	x	x		C0S0CR10
Courier 12	0055	0085	0078	0120	x			C0S0CE12 C0S0CR12
Courier 17	00FC	0252	0054	0084			x	
Courier 17.1	00FE	0254	0054	0084			x	



Figure 252 (Page 2 of 4). 3812/3816 Resident Fonts. 3812/3816 resident fonts are available on 3270 IDS, DCF/GML, 5219 Emulation, or Language Groups (LG) diskettes, cartridges, or font cards.

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	3270 IDS	DCF or GML	5219 or LG	Font Character Set
Document PS	00AF	0175	0078	0120	x			C0S0DOTR
Essay Bold PS	00A3	0163	0078	0120	x			C0S0EBTR
Essay Italic PS	00A2	0162	0078	0120	x			C0S0EITR
Essay Light PS	00AD	0173	0078	0120	x			C0S0ELTR
Essay PS	00A0	0160	0078	0120	x			C0S0ESTR
Gothic Text Bold 10	0027	0039	0090	0144	x	x		C0D0GB10
Gothic Text Bold 12	0045	0069	0078	0120	x	x		C0D0GB12
Gothic Text Italic 12	0044	0068	0078	0120	x		x	C0D0GI12
Gothic Text 10	0028	0040	0090	0144	x	x		C0D0GT10
Gothic Text 12	0042	0066	0078	0120	x	x		C0D0GT12
Gothic Text 13	00CC	0204	006C	0108	x	x		C0S0D224
Gothic Text 15	00E6	0230	0060	0096	x	x		C0D0GT15
Gothic Text 20	0119	0281	0048	0072	x	x		C0D0GT20
Gothic Text 27	0122	0290	0036	0054	x	x		C0D0GT24
Katakana Gothic 10	002C	0044	0090	0144	x			C0L0KATA
Kateb 8	0109	0265	00B4	0100			x	C0ARAB08
Kateb 10	0021	0033	0090	0144			x	C0ARAB10
Letter Gothic Bold 12	006E	0110	0078	0120	x			C0S0LB12
Letter Gothic 12	0057	0087	0078	0120	x			C0S0LR12
Narkiss Bold 8pt	(324B)	(12875)	0054	0036			x	
Narkiss Bold 10pt	(324B)	(12875)	0042	0066			x	
Narkiss Bold 12pt	(324B)	(12875)	004E	0078			x	
Narkiss Bold 16pt	(324B)	(12875)	006C	0108			x	
Narkiss Bold 24pt	(324B)	(12875)	00A2	0162			x	
Narkiss 8pt	(3237)	(12855)	0036	0054			x	
Narkiss 10pt	(3237)	(12855)	0042	0066			x	
Narkiss 12pt	(3237)	(12855)	004E	0078			x	
Narkiss 16pt	(3237)	(12855)	006C	0108			x	
Narkiss 24pt	(3237)	(12855)	00A2	0162			x	
OCR A 10	0013	0019	0090	0144	x			C0L00AOA
OCR B 10	0003	0003	0090	0144	x			C0L00BOA
Orator Bold 10	0026	0038	0090	0144	x			C0S0OB10
Orator 10	0005	0005	0090	0144	x			C0S0OR10
Pi Specials Sans Serif 8pt	C237	49719	0036	0054		x		C0P05580
Prestige Bold 12	006F	0111	0078	0120	x	x		C0S0PB12
Prestige Italic 12	0070	0112	0078	0120	x			C0S0PI12

Figure 252 (Page 3 of 4). 3812/3816 Resident Fonts. 3812/3816 resident fonts are available on 3270 IDS, DCF/GML, 5219 Emulation, or Language Groups (LG) diskettes, cartridges, or font cards.

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	3270 IDS	DCF or GML	5219 or LG	Font Character Set
Prestige 10	000C	0012	0090	0144			x	C0S0PR10
Prestige 12	0056	0086	0078	0120	x	x		C0S0PR12
Roman Text 10	0029	0041	0090	0144			x	
Script 12	0054	0084	0078	0120	x			C0S0SR12
Serif Text Italic 10	002B	0043	0090	0144			x	
Serif Text Italic 12	0047	0071	0078	0120	x		x	
Serif Text 10	002A	0042	0090	0144			x	
Serif Text 12	0046	0070	0078	0120	x		x	
Serif Text 15	00E5	0229	0060	0096			x	
Shalom Bold 15	00D4	0212	0060	0096			x	
Shalom Condensed 15	00E2	0226	0060	0096			x	
Shalom 10	0031	0049	0090	0144			x	C0H0HB10
Shalom 12	0062	0098	0078	0120			x	C0H0HB12
Shalom 15	00D3	0211	0060	0096			x	C0H0HB15
Sonoran Serif Bold 9pt	(114B)	(4427)	003C	0060		x		C0T07590
Sonoran Serif Bold 10pt	041D (114B)	1053 (4427)	0042	0066	x	x		C0T07500
Sonoran Serif Bold 14pt	(114B)	(4427)	0060	0096		x		C0T075D0
Sonoran Serif Bold 16pt	0675 (114B)	1653 (4427)	006C	0108	x		x	C0T075F0
Sonoran Serif Bold 20pt	(114B)	(4427)	0084	0132		x		C0T075J0
Sonoran Serif Bold 24pt	837 (114B)	2103 (4427)	00A2	0162	x	x	x	C0T075N0
Sonoran Serif Italic Bold 9pt	(11CB)	(4555)	003C	0060		x		C0T17590
Sonoran Serif Italic Bold 10pt	(11CB)	(4555)	0042	0066	x	x		C0T17500
Sonoran Serif Italic Bold 12pt	(11CB)	(4555)	004E	0078		x		C0T175B0
Sonoran Serif Italic Bold 18pt	(11CB)	(4555)	0078	0120		x		C0T175H0
Sonoran Serif Italic Bold 20pt	(11CB)	(4555)	0084	0132		x		C0T175J0
Sonoran Serif Italic 9pt	(11B7)	(4535)	003C	0060		x		C0T15590
Sonoran Serif Italic 10pt	0420 (11B7)	1056 (4535)	0042	0066	x	x	x	C0T15500

Figure 252 (Page 4 of 4). 3812/3816 Resident Fonts. 3812/3816 resident fonts are available on 3270 IDS, DCF/GML, 5219 Emulation, or Language Groups (LG) diskettes, cartridges, or font cards.

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	3270 IDS	DCF or GML	5219 or LG	Font Character Set
Sonoran Serif Italic 11pt	(11B7)	(4535)	0048	0072		x		C0T155A0
Sonoran Serif 6pt	(1137)	(4407)	002A	0042		x		C0T05560
Sonoran Serif 8pt	02EF (1137)	0751 (4407)	0036	0054	x		x	C0T05580
Sonoran Serif 9pt	(1137)	(4407)	003C	0060		x		C0T05590
Sonoran Serif 10pt	041B (1137)	1051 (4407)	0042	0066	x	x	x	C0T05500
Sonoran Serif 11pt	(1137)	(4407)	0048	0072		x		C0T055A0
Sonoran Serif 12pt	0547 (1137)	1351 (4407)	004E	0078	x	x	x	C0T055B0
Yasmin Expanded PS	00A9	0169	0078	0120			x	C0YASEXP
Yasmin PS	00A6	0166	0078	0120			x	C0YASMIN

Figure 253 contains the country names and code pages for the 3812/3816 3270 IDS and DCF/GML diskettes, cartridges, or font cards. The lists for 3270 IDS and DCF/GML are essentially the same, except that the 3270 IDS contains 4 more code pages, which are indicated by superscripts (1) in the table.

<i>Figure 253 (Page 1 of 2). 3812/3816 Code Pages</i>			
<b>Country or Name</b>	<b>CPGID HEX</b>	<b>CPGID DEC</b>	<b>Code Page</b>
United States	0025	0037	T1GDP037 or T1V10037
Canadian Bilingual	0025	0037	T1GDP037 or T1V10037
International Set 1	0100	0256	T1GDP256
Austria/Germany	0111	0273	T1GDP273 or T1V10273
Belgium	0112	0274	T1GDP274 or T1V10274
Brazil	0113	0275	T1GDP275 or T1V10275
Denmark/Norway	0115	0277	T1GDP277 or T1V10277
Finland/Sweden	0116	0278	T1GDP278 or T1V10278
Italy	0118	0280	T1GDP280 or T1V10280
Japan (English)	0119	0281	T1GDP281 or T1V10281
Portugal	011A	0282	T1GDP282 or T1V10282
Spanish	011C	0284	T1GDP284 or T1V10284
Spanish Speaking	011C	0284	T1GDP284 or T1V10284
United Kingdom	011D	0285	T1GDP285 or T1V10285
Japan - Katakana <sup>1</sup>	0122	0290	T1L02773 or T1L02774
APL <sup>1</sup>	0125	0293	T1S0AE10
France	0129	0297	T1GDP279 or T1V10297
International Typographic 500	0169	0361	T1GI0361
Austria/Germany	017E	0382	T1GI0382
Belgium	017F	0383	T1GI0383
Brazil	0180	0384	T1GI0384
Canadian French	0181	0385	T1GI0385
Denmark/Norway	0182	0386	T1GI0386
Finland/Sweden	0183	0387	T1GI0387
France/Luxembourg	0184	0388	T1GI0388
Italy	0185	0389	T1GI0389
Japan - Latin	0186	0390	T1GI0390
Portugal	0187	0391	T1GI0391
Spain/Phillipines	0188	0392	T1GI0392
Spanish Speaking	0189	0393	T1GI0393
United Kingdom	018A	0394	T1GI0394
United States	018B	0395	T1GI0395
Personal Computer	01B5	0437	T1GPI363
International Set 5	01F4	0500	T1V10500
OCR-A <sup>1</sup>	037C	0892	T1L0OCR1
OCR-B <sup>1</sup>	037D	0893	T1L0OCRB
DCF Rel 2 Compatibility	03EA	1002	T1001002

<i>Figure 253 (Page 2 of 2). 3812/3816 Code Pages</i>			
Country or Name	CPGID HEX	CPGID DEC	Code Page
U.S.Text Subset	03EB	1003	T1DCDCFS
<b>Notes:</b>			
<ul style="list-style-type: none"> <li>• The GCSGID for all these code pages is 0000.</li> <li>• 1Only on the 3270 IDS diskettes, cartridges, or font cards.</li> </ul>			

## 3820 Resident Fonts

Figure 254 lists five 3820 double-byte resident fonts available in RPQ 8A5014. This RPQ was available only on PSF/MVS and PSF/VSE. The MVS APSRMARK job to mark the host equivalents of these fonts is APSWMROM; the VSE APTRMARK job is APTSMROM.

<i>Figure 254. 3820 DBCS Raster Resident Fonts</i>							
Typeface and Pitch	FGID HEX	FGID DEC	Point	FW HEX	FW DEC	GCSGID	CPGID
Gothic (G16F)	D237	53815	5	0064	0100	370	300
Gothic (G24F)	D235	53813	7	008C	0140	370	300
Mincho (M24F)	D137	53559	7	008C	0140	370	300
Mincho (M32F)	D137	53559	10	00B4	0180	370	300
Mincho (M40F)	D137	53559	12	00F0	0240	370	300

## Fonts Resident in the AFCCU Printers

This section lists the resident fonts and code pages for the AFCCU printers: 3130, 3900 Duplex, 3900-0W1, 3900 Wide Duplex, and 3935. The AFCCU printers support the resident fonts as *Type 1 scalable outline fonts*, depending on the PSF support. The default font is Courier Roman Medium 12 pitch (10 point), using code page 500, version 2. The GRID for the default font is FGID=416, GCSGID=1269, CPGID=500, and font width=120. The host equivalents of the AFCCU resident fonts are shipped in the IBM AFP Font Collection and are marked PUBLIC, so that on PSF/MVS 2.2.0 with APAR OW08340, you can use them to activate the printer resident fonts. You do not need to run any APSRMARK jobs to mark them.

If the IBM AFP Font Collection is not installed, you can run the following APSRMARK jobs on PSF/MVS to mark the host equivalents of the resident fonts: APSWMC PG, APSWMCR, APSWMHLV, APSWMTNR, and APSW4028.

### Activating Resident Fonts in the AFCCU Printers

Use one of the following IPDS commands to activate resident fonts in the AFCCU printers.

**Load Font Equivalence Command:** The Load Font Equivalence (LFE) command maps font local identifiers specified in text, graphics, or bar code data, to font Host Assigned IDs (HAIDs) and to Global Resource IDs (GRIDs). If the GRID specified in the LFE command matches a GRID contained in the printer, the font is activated.

**Activate Resource (Load Resource Equivalence) Command:** The Activate Resource (AR) command (previously known as Load Resource Equivalence) maps Host Assigned IDs to global names of another format. The format for the global name is identified by a resource type and resource ID combination. If the printer contains a font that matches the global name in the AR command, that font is activated.

Figure 255 shows the combinations of resource types (RT) and resource ID formats (RIDF) supported by the AFCCU printers.

*Figure 255. Resource Type and Resource ID Formats*

Resource Type	RT HEX	Resource ID Format	RIDF HEX
Single-Byte Coded Raster Font	X'01'	IBM GRID	X'03'
Single-Byte Coded Raster Font	X'01'	MVS Host Unalterable	X'06'
Code Page	X'06'	IBM Grid	X'03'
Font Character Set	X'07'	Coded Font Format	X'07'
Single-Byte Coded Font Index	X'08'	IBM GRID	X'03'
Single-Byte Coded Font Index	X'08'	MVS Host Unalterable	X'06'
Coded Font	X'10'	Coded Font Format	X'07'
Coded Font	X'10'	IBM GRID	X'03'

## IBM Expanded Core Fonts Resident in the AFCCU Printers

The Expanded Core Fonts shown in Figure 256 through Figure 262 on page 404 are supported as resident, scalable fonts. These tables show the valid Font Global ID (FGID) and code pages for each font.

**XOA-RRL Replies for Font Character Sets:** The resident font set supports a font character set of any valid font width when queried as an individual font character set. When queried for a list of font character sets, using Execute Order Anytime (XOA)-Request Resource List (RRL), the resident character sets are reported with a font width of zero. A font width of zero indicates that the font is scalable. All of the following fonts are scalable.

See Figure 264 on page 405 for the code pages associated with these fonts.

*Figure 256. Arabic Expanded Core Fonts*

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	Font Character Set
Boutros Typing Roman Bold	01A4	0420	04F0	1264	CZ4404
Boutros Typing Roman Medium	01A0	0416	04F0	1264	CZ4204
Boutros Typing Italic Bold	01AC	0428	04F0	1264	CZ4504
Boutros Typing Italic Medium	01A8	0424	04F0	1264	CZ4304
ITC Boutros Modern Rokaal Italic Bold	0903	2307	04F0	1264	CZH504
ITC Boutros Modern Rokaal Italic Medium	0902	2306	04F0	1264	CZH304
ITC Boutros Modern Rokaal Roman Bold	0901	2305	04F0	1264	CZH404
ITC Boutros Modern Rokaal Roman Medium	0900	2304	04F0	1264	CZH204
ITC Boutros Setting Italic Bold	0907	2311	04F0	1264	CZN504
ITC Boutros Setting Italic Medium	0906	2310	04F0	1264	CZN304
ITC Boutros Setting Roman Bold	0905	2309	04F0	1264	CZN404
ITC Boutros Setting Roman Medium	0904	2308	04F0	1264	CZN204

*Figure 257 (Page 1 of 2). Hebrew Expanded Core Fonts*

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	Font Character Set
Narkissim Italic Bold	0907	2311	04F1	1265	CZN505
Narkissim Italic Medium	0906	2310	04F1	1265	CZN305
Narkissim Roman Bold	0905	2309	04F1	1265	CZN405
Narkissim Roman Medium	0904	2308	04F1	1265	CZN205

Figure 257 (Page 2 of 2). Hebrew Expanded Core Fonts

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	Font Character Set
Narkiss Tam Italic Bold	0903	2307	04F1	1265	CZH505
Narkiss Tam Italic Medium	0902	2306	04F1	1265	CZH305
Narkiss Tam Roman Bold	0901	2305	04F1	1265	CZH405
Narkiss Tam Roman Medium	0900	2304	04F1	1265	CZH205
Shalom Italic Bold	01AC	0428	04F1	1265	CZ4505
Shalom Italic Medium	01A8	0424	04F1	1265	CZ4305
Shalom Roman Bold	01A4	0420	04F1	1265	CZ4405
Shalom Roman Medium	01A0	0416	04F1	1265	CZ4205

Figure 258. Latin1 Expanded Core Fonts

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	Font Character Set
Boldface	4F00	20224	07F7	2039	CZ8400
Courier Italic Bold	01AC	0428	04F5	1269	CZ4500
Courier Italic Medium	01A8	0424	04F5	1269	CZ4300
Courier Roman Bold	01A4	0420	04F5	1269	CZ4400
Courier Roman Medium	01A0	0416	04F5	1269	CZ4200
Gothic Text	0130	304	07F7	2039	CZ6200
Helvetica Italic Bold	0903	2307	04F5	1269	CZH500
Helvetica Italic Medium	0902	2306	04F5	1269	CZH300
Helvetica Roman Bold	0901	2305	04F5	1269	CZH400
Helvetica Roman Medium	0900	2304	04F5	1269	CZH200
Letter Gothic	0190	400	07F7	2039	CZ5200
Letter Gothic Bold	0194	404	07F7	2039	CZ5400
Prestige	01B0	432	07F7	2039	CZ7200
Prestige Bold	013E	318	07F7	2039	CZ7400
Prestige Italic	013F	319	07F7	2039	CZ7300
Times New Roman Bold	0905	2309	04F5	1269	CZN400
Times New Roman Italic Bold	0907	2311	04F5	1269	CZN500
Times New Roman Italic Medium	0906	2310	04F5	1269	CZN300
Times New Roman Medium	0904	2308	04F5	1269	CZN200



Figure 259. Latin2/3/5 Expanded Core Fonts

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	Font Character Set
Courier Italic Bold	01AC	0428	04F5	1269	CZ4502
Courier Italic Medium	01A8	0424	04F5	1269	CZ4302
Courier Roman Bold	01A4	0420	04F5	1269	CZ4402
Courier Roman Medium	01A0	0416	04F5	1269	CZ4202
Helvetica Italic Bold	0903	2307	04F5	1269	CZH500
Helvetica Italic Medium	0902	2306	04F5	1269	CZH302
Helvetica Roman Bold	0901	2305	04F5	1269	CZH402
Helvetica Roman Medium	0900	2304	04F5	1269	CZH202
Times New Roman Bold	0905	2309	04F5	1269	CZN402
Times New Roman Italic Bold	0907	2311	04F5	1269	CZN502
Times New Roman Italic Medium	0906	2310	04F5	1269	CZN302
Times New Roman Medium	0904	2308	04F5	1269	CZN202

Figure 260. Latin4 Expanded Core Fonts

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	Font Character Set
Courier Italic Bold	01AC	0428	04F5	1269	CZ4507
Courier Italic Medium	01A8	0424	04F5	1269	CZ4307
Courier Roman Bold	01A4	0420	04F5	1269	CZ4407
Courier Roman Medium	01A0	0416	04F5	1269	CZ4207
Helvetica Italic Bold	0903	2307	04F5	1269	CZH507
Helvetica Italic Medium	0902	2306	04F5	1269	CZH307
Helvetica Roman Bold	0901	2305	04F5	1269	CZH407
Helvetica Roman Medium	0900	2304	04F5	1269	CZH207
Times New Roman Bold	0905	2309	04F5	1269	CZN407
Times New Roman Italic Bold	0907	2311	04F5	1269	CZN507
Times New Roman Italic Medium	0906	2310	04F5	1269	CZN307
Times New Roman Medium	0904	2308	04F5	1269	CZN207

*Figure 261. Symbols Expanded Core Fonts*

<b>Typeface</b>	<b>FGID HEX</b>	<b>FGID DEC</b>	<b>GCSGID HEX</b>	<b>GCSGID DEC</b>	<b>Font Character Set</b>
Courier Roman Bold	01A4	0420	04FB	1275	CZ4401
Courier Roman Medium	01A0	0416	04FB	1275	CZ4201
Helvetica Roman Bold	0901	2305	04FB	1275	CZH401
Helvetica Roman Medium	0900	2304	04FB	1275	CZH201
Times New Roman Bold	0905	2309	04FB	1275	CZN401
Times New Roman Medium	0904	2308	04FB	1275	CZN201

*Figure 262. Cyrillic Greek Expanded Core Fonts*

<b>Typeface</b>	<b>FGID HEX</b>	<b>FGID DEC</b>	<b>GCSGID HEX</b>	<b>GCSGID DEC</b>	<b>Font Character Set</b>
Courier Italic Bold	01AC	0428	0514	1300	CZ4503
Courier Italic Medium	01A8	0424	0514	1300	CZ4303
Courier Roman Bold	01A4	0420	0514	1300	CZ4403
Courier Roman Medium	01A0	0416	0514	1300	CZ4203
Helvetica Italic Bold	0903	2307	0514	1300	CZH503
Helvetica Italic Medium	0902	2306	0514	1300	CZH303
Helvetica Roman Bold	0901	2305	0514	1300	CZH403
Helvetica Roman Medium	0900	2304	0514	1300	CZH203
Times New Roman Bold	0905	2309	0514	1300	CZN403
Times New Roman Italic Bold	0907	2311	0514	1300	CZN503
Times New Roman Italic Medium	0906	2310	0514	1300	CZN303
Times New Roman Medium	0904	2308	0514	1300	CZN203

Figure 263 lists the scalable OCR, APL, and Katakana fonts resident in the AFCCU printers.

*Figure 263. OCR, APL, and Katakana Fonts Resident in the AFCCU Printers*

Typeface	FGID HEX	FGID DEC	GCSGID HEX	GCSGID DEC	CPGID HEX	CPGID DEC	Font Char. Set
APL	0133	307	0518	1304	125, 136, 38E	293, 310, 910	CZ420P
APL Bold	0142	322	0518	1304	125, 136, 38E	293, 310, 910	CZ440P
OCR A	0131	305	03C8	968	36C, 37C	876, 892	CZ920A
OCR B	0132	306	03C9	969	36D, 37D	877, 893	CZ920B
Katakana Gothic	0130	304	051A	1306	122, 381, 403, 411	290, 897, 1027, 1041	CZ6208

### Code Pages for the IBM Expanded Core Fonts

Figure 264 lists the code pages used with the resident IBM Expanded Core Fonts. Although all the IBM Expanded Core fonts code pages are referenced in Figure 264, the AFCCU printers support only the Latin1 Country Extended, Latin1 EBCDIC Publishing, Latin1 ASCII, and Latin EBCDIC DCF code pages.

*Figure 264 (Page 1 of 4). Code Pages for the Expanded Core Fonts*

Language Supported	CPGID HEX	CPGID DEC	GCSGID HEX	GCSGID DEC	Code Page Name
<b>Latin 1 Country Extended Code Pages:</b>					
US English, Canadian English, Canadian French, Dutch, Brazilian Portuguese, Portuguese	0025	0037	02B9	0697	T1V10037
German	0111	0273	02B9	0697	T1V10273
Belgian	0112	0274	02B9	0697	T1V10274
Brazilian	0113	0275	02B9	0697	T1V10275
Danish, Norwegian	0113	0277	02B9	0697	T1V10277
Finnish, Swedish	0116	0278	02B9	0697	T1V10278
Italian	0118	0280	02B9	0697	T1V10280
Japanese	0119	0281	02B9	0697	T1V10281
Portuguese	011A	0282	02B9	0697	T1V10282
Castillian Spanish, Latin American Spanish	011C	0284	02B9	0697	T1V10284
UK English	011D	0285	02B9	0697	T1V10285
French, Catalan	0129	0297	02B9	0697	T1V10297
Multinational, Belgium French, Belgium Dutch, Swiss French, Swiss German, Swiss Italian	01F4	0500	02B9	0697	T1V10500
Icelandic	0367	0871	02B9	0697	T1V10871

Figure 264 (Page 2 of 4). Code Pages for the Expanded Core Fonts

Language Supported	CPGID HEX	CPGID DEC	GCSGID HEX	GCSGID DEC	Code Page Name
<b>Latin 1 EBCDIC Publishing Code Pages:</b>					
Multinational, Belgium French, Belgium Dutch, Swiss French, Swiss German, Swiss Italian	0169	0361	0479	1145	T1000361
German	017E	0382	0479	1145	T1000382
Belgian	017F	0383	0479	1145	T1000383
Brazilian Portuguese	0180	0384	0479	1145	T1000384
Canadian French	0181	0385	0479	1145	T1000385
Danish, Norwegian	0182	0386	0479	1145	T1000386
Finnish, Swedish	0183	0387	0479	1145	T1000387
French, Catalan	0184	0388	0479	1145	T1000388
Italian	0185	0389	0479	1145	T1000389
Japanese	0186	0390	0479	1145	T1000390
Portuguese	0187	0391	0479	1145	T1000391
Castillian Spanish	0188	0392	0479	1145	T1000392
Latin American Spanish	0189	0393	0479	1145	T1000393
UK English	018A	0394	0479	1145	T1000394
US English, Canadian English	018B	0395	0479	1145	T1000395
<b>Latin 1 ASCII Code Pages:</b>					
Multinational, US English, UK English, Dutch, German, Finnish, French, Italian, Spanish, Swedish	01B5	0437	0397	0919	T1000437
Multinational (Same as all Country extended Code Pages)	0352	0850	0304	0980	T1000850
Portugese (Primary = 850)	035C	0860	03DE	0990	T1000860
Icelandic (Primary = 850)	035D	0861	03DF	0991	T1000861
Canadian French (Primary = 850)	035F	0863	03E1	0993	T1000863
Nordic (Primary = 850)	0361	0865	03E3	0995	T1000865
IBM PC Desktop Publishing	03EC	1004	047A	1146	T1001004
IOS Latin 1	0333	0819	02B9	0697	T1000819

<i>Figure 264 (Page 3 of 4). Code Pages for the Expanded Core Fonts</i>					
Language Supported	CPGID HEX	CPGID DEC	GCSGID HEX	GCSGID DEC	Code Page Name
<b>Latin 2/3/4/5 EBCDIC and ASCII Code Pages:</b>					
Croatian, Czech, East German, Hungarian, Polish, Romanian, Slovak, Slovenian	0354	0852	0306	0982	T1000852
Latin2 Multilingual	0366	0870	03BF	0959	T1000870
Latin2 ISO/ ANSI 8 Bit	0390	0912	03BF	0959	T1000912
Latin3 Multilingual PC	0355	0853	0307	0983	T1000853
Latin3 Multilingual	0389	0905	0506	1286	T1000905
Latin4 ISO/ASCII	042D	1069	04E8	1256	T1001069
Latin4 EBCDIC	0392	0914	04E8	1256	T1000914
Latin5 PC	0359	0857	03DB	0987	T1000857
Latin5 ISO/ANSI 8 Bit	0398	0920	0480	1152	T1000920
Latin5	0402	1026	0480	1152	T1001026
<b>Latin EBCDIC DCF Code Pages:</b>					
DCF Release 2 Compatibility	03EA	1002	046C	1132	T1001002
US Text Subset	03EB	1003	046D	1133	T1DCDCFS
Text with Numeric Spacing	042C	1068	04EB	1259	T1001068
GML List Symbols	040F	1039	04EA	1258	T1001039
<b>Cyrillic and Greek EBCDIC and ASCII Code Pages:</b>					
Cyrillic Multilingual (Primary = 1025)	0370	0880	03C0	0960	T1000880
Cyrillic ISO/ASCII 8 Bit	0393	0915	047E	1150	
Cyrillic PC	0357	0855	03D9	0985	T1000855
Cyrillic #2 PC	0362	0866	03E4	0996	T1000866
Cyrillic Multilingual	0401	1025	047E	1150	
Greek 183 (Primary = 875)	01A7	0423	00DA	0218	
Greek ISO/ASCII 8 Bit	032D	0813	039D	0925	T1000813
Greek PC (Primary = 869)	0353	0851	0305	0981	T1000851
Greek PC	0365	0869	03E6	0998	T1000869
Greek	036B	0875	039D	0925	T1000875
GML List Symbols	040F	1039	04EA	1258	T1001039
<b>Arabic EBCDIC and ASCII Code Pages:</b>					
Arabic Bilingual	01A4	0420	00EB	0235	T1000420
Arabic PC	0360	0864	03E2	0994	T1000864
Arabic ISO/ASCII 8 Bit	03F0	1008	048A	1162	T1001008
Arabic Extended ISO/ASCII 8 Bit	0405	1029	0482	1154	T1001029
Arabic Extended ISO/ASCII 8 Bit	0416	1046	0499	1177	T1001046

<i>Figure 264 (Page 4 of 4). Code Pages for the Expanded Core Fonts</i>					
<b>Language Supported</b>	<b>CPGID HEX</b>	<b>CPGID DEC</b>	<b>GCSGID HEX</b>	<b>GCSGID DEC</b>	<b>Code Page Name</b>
GML List Symbols	040F	1039	04EA	1258	T1001039
<b>Hebrew EBCDIC and ASCII Code Pages:</b>					
Hebrew ISO/ASCII 8 Bit	0394	0916	03AD	0941	T1000916
Hebrew Publishing	0404	1028	04AF	1199	T1001028
Hebrew	01A8	0424	03AD	0941	T1000424
Hebrew Character Set A (Primary = 424)	0323	0803	047B	1147	T1000803
Hebrew PC (Primary = 862)	0358	0856	03DA	0986	T1000856
Hebrew PC	035E	0862	03E0	0992	T1000862
GML List Symbols	040F	1039	04EA	1258	T1001039
<b>Symbols:</b>					
Symbols, Set 7	0103	0259	0154	0340	T1000259
Symbols, Set 7 ASCII	0383	0899	0154	0340	T1000899
Symbols, Adobe	043F	1087	04E9	1257	T1001087
Symbols, Adobe ASCII	040E	1038	04E9	1257	T1001038
Symbols, Modified Set 7	0443	1091	04A7	1191	T1001091
Symbols, Modified Set 7 ASCII	0444	1092	04A7	1191	T1001092
Symbols, Set 8	016B	0363	0276	0630	T1000363
Math Symbols	033D	0829	038D	0909	T1M00829, T1000829

## 4028 Font Metrics Resident in the AFCCU Printers

Figure 265 lists the 4028 font metrics resident in the AFCCU printers and includes the valid Font Global ID (FGID) and code pages for each font. The AFCCU printers substitute Times New Roman fonts (from the IBM Expanded Core fonts) for the Times Roman fonts.

See Figure 266 on page 411 for an explanation of the groups used in the Code Pages column. A font referenced with a CPGID of 259 is mapped to the Courier Roman Medium Symbols font (FGID 416) and character set (GCSGID 1275).

The 4028 Font Metrics are shipped already marked; however, if you need to mark them on MVS, the ARSRMARK job is APSW4028.

Figure 265 (Page 1 of 2). 4028 Font Metrics Resident in the AFCCU Printers

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Pages	Font Character Set
APL 12	004C	0076	10	0078	0120	0310	C0E0AP12
Boldface PS	009F	0159	12	0078	0120	A, B	C0E0BRTR
Courier Bold 10	002E	0046	12	0090	144	A, B	C0E0CB10
Courier Italic 10	0012	0018	12	0090	0144	A, B	C0E0CI10
Courier Italic 12	005C	0092	10	0078	0120	A, B	C0E0CI12
Courier 10	000B	0011	12	0090	0144	259, A, B	C0E0CR10
Courier 12	0055	0085	10	0078	0120	0259, A, B	C0E0CR12
Courier 15	00DF	0223	9	0060	0096	A, B	C0E0CR15
Courier 17.1	00FE	0254	8.5	0054	0084	A, B	C0E0CR17
Letter Gothic 20	0119	0281	7.5	0048	0072	A, B	C0E0LR20
OCR A 10	0013	0019	12	0090	0144	0892	C0E0OCRA
OCR B 10	0003	0003	12	0090	0144	0893	C0E0OCRB
Prestige Bold 12	006F	0111	10	0078	120	A, B	C0E0PB12
Prestige Italic 12	0070	0112	10	0078	120	A, B	C0E0PI12
Prestige 10	000C	0012	12	0090	0144	259, A, B	C0E0PR10 C0E0PROR C0E0PROG C0E0PROH
Prestige 12	0056	0086	10	0078	0120	259, A, B	C0E0PR12 C0E0PREF C0E0PREQ C0E0PREH C0E0PRER C0E0PREG
Prestige 15	00DD	0221	9	0060	0096	A, B	C0E0PR15
Prestige 17.1	0100	0256	8.5	0054	0084	A, B	C0E0PR17
Times Roman Bold Italic TYPO	16CB	5835	10	0043	0067	A	C0E50T00
Times Roman Bold Italic TYPO	16CB	5835	12	0050	0080	A	C0E50TB0
Times Roman Bold TYPO	164B	5707	10	0043	0067	A	C0E40T00
Times Roman Bold TYPO	164B	5707	12	0050	0080	A	C0E40TB0
Times Roman Bold TYPO	164B	5707	14	005D	0093	A	C0E40TD0
Times Roman Bold TYPO	164B	5707	18	0078	0120	A	C0E40TH0
Times Roman Bold TYPO	164B	5707	24	00A0	0160	A	C0E40TN0

Figure 265 (Page 2 of 2). 4028 Font Metrics Resident in the AFCCU Printers

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Pages	Font Character Set
Times Roman Italic TYPO	16B7	5815	10	0043	0067	A	C0E30T00
Times Roman Italic TYPO	16B7	5815	12	0050	0080	A	C0E30TB0
Times Roman TYPO	1637	5687	6	0028	0040	A	C0E20T60
Times Roman TYPO	1637	5687	8	0035	0053	A	C0E20T80
Times Roman TYPO	1637	5687	10	0043	0067	A	C0E20T00
Times Roman TYPO	1637	5687	12	0050	0080	A	C0E20TB0

**Note:** The Prestige Proportional Spaced font (FGID 164) is **not** supported as a resident font.



## Code Pages for the 4028 Font Metrics

Figure 266 explains the groups as used in the Code Pages column of Figure 265 on page 409.

<i>Figure 266. Code Pages for the 4028 Font Metrics</i>				
CPGID HEX	CPGID DEC	GCSGID HEX	GCSGID DEC	Code Page
<b>Group A:</b>				
See Figure 264 on page 405	037, 273, 274, 277, 278, 280, 281, 284, 285, 297, 500, 871	02B9	697	See Figure 264 on page 405
0026, 016F	038, 367	0067	103	T1000038
0104	260	0155	341	T1000260
0114	276	0115	277	T1000276
011E	286	013D	317	T1000286
011F	287	0141	321	T1000286
0120	288	0145	325	T1000288
03EA	1002	046C	1132	
<b>Group B:</b>				
0100	256 (Replaced by 500)	0151	337	T1GDP256
0121	289 (Replaced by 500, but missing obsolete "Peseta" character)	0149	329	T1000289
<b>Miscellaneous:</b>				
0136	310	03C3	963	T1000310
0103	259	0154	340	T1000259
037C	892	03C8	968	T1000892
037D	893	03C9	969	T1000893

## 3130 Double-Byte Resident Raster Fonts and Code Pages

The following AFP raster font products are available in resident form as a separately orderable feature for the 3130. The fonts provide 240-pel capability for Japanese, Korean, Simplified Chinese, Traditional Chinese and Thai languages.

- AFP Japanese Object Font V2R1.0 (5771-AGB)

This product ships an AP\*RMARK job for marking the host equivalent font, to activate the Japanese font as a resident font.

- AFP Korean Object Font V1R1.0 (5771-AFW)
- AFP Traditional Chinese Object Font V1R1.1 (5771-AFZ)
- AFP Simplified Chinese Object Font V1R1.0 (5771-AEK)
- AFP Thai Object Font V1R1.0 (5771-AEN)

### Notes:

1. These fonts are available only in raster form at 240-pel resolution. Although AFP Japanese Font 5771-AGB consists of 23 sizes of double-byte fonts and 20 sizes of single-byte fonts, the single-byte fonts are NOT available in this resident raster font set.
2. The 5 Japanese/kanji double-byte fonts supported by 3820 ROM Font RPQ #8A5014 are included in the AFP Japanese Object Font V2R1.0 (5771-AGB).

The following tables list the 3130 resident double-byte fonts by typeface and size and include their code page IDs.

Figure 267. AFP Japanese Font Compatibility Set

Typeface	Box Size	Point Size	FW HEX	FW DEC	GCSGID	CPGID	FGID HEX	FGID DEC
Gothic (G16F)	16x16	5	064	100	370	300	D237	53815
Gothic (G20F)	20x24	7.2	078	120	370	300	D235	53813
Gothic (G24F)	24x30	7	08C	140	370	300	D235	53813
Gothic (G32F)	32x32	9.6	0C0	192	370	300	D237	53815
Gothic (G36F)	36x36	10.8	0D8	216	370	300	D237	53815
Gothic (G40F)	40x40	12	0F0	240	370	300	D237	53815
Gothic (G48F)	48x48	14.4	120	288	370	300	D237	53815
Gothic (G64F)	64x64	19.2	180	384	370	300	D237	53815
Mincho (M16F)	16x16	4.8	060	096	370	300	D137	53559
Mincho (M24F)	24x24	7	08C	140	370	300	D137	53559
Mincho (Z24F)	24x24	7.2	090	144	370	300	D137	53559
Mincho (M26F)	26x26	7.8	09C	156	370	300	D137	53559
Mincho (M32F)	32x32	10	0B4	180	370	300	D137	53559
Mincho (M36F)	36x36	10.8	0D8	216	370	300	D137	53559
Mincho (M40F)	40x40	12	0F0	240	370	300	D137	53559
Mincho (M44F)	44x44	13.2	108	264	370	300	D137	53559
Mincho (M48F)	48x48	14.4	120	288	370	300	D137	53559
Mincho (M52F)	52x52	15.6	138	312	370	300	D137	53559
Mincho (M64F)	64x64	19.2	180	384	370	300	D137	53559
R-Gothic (R36F)	36x36	10.8	0D8	216	370	300	D337	54071
R-Gothic (R40F)	40x40	12	0F0	240	370	300	D337	54071
R-Gothic (R48F)	48x48	14.4	120	288	370	300	D337	54071
R-Gothic (R64F)	64x64	19.2	180	384	370	300	D337	54071

Figure 268. AFP Korean Font Compatibility Set

Typeface	Box Size	Point Size	FW HEX	FW DEC	GCSGID	CPGID	FGID HEX	FGID DEC
Gothic (G16K)	16x16	4.8	060	096	934	834	D237	53815
Gothic (G24K)	24x30	9	090	144	934	834	D235	53813
Mincho (M24K)	24x24	7.2	090	144	934	834	D137	53559
Mincho (M32K)	32x32	9.6	0C0	192	934	834	D137	53559
Mincho (M36K)	36x36	10.8	0D8	216	934	834	D137	53559
Mincho (M40K)	40x40	12	0F0	240	934	834	D137	53559
Mincho (M48K)	48x48	14.4	120	288	934	834	D137	53559
Mincho (M64K)	64x64	19.2	180	384	934	834	D137	53559

Figure 269. AFP Traditional Chinese Font Compatibility Set

Typeface	Box Size	Point Size	FW HEX	FW DEC	GCSGID	CPGID	FGID HEX	FGID DEC
Gothic (G16T)	16x16	4.8	060	096	935	835	D237	53815
Ming (M24T)	24x24	7.2	090	144	935	835	D537	54583
Ming (M32T)	32x32	9.6	0C0	192	935	835	D537	54583
Ming (M40T)	40x40	12	240	0F0	935	835	D537	54583

Figure 270. AFP Simplified Chinese Font Compatibility Set

Typeface	Box Size	Point Size	FW HEX	FW DEC	GCSGID	CPGID	FGID HEX	FGID DEC
Gothic (G16P)	16x16	4.8	060	096	937	837	D237	53815
Song (S26P)	26x26	7.8	09C	156	937	837	D437	54327
Song (S32P)	32x32	9.6	0C0	192	937	837	D437	54327
Song (S40P)	40x40	12	0F0	240	937	837	D437	54327

Figure 271. AFP Thai Font Compatibility Set

Typeface	Box Size	Point Size	FW HEX	FW DEC	GCSGID	CPGID	FGID HEX	FGID DEC
Italics (I60F)	24x60	18	090	144	939	839	E2B7	58039
Official (O40F)	24x40	12	090	144	939	839	E137	57655
Official (O60F)	24x60	18	090	144	939	839	E137	57655

## IBM Expanded Core Raster Fonts for the AFCCU Printers

**Courier APL2, Gothic Katakana, OCR, and Latin1 Raster Fonts:** The following tables list the Core Courier APL2, Gothic Katakana, OCR, and Latin1 raster fonts used to activate the fonts resident in the AFCCU printers.

Figure 272 (Page 1 of 2). Courier APL2, Gothic Katakana, and OCR Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier APL2 12	133	307	0090	144	0518	1304	C0420PB0
Courier APL2 12	142	322	0090	144	0518	1304	C0440PB0
Gothic Katakana 6	130	304	0048	072	051A	1306	C0620860
Gothic Katakana 7	130	304	0054	084	051A	1306	C0620870
Gothic Katakana 8	130	304	0060	096	051A	1306	C0620880
Gothic Katakana 10	130	304	0078	120	051A	1306	C0620800
Gothic Katakana 12	130	304	0090	144	051A	1306	C06208B0
Gothic Katakana 14	130	304	00A8	168	051A	1306	C06208D0
Gothic Katakana 20	130	304	00F0	240	051A	1306	C06208J0

Figure 272 (Page 2 of 2). Courier APL2, Gothic Katakana, and OCR Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
OCR A 12	131	305	0090	144	03C8	0968	C0920AB0
OCR B 12	132	306	0090	144	03C9	0969	C0920BB0

Figure 273 (Page 1 of 2). Latin1 Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Boldface Latin1 12	4F00	20224	0050	080	07F7	2039	C08400B0
Gothic Text Latin1 5	130	304	003C	060	07F7	2039	C0620050
Gothic Text Latin1 6	130	304	0048	072	07F7	2039	C0620060
Gothic Text Latin1 7	130	304	0054	084	07F7	2039	C0620070
Gothic Text Latin1 8	130	304	0060	096	07F7	2039	C0620080
Gothic Text Latin1 9	130	304	006C	108	07F7	2039	C0620090
Gothic Text Latin1 10	130	304	0078	120	07F7	2039	C0620000
Gothic Text Latin1 12	130	304	0090	144	07F7	2039	C06200B0
Gothic Text Latin1 14	130	304	00A8	168	07F7	2039	C06200D0
Gothic Text Latin1 20	130	304	00F0	240	07F7	2039	C06200J0
Letter Gothic Latin1 6	190	400	0048	072	07F7	2039	C0520060
Letter Gothic Latin1 6	194	404	0048	072	07F7	2039	C0540060
Letter Gothic Latin1 7	190	400	0054	084	07F7	2039	C0520070
Letter Gothic Latin1 7	194	404	0054	084	07F7	2039	C0540070
Letter Gothic Latin1 8	190	400	0060	096	07F7	2039	C0520080
Letter Gothic Latin1 8	194	404	0060	096	07F7	2039	C0540080
Letter Gothic Latin1 10	190	400	0078	120	07F7	2039	C0520000
Letter Gothic Latin1 10	194	404	0078	120	07F7	2039	C0540000
Letter Gothic Latin1 12	190	400	0090	144	07F7	2039	C05200B0
Letter Gothic Latin1 12	190	400	0090	144	07F7	2039	C05400B0
Letter Gothic Latin1 14	190	400	00A8	168	07F7	2039	C05200D0
Letter Gothic Latin1 14	194	404	00A8	168	07F7	2039	C05400D0
Letter Gothic Latin1 20	190	400	00F0	240	07F7	2039	C05200J0
Letter Gothic Latin1 20	194	404	00F0	240	07F7	2039	C05400J0
Prestige Latin1 7	13E	318	0054	084	07F7	2039	C0740070
Prestige Latin1 7	13F	319	0054	084	07F7	2039	C0730070
Prestige Latin1 7	1B0	432	0054	084	07F7	2039	C0720070
Prestige Latin1 8	13E	318	0060	096	07F7	2039	C0740080
Prestige Latin1 8	13F	319	0060	096	07F7	2039	C0730080
Prestige Latin1 8	1B0	432	0060	096	07F7	2039	C0720080
Prestige Latin1 10	13E	318	0078	120	07F7	2039	C0740000
Prestige Latin1 10	13F	319	0078	120	07F7	2039	C0730000
Prestige Latin1 10	1B0	432	0078	120	07F7	2039	C0720000
Prestige Latin1 12	13E	318	0090	144	07F7	2039	C07400B0

Figure 273 (Page 2 of 2). Latin1 Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Prestige Latin1 12	13F	319	0090	144	07F7	2039	C07300B0
Prestige Latin1 12	1B0	432	0090	144	07F7	2039	C07200B0
Prestige Latin1 14	13E	318	00A8	168	07F7	2039	C07400D0
Prestige Latin1 14	13F	319	00A8	168	07F7	2039	C07300D0
Prestige Latin1 14	1B0	432	00A8	168	07F7	2039	C07200D0
Prestige Latin1 20	13E	318	00F0	240	07F7	2039	C07400J0
Prestige Latin1 20	13F	319	00F0	240	07F7	2039	C07300J0
Prestige Latin1 20	1B0	432	00F0	240	07F7	2039	C07200J0

**Core Courier Raster Fonts for the AFCCU Printers:** The following table lists the Core Courier raster fonts used to activate the fonts resident in the AFCCU printers.

Figure 274 (Page 1 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Boutros Typing Arabic	RM 7	1A0	416	054	084	04F0	1264	C0420470
Boutros Typing Arabic	IM 7	1A8	424	054	084	04F0	1264	C0430470
Boutros Typing Arabic	RB 7	1A4	420	054	084	04F0	1264	C0440470
Boutros Typing Arabic	IB 7	1AC	428	054	084	04F0	1264	C0450470
Boutros Typing Arabic	RM 8	1A0	416	060	096	04F0	1264	C0420480
Boutros Typing Arabic	IM 8	1A8	424	060	096	04F0	1264	C0430480
Boutros Typing Arabic	RB 8	1A4	420	060	096	04F0	1264	C0440480
Boutros Typing Arabic	IB 8	1AC	428	060	096	04F0	1264	C0450480
Boutros Typing Arabic	RM 10	1A0	416	078	120	04F0	1264	C0420400
Boutros Typing Arabic	IM 10	1A8	424	078	120	04F0	1264	C0430400
Boutros Typing Arabic	RB 10	1A4	420	078	120	04F0	1264	C0440400
Boutros Typing Arabic	IB 10	1AC	428	078	120	04F0	1264	C0450400
Boutros Typing Arabic	RM 12	1A0	416	090	144	04F0	1264	C04204B0
Boutros Typing Arabic	IM 12	1A8	424	090	144	04F0	1264	C04304B0
Boutros Typing Arabic	RB 12	1A4	420	090	144	04F0	1264	C04404B0
Boutros Typing Arabic	IB 12	1AC	428	090	144	04F0	1264	C04504B0
Boutros Typing Arabic	RM 14	1A0	416	0A8	168	04F0	1264	C04204D0
Boutros Typing Arabic	IM 14	1A8	424	0A8	168	04F0	1264	C04304D0
Boutros Typing Arabic	RB 14	1A4	420	0A8	168	04F0	1264	C04404D0
Boutros Typing Arabic	IB 14	1AC	428	0A8	168	04F0	1264	C04504D0
Boutros Typing Arabic	RM 20	1A0	416	0F0	240	04F0	1264	C04204J0
Boutros Typing Arabic	IM 20	1A8	424	0F0	240	04F0	1264	C04304J0
Boutros Typing Arabic	RB 20	1A4	420	0F0	240	04F0	1264	C04404J0

Figure 274 (Page 2 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Boutros Typing Arabic	IB 20	1AC	428	0F0	240	04F0	1264	C04504J0
Courier Cyrillic Greek	RM 7	1A0	416	054	084	04FC	1276	C0420370
Courier Cyrillic Greek	IM 7	1A8	424	054	084	04FC	1276	C0430370
Courier Cyrillic Greek	RB 7	1A4	420	054	084	04FC	1276	C0440370
Courier Cyrillic Greek	IB 7	1AC	428	054	084	04FC	1276	C0450370
Courier Cyrillic Greek	RM 8	1A0	416	060	096	04FC	1276	C0420380
Courier Cyrillic Greek	IM 8	1A8	424	060	096	04FC	1276	C0430380
Courier Cyrillic Greek	RB 8	1A4	420	060	096	04FC	1276	C0440380
Courier Cyrillic Greek	IB 8	1AC	428	060	096	04FC	1276	C0450380
Courier Cyrillic Greek	RM 10	1A0	416	078	120	04FC	1276	C0420300
Courier Cyrillic Greek	IM 10	1A8	424	078	120	04FC	1276	C0430300
Courier Cyrillic Greek	RB 10	1A4	420	078	120	04FC	1276	C0440300
Courier Cyrillic Greek	IB 10	1AC	428	078	120	04FC	1276	C0450300
Courier Cyrillic Greek	RM 12	1A0	416	090	144	04FC	1276	C04203B0
Courier Cyrillic Greek	IM 12	1A8	424	090	144	04FC	1276	C04303B0
Courier Cyrillic Greek	RB 12	1A4	420	090	144	04FC	1276	C04403B0
Courier Cyrillic Greek	IB 12	1AC	428	090	144	04FC	1276	C04503B0
Courier Cyrillic Greek	RM 14	1A0	416	0A8	168	04FC	1276	C04203D0
Courier Cyrillic Greek	IM 14	1A8	424	0A8	168	04FC	1276	C04303D0
Courier Cyrillic Greek	RB 14	1A4	420	0A8	168	04FC	1276	C04403D0
Courier Cyrillic Greek	IB 14	1AC	428	0A8	168	04FC	1276	C04503D0
Courier Cyrillic Greek	RM 20	1A0	416	0F0	240	04FC	1276	C04203J0
Courier Cyrillic Greek	IM 20	1A8	424	0F0	240	04FC	1276	C04303J0
Courier Cyrillic Greek	RB 20	1A4	420	0F0	240	04FC	1276	C04403J0
Courier Cyrillic Greek	IB 20	1AC	428	0F0	240	04FC	1276	C04503J0
Courier Latin1	RM 7	1A0	416	054	084	07F7	2039	C0420070
Courier Latin1	IM 7	1A8	424	054	084	07F7	2039	C0430070
Courier Latin1	RB 7	1A4	420	054	084	07F7	2039	C0440070
Courier Latin1	IB 7	1AC	428	054	084	07F7	2039	C0450070
Courier Latin1	RM 8	1A0	416	060	096	07F7	2039	C0420080
Courier Latin1	IM 8	1A8	424	060	096	07F7	2039	C0430080
Courier Latin1	RB 8	1A4	420	060	096	07F7	2039	C0440080
Courier Latin1	IB 8	1AC	428	060	096	07F7	2039	C0450080
Courier Latin1	RM 10	1A0	416	078	120	07F7	2039	C0420000
Courier Latin1	IM 10	1A8	424	078	120	07F7	2039	C0430000
Courier Latin1	RB 10	1A4	420	078	120	07F7	2039	C0440000

Figure 274 (Page 3 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier Latin1	IB 10	1AC	428	078	120	07F7	2039	C0450000
Courier Latin1	RM 12	1A0	416	090	144	07F7	2039	C04200B0
Courier Latin1	IM 12	1A8	424	090	144	07F7	2039	C04300B0
Courier Latin1	RB 12	1A4	420	090	144	07F7	2039	C04400B0
Courier Latin1	IB 12	1AC	428	090	144	07F7	2039	C04500B0
Courier Latin1	RM 14	1A0	416	0A8	168	07F7	2039	C04200D0
Courier Latin1	IM 14	1A8	424	0A8	168	07F7	2039	C04300D0
Courier Latin1	RB 14	1A4	420	0A8	168	07F7	2039	C04400D0
Courier Latin1	IB 14	1AC	428	0A8	168	07F7	2039	C04500D0
Courier Latin1	RM 20	1A0	416	0F0	240	07F7	2039	C04200J0
Courier Latin1	IM 20	1A8	424	0F0	240	07F7	2039	C04300J0
Courier Latin1	RB 20	1A4	420	0F0	240	07F7	2039	C04400J0
Courier Latin1	IB 20	1AC	428	0F0	240	07F7	2039	C04500J0
Courier Latin235	RM 7	1A0	416	054	084	04ED	1261	C0420270
Courier Latin235	IM 7	1A8	424	054	084	04ED	1261	C0430270
Courier Latin235	RB 7	1A4	420	054	084	04ED	1261	C0440270
Courier Latin235	IB 7	1AC	428	054	084	04ED	1261	C0450270
Courier Latin235	RM 8	1A0	416	060	096	04ED	1261	C0420280
Courier Latin235	IM 8	1A8	424	060	096	04ED	1261	C0430280
Courier Latin235	RB 8	1A4	420	060	096	04ED	1261	C0440280
Courier Latin235	IB 8	1AC	428	060	096	04ED	1261	C0450280
Courier Latin235	RM 10	1A0	416	078	120	04ED	1261	C0420200
Courier Latin235	IM 10	1A8	424	078	120	04ED	1261	C0430200
Courier Latin235	RB 10	1A4	420	078	120	04ED	1261	C0440200
Courier Latin235	IB 10	1AC	428	078	120	04ED	1261	C0450200
Courier Latin235	RM 12	1A0	416	090	144	04ED	1261	C04202B0
Courier Latin235	IM 12	1A8	424	090	144	04ED	1261	C04302B0
Courier Latin235	RB 12	1A4	420	090	144	04ED	1261	C04402B0
Courier Latin235	IB 12	1AC	428	090	144	04ED	1261	C04502B0
Courier Latin235	RM 14	1A0	416	0A8	168	04ED	1261	C04202D0
Courier Latin235	IM 14	1A8	424	0A8	168	04ED	1261	C04302D0
Courier Latin235	RB 14	1A4	420	0A8	168	04ED	1261	C04402D0
Courier Latin235	IB 14	1AC	428	0A8	168	04ED	1261	C04502D0
Courier Latin235	RM 20	1A0	416	0F0	240	04ED	1261	C04202J0
Courier Latin235	IM 20	1A8	424	0F0	240	04ED	1261	C04302J0
Courier Latin235	RB 20	1A4	420	0F0	240	04ED	1261	C04402J0



Figure 274 (Page 4 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier Latin235	IB 20	1AC	428	0F0	240	04ED	1261	C04502J0
Courier Latin4	RM 7	1A0	416	054	084	04F4	1268	C0420770
Courier Latin4	IM 7	1A8	424	054	084	04F4	1268	C0430770
Courier Latin4	RB 7	1A4	420	054	084	04F4	1268	C0440770
Courier Latin4	IB 7	1AC	428	054	084	04F4	1268	C0450770
Courier Latin4	RM 8	1A0	416	060	096	04F4	1268	C0420780
Courier Latin4	IM 8	1A8	424	060	096	04F4	1268	C0430780
Courier Latin4	RB 8	1A4	420	060	096	04F4	1268	C0440780
Courier Latin4	IB 8	1AC	428	060	096	04F4	1268	C0450780
Courier Latin4	RM 10	1A0	416	078	120	04F4	1268	C0420700
Courier Latin4	IM 10	1A8	424	078	120	04F4	1268	C0430700
Courier Latin4	RB 10	1A4	420	078	120	04F4	1268	C0440700
Courier Latin4	IB 10	1AC	428	078	120	04F4	1268	C0450700
Courier Latin4	RM 12	1A0	416	090	144	04F4	1268	C04207B0
Courier Latin4	IM 12	1A8	424	090	144	04F4	1268	C04307B0
Courier Latin4	RB 12	1A4	420	090	144	04F4	1268	C04407B0
Courier Latin4	IB 12	1AC	428	090	144	04F4	1268	C04507B0
Courier Latin4	RM 14	1A0	416	0A8	168	04F4	1268	C04207D0
Courier Latin4	IM 14	1A8	424	0A8	168	04F4	1268	C04307D0
Courier Latin4	RB 14	1A4	420	0A8	168	04F4	1268	C04407D0
Courier Latin4	IB 14	1AC	428	0A8	168	04F4	1268	C04507D0
Courier Latin4	RM 20	1A0	416	0F0	240	04F4	1268	C04207J0
Courier Latin4	IM 20	1A8	424	0F0	240	04F4	1268	C04307J0
Courier Latin4	RB 20	1A4	420	0F0	240	04F4	1268	C04407J0
Courier Latin4	IB 20	1AC	428	0F0	240	04F4	1268	C04507J0
Courier Symbols	RM 7	1A0	416	054	084	04A7	1191	C0420170
Courier Symbols	RB 7	1A4	420	054	084	04A7	1191	C0440170
Courier Symbols	RM 8	1A0	416	060	096	04A7	1191	C0420180
Courier Symbols	RB 8	1A4	420	060	096	04A7	1191	C0440180
Courier Symbols	RM 10	1A0	416	078	120	04A7	1191	C0420100
Courier Symbols	RB 10	1A4	420	078	120	04A7	1191	C0440100
Courier Symbols	RM 12	1A0	416	090	144	04A7	1191	C04201B0
Courier Symbols	RB 12	1A4	420	090	144	04A7	1191	C04401B0
Courier Symbols	RM 14	1A0	416	0A8	168	04A7	1191	C04201D0
Courier Symbols	RB 14	1A4	420	0A8	168	04A7	1191	C04401D0
Courier Symbols	RM 20	1A0	416	0F0	240	04A7	1191	C04201J0

Figure 274 (Page 5 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier Symbols	RB 20	1A4	420	0F0	240	04A7	1191	C04401J0
Shalom Hebrew	RM 7	1A0	416	054	084	04F1	1265	C0420570
Shalom Hebrew	IM 7	1A8	424	054	084	04F1	1265	C0430570
Shalom Hebrew	RB 7	1A4	420	054	084	04F1	1265	C0440570
Shalom Hebrew	IB 7	1AC	428	054	084	04F1	1265	C0450570
Shalom Hebrew	RM 8	1A0	416	060	096	04F1	1265	C0420580
Shalom Hebrew	IM 8	1A8	424	060	096	04F1	1265	C0430580
Shalom Hebrew	RB 8	1A4	420	060	096	04F1	1265	C0440580
Shalom Hebrew	IB 8	1AC	428	060	096	04F1	1265	C0450580
Shalom Hebrew	RM 10	1A0	416	078	120	04F1	1265	C0420500
Shalom Hebrew	IM 10	1A8	424	078	120	04F1	1265	C0430500
Shalom Hebrew	RB 10	1A4	420	078	120	04F1	1265	C0440500
Shalom Hebrew	IB 10	1AC	428	078	120	04F1	1265	C0450500
Shalom Hebrew	RM 12	1A0	416	090	144	04F1	1265	C04205B0
Shalom Hebrew	IM 12	1A8	424	090	144	04F1	1265	C04305B0
Shalom Hebrew	RB 12	1A4	420	090	144	04F1	1265	C04405B0
Shalom Hebrew	IB 12	1AC	428	090	144	04F1	1265	C04505B0
Shalom Hebrew	RM 14	1A0	416	0A8	168	04F1	1265	C04205D0
Shalom Hebrew	IM 14	1A8	424	0A8	168	04F1	1265	C04305D0
Shalom Hebrew	RB 14	1A4	420	0A8	168	04F1	1265	C04405D0
Shalom Hebrew	IB 14	1AC	428	0A8	168	04F1	1265	C04505D0
Shalom Hebrew	RM 20	1A0	416	0F0	240	04F1	1265	C04205J0
Shalom Hebrew	IM 20	1A8	424	0F0	240	04F1	1265	C04305J0
Shalom Hebrew	RB 20	1A4	420	0F0	240	04F1	1265	C04405J0
Shalom Hebrew	IB 20	1AC	428	0F0	240	04F1	1265	C04505J0

**Core Helvetica Raster Fonts for the AFCCU Printers:** The following table lists the Core Helvetica raster fonts used to activate the fonts resident in the AFCCU printers.

Figure 275 (Page 1 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Cyrillic Greek	RM 6	0900	2304	028	040	04FC	1276	C0H20360
Helvetica Cyrillic Greek	IM 6	0902	2306	028	040	04FC	1276	C0H30360
Helvetica Cyrillic Greek	RB 6	0901	2305	028	040	04FC	1276	C0H40360

Figure 275 (Page 2 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Cyrillic Greek	IB 6	0903	2307	028	040	04FC	1276	C0H50360
Helvetica Cyrillic Greek	RM 7	0900	2304	02F	047	04FC	1276	C0H20370
Helvetica Cyrillic Greek	IM 7	0902	2306	02F	047	04FC	1276	C0H30370
Helvetica Cyrillic Greek	RB 7	0901	2305	02F	047	04FC	1276	C0H40370
Helvetica Cyrillic Greek	IB 7	0903	2307	02F	047	04FC	1276	C0H50370
Helvetica Cyrillic Greek	RM 8	0900	2304	035	053	04FC	1276	C0H20380
Helvetica Cyrillic Greek	IM 8	0902	2306	035	053	04FC	1276	C0H30380
Helvetica Cyrillic Greek	RB 8	0901	2305	035	053	04FC	1276	C0H40380
Helvetica Cyrillic Greek	IB 8	0903	2307	035	053	04FC	1276	C0H50380
Helvetica Cyrillic Greek	RM 9	0900	2304	03C	060	04FC	1276	C0H20390
Helvetica Cyrillic Greek	IM 9	0902	2306	03C	060	04FC	1276	C0H30390
Helvetica Cyrillic Greek	RB 9	0901	2305	03C	060	04FC	1276	C0H40390
Helvetica Cyrillic Greek	IB 9	0903	2307	03C	060	04FC	1276	C0H50390
Helvetica Cyrillic Greek	RM 10	0900	2304	043	067	04FC	1276	C0H20300
Helvetica Cyrillic Greek	IM 10	0902	2306	043	067	04FC	1276	C0H30300
Helvetica Cyrillic Greek	RB 10	0901	2305	043	067	04FC	1276	C0H40300
Helvetica Cyrillic Greek	IB 10	0903	2307	043	067	04FC	1276	C0H50300
Helvetica Cyrillic Greek	RM 11	0900	2304	049	073	04FC	1276	C0H203A0
Helvetica Cyrillic Greek	IM 11	0902	2306	049	073	04FC	1276	C0H303A0
Helvetica Cyrillic Greek	RB 11	0901	2305	049	073	04FC	1276	C0H403A0
Helvetica Cyrillic Greek	IB 11	0903	2307	049	073	04FC	1276	C0H503A0
Helvetica Cyrillic Greek	RM 12	0900	2304	050	080	04FC	1276	C0H203B0
Helvetica Cyrillic Greek	IM 12	0902	2306	050	080	04FC	1276	C0H303B0
Helvetica Cyrillic Greek	RB 12	0901	2305	050	080	04FC	1276	C0H403B0
Helvetica Cyrillic Greek	IB 12	0903	2307	050	080	04FC	1276	C0H503B0
Helvetica Cyrillic Greek	RM 14	0900	2304	05D	093	04FC	1276	C0H203D0
Helvetica Cyrillic Greek	IM 14	0902	2306	05D	093	04FC	1276	C0H303D0
Helvetica Cyrillic Greek	RB 14	0901	2305	05D	093	04FC	1276	C0H403D0
Helvetica Cyrillic Greek	IB 14	0903	2307	05D	093	04FC	1276	C0H503D0
Helvetica Cyrillic Greek	RM 16	0900	2304	06B	107	04FC	1276	C0H203F0
Helvetica Cyrillic Greek	IM 16	0902	2306	06B	107	04FC	1276	C0H303F0
Helvetica Cyrillic Greek	RB 16	0901	2305	06B	107	04FC	1276	C0H403F0
Helvetica Cyrillic Greek	IB 16	0903	2307	06B	107	04FC	1276	C0H503F0
Helvetica Cyrillic Greek	RM 18	0900	2304	078	120	04FC	1276	C0H203H0
Helvetica Cyrillic Greek	IM 18	0902	2306	078	120	04FC	1276	C0H303H0
Helvetica Cyrillic Greek	RB 18	0901	2305	078	120	04FC	1276	C0H403H0

Figure 275 (Page 3 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Cyrillic Greek	IB 18	0903	2307	078	120	04FC	1276	C0H503H0
Helvetica Cyrillic Greek	RM 20	0900	2304	085	133	04FC	1276	C0H203J0
Helvetica Cyrillic Greek	IM 20	0902	2306	085	133	04FC	1276	C0H303J0
Helvetica Cyrillic Greek	RB 20	0901	2305	085	133	04FC	1276	C0H403J0
Helvetica Cyrillic Greek	IB 20	0903	2307	085	133	04FC	1276	C0H503J0
Helvetica Cyrillic Greek	RM 24	0900	2304	0A0	160	04FC	1276	C0H203N0
Helvetica Cyrillic Greek	IM 24	0902	2306	0A0	160	04FC	1276	C0H303N0
Helvetica Cyrillic Greek	RB 24	0901	2305	0A0	160	04FC	1276	C0H403N0
Helvetica Cyrillic Greek	IB 24	0903	2307	0A0	160	04FC	1276	C0H503N0
Helvetica Cyrillic Greek	RM 30	0900	2304	0C8	200	04FC	1276	C0H203T0
Helvetica Cyrillic Greek	IM 30	0902	2306	0C8	200	04FC	1276	C0H303T0
Helvetica Cyrillic Greek	RB 30	0901	2305	0C8	200	04FC	1276	C0H403T0
Helvetica Cyrillic Greek	IB 30	0903	2307	0C8	200	04FC	1276	C0H503T0
Helvetica Cyrillic Greek	RM 36	0900	2304	0F0	240	04FC	1276	C0H203Z0
Helvetica Cyrillic Greek	IM 36	0902	2306	0F0	240	04FC	1276	C0H303Z0
Helvetica Cyrillic Greek	RB 36	0901	2305	0F0	240	04FC	1276	C0H403Z0
Helvetica Cyrillic Greek	IB 36	0903	2307	0F0	240	04FC	1276	C0H503Z0
Helvetica Latin1	RM 6	0900	2304	028	040	07F7	2039	C0H20060
Helvetica Latin1	IM 6	0902	2306	028	040	07F7	2039	C0H30060
Helvetica Latin1	RB 6	0901	2305	028	040	07F7	2039	C0H40060
Helvetica Latin1	IB 6	0903	2307	028	040	07F7	2039	C0H50060
Helvetica Latin1	RM 7	0900	2304	02F	047	07F7	2039	C0H20070
Helvetica Latin1	IM 7	0902	2306	02F	047	07F7	2039	C0H30070
Helvetica Latin1	RB 7	0901	2305	02F	047	07F7	2039	C0H40070
Helvetica Latin1	IB 7	0903	2307	02F	047	07F7	2039	C0H50070
Helvetica Latin1	RM 8	0900	2304	035	053	07F7	2039	C0H20080
Helvetica Latin1	IM 8	0902	2306	035	053	07F7	2039	C0H30080
Helvetica Latin1	RB 8	0901	2305	035	053	07F7	2039	C0H40080
Helvetica Latin1	IB 8	0903	2307	035	053	07F7	2039	C0H50080
Helvetica Latin1	RM 9	0900	2304	03C	060	07F7	2039	C0H20090
Helvetica Latin1	IM 9	0902	2306	03C	060	07F7	2039	C0H30090
Helvetica Latin1	RB 9	0901	2305	03C	060	07F7	2039	C0H40090
Helvetica Latin1	IB 9	0903	2307	03C	060	07F7	2039	C0H50090
Helvetica Latin1	RM 10	0900	2304	043	067	07F7	2039	C0H20000
Helvetica Latin1	IM 10	0902	2306	043	067	07F7	2039	C0H30000
Helvetica Latin1	RB 10	0901	2305	043	067	07F7	2039	C0H40000

Figure 275 (Page 4 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin1	IB 10	0903	2307	043	067	07F7	2039	C0H50000
Helvetica Latin1	RM 11	0900	2304	049	073	07F7	2039	C0H200A0
Helvetica Latin1	IM 11	0902	2306	049	073	07F7	2039	C0H300A0
Helvetica Latin1	RB 11	0901	2305	049	073	07F7	2039	C0H400A0
Helvetica Latin1	IB 11	0903	2307	049	073	07F7	2039	C0H500A0
Helvetica Latin1	RM 12	0900	2304	050	080	07F7	2039	C0H200B0
Helvetica Latin1	IM 12	0902	2306	050	080	07F7	2039	C0H300B0
Helvetica Latin1	RB 12	0901	2305	050	080	07F7	2039	C0H400B0
Helvetica Latin1	IB 12	0903	2307	050	080	07F7	2039	C0H500B0
Helvetica Latin1	RM 14	0900	2304	05D	093	07F7	2039	C0H200D0
Helvetica Latin1	IM 14	0902	2306	05D	093	07F7	2039	C0H300D0
Helvetica Latin1	RB 14	0901	2305	05D	093	07F7	2039	C0H400D0
Helvetica Latin1	IB 14	0903	2307	05D	093	07F7	2039	C0H500D0
Helvetica Latin1	RM 16	0900	2304	06B	107	07F7	2039	C0H200F0
Helvetica Latin1	IM 16	0902	2306	06B	107	07F7	2039	C0H300F0
Helvetica Latin1	RB 16	0901	2305	06B	107	07F7	2039	C0H400F0
Helvetica Latin1	IB 16	0903	2307	06B	107	07F7	2039	C0H500F0
Helvetica Latin1	RM 18	0900	2304	078	120	07F7	2039	C0H200H0
Helvetica Latin1	IM 18	0902	2306	078	120	07F7	2039	C0H300H0
Helvetica Latin1	RB 18	0901	2305	078	120	07F7	2039	C0H400H0
Helvetica Latin1	IB 18	0903	2307	078	120	07F7	2039	C0H500H0
Helvetica Latin1	RM 20	0900	2304	085	133	07F7	2039	C0H200J0
Helvetica Latin1	IM 20	0902	2306	085	133	07F7	2039	C0H300J0
Helvetica Latin1	RB 20	0901	2305	085	133	07F7	2039	C0H400J0
Helvetica Latin1	IB 20	0903	2307	085	133	07F7	2039	C0H500J0
Helvetica Latin1	RM 24	0900	2304	0A0	160	07F7	2039	C0H200N0
Helvetica Latin1	IM 24	0902	2306	0A0	160	07F7	2039	C0H300N0
Helvetica Latin1	RB 24	0901	2305	0A0	160	07F7	2039	C0H400N0
Helvetica Latin1	IB 24	0903	2307	0A0	160	07F7	2039	C0H500N0
Helvetica Latin1	RM 30	0900	2304	0C8	200	07F7	2039	C0H200T0
Helvetica Latin1	IM 30	0902	2306	0C8	200	07F7	2039	C0H300T0
Helvetica Latin1	RB 30	0901	2305	0C8	200	07F7	2039	C0H400T0
Helvetica Latin1	IB 30	0903	2307	0C8	200	07F7	2039	C0H500T0
Helvetica Latin1	RM 36	0900	2304	0F0	240	07F7	2039	C0H200Z0
Helvetica Latin1	IM 36	0902	2306	0F0	240	07F7	2039	C0H300Z0
Helvetica Latin1	RB 36	0901	2305	0F0	240	07F7	2039	C0H400Z0

Figure 275 (Page 5 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin1	IB 36	0903	2307	0F0	240	07F7	2039	C0H500Z0
Helvetica Latin235	RM 6	0900	2304	028	040	04ED	1261	C0H20260
Helvetica Latin235	IM 6	0902	2306	028	040	04ED	1261	C0H30260
Helvetica Latin235	RB 6	0901	2305	028	040	04ED	1261	C0H40260
Helvetica Latin235	IB 6	0903	2307	028	040	04ED	1261	C0H50260
Helvetica Latin235	RM 7	0900	2304	02F	047	04ED	1261	C0H20270
Helvetica Latin235	IM 7	0902	2306	02F	047	04ED	1261	C0H30270
Helvetica Latin235	RB 7	0901	2305	02F	047	04ED	1261	C0H40270
Helvetica Latin235	IB 7	0903	2307	02F	047	04ED	1261	C0H50270
Helvetica Latin235	RM 8	0900	2304	035	053	04ED	1261	C0H20280
Helvetica Latin235	IM 8	0902	2306	035	053	04ED	1261	C0H30280
Helvetica Latin235	RB 8	0901	2305	035	053	04ED	1261	C0H40280
Helvetica Latin235	IB 8	0903	2307	035	053	04ED	1261	C0H50280
Helvetica Latin235	RM 9	0900	2304	03C	060	04ED	1261	C0H20290
Helvetica Latin235	IM 9	0902	2306	03C	060	04ED	1261	C0H30290
Helvetica Latin235	RB 9	0901	2305	03C	060	04ED	1261	C0H40290
Helvetica Latin235	IB 9	0903	2307	03C	060	04ED	1261	C0H50290
Helvetica Latin235	RM 10	0900	2304	043	067	04ED	1261	C0H20200
Helvetica Latin235	IM 10	0902	2306	043	067	04ED	1261	C0H30200
Helvetica Latin235	RB 10	0901	2305	043	067	04ED	1261	C0H40200
Helvetica Latin235	IB 10	0903	2307	043	067	04ED	1261	C0H50200
Helvetica Latin235	RM 11	0900	2304	049	073	04ED	1261	C0H202A0
Helvetica Latin235	IM 11	0902	2306	049	073	04ED	1261	C0H302A0
Helvetica Latin235	RB 11	0901	2305	049	073	04ED	1261	C0H402A0
Helvetica Latin235	IB 11	0903	2307	049	073	04ED	1261	C0H502A0
Helvetica Latin235	RM 12	0900	2304	050	080	04ED	1261	C0H202B0
Helvetica Latin235	IM 12	0902	2306	050	080	04ED	1261	C0H302B0
Helvetica Latin235	RB 12	0901	2305	050	080	04ED	1261	C0H402B0
Helvetica Latin235	IB 12	0903	2307	050	080	04ED	1261	C0H502B0
Helvetica Latin235	RM 14	0900	2304	05D	093	04ED	1261	C0H202D0
Helvetica Latin235	IM 14	0902	2306	05D	093	04ED	1261	C0H302D0
Helvetica Latin235	RB 14	0901	2305	05D	093	04ED	1261	C0H402D0
Helvetica Latin235	IB 14	0903	2307	05D	093	04ED	1261	C0H502D0
Helvetica Latin235	RM 16	0900	2304	06B	107	04ED	1261	C0H202F0
Helvetica Latin235	IM 16	0902	2306	06B	107	04ED	1261	C0H302F0
Helvetica Latin235	RB 16	0901	2305	06B	107	04ED	1261	C0H402F0

Figure 275 (Page 6 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin235	IB 16	0903	2307	06B	107	04ED	1261	C0H502F0
Helvetica Latin235	RM 18	0900	2304	078	120	04ED	1261	C0H202H0
Helvetica Latin235	IM 18	0902	2306	078	120	04ED	1261	C0H302H0
Helvetica Latin235	RB 18	0901	2305	078	120	04ED	1261	C0H402H0
Helvetica Latin235	IB 18	0903	2307	078	120	04ED	1261	C0H502H0
Helvetica Latin235	RM 20	0900	2304	085	133	04ED	1261	C0H202J0
Helvetica Latin235	IM 20	0902	2306	085	133	04ED	1261	C0H302J0
Helvetica Latin235	RB 20	0901	2305	085	133	04ED	1261	C0H402J0
Helvetica Latin235	IB 20	0903	2307	085	133	04ED	1261	C0H502J0
Helvetica Latin235	RM 24	0900	2304	0A0	160	04ED	1261	C0H202N0
Helvetica Latin235	IM 24	0902	2306	0A0	160	04ED	1261	C0H302N0
Helvetica Latin235	RB 24	0901	2305	0A0	160	04ED	1261	C0H402N0
Helvetica Latin235	IB 24	0903	2307	0A0	160	04ED	1261	C0H502N0
Helvetica Latin235	RM 30	0900	2304	0C8	200	04ED	1261	C0H202T0
Helvetica Latin235	IM 30	0902	2306	0C8	200	04ED	1261	C0H302T0
Helvetica Latin235	RB 30	0901	2305	0C8	200	04ED	1261	C0H402T0
Helvetica Latin235	IB 30	0903	2307	0C8	200	04ED	1261	C0H502T0
Helvetica Latin235	RM 36	0900	2304	0F0	240	04ED	1261	C0H202Z0
Helvetica Latin235	IM 36	0902	2306	0F0	240	04ED	1261	C0H302Z0
Helvetica Latin235	RB 36	0901	2305	0F0	240	04ED	1261	C0H402Z0
Helvetica Latin235	IB 36	0903	2307	0F0	240	04ED	1261	C0H502Z0
Helvetica Latin4	RM 6	0900	2304	028	040	04F4	1268	C0H20760
Helvetica Latin4	IM 6	0902	2306	028	040	04F4	1268	C0H30760
Helvetica Latin4	RB 6	0901	2305	028	040	04F4	1268	C0H40760
Helvetica Latin4	IB 6	0903	2307	028	040	04F4	1268	C0H50760
Helvetica Latin4	RM 7	0900	2304	02F	047	04F4	1268	C0H20770
Helvetica Latin4	IM 7	0902	2306	02F	047	04F4	1268	C0H30770
Helvetica Latin4	RB 7	0901	2305	02F	047	04F4	1268	C0H40770
Helvetica Latin4	IB 7	0903	2307	02F	047	04F4	1268	C0H50770
Helvetica Latin4	RM 8	0900	2304	035	053	04F4	1268	C0H20780
Helvetica Latin4	IM 8	0902	2306	035	053	04F4	1268	C0H30780
Helvetica Latin4	RB 8	0901	2305	035	053	04F4	1268	C0H40780
Helvetica Latin4	IB 8	0903	2307	035	053	04F4	1268	C0H50780
Helvetica Latin4	RM 9	0900	2304	03C	060	04F4	1268	C0H20790
Helvetica Latin4	IM 9	0902	2306	03C	060	04F4	1268	C0H30790
Helvetica Latin4	RB 9	0901	2305	03C	060	04F4	1268	C0H40790

Figure 275 (Page 7 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin4	IB 9	0903	2307	03C	060	04F4	1268	C0H50790
Helvetica Latin4	RM 10	0900	2304	043	067	04F4	1268	C0H20700
Helvetica Latin4	IM 10	0902	2306	043	067	04F4	1268	C0H30700
Helvetica Latin4	RB 10	0901	2305	043	067	04F4	1268	C0H40700
Helvetica Latin4	IB 10	0903	2307	043	067	04F4	1268	C0H50700
Helvetica Latin4	RM 11	0900	2304	049	073	04F4	1268	C0H207A0
Helvetica Latin4	IM 11	0902	2306	049	073	04F4	1268	C0H307A0
Helvetica Latin4	RB 11	0901	2305	049	073	04F4	1268	C0H407A0
Helvetica Latin4	IB 11	0903	2307	049	073	04F4	1268	C0H507A0
Helvetica Latin4	RM 12	0900	2304	050	080	04F4	1268	C0H207B0
Helvetica Latin4	IM 12	0902	2306	050	080	04F4	1268	C0H307B0
Helvetica Latin4	RB 12	0901	2305	050	080	04F4	1268	C0H407B0
Helvetica Latin4	IB 12	0903	2307	050	080	04F4	1268	C0H507B0
Helvetica Latin4	RM 14	0900	2304	05D	093	04F4	1268	C0H207D0
Helvetica Latin4	IM 14	0902	2306	05D	093	04F4	1268	C0H307D0
Helvetica Latin4	RB 14	0901	2305	05D	093	04F4	1268	C0H407D0
Helvetica Latin4	IB 14	0903	2307	05D	093	04F4	1268	C0H507D0
Helvetica Latin4	RM 16	0900	2304	06B	107	04F4	1268	C0H207F0
Helvetica Latin4	IM 16	0902	2306	06B	107	04F4	1268	C0H307F0
Helvetica Latin4	RB 16	0901	2305	06B	107	04F4	1268	C0H407F0
Helvetica Latin4	IB 16	0903	2307	06B	107	04F4	1268	C0H507F0
Helvetica Latin4	RM 18	0900	2304	078	120	04F4	1268	C0H207H0
Helvetica Latin4	IM 18	0902	2306	078	120	04F4	1268	C0H307H0
Helvetica Latin4	RB 18	0901	2305	078	120	04F4	1268	C0H407H0
Helvetica Latin4	IB 18	0903	2307	078	120	04F4	1268	C0H507H0
Helvetica Latin4	RM 20	0900	2304	085	133	04F4	1268	C0H207J0
Helvetica Latin4	IM 20	0902	2306	085	133	04F4	1268	C0H307J0
Helvetica Latin4	RB 20	0901	2305	085	133	04F4	1268	C0H407J0
Helvetica Latin4	IB 20	0903	2307	085	133	04F4	1268	C0H507J0
Helvetica Latin4	RM 24	0900	2304	0A0	160	04F4	1268	C0H207N0
Helvetica Latin4	IM 24	0902	2306	0A0	160	04F4	1268	C0H307N0
Helvetica Latin4	RB 24	0901	2305	0A0	160	04F4	1268	C0H407N0
Helvetica Latin4	IB 24	0903	2307	0A0	160	04F4	1268	C0H507N0
Helvetica Latin4	RM 30	0900	2304	0C8	200	04F4	1268	C0H207T0
Helvetica Latin4	IM 30	0902	2306	0C8	200	04F4	1268	C0H307T0
Helvetica Latin4	RB 30	0901	2305	0C8	200	04F4	1268	C0H407T0



Figure 275 (Page 8 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin4	IB 30	0903	2307	0C8	200	04F4	1268	C0H507T0
Helvetica Latin4	RM 36	0900	2304	0F0	240	04F4	1268	C0H207Z0
Helvetica Latin4	IM 36	0902	2306	0F0	240	04F4	1268	C0H307Z0
Helvetica Latin4	RB 36	0901	2305	0F0	240	04F4	1268	C0H407Z0
Helvetica Latin4	IB 36	0903	2307	0F0	240	04F4	1268	C0H507Z0
Helvetica Symbols	RM 6	0900	2304	028	040	04A7	1191	C0H20160
Helvetica Symbols	RB 6	0901	2305	028	040	04A7	1191	C0H40160
Helvetica Symbols	RM 7	0900	2304	02F	047	04A7	1191	C0H20170
Helvetica Symbols	RB 07	0901	2305	02F	047	04A7	1191	C0H40170
Helvetica Symbols	RM 08	0900	2304	035	053	04A7	1191	C0H20180
Helvetica Symbols	RB 08	0901	2305	035	053	04A7	1191	C0H40180
Helvetica Symbols	RM 09	0900	2304	03C	060	04A7	1191	C0H20190
Helvetica Symbols	RB 09	0901	2305	03C	060	04A7	1191	C0H40190
Helvetica Symbols	RM 10	0900	2304	043	067	04A7	1191	C0H20100
Helvetica Symbols	RB 10	0901	2305	043	067	04A7	1191	C0H40100
Helvetica Symbols	RM 11	0900	2304	049	073	04A7	1191	C0H201A0
Helvetica Symbols	RB 11	0901	2305	049	073	04A7	1191	C0H401A0
Helvetica Symbols	RM 12	0900	2304	050	080	04A7	1191	C0H201B0
Helvetica Symbols	RB 12	0901	2305	050	080	04A7	1191	C0H401B0
Helvetica Symbols	RM 14	0900	2304	05D	093	04A7	1191	C0H201D0
Helvetica Symbols	RB 14	0901	2305	05D	093	04A7	1191	C0H401D0
Helvetica Symbols	RM 16	0900	2304	06B	107	04A7	1191	C0H201F0
Helvetica Symbols	RB 16	0901	2305	06B	107	04A7	1191	C0H401F0
Helvetica Symbols	RM 18	0900	2304	078	120	04A7	1191	C0H201H0
Helvetica Symbols	RB 18	0901	2305	078	120	04A7	1191	C0H401H0
Helvetica Symbols	RM 20	0900	2304	085	133	04A7	1191	C0H201J0
Helvetica Symbols	RB 20	0901	2305	085	133	04A7	1191	C0H401J0
Helvetica Symbols	RM 24	0900	2304	0A0	160	04A7	1191	C0H201N0
Helvetica Symbols	RB 24	0901	2305	0A0	160	04A7	1191	C0H401N0
Helvetica Symbols	RM 30	0900	2304	0C8	200	04A7	1191	C0H201T0
Helvetica Symbols	RB 30	0901	2305	0C8	200	04A7	1191	C0H401T0
Helvetica Symbols	RM 36	0900	2304	0F0	240	04A7	1191	C0H201Z0
Helvetica Symbols	RB 36	0901	2305	0F0	240	04A7	1191	C0H401Z0
ITC Boutros Modern Rokaa Arabic	RM 6	0900	2304	028	040	04F0	1264	C0H20460
ITC Boutros Modern Rokaa Arabic	IM 6	0902	2306	028	040	04F0	1264	C0H30460

Figure 275 (Page 9 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Modern Rokaa Arabic	RB 6	0901	2305	028	040	04F0	1264	C0H40460
ITC Boutros Modern Rokaa Arabic	IB 6	0903	2307	028	040	04F0	1264	C0H50460
ITC Boutros Modern Rokaa Arabic	RM 7	0900	2304	02F	047	04F0	1264	C0H20470
ITC Boutros Modern Rokaa Arabic	IM 7	0902	2306	02F	047	04F0	1264	C0H30470
ITC Boutros Modern Rokaa Arabic	RB 7	0901	2305	02F	047	04F0	1264	C0H40470
ITC Boutros Modern Rokaa Arabic	IB 7	0903	2307	02F	047	04F0	1264	C0H50470
ITC Boutros Modern Rokaa Arabic	RM 8	0900	2304	035	053	04F0	1264	C0H20480
ITC Boutros Modern Rokaa Arabic	IM 8	0902	2306	035	053	04F0	1264	C0H30480
ITC Boutros Modern Rokaa Arabic	RB 8	0901	2305	035	053	04F0	1264	C0H40480
ITC Boutros Modern Rokaa Arabic	IB 8	0903	2307	035	053	04F0	1264	C0H50480
ITC Boutros Modern Rokaa Arabic	RM 9	0900	2304	03C	060	04F0	1264	C0H20490
ITC Boutros Modern Rokaa Arabic	IM 9	0902	2306	03C	060	04F0	1264	C0H30490
ITC Boutros Modern Rokaa Arabic	RB 9	0901	2305	03C	060	04F0	1264	C0H40490
ITC Boutros Modern Rokaa Arabic	IB 9	0903	2307	03C	060	04F0	1264	C0H50490
ITC Boutros Modern Rokaa Arabic	RM 10	0900	2304	043	067	04F0	1264	C0H20400
ITC Boutros Modern Rokaa Arabic	IM 10	0902	2306	043	067	04F0	1264	C0H30400
ITC Boutros Modern Rokaa Arabic	RB 10	0901	2305	043	067	04F0	1264	C0H40400
ITC Boutros Modern Rokaa Arabic	IB 10	0903	2307	043	067	04F0	1264	C0H50400
ITC Boutros Modern Rokaa Arabic	RM 11	0900	2304	049	073	04F0	1264	C0H204A0
ITC Boutros Modern Rokaa Arabic	IM 11	0902	2306	049	073	04F0	1264	C0H304A0
ITC Boutros Modern Rokaa Arabic	RB 11	0901	2305	049	073	04F0	1264	C0H404A0

Figure 275 (Page 10 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Modern Rokaa Arabic	IB 11	0903	2307	049	073	04F0	1264	C0H504A0
ITC Boutros Modern Rokaa Arabic	RM 12	0900	2304	050	080	04F0	1264	C0H204B0
ITC Boutros Modern Rokaa Arabic	IM 12	0902	2306	050	080	04F0	1264	C0H304B0
ITC Boutros Modern Rokaa Arabic	RB 12	0901	2305	050	080	04F0	1264	C0H404B0
ITC Boutros Modern Rokaa Arabic	IB 12	0903	2307	050	080	04F0	1264	C0H504B0
ITC Boutros Modern Rokaa Arabic	RM 14	0900	2304	05D	093	04F0	1264	C0H204D0
ITC Boutros Modern Rokaa Arabic	IM 14	0902	2306	05D	093	04F0	1264	C0H304D0
ITC Boutros Modern Rokaa Arabic	RB 14	0901	2305	05D	093	04F0	1264	C0H404D0
ITC Boutros Modern Rokaa Arabic	IB 14	0903	2307	05D	093	04F0	1264	C0H504D0
ITC Boutros Modern Rokaa Arabic	RM 16	0900	2304	06B	107	04F0	1264	C0H204F0
ITC Boutros Modern Rokaa Arabic	IM 16	0902	2306	06B	107	04F0	1264	C0H304F0
ITC Boutros Modern Rokaa Arabic	RB 16	0901	2305	06B	107	04F0	1264	C0H404F0
ITC Boutros Modern Rokaa Arabic	IB 16	0903	2307	06B	107	04F0	1264	C0H504F0
ITC Boutros Modern Rokaa Arabic	RM 18	0900	2304	078	120	04F0	1264	C0H204H0
ITC Boutros Modern Rokaa Arabic	IM 18	0902	2306	078	120	04F0	1264	C0H304H0
ITC Boutros Modern Rokaa Arabic	RB 18	0901	2305	078	120	04F0	1264	C0H404H0
ITC Boutros Modern Rokaa Arabic	IB 18	0903	2307	078	120	04F0	1264	C0H504H0
ITC Boutros Modern Rokaa Arabic	RM 20	0900	2304	085	133	04F0	1264	C0H204J0
ITC Boutros Modern Rokaa Arabic	IM 20	0902	2306	085	133	04F0	1264	C0H304J0
ITC Boutros Modern Rokaa Arabic	RB 20	0901	2305	085	133	04F0	1264	C0H404J0
ITC Boutros Modern Rokaa Arabic	IB 20	0903	2307	085	133	04F0	1264	C0H504J0

Figure 275 (Page 11 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Modern Rokaa Arabic	RM 24	0900	2304	0A0	160	04F0	1264	C0H204N0
ITC Boutros Modern Rokaa Arabic	IM 24	0902	2306	0A0	160	04F0	1264	C0H304N0
ITC Boutros Modern Rokaa Arabic	RB 24	0901	2305	0A0	160	04F0	1264	C0H404N0
ITC Boutros Modern Rokaa Arabic	IB 24	0903	2307	0A0	160	04F0	1264	C0H504N0
ITC Boutros Modern Rokaa Arabic	RM 30	0900	2304	0C8	200	04F0	1264	C0H204T0
ITC Boutros Modern Rokaa Arabic	IM 30	0902	2306	0C8	200	04F0	1264	C0H304T0
ITC Boutros Modern Rokaa Arabic	RB 30	0901	2305	0C8	200	04F0	1264	C0H404T0
ITC Boutros Modern Rokaa Arabic	IB 30	0903	2307	0C8	200	04F0	1264	C0H504T0
ITC Boutros Modern Rokaa Arabic	RM 36	0900	2304	0F0	240	04F0	1264	C0H204Z0
ITC Boutros Modern Rokaa Arabic	IM 36	0902	2306	0F0	240	04F0	1264	C0H304Z0
ITC Boutros Modern Rokaa Arabic	RB 36	0901	2305	0F0	240	04F0	1264	C0H404Z0
ITC Boutros Modern Rokaa Arabic	IB 36	0903	2307	0F0	240	04F0	1264	C0H504Z0
Narkiss Tam HEBREW	RM 6	0900	2304	028	040	04F1	1265	C0H20560
Narkiss Tam HEBREW	IM 6	0902	2306	028	040	04F1	1265	C0H30560
Narkiss Tam HEBREW	RB 6	0901	2305	028	040	04F1	1265	C0H40560
Narkiss Tam HEBREW	IB 6	0903	2307	028	040	04F1	1265	C0H50560
Narkiss Tam HEBREW	RM 7	0900	2304	02F	047	04F1	1265	C0H20570
Narkiss Tam HEBREW	IM 7	0902	2306	02F	047	04F1	1265	C0H30570
Narkiss Tam HEBREW	RB 7	0901	2305	02F	047	04F1	1265	C0H40570
Narkiss Tam Hebrew	IB 7	0903	2307	02F	047	04F1	1265	C0H50570
Narkiss Tam Hebrew	RM 8	0900	2304	035	053	04F1	1265	C0H20580
Narkiss Tam Hebrew	IM 8	0902	2306	035	053	04F1	1265	C0H30580
Narkiss Tam Hebrew	RB 8	0901	2305	035	053	04F1	1265	C0H40580
Narkiss Tam Hebrew	IB 8	0903	2307	035	053	04F1	1265	C0H50580
Narkiss Tam Hebrew	RM 9	0900	2304	03C	060	04F1	1265	C0H20590
Narkiss Tam Hebrew	IM 9	0902	2306	03C	060	04F1	1265	C0H30590
Narkiss Tam Hebrew	RB 9	0901	2305	03C	060	04F1	1265	C0H40590
Narkiss Tam Hebrew	IB 9	0903	2307	03C	060	04F1	1265	C0H50590

Figure 275 (Page 12 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkiss Tam Hebrew	RM 10	0900	2304	043	067	04F1	1265	C0H20500
Narkiss Tam Hebrew	IM 10	0902	2306	043	067	04F1	1265	C0H30500
Narkiss Tam Hebrew	RB 10	0901	2305	043	067	04F1	1265	C0H40500
Narkiss Tam Hebrew	IB 10	0903	2307	043	067	04F1	1265	C0H50500
Narkiss Tam Hebrew	RM 11	0900	2304	049	073	04F1	1265	C0H205A0
Narkiss Tam Hebrew	IM 11	0902	2306	049	073	04F1	1265	C0H305A0
Narkiss Tam Hebrew	RB 11	0901	2305	049	073	04F1	1265	C0H405A0
Narkiss Tam Hebrew	IB 11	0903	2307	049	073	04F1	1265	C0H505A0
Narkiss Tam Hebrew	RM 12	0900	2304	050	080	04F1	1265	C0H205B0
Narkiss Tam Hebrew	IM 12	0902	2306	050	080	04F1	1265	C0H305B0
Narkiss Tam Hebrew	RB 12	0901	2305	050	080	04F1	1265	C0H405B0
Narkiss Tam Hebrew	IB 12	0903	2307	050	080	04F1	1265	C0H505B0
Narkiss Tam Hebrew	RM 14	0900	2304	05D	093	04F1	1265	C0H205D0
Narkiss Tam Hebrew	IM 14	0902	2306	05D	093	04F1	1265	C0H305D0
Narkiss Tam Hebrew	RB 14	0901	2305	05D	093	04F1	1265	C0H405D0
Narkiss Tam Hebrew	IB 14	0903	2307	05D	093	04F1	1265	C0H505D0
Narkiss Tam Hebrew	RM 16	0900	2304	06B	107	04F1	1265	C0H205F0
Narkiss Tam Hebrew	IM 16	0902	2306	06B	107	04F1	1265	C0H305F0
Narkiss Tam Hebrew	RB 16	0901	2305	06B	107	04F1	1265	C0H405F0
Narkiss Tam Hebrew	IB 16	0903	2307	06B	107	04F1	1265	C0H505F0
Narkiss Tam Hebrew	RM 18	0900	2304	078	120	04F1	1265	C0H205H0
Narkiss Tam Hebrew	IM 18	0902	2306	078	120	04F1	1265	C0H305H0
Narkiss Tam Hebrew	RB 18	0901	2305	078	120	04F1	1265	C0H405H0
Narkiss Tam Hebrew	IB 18	0903	2307	078	120	04F1	1265	C0H505H0
Narkiss Tam Hebrew	RM 20	0900	2304	085	133	04F1	1265	C0H205J0
Narkiss Tam Hebrew	IM 20	0902	2306	085	133	04F1	1265	C0H305J0
Narkiss Tam Hebrew	RB 20	0901	2305	085	133	04F1	1265	C0H405J0
Narkiss Tam Hebrew	IB 20	0903	2307	085	133	04F1	1265	C0H505J0
Narkiss Tam Hebrew	RM 24	0900	2304	0A0	160	04F1	1265	C0H205N0
Narkiss Tam Hebrew	IM 24	0902	2306	0A0	160	04F1	1265	C0H305N0
Narkiss Tam Hebrew	RB 24	0901	2305	0A0	160	04F1	1265	C0H405N0
Narkiss Tam Hebrew	IB 24	0903	2307	0A0	160	04F1	1265	C0H505N0
Narkiss Tam Hebrew	RM 30	0900	2304	0C8	200	04F1	1265	C0H205T0
Narkiss Tam Hebrew	IM 30	0902	2306	0C8	200	04F1	1265	C0H305T0
Narkiss Tam Hebrew	RB 30	0901	2305	0C8	200	04F1	1265	C0H405T0
Narkiss Tam Hebrew	IB 30	0903	2307	0C8	200	04F1	1265	C0H505T0

Figure 275 (Page 13 of 13). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkiss Tam Hebrew	RM 36	0900	2304	0F0	240	04F1	1265	C0H205Z0
Narkiss Tam Hebrew	IM 36	0902	2306	0F0	240	04F1	1265	C0H305Z0
Narkiss Tam Hebrew	RB 36	0901	2305	0F0	240	04F1	1265	C0H405Z0
Narkiss Tam Hebrew	IB 36	0903	2307	0F0	240	04F1	1265	C0H505Z0

**Core Times New Roman Raster Fonts for the AFCCU Printers:** The following table lists the Core Times New Roman raster fonts used to activate the fonts resident in the AFCCU printers.

Figure 276 (Page 1 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	RM 6	0904	2308	028	040	04F0	1264	C0N20460
ITC Boutros Setting Arabic	IM 6	0906	2310	028	040	04F0	1264	C0N30460
ITC Boutros Setting Arabic	RB 6	0905	2309	028	040	04F0	1264	C0N40460
ITC Boutros Setting Arabic	IB 6	0907	2311	028	040	04F0	1264	C0N50460
ITC Boutros Setting Arabic	RM 7	0904	2308	02F	047	04F0	1264	C0N20470
ITC Boutros Setting Arabic	IM 7	0906	2310	02F	047	04F0	1264	C0N30470
ITC Boutros Setting Arabic	RB 7	0905	2309	02F	047	04F0	1264	C0N40470
ITC Boutros Setting Arabic	IB 7	0907	2311	02F	047	04F0	1264	C0N50470
ITC Boutros Setting Arabic	RM 8	0904	2308	035	053	04F0	1264	C0N20480
ITC Boutros Setting Arabic	IM 8	0906	2310	035	053	04F0	1264	C0N30480
ITC Boutros Setting Arabic	RB 8	0905	2309	035	053	04F0	1264	C0N40480
ITC Boutros Setting Arabic	IB 8	0907	2311	035	053	04F0	1264	C0N50480
ITC Boutros Setting Arabic	RM 9	0904	2308	03C	060	04F0	1264	C0N20490
ITC Boutros Setting Arabic	IM 9	0906	2310	03C	060	04F0	1264	C0N30490

Figure 276 (Page 2 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	RB 9	0905	2309	03C	060	04F0	1264	C0N40490
ITC Boutros Setting Arabic	IB 9	0907	2311	03C	060	04F0	1264	C0N50490
ITC Boutros Setting Arabic	RM 10	0904	2308	043	067	04F0	1264	C0N20400
ITC Boutros Setting Arabic	IM 10	0906	2310	043	067	04F0	1264	C0N30400
ITC Boutros Setting Arabic	RB 10	0905	2309	043	067	04F0	1264	C0N40400
ITC Boutros Setting Arabic	IB 10	0907	2311	043	067	04F0	1264	C0N50400
ITC Boutros Setting Arabic	RM 11	0904	2308	049	073	04F0	1264	C0N204A0
ITC Boutros Setting Arabic	IM 11	0906	2310	049	073	04F0	1264	C0N304A0
ITC Boutros Setting Arabic	RB 11	0905	2309	049	073	04F0	1264	C0N404A0
ITC Boutros Setting Arabic	IB 11	0907	2311	049	073	04F0	1264	C0N504A0
ITC Boutros Setting Arabic	RM 12	0904	2308	050	080	04F0	1264	C0N204B0
ITC Boutros Setting Arabic	IM 12	0906	2310	050	080	04F0	1264	C0N304B0
ITC Boutros Setting Arabic	RB 12	0905	2309	050	080	04F0	1264	C0N404B0
ITC Boutros Setting Arabic	IB 12	0907	2311	050	080	04F0	1264	C0N504B0
ITC Boutros Setting Arabic	RM 14	0904	2308	05D	093	04F0	1264	C0N204D0
ITC Boutros Setting Arabic	IM 14	0906	2310	05D	093	04F0	1264	C0N304D0
ITC Boutros Setting Arabic	RB 14	0905	2309	05D	093	04F0	1264	C0N404D0
ITC Boutros Setting Arabic	IB 14	0907	2311	05D	093	04F0	1264	C0N504D0
ITC Boutros Setting Arabic	RM 16	0904	2308	06B	107	04F0	1264	C0N204F0
ITC Boutros Setting Arabic	IM 16	0906	2310	06B	107	04F0	1264	C0N304F0
ITC Boutros Setting Arabic	RB 16	0905	2309	06B	107	04F0	1264	C0N404F0

Figure 276 (Page 3 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	IB 16	0907	2311	06B	107	04F0	1264	C0N504F0
ITC Boutros Setting Arabic	RM 18	0904	2308	078	120	04F0	1264	C0N204H0
ITC Boutros Setting Arabic	IM 18	0906	2310	078	120	04F0	1264	C0N304H0
ITC Boutros Setting Arabic	RB 18	0905	2309	078	120	04F0	1264	C0N404H0
ITC Boutros Setting Arabic	IB 18	0907	2311	078	120	04F0	1264	C0N504H0
ITC Boutros Setting Arabic	RM 20	0904	2308	085	133	04F0	1264	C0N204J0
ITC Boutros Setting Arabic	IM 20	0906	2310	085	133	04F0	1264	C0N304J0
ITC Boutros Setting Arabic	RB 20	0905	2309	085	133	04F0	1264	C0N404J0
ITC Boutros Setting Arabic	IB 20	0907	2311	085	133	04F0	1264	C0N504J0
ITC Boutros Setting Arabic	RM 24	0904	2308	0A0	160	04F0	1264	C0N204N0
ITC Boutros Setting Arabic	IM 24	0906	2310	0A0	160	04F0	1264	C0N304N0
ITC Boutros Setting Arabic	RB 24	0905	2309	0A0	160	04F0	1264	C0N404N0
ITC Boutros Setting Arabic	IB 24	0907	2311	0A0	160	04F0	1264	C0N504N0
ITC Boutros Setting Arabic	RM 30	0904	2308	0C8	200	04F0	1264	C0N204T0
ITC Boutros Setting Arabic	IM 30	0906	2310	0C8	200	04F0	1264	C0N304T0
ITC Boutros Setting Arabic	RB 30	0905	2309	0C8	200	04F0	1264	C0N404T0
ITC Boutros Setting Arabic	IB 30	0907	2311	0C8	200	04F0	1264	C0N504T0
ITC Boutros Setting Arabic	RM 36	0904	2308	0F0	240	04F0	1264	C0N204Z0
ITC Boutros Setting Arabic	IM 36	0906	2310	0F0	240	04F0	1264	C0N304Z0
ITC Boutros Setting Arabic	RB 36	0905	2309	0F0	240	04F0	1264	C0N404Z0
ITC Boutros Setting Arabic	IB 36	0907	2311	0F0	240	04F0	1264	C0N504Z0
Narkissim Hebrew	RM 6	0904	2308	028	040	04F1	1265	C0N20560



Figure 276 (Page 4 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkissim Hebrew	IM 6	0906	2310	028	040	04F1	1265	C0N30560
Narkissim Hebrew	RB 6	0905	2309	028	040	04F1	1265	C0N40560
Narkissim Hebrew	IB 6	0907	2311	028	040	04F1	1265	C0N50560
Narkissim Hebrew	RM 7	0904	2308	02F	047	04F1	1265	C0N20570
Narkissim Hebrew	IM 7	0906	2310	02F	047	04F1	1265	C0N30570
Narkissim Hebrew	RB 7	0905	2309	02F	047	04F1	1265	C0N40570
Narkissim Hebrew	IB 7	0907	2311	02F	047	04F1	1265	C0N50570
Narkissim Hebrew	RM 8	0904	2308	035	053	04F1	1265	C0N20580
Narkissim Hebrew	IM 8	0906	2310	035	053	04F1	1265	C0N30580
Narkissim Hebrew	RB 8	0905	2309	035	053	04F1	1265	C0N40580
Narkissim Hebrew	IB 8	0907	2311	035	053	04F1	1265	C0N50580
Narkissim Hebrew	RM 9	0904	2308	03C	060	04F1	1265	C0N20590
Narkissim Hebrew	IM 9	0906	2310	03C	060	04F1	1265	C0N30590
Narkissim Hebrew	RB 9	0905	2309	03C	060	04F1	1265	C0N40590
Narkissim Hebrew	IB 9	0907	2311	03C	060	04F1	1265	C0N50590
Narkissim Hebrew	RM 10	0904	2308	043	067	04F1	1265	C0N20500
Narkissim Hebrew	IM 10	0906	2310	043	067	04F1	1265	C0N30500
Narkissim Hebrew	RB 10	0905	2309	043	067	04F1	1265	C0N40500
Narkissim Hebrew	IB 10	0907	2311	043	067	04F1	1265	C0N50500
Narkissim Hebrew	RM 11	0904	2308	049	073	04F1	1265	C0N205A0
Narkissim Hebrew	IM 11	0906	2310	049	073	04F1	1265	C0N305A0
Narkissim Hebrew	RB 11	0905	2309	049	073	04F1	1265	C0N405A0
Narkissim Hebrew	IB 11	0907	2311	049	073	04F1	1265	C0N505A0
Narkissim Hebrew	RM 12	0904	2308	050	080	04F1	1265	C0N205B0
Narkissim Hebrew	IM 12	0906	2310	050	080	04F1	1265	C0N305B0
Narkissim Hebrew	RB 12	0905	2309	050	080	04F1	1265	C0N405B0
Narkissim Hebrew	IB 12	0907	2311	050	080	04F1	1265	C0N505B0
Narkissim Hebrew	RM 14	0904	2308	05D	093	04F1	1265	C0N205D0
Narkissim Hebrew	IM 14	0906	2310	05D	093	04F1	1265	C0N305D0
Narkissim Hebrew	RB 14	0905	2309	05D	093	04F1	1265	C0N405D0
Narkissim Hebrew	IB 14	0907	2311	05D	093	04F1	1265	C0N505D0
Narkissim Hebrew	RM 16	0904	2308	06B	107	04F1	1265	C0N205F0
Narkissim Hebrew	IM 16	0906	2310	06B	107	04F1	1265	C0N305F0
Narkissim Hebrew	RB 16	0905	2309	06B	107	04F1	1265	C0N405F0
Narkissim Hebrew	IB 16	0907	2311	06B	107	04F1	1265	C0N505F0
Narkissim Hebrew	RM 18	0904	2308	078	120	04F1	1265	C0N205H0

Figure 276 (Page 5 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkissim Hebrew	IM 18	0906	2310	078	120	04F1	1265	C0N305H0
Narkissim Hebrew	RB 18	0905	2309	078	120	04F1	1265	C0N405H0
Narkissim Hebrew	IB 18	0907	2311	078	120	04F1	1265	C0N505H0
Narkissim Hebrew	RM 20	0904	2308	085	133	04F1	1265	C0N205J0
Narkissim Hebrew	IM 20	0906	2310	085	133	04F1	1265	C0N305J0
Narkissim Hebrew	RB 20	0905	2309	085	133	04F1	1265	C0N405J0
Narkissim Hebrew	IB 20	0907	2311	085	133	04F1	1265	C0N505J0
Narkissim Hebrew	RM 24	0904	2308	0A0	160	04F1	1265	C0N205N0
Narkissim Hebrew	IM 24	0906	2310	0A0	160	04F1	1265	C0N305N0
Narkissim Hebrew	RB 24	0905	2309	0A0	160	04F1	1265	C0N405N0
Narkissim Hebrew	IB 24	0907	2311	0A0	160	04F1	1265	C0N505N0
Narkissim Hebrew	RM 30	0904	2308	0C8	200	04F1	1265	C0N205T0
Narkissim Hebrew	IM 30	0906	2310	0C8	200	04F1	1265	C0N305T0
Narkissim Hebrew	RB 30	0905	2309	0C8	200	04F1	1265	C0N405T0
Narkissim Hebrew	IB 30	0907	2311	0C8	200	04F1	1265	C0N505T0
Narkissim Hebrew	RM 36	0904	2308	0F0	240	04F1	1265	C0N205Z0
Narkissim Hebrew	IM 36	0906	2310	0F0	240	04F1	1265	C0N305Z0
Narkissim Hebrew	RB 36	0905	2309	0F0	240	04F1	1265	C0N405Z0
Narkissim Hebrew	IB 36	0907	2311	0F0	240	04F1	1265	C0N505Z0
Times New Roman Cyrillic Greek	RM 6	0904	2308	028	40	04FC	1276	C0N20360
Times New Roman Cyrillic Greek	IM 6	0906	2310	028	40	04FC	1276	C0N30360
Times New Roman Cyrillic Greek	RB 6	0905	2309	028	40	04FC	1276	C0N40360
Times New Roman Cyrillic Greek	IB 6	0907	2311	028	40	04FC	1276	C0N50360
Times New Roman Cyrillic Greek	RM 7	0904	2308	02F	47	04FC	1276	C0N20370
Times New Roman Cyrillic Greek	IM 7	0906	2310	02F	47	04FC	1276	C0N30370
Times New Roman Cyrillic Greek	RB 7	0905	2309	02F	47	04FC	1276	C0N40370
Times New Roman Cyrillic Greek	IB 7	0907	2311	02F	47	04FC	1276	C0N50370
Times New Roman Cyrillic Greek	RM 8	0904	2308	035	53	04FC	1276	C0N20380
Times New Roman Cyrillic Greek	IM 8	0906	2310	035	53	04FC	1276	C0N30380

Figure 276 (Page 6 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Cyrillic Greek	RB 8	0905	2309	035	53	04FC	1276	C0N40380
Times New Roman Cyrillic Greek	IB 8	0907	2311	035	53	04FC	1276	C0N50380
Times New Roman Cyrillic Greek	RM 9	0904	2308	03C	60	04FC	1276	C0N20390
Times New Roman Cyrillic Greek	IM 9	0906	2310	03C	60	04FC	1276	C0N30390
Times New Roman Cyrillic Greek	RB 9	0905	2309	03C	60	04FC	1276	C0N40390
Times New Roman Cyrillic Greek	IB 9	0907	2311	03C	60	04FC	1276	C0N50390
Times New Roman Cyrillic Greek	RM 10	0904	2308	043	67	04FC	1276	C0N20300
Times New Roman Cyrillic Greek	IM 10	0906	2310	043	67	04FC	1276	C0N30300
Times New Roman Cyrillic Greek	RB 10	0905	2309	043	67	04FC	1276	C0N40300
Times New Roman Cyrillic Greek	IB 10	0907	2311	043	67	04FC	1276	C0N50300
Times New Roman Cyrillic Greek	RM 11	0904	2308	049	73	04FC	1276	C0N203A0
Times New Roman Cyrillic Greek	IM 11	0906	2310	049	73	04FC	1276	C0N303A0
Times New Roman Cyrillic Greek	RB 11	0905	2309	049	73	04FC	1276	C0N403A0
Times New Roman Cyrillic Greek	IB 11	0907	2311	049	73	04FC	1276	C0N503A0
Times New Roman Cyrillic Greek	RM 12	0904	2308	050	80	04FC	1276	C0N203B0
Times New Roman Cyrillic Greek	IM 12	0906	2310	050	80	04FC	1276	C0N303B0
Times New Roman Cyrillic Greek	RB 12	0905	2309	050	80	04FC	1276	C0N403B0
Times New Roman Cyrillic Greek	IB 12	0907	2311	050	80	04FC	1276	C0N503B0
Times New Roman Cyrillic Greek	RM 14	0904	2308	05D	93	04FC	1276	C0N203D0
Times New Roman Cyrillic Greek	IM 14	0906	2310	05D	93	04FC	1276	C0N303D0
Times New Roman Cyrillic Greek	RB 14	0905	2309	05D	93	04FC	1276	C0N403D0

Figure 276 (Page 7 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Cyrillic Greek	IB 14	0907	2311	05D	093	04FC	1276	C0N503D0
Times New Roman Cyrillic Greek	RM 16	0904	2308	06B	107	04FC	1276	C0N203F0
Times New Roman Cyrillic Greek	IM 16	0906	2310	06B	107	04FC	1276	C0N303F0
Times New Roman Cyrillic Greek	RB 16	0905	2309	06B	107	04FC	1276	C0N403F0
Times New Roman Cyrillic Greek	IB 16	0907	2311	06B	107	04FC	1276	C0N503F0
Times New Roman Cyrillic Greek	RM 18	0904	2308	078	120	04FC	1276	C0N203H0
Times New Roman Cyrillic Greek	IM 18	0906	2310	078	120	04FC	1276	C0N303H0
Times New Roman Cyrillic Greek	RB 18	0905	2309	078	120	04FC	1276	C0N403H0
Times New Roman Cyrillic Greek	IB 18	0907	2311	078	120	04FC	1276	C0N503H0
Times New Roman Cyrillic Greek	RM 20	0904	2308	085	133	04FC	1276	C0N203J0
Times New Roman Cyrillic Greek	IM 20	0906	2310	085	133	04FC	1276	C0N303J0
Times New Roman Cyrillic Greek	RB 20	0905	2309	085	133	04FC	1276	C0N403J0
Times New Roman Cyrillic Greek	IB 20	0907	2311	085	133	04FC	1276	C0N503J0
Times New Roman Cyrillic Greek	RM 24	0904	2308	0A0	160	04FC	1276	C0N203N0
Times New Roman Cyrillic Greek	IM 24	0906	2310	0A0	160	04FC	1276	C0N303N0
Times New Roman Cyrillic Greek	RB 24	0905	2309	0A0	160	04FC	1276	C0N403N0
Times New Roman Cyrillic Greek	IB 24	0907	2311	0A0	160	04FC	1276	C0N503N0
Times New Roman Cyrillic Greek	RM 30	0904	2308	0C8	200	04FC	1276	C0N203T0
Times New Roman Cyrillic Greek	IM 30	0906	2310	0C8	200	04FC	1276	C0N303T0
Times New Roman Cyrillic Greek	RB 30	0905	2309	0C8	200	04FC	1276	C0N403T0
Times New Roman Cyrillic Greek	IB 30	0907	2311	0C8	200	04FC	1276	C0N503T0

Figure 276 (Page 8 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Cyrillic Greek	RM 36	0904	2308	0F0	240	04FC	1276	C0N203Z0
Times New Roman Cyrillic Greek	IM 36	0906	2310	0F0	240	04FC	1276	C0N303Z0
Times New Roman Cyrillic Greek	RB 36	0905	2309	0F0	240	04FC	1276	C0N403Z0
Times New Roman Cyrillic Greek	IB 36	0907	2311	0F0	240	04FC	1276	C0N503Z0
Times New Roman Latin1	RM 6	0904	2308	028	40	07F7	2039	C0N20060
Times New Roman Latin1	IM 6	0906	2310	028	40	07F7	2039	C0N30060
Times New Roman Latin1	RB 6	0905	2309	028	40	07F7	2039	C0N40060
Times New Roman Latin1	IB 6	0907	2311	028	40	07F7	2039	C0N50060
Times New Roman Latin1	RM 7	0904	2308	02F	47	07F7	2039	C0N20070
Times New Roman Latin1	IM 7	0906	2310	02F	47	07F7	2039	C0N30070
Times New Roman Latin1	RB 7	0905	2309	02F	47	07F7	2039	C0N40070
Times New Roman Latin1	IB 7	0907	2311	02F	47	07F7	2039	C0N50070
Times New Roman Latin1	RM 8	0904	2308	035	53	07F7	2039	C0N20080
Times New Roman Latin1	IM 8	0906	2310	035	53	07F7	2039	C0N30080
Times New Roman Latin1	RB 8	0905	2309	035	53	07F7	2039	C0N40080
Times New Roman Latin1	IB 8	0907	2311	035	53	07F7	2039	C0N50080
Times New Roman Latin1	RM 9	0904	2308	03C	60	07F7	2039	C0N20090
Times New Roman Latin1	IM 9	0906	2310	03C	60	07F7	2039	C0N30090
Times New Roman Latin1	RB 9	0905	2309	03C	60	07F7	2039	C0N40090
Times New Roman Latin1	IB 9	0907	2311	03C	60	07F7	2039	C0N50090
Times New Roman Latin1	RM 10	0904	2308	043	67	07F7	2039	C0N20000
Times New Roman Latin1	IM 10	0906	2310	043	67	07F7	2039	C0N30000
Times New Roman Latin1	RB 10	0905	2309	043	67	07F7	2039	C0N40000
Times New Roman Latin1	IB 10	0907	2311	043	67	07F7	2039	C0N50000
Times New Roman Latin1	RM 11	0904	2308	049	73	07F7	2039	C0N200A0
Times New Roman Latin1	IM 11	0906	2310	049	73	07F7	2039	C0N300A0
Times New Roman Latin1	RB 11	0905	2309	049	73	07F7	2039	C0N400A0
Times New Roman Latin1	IB 11	0907	2311	049	73	07F7	2039	C0N500A0
Times New Roman Latin1	RM 12	0904	2308	050	80	07F7	2039	C0N200B0
Times New Roman Latin1	IM 12	0906	2310	050	80	07F7	2039	C0N300B0
Times New Roman Latin1	RB 12	0905	2309	050	80	07F7	2039	C0N400B0
Times New Roman Latin1	IB 12	0907	2311	050	80	07F7	2039	C0N500B0
Times New Roman Latin1	RM 14	0904	2308	05D	93	07F7	2039	C0N200D0

Figure 276 (Page 9 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin1	IM 14	0906	2310	05D	93	07F7	2039	C0N300D0
Times New Roman Latin1	RB 14	0905	2309	05D	93	07F7	2039	C0N400D0
Times New Roman Latin1	IB 14	0907	2311	05D	93	07F7	2039	C0N500D0
Times New Roman Latin1	RM 16	0904	2308	06B	107	07F7	2039	C0N200F0
Times New Roman Latin1	IM 16	0906	2310	06B	107	07F7	2039	C0N300F0
Times New Roman Latin1	RB 16	0905	2309	06B	107	07F7	2039	C0N400F0
Times New Roman Latin1	IB 16	0907	2311	06B	107	07F7	2039	C0N500F0
Times New Roman Latin1	RM 18	0904	2308	078	120	07F7	2039	C0N200H0
Times New Roman Latin1	IM 18	0906	2310	078	120	07F7	2039	C0N300H0
Times New Roman Latin1	RB 18	0905	2309	078	120	07F7	2039	C0N400H0
Times New Roman Latin1	IB 18	0907	2311	078	120	07F7	2039	C0N500H0
Times New Roman Latin1	RM 20	0904	2308	085	133	07F7	2039	C0N200J0
Times New Roman Latin1	IM 20	0906	2310	085	133	07F7	2039	C0N300J0
Times New Roman Latin1	RB 20	0905	2309	085	133	07F7	2039	C0N400J0
Times New Roman Latin1	IB 20	0907	2311	085	133	07F7	2039	C0N500J0
Times New Roman Latin1	RM 24	0904	2308	0A0	160	07F7	2039	C0N200N0
Times New Roman Latin1	IM 24	0906	2310	0A0	160	07F7	2039	C0N300N0
Times New Roman Latin1	RB 24	0905	2309	0A0	160	07F7	2039	C0N400N0
Times New Roman Latin1	IB 24	0907	2311	0A0	160	07F7	2039	C0N500N0
Times New Roman Latin1	RM 30	0904	2308	0C8	200	07F7	2039	C0N200T0
Times New Roman Latin1	IM 30	0906	2310	0C8	200	07F7	2039	C0N300T0
Times New Roman Latin1	RB 30	0905	2309	0C8	200	07F7	2039	C0N400T0
Times New Roman Latin1	IB 30	0907	2311	0C8	200	07F7	2039	C0N500T0
Times New Roman Latin1	RM 36	0904	2308	0F0	240	07F7	2039	C0N200Z0
Times New Roman Latin1	IM 36	0906	2310	0F0	240	07F7	2039	C0N300Z0
Times New Roman Latin1	RB 36	0905	2309	0F0	240	07F7	2039	C0N400Z0
Times New Roman Latin1	IB 36	0907	2311	0F0	240	07F7	2039	C0N500Z0
Times New Roman Latin235	RM 6	0904	2308	028	40	04ED	1261	C0N20260
Times New Roman Latin235	IM 6	0906	2310	028	40	04ED	1261	C0N30260
Times New Roman Latin235	RB 6	0905	2309	028	40	04ED	1261	C0N40260
Times New Roman Latin235	IB 6	0907	2311	028	40	04ED	1261	C0N50260
Times New Roman Latin235	RM 7	0904	2308	02F	47	04ED	1261	C0N20270

Figure 276 (Page 10 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin235	IM 7	0906	2310	02F	47	04ED	1261	C0N30270
Times New Roman Latin235	RB 7	0905	2309	02F	47	04ED	1261	C0N40270
Times New Roman Latin235	IB 7	0907	2311	02F	47	04ED	1261	C0N50270
Times New Roman Latin235	RM 8	0904	2308	035	53	04ED	1261	C0N20280
Times New Roman Latin235	IM 8	0906	2310	035	53	04ED	1261	C0N30280
Times New Roman Latin235	RB 8	0905	2309	035	53	04ED	1261	C0N40280
Times New Roman Latin235	IB 8	0907	2311	035	53	04ED	1261	C0N50280
Times New Roman Latin235	RM 9	0904	2308	03C	60	04ED	1261	C0N20290
Times New Roman Latin235	IM 9	0906	2310	03C	60	04ED	1261	C0N30290
Times New Roman Latin235	RB 9	0905	2309	03C	60	04ED	1261	C0N40290
Times New Roman Latin235	IB 9	0907	2311	03C	60	04ED	1261	C0N50290
Times New Roman Latin235	RM 10	0904	2308	043	67	04ED	1261	C0N20200
Times New Roman Latin235	IM 10	0906	2310	043	67	04ED	1261	C0N30200
Times New Roman Latin235	RB 10	0905	2309	043	67	04ED	1261	C0N40200
Times New Roman Latin235	IB 10	0907	2311	043	67	04ED	1261	C0N50200
Times New Roman Latin235	RM 11	0904	2308	049	73	04ED	1261	C0N202A0
Times New Roman Latin235	IM 11	0906	2310	049	73	04ED	1261	C0N302A0
Times New Roman Latin235	RB 11	0905	2309	049	73	04ED	1261	C0N402A0
Times New Roman Latin235	IB 11	0907	2311	049	73	04ED	1261	C0N502A0
Times New Roman Latin235	RM 12	0904	2308	050	80	04ED	1261	C0N202B0
Times New Roman Latin235	IM 12	0906	2310	050	80	04ED	1261	C0N302B0

Figure 276 (Page 11 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin235	RB 12	0905	2309	050	80	04ED	1261	C0N402B0
Times New Roman Latin235	IB 12	0907	2311	050	80	04ED	1261	C0N502B0
Times New Roman Latin235	RM 14	0904	2308	05D	93	04ED	1261	C0N202D0
Times New Roman Latin235	IM 14	0906	2310	05D	93	04ED	1261	C0N302D0
Times New Roman Latin235	RB 14	0905	2309	05D	93	04ED	1261	C0N402D0
Times New Roman Latin235	IB 14	0907	2311	05D	93	04ED	1261	C0N502D0
Times New Roman Latin235	RM 16	0904	2308	06B	107	04ED	1261	C0N202F0
Times New Roman Latin235	IM 16	0906	2310	06B	107	04ED	1261	C0N302F0
Times New Roman Latin235	RB 16	0905	2309	06B	107	04ED	1261	C0N402F0
Times New Roman Latin235	IB 16	0907	2311	06B	107	04ED	1261	C0N502F0
Times New Roman Latin235	RM 18	0904	2308	078	120	04ED	1261	C0N202H0
Times New Roman Latin235	IM 18	0906	2310	078	120	04ED	1261	C0N302H0
Times New Roman Latin235	RB 18	0905	2309	078	120	04ED	1261	C0N402H0
Times New Roman Latin235	IB 18	0907	2311	078	120	04ED	1261	C0N502H0
Times New Roman Latin235	RM 20	0904	2308	085	133	04ED	1261	C0N202J0
Times New Roman Latin235	IM 20	0906	2310	085	133	04ED	1261	C0N302J0
Times New Roman Latin235	RB 20	0905	2309	085	133	04ED	1261	C0N402J0
Times New Roman Latin235	IB 20	0907	2311	085	133	04ED	1261	C0N502J0
Times New Roman Latin235	RM 24	0904	2308	0A0	160	04ED	1261	C0N202N0
Times New Roman Latin235	IM 24	0906	2310	0A0	160	04ED	1261	C0N302N0
Times New Roman Latin235	RB 24	0905	2309	0A0	160	04ED	1261	C0N402N0



Figure 276 (Page 12 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin235	IB 24	0907	2311	0A0	160	04ED	1261	C0N502N0
Times New Roman Latin235	RM 30	0904	2308	0C8	200	04ED	1261	C0N202T0
Times New Roman Latin235	IM 30	0906	2310	0C8	200	04ED	1261	C0N302T0
Times New Roman Latin235	RB 30	0905	2309	0C8	200	04ED	1261	C0N402T0
Times New Roman Latin235	IB 30	0907	2311	0C8	200	04ED	1261	C0N502T0
Times New Roman Latin235	RM 36	0904	2308	0F0	240	04ED	1261	C0N202Z0
Times New Roman Latin235	IM 36	0906	2310	0F0	240	04ED	1261	C0N302Z0
Times New Roman Latin235	RB 36	0905	2309	0F0	240	04ED	1261	C0N402Z0
Times New Roman Latin235	IB 36	0907	2311	0F0	240	04ED	1261	C0N502Z0
Times New Roman Latin4	RM 6	0904	2308	028	040	04F4	1268	C0N20760
Times New Roman Latin4	IM 6	0906	2310	028	040	04F4	1268	C0N30760
Times New Roman Latin4	RB 6	0905	2309	028	040	04F4	1268	C0N40760
Times New Roman Latin4	IB 6	0907	2311	028	040	04F4	1268	C0N50760
Times New Roman Latin4	RM 7	0904	2308	02F	047	04F4	1268	C0N20770
Times New Roman Latin4	IM 7	0906	2310	02F	047	04F4	1268	C0N30770
Times New Roman Latin4	RB 7	0905	2309	02F	047	04F4	1268	C0N40770
Times New Roman Latin4	IB 7	0907	2311	02F	047	04F4	1268	C0N50770
Times New Roman Latin4	RM 8	0904	2308	035	053	04F4	1268	C0N20780
Times New Roman Latin4	IM 8	0906	2310	035	053	04F4	1268	C0N30780
Times New Roman Latin4	RB 8	0905	2309	035	053	04F4	1268	C0N40780
Times New Roman Latin4	IB 8	0907	2311	035	053	04F4	1268	C0N50780
Times New Roman Latin4	RM 9	0904	2308	03C	060	04F4	1268	C0N20790
Times New Roman Latin4	IM 9	0906	2310	03C	060	04F4	1268	C0N30790
Times New Roman Latin4	RB 9	0905	2309	03C	060	04F4	1268	C0N40790
Times New Roman Latin4	IB 9	0907	2311	03C	060	04F4	1268	C0N50790
Times New Roman Latin4	RM 10	0904	2308	043	067	04F4	1268	C0N20700
Times New Roman Latin4	IM 10	0906	2310	043	067	04F4	1268	C0N30700
Times New Roman Latin4	RB 10	0905	2309	043	067	04F4	1268	C0N40700
Times New Roman Latin4	IB 10	0907	2311	043	067	04F4	1268	C0N50700
Times New Roman Latin4	RM 11	0904	2308	049	073	04F4	1268	C0N207A0

Figure 276 (Page 13 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin4	IM 11	0906	2310	049	073	04F4	1268	C0N307A0
Times New Roman Latin4	RB 11	0905	2309	049	073	04F4	1268	C0N407A0
Times New Roman Latin4	IB 11	0907	2311	049	073	04F4	1268	C0N507A0
Times New Roman Latin4	RM 12	0904	2308	050	080	04F4	1268	C0N207B0
Times New Roman Latin4	IM 12	0906	2310	050	080	04F4	1268	C0N307B0
Times New Roman Latin4	RB 12	0905	2309	050	080	04F4	1268	C0N407B0
Times New Roman Latin4	IB 12	0907	2311	050	080	04F4	1268	C0N507B0
Times New Roman Latin4	RM 14	0904	2308	05D	093	04F4	1268	C0N207D0
Times New Roman Latin4	IM 14	0906	2310	05D	093	04F4	1268	C0N307D0
Times New Roman Latin4	RB 14	0905	2309	05D	093	04F4	1268	C0N407D0
Times New Roman Latin4	IB 14	0907	2311	05D	093	04F4	1268	C0N507D0
Times New Roman Latin4	RM 16	0904	2308	06B	107	04F4	1268	C0N207F0
Times New Roman Latin4	IM 16	0906	2310	06B	107	04F4	1268	C0N307F0
Times New Roman Latin4	RB 16	0905	2309	06B	107	04F4	1268	C0N407F0
Times New Roman Latin4	IB 16	0907	2311	06B	107	04F4	1268	C0N507F0
Times New Roman Latin4	RM 18	0904	2308	078	120	04F4	1268	C0N207H0
Times New Roman Latin4	IM 18	0906	2310	078	120	04F4	1268	C0N307H0
Times New Roman Latin4	RB 18	0905	2309	078	120	04F4	1268	C0N407H0
Times New Roman Latin4	IB 18	0907	2311	078	120	04F4	1268	C0N507H0
Times New Roman Latin4	RM 20	0904	2308	085	133	04F4	1268	C0N207J0
Times New Roman Latin4	IM 20	0906	2310	085	133	04F4	1268	C0N307J0
Times New Roman Latin4	RB 20	0905	2309	085	133	04F4	1268	C0N407J0
Times New Roman Latin4	IB 20	0907	2311	085	133	04F4	1268	C0N507J0
Times New Roman Latin4	RM 24	0904	2308	0A0	160	04F4	1268	C0N207N0
Times New Roman Latin4	IM 24	0906	2310	0A0	160	04F4	1268	C0N307N0
Times New Roman Latin4	RB 24	0905	2309	0A0	160	04F4	1268	C0N407N0
Times New Roman Latin4	IB 24	0907	2311	0A0	160	04F4	1268	C0N507N0
Times New Roman Latin4	RM 30	0904	2308	0C8	200	04F4	1268	C0N207T0
Times New Roman Latin4	IM 30	0906	2310	0C8	200	04F4	1268	C0N307T0
Times New Roman Latin4	RB 30	0905	2309	0C8	200	04F4	1268	C0N407T0
Times New Roman Latin4	IB 30	0907	2311	0C8	200	04F4	1268	C0N507T0
Times New Roman Latin4	RM 36	0904	2308	0F0	240	04F4	1268	C0N207Z0
Times New Roman Latin4	IM 36	0906	2310	0F0	240	04F4	1268	C0N307Z0
Times New Roman Latin4	RB 36	0905	2309	0F0	240	04F4	1268	C0N407Z0
Times New Roman Latin4	IB 36	0907	2311	0F0	240	04F4	1268	C0N507Z0

Figure 276 (Page 14 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Symbols	RM 6	0904	2308	028	40	04A7	1191	C0N20160
Times New Roman Symbols	RB 6	0905	2309	028	40	04A7	1191	C0N40160
Times New Roman Symbols	RM 7	0904	2308	02F	47	04A7	1191	C0N20170
Times New Roman Symbols	RB 7	0905	2309	02F	47	04A7	1191	C0N40170
Times New Roman Symbols	RM 8	0904	2308	035	53	04A7	1191	C0N20180
Times New Roman Symbols	RB 8	0905	2309	035	53	04A7	1191	C0N40180
Times New Roman Symbols	RM 9	0904	2308	03C	60	04A7	1191	C0N20190
Times New Roman Symbols	RB 9	0905	2309	03C	60	04A7	1191	C0N40190
Times New Roman Symbols	RM 10	0904	2308	043	67	04A7	1191	C0N20100
Times New Roman Symbols	RB 10	0905	2309	043	67	04A7	1191	C0N40100
Times New Roman Symbols	RM 11	0904	2308	049	73	04A7	1191	C0N201A0
Times New Roman Symbols	RB 11	0905	2309	049	73	04A7	1191	C0N401A0
Times New Roman Symbols	RM 12	0904	2308	050	80	04A7	1191	C0N201B0
Times New Roman Symbols	RB 12	0905	2309	050	80	04A7	1191	C0N401B0
Times New Roman Symbols	RM 14	0904	2308	05D	93	04A7	1191	C0N201D0
Times New Roman Symbols	RB 14	0905	2309	05D	93	04A7	1191	C0N401D0
Times New Roman Symbols	RM 16	0904	2308	06B	107	04A7	1191	C0N201F0
Times New Roman Symbols	RB 16	0905	2309	06B	107	04A7	1191	C0N401F0
Times New Roman Symbols	RM 18	0904	2308	078	120	04A7	1191	C0N201H0
Times New Roman Symbols	RB 18	0905	2309	078	120	04A7	1191	C0N401H0
Times New Roman Symbols	RM 20	0904	2308	085	133	04A7	1191	C0N201J0

Figure 276 (Page 15 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Symbols	RB 20	0905	2309	085	133	04A7	1191	C0N401J0
Times New Roman Symbols	RM 24	0904	2308	0A0	160	04A7	1191	C0N201N0
Times New Roman Symbols	RB 24	0905	2309	0A0	160	04A7	1191	C0N401N0
Times New Roman Symbols	RM 30	0904	2308	0C8	200	04A7	1191	C0N201T0
Times New Roman Symbols	RB 30	0905	2309	0C8	200	04A7	1191	C0N401T0
Times New Roman Symbols	RM 36	0904	2308	0F0	240	04A7	1191	C0N201Z0
Times New Roman Symbols	RB 36	0905	2309	0F0	240	04A7	1191	C0N401Z0

## Fonts Resident in the 3930 Printer

The 3930 operational diskette contains resident fonts, which are listed in the table below. With the IPDS data stream, you can select among these resident fonts and several code pages; however, not every font fully populates every code page. Each of the PPDS fonts is available with one or more ASCII code pages. When you use a font with an FGID enclosed in parentheses, you must also specify the font width. The fonts resident in the 3930 printer include all of the fonts resident in the 3812 and 3816 printers, in addition to 14 others available only in 3930 PPDS mode.

With PSF/MVS, if the printer has Feature 4850 installed, the feature contains the IBM Expanded Core fonts (Courier, Helvetica, and Times New Roman). To mark the host equivalents of these fonts, run the following APSRMARK jobs: APSWMC PG, APSWMC R, APSWMC HL V, and APSWMC TN R. To mark the host equivalents of all the 3930 fonts, run APSWMC GR 4.

Figure 277 (Page 1 of 4). 3930 Resident Fonts in IPDS or PPDS Mode

Font	FGID HEX	FGID DEC	FW HEX	FW DEC	IPDS Mode	PPDS Mode	Font Character Set
APL 10	002D	0045	0090	0144	x	x	C0S0AE10
APL 20	0118	0280	0048	0072	x	x	C0S0AE20
Aviv 20	011A	0282	0048	0072	x	x	
Barak Bold PS	00A8	0168	0078	0120		x	
Barak PS	00A7	0167	0078	0120	x	x	C0H0BRK12
Boldface Italic PS	009B	0155	0078	0120	x	x	C0S0BITR
Boldface PS	00B0	0176	0078	0120		x	
Courier Bold 5	00F5	0245	0120	0288		x	
Courier Bold 10	002E	0046	0090	0144		x	C0S0CB10 C0S0OCB0
Courier Bold 12	006C	0108	0078	0120		x	C0S0CB12
Courier Bold 17	00FD	0253	0054	0084		x	
Courier Italic 10	0012	0018	0090	0144	x	x	C0S0CI10
Courier 5	00F4	0244	0120	0288	x	x	
Courier 10	000B	0011	0090	0144	x	x	C0S0CR10
Courier 12	0055	0085	0078	0120	x	x	C0S0CR12 C0S0CE12
Courier 17	00FC	0252	0054	0084	x	x	
Courier 17.1	00FE	0254	0054	0084	x	x	
Document PS	00AF	0175	0078	0120	x	x	C0S0DOTR
Essay Bold PS	00A3	0163	0078	0120		x	C0S0EBTR
Essay Italic PS	00A2	0162	0078	0120	x	x	C0S0EITR
Essay Light PS	00AD	0173	0078	0120	x	x	C0S0ELTR
Essay PS	00A0	0160	0078	0120	x	x	C0S0ESTR
Gothic Text Bold 10	0027	0039	0090	0144		x	C0D0GB10

Figure 277 (Page 2 of 4). 3930 Resident Fonts in IPDS or PPDS Mode

Font	FGID HEX	FGID DEC	FW HEX	FW DEC	IPDS Mode	PPDS Mode	Font Character Set
Gothic Text Bold 12	0045	0069	0078	0120		x	C0D0GB12
Gothic Text Condensed 15	00E7	0231	0060	0096		x	
Gothic Text Italic 12	0044	0068	0078	0120	x	x	C0D0GI12
Gothic Text TriPitch	00AE	0174	0078	0120		x	
Gothic Text 10	0028	0040	0090	0144	x	x	C0D0GT10
Gothic Text 12	0042	0066	0078	0120	x	x	C0D0GT12
Gothic Text 13	00CC	0204	006C	0108	x	x	C0S0D224
Gothic Text 15	00E6	0230	0060	0096	x	x	C0D0GT15
Gothic Text 20	0119	0281	0048	0072	x	x	C0D0GT20
Gothic Text 27	0122	0290	0036	0054	x	x	C0D0GT24
Katakana Gothic 10	002C	0044	0090	0144	x	x	C0L0KATA
Kateb 8	0109	0265	00B4	100	x	x	C0ARAB08
Kateb 10	0021	0033	0090	0144	x	x	C0ARAB10
Letter Gothic Bold 12	006E	0110	0078	0120		x	C0S0LB12
Letter Gothic 12	0057	0087	0078	0120	x		C0S0LR12
Math Symbol 10	001E	0030	0090	0144		x	
Math Symbol 12	0073	0115	0078	0120		x	
Narkiss Bold 8pt	(324B)	(12875)	0036	0054	x	x	
Narkiss Bold 10pt	(324B)	(12875)	0042	0066	x	x	
Narkiss Bold 12pt	(324B)	(12875)	004E	0078	x	x	
Narkiss Bold 16pt	(324B)	(12875)	006C	0108	x	x	
Narkiss Bold 24pt	(324B)	(12875)	00A2	0162	x	x	
Narkiss 8pt	(3237)	(12855)	0036	0054	x	x	
Narkiss 10pt	(3237)	(12855)	0042	0066	x	x	
Narkiss 12pt	(3237)	(12855)	004E	0078	x	x	
Narkiss 16pt	(3237)	(12855)	006C	0108	x	x	
Narkiss 24pt	(3237)	(12855)	00A2	0162	x	x	
OCR A 10	0013	0019	0090	0144	x	x	C0L00AOA
OCR B 10	0003	0003	0090	0144	x	x	C0L00BOA
Orator Bold 10	0026	0038	0090	0144		x	C0S0OB10
Orator 10	0005	0005	0090	0144	x	x	C0S0OR10
Pi Special Sans Serif 8pt.	(C237)	(49719)	0036	0054	x		C0P05580
Prestige Bold 10	003C	0060	0090	0144		x	
Prestige Bold 12	006F	0111	0078	0120		x	C0S0PB12
Prestige Italic 12	0070	0112	0078	0120	x	x	C0S0PI12

Figure 277 (Page 3 of 4). 3930 Resident Fonts in IPDS or PPDS Mode

Font	FGID HEX	FGID DEC	FW HEX	FW DEC	IPDS Mode	PPDS Mode	Font Character Set
Prestige 10	000C	0012	0090	0144	x	x	C0S0PR10
Prestige 12	0056	0086	0078	0120	x	x	C0S0PR12
Roman Text 10	0029	0041	0090	0144	x	x	C0D0RT10
Script 12	0054	0084	0078	0120	x	x	C0S0SR12
Serif Text Bold 12	0048	0072	0078	0120		x	C0D0SB12
Serif Text Italic 10	002B	0043	0090	0144	x	x	C0D0SI10
Serif Text Italic 12	0047	0071	0078	0120	x	x	C0D0SI12
Serif Text 10	002A	0042	0090	0144	x	x	C0D0ST10
Serif Text 12	0046	0070	0078	0120	x	x	C0D0ST12
Serif Text 15	00E5	0229	0060	0096	x	x	C0D0ST15
Shalom Bold Condensed 15	00EA	0234	0060	0096		x	
Shalom Bold 10	0032	0050	0090	0144		x	
Shalom Bold 12	0065	0101	0078	0120		x	
Shalom Bold 15	00D4	0212	0060	0096	x	x	
Shalom Condensed 15	00E2	0226	0060	0096	x	x	
Shalom 10	0031	0049	0090	0144	x	x	C0H0HB10
Shalom 12	0062	0098	0078	0120	x	x	C0H0HB12
Shalom 15	00D3	0211	0060	0096	x	x	C0H0HB15
Sonoran Serif Bold 9pt	(114B)	(4427)	003C	0060	x		C0T07590
Sonoran Serif Bold 10pt	041D (114B)	1053 (4427)	0042	0066	x	x	C0T07500
Sonoran Serif Bold 14pt	(114B)	(4427)	0060	0096	x		C0T07500
Sonoran Serif Bold 16pt	0675 (114B)	1653 (4427)	006C	0108	x	x	C0T075F0
Sonoran Serif Bold 18pt	(114B)	(4427)	0078	0120		x	
Sonoran Serif Bold 20pt	(114B)	(4427)	0084	0132	x		C0T075J0
Sonoran Serif Bold 24pt	0837 (114B)	2103 (4427)	00A2	0162	x	x	C0T075N0
Sonoran Serif Italic Bold 9pt	(11CB)	(4555)	003C	0060	x		C0T17590
Sonoran Serif Italic Bold 10pt	(11CB)	(4555)	0042	0066	x		C0T17500
Sonoran Serif Italic Bold 12pt	(11CB)	(4555)	004E	0078	x		C0T175B0
Sonoran Serif Italic Bold 18pt	(11CB)	(4555)	0078	0120	x		C0T175H0

Figure 277 (Page 4 of 4). 3930 Resident Fonts in IPDS or PPDS Mode

Font	FGID HEX	FGID DEC	FW HEX	FW DEC	IPDS Mode	PPDS Mode	Font Character Set
Sonoran Serif Italic Bold 20pt	(11CB)	(4555)	0084	0132	x		C0T175J0
Sonoran Serif Italic 9pt	(11B7)	(4535)	003C	0060	X		C0T15590
Sonoran Serif Italic 10pt	0420 (11B7)	1056 (4535)	0042	0066	x	x	C0T15500
Sonoran Serif Italic 11pt	(11B7)	(4535)	0048	0072	x		C0T155A0
Sonoran Serif 6pt	(1137)	(4407)	002A	0042	x		C0T05560
Sonoran Serif 8pt	02EF (1137)	0751 (4407)	0036	0054	x	x	C0T05580
Sonoran Serif 9pt	(1137)	(4407)	003C	0060	x		C0T05590
Sonoran Serif 10pt	041B (1137)	1051 (4407)	0042	0066	x	x	C0T05500
Sonoran Serif 11pt	(1137)	(4407)	0048	0072	x		C0T055A0
Sonoran Serif 12pt	0547 (1137)	1351 (4407)	004E	0078	x	x	C0T055B0
Yasmin Expanded PS	00A9	0169	0078	0120	x	x	C0YASEXP
Yasmin PS	00A6	0166	0078	0120	x	x	C0YASMIN

### Using the PPDS Set Font Global Command

The following fonts cannot be selected using the Set Font Global command:

- Barak Bold PS
- Courier Bold 5
- Courier 5 (Select Courier 10 and Double Wide using PPDS commands)
- Courier Bold 10
- Courier Bold 12
- Courier 17
- Essay Bold PS
- Gothic Text Bold 10
- Gothic Text Bold 12
- Letter Gothic Bold 12
- Orator Bold 10
- Prestige Bold 10
- Serif Text Bold 12
- Prestige Bold 12
- Shalom Bold Condensed 5
- Shalom Bold 10
- Shalom Bold 12
- Shalom Bold 15

**Note:** These fonts can, however, be accessed by choosing the normal versions of the font (for example, Orator 10) and turning emphasis on using the appropriate PPDS commands.



## Using 3930 Code Pages

The following table shows the code page ID values for the 3930 resident fonts, when the 3930 is connected using twinaxial or coaxial attachments.

### Notes:

1. CPGIDS are available with coaxial attachment only.
2. Some fonts are available only with LU-1 mode. Others are available only with Advanced Function Presentation (AFP) and the Intelligent Printer Data Stream (IPDS).

*Figure 278 (Page 1 of 2). 3930 Code Pages*

<b>CPGID DEC</b>	<b>CPGID HEX</b>	<b>Country or Name</b>
037	0025	English-United States/Canada/Portugal (Alternate)
256	0100	International Set 1
259	0103	Symbols, Set 7
260	0104	Canadian French
273	0111	Austrian/German
274	0112	Belgian
275	0113	Brazilian
277	0115	Danish/Norwegian
278	0116	Finnish/Swedish
280	0118	Italian
281	0119	Japanese/English
282	011A	Portuguese
284	011C	Spanish/Spanish Speaking
285	011D	English (United Kingdom)
286	011E	Austrian/German (Alternate)
287	011F	Danish/Norwegian (Alternate)
288	0120	Finnish/Swedish (Alternate)
289	0121	Spanish (Alternate)
290	0122	Japanese/Katakana
293	0125	APL (Coaxial attachment only)
297	0129	French
310	0136	APL (Coaxial attachment only)
361	0169	International-Typographic 500
363	016B	Pi-Specials (Coaxial attachment only)
382	017E	Austrian/German (Coaxial attachment only)
383	017F	Belgian (Coaxial attachment only)

Figure 278 (Page 2 of 2). 3930 Code Pages

CPGID DEC	CPGID HEX	Country or Name
384	0180	Brazilian (Coaxial attachment only)
385	0181	Canadian French (Coaxial attachment only)
386	0182	Danish/Norwegian (Coaxial attachment only)
387	0183	Finnish/Swedish (Coaxial attachment only)
388	0184	French-Luxembourg (Coaxial attachment only)
389	0185	Italian (Coaxial attachment only)
390	0186	Japanese-Latin (Coaxial attachment only)
391	0187	Portuguese (Coaxial attachment only)
392	0188	Spanish/Philippine (Coaxial attachment only)
393	0189	Spanish Speaking (Coaxial attachment only)
394	018A	English (United Kingdom) (Coaxial attachment only)
395	018B	English (United States) (Coaxial attachment only)
420	01A4	Arabic
423	01A7	Greek
424	01A8	Hebrew
437	01B5	PC-ASCII
500	01F4	International Set 5/Swiss Bilingual
803	0323	Hebrew (Alternate) (Coaxial attachment only)
850	0352	PC Multilingual (Not valid for Twinaxial SCS (5219 Emulation) attachment)
870	0366	ROECE - Latin-2
871	0367	Icelandic
880	0370	Cyrillic
892	037C	OCR-A
893	037D	OCR-B
1002	03EA	T1D0BASE (Coaxial attachment only)
1003	03EB	U.S. Text Subset (Coaxial attachment only)
1026	0389	Turkish - Latin-5

## Core Raster Fonts for the 3930 Printer

**Courier APL2, Gothic Katakana, OCR, and Latin1 Raster Fonts:** The following tables list the Core Courier APL2, Gothic Katakana, OCR, and Latin1 raster fonts used to activate the fonts resident in 3930 printers with feature 4850.

Figure 279. Courier APL2, Gothic Katakana, and OCR Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier APL2 12	133	307	0090	144	0518	1304	C0420PB0
Courier APL2 12	142	322	0090	144	0518	1304	C0440PB0
Gothic Katakana 6	130	304	0048	072	051A	1306	C0620860
Gothic Katakana 7	130	304	0054	084	051A	1306	C0620870
Gothic Katakana 8	130	304	0060	096	051A	1306	C0620880
Gothic Katakana 10	130	304	0078	120	051A	1306	C0620800
Gothic Katakana 12	130	304	0090	144	051A	1306	C06208B0
Gothic Katakana 14	130	304	00A8	168	051A	1306	C06208D0
Gothic Katakana 20	130	304	00F0	240	051A	1306	C06208J0
OCR A 12	131	305	0090	144	03C8	0968	C0920AB0
OCR B 12	132	306	0090	144	03C9	0969	C0920BB0

Figure 280 (Page 1 of 2). Latin1 Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Boldface Latin1 12	4F00	20224	0050	080	07F7	2039	C08400B0
Gothic Text Latin1 5	130	304	003C	060	07F7	2039	C0620050
Gothic Text Latin1 6	130	304	0048	072	07F7	2039	C0620060
Gothic Text Latin1 7	130	304	0054	084	07F7	2039	C0620070
Gothic Text Latin1 8	130	304	0060	096	07F7	2039	C0620080
Gothic Text Latin1 9	130	304	006C	108	07F7	2039	C0620090
Gothic Text Latin1 10	130	304	0078	120	07F7	2039	C0620000
Gothic Text Latin1 12	130	304	0090	144	07F7	2039	C06200B0
Gothic Text Latin1 14	130	304	00A8	168	07F7	2039	C06200D0
Gothic Text Latin1 20	130	304	00F0	240	07F7	2039	C06200J0
Letter Gothic Latin1 6	190	400	0048	072	07F7	2039	C0520060
Letter Gothic Latin1 6	194	404	0048	072	07F7	2039	C0540060
Letter Gothic Latin1 7	190	400	0054	084	07F7	2039	C0520070
Letter Gothic Latin1 7	194	404	0054	084	07F7	2039	C0540070
Letter Gothic Latin1 8	190	400	0060	096	07F7	2039	C0520080
Letter Gothic Latin1 8	194	404	0060	096	07F7	2039	C0540080
Letter Gothic Latin1 10	190	400	0078	120	07F7	2039	C0520000
Letter Gothic Latin1 10	194	404	0078	120	07F7	2039	C0540000
Letter Gothic Latin1 12	190	400	0090	144	07F7	2039	C05200B0
Letter Gothic Latin1 12	190	400	0090	144	07F7	2039	C05400B0
Letter Gothic Latin1 14	190	400	00A8	168	07F7	2039	C05200D0
Letter Gothic Latin1 14	194	404	00A8	168	07F7	2039	C05400D0
Letter Gothic Latin1 20	190	400	00F0	240	07F7	2039	C05200J0
Letter Gothic Latin1 20	194	404	00F0	240	07F7	2039	C05400J0
Prestige Latin1 7	13E	318	0054	084	07F7	2039	C0740070

Figure 280 (Page 2 of 2). Latin1 Raster Fonts

Typeface and Pitch	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Prestige Latin1 7	13F	319	0054	084	07F7	2039	C0730070
Prestige Latin1 7	1B0	432	0054	084	07F7	2039	C0720070
Prestige Latin1 8	13E	318	0060	096	07F7	2039	C0740080
Prestige Latin1 8	13F	319	0060	096	07F7	2039	C0730080
Prestige Latin1 8	1B0	432	0060	096	07F7	2039	C0720080
Prestige Latin1 10	13E	318	0078	120	07F7	2039	C0740000
Prestige Latin1 10	13F	319	0078	120	07F7	2039	C0730000
Prestige Latin1 10	1B0	432	0078	120	07F7	2039	C0720000
Prestige Latin1 12	13E	318	0090	144	07F7	2039	C07400B0
Prestige Latin1 12	13F	319	0090	144	07F7	2039	C07300B0
Prestige Latin1 12	1B0	432	0090	144	07F7	2039	C07200B0
Prestige Latin1 14	13E	318	00A8	168	07F7	2039	C07400D0
Prestige Latin1 14	13F	319	00A8	168	07F7	2039	C07300D0
Prestige Latin1 14	1B0	432	00A8	168	07F7	2039	C07200D0
Prestige Latin1 20	13E	318	00F0	240	07F7	2039	C07400J0
Prestige Latin1 20	13F	319	00F0	240	07F7	2039	C07300J0
Prestige Latin1 20	1B0	432	00F0	240	07F7	2039	C07200J0

**Core Courier Raster Fonts for the 3930 Printer:** The following table lists the Core Courier raster fonts used to activate the fonts resident in 3930 printers with feature 4850.

Figure 281 (Page 1 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Boutros Typing Arabic	RM 7	1A0	416	054	084	04F0	1264	C0420470
Boutros Typing Arabic	IM 7	1A8	424	054	084	04F0	1264	C0430470
Boutros Typing Arabic	RB 7	1A4	420	054	084	04F0	1264	C0440470
Boutros Typing Arabic	IB 7	1AC	428	054	084	04F0	1264	C0450470
Boutros Typing Arabic	RM 8	1A0	416	060	096	04F0	1264	C0420480
Boutros Typing Arabic	IM 8	1A8	424	060	096	04F0	1264	C0430480
Boutros Typing Arabic	RB 8	1A4	420	060	096	04F0	1264	C0440480
Boutros Typing Arabic	IB 8	1AC	428	060	096	04F0	1264	C0450480
Boutros Typing Arabic	RM 10	1A0	416	078	120	04F0	1264	C0420400
Boutros Typing Arabic	IM 10	1A8	424	078	120	04F0	1264	C0430400
Boutros Typing Arabic	RB 10	1A4	420	078	120	04F0	1264	C0440400
Boutros Typing Arabic	IB 10	1AC	428	078	120	04F0	1264	C0450400
Boutros Typing Arabic	RM 12	1A0	416	090	144	04F0	1264	C04204B0
Boutros Typing Arabic	IM 12	1A8	424	090	144	04F0	1264	C04304B0

Figure 281 (Page 2 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Boutros Typing Arabic	RB 12	1A4	420	090	144	04F0	1264	C04404B0
Boutros Typing Arabic	IB 12	1AC	428	090	144	04F0	1264	C04504B0
Boutros Typing Arabic	RM 14	1A0	416	0A8	168	04F0	1264	C04204D0
Boutros Typing Arabic	IM 14	1A8	424	0A8	168	04F0	1264	C04304D0
Boutros Typing Arabic	RB 14	1A4	420	0A8	168	04F0	1264	C04404D0
Boutros Typing Arabic	IB 14	1AC	428	0A8	168	04F0	1264	C04504D0
Boutros Typing Arabic	RM 20	1A0	416	0F0	240	04F0	1264	C04204J0
Boutros Typing Arabic	IM 20	1A8	424	0F0	240	04F0	1264	C04304J0
Boutros Typing Arabic	RB 20	1A4	420	0F0	240	04F0	1264	C04404J0
Boutros Typing Arabic	IB 20	1AC	428	0F0	240	04F0	1264	C04504J0
Courier Cyrillic Greek	RM 7	1A0	416	054	084	04FC	1276	C0420370
Courier Cyrillic Greek	IM 7	1A8	424	054	084	04FC	1276	C0430370
Courier Cyrillic Greek	RB 7	1A4	420	054	084	04FC	1276	C0440370
Courier Cyrillic Greek	IB 7	1AC	428	054	084	04FC	1276	C0450370
Courier Cyrillic Greek	RM 8	1A0	416	060	096	04FC	1276	C0420380
Courier Cyrillic Greek	IM 8	1A8	424	060	096	04FC	1276	C0430380
Courier Cyrillic Greek	RB 8	1A4	420	060	096	04FC	1276	C0440380
Courier Cyrillic Greek	IB 8	1AC	428	060	096	04FC	1276	C0450380
Courier Cyrillic Greek	RM 10	1A0	416	078	120	04FC	1276	C0420300
Courier Cyrillic Greek	IM 10	1A8	424	078	120	04FC	1276	C0430300
Courier Cyrillic Greek	RB 10	1A4	420	078	120	04FC	1276	C0440300
Courier Cyrillic Greek	IB 10	1AC	428	078	120	04FC	1276	C0450300
Courier Cyrillic Greek	RM 12	1A0	416	090	144	04FC	1276	C04203B0
Courier Cyrillic Greek	IM 12	1A8	424	090	144	04FC	1276	C04303B0
Courier Cyrillic Greek	RB 12	1A4	420	090	144	04FC	1276	C04403B0
Courier Cyrillic Greek	IB 12	1AC	428	090	144	04FC	1276	C04503B0
Courier Cyrillic Greek	RM 14	1A0	416	0A8	168	04FC	1276	C04203D0
Courier Cyrillic Greek	IM 14	1A8	424	0A8	168	04FC	1276	C04303D0
Courier Cyrillic Greek	RB 14	1A4	420	0A8	168	04FC	1276	C04403D0
Courier Cyrillic Greek	IB 14	1AC	428	0A8	168	04FC	1276	C04503D0
Courier Cyrillic Greek	RM 20	1A0	416	0F0	240	04FC	1276	C04203J0
Courier Cyrillic Greek	IM 20	1A8	424	0F0	240	04FC	1276	C04303J0
Courier Cyrillic Greek	RB 20	1A4	420	0F0	240	04FC	1276	C04403J0
Courier Cyrillic Greek	IB 20	1AC	428	0F0	240	04FC	1276	C04503J0
Courier Latin1	RM 7	1A0	416	054	084	07F7	2039	C0420070
Courier Latin1	IM 7	1A8	424	054	084	07F7	2039	C0430070

Figure 281 (Page 3 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier Latin1	RB 7	1A4	420	054	084	07F7	2039	C0440070
Courier Latin1	IB 7	1AC	428	054	084	07F7	2039	C0450070
Courier Latin1	RM 8	1A0	416	060	096	07F7	2039	C0420080
Courier Latin1	IM 8	1A8	424	060	096	07F7	2039	C0430080
Courier Latin1	RB 8	1A4	420	060	096	07F7	2039	C0440080
Courier Latin1	IB 8	1AC	428	060	096	07F7	2039	C0450080
Courier Latin1	RM 10	1A0	416	078	120	07F7	2039	C0420000
Courier Latin1	IM 10	1A8	424	078	120	07F7	2039	C0430000
Courier Latin1	RB 10	1A4	420	078	120	07F7	2039	C0440000
Courier Latin1	IB 10	1AC	428	078	120	07F7	2039	C0450000
Courier Latin1	RM 12	1A0	416	090	144	07F7	2039	C04200B0
Courier Latin1	IM 12	1A8	424	090	144	07F7	2039	C04300B0
Courier Latin1	RB 12	1A4	420	090	144	07F7	2039	C04400B0
Courier Latin1	IB 12	1AC	428	090	144	07F7	2039	C04500B0
Courier Latin1	RM 14	1A0	416	0A8	168	07F7	2039	C04200D0
Courier Latin1	IM 14	1A8	424	0A8	168	07F7	2039	C04300D0
Courier Latin1	RB 14	1A4	420	0A8	168	07F7	2039	C04400D0
Courier Latin1	IB 14	1AC	428	0A8	168	07F7	2039	C04500D0
Courier Latin1	RM 20	1A0	416	0F0	240	07F7	2039	C04200J0
Courier Latin1	IM 20	1A8	424	0F0	240	07F7	2039	C04300J0
Courier Latin1	RB 20	1A4	420	0F0	240	07F7	2039	C04400J0
Courier Latin1	IB 20	1AC	428	0F0	240	07F7	2039	C04500J0
Courier Latin235	RM 7	1A0	416	054	084	04ED	1261	C0420270
Courier Latin235	IM 7	1A8	424	054	084	04ED	1261	C0430270
Courier Latin235	RB 7	1A4	420	054	084	04ED	1261	C0440270
Courier Latin235	IB 7	1AC	428	054	084	04ED	1261	C0450270
Courier Latin235	RM 8	1A0	416	060	096	04ED	1261	C0420280
Courier Latin235	IM 8	1A8	424	060	096	04ED	1261	C0430280
Courier Latin235	RB 8	1A4	420	060	096	04ED	1261	C0440280
Courier Latin235	IB 8	1AC	428	060	096	04ED	1261	C0450280
Courier Latin235	RM 10	1A0	416	078	120	04ED	1261	C0420200
Courier Latin235	IM 10	1A8	424	078	120	04ED	1261	C0430200
Courier Latin235	RB 10	1A4	420	078	120	04ED	1261	C0440200
Courier Latin235	IB 10	1AC	428	078	120	04ED	1261	C0450200
Courier Latin235	RM 12	1A0	416	090	144	04ED	1261	C04202B0
Courier Latin235	IM 12	1A8	424	090	144	04ED	1261	C04302B0

Figure 281 (Page 4 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier Latin235	RB 12	1A4	420	090	144	04ED	1261	C04402B0
Courier Latin235	IB 12	1AC	428	090	144	04ED	1261	C04502B0
Courier Latin235	RM 14	1A0	416	0A8	168	04ED	1261	C04202D0
Courier Latin235	IM 14	1A8	424	0A8	168	04ED	1261	C04302D0
Courier Latin235	RB 14	1A4	420	0A8	168	04ED	1261	C04402D0
Courier Latin235	IB 14	1AC	428	0A8	168	04ED	1261	C04502D0
Courier Latin235	RM 20	1A0	416	0F0	240	04ED	1261	C04202J0
Courier Latin235	IM 20	1A8	424	0F0	240	04ED	1261	C04302J0
Courier Latin235	RB 20	1A4	420	0F0	240	04ED	1261	C04402J0
Courier Latin235	IB 20	1AC	428	0F0	240	04ED	1261	C04502J0
Courier Latin4	RM 7	1A0	416	054	084	04F4	1268	C0420770
Courier Latin4	IM 7	1A8	424	054	084	04F4	1268	C0430770
Courier Latin4	RB 7	1A4	420	054	084	04F4	1268	C0440770
Courier Latin4	IB 7	1AC	428	054	084	04F4	1268	C0450770
Courier Latin4	RM 8	1A0	416	060	096	04F4	1268	C0420780
Courier Latin4	IM 8	1A8	424	060	096	04F4	1268	C0430780
Courier Latin4	RB 8	1A4	420	060	096	04F4	1268	C0440780
Courier Latin4	IB 8	1AC	428	060	096	04F4	1268	C0450780
Courier Latin4	RM 10	1A0	416	078	120	04F4	1268	C0420700
Courier Latin4	IM 10	1A8	424	078	120	04F4	1268	C0430700
Courier Latin4	RB 10	1A4	420	078	120	04F4	1268	C0440700
Courier Latin4	IB 10	1AC	428	078	120	04F4	1268	C0450700
Courier Latin4	RM 12	1A0	416	090	144	04F4	1268	C04207B0
Courier Latin4	IM 12	1A8	424	090	144	04F4	1268	C04307B0
Courier Latin4	RB 12	1A4	420	090	144	04F4	1268	C04407B0
Courier Latin4	IB 12	1AC	428	090	144	04F4	1268	C04507B0
Courier Latin4	RM 14	1A0	416	0A8	168	04F4	1268	C04207D0
Courier Latin4	IM 14	1A8	424	0A8	168	04F4	1268	C04307D0
Courier Latin4	RB 14	1A4	420	0A8	168	04F4	1268	C04407D0
Courier Latin4	IB 14	1AC	428	0A8	168	04F4	1268	C04507D0
Courier Latin4	RM 20	1A0	416	0F0	240	04F4	1268	C04207J0
Courier Latin4	IM 20	1A8	424	0F0	240	04F4	1268	C04307J0
Courier Latin4	RB 20	1A4	420	0F0	240	04F4	1268	C04407J0
Courier Latin4	IB 20	1AC	428	0F0	240	04F4	1268	C04507J0
Courier Symbols	RM 7	1A0	416	054	084	04A7	1191	C0420170
Courier Symbols	RB 7	1A4	420	054	084	04A7	1191	C0440170

Figure 281 (Page 5 of 5). Core Courier Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Courier Symbols	RM 8	1A0	416	060	096	04A7	1191	C0420180
Courier Symbols	RB 8	1A4	420	060	096	04A7	1191	C0440180
Courier Symbols	RM 10	1A0	416	078	120	04A7	1191	C0420100
Courier Symbols	RB 10	1A4	420	078	120	04A7	1191	C0440100
Courier Symbols	RM 12	1A0	416	090	144	04A7	1191	C04201B0
Courier Symbols	RB 12	1A4	420	090	144	04A7	1191	C04401B0
Courier Symbols	RM 14	1A0	416	0A8	168	04A7	1191	C04201D0
Courier Symbols	RB 14	1A4	420	0A8	168	04A7	1191	C04401D0
Courier Symbols	RM 20	1A0	416	0F0	240	04A7	1191	C04201J0
Courier Symbols	RB 20	1A4	420	0F0	240	04A7	1191	C04401J0
Shalom Hebrew	RM 7	1A0	416	054	084	04F1	1265	C0420570
Shalom Hebrew	IM 7	1A8	424	054	084	04F1	1265	C0430570
Shalom Hebrew	RB 7	1A4	420	054	084	04F1	1265	C0440570
Shalom Hebrew	IB 7	1AC	428	054	084	04F1	1265	C0450570
Shalom Hebrew	RM 8	1A0	416	060	096	04F1	1265	C0420580
Shalom Hebrew	IM 8	1A8	424	060	096	04F1	1265	C0430580
Shalom Hebrew	RB 8	1A4	420	060	096	04F1	1265	C0440580
Shalom Hebrew	IB 8	1AC	428	060	096	04F1	1265	C0450580
Shalom Hebrew	RM 10	1A0	416	078	120	04F1	1265	C0420500
Shalom Hebrew	IM 10	1A8	424	078	120	04F1	1265	C0430500
Shalom Hebrew	RB 10	1A4	420	078	120	04F1	1265	C0440500
Shalom Hebrew	IB 10	1AC	428	078	120	04F1	1265	C0450500
Shalom Hebrew	RM 12	1A0	416	090	144	04F1	1265	C04205B0
Shalom Hebrew	IM 12	1A8	424	090	144	04F1	1265	C04305B0
Shalom Hebrew	RB 12	1A4	420	090	144	04F1	1265	C04405B0
Shalom Hebrew	IB 12	1AC	428	090	144	04F1	1265	C04505B0
Shalom Hebrew	RM 14	1A0	416	0A8	168	04F1	1265	C04205D0
Shalom Hebrew	IM 14	1A8	424	0A8	168	04F1	1265	C04305D0
Shalom Hebrew	RB 14	1A4	420	0A8	168	04F1	1265	C04405D0
Shalom Hebrew	IB 14	1AC	428	0A8	168	04F1	1265	C04505D0
Shalom Hebrew	RM 20	1A0	416	0F0	240	04F1	1265	C04205J0
Shalom Hebrew	IM 20	1A8	424	0F0	240	04F1	1265	C04305J0
Shalom Hebrew	RB 20	1A4	420	0F0	240	04F1	1265	C04405J0
Shalom Hebrew	IB 20	1AC	428	0F0	240	04F1	1265	C04505J0



**Core Helvetica Raster Fonts for the 3930 Printer:** The following table lists the Core Helvetica raster fonts used to activate the fonts resident in 3930 printers with feature 4850.

Figure 282 (Page 1 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Cyrillic Greek	RM 6	0900	2304	028	040	04FC	1276	C0H20360
Helvetica Cyrillic Greek	IM 6	0902	2306	028	040	04FC	1276	C0H30360
Helvetica Cyrillic Greek	RB 6	0901	2305	028	040	04FC	1276	C0H40360
Helvetica Cyrillic Greek	IB 6	0903	2307	028	040	04FC	1276	C0H50360
Helvetica Cyrillic Greek	RM 7	0900	2304	02F	047	04FC	1276	C0H20370
Helvetica Cyrillic Greek	IM 7	0902	2306	02F	047	04FC	1276	C0H30370
Helvetica Cyrillic Greek	RB 7	0901	2305	02F	047	04FC	1276	C0H40370
Helvetica Cyrillic Greek	IB 7	0903	2307	02F	047	04FC	1276	C0H50370
Helvetica Cyrillic Greek	RM 8	0900	2304	035	053	04FC	1276	C0H20380
Helvetica Cyrillic Greek	IM 8	0902	2306	035	053	04FC	1276	C0H30380
Helvetica Cyrillic Greek	RB 8	0901	2305	035	053	04FC	1276	C0H40380
Helvetica Cyrillic Greek	IB 8	0903	2307	035	053	04FC	1276	C0H50380
Helvetica Cyrillic Greek	RM 9	0900	2304	03C	060	04FC	1276	C0H20390
Helvetica Cyrillic Greek	IM 9	0902	2306	03C	060	04FC	1276	C0H30390
Helvetica Cyrillic Greek	RB 9	0901	2305	03C	060	04FC	1276	C0H40390
Helvetica Cyrillic Greek	IB 9	0903	2307	03C	060	04FC	1276	C0H50390
Helvetica Cyrillic Greek	RM 10	0900	2304	043	067	04FC	1276	C0H20300
Helvetica Cyrillic Greek	IM 10	0902	2306	043	067	04FC	1276	C0H30300
Helvetica Cyrillic Greek	RB 10	0901	2305	043	067	04FC	1276	C0H40300
Helvetica Cyrillic Greek	IB 10	0903	2307	043	067	04FC	1276	C0H50300
Helvetica Cyrillic Greek	RM 11	0900	2304	049	073	04FC	1276	C0H203A0
Helvetica Cyrillic Greek	IM 11	0902	2306	049	073	04FC	1276	C0H303A0
Helvetica Cyrillic Greek	RB 11	0901	2305	049	073	04FC	1276	C0H403A0
Helvetica Cyrillic Greek	IB 11	0903	2307	049	073	04FC	1276	C0H503A0
Helvetica Cyrillic Greek	RM 12	0900	2304	050	080	04FC	1276	C0H203B0
Helvetica Cyrillic Greek	IM 12	0902	2306	050	080	04FC	1276	C0H303B0
Helvetica Cyrillic Greek	RB 12	0901	2305	050	080	04FC	1276	C0H403B0
Helvetica Cyrillic Greek	IB 12	0903	2307	050	080	04FC	1276	C0H503B0
Helvetica Cyrillic Greek	RM 14	0900	2304	05D	093	04FC	1276	C0H203D0
Helvetica Cyrillic Greek	IM 14	0902	2306	05D	093	04FC	1276	C0H303D0
Helvetica Cyrillic Greek	RB 14	0901	2305	05D	093	04FC	1276	C0H403D0
Helvetica Cyrillic Greek	IB 14	0903	2307	05D	093	04FC	1276	C0H503D0
Helvetica Cyrillic Greek	RM 16	0900	2304	06B	107	04FC	1276	C0H203F0

Figure 282 (Page 2 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Cyrillic Greek	IM 16	0902	2306	06B	107	04FC	1276	C0H303F0
Helvetica Cyrillic Greek	RB 16	0901	2305	06B	107	04FC	1276	C0H403F0
Helvetica Cyrillic Greek	IB 16	0903	2307	06B	107	04FC	1276	C0H503F0
Helvetica Cyrillic Greek	RM 18	0900	2304	078	120	04FC	1276	C0H203H0
Helvetica Cyrillic Greek	IM 18	0902	2306	078	120	04FC	1276	C0H303H0
Helvetica Cyrillic Greek	RB 18	0901	2305	078	120	04FC	1276	C0H403H0
Helvetica Cyrillic Greek	IB 18	0903	2307	078	120	04FC	1276	C0H503H0
Helvetica Cyrillic Greek	RM 20	0900	2304	085	133	04FC	1276	C0H203J0
Helvetica Cyrillic Greek	IM 20	0902	2306	085	133	04FC	1276	C0H303J0
Helvetica Cyrillic Greek	RB 20	0901	2305	085	133	04FC	1276	C0H403J0
Helvetica Cyrillic Greek	IB 20	0903	2307	085	133	04FC	1276	C0H503J0
Helvetica Cyrillic Greek	RM 24	0900	2304	0A0	160	04FC	1276	C0H203N0
Helvetica Cyrillic Greek	IM 24	0902	2306	0A0	160	04FC	1276	C0H303N0
Helvetica Cyrillic Greek	RB 24	0901	2305	0A0	160	04FC	1276	C0H403N0
Helvetica Cyrillic Greek	IB 24	0903	2307	0A0	160	04FC	1276	C0H503N0
Helvetica Cyrillic Greek	RM 30	0900	2304	0C8	200	04FC	1276	C0H203T0
Helvetica Cyrillic Greek	IM 30	0902	2306	0C8	200	04FC	1276	C0H303T0
Helvetica Cyrillic Greek	RB 30	0901	2305	0C8	200	04FC	1276	C0H403T0
Helvetica Cyrillic Greek	IB 30	0903	2307	0C8	200	04FC	1276	C0H503T0
Helvetica Cyrillic Greek	RM 36	0900	2304	0F0	240	04FC	1276	C0H203Z0
Helvetica Cyrillic Greek	IM 36	0902	2306	0F0	240	04FC	1276	C0H303Z0
Helvetica Cyrillic Greek	RB 36	0901	2305	0F0	240	04FC	1276	C0H403Z0
Helvetica Cyrillic Greek	IB 36	0903	2307	0F0	240	04FC	1276	C0H503Z0
Helvetica Latin1	RM 6	0900	2304	028	040	07F7	2039	C0H20060
Helvetica Latin1	IM 6	0902	2306	028	040	07F7	2039	C0H30060
Helvetica Latin1	RB 6	0901	2305	028	040	07F7	2039	C0H40060
Helvetica Latin1	IB 6	0903	2307	028	040	07F7	2039	C0H50060
Helvetica Latin1	RM 7	0900	2304	02F	047	07F7	2039	C0H20070
Helvetica Latin1	IM 7	0902	2306	02F	047	07F7	2039	C0H30070
Helvetica Latin1	RB 7	0901	2305	02F	047	07F7	2039	C0H40070
Helvetica Latin1	IB 7	0903	2307	02F	047	07F7	2039	C0H50070
Helvetica Latin1	RM 8	0900	2304	035	053	07F7	2039	C0H20080
Helvetica Latin1	IM 8	0902	2306	035	053	07F7	2039	C0H30080
Helvetica Latin1	RB 8	0901	2305	035	053	07F7	2039	C0H40080
Helvetica Latin1	IB 8	0903	2307	035	053	07F7	2039	C0H50080
Helvetica Latin1	RM 9	0900	2304	03C	060	07F7	2039	C0H20090

Figure 282 (Page 3 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin1	IM 9	0902	2306	03C	060	07F7	2039	C0H30090
Helvetica Latin1	RB 9	0901	2305	03C	060	07F7	2039	C0H40090
Helvetica Latin1	IB 9	0903	2307	03C	060	07F7	2039	C0H50090
Helvetica Latin1	RM 10	0900	2304	043	067	07F7	2039	C0H20000
Helvetica Latin1	IM 10	0902	2306	043	067	07F7	2039	C0H30000
Helvetica Latin1	RB 10	0901	2305	043	067	07F7	2039	C0H40000
Helvetica Latin1	IB 10	0903	2307	043	067	07F7	2039	C0H50000
Helvetica Latin1	RM 11	0900	2304	049	073	07F7	2039	C0H200A0
Helvetica Latin1	IM 11	0902	2306	049	073	07F7	2039	C0H300A0
Helvetica Latin1	RB 11	0901	2305	049	073	07F7	2039	C0H400A0
Helvetica Latin1	IB 11	0903	2307	049	073	07F7	2039	C0H500A0
Helvetica Latin1	RM 12	0900	2304	050	080	07F7	2039	C0H200B0
Helvetica Latin1	IM 12	0902	2306	050	080	07F7	2039	C0H300B0
Helvetica Latin1	RB 12	0901	2305	050	080	07F7	2039	C0H400B0
Helvetica Latin1	IB 12	0903	2307	050	080	07F7	2039	C0H500B0
Helvetica Latin1	RM 14	0900	2304	05D	093	07F7	2039	C0H200D0
Helvetica Latin1	IM 14	0902	2306	05D	093	07F7	2039	C0H300D0
Helvetica Latin1	RB 14	0901	2305	05D	093	07F7	2039	C0H400D0
Helvetica Latin1	IB 14	0903	2307	05D	093	07F7	2039	C0H500D0
Helvetica Latin1	RM 16	0900	2304	06B	107	07F7	2039	C0H200F0
Helvetica Latin1	IM 16	0902	2306	06B	107	07F7	2039	C0H300F0
Helvetica Latin1	RB 16	0901	2305	06B	107	07F7	2039	C0H400F0
Helvetica Latin1	IB 16	0903	2307	06B	107	07F7	2039	C0H500F0
Helvetica Latin1	RM 18	0900	2304	078	120	07F7	2039	C0H200H0
Helvetica Latin1	IM 18	0902	2306	078	120	07F7	2039	C0H300H0
Helvetica Latin1	RB 18	0901	2305	078	120	07F7	2039	C0H400H0
Helvetica Latin1	IB 18	0903	2307	078	120	07F7	2039	C0H500H0
Helvetica Latin1	RM 20	0900	2304	085	133	07F7	2039	C0H200J0
Helvetica Latin1	IM 20	0902	2306	085	133	07F7	2039	C0H300J0
Helvetica Latin1	RB 20	0901	2305	085	133	07F7	2039	C0H400J0
Helvetica Latin1	IB 20	0903	2307	085	133	07F7	2039	C0H500J0
Helvetica Latin1	RM 24	0900	2304	0A0	160	07F7	2039	C0H200N0
Helvetica Latin1	IM 24	0902	2306	0A0	160	07F7	2039	C0H300N0
Helvetica Latin1	RB 24	0901	2305	0A0	160	07F7	2039	C0H400N0
Helvetica Latin1	IB 24	0903	2307	0A0	160	07F7	2039	C0H500N0
Helvetica Latin1	RM 30	0900	2304	0C8	200	07F7	2039	C0H200T0

Figure 282 (Page 4 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin1	IM 30	0902	2306	0C8	200	07F7	2039	C0H300T0
Helvetica Latin1	RB 30	0901	2305	0C8	200	07F7	2039	C0H400T0
Helvetica Latin1	IB 30	0903	2307	0C8	200	07F7	2039	C0H500T0
Helvetica Latin1	RM 36	0900	2304	0F0	240	07F7	2039	C0H200Z0
Helvetica Latin1	IM 36	0902	2306	0F0	240	07F7	2039	C0H300Z0
Helvetica Latin1	RB 36	0901	2305	0F0	240	07F7	2039	C0H400Z0
Helvetica Latin1	IB 36	0903	2307	0F0	240	07F7	2039	C0H500Z0
Helvetica Latin235	RM 6	0900	2304	028	040	04ED	1261	C0H20260
Helvetica Latin235	IM 6	0902	2306	028	040	04ED	1261	C0H30260
Helvetica Latin235	RB 6	0901	2305	028	040	04ED	1261	C0H40260
Helvetica Latin235	IB 6	0903	2307	028	040	04ED	1261	C0H50260
Helvetica Latin235	RM 7	0900	2304	02F	047	04ED	1261	C0H20270
Helvetica Latin235	IM 7	0902	2306	02F	047	04ED	1261	C0H30270
Helvetica Latin235	RB 7	0901	2305	02F	047	04ED	1261	C0H40270
Helvetica Latin235	IB 7	0903	2307	02F	047	04ED	1261	C0H50270
Helvetica Latin235	RM 8	0900	2304	035	053	04ED	1261	C0H20280
Helvetica Latin235	IM 8	0902	2306	035	053	04ED	1261	C0H30280
Helvetica Latin235	RB 8	0901	2305	035	053	04ED	1261	C0H40280
Helvetica Latin235	IB 8	0903	2307	035	053	04ED	1261	C0H50280
Helvetica Latin235	RM 9	0900	2304	03C	060	04ED	1261	C0H20290
Helvetica Latin235	IM 9	0902	2306	03C	060	04ED	1261	C0H30290
Helvetica Latin235	RB 9	0901	2305	03C	060	04ED	1261	C0H40290
Helvetica Latin235	IB 9	0903	2307	03C	060	04ED	1261	C0H50290
Helvetica Latin235	RM 10	0900	2304	043	067	04ED	1261	C0H20200
Helvetica Latin235	IM 10	0902	2306	043	067	04ED	1261	C0H30200
Helvetica Latin235	RB 10	0901	2305	043	067	04ED	1261	C0H40200
Helvetica Latin235	IB 10	0903	2307	043	067	04ED	1261	C0H50200
Helvetica Latin235	RM 11	0900	2304	049	073	04ED	1261	C0H202A0
Helvetica Latin235	IM 11	0902	2306	049	073	04ED	1261	C0H302A0
Helvetica Latin235	RB 11	0901	2305	049	073	04ED	1261	C0H402A0
Helvetica Latin235	IB 11	0903	2307	049	073	04ED	1261	C0H502A0
Helvetica Latin235	RM 12	0900	2304	050	080	04ED	1261	C0H202B0
Helvetica Latin235	IM 12	0902	2306	050	080	04ED	1261	C0H302B0
Helvetica Latin235	RB 12	0901	2305	050	080	04ED	1261	C0H402B0
Helvetica Latin235	IB 12	0903	2307	050	080	04ED	1261	C0H502B0
Helvetica Latin235	RM 14	0900	2304	05D	093	04ED	1261	C0H202D0

Figure 282 (Page 5 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin235	IM 14	0902	2306	05D	093	04ED	1261	C0H302D0
Helvetica Latin235	RB 14	0901	2305	05D	093	04ED	1261	C0H402D0
Helvetica Latin235	IB 14	0903	2307	05D	093	04ED	1261	C0H502D0
Helvetica Latin235	RM 16	0900	2304	06B	107	04ED	1261	C0H202F0
Helvetica Latin235	IM 16	0902	2306	06B	107	04ED	1261	C0H302F0
Helvetica Latin235	RB 16	0901	2305	06B	107	04ED	1261	C0H402F0
Helvetica Latin235	IB 16	0903	2307	06B	107	04ED	1261	C0H502F0
Helvetica Latin235	RM 18	0900	2304	078	120	04ED	1261	C0H202H0
Helvetica Latin235	IM 18	0902	2306	078	120	04ED	1261	C0H302H0
Helvetica Latin235	RB 18	0901	2305	078	120	04ED	1261	C0H402H0
Helvetica Latin235	IB 18	0903	2307	078	120	04ED	1261	C0H502H0
Helvetica Latin235	RM 20	0900	2304	085	133	04ED	1261	C0H202J0
Helvetica Latin235	IM 20	0902	2306	085	133	04ED	1261	C0H302J0
Helvetica Latin235	RB 20	0901	2305	085	133	04ED	1261	C0H402J0
Helvetica Latin235	IB 20	0903	2307	085	133	04ED	1261	C0H502J0
Helvetica Latin235	RM 24	0900	2304	0A0	160	04ED	1261	C0H202N0
Helvetica Latin235	IM 24	0902	2306	0A0	160	04ED	1261	C0H302N0
Helvetica Latin235	RB 24	0901	2305	0A0	160	04ED	1261	C0H402N0
Helvetica Latin235	IB 24	0903	2307	0A0	160	04ED	1261	C0H502N0
Helvetica Latin235	RM 30	0900	2304	0C8	200	04ED	1261	C0H202T0
Helvetica Latin235	IM 30	0902	2306	0C8	200	04ED	1261	C0H302T0
Helvetica Latin235	RB 30	0901	2305	0C8	200	04ED	1261	C0H402T0
Helvetica Latin235	IB 30	0903	2307	0C8	200	04ED	1261	C0H502T0
Helvetica Latin235	RM 36	0900	2304	0F0	240	04ED	1261	C0H202Z0
Helvetica Latin235	IM 36	0902	2306	0F0	240	04ED	1261	C0H302Z0
Helvetica Latin235	RB 36	0901	2305	0F0	240	04ED	1261	C0H402Z0
Helvetica Latin235	IB 36	0903	2307	0F0	240	04ED	1261	C0H502Z0
Helvetica Latin4	RM 6	0900	2304	028	040	04F4	1268	C0H20760
Helvetica Latin4	IM 6	0902	2306	028	040	04F4	1268	C0H30760
Helvetica Latin4	RB 6	0901	2305	028	040	04F4	1268	C0H40760
Helvetica Latin4	IB 6	0903	2307	028	040	04F4	1268	C0H50760
Helvetica Latin4	RM 7	0900	2304	02F	047	04F4	1268	C0H20770
Helvetica Latin4	IM 7	0902	2306	02F	047	04F4	1268	C0H30770
Helvetica Latin4	RB 7	0901	2305	02F	047	04F4	1268	C0H40770
Helvetica Latin4	IB 7	0903	2307	02F	047	04F4	1268	C0H50770
Helvetica Latin4	RM 8	0900	2304	035	053	04F4	1268	C0H20780

Figure 282 (Page 6 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin4	IM 8	0902	2306	035	053	04F4	1268	C0H30780
Helvetica Latin4	RB 8	0901	2305	035	053	04F4	1268	C0H40780
Helvetica Latin4	IB 8	0903	2307	035	053	04F4	1268	C0H50780
Helvetica Latin4	RM 9	0900	2304	03C	060	04F4	1268	C0H20790
Helvetica Latin4	IM 9	0902	2306	03C	060	04F4	1268	C0H30790
Helvetica Latin4	RB 9	0901	2305	03C	060	04F4	1268	C0H40790
Helvetica Latin4	IB 9	0903	2307	03C	060	04F4	1268	C0H50790
Helvetica Latin4	RM 10	0900	2304	043	067	04F4	1268	C0H20700
Helvetica Latin4	IM 10	0902	2306	043	067	04F4	1268	C0H30700
Helvetica Latin4	RB 10	0901	2305	043	067	04F4	1268	C0H40700
Helvetica Latin4	IB 10	0903	2307	043	067	04F4	1268	C0H50700
Helvetica Latin4	RM 11	0900	2304	049	073	04F4	1268	C0H207A0
Helvetica Latin4	IM 11	0902	2306	049	073	04F4	1268	C0H307A0
Helvetica Latin4	RB 11	0901	2305	049	073	04F4	1268	C0H407A0
Helvetica Latin4	IB 11	0903	2307	049	073	04F4	1268	C0H507A0
Helvetica Latin4	RM 12	0900	2304	050	080	04F4	1268	C0H207B0
Helvetica Latin4	IM 12	0902	2306	050	080	04F4	1268	C0H307B0
Helvetica Latin4	RB 12	0901	2305	050	080	04F4	1268	C0H407B0
Helvetica Latin4	IB 12	0903	2307	050	080	04F4	1268	C0H507B0
Helvetica Latin4	RM 14	0900	2304	05D	093	04F4	1268	C0H207D0
Helvetica Latin4	IM 14	0902	2306	05D	093	04F4	1268	C0H307D0
Helvetica Latin4	RB 14	0901	2305	05D	093	04F4	1268	C0H407D0
Helvetica Latin4	IB 14	0903	2307	05D	093	04F4	1268	C0H507D0
Helvetica Latin4	RM 16	0900	2304	06B	107	04F4	1268	C0H207F0
Helvetica Latin4	IM 16	0902	2306	06B	107	04F4	1268	C0H307F0
Helvetica Latin4	RB 16	0901	2305	06B	107	04F4	1268	C0H407F0
Helvetica Latin4	IB 16	0903	2307	06B	107	04F4	1268	C0H507F0
Helvetica Latin4	RM 18	0900	2304	078	120	04F4	1268	C0H207H0
Helvetica Latin4	IM 18	0902	2306	078	120	04F4	1268	C0H307H0
Helvetica Latin4	RB 18	0901	2305	078	120	04F4	1268	C0H407H0
Helvetica Latin4	IB 18	0903	2307	078	120	04F4	1268	C0H507H0
Helvetica Latin4	RM 20	0900	2304	085	133	04F4	1268	C0H207J0
Helvetica Latin4	IM 20	0902	2306	085	133	04F4	1268	C0H307J0
Helvetica Latin4	RB 20	0901	2305	085	133	04F4	1268	C0H407J0
Helvetica Latin4	IB 20	0903	2307	085	133	04F4	1268	C0H507J0
Helvetica Latin4	RM 24	0900	2304	0A0	160	04F4	1268	C0H207N0

Figure 282 (Page 7 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Latin4	IM 24	0902	2306	0A0	160	04F4	1268	C0H307N0
Helvetica Latin4	RB 24	0901	2305	0A0	160	04F4	1268	C0H407N0
Helvetica Latin4	IB 24	0903	2307	0A0	160	04F4	1268	C0H507N0
Helvetica Latin4	RM 30	0900	2304	0C8	200	04F4	1268	C0H207T0
Helvetica Latin4	IM 30	0902	2306	0C8	200	04F4	1268	C0H307T0
Helvetica Latin4	RB 30	0901	2305	0C8	200	04F4	1268	C0H407T0
Helvetica Latin4	IB 30	0903	2307	0C8	200	04F4	1268	C0H507T0
Helvetica Latin4	RM 36	0900	2304	0F0	240	04F4	1268	C0H207Z0
Helvetica Latin4	IM 36	0902	2306	0F0	240	04F4	1268	C0H307Z0
Helvetica Latin4	RB 36	0901	2305	0F0	240	04F4	1268	C0H407Z0
Helvetica Latin4	IB 36	0903	2307	0F0	240	04F4	1268	C0H507Z0
Helvetica Symbols	RM 6	0900	2304	028	040	04A7	1191	C0H20160
Helvetica Symbols	RB 6	0901	2305	028	040	04A7	1191	C0H40160
Helvetica Symbols	RM 7	0900	2304	02F	047	04A7	1191	C0H20170
Helvetica Symbols	RB 07	0901	2305	02F	047	04A7	1191	C0H40170
Helvetica Symbols	RM 08	0900	2304	035	053	04A7	1191	C0H20180
Helvetica Symbols	RB 08	0901	2305	035	053	04A7	1191	C0H40180
Helvetica Symbols	RM 09	0900	2304	03C	060	04A7	1191	C0H20190
Helvetica Symbols	RB 09	0901	2305	03C	060	04A7	1191	C0H40190
Helvetica Symbols	RM 10	0900	2304	043	067	04A7	1191	C0H20100
Helvetica Symbols	RB 10	0901	2305	043	067	04A7	1191	C0H40100
Helvetica Symbols	RM 11	0900	2304	049	073	04A7	1191	C0H201A0
Helvetica Symbols	RB 11	0901	2305	049	073	04A7	1191	C0H401A0
Helvetica Symbols	RM 12	0900	2304	050	080	04A7	1191	C0H201B0
Helvetica Symbols	RB 12	0901	2305	050	080	04A7	1191	C0H401B0
Helvetica Symbols	RM 14	0900	2304	05D	093	04A7	1191	C0H201D0
Helvetica Symbols	RB 14	0901	2305	05D	093	04A7	1191	C0H401D0
Helvetica Symbols	RM 16	0900	2304	06B	107	04A7	1191	C0H201F0
Helvetica Symbols	RB 16	0901	2305	06B	107	04A7	1191	C0H401F0
Helvetica Symbols	RM 18	0900	2304	078	120	04A7	1191	C0H201H0
Helvetica Symbols	RB 18	0901	2305	078	120	04A7	1191	C0H401H0
Helvetica Symbols	RM 20	0900	2304	085	133	04A7	1191	C0H201J0
Helvetica Symbols	RB 20	0901	2305	085	133	04A7	1191	C0H401J0
Helvetica Symbols	RM 24	0900	2304	0A0	160	04A7	1191	C0H201N0
Helvetica Symbols	RB 24	0901	2305	0A0	160	04A7	1191	C0H401N0
Helvetica Symbols	RM 30	0900	2304	0C8	200	04A7	1191	C0H201T0

Figure 282 (Page 8 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Helvetica Symbols	RB 30	0901	2305	0C8	200	04A7	1191	C0H401T0
Helvetica Symbols	RM 36	0900	2304	0F0	240	04A7	1191	C0H201Z0
Helvetica Symbols	RB 36	0901	2305	0F0	240	04A7	1191	C0H401Z0
ITC Boutros Modern Rokaa Arabic	RM 6	0900	2304	028	040	04F0	1264	C0H20460
ITC Boutros Modern Rokaa Arabic	IM 6	0902	2306	028	040	04F0	1264	C0H30460
ITC Boutros Modern Rokaa Arabic	RB 6	0901	2305	028	040	04F0	1264	C0H40460
ITC Boutros Modern Rokaa Arabic	IB 6	0903	2307	028	040	04F0	1264	C0H50460
ITC Boutros Modern Rokaa Arabic	RM 7	0900	2304	02F	047	04F0	1264	C0H20470
ITC Boutros Modern Rokaa Arabic	IM 7	0902	2306	02F	047	04F0	1264	C0H30470
ITC Boutros Modern Rokaa Arabic	RB 7	0901	2305	02F	047	04F0	1264	C0H40470
ITC Boutros Modern Rokaa Arabic	IB 7	0903	2307	02F	047	04F0	1264	C0H50470
ITC Boutros Modern Rokaa Arabic	RM 8	0900	2304	035	053	04F0	1264	C0H20480
ITC Boutros Modern Rokaa Arabic	IM 8	0902	2306	035	053	04F0	1264	C0H30480
ITC Boutros Modern Rokaa Arabic	RB 8	0901	2305	035	053	04F0	1264	C0H40480
ITC Boutros Modern Rokaa Arabic	IB 8	0903	2307	035	053	04F0	1264	C0H50480
ITC Boutros Modern Rokaa Arabic	RM 9	0900	2304	03C	060	04F0	1264	C0H20490
ITC Boutros Modern Rokaa Arabic	IM 9	0902	2306	03C	060	04F0	1264	C0H30490
ITC Boutros Modern Rokaa Arabic	RB 9	0901	2305	03C	060	04F0	1264	C0H40490
ITC Boutros Modern Rokaa Arabic	IB 9	0903	2307	03C	060	04F0	1264	C0H50490
ITC Boutros Modern Rokaa Arabic	RM 10	0900	2304	043	067	04F0	1264	C0H20400
ITC Boutros Modern Rokaa Arabic	IM 10	0902	2306	043	067	04F0	1264	C0H30400
ITC Boutros Modern Rokaa Arabic	RB 10	0901	2305	043	067	04F0	1264	C0H40400



Figure 282 (Page 9 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Modern Rokaa Arabic	IB 10	0903	2307	043	067	04F0	1264	C0H50400
ITC Boutros Modern Rokaa Arabic	RM 11	0900	2304	049	073	04F0	1264	C0H204A0
ITC Boutros Modern Rokaa Arabic	IM 11	0902	2306	049	073	04F0	1264	C0H304A0
ITC Boutros Modern Rokaa Arabic	RB 11	0901	2305	049	073	04F0	1264	C0H404A0
ITC Boutros Modern Rokaa Arabic	IB 11	0903	2307	049	073	04F0	1264	C0H504A0
ITC Boutros Modern Rokaa Arabic	RM 12	0900	2304	050	080	04F0	1264	C0H204B0
ITC Boutros Modern Rokaa Arabic	IM 12	0902	2306	050	080	04F0	1264	C0H304B0
ITC Boutros Modern Rokaa Arabic	RB 12	0901	2305	050	080	04F0	1264	C0H404B0
ITC Boutros Modern Rokaa Arabic	IB 12	0903	2307	050	080	04F0	1264	C0H504B0
ITC Boutros Modern Rokaa Arabic	RM 14	0900	2304	05D	093	04F0	1264	C0H204D0
ITC Boutros Modern Rokaa Arabic	IM 14	0902	2306	05D	093	04F0	1264	C0H304D0
ITC Boutros Modern Rokaa Arabic	RB 14	0901	2305	05D	093	04F0	1264	C0H404D0
ITC Boutros Modern Rokaa Arabic	IB 14	0903	2307	05D	093	04F0	1264	C0H504D0
ITC Boutros Modern Rokaa Arabic	RM 16	0900	2304	06B	107	04F0	1264	C0H204F0
ITC Boutros Modern Rokaa Arabic	IM 16	0902	2306	06B	107	04F0	1264	C0H304F0
ITC Boutros Modern Rokaa Arabic	RB 16	0901	2305	06B	107	04F0	1264	C0H404F0
ITC Boutros Modern Rokaa Arabic	IB 16	0903	2307	06B	107	04F0	1264	C0H504F0
ITC Boutros Modern Rokaa Arabic	RM 18	0900	2304	078	120	04F0	1264	C0H204H0
ITC Boutros Modern Rokaa Arabic	IM 18	0902	2306	078	120	04F0	1264	C0H304H0
ITC Boutros Modern Rokaa Arabic	RB 18	0901	2305	078	120	04F0	1264	C0H404H0
ITC Boutros Modern Rokaa Arabic	IB 18	0903	2307	078	120	04F0	1264	C0H504H0

Figure 282 (Page 10 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Modern Rokaa Arabic	RM 20	0900	2304	085	133	04F0	1264	C0H204J0
ITC Boutros Modern Rokaa Arabic	IM 20	0902	2306	085	133	04F0	1264	C0H304J0
ITC Boutros Modern Rokaa Arabic	RB 20	0901	2305	085	133	04F0	1264	C0H404J0
ITC Boutros Modern Rokaa Arabic	IB 20	0903	2307	085	133	04F0	1264	C0H504J0
ITC Boutros Modern Rokaa Arabic	RM 24	0900	2304	0A0	160	04F0	1264	C0H204N0
ITC Boutros Modern Rokaa Arabic	IM 24	0902	2306	0A0	160	04F0	1264	C0H304N0
ITC Boutros Modern Rokaa Arabic	RB 24	0901	2305	0A0	160	04F0	1264	C0H404N0
ITC Boutros Modern Rokaa Arabic	IB 24	0903	2307	0A0	160	04F0	1264	C0H504N0
ITC Boutros Modern Rokaa Arabic	RM 30	0900	2304	0C8	200	04F0	1264	C0H204T0
ITC Boutros Modern Rokaa Arabic	IM 30	0902	2306	0C8	200	04F0	1264	C0H304T0
ITC Boutros Modern Rokaa Arabic	RB 30	0901	2305	0C8	200	04F0	1264	C0H404T0
ITC Boutros Modern Rokaa Arabic	IB 30	0903	2307	0C8	200	04F0	1264	C0H504T0
ITC Boutros Modern Rokaa Arabic	RM 36	0900	2304	0F0	240	04F0	1264	C0H204Z0
ITC Boutros Modern Rokaa Arabic	IM 36	0902	2306	0F0	240	04F0	1264	C0H304Z0
ITC Boutros Modern Rokaa Arabic	RB 36	0901	2305	0F0	240	04F0	1264	C0H404Z0
ITC Boutros Modern Rokaa Arabic	IB 36	0903	2307	0F0	240	04F0	1264	C0H504Z0
Narkiss Tam HEBREW	RM 6	0900	2304	028	040	04F1	1265	C0H20560
Narkiss Tam HEBREW	IM 6	0902	2306	028	040	04F1	1265	C0H30560
Narkiss Tam HEBREW	RB 6	0901	2305	028	040	04F1	1265	C0H40560
Narkiss Tam HEBREW	IB 6	0903	2307	028	040	04F1	1265	C0H50560
Narkiss Tam HEBREW	RM 7	0900	2304	02F	047	04F1	1265	C0H20570
Narkiss Tam HEBREW	IM 7	0902	2306	02F	047	04F1	1265	C0H30570
Narkiss Tam HEBREW	RB 7	0901	2305	02F	047	04F1	1265	C0H40570
Narkiss Tam Hebrew	IB 7	0903	2307	02F	047	04F1	1265	C0H50570
Narkiss Tam Hebrew	RM 8	0900	2304	035	053	04F1	1265	C0H20580

Figure 282 (Page 11 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkiss Tam Hebrew	IM 8	0902	2306	035	053	04F1	1265	C0H30580
Narkiss Tam Hebrew	RB 8	0901	2305	035	053	04F1	1265	C0H40580
Narkiss Tam Hebrew	IB 8	0903	2307	035	053	04F1	1265	C0H50580
Narkiss Tam Hebrew	RM 9	0900	2304	03C	060	04F1	1265	C0H20590
Narkiss Tam Hebrew	IM 9	0902	2306	03C	060	04F1	1265	C0H30590
Narkiss Tam Hebrew	RB 9	0901	2305	03C	060	04F1	1265	C0H40590
Narkiss Tam Hebrew	IB 9	0903	2307	03C	060	04F1	1265	C0H50590
Narkiss Tam Hebrew	RM 10	0900	2304	043	067	04F1	1265	C0H20500
Narkiss Tam Hebrew	IM 10	0902	2306	043	067	04F1	1265	C0H30500
Narkiss Tam Hebrew	RB 10	0901	2305	043	067	04F1	1265	C0H40500
Narkiss Tam Hebrew	IB 10	0903	2307	043	067	04F1	1265	C0H50500
Narkiss Tam Hebrew	RM 11	0900	2304	049	073	04F1	1265	C0H205A0
Narkiss Tam Hebrew	IM 11	0902	2306	049	073	04F1	1265	C0H305A0
Narkiss Tam Hebrew	RB 11	0901	2305	049	073	04F1	1265	C0H405A0
Narkiss Tam Hebrew	IB 11	0903	2307	049	073	04F1	1265	C0H505A0
Narkiss Tam Hebrew	RM 12	0900	2304	050	080	04F1	1265	C0H205B0
Narkiss Tam Hebrew	IM 12	0902	2306	050	080	04F1	1265	C0H305B0
Narkiss Tam Hebrew	RB 12	0901	2305	050	080	04F1	1265	C0H405B0
Narkiss Tam Hebrew	IB 12	0903	2307	050	080	04F1	1265	C0H505B0
Narkiss Tam Hebrew	RM 14	0900	2304	05D	093	04F1	1265	C0H205D0
Narkiss Tam Hebrew	IM 14	0902	2306	05D	093	04F1	1265	C0H305D0
Narkiss Tam Hebrew	RB 14	0901	2305	05D	093	04F1	1265	C0H405D0
Narkiss Tam Hebrew	IB 14	0903	2307	05D	093	04F1	1265	C0H505D0
Narkiss Tam Hebrew	RM 16	0900	2304	06B	107	04F1	1265	C0H205F0
Narkiss Tam Hebrew	IM 16	0902	2306	06B	107	04F1	1265	C0H305F0
Narkiss Tam Hebrew	RB 16	0901	2305	06B	107	04F1	1265	C0H405F0
Narkiss Tam Hebrew	IB 16	0903	2307	06B	107	04F1	1265	C0H505F0
Narkiss Tam Hebrew	RM 18	0900	2304	078	120	04F1	1265	C0H205H0
Narkiss Tam Hebrew	IM 18	0902	2306	078	120	04F1	1265	C0H305H0
Narkiss Tam Hebrew	RB 18	0901	2305	078	120	04F1	1265	C0H405H0
Narkiss Tam Hebrew	IB 18	0903	2307	078	120	04F1	1265	C0H505H0
Narkiss Tam Hebrew	RM 20	0900	2304	085	133	04F1	1265	C0H205J0
Narkiss Tam Hebrew	IM 20	0902	2306	085	133	04F1	1265	C0H305J0
Narkiss Tam Hebrew	RB 20	0901	2305	085	133	04F1	1265	C0H405J0
Narkiss Tam Hebrew	IB 20	0903	2307	085	133	04F1	1265	C0H505J0
Narkiss Tam Hebrew	RM 24	0900	2304	0A0	160	04F1	1265	C0H205N0

Figure 282 (Page 12 of 12). Helvetica Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkiss Tam Hebrew	IM 24	0902	2306	0A0	160	04F1	1265	C0H305N0
Narkiss Tam Hebrew	RB 24	0901	2305	0A0	160	04F1	1265	C0H405N0
Narkiss Tam Hebrew	IB 24	0903	2307	0A0	160	04F1	1265	C0H505N0
Narkiss Tam Hebrew	RM 30	0900	2304	0C8	200	04F1	1265	C0H205T0
Narkiss Tam Hebrew	IM 30	0902	2306	0C8	200	04F1	1265	C0H305T0
Narkiss Tam Hebrew	RB 30	0901	2305	0C8	200	04F1	1265	C0H405T0
Narkiss Tam Hebrew	IB 30	0903	2307	0C8	200	04F1	1265	C0H505T0
Narkiss Tam Hebrew	RM 36	0900	2304	0F0	240	04F1	1265	C0H205Z0
Narkiss Tam Hebrew	IM 36	0902	2306	0F0	240	04F1	1265	C0H305Z0
Narkiss Tam Hebrew	RB 36	0901	2305	0F0	240	04F1	1265	C0H405Z0
Narkiss Tam Hebrew	IB 36	0903	2307	0F0	240	04F1	1265	C0H505Z0

**Core Times New Roman Raster Fonts for the 3930 Printer:** The following table lists the Core Times New Roman raster fonts used to activate the fonts resident in 3930 printers with feature 4850.

Figure 283 (Page 1 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	RM 6	0904	2308	028	040	04F0	1264	C0N20460
ITC Boutros Setting Arabic	IM 6	0906	2310	028	040	04F0	1264	C0N30460
ITC Boutros Setting Arabic	RB 6	0905	2309	028	040	04F0	1264	C0N40460
ITC Boutros Setting Arabic	IB 6	0907	2311	028	040	04F0	1264	C0N50460
ITC Boutros Setting Arabic	RM 7	0904	2308	02F	047	04F0	1264	C0N20470
ITC Boutros Setting Arabic	IM 7	0906	2310	02F	047	04F0	1264	C0N30470
ITC Boutros Setting Arabic	RB 7	0905	2309	02F	047	04F0	1264	C0N40470
ITC Boutros Setting Arabic	IB 7	0907	2311	02F	047	04F0	1264	C0N50470
ITC Boutros Setting Arabic	RM 8	0904	2308	035	053	04F0	1264	C0N20480
ITC Boutros Setting Arabic	IM 8	0906	2310	035	053	04F0	1264	C0N30480

Figure 283 (Page 2 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	RB 8	0905	2309	035	053	04F0	1264	C0N40480
ITC Boutros Setting Arabic	IB 8	0907	2311	035	053	04F0	1264	C0N50480
ITC Boutros Setting Arabic	RM 9	0904	2308	03C	060	04F0	1264	C0N20490
ITC Boutros Setting Arabic	IM 9	0906	2310	03C	060	04F0	1264	C0N30490
ITC Boutros Setting Arabic	RB 9	0905	2309	03C	060	04F0	1264	C0N40490
ITC Boutros Setting Arabic	IB 9	0907	2311	03C	060	04F0	1264	C0N50490
ITC Boutros Setting Arabic	RM 10	0904	2308	043	067	04F0	1264	C0N20400
ITC Boutros Setting Arabic	IM 10	0906	2310	043	067	04F0	1264	C0N30400
ITC Boutros Setting Arabic	RB 10	0905	2309	043	067	04F0	1264	C0N40400
ITC Boutros Setting Arabic	IB 10	0907	2311	043	067	04F0	1264	C0N50400
ITC Boutros Setting Arabic	RM 11	0904	2308	049	073	04F0	1264	C0N204A0
ITC Boutros Setting Arabic	IM 11	0906	2310	049	073	04F0	1264	C0N304A0
ITC Boutros Setting Arabic	RB 11	0905	2309	049	073	04F0	1264	C0N404A0
ITC Boutros Setting Arabic	IB 11	0907	2311	049	073	04F0	1264	C0N504A0
ITC Boutros Setting Arabic	RM 12	0904	2308	050	080	04F0	1264	C0N204B0
ITC Boutros Setting Arabic	IM 12	0906	2310	050	080	04F0	1264	C0N304B0
ITC Boutros Setting Arabic	RB 12	0905	2309	050	080	04F0	1264	C0N404B0
ITC Boutros Setting Arabic	IB 12	0907	2311	050	080	04F0	1264	C0N504B0
ITC Boutros Setting Arabic	RM 14	0904	2308	05D	093	04F0	1264	C0N204D0
ITC Boutros Setting Arabic	IM 14	0906	2310	05D	093	04F0	1264	C0N304D0
ITC Boutros Setting Arabic	RB 14	0905	2309	05D	093	04F0	1264	C0N404D0

Figure 283 (Page 3 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	IB 14	0907	2311	05D	093	04F0	1264	C0N504D0
ITC Boutros Setting Arabic	RM 16	0904	2308	06B	107	04F0	1264	C0N204F0
ITC Boutros Setting Arabic	IM 16	0906	2310	06B	107	04F0	1264	C0N304F0
ITC Boutros Setting Arabic	RB 16	0905	2309	06B	107	04F0	1264	C0N404F0
ITC Boutros Setting Arabic	IB 16	0907	2311	06B	107	04F0	1264	C0N504F0
ITC Boutros Setting Arabic	RM 18	0904	2308	078	120	04F0	1264	C0N204H0
ITC Boutros Setting Arabic	IM 18	0906	2310	078	120	04F0	1264	C0N304H0
ITC Boutros Setting Arabic	RB 18	0905	2309	078	120	04F0	1264	C0N404H0
ITC Boutros Setting Arabic	IB 18	0907	2311	078	120	04F0	1264	C0N504H0
ITC Boutros Setting Arabic	RM 20	0904	2308	085	133	04F0	1264	C0N204J0
ITC Boutros Setting Arabic	IM 20	0906	2310	085	133	04F0	1264	C0N304J0
ITC Boutros Setting Arabic	RB 20	0905	2309	085	133	04F0	1264	C0N404J0
ITC Boutros Setting Arabic	IB 20	0907	2311	085	133	04F0	1264	C0N504J0
ITC Boutros Setting Arabic	RM 24	0904	2308	0A0	160	04F0	1264	C0N204N0
ITC Boutros Setting Arabic	IM 24	0906	2310	0A0	160	04F0	1264	C0N304N0
ITC Boutros Setting Arabic	RB 24	0905	2309	0A0	160	04F0	1264	C0N404N0
ITC Boutros Setting Arabic	IB 24	0907	2311	0A0	160	04F0	1264	C0N504N0
ITC Boutros Setting Arabic	RM 30	0904	2308	0C8	200	04F0	1264	C0N204T0
ITC Boutros Setting Arabic	IM 30	0906	2310	0C8	200	04F0	1264	C0N304T0
ITC Boutros Setting Arabic	RB 30	0905	2309	0C8	200	04F0	1264	C0N404T0
ITC Boutros Setting Arabic	IB 30	0907	2311	0C8	200	04F0	1264	C0N504T0

Figure 283 (Page 4 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
ITC Boutros Setting Arabic	RM 36	0904	2308	0F0	240	04F0	1264	C0N204Z0
ITC Boutros Setting Arabic	IM 36	0906	2310	0F0	240	04F0	1264	C0N304Z0
ITC Boutros Setting Arabic	RB 36	0905	2309	0F0	240	04F0	1264	C0N404Z0
ITC Boutros Setting Arabic	IB 36	0907	2311	0F0	240	04F0	1264	C0N504Z0
Narkissim Hebrew	RM 6	0904	2308	028	040	04F1	1265	C0N20560
Narkissim Hebrew	IM 6	0906	2310	028	040	04F1	1265	C0N30560
Narkissim Hebrew	RB 6	0905	2309	028	040	04F1	1265	C0N40560
Narkissim Hebrew	IB 6	0907	2311	028	040	04F1	1265	C0N50560
Narkissim Hebrew	RM 7	0904	2308	02F	047	04F1	1265	C0N20570
Narkissim Hebrew	IM 7	0906	2310	02F	047	04F1	1265	C0N30570
Narkissim Hebrew	RB 7	0905	2309	02F	047	04F1	1265	C0N40570
Narkissim Hebrew	IB 7	0907	2311	02F	047	04F1	1265	C0N50570
Narkissim Hebrew	RM 8	0904	2308	035	053	04F1	1265	C0N20580
Narkissim Hebrew	IM 8	0906	2310	035	053	04F1	1265	C0N30580
Narkissim Hebrew	RB 8	0905	2309	035	053	04F1	1265	C0N40580
Narkissim Hebrew	IB 8	0907	2311	035	053	04F1	1265	C0N50580
Narkissim Hebrew	RM 9	0904	2308	03C	060	04F1	1265	C0N20590
Narkissim Hebrew	IM 9	0906	2310	03C	060	04F1	1265	C0N30590
Narkissim Hebrew	RB 9	0905	2309	03C	060	04F1	1265	C0N40590
Narkissim Hebrew	IB 9	0907	2311	03C	060	04F1	1265	C0N50590
Narkissim Hebrew	RM 10	0904	2308	043	067	04F1	1265	C0N20500
Narkissim Hebrew	IM 10	0906	2310	043	067	04F1	1265	C0N30500
Narkissim Hebrew	RB 10	0905	2309	043	067	04F1	1265	C0N40500
Narkissim Hebrew	IB 10	0907	2311	043	067	04F1	1265	C0N50500
Narkissim Hebrew	RM 11	0904	2308	049	073	04F1	1265	C0N205A0
Narkissim Hebrew	IM 11	0906	2310	049	073	04F1	1265	C0N305A0
Narkissim Hebrew	RB 11	0905	2309	049	073	04F1	1265	C0N405A0
Narkissim Hebrew	IB 11	0907	2311	049	073	04F1	1265	C0N505A0
Narkissim Hebrew	RM 12	0904	2308	050	080	04F1	1265	C0N205B0
Narkissim Hebrew	IM 12	0906	2310	050	080	04F1	1265	C0N305B0
Narkissim Hebrew	RB 12	0905	2309	050	080	04F1	1265	C0N405B0
Narkissim Hebrew	IB 12	0907	2311	050	080	04F1	1265	C0N505B0
Narkissim Hebrew	RM 14	0904	2308	05D	093	04F1	1265	C0N205D0

Figure 283 (Page 5 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Narkissim Hebrew	IM 14	0906	2310	05D	093	04F1	1265	C0N305D0
Narkissim Hebrew	RB 14	0905	2309	05D	093	04F1	1265	C0N405D0
Narkissim Hebrew	IB 14	0907	2311	05D	093	04F1	1265	C0N505D0
Narkissim Hebrew	RM 16	0904	2308	06B	107	04F1	1265	C0N205F0
Narkissim Hebrew	IM 16	0906	2310	06B	107	04F1	1265	C0N305F0
Narkissim Hebrew	RB 16	0905	2309	06B	107	04F1	1265	C0N405F0
Narkissim Hebrew	IB 16	0907	2311	06B	107	04F1	1265	C0N505F0
Narkissim Hebrew	RM 18	0904	2308	078	120	04F1	1265	C0N205H0
Narkissim Hebrew	IM 18	0906	2310	078	120	04F1	1265	C0N305H0
Narkissim Hebrew	RB 18	0905	2309	078	120	04F1	1265	C0N405H0
Narkissim Hebrew	IB 18	0907	2311	078	120	04F1	1265	C0N505H0
Narkissim Hebrew	RM 20	0904	2308	085	133	04F1	1265	C0N205J0
Narkissim Hebrew	IM 20	0906	2310	085	133	04F1	1265	C0N305J0
Narkissim Hebrew	RB 20	0905	2309	085	133	04F1	1265	C0N405J0
Narkissim Hebrew	IB 20	0907	2311	085	133	04F1	1265	C0N505J0
Narkissim Hebrew	RM 24	0904	2308	0A0	160	04F1	1265	C0N205N0
Narkissim Hebrew	IM 24	0906	2310	0A0	160	04F1	1265	C0N305N0
Narkissim Hebrew	RB 24	0905	2309	0A0	160	04F1	1265	C0N405N0
Narkissim Hebrew	IB 24	0907	2311	0A0	160	04F1	1265	C0N505N0
Narkissim Hebrew	RM 30	0904	2308	0C8	200	04F1	1265	C0N205T0
Narkissim Hebrew	IM 30	0906	2310	0C8	200	04F1	1265	C0N305T0
Narkissim Hebrew	RB 30	0905	2309	0C8	200	04F1	1265	C0N405T0
Narkissim Hebrew	IB 30	0907	2311	0C8	200	04F1	1265	C0N505T0
Narkissim Hebrew	RM 36	0904	2308	0F0	240	04F1	1265	C0N205Z0
Narkissim Hebrew	IM 36	0906	2310	0F0	240	04F1	1265	C0N305Z0
Narkissim Hebrew	RB 36	0905	2309	0F0	240	04F1	1265	C0N405Z0
Narkissim Hebrew	IB 36	0907	2311	0F0	240	04F1	1265	C0N505Z0
Times New Roman Cyrillic Greek	RM 6	0904	2308	028	40	04FC	1276	C0N20360
Times New Roman Cyrillic Greek	IM 6	0906	2310	028	40	04FC	1276	C0N30360
Times New Roman Cyrillic Greek	RB 6	0905	2309	028	40	04FC	1276	C0N40360
Times New Roman Cyrillic Greek	IB 6	0907	2311	028	40	04FC	1276	C0N50360
Times New Roman Cyrillic Greek	RM 7	0904	2308	02F	47	04FC	1276	C0N20370



Figure 283 (Page 6 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Cyrillic Greek	IM 7	0906	2310	02F	47	04FC	1276	C0N30370
Times New Roman Cyrillic Greek	RB 7	0905	2309	02F	47	04FC	1276	C0N40370
Times New Roman Cyrillic Greek	IB 7	0907	2311	02F	47	04FC	1276	C0N50370
Times New Roman Cyrillic Greek	RM 8	0904	2308	035	53	04FC	1276	C0N20380
Times New Roman Cyrillic Greek	IM 8	0906	2310	035	53	04FC	1276	C0N30380
Times New Roman Cyrillic Greek	RB 8	0905	2309	035	53	04FC	1276	C0N40380
Times New Roman Cyrillic Greek	IB 8	0907	2311	035	53	04FC	1276	C0N50380
Times New Roman Cyrillic Greek	RM 9	0904	2308	03C	60	04FC	1276	C0N20390
Times New Roman Cyrillic Greek	IM 9	0906	2310	03C	60	04FC	1276	C0N30390
Times New Roman Cyrillic Greek	RB 9	0905	2309	03C	60	04FC	1276	C0N40390
Times New Roman Cyrillic Greek	IB 9	0907	2311	03C	60	04FC	1276	C0N50390
Times New Roman Cyrillic Greek	RM 10	0904	2308	043	67	04FC	1276	C0N20300
Times New Roman Cyrillic Greek	IM 10	0906	2310	043	67	04FC	1276	C0N30300
Times New Roman Cyrillic Greek	RB 10	0905	2309	043	67	04FC	1276	C0N40300
Times New Roman Cyrillic Greek	IB 10	0907	2311	043	67	04FC	1276	C0N50300
Times New Roman Cyrillic Greek	RM 11	0904	2308	049	73	04FC	1276	C0N203A0
Times New Roman Cyrillic Greek	IM 11	0906	2310	049	73	04FC	1276	C0N303A0
Times New Roman Cyrillic Greek	RB 11	0905	2309	049	73	04FC	1276	C0N403A0
Times New Roman Cyrillic Greek	IB 11	0907	2311	049	73	04FC	1276	C0N503A0
Times New Roman Cyrillic Greek	RM 12	0904	2308	050	80	04FC	1276	C0N203B0
Times New Roman Cyrillic Greek	IM 12	0906	2310	050	80	04FC	1276	C0N303B0

Figure 283 (Page 7 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Cyrillic Greek	RB 12	0905	2309	050	80	04FC	1276	C0N403B0
Times New Roman Cyrillic Greek	IB 12	0907	2311	050	80	04FC	1276	C0N503B0
Times New Roman Cyrillic Greek	RM 14	0904	2308	05D	93	04FC	1276	C0N203D0
Times New Roman Cyrillic Greek	IM 14	0906	2310	05D	93	04FC	1276	C0N303D0
Times New Roman Cyrillic Greek	RB 14	0905	2309	05D	093	04FC	1276	C0N403D0
Times New Roman Cyrillic Greek	IB 14	0907	2311	05D	093	04FC	1276	C0N503D0
Times New Roman Cyrillic Greek	RM 16	0904	2308	06B	107	04FC	1276	C0N203F0
Times New Roman Cyrillic Greek	IM 16	0906	2310	06B	107	04FC	1276	C0N303F0
Times New Roman Cyrillic Greek	RB 16	0905	2309	06B	107	04FC	1276	C0N403F0
Times New Roman Cyrillic Greek	IB 16	0907	2311	06B	107	04FC	1276	C0N503F0
Times New Roman Cyrillic Greek	RM 18	0904	2308	078	120	04FC	1276	C0N203H0
Times New Roman Cyrillic Greek	IM 18	0906	2310	078	120	04FC	1276	C0N303H0
Times New Roman Cyrillic Greek	RB 18	0905	2309	078	120	04FC	1276	C0N403H0
Times New Roman Cyrillic Greek	IB 18	0907	2311	078	120	04FC	1276	C0N503H0
Times New Roman Cyrillic Greek	RM 20	0904	2308	085	133	04FC	1276	C0N203J0
Times New Roman Cyrillic Greek	IM 20	0906	2310	085	133	04FC	1276	C0N303J0
Times New Roman Cyrillic Greek	RB 20	0905	2309	085	133	04FC	1276	C0N403J0
Times New Roman Cyrillic Greek	IB 20	0907	2311	085	133	04FC	1276	C0N503J0
Times New Roman Cyrillic Greek	RM 24	0904	2308	0A0	160	04FC	1276	C0N203N0
Times New Roman Cyrillic Greek	IM 24	0906	2310	0A0	160	04FC	1276	C0N303N0
Times New Roman Cyrillic Greek	RB 24	0905	2309	0A0	160	04FC	1276	C0N403N0

Figure 283 (Page 8 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Cyrillic Greek	IB 24	0907	2311	0A0	160	04FC	1276	C0N503N0
Times New Roman Cyrillic Greek	RM 30	0904	2308	0C8	200	04FC	1276	C0N203T0
Times New Roman Cyrillic Greek	IM 30	0906	2310	0C8	200	04FC	1276	C0N303T0
Times New Roman Cyrillic Greek	RB 30	0905	2309	0C8	200	04FC	1276	C0N403T0
Times New Roman Cyrillic Greek	IB 30	0907	2311	0C8	200	04FC	1276	C0N503T0
Times New Roman Cyrillic Greek	RM 36	0904	2308	0F0	240	04FC	1276	C0N203Z0
Times New Roman Cyrillic Greek	IM 36	0906	2310	0F0	240	04FC	1276	C0N303Z0
Times New Roman Cyrillic Greek	RB 36	0905	2309	0F0	240	04FC	1276	C0N403Z0
Times New Roman Cyrillic Greek	IB 36	0907	2311	0F0	240	04FC	1276	C0N503Z0
Times New Roman Latin1	RM 6	0904	2308	028	40	07F7	2039	C0N20060
Times New Roman Latin1	IM 6	0906	2310	028	40	07F7	2039	C0N30060
Times New Roman Latin1	RB 6	0905	2309	028	40	07F7	2039	C0N40060
Times New Roman Latin1	IB 6	0907	2311	028	40	07F7	2039	C0N50060
Times New Roman Latin1	RM 7	0904	2308	02F	47	07F7	2039	C0N20070
Times New Roman Latin1	IM 7	0906	2310	02F	47	07F7	2039	C0N30070
Times New Roman Latin1	RB 7	0905	2309	02F	47	07F7	2039	C0N40070
Times New Roman Latin1	IB 7	0907	2311	02F	47	07F7	2039	C0N50070
Times New Roman Latin1	RM 8	0904	2308	035	53	07F7	2039	C0N20080
Times New Roman Latin1	IM 8	0906	2310	035	53	07F7	2039	C0N30080
Times New Roman Latin1	RB 8	0905	2309	035	53	07F7	2039	C0N40080
Times New Roman Latin1	IB 8	0907	2311	035	53	07F7	2039	C0N50080
Times New Roman Latin1	RM 9	0904	2308	03C	60	07F7	2039	C0N20090
Times New Roman Latin1	IM 9	0906	2310	03C	60	07F7	2039	C0N30090
Times New Roman Latin1	RB 9	0905	2309	03C	60	07F7	2039	C0N40090
Times New Roman Latin1	IB 9	0907	2311	03C	60	07F7	2039	C0N50090
Times New Roman Latin1	RM 10	0904	2308	043	67	07F7	2039	C0N20000
Times New Roman Latin1	IM 10	0906	2310	043	67	07F7	2039	C0N30000
Times New Roman Latin1	RB 10	0905	2309	043	67	07F7	2039	C0N40000
Times New Roman Latin1	IB 10	0907	2311	043	67	07F7	2039	C0N50000
Times New Roman Latin1	RM 11	0904	2308	049	73	07F7	2039	C0N200A0

Figure 283 (Page 9 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin1	IM 11	0906	2310	049	73	07F7	2039	C0N300A0
Times New Roman Latin1	RB 11	0905	2309	049	73	07F7	2039	C0N400A0
Times New Roman Latin1	IB 11	0907	2311	049	73	07F7	2039	C0N500A0
Times New Roman Latin1	RM 12	0904	2308	050	80	07F7	2039	C0N200B0
Times New Roman Latin1	IM 12	0906	2310	050	80	07F7	2039	C0N300B0
Times New Roman Latin1	RB 12	0905	2309	050	80	07F7	2039	C0N400B0
Times New Roman Latin1	IB 12	0907	2311	050	80	07F7	2039	C0N500B0
Times New Roman Latin1	RM 14	0904	2308	05D	93	07F7	2039	C0N200D0
Times New Roman Latin1	IM 14	0906	2310	05D	93	07F7	2039	C0N300D0
Times New Roman Latin1	RB 14	0905	2309	05D	93	07F7	2039	C0N400D0
Times New Roman Latin1	IB 14	0907	2311	05D	93	07F7	2039	C0N500D0
Times New Roman Latin1	RM 16	0904	2308	06B	107	07F7	2039	C0N200F0
Times New Roman Latin1	IM 16	0906	2310	06B	107	07F7	2039	C0N300F0
Times New Roman Latin1	RB 16	0905	2309	06B	107	07F7	2039	C0N400F0
Times New Roman Latin1	IB 16	0907	2311	06B	107	07F7	2039	C0N500F0
Times New Roman Latin1	RM 18	0904	2308	078	120	07F7	2039	C0N200H0
Times New Roman Latin1	IM 18	0906	2310	078	120	07F7	2039	C0N300H0
Times New Roman Latin1	RB 18	0905	2309	078	120	07F7	2039	C0N400H0
Times New Roman Latin1	IB 18	0907	2311	078	120	07F7	2039	C0N500H0
Times New Roman Latin1	RM 20	0904	2308	085	133	07F7	2039	C0N200J0
Times New Roman Latin1	IM 20	0906	2310	085	133	07F7	2039	C0N300J0
Times New Roman Latin1	RB 20	0905	2309	085	133	07F7	2039	C0N400J0
Times New Roman Latin1	IB 20	0907	2311	085	133	07F7	2039	C0N500J0
Times New Roman Latin1	RM 24	0904	2308	0A0	160	07F7	2039	C0N200N0
Times New Roman Latin1	IM 24	0906	2310	0A0	160	07F7	2039	C0N300N0
Times New Roman Latin1	RB 24	0905	2309	0A0	160	07F7	2039	C0N400N0
Times New Roman Latin1	IB 24	0907	2311	0A0	160	07F7	2039	C0N500N0
Times New Roman Latin1	RM 30	0904	2308	0C8	200	07F7	2039	C0N200T0
Times New Roman Latin1	IM 30	0906	2310	0C8	200	07F7	2039	C0N300T0
Times New Roman Latin1	RB 30	0905	2309	0C8	200	07F7	2039	C0N400T0
Times New Roman Latin1	IB 30	0907	2311	0C8	200	07F7	2039	C0N500T0
Times New Roman Latin1	RM 36	0904	2308	0F0	240	07F7	2039	C0N200Z0
Times New Roman Latin1	IM 36	0906	2310	0F0	240	07F7	2039	C0N300Z0
Times New Roman Latin1	RB 36	0905	2309	0F0	240	07F7	2039	C0N400Z0
Times New Roman Latin1	IB 36	0907	2311	0F0	240	07F7	2039	C0N500Z0

Figure 283 (Page 10 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin235	RM 6	0904	2308	028	40	04ED	1261	C0N20260
Times New Roman Latin235	IM 6	0906	2310	028	40	04ED	1261	C0N30260
Times New Roman Latin235	RB 6	0905	2309	028	40	04ED	1261	C0N40260
Times New Roman Latin235	IB 6	0907	2311	028	40	04ED	1261	C0N50260
Times New Roman Latin235	RM 7	0904	2308	02F	47	04ED	1261	C0N20270
Times New Roman Latin235	IM 7	0906	2310	02F	47	04ED	1261	C0N30270
Times New Roman Latin235	RB 7	0905	2309	02F	47	04ED	1261	C0N40270
Times New Roman Latin235	IB 7	0907	2311	02F	47	04ED	1261	C0N50270
Times New Roman Latin235	RM 8	0904	2308	035	53	04ED	1261	C0N20280
Times New Roman Latin235	IM 8	0906	2310	035	53	04ED	1261	C0N30280
Times New Roman Latin235	RB 8	0905	2309	035	53	04ED	1261	C0N40280
Times New Roman Latin235	IB 8	0907	2311	035	53	04ED	1261	C0N50280
Times New Roman Latin235	RM 9	0904	2308	03C	60	04ED	1261	C0N20290
Times New Roman Latin235	IM 9	0906	2310	03C	60	04ED	1261	C0N30290
Times New Roman Latin235	RB 9	0905	2309	03C	60	04ED	1261	C0N40290
Times New Roman Latin235	IB 9	0907	2311	03C	60	04ED	1261	C0N50290
Times New Roman Latin235	RM 10	0904	2308	043	67	04ED	1261	C0N20200
Times New Roman Latin235	IM 10	0906	2310	043	67	04ED	1261	C0N30200
Times New Roman Latin235	RB 10	0905	2309	043	67	04ED	1261	C0N40200
Times New Roman Latin235	IB 10	0907	2311	043	67	04ED	1261	C0N50200
Times New Roman Latin235	RM 11	0904	2308	049	73	04ED	1261	C0N202A0

Figure 283 (Page 11 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin235	IM 11	0906	2310	049	73	04ED	1261	C0N302A0
Times New Roman Latin235	RB 11	0905	2309	049	73	04ED	1261	C0N402A0
Times New Roman Latin235	IB 11	0907	2311	049	73	04ED	1261	C0N502A0
Times New Roman Latin235	RM 12	0904	2308	050	80	04ED	1261	C0N202B0
Times New Roman Latin235	IM 12	0906	2310	050	80	04ED	1261	C0N302B0
Times New Roman Latin235	RB 12	0905	2309	050	80	04ED	1261	C0N402B0
Times New Roman Latin235	IB 12	0907	2311	050	80	04ED	1261	C0N502B0
Times New Roman Latin235	RM 14	0904	2308	05D	93	04ED	1261	C0N202D0
Times New Roman Latin235	IM 14	0906	2310	05D	93	04ED	1261	C0N302D0
Times New Roman Latin235	RB 14	0905	2309	05D	93	04ED	1261	C0N402D0
Times New Roman Latin235	IB 14	0907	2311	05D	93	04ED	1261	C0N502D0
Times New Roman Latin235	RM 16	0904	2308	06B	107	04ED	1261	C0N202F0
Times New Roman Latin235	IM 16	0906	2310	06B	107	04ED	1261	C0N302F0
Times New Roman Latin235	RB 16	0905	2309	06B	107	04ED	1261	C0N402F0
Times New Roman Latin235	IB 16	0907	2311	06B	107	04ED	1261	C0N502F0
Times New Roman Latin235	RM 18	0904	2308	078	120	04ED	1261	C0N202H0
Times New Roman Latin235	IM 18	0906	2310	078	120	04ED	1261	C0N302H0
Times New Roman Latin235	RB 18	0905	2309	078	120	04ED	1261	C0N402H0
Times New Roman Latin235	IB 18	0907	2311	078	120	04ED	1261	C0N502H0
Times New Roman Latin235	RM 20	0904	2308	085	133	04ED	1261	C0N202J0
Times New Roman Latin235	IM 20	0906	2310	085	133	04ED	1261	C0N302J0

Figure 283 (Page 12 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin235	RB 20	0905	2309	085	133	04ED	1261	C0N402J0
Times New Roman Latin235	IB 20	0907	2311	085	133	04ED	1261	C0N502J0
Times New Roman Latin235	RM 24	0904	2308	0A0	160	04ED	1261	C0N202N0
Times New Roman Latin235	IM 24	0906	2310	0A0	160	04ED	1261	C0N302N0
Times New Roman Latin235	RB 24	0905	2309	0A0	160	04ED	1261	C0N402N0
Times New Roman Latin235	IB 24	0907	2311	0A0	160	04ED	1261	C0N502N0
Times New Roman Latin235	RM 30	0904	2308	0C8	200	04ED	1261	C0N202T0
Times New Roman Latin235	IM 30	0906	2310	0C8	200	04ED	1261	C0N302T0
Times New Roman Latin235	RB 30	0905	2309	0C8	200	04ED	1261	C0N402T0
Times New Roman Latin235	IB 30	0907	2311	0C8	200	04ED	1261	C0N502T0
Times New Roman Latin235	RM 36	0904	2308	0F0	240	04ED	1261	C0N202Z0
Times New Roman Latin235	IM 36	0906	2310	0F0	240	04ED	1261	C0N302Z0
Times New Roman Latin235	RB 36	0905	2309	0F0	240	04ED	1261	C0N402Z0
Times New Roman Latin235	IB 36	0907	2311	0F0	240	04ED	1261	C0N502Z0
Times New Roman Latin4	RM 6	0904	2308	028	040	04F4	1268	C0N20760
Times New Roman Latin4	IM 6	0906	2310	028	040	04F4	1268	C0N30760
Times New Roman Latin4	RB 6	0905	2309	028	040	04F4	1268	C0N40760
Times New Roman Latin4	IB 6	0907	2311	028	040	04F4	1268	C0N50760
Times New Roman Latin4	RM 7	0904	2308	02F	047	04F4	1268	C0N20770
Times New Roman Latin4	IM 7	0906	2310	02F	047	04F4	1268	C0N30770
Times New Roman Latin4	RB 7	0905	2309	02F	047	04F4	1268	C0N40770
Times New Roman Latin4	IB 7	0907	2311	02F	047	04F4	1268	C0N50770
Times New Roman Latin4	RM 8	0904	2308	035	053	04F4	1268	C0N20780
Times New Roman Latin4	IM 8	0906	2310	035	053	04F4	1268	C0N30780
Times New Roman Latin4	RB 8	0905	2309	035	053	04F4	1268	C0N40780
Times New Roman Latin4	IB 8	0907	2311	035	053	04F4	1268	C0N50780
Times New Roman Latin4	RM 9	0904	2308	03C	060	04F4	1268	C0N20790

Figure 283 (Page 13 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin4	IM 9	0906	2310	03C	060	04F4	1268	C0N30790
Times New Roman Latin4	RB 9	0905	2309	03C	060	04F4	1268	C0N40790
Times New Roman Latin4	IB 9	0907	2311	03C	060	04F4	1268	C0N50790
Times New Roman Latin4	RM 10	0904	2308	043	067	04F4	1268	C0N20700
Times New Roman Latin4	IM 10	0906	2310	043	067	04F4	1268	C0N30700
Times New Roman Latin4	RB 10	0905	2309	043	067	04F4	1268	C0N40700
Times New Roman Latin4	IB 10	0907	2311	043	067	04F4	1268	C0N50700
Times New Roman Latin4	RM 11	0904	2308	049	073	04F4	1268	C0N207A0
Times New Roman Latin4	IM 11	0906	2310	049	073	04F4	1268	C0N307A0
Times New Roman Latin4	RB 11	0905	2309	049	073	04F4	1268	C0N407A0
Times New Roman Latin4	IB 11	0907	2311	049	073	04F4	1268	C0N507A0
Times New Roman Latin4	RM 12	0904	2308	050	080	04F4	1268	C0N207B0
Times New Roman Latin4	IM 12	0906	2310	050	080	04F4	1268	C0N307B0
Times New Roman Latin4	RB 12	0905	2309	050	080	04F4	1268	C0N407B0
Times New Roman Latin4	IB 12	0907	2311	050	080	04F4	1268	C0N507B0
Times New Roman Latin4	RM 14	0904	2308	05D	093	04F4	1268	C0N207D0
Times New Roman Latin4	IM 14	0906	2310	05D	093	04F4	1268	C0N307D0
Times New Roman Latin4	RB 14	0905	2309	05D	093	04F4	1268	C0N407D0
Times New Roman Latin4	IB 14	0907	2311	05D	093	04F4	1268	C0N507D0
Times New Roman Latin4	RM 16	0904	2308	06B	107	04F4	1268	C0N207F0
Times New Roman Latin4	IM 16	0906	2310	06B	107	04F4	1268	C0N307F0
Times New Roman Latin4	RB 16	0905	2309	06B	107	04F4	1268	C0N407F0
Times New Roman Latin4	IB 16	0907	2311	06B	107	04F4	1268	C0N507F0
Times New Roman Latin4	RM 18	0904	2308	078	120	04F4	1268	C0N207H0
Times New Roman Latin4	IM 18	0906	2310	078	120	04F4	1268	C0N307H0
Times New Roman Latin4	RB 18	0905	2309	078	120	04F4	1268	C0N407H0
Times New Roman Latin4	IB 18	0907	2311	078	120	04F4	1268	C0N507H0
Times New Roman Latin4	RM 20	0904	2308	085	133	04F4	1268	C0N207J0
Times New Roman Latin4	IM 20	0906	2310	085	133	04F4	1268	C0N307J0
Times New Roman Latin4	RB 20	0905	2309	085	133	04F4	1268	C0N407J0
Times New Roman Latin4	IB 20	0907	2311	085	133	04F4	1268	C0N507J0
Times New Roman Latin4	RM 24	0904	2308	0A0	160	04F4	1268	C0N207N0
Times New Roman Latin4	IM 24	0906	2310	0A0	160	04F4	1268	C0N307N0
Times New Roman Latin4	RB 24	0905	2309	0A0	160	04F4	1268	C0N407N0
Times New Roman Latin4	IB 24	0907	2311	0A0	160	04F4	1268	C0N507N0
Times New Roman Latin4	RM 30	0904	2308	0C8	200	04F4	1268	C0N207T0



Figure 283 (Page 14 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Latin4	IM 30	0906	2310	0C8	200	04F4	1268	C0N307T0
Times New Roman Latin4	RB 30	0905	2309	0C8	200	04F4	1268	C0N407T0
Times New Roman Latin4	IB 30	0907	2311	0C8	200	04F4	1268	C0N507T0
Times New Roman Latin4	RM 36	0904	2308	0F0	240	04F4	1268	C0N207Z0
Times New Roman Latin4	IM 36	0906	2310	0F0	240	04F4	1268	C0N307Z0
Times New Roman Latin4	RB 36	0905	2309	0F0	240	04F4	1268	C0N407Z0
Times New Roman Latin4	IB 36	0907	2311	0F0	240	04F4	1268	C0N507Z0
Times New Roman Symbols	RM 6	0904	2308	028	40	04A7	1191	C0N20160
Times New Roman Symbols	RB 6	0905	2309	028	40	04A7	1191	C0N40160
Times New Roman Symbols	RM 7	0904	2308	02F	47	04A7	1191	C0N20170
Times New Roman Symbols	RB 7	0905	2309	02F	47	04A7	1191	C0N40170
Times New Roman Symbols	RM 8	0904	2308	035	53	04A7	1191	C0N20180
Times New Roman Symbols	RB 8	0905	2309	035	53	04A7	1191	C0N40180
Times New Roman Symbols	RM 9	0904	2308	03C	60	04A7	1191	C0N20190
Times New Roman Symbols	RB 9	0905	2309	03C	60	04A7	1191	C0N40190
Times New Roman Symbols	RM 10	0904	2308	043	67	04A7	1191	C0N20100
Times New Roman Symbols	RB 10	0905	2309	043	67	04A7	1191	C0N40100
Times New Roman Symbols	RM 11	0904	2308	049	73	04A7	1191	C0N201A0
Times New Roman Symbols	RB 11	0905	2309	049	73	04A7	1191	C0N401A0
Times New Roman Symbols	RM 12	0904	2308	050	80	04A7	1191	C0N201B0
Times New Roman Symbols	RB 12	0905	2309	050	80	04A7	1191	C0N401B0
Times New Roman Symbols	RM 14	0904	2308	05D	93	04A7	1191	C0N201D0
Times New Roman Symbols	RB 14	0905	2309	05D	93	04A7	1191	C0N401D0
Times New Roman Symbols	RM 16	0904	2308	06B	107	04A7	1191	C0N201F0

Figure 283 (Page 15 of 15). Times New Roman Core Raster Fonts

Typeface	Attribute and Points	FGID HEX	FGID DEC	FW HEX	FW DEC	GC-SGID HEX	GC-SGID DEC	Font Character Set
Times New Roman Symbols	RB 16	0905	2309	06B	107	04A7	1191	C0N401F0
Times New Roman Symbols	RM 18	0904	2308	078	120	04A7	1191	C0N201H0
Times New Roman Symbols	RB 18	0905	2309	078	120	04A7	1191	C0N401H0
Times New Roman Symbols	RM 20	0904	2308	085	133	04A7	1191	C0N201J0
Times New Roman Symbols	RB 20	0905	2309	085	133	04A7	1191	C0N401J0
Times New Roman Symbols	RM 24	0904	2308	0A0	160	04A7	1191	C0N201N0
Times New Roman Symbols	RB 24	0905	2309	0A0	160	04A7	1191	C0N401N0
Times New Roman Symbols	RM 30	0904	2308	0C8	200	04A7	1191	C0N201T0
Times New Roman Symbols	RB 30	0905	2309	0C8	200	04A7	1191	C0N401T0
Times New Roman Symbols	RM 36	0904	2308	0F0	240	04A7	1191	C0N201Z0
Times New Roman Symbols	RB 36	0905	2309	0F0	240	04A7	1191	C0N401Z0

## Fonts Resident in the 3912 and 3916 Printers

This section of the appendix describes 391x resident fonts and code pages.

The 391x contains 32 resident fonts accessible in IPDS mode (Models AS1 and NS1), 20 resident fonts (13 of which are scalable) accessible in PCL-5 mode (Models AS0 and NS0), and 39 scalable resident fonts accessible in PostScript applications.

### 391x Default Font

The printer default font is Courier 10, code page 037, Version 1, unless you changed the configuration settings for the printer.

### 391x Non-IPDS Resident Font Cards and Cartridges

When running in non-IPDS mode, the 391x operates like the 4039 and can use font cards and font cartridges. When running in IPDS mode, however, the 391x cannot use the fonts on these cards and cartridges. For information on font cards and font cartridges, refer to the 4039 printer publications.

### 4028 Font Metrics Resident in the 391x

You can use IBM 4028 Font Metrics, which contain font values corresponding to those in the 4028 resident fonts, to format text on the host and print the formatted text on the 4028 or the 391x. Font metrics contain all the information needed for formatting characters but do not contain the characters themselves, which means they cannot be downloaded.

PSF/MVS 2.1.0 ships 4028 Font Metrics already marked, but if you do need to mark them, use the APSW4028 APSRMARK job.

### Selecting 391x Fonts and Code Pages

391x Models AS1 and NS1 receive IPDS commands to specify fonts. The IPDS command set can select any font or code page supported by the printer; however, host software may restrict the actual fonts or code pages that can be selected. Font selection includes typographic and nontypographic fonts in all pitches, points, and widths. The information provided to the printer to select a font is called a Global Resource ID (GRID), which consists of the following elements:

- FGID (font typeface global identifier)
- GCSGID (graphic character set global identifier)
- CPGID (code page global identifier)
- FW (font width)

For typographic fonts with the same FGID, specify the FW parameter to the printer, which the printer needs to identify the correct size font. When using an application that does not allow you to select font width, use the alternate FGID (enclosed in parentheses), when available, to access typographic fonts.

You can select the code page and code page version from a configuration setting. Some system software does not allow you to change code pages by software but uses the printer default code page for printing. The printer factory default character set is 0697, and the code page is 00037 version 1. This may require you to change the printer code page to match the system software.

### 391x Resident Fonts in IPDS Mode

Figure 284 lists the typefaces resident in the 391x printer.

Figure 284 (Page 1 of 2). 391x IPDS Resident Fonts

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Pages	Font Character Set
APL/TN 12	004C	0076	10	0078	0120	0310	C0E0AP12
Boldface PS	009F	0159	12	0078	0120	A, B, 1002	C0E0BRTR
Courier Bold 10	002E	0046	12	0090	0144	A, B, 1002	C0E0CB10
Courier Italic 10	0012	0018	12	0090	0144	A, B, 1002	C0E0CI10
Courier Italic 12	005C	0092	10	0078	0120	A, B, 1002	C0E0CI12
Courier 10	000B	0011	12	0090	0144	259, A, B, 1002	C0E0CR10
Courier 12	0055	0085	10	0078	0120	259, A, B, 1002	C0E0CE12 C0S0CR12
Courier 15	00DF	0223	9	0060	0096	A, B, 1002	C0E0CR15
Courier 17.1	00FE	0254	8.5	0054	0084	A, B, 1002	C0E0CR17
Letter Gothic 20	0119	0281	7.5	0048	0072	A, B, 1002	C0E0LR20
OCR A 10	0013	0019	12	0090	0144	892	C0E0OCRA
OCR B 10	0003	0003	12	0090	0144	893	C0E0OCRB
Prestige Bold 12	006F	0111	10	0078	0120	A, B, 1002	C0E0PB12
Prestige Italic 12	0070	0112	10	0078	0120	A, B, 1002	C0E0PI12
Prestige PS	00A4	0164	12	0078	0120	A, B, 1002	C0E0PRTR
Prestige 10	000C	0012	12	0090	0144	259, A, B, 1002	C0E0PR10, C0E0PROR, C0E0PROG, C0E0PROH
Prestige 12	0056	0086	10	0078	0120	259, A, B, 1002	C0E0PR12
Prestige 15	00DD	0221	9	0060	0096	A, B, 1002	C0E0PR15
Prestige 17.1	0100	0256	8.5	0054	0084	A, B, 1002	C0E0PR17
Times New Roman Latin1 TYPO	1637	5687	6	0028	0040	A	C0E20T60
Times New Roman Latin1 TYPO	1637	5687	8	0035	0053	A	C0E20T80
Times New Roman Latin1 TYPO	1637	5687	10	0043	0067	A	C0E20T00
Times New Roman Latin1 TYPO	1637	5687	12	0050	0080	A	C0E20TB0
Times New Roman Latin1 Bold TYPO	164B	5707	10	0043	0067	A	C0E40T00
Times New Roman Latin1 TYPO Bold	164B	5707	12	0050	0080	A	C0E40TB0
Times New Roman Latin1 Bold TYPO	164B	5707	14	005D	0093	A	C0E40TD0

<i>Figure 284 (Page 2 of 2). 391x IPDS Resident Fonts</i>							
<b>Typeface and Pitch</b>	<b>FGID HEX</b>	<b>FGID DEC</b>	<b>Point Size</b>	<b>FW HEX</b>	<b>FW DEC</b>	<b>Code Pages</b>	<b>Font Character Set</b>
Times New Roman Latin1 Bold TYPO	164B	5707	18	0078	0120	A	C0E40TH0
Times New Roman Latin1 Bold TYPO	164B	5707	24	00A0	0160	A	C0E40TN0
Times New Roman Latin1 Bold Italic TYPO	16CB	5835	10	0043	0067	A	C0E50T00
Times New Roman Latin1 Bold Italic TYPO	16CB	5835	12	0050	0080	A	C0E50TB0
Times New Roman Latin1 Italic TYPO	16B7	5815	10	0043	0067	A	C0E30T00
Times New Roman Latin1 Italic TYPO	16B7	5815	12	0050	0080	A	C0E30TB0

Figure 285 explains A and B as used in Figure 284 on page 486. In Figure 285, when a 0, 1, or 2 follows the code page, this digit indicates the specific version of that code page. Different code page versions may have different characters at different code points.

<i>Figure 285. Definition of Code Page Groups A and B</i>	
<b>Supported Code Pages (CPGID)</b>	<b>Supported Character Sets (GCSGID)</b>
<b>Group A</b>	
037/0, 273/0, 274/0, 277/0, 278/0, 280/0, 281/0, 284/0, 285/0, 297/0, 500/0, 871/0	697/0
037/1, 273/1, 274/1, 277/1, 278/1, 280/1, 281/1, 284/1, 285/1, 297/1, 500/1, 871/1	697/1
038, 367	103, 697
259	340
260	341, 697
276	277
286	317
287	321
288	325
<b>Group B</b>	
256	337
289	329

## 391x Resident Fonts on the Font Cards

The fonts listed in the following tables are available on font cards. An A or B in the Code Pages column indicates the font supports a group of code pages as given in the Code Page Groups A and B Definition Table on page 487.

Figure 286 (Page 1 of 4). 391x Resident Fonts on the Font Cards

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Page Group or Code Page	Font Character Set
Adjutant 12	005F	0095	10	0078	0120	A, B, 1002	C0E0AJER
Baskerville Bold Italic TYPO	21CB	8651	10	0043	0067	A	C0E50B00
Baskerville Bold TYPO	214B	8523	10	0043	0067	A	C0E40B00
Baskerville Bold TYPO	214B	8523	14	005D	0093	A	C0E40BD0
Baskerville Bold TYPO	214B	8523	18	0078	0120	A	C0E40BH0
Baskerville Italic TYPO	21B7	8631	10	0043	0067	A	C0E30B00
Baskerville TYPO	2137	8503	6	0028	0040	A	C0E20B60
Baskerville TYPO	2137	8503	8	0035	0053	A	C0E20B80
Baskerville TYPO	2137	8503	10	0043	0067	A	C0E20B00
Baskerville TYPO	2137	8503	12	0050	0080	A	C0E20BB0
Boldface Italic PS	009B	0155	12	0078	0120	A, B, 1002 <sup>16</sup>	C0E0BITR
Century Schoolbook Bold Italic TYPO	42CB	17099	10	0043	0067	A	C0E50C00
Century Schoolbook Bold TYPO	424B	16971	10	0043	0067	A	C0E40C00
Century Schoolbook Bold TYPO	424B	16971	14	005D	0093	A	C0E40CD0
Century Schoolbook Bold TYPO	424B	16971	18	0078	0120	A	C0E40CH0
Century Schoolbook Italic TYPO	42B7	17079	10	0043	0067	A	C0E30C00
Century Schoolbook TYPO	4237	16951	6	0028	0040	A	C0E20C60
Century Schoolbook TYPO	4237	16951	8	0035	0053	A	C0E20C80
Century Schoolbook TYPO	4237	16951	10	0043	0067	A	C0E20C00
Century Schoolbook TYPO	4237	16951	12	0050	0080	A	C0E20CB0
Cursive Bold Italic TYPO	A34B	41803	14	005D	0093	A	C0E50SD0
Cursive Bold Italic TYPO	A34B	41803	18	0078	0120	A	C0E50SH0
Cursive Italic TYPO	A337	41783	12	0050	0080	A	C0E30SB0
Delegate 10	0002	0002	12	0090	0144	A, B, 1002	C0E0DE10
Engravers' Old English TYPO	9237	37431	12	0050	0080	A	C0E20EB0
Engravers' Old English TYPO	9237	37431	14	005D	0093	A	C0E20EO0
Engravers' Old English TYPO	9327	37431	18	0078	0120	A	C0E20EH0
Essay Italic PS	00A2	0162	12	0078	0120	A, B, 1002 <sup>16</sup>	C0E0EITR
Essay PS	00A0	0160	12	0078	0120	A, B, 1002 <sup>16</sup>	C0E0ESTR

<sup>16</sup> Support of code page 1002 requires that font card part number 1255808, 1255809, or 1049454 be installed in the printer.

<sup>17</sup> Support of code page 1002 requires that font card part number 1049454 be installed in the printer.

Figure 286 (Page 2 of 4). 391x Resident Fonts on the Font Cards

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Page Group or Code Page	Font Character Set
Foundry Bold Italic PS	00C3	0195	10	0078	0120	A, B, 1002	C0E0FMTR
Foundry Bold PS	00BF	0191	10	0078	0120	A, B, 1002	C0E0FBTR
Foundry Italic PS	00C2	0194	10	0078	0120	A, B, 1002	C0E0FITR
Foundry PS	006E	0190	10	0078	0120	A, B, 1002	C0E0FRTR
Futura Book Italic TYPO	83B7	33719	10	0043	0067	A	C0E30F00
Futura Book TYPO	8337	33591	6	0028	0040	A	C0E20F60
Futura Book TYPO	8337	33591	8	0035	0053	A	C0E20F80
Futura Book TYPO	8337	33591	10	0043	0067	A	C0E20F00
Futura Book TYPO	8337	33591	12	0050	0080	A	C0E20FB0
Futura Heavy Italic Bold TYPO	83C1	33729	10	0043	0067	A	C0E50F00
Futura Heavy TYPO	8341	33601	10	0043	0067	A	C0E40F00
Futura Heavy TYPO	8341	33601	14	005D	0093	A	C0E40FO0
Futura Heavy TYPO	8341	33601	18	0078	0120	A	C0E40FH0
Goudy Old Style Bold Italic TYPO	13CB	5067	10	0043	0067	A	C0E50G00
Goudy Old Style Bold TYPO	134B	4939	10	0043	0067	A	C0E40G00
Goudy Old Style Bold TYPO	134B	4939	14	005D	0093	A	C0E40GD0
Goudy Old Style Bold TYPO	134B	4939	18	0078	0120	A	C0E40GH0
Goudy Old Style Italic TYPO	13B7	5047	10	0043	0067	A	C0E30G00
Goudy Old Style TYPO	1337	4919	6	0028	0040	A	C0E20G60
Goudy Old Style TYPO	1337	4919	8	0035	0053	A	C0E20G80
Goudy Old Style TYPO	1337	4919	10	0043	0067	A	C0E20G00
Goudy Old Style TYPO	1337	4919	12	0050	0080	A	C0E20GB0
Helvetica Bold Italic TYPO	85CB	34251	10	0043	0067	A	C0E50H00
Helvetica Bold TYPO	854B	34123	10	0043	0067	A	C0E40H00
Helvetica Bold TYPO	854B	34123	14	005D	0093	A	C0E40HD0
Helvetica Bold TYPO	854B	34123	18	0078	0120	A	C0E40HH0
Helvetica Italic TYPO	85B7	34231	10	0043	0067	A	C0E30H00
Helvetica TYPO	8537	34103	6	0028	0040	A	C0E20H60
Helvetica TYPO	8537	34103	8	0035	0053	A	C0E20H80
Helvetica TYPO	8537	34103	10	0043	0067	A	C0E20H00
Helvetica TYPO	8537	34103	12	0050	0080	A	C0E20HB0
Letter Gothic Bold 12	006E	0110	12	0078	0120	A, B, 1002	C0E0LB12
Letter Gothic Italic 12	006D	0109	12	0078	0120	A, B, 1002	C0E0LI12
Letter Gothic 10	0024	0036	14	0090	0144	A, B, 1002	C0E0LR10
Letter Gothic 12	0057	0087	12	0078	0120	A, B, 1002	C0E0LR12
Letter Gothic 15	00DE	0222	9	0060	0096	A, B, 1002 <sup>17</sup>	C0E0LR15
Letter Gothic 17.1	00FF	0255	8.5	0054	0084	A, B, 1002 <sup>17</sup>	C0E0LR7R

Figure 286 (Page 3 of 4). 391x Resident Fonts on the Font Cards

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Page Group or Code Page	Font Character Set
Letter Gothic 25	011D	0285	6	003C	0060	A, B	C0E0LR25
Light Italic 12	005B	0091	10	0078	0120	A, B, 1002	C0E0LT12
Olde World 12	0060	0096	10	0078	0120	A, B, 1002	C0E0WB12
Modern PS	009E	0158	12	0078	0120	A, B, 1002 <sup>16</sup>	C0E0MRTR
Optima Bold Italic TYPO	82CB	33483	10	0043	0067	A	C0E50O00
Optima Bold TYPO	8237	33335	10	0043	0067	A	C0E20O00
Optima Bold TYPO	824B	33355	14	005D	0093	A	C0E40OD0
Optima Bold TYPO	824B	33355	18	0078	0120	A	C0E40OH0
Optima Italic TYPO	82B7	33463	10	0043	0067	A	C0E30O00
Optima TYPO	8237	33335	6	0028	0040	A	C0E20O60
Optima TYPO	8237	33335	8	0035	0053	A	C0E20O80
Optima TYPO	824B	33355	10	0043	0067	A	C0E40O00
Optima TYPO	8237	33335	12	0050	0080	A	C0E20OB0
Orator Bold 6.5	01B3	0435	18	00DD	0221	A	C0E0OB06
Orator Bold 8.1	01B2	0434	16	00B1	0177	A	C0E0OB08
Orator 10	0005	0005	14	0090	0144	A	C0E0OR10
Palatino Bold Italic TYPO	18CB	6347	10	0043	0067	A	C0E50P00
Palatino Bold TYPO	184B	6219	10	0043	0067	A	C0E40P00
Palatino Bold TYPO	184B	6219	14	005D	0093	A	C0E40PD0
Palatino Bold TYPO	184B	6219	18	0078	0120	A	C0E40PH0
Palatino Italic TYPO	18B7	6327	10	0043	0067	A	C0E30P00
Palatino TYPO	1837	6199	6	0028	0040	A	C0E20P60
Palatino TYPO	1837	6199	8	0035	0053	A	C0E20P80
Palatino TYPO	1837	6199	10	0043	0067	A	C0E20P00
Palatino TYPO	1837	6199	12	0050	0080	A	C0E20PB0
Presenter 10	0019	0025	14	0090	144	A	C0E0PS10
Press Roman Bold Italic PS	00BD	0189	10	0078	0120	A, B, 1002	C0E0RMTR, C0E0RMRR
Press Roman Bold PS	00BB	0187	10	0078	0120	A, B, 1002	C0E0RBTR, C0E0RBRR
Press Roman Italic PS	00BC	0188	10	0078	0120	A, B, 1002	C0E0RITR, C0E0RIRR
Press Roman PS	00BA	0186	10	0078	0120	A, B, 1002	C0E0RRTR, C0E0RRRR
Script 12	0054	0084	10	0078	0120	A, B, 1002	C0E0SR12
Testimonial TYPO	1737	5943	12	0050	0080	A	C0E20MB0
Testimonial TYPO	1737	5943	14	005D	0093	A	C0E20MO0
Testimonial TYPO	1737	5943	18	0078	0120	A	C0E20MH0



Figure 286 (Page 4 of 4). 391x Resident Fonts on the Font Cards

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC	Code Page Group or Code Page	Font Character Set
Title PS	009D	0157	12	0078	0120	A, B, 1002 <sup>16</sup>	C0E0TBRR

The following fonts are available in font cards in code page 259.

Figure 287 (Page 1 of 2). Symbol Fonts in Code Page 259

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Adjutant 12	005F	0095	10	0078	0120
Boldface Italic PS	009B	0155	10	0078	0120
Boldface PS	009F	0159	10	0078	0120
Courier Bold 10	002E	0046	12	0090	0144
Courier Bold 12	006C	0108	10	0078	0120
Courier Italic 10	0012	0018	12	0090	0144
Courier Italic 12	005C	0092	10	0078	0120
Courier 10	000B	0011	12	0090	0144
Courier 12	0055	0085	10	0078	0120
Courier 15	00DF	0223	9	0060	0096
Courier 17.1	00FE	0254	8.5	0054	0084
Cyrillic 22	000A	0010	12	0090	0144
Delegate 10	0002	0002	12	0090	0144
Essay Italic PS	00A2	0162	10	0078	0120
Essay PS	00A0	0160	10	0078	0120
Foundry Bold Italic PS	00C3	0195	10	0078	0120
Foundry Bold PS	00BF	0191	10	0078	0120
Foundry Italic PS	00C2	0194	10	0078	0120
Foundry PS	006E	0190	10	0078	0120
Letter Gothic Bold 12	006E	0110	10	0078	0120
Letter Gothic Italic 12	006D	0109	10	0078	0120
Letter Gothic 12	0057	0087	10	0078	0120
Letter Gothic 15	00DE	0222	9	0060	0096
Letter Gothic 17.1	00FF	0255	8.5	0054	0084
Letter Gothic 20	0119	0281	7.5	0048	0072
Light Italic 12	005B	0091	10	0078	0120
Modern PS	009E	0158	10	0078	0120
Press Roman Bold Italic PS	00BD	0189	10	0078	0120
Press Roman Bold PS	00BB	0187	10	0078	0120

Figure 287 (Page 2 of 2). Symbol Fonts in Code Page 259

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Press Roman Italic PS	00BC	0188	10	0078	0120
Press Roman PS	00BA	0186	10	0078	0120
Prestige Elite Bold 12	006F	0111	10	0078	0120
Prestige Italic 12	0070	0112	10	0078	0120
Prestige Pica 10	000C	0012	12	0090	0144
Prestige PS	00A4	0164	10	0078	0120
Prestige 12	0056	0086	10	0078	0120
Prestige 15	00DD	0221	9	0060	0096
Prestige 17.1	0100	0256	8.5	0054	0084
Title PS	009D	0157	10	0078	0120

The following font is available in the APL font card (Code Page 293).

Figure 288. Font in APL Font Card

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
APL 12	004C	0076	10	0078	0120

### 391x International Language Fonts

The following fonts are available in font cards in code page 290 for support of the Katakana language.

Figure 289. Fonts in Code Page 290—Katakana

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Katakana 10	0015	0021	12	0090	0144
Katakana 12	004E	0078	12	0078	0120
Katakana 17.1	00F9	0249	8.5	0054	0084

The following fonts are available in font cards in code page 420 for support of the Arabic language.

Use the alternate FGID if your host software does not allow you to select a font by the FGID and point size for typographic fonts.

Figure 290. Fonts in Code Page 420—Arabic

Typeface and Pitch	FGID HEX (Alt FGID)	FGID DEC (Alt FGID)	Point Size	FW HEX	FW DEC
Baskerville/Nasseem Bold Italic TYPO	22CB (02F5)	8907 (0757)	12	0050	0080
Baskerville/Nasseem Bold Italic TYPO	22CB (02F6)	8907 (0758)	18	0078	0120
Baskerville/Nasseem Bold Italic TYPO	22CB (02F7)	8907 (0759)	24	00A0	0160
Boldface/Nasseem Bold PS	224B (02F1)	8779 (0753)	12	0078	0120
Baskerville/Nasseem Bold TYPO	224B (02F2)	8779 (0753)	12	0050	0080
Baskerville/Nasseem Bold TYPO	224B (02F1)	8779 (0754)	18	0078	0120
Baskerville/Nasseem Bold TYPO	224B (02F3)	8779 (0755)	24	00A0	0160
Baskerville/Nasseem Italic TYPO	22B7 (02F4)	8887 (0756)	12	0050	0080
Baskerville/Nasseem TYPO	2237 (02F0)	8759 (0752)	12	0050	0080
Courier/Nasseem Bold Italic 10	0040	0064	12	0090	0144
Courier/Nasseem Bold 7.9	010A	0266	12	0061	0177
Courier/Nasseem Bold 10	003F	0063	12	0090	0144
Courier/Nasseem Italic 7.9	010B	0267	12	0061	0177
Courier/Nasseem Italic 10	003E	0062	12	0090	0144
Courier/Nasseem Italic 12	0068	0104	10	0078	0120
Courier/Nasseem 10	003D	0061	12	0090	0144
Courier/Nasseem 12	0067	0103	10	0078	0120
Courier/Nasseem 15	00D5	0213	9	0060	0096
Courier/Nasseem 17.1	0117	0279	8.5	0054	0084
Gothic/Nasseem 20	011B	0283	7.5	0048	0072

The following fonts are available in font cards in code pages 423 and 875 for support of the Greek language.

<i>Figure 291. Fonts in Code Pages 423 and 875—Greek</i>					
<b>Typeface and Pitch</b>	<b>FGID HEX</b>	<b>FGID DEC</b>	<b>Point Size</b>	<b>FW HEX</b>	<b>FW DEC</b>
Boldface Italic PS	009B	0155	12	0078	0120
Boldface PS	009F	0159	12	0078	0120
Courier 10	000B	0011	12	0090	0144
Courier 15	00DF	0223	9	0060	0096
Letter Gothic Bold 12	006E	0110	12	0078	0120
Letter Gothic 12	0057	0087	12	0078	0120

The following fonts are available in font cards in code pages 424/2 and 803 for support of the Hebrew language.

Figure 292. Fonts in Code Pages 424/2 and 803

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Boldface/Barak PS	00A7	0167	12	0078	0120
Courier/Shalom Bold 10	0032	0050	12	0090	0144
Courier/Shalom 10	0031	0049	12	0090	0144
Courier/Shalom 12	0062	0098	10	0078	0120
Courier/Shalom 15	00E2	0226	9	0060	0096
Letter Gothic/Aviv 20	011A	0282	7.5	0048	0072
Times Roman/Narkissim Bold TYPO	324B	12875	8	0035	0053
Times Roman/Narkissim Bold TYPO	324B	12875	10	0043	0067
Times Roman/Narkissim Bold TYPO	324B	12875	12	0050	0080
Times Roman/Narkissim Bold TYPO	324B	12875	18	0078	0120
Times Roman/Narkissim Bold TYPO	324B	12875	24	00A0	0160
Times Roman/Narkissim TYPO	3237	12855	8	0035	0053
Times Roman/Narkissim TYPO	3237	12855	10	0043	0067
Times Roman/Narkissim TYPO	3237	12855	12	0050	0080

The following fonts are available in font cards in code page 870 for support of the Latin 2 (Roece) and Yugoslav languages.

*Figure 293. Fonts in Code Page 870*

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Courier 10	000B	0011	12	0090	0144
Courier 12	0055	0085	10	0078	0120
Courier 17.1	00FE	0254	8.5	0054	0084
Letter Gothic 12	0057	0087	12	0078	0120
Prestige Elite 12	0056	0086	10	0078	0120
Title PS	009D	0157	12	0078	0120

The following fonts are available in font cards in code page 880 for support of the Cyrillic language.

*Figure 294. Fonts in Code Page 880—Cyrillic*

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Boldface PS	009F	0159	12	0078	0120
Courier 10	000B	0011	12	0090	0144
Courier 12	0055	0085	10	0078	0120
Cyrillic 22 10	000A	0010	12	0090	0144
Letter Gothic 12	0057	0087	12	0078	0120
Prestige 12	0056	0086	10	0078	0120

The following fonts are available in font cards in code pages 905 and 1026 for support of the Turkish language.

*Figure 295. Fonts in Code Pages 905 and 1026—Turkish*

Typeface and Pitch	FGID HEX	FGID DEC	Point Size	FW HEX	FW DEC
Boldface PS	009F	0159	12	0078	0120
Courier 10	000B	0011	12	0090	0144
Courier 12	0055	0085	10	0078	0120
Courier 15	00DF	0223	9	0060	0096
Courier 17.1	00FE	0254	8.5	0054	0084
Letter Gothic 12	0057	0087	12	0078	0120
Prestige 10	000C	0012	12	0090	0144
Prestige 12	0056	0086	10	0078	0120

### 391x Internal Code Pages

The printer supports the code pages and code points listed in Figure 296. When a 0, 1, or 2 follows the code page number, this digit indicates the specific version of that code page. Different code page versions may have different characters at different code points. The version number cannot be changed from the system.

Figure 296 (Page 1 of 2). 391x-Supported Code Pages

Code Pages	Character Set ID (GCSGID)	Country or Name
037/0 037/1	697	United States Canada Netherlands Portugal
038	103, 697	US ASCII-L
256	337	International # 1
259	340	Symbols Set 7
260	341, 697	Canada (French)
273/0 273/1	697	Austria Germany
274/0 274/1	697	Belgium
276	277	Canada (French) DP 94
277/0 277/1	697	Denmark Norway
278/0 278/1	697	Finland Sweden
280/0 280/1	697	Italy
281/0 281/1	697	Japan (Latin)
284/0 284/1	697	Spain Latin America
285/0 285/1	697	United Kingdom
286	317	Alternate (3270) Austria Germany
287	321	Alternate (3270) Denmark Norway
288	325	Alternate (3270) Finland Sweden
289	329	Alternate (3270) Spain
297/0 297/1	697	France
310	963	Graphic Escape APL/TN

<i>Figure 296 (Page 2 of 2). 391x-Supported Code Pages</i>		
<b>Code Pages</b>	<b>Character Set ID (GCSGID)</b>	<b>Country or Name</b>
367	103	ASCII
500/0 500/1	697	International # 5 Belgium as New Belgium Switzerland
871/0 871/1	697	Iceland
892	968	OCR A
893	969	OCR B
1002	1132	DCF Release 2
1303	1454	Code 128 Character Set (Bar Code)

### **391x Font Card Code Pages**

The following code pages are supported only in font cards:

<i>Figure 297. Code Pages Supported in 391x Font Cards</i>		
<b>Code Page ID</b>	<b>Character Set ID</b>	<b>Country or Name</b>
290	1172	Katakana (Japan)
293	380	APL (USA)
420	235	Arabic
423	218	Greek
875	925	Greek
424/2	941	Hebrew (Israel)
803	1147	Hebrew (Israel)
870	959	Roece—Latin 2 and Yugoslav
880	960	Roece—Cyrillic
905	965	Turkey
1026	1152	Turkey



## Fonts Resident in the 4028 Printer

In addition to supporting single-byte downloaded raster fonts, the 4028 uses resident fonts stored in the printer, in addition to resident fonts provided on IBM LaserPrinter Font Cards, which must be ordered separately.

### Raster Fonts for Marking 4028 Resident Fonts

The following are raster fonts you can mark to identify fonts resident in the 4028 printer. Although the 4028 fonts are shipped already marked, on MVS you can use the APSW4028 APSRMARK job to mark any that are not already marked.

Figure 298. Raster Fonts for the 4028 Printer

Typeface and Pitch	Point	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Boldface Italic PS	12	009B	0155	0078	0120	C0S0BITR
Boldface PS	12	009F	0159	0078	0120	C0S0BRTR
Courier Italic 10	12	0012	0018	0090	0144	C0S0CI10
Courier 10	12	000B	0011	0090	0144	C0S0CR10
Courier 12	10	0055	0085	0078	0120	C0S0CR12 C0S0CE12
Essay Italic PS	12	00A2	0162	0078	0120	C0S0EITR
Essay PS	12	00A0	0160	0078	0120	C0S0ESTR
Katakana 10	12	0015	0021	0090	0144	C0L0KATA
Letter Gothic Bold 12	12	006E	0110	0078	0120	C0S0LB12
Letter Gothic 12	12	0057	0087	0078	0120	C0S0LR12
OCR A 10	12	0013	0019	0090	0144	C0L00AOA
OCR B 10	12	0003	0003	0090	0144	C0L00BOA
Orator 10	14	0005	0005	0090	0144	C0S0OR10
Prestige Bold 12	10	006F	0111	0078	0120	C0S0PB12
Prestige Italic 12	10	0070	0112	0078	0120	C0S0PI12
Prestige 12	10	0056	0086	0078	0120	C0S0PR12

## 4028 Font Metrics

Following are the 4028 Font Metrics, which contain metric values corresponding to those found in the 4028 resident fonts. Using the 4028 Font Metrics, you can format text on the host and print the formatted text on the 4028. 4028 Font Metrics contain all the information needed for formatting text, but they do not contain the characters themselves, nor can they be downloaded.

Figure 299 (Page 1 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Adjutant	005F	0095	0078	0120	C0E0AJ12
Adjutant Symbol	005F	0095	0078	0120	C0E0AJER
APL	004C	0076	0078	0120	C0E0AP12
Baskerville 12pt	2137	8503	0050	0080	C0E20BB0
Baskerville 10pt	2137	8503	0043	0067	C0E20B00
Baskerville 8pt	2137	8503	0035	0053	C0E20B80
Baskerville 6pt	2137	8503	0028	0040	C0E20B60
Baskerville Bold 18pt	214B	8523	0078	0120	C0E40BH0
Baskerville Bold 14pt	214B	8523	005D	0093	C0E40BD0
Baskerville Bold 10pt	214B	8523	0043	0067	C0E40B00
Baskerville Bold Italic 10pt	21CB	8651	0043	0067	C0E50B00
Baskerville Italic 10pt	21B7	8631	0043	0067	C0E30B00
Baskerville Nasseem 12pt	02F0	0752	0050	0080	C0E20NB0
Baskerville Nasseem Bold 12pt	02F1	0753	0050	0080	C0E40NB0
Baskerville Nasseem Bold 18pt	02F2	0754	0078	0120	C0E40NH0
Baskerville Nasseem Bold 24pt	02F3	0755	00A0	0160	C0E40NN0
Baskerville Nasseem Bold Italic 12pt	02F5	0757	0050	0080	C0E50NB0
Baskerville Nasseem Bold Italic 18pt	02F6	0758	0078	0120	C0E50NH0
Baskerville Nasseem Bold Italic 24pt	02F7	0759	00A0		C0E50NN0
Baskerville Nasseem Italic 12pt	02F4	0756	0050	0080	C0E30NB0
Boldface PS 12pt	009F	0159	0078	0120	C0E0BRTR
Boldface Barak	00A7	0167	0078	0120	C0E0BKTR
Boldface Cyrillic	009F	0159	0078	0120	C0E0BRRQ
Boldface Greek 12pt	009B	0155	0078	0120	C0E0BIRN
Boldface Greek 12pt	009F	0159	0078	0120	C0E0BRRN
Boldface Greek 183 12pt	009B	0155	0078	0120	C0E0BIRK
Boldface Greek 183 12pt	009F	0159	0078	0120	C0E0BRRK
Boldface Italic 12pt	009B	0155	0078	0120	C0E0BITR
Boldface Latin3 12pt	009F	0159	0078	0120	C0E0BRRG

Figure 299 (Page 2 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Boldface Latin5 12pt	009F	0159	0078	0120	C0E0BRRH
Boldface Nasseem 12pt	02F1	0753	0078	0120	C0E0BNTR
Boldface Symbol 10pt	009B	0155	0078	0120	C0E0BIRR
Boldface Symbol 10pt	009F	0159	0078	0120	C0E0BRRR
Century Schoolbook 12pt	4237	16951	0050	0080	C0E20CB0
Century Schoolbook 10pt	4237	16951	0043	0067	C0E20C00
Century Schoolbook 8pt	4237	16951	0035	0053	C0E20C80
Century Schoolbook 6pt	4237	16951	0028	0040	C0E20C60
Century Schoolbook Bold 18pt	424B	16971	0078	0120	C0E40CH0
Century Schoolbook Bold 14pt	424B	16971	005D	0093	C0E40CD0
Century Schoolbook Bold 10pt	424B	16971	0043	0067	C0E40C00
Century Schoolbook Italic	42B7	17079	0043	0067	C0E30C00
Century Schoolbook Bold Italic	42CB	17099	0043	0067	C0E50C00
Courier 10	000B	0011	0090	0144	C0E0CR10
Courier 17.1	00FE	0254	0054	0084	C0E0CR17
Courier 15	00DF	0223	0060	0096	C0E0CR15
Courier Bold	002E	0046	0090	0144	C0E0CB10
Courier Cyrillic 10 12pt	000B	0011	0090	0144	C0E0CR0Q
Courier Cyrillic	0055	0085	0078	0120	C0E0CREQ
Courier Greek 10 12pt	000B	0011	0090	0144	C0E0CR0N
Courier Greek	00DF	0223	0060	0096	C0E0CR5N
Courier Greek 183	000B	0011	0090	0144	C0E0CR0K
Courier Greek 183	00DF	0223	0060	0096	C0E0CR5K
Courier Italic 10 12pt	0012	0018	0090	0144	C0E0CI10
Courier Italic	005C	0092	0078	0120	C0E0CI12
Courier Italic Symbol	005C	0092	0078	0120	C0E0CIER
Courier Latin2	00FE	0254	0054	0084	C0E0CR7F
Courier Latin2	0055	0085	0078	0120	C0E0CREF
Courier Latin2 10 12pt	000B	0011	0090	0144	C0E0CR0F
Courier Latin3 10 12pt	000B	0011	0090	0144	C0E0CR0G
Courier Latin3	0055	0085	0078	0120	C0E0CREG
Courier Latin3	00DF	0223	0060	0096	C0E0CR5G
Courier Latin3	00FE	0254	0054	0084	C0E0CR7G
Courier Latin5	0055	0085	0078	0120	C0E0CREH
Courier Latin5 10 12pt	000B	0011	0090	0144	C0E0CR0H
Courier Latin5	00DF	0223	0060	0096	C0E0CR5H
Courier Latin5	00FE	0254	0054	0084	C0E0CR7H

Figure 299 (Page 3 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Courier Nasseem	0067	0103	0078	0120	C0E0NR12
Courier Nasseem	00D5	0213	0060	0096	C0E0NR15
Courier Nasseem	010A	0266	00B6	0182	C0E0NB08
Courier Nasseem	010B	0267	00B6	0182	C0E0NM08
Courier Nasseem	0117	0279	0054	0084	C0E0NR17
Courier Nasseem Italic	0068	0104	0078	0120	C0E0NI12
Courier Nasseem 10	003D	0061	0090	0144	C0E0NR10
Courier Nasseem 10 Bold	003F	0063	0090	0144	C0E0NB10
Courier Nasseem 10 Italic	003E	0062	0090	0144	C0E0NI10
Courier Nasseem 10 Italic Bold	0040	0064	0090	0144	C0E0NM10
Courier Shalom	0062	0098	0078	0120	C0E0HR12
Courier Shalom	0031	0049	0090	0144	C0E0HR10
Courier Shalom	00E2	0226	0060	0096	C0E0HR15
Courier Shalom Bold	0032	0050	0090	0144	C0E0HB10
Courier Symbol	00FE	0254	0054	0084	C0E0CR7R
Courier Symbol	00DF	0223	0060	0096	C0E0CR5R
Courier Symbol	0055	0085	0078	0120	C0E0CRER
Courier Symbol 10 12pt	000B	0011	0090	0144	C0E0CR0R
Courier Symbol	006C	0108	0078	0120	C0E0CBER
Courier Symbol Bold	002E	0046	0090	0144	C0E0CB0R
Courier Symbol Italic	0012	0018	0090	0144	C0E0CI0R
Courier 12	0055	0085	0078	0120	C0E0CR12
Cursive Bold Italic	A34B	41803	0078	0120	C0E50SH0
Cursive Bold Italic	A34B	41803	005D	0093	C0E50SD0
Cursive Italic	A337	41783	0050	0080	C0E30SB0
Cyrillic 22 10 12pt	000A	0010	0090	0144	C0E0CY10
Cyrillic 22 Symbol 10 12pt	000A	0010	0090	0144	C0E0CY0R
Delegate	0002	0002	0090	0144	C0E0DE10
Delegate Symbol	0002	0002	0090	0144	C0E0DE0R
Engravers' Old English	9237	37431	0078	0120	C0E20EH0
Engravers' Old English	9237	37431	005D	0093	C0E20ED0
Engravers' Old English	9237	37431	0050	0080	C0E20EB0
Essay	00A0	0160	0078	0120	C0E0ESTR
Essay Italic	00A2	0162	0078	0120	C0E0EITR
Essay Symbol	00A0	0160	0078	0120	C0E0ESRR
Essay Symbol Italic	00A2	0162	0078	0120	C0E0EIRR
Foundry	00BE	0190	0078	0120	C0E0FRTR

Figure 299 (Page 4 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Foundry Bold	00BF	0191	0078	0120	C0E0FBTR
Foundry Bold Italic	00C3	0195	0078	0120	C0E0FMTR
Foundry Italic	00C2	0194	0078	0120	C0E0FITR
Foundry Symbol	00C3	0195	0078	0120	C0E0FMRR
Foundry Symbol	00BE	0190	0078	0120	C0E0FRRR
Foundry Symbol Bold	00BF	0191	0078	0120	C0E0FBRR
Foundry Symbol Italic	00C2	0194	0078	0120	C0E0FIRR
Futura Book	8337	33591	0050	0080	C0E20FB0
Futura Book	8337	33591	0043	0067	C0E20F00
Futura Book	8337	33591	0035	0053	C0E20F80
Futura Book	8337	33591	0028	0040	C0E20F60
Futura Book Italic	83B7	33719	0043	0067	C0E30F00
Futura Heavy	8341	33601	0078	0120	C0E40FH0
Futura Heavy	8341	33601	005D	0093	C0E40FD0
Futura Heavy	8341	33601	0043	0067	C0E40F00
Futura Heavy Italic Bold	83C1	33729	0043	0067	C0E50F00
Gothic Nasseem	011B	0283	0048	0072	C0E0GN20
Goudy Old Style	1337	4919	0050	0080	C0E20GB0
Goudy Old Style	1337	4919	0043	0067	C0E20G00
Goudy Old Style	1337	4919	0035	0053	C0E20G80
Goudy Old Style	1337	4919	0028	0040	C0E20G60
Goudy Old Style Bold	134B	4939	0078	0120	C0E40GH0
Goudy Old Style Bold	134B	4939	005D	0093	C0E40GD0
Goudy Old Style Bold	134B	4939	0043	0067	C0E40G00
Goudy Old Style Bold Italic	13CB	5067	0043	0067	C0E50G00
Goudy Old Style Italic	13B7	5047	0043	0067	C0E30G00
Helvetica	8537	34103	0050	0080	C0E20HB0
Helvetica	8537	34103	0043	0067	C0E20H00
Helvetica	8537	34103	0035	0053	C0E20H80
Helvetica	8537	34103	0028	0040	C0E20H60
Helvetica Bold	854B	34123	0078	0120	C0E40HH0
Helvetica Bold	854B	34123	005D	0093	C0E40HD0
Helvetica Bold	854B	34123	0043	0067	C0E40H00
Helvetica Bold italic	85CB	34251	0043	0067	C0E50H00
Helvetica Italic	85B7	34231	0043	0067	C0E30H00
Katakana	00F9	0249	0054	0084	C0E0KA17
Katakana 10	0015	0021	0090	0144	C0E0KA10

Figure 299 (Page 5 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Katakana 12	004E	0078	0078	0120	C0E0KA12
Letter Gothic	00FF	0255	0054	0084	C0E0LR17
Letter Gothic	0119	0281	0048	0072	C0E0LR20
Letter Gothic	011D	0285	0038	0056	C0E0LR25
Letter Gothic	00DE	0222	0060	0096	C0E0LR15
Letter Gothic	0024	0036	0090	0144	C0E0LR10
Letter Gothic	0057	0087	0078	0120	C0E0LR12
Letter Gothic Aviv	011A	0282	0048	0072	C0E0LV20
Letter Gothic Bold	006E	0110	0078	0120	C0E0LB12
Letter Gothic Cyrillic	0057	0087	0078	0120	C0E0LREQ
Letter Gothic Greek	0057	0087	0078	0120	C0E0LREN
Letter Gothic Greek	006E	0110	0078	0120	C0E0LBEK
Letter Gothic Greek 183	0057	0087	0078	0120	C0E0LREK
Letter Gothic Greek 183	006E	0110	0078	0120	C0E0LBEN
Letter Gothic Italic	006D	0109	0078	0120	C0E0LI12
Letter Gothic Latin2	0057	0087	0078	0120	C0E0LREF
Letter Gothic Latin3	0057	0087	0078	0120	C0E0LREG
Letter Gothic Latin5	0057	0087	0078	0120	C0E0LREH
Letter Gothic Symbol	0057	0087	0078	0120	C0E0LRER
Letter Gothic Symbol	0057	0087	0078	0120	C0E0LRSR
Letter Gothic Symbol	006D	0109	0078	0120	C0E0LISR
Letter Gothic Symbol	006E	0110	0078	0120	C0E0LBSR
Letter Gothic Symbol	00DE	0222	0060	0096	C0E0LR5R
Letter Gothic Symbol	00FF	0255	0054	0084	C0E0LR7R
Letter Gothic Symbol	0119	0281	0048	0072	C0E0LRFR
Light Italic	005B	0091	0078	0120	C0E0LT12
Light Italic Symbol	005B	0091	0078	0120	C0E0LTER
Modern	009E	0158	0078	0120	C0E0MRTR
Modern Symbol	009E	0158	0078	0120	C0E0MRRR
OCR A	0013	0019	0090	0144	C0E0OCRA
OCR B	0003	0003	0090	0144	C0E0OCRB
Olde World	0060	0096	0078	0120	C0E0WB12
Optima	8237	33335	0050	0080	C0E20OB0
Optima	8237	33335	0043	0067	C0E20O00
Optima	8237	33335	0035	0053	C0E20O80
Optima	8237	33335	0028	0040	C0E20O60
Optima Bold	824B	33355	0078	0120	C0E40OH0

Figure 299 (Page 6 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Optima Bold	824B	33355	005D	0093	C0E40OD0
Optima Bold	824B	33355	0043	0067	C0E40O00
Optima Bold Italic	82CB	33483	0043	0067	C0E50O00
Optima Italic	82B7	33463	0043	0067	C0E30O00
Orator 10 14pt	0005	0005	0090	0144	C0E0OR10
Orator Bold	01B2	0434	00B1	0177	C0E0OB08
Orator Bold	01B3	0435	00DD	0221	C0E0OB06
Palatino	1837	6199	0050	0080	C0E20PB0
Palatino	1837	6199	0043	0067	C0E20P00
Palatino	1837	6199	0035	0053	C0E20P80
Palatino	1837	6199	0028	0040	C0E20P60
Palatino Bold	184B	6219	0078	0120	C0E40PH0
Palatino Bold	184B	6219	005D	0093	C0E40PD0
Palatino Bold	184B	6219	0043	0067	C0E40P00
Palatino Bold Italic	18CB	6347	0043	0067	C0E50P00
Palatino Italic	18B7	6327	0043	0067	C0E30P00
Presentor	0019	0025	0090	0144	C0E0PS10
Press Roman	00BA	0186	0078	0120	C0E0RRTR
Press Roman Bold	00BB	0187	0078	0120	C0E0RBTR
Press Roman Bold Italic	00BD	0189	0078	0120	C0E0RMTR
Press Roman Italic	00BC	0188	0078	0120	C0E0RITR
Press Roman Symbol	00BA	0186	0078	0120	C0E0RRRR
Press Roman Symbol	00BD	0189	0078	0120	C0E0RMRR
Press Roman Symbol Bold	00BB	0187	0078	0120	C0E0RBRR
Press Roman Symbol Italic	00BC	0188	0078	0120	C0E0RIRR
Prestige	00A4	0164	0078	0120	C0E0PRTR
Prestige	00DD	0221	0060	0096	C0E0PR15
Prestige	0100	0256	0054	0084	C0E0PR17
Prestige Elite	0056	0086	0078	0120	C0E0PR12
Prestige Elite Bold	006F	0111	0078	0120	C0E0PB12
Prestige Elite Cyrillic	0056	0086	0078	0120	C0E0PREQ
Prestige Elite Italic	0070	0112	0078	0120	C0E0PI12
Prestige Elite Latin2	0056	0086	0078	0120	C0E0PREF
Prestige Elite Latin3	0056	0086	0078	0120	C0E0PREG
Prestige Elite Latin5	0056	0086	0078	0120	C0E0PREH
Prestige Elite Symbol	0056	0086	0078	0120	C0E0PRER
Prestige Elite Symbol	006F	0111	0078	0120	C0E0PBER

Figure 299 (Page 7 of 7). 4028 Font Metrics

Typeface, Pitch, and Point (if needed)	FGID HEX	FGID DEC	FW HEX	FW DEC	Font Character Set
Prestige Elite Symbol	0070	0112	0078	0120	C0E0PIER
Prestige Pica 10 12pt	000C	0012	0090	0144	C0E0PR10
Prestige Pica Latin3 10 12pt	000C	0012	0090	0144	C0E0PR0G
Prestige Pica Latin5 10 12pt	000C	0012	0090	0144	C0E0PR0H
Prestige Pica Symbol 10 12pt	000C	0012	0090	0144	C0E0PR0R
Prestige Symbol	00A4	0164	0078	0120	C0E0PRRR
Prestige Symbol	00DD	0221	0060	0096	C0E0PR5R
Prestige Symbol	0100	0256	0054	0084	C0E0PR7R
Script Italic	0054	0084	0078	0120	C0E0SR12
Testimonial 18pt	1737	5943	0078	0120	C0E20MH0
Testimonial 14pt	1737	5943	005D	0093	C0E20MD0
Testimonial 12pt	1737	5943	0050	0080	C0E20MB0
Times Roman	1637	5687	0050	0080	C0E20TB0
Times Roman	1637	5687	0043	0067	C0E20T00
Times Roman	1637	5687	0035	0053	C0E20T80
Times Roman	1637	5687	0028	0040	C0E20T60
Times Roman Bold	164B	5707	00A0	0160	C0E40TN0
Times Roman Bold	164B	5707	0078	0120	C0E40TH0
Times Roman Bold	164B	5707	005D	0093	C0E40TD0
Times Roman Bold	164B	5707	0050	0080	C0E40TB0
Times Roman Bold	164B	5707	0043	0067	C0E40T00
Times Roman Bold Italic	16CB	5835	0050	0080	C0E50TB0
Times Roman Bold Italic	16CB	5835	0043	0067	C0E50T00
Times Roman Italic	16B7	5815	0050	0080	C0E30TB0
Times Roman Italic	16B7	5815	0043	0067	C0E30T00
Times Roman Narkissm	3237	12855	0050	0080	C0E20KB0
Times Roman Narkissm	3237	12855	0043	0067	C0E20K00
Times Roman Narkissm	3237	12855	0035	0053	C0E20K80
Times Roman Narkissm Bold	324B	12875	00A0	0160	C0E40KN0
Times Roman Narkissm Bold	324B	12875	0078	0120	C0E40KH0
Times Roman Narkissm Bold	324B	12875	0050	0080	C0E40KB0
Times Roman Narkissm Bold	324B	12875	0043	0067	C0E40K00
Times Roman Narkissm Bold	324B	12875	0035	0053	C0E40K80
Title PS 12pt	009D	0157	0078	0120	C0E0TBTR
Title Latin2 PS 12pt	009D	0157	0078	0120	C0E0TBRF
Title Symbol PS 10pt	009D	0157	0078	0120	C0E0TBRR



## 4028 Font Metrics in Ascending FGID Order

Figure 300 contains the 4028 Font Metrics, some of which are resident, and some of which are located on font cards. In the table, the FGID DEC column indicates values that correspond to the values identified on the IBM LaserPrinter Font Card and in *IBM Supplies/Options Catalog for the IBM LaserPrinter 4028*.

Figure 300 (Page 1 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Delegate 10	RM	12	2	C0E0DE10	T1V10500	X0E0DE09	1255804
Delegate 10	RM	12	2	C0E0DE10	T1001002	X0E0DE0E	1255804
Delegate Symbol 10	RM	12	2	C0E0DE0R	T1000259	X0E0DE0R	1049454
OCR B 10	RM	12	3	C0E0OCRB	T1000893	X0E0OCRB	Resident
Orator 10	RM	14	5	C0E0OR10	T1V10500	X0E0OR09	1255806
Orator 10	RM	14	5	C0E0OR10	T1001002	X0E0OR0E	1255806
Cyrillic 22 10	RL	12	10	C0E0CY10	T1000880	X0E0CY0Q	1255817
Cyrillic 22 Symbol 10	RL	12	10	C0E0CY0R	T1000259	X0E0CY0R	1049454
Courier Symbol 10	RM	12	11	C0E0CR0R	T1000259	X0E0CR0R	1049454
Courier Greek 183 10	RM	12	11	C0E0CR0K	T1000423	X0E0CR0K	1049453
Courier Latin2 10	RM	12	11	C0E0CR0F	T1000870	X0E0CR0F	1255816
Courier Greek 10	RM	12	11	C0E0CR0N	T1000875	X0E0CR0N	1049453
Courier Cyrillic 10	RM	12	11	C0E0CR0Q	T1000880	X0E0CR0Q	1255817
Courier Latin3 10	RM	12	11	C0E0CR0G	T1000905	X0E0CR0G	1255810
Courier Latin5 10	RM	12	11	C0E0CR0H	T1001026	X0E0CR0H	1255810
Courier 10	RM	12	11	C0E0CR10	T1V10500	X0E0CR09	Resident
Courier 10	RM	12	11	C0E0CR10	T1001002	X0E0CR0E	Resident
Prestige Pica 10	RM	12	12	C0E0PR10	T1V10500	X0E0PR09	Resident
Prestige Pica 10	RM	12	12	C0E0PR10	T1001002	X0E0PR0E	Resident
Prestige Pica Symbol 10	RM	12	12	C0E0PR0R	T1000259	X0E0PR0R	1049454
Prestige Pica Latin3 10	RM	12	12	C0E0PR0G	T1000905	X0E0PR0G	1255810
Prestige Pica Latin5 10	RM	12	12	C0E0PR0H	T1001026	X0E0PR0H	1255810
Courier 10	IM	12	18	C0E0CI10	T1V10500	X0E0CI09	Resident
Courier 10	IM	12	18	C0E0CI10	T1001002	X0E0CI0E	Resident
Courier Symbol 10	IM	12	18	C0E0CI0R	T1000259	X0E0CI0R	1049454
OCR A 10	RM	12	19	C0E0OCRA	T1000892	X0E0OCRA	Resident
Katakana 10	RM	12	21	C0E0KA10	T1V10290	X0E0KA0P	1255814
Presentor 10	RM	14	25	C0E0PS10	T1V10500	X0E0PS09	1255800
Presentor 10	RM	14	25	C0E0PS10	T1001002	X0E0PS0E	1255800
Letter Gothic 10	RM	14	36	C0E0LR10	T1V10500	X0E0LR09	1255803
Letter Gothic 10	RM	14	36	C0E0LR10	T1001002	X0E0LR0E	1255803
Courier 10	RB	12	46	C0E0CB10	T1V10500	X0E0CB09	Resident
Courier 10	RB	12	46	C0E0CB10	T1001002	X0E0CB0E	Resident
Courier Symbol 10	RB	12	46	C0E0CB0R	T1000259	X0E0CB0R	1049454
Courier Shalom 10	RM	12	49	C0E0HR10	T1000424	X0E0HR0L	1255811
Courier Shalom 10	RM	12	49	C0E0HR10	T1000803	X0E0HR0M	1255811
Courier Shalom 10	RB	12	50	C0E0HB10	T1000424	X0E0HB0L	1255811

Figure 300 (Page 2 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Courier Shalom 10	RB	12	50	C0E0HB10	T1000803	X0E0HB0M	1255811
Courier Nasseem 10	RM	12	61	C0E0NR10	T1000420	X0E0NR0J	1049450
Courier Nasseem 10	IM	12	62	C0E0NI10	T1000420	X0E0NI0J	1049450
Courier Nasseem 10	RB	12	63	C0E0NB10	T1000420	X0E0NB0J	1049450
Courier Nasseem 10	IB	12	64	C0E0NM10	T1000420	X0E0NM0J	1049450
APL 12	RM	10	76	C0E0AP12	T1000310	X0E0APET	1255805
APL 12	RM	10	76	C0E0AP12	T1000293	X0E0APES	1255805
Katakana 12	RM	12	78	C0E0KA12	T1V10290	X0E0KAEP	1255814
Script 12	IM	10	84	C0E0SR12	T1V10500	X0E0SRE9	1255805
Script 12	IM	10	84	C0E0SR12	T1001002	X0E0SREE	1255805
Courier 12	RM	10	85	C0E0CR12	T1V10500	X0E0CRE9	Resident
Courier 12	RM	10	85	C0E0CR12	T1001002	X0E0CREE	Resident
Courier Symbol 12	RM	10	85	C0E0CRER	T1000259	X0E0CRER	1049454
Courier Latin2 12	RM	10	85	C0E0CREP	T1000870	X0E0CREP	1255816
Courier Cyrillic 12	RM	10	85	C0E0CREQ	T1000880	X0E0CREQ	1255817
Courier Latin3 12	RM	10	85	C0E0CREG	T1000905	X0E0CREG	1255810
Courier Latin5 12	RM	10	85	C0E0CREH	T1001026	X0E0CREH	1255810
Prestige Elite 12	RM	10	86	C0E0PR12	T1V10500	X0E0PRE9	Resident
Prestige Elite Latin2 12	RM	10	86	C0E0PREP	T1000870	X0E0PREP	1255816
Prestige Elite Cyrillic 12	RM	10	86	C0E0PREQ	T1000880	X0E0PREQ	1255817
Prestige Elite Latin3 12	RM	10	86	C0E0PREG	T1000905	X0E0PREG	1255810
Prestige Elite Latin5 12	RM	10	86	C0E0PREH	T1001026	X0E0PREH	1255810
Prestige Elite 12	RM	10	86	C0E0PR12	T1001002	X0E0PREE	Resident
Prestige Elite Symbol 12	RM	10	86	C0E0PRER	T1000259	X0E0PRER	1049454
Letter Gothic 12	RM	12	87	C0E0LR12	T1V10500	X0E0LRE9	1255803
Letter Gothic 12	RM	12	87	C0E0LR12	T1001002	X0E0LREE	1255803
Letter Gothic Symbol 12	RM	12	87	C0E0LRER	T1000259	X0E0LRER	1255800
Letter Gothic Symbol 12	RM	10	87	C0E0LRSR	T1000259	X0E0LRSR	1049454
Letter Gothic Greek 183 12	RM	12	87	C0E0LREK	T1000423	X0E0LREK	1049453
Letter Gothic Latin2 12	RM	12	87	C0E0LREF	T1000870	X0E0LREF	1255816
Letter Gothic Cyrillic 12	RM	12	87	C0E0LREQ	T1000880	X0E0LREQ	1255817
Letter Gothic Greek 12	RM	12	87	C0E0LREN	T1000875	X0E0LREN	1049453
Letter Gothic Latin3 12	RM	12	87	C0E0LREG	T1000905	X0E0LREG	1255810
Letter Gothic Latin5 12	RM	12	87	C0E0LREH	T1001026	X0E0LREH	1255810
Light Italic 12	IS	10	91	C0E0LT12	T1V10500	X0E0LTE9	1255807
Light Italic 12	IS	10	91	C0E0LT12	T1001002	X0E0LTEE	1255807
Light Italic Symbol 12	IM	10	91	C0E0LTER	T1000259	X0E0LTER	1049454
Courier 12	IM	10	92	C0E0CI12	T1V10500	X0E0CIE9	Resident
Courier 12	IM	10	92	C0E0CI12	T1001002	X0E0CIEE	Resident
Courier Symbol 12	IM	10	92	C0E0CIER	T1000259	X0E0CIER	1049454
Adjutant 12	RM	10	95	C0E0AJ12	T1V10500	X0E0AJE9	1255804
Adjutant 12	RM	10	95	C0E0AJ12	T1001002	X0E0AJEE	1255804

Figure 300 (Page 3 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Adjutant Symbol 12	RM	10	95	C0E0AJER	T1000259	X0E0AJER	1049454
Olde World 12	RB	10	96	C0E0WB12	T1V10500	X0E0WBE9	1255805
Olde World 12	RB	10	96	C0E0WB12	T1001002	X0E0WBEE	1255805
Courier Shalom 12	RM	10	98	C0E0HR12	T1000424	X0E0HREL	1255811
Courier Shalom 12	RM	10	98	C0E0HR12	T1000803	X0E0HREM	1255811
Courier Nasseem 12	RM	10	103	C0E0NR12	T1000420	X0E0NREJ	1049450
Courier Nasseem 12	IM	10	104	C0E0NI12	T1000420	X0E0NIEJ	1049450
Courier Symbol 12	RB	10	108	C0E0CBER	T1000259	X0E0CBER	1049454
Letter Gothic 12	IM	12	109	C0E0LI12	T1V10500	X0E0LIE9	1255803
Letter Gothic 12	IM	12	109	C0E0LI12	T1001002	X0E0LIEE	1255803
Letter Gothic Symbol 12	IM	10	109	C0E0LISR	T1000259	X0E0LISR	1049454
Letter Gothic 12	RB	12	110	C0E0LB12	T1V10500	X0E0LBE9	1255803
Letter Gothic 12	RB	12	110	C0E0LB12	T1001002	X0E0LBEE	1255803
Letter Gothic Symbol 12	RB	10	110	C0E0LBSR	T1000259	X0E0LBSR	1049454
Letter Gothic Greek 183 12	RB	12	110	C0E0LBEK	T1000423	X0E0LBEK	1049453
Letter Gothic Greek 12	RB	12	110	C0E0LBEN	T1000875	X0E0LBEN	1049453
Prestige Elite 12	RB	10	111	C0E0PB12	T1V10500	X0E0PBE9	Resident
Prestige Elite 12	RB	10	111	C0E0PB12	T1001002	X0E0PBEE	Resident
Prestige Elite Symbol 12	RB	10	111	C0E0PBER	T1000259	X0E0PBER	1049454
Prestige Elite 12	IM	10	112	C0E0PI12	T1V10500	X0E0PIE9	Resident
Prestige Elite 12	IM	10	112	C0E0PI12	T1001002	X0E0PIEE	Resident
Prestige Elite Symbol 12	IM	10	112	C0E0PIER	T1000259	X0E0PIER	1049454
Boldface PS	IS	12	155	C0E0BITR	T1V10500	X0E0BIR9	1255801
Boldface PS	IS	12	155	C0E0BITR	T1001002	X0E0BIRE	1255801
Boldface Symbol PS	IB	10	155	C0E0BIRR	T1000259	X0E0BIRR	1049454
Boldface Greek 183 PS	IS	12	155	C0E0BIRK	T1000423	X0E0BIRK	1049453
Boldface Greek PS	IS	12	155	C0E0BIRN	T1000875	X0E0BIRN	1049453
Title PS	RB	12	157	C0E0TBTR	T1V10500	X0E0TBR9	1255805
Title PS	RB	12	157	C0E0TBTR	T1001002	X0E0TBRE	1255805
Title Symbol PS	RB	10	157	C0E0TBRR	T1000259	X0E0TBRR	1049454
Title Latin2 PS	RB	12	157	C0E0TBRF	T1000870	X0E0TBRF	1255816
MODERN PS	RM	12	158	C0E0MRTR	T1V10500	X0E0MRR9	1255804
Modern PS	RM	12	158	C0E0MRTR	T1001002	X0E0MRRE	1255804
Modern Symbol PS	RM	10	158	C0E0MRRR	T1000259	X0E0MRRR	1049454
Boldface PS	RS	12	159	C0E0BRTR	T1V10500	X0E0BRR9	Resident
Boldface PS	RS	12	159	C0E0BRTR	T1001002	X0E0BRRE	Resident
Boldface Symbol PS	RB	10	159	C0E0BRRR	T1000259	X0E0BRRR	1049454
Boldface Greek 183 PS	RS	12	159	C0E0BRRK	T1000423	X0E0BRRK	1049453
Boldface Greek PS	RS	12	159	C0E0BRRN	T1000875	X0E0BRRN	1049453
Boldface Cyrillic PS	RS	12	159	C0E0BRRQ	T1000880	X0E0BRRQ	1255817
Boldface Latin3 PS	RS	12	159	C0E0BRRG	T1000905	X0E0BRRG	1255810
Boldface Latin5 PS	RS	12	159	C0E0BRRH	T1001026	X0E0BRRH	1255810

Figure 300 (Page 4 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Essay PS	RM	12	160	C0E0ESTR	T1V10500	X0E0ESR9	1255804
Essay PS	RM	12	160	C0E0ESTR	T1001002	X0E0ESRE	1255804
Essay Symbol PS	RM	10	160	C0E0ESRR	T1000259	X0E0ESRR	1049454
Essay PS	IM	12	162	C0E0EITR	T1V10500	X0E0EIR9	1255804
Essay PS	IM	12	162	C0E0EITR	T1001002	X0E0EIRE	1255804
Essay Symbol PS	IM	10	162	C0E0EIRR	T1000259	X0E0EIRR	1049454
Prestige PS	RM	12	164	C0E0PRTR	T1V10500	X0E0PRR9	Resident
Prestige PS	RM	12	164	C0E0PRTR	T1001002	X0E0PRRE	Resident
Prestige Symbol PS	RM	10	164	C0E0PRRR	T1000259	X0E0PRRR	1049454
Boldface Barak PS	RM	12	167	C0E0BKTR	T1000424	X0E0BKRL	1255811
Boldface Barak PS	RM	12	167	C0E0BKTR	T1000803	X0E0BKRM	1255811
Press Roman PS	RM	10	186	C0E0RRTR	T1V10500	X0E0RRR9	1255808
Press Roman PS	RM	10	186	C0E0RRTR	T1001002	X0E0RRRE	1255808
Press Roman Symbol PS	RM	10	186	C0E0RRRR	T1000259	X0E0RRRR	1049454
Press Roman PS	RB	10	187	C0E0RBTR	T1V10500	X0E0RBR9	1255808
Press Roman PS	RB	10	187	C0E0RBTR	T1001002	X0E0RBRE	1255808
Press Roman Symbol PS	RB	10	187	C0E0RBRR	T1000259	X0E0RBRR	1049454
Press Roman PS	IM	10	188	C0E0RITR	T1V10500	X0E0RIR9	1255808
Press Roman PS	IM	10	188	C0E0RITR	T1001002	X0E0RIRE	1255808
Press Roman Symbol PS	IM	10	188	C0E0RIRR	T1000259	X0E0RIRR	1049454
Press Roman PS	IB	10	189	C0E0RMTR	T1V10500	X0E0RMR9	1255808
Press Roman PS	IB	10	189	C0E0RMTR	T1001002	X0E0RMRE	1255808
Press Roman Symbol PS	IB	10	189	C0E0RMRR	T1000259	X0E0RMRR	1049454
Foundry PS	RM	10	190	C0E0FRTR	T1V10500	X0E0FRR9	1255809
Foundry PS	RM	10	190	C0E0FRTR	T1001002	X0E0FRRE	1255809
Foundry Symbol PS	RM	10	190	C0E0FRRR	T1000259	X0E0FRRR	1255809
Foundry PS	RB	10	191	C0E0FBTR	T1V10500	X0E0FBR9	1255809
Foundry PS	RB	10	191	C0E0FBTR	T1001002	X0E0FBRE	1255809
Foundry Symbol PS	RB	10	191	C0E0FBRR	T1000259	X0E0FBRR	1049454
Foundry PS	IM	10	194	C0E0FITR	T1V10500	X0E0FIR9	1255809
Foundry PS	IM	10	194	C0E0FITR	T1001002	X0E0FIRE	1255809
Foundry Symbol PS	IM	10	194	C0E0FIRR	T1000259	X0E0FIRR	1049454
Foundry PS	IB	10	195	C0E0FMTR	T1V10500	X0E0FMR9	1255809
Foundry PS	IB	10	195	C0E0FMTR	T1001002	X0E0FMRE	1255809
Foundry Symbol PS	IB	10	195	C0E0FMRR	T1000259	X0E0FMRR	1049454
Courier Nasseem 15	RM	9	213	C0E0NR15	T1000420	X0E0NR5J	1049450
Prestige 15	RM	9	221	C0E0PR15	T1V10500	X0E0PR59	Resident
Prestige 15	RM	9	221	C0E0PR15	T1001002	X0E0PR5E	1049454
Prestige Symbol 15	RM	9	221	C0E0PR5R	T1000259	X0E0PR5R	1049454
Letter Gothic 15	RM	9	222	C0E0LR15	T1V10500	X0E0LR59	1255807

Figure 300 (Page 5 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Letter Gothic 15	RM	9	222	C0E0LR15	T1001002	X0E0LR5E	1255807 and 1049454
Letter Gothic Symbol 15	RM	9	222	C0E0LR5R	T1000259	X0E0LR5R	1049454
Courier 15	RM	9	223	C0E0CR15	T1V10500	X0E0CR59	Resident
Courier 15	RM	9	223	C0E0CR15	T1001002	X0E0CR5E	1049454
Courier Symbol 15	RM	9	223	C0E0CR5R	T1000259	X0E0CR5R	1049454
Courier Greek 183 15	RM	9	223	C0E0CR5K	T1000423	X0E0CR5K	1049453
Courier Greek 15	RM	9	223	C0E0CR5N	T1000875	X0E0CR5N	1049453
Courier Latin3 15	RM	9	223	C0E0CR5G	T1000905	X0E0CR5G	1255810
Courier Latin5 15	RM	9	223	C0E0CR5H	T1001026	X0E0CR5H	1255810
Courier Shalom 15	RM	9	226	C0E0HR15	T1000424	X0E0HR5L	1255811
Courier Shalom 15	RM	9	226	C0E0HR15	T1000803	X0E0HR5M	1255811
Katakana 17.1	RM	8.5	249	C0E0KA17	T1V10290	X0E0KA7P	1255814
Courier 17.1	RM	8.5	254	C0E0CR17	T1V10500	X0E0CR79	Resident
Courier 17.1	RM	8.5	254	C0E0CR17	T1001002	X0E0CR7E	1049454
Courier Symbol 17.1	RM	8.5	254	C0E0CR7R	T1000259	X0E0CR7R	1049454
Courier Latin2 17.1	RM	8.5	254	C0E0CR7F	T1000870	X0E0CR7F	1255816
Courier Latin3 17.1	RM	8.5	254	C0E0CR7G	T1000905	X0E0CR7G	1255810
Courier Latin5 17.1	RM	8.5	254	C0E0CR7H	T1001026	X0E0CR7H	1255810
Letter Gothic 17.1	RM	8.5	255	C0E0LR17	T1V10500	X0E0LR79	1255807
Letter Gothic 17.1	RM	8.5	255	C0E0LR17	T1001002	X0E0LR7E	1255807 and 1049454
Letter Gothic Symbol 17.1	RM	8.5	255	C0E0LR7R	T1000259	X0E0LR7R	1049454
Prestige 17.1	RM	8.5	256	C0E0PR17	T1V10500	X0E0PR79	Resident
Prestige 17.1	RM	8.5	256	C0E0PR17	T1001002	X0E0PR7E	1049454
Prestige Symbol 17.1	RM	8.5	256	C0E0PR7R	T1000259	X0E0PR7R	1049454
Courier Nasseem 7.9	RB	12	266	C0E0NB08	T1000420	X0E0NB08	1049450
Courier Nasseem 7.9	IB	12	267	C0E0NM08	T1000420	X0E0NM08	1049450
Courier Nasseem 17.1	RM	8.5	279	C0E0NR17	T1000420	X0E0NR17	1049450
Letter Gothic 20	RM	7.5	281	C0E0LR20	T1V10500	X0E0LRF9	Resident
Letter Gothic 20	RM	7.5	281	C0E0LR20	T1001002	X0E0LRF9	1049454
Letter Gothic Symbol 20	RM	7.5	281	C0E0LRF9	T1000259	X0E0LRF9	1049454
Letter Gothic Aviv 20	RM	7.5	282	C0E0LV20	T1000424	X0E0LVFL	1255811
Letter Gothic Aviv 20	RM	7.5	282	C0E0LV20	T1000803	X0E0LVFM	1255811
Gothic Nasseem 20	RM	7.5	283	C0E0GN20	T1000420	X0E0GNFJ	1049450
Letter Gothic 25	RM	6	285	C0E0LR25	T1V10500	X0E0LRG9	1255807
Orator 8.1	RB	16	434	C0E0OB08	T1V10500	X0E0OBH9	1255806
Orator 6.5	RB	18	435	C0E0OB06	T1V10500	X0E0OB69	1255806
Baskerville Nasseem TYPO	RM	12	752	C0E20NB0	T1000420	X0E26NB1	1049451
Boldface Nasseem PS	RB	12	753	C0E0BNTR	T1000420	X0E0BNRJ	1049450
Baskerville Nasseem TYPO	RB	12	753	C0E40NB0	T1000420	X0E46NB1	1049451

Figure 300 (Page 6 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Baskerville Nasseem TYPO	RB	18	754	C0E40NH0	T1000420	X0E46NH1	1049451
Baskerville Nasseem TYPO	RB	24	755	C0E40NN0	T1000420	X0E46NN1	1049451
Baskerville Nasseem TYPO	IM	12	756	C0E30NB0	T1000420	X0E36NB1	1049452
Baskerville Nasseem TYPO	IB	12	757	C0E50NB0	T1000420	X0E56NB1	1049452
Baskerville Nasseem TYPO	IB	18	758	C0E50NH0	T1000420	X0E56NH1	1049452
Baskerville Nasseem TYPO	IB	24	759	C0E50NN0	T1000420	X0E56NN1	1049452
Goudy Old Style TYPO	RM	12	4919	C0E20GB0	T1V10500	X0E21GBC	1255834
Goudy Old Style TYPO	RM	10	4919	C0E20G00	T1V10500	X0E21G0C	1255835
Goudy Old Style TYPO	RM	8	4919	C0E20G80	T1V10500	X0E21G8C	1255835
Goudy Old Style TYPO	RM	6	4919	C0E20G60	T1V10500	X0E21G6C	1255835
Goudy Old Style TYPO	RB	18	4939	C0E40GH0	T1V10500	X0E41GHC	1255834
Goudy Old Style TYPO	RB	14	4939	C0E40GD0	T1V10500	X0E41GDC	1255834
Goudy Old Style TYPO	RB	10	4939	C0E40G00	T1V10500	X0E41G0C	1255835
Goudy Old Style TYPO	IM	10	5047	C0E30G00	T1V10500	X0E31G0C	1255835
Goudy Old Style TYPO	IB	10	5067	C0E50G00	T1V10500	X0E51G0C	1255835
Times Roman TYPO	RM	12	5687	C0E20TB0	T1V10500	X0E21TBC	Resident
Times Roman TYPO	RM	10	5687	C0E20T00	T1V10500	X0E21T0C	Resident
Times Roman TYPO	RM	8	5687	C0E20T80	T1V10500	X0E21T8C	Resident
Times Roman TYPO	RM	6	5687	C0E20T60	T1V10500	X0E21T6C	Resident
Times Roman TYPO	RB	24	5707	C0E40TN0	T1V10500	X0E41TNC	Resident
Times Roman TYPO	RB	18	5707	C0E40TH0	T1V10500	X0E41THC	Resident
Times Roman TYPO	RB	14	5707	C0E40TD0	T1V10500	X0E41TDC	Resident
Times Roman TYPO	RB	12	5707	C0E40TB0	T1V10500	X0E41TBC	Resident
Times Roman TYPO	RB	10	5707	C0E40T00	T1V10500	X0E41T0C	Resident
Times Roman TYPO	IM	12	5815	C0E30TB0	T1V10500	X0E31TBC	Resident
Times Roman TYPO	IM	10	5815	C0E30T00	T1V10500	X0E31T0C	Resident
Times Roman TYPO	IB	12	5835	C0E50TB0	T1V10500	X0E51TBC	Resident
Times Roman TYPO	IB	10	5835	C0E50T00	T1V10500	X0E51T0C	Resident
Testimonial TYPO	RM	18	5943	C0E20MH0	T1V10500	X0E21MHC	1255820
Testimonial TYPO	RM	14	5943	C0E20MD0	T1V10500	X0E21MDC	1255820
Testimonial TYPO	RM	12	5943	C0E20MB0	T1V10500	X0E21MBC	1255820
Palatino TYPO	RM	12	6199	C0E20PB0	T1V10500	X0E21PBC	1255828
Palatino TYPO	RM	10	6199	C0E20P00	T1V10500	X0E21P0C	1255829
Palatino TYPO	RM	8	6199	C0E20P80	T1V10500	X0E21P8C	1255829
Palatino TYPO	RM	6	6199	C0E20P60	T1V10500	X0E21P6C	1255829
Palatino TYPO	RB	18	6219	C0E40PH0	T1V10500	X0E41PHC	1255828
Palatino TYPO	RB	14	6219	C0E40PD0	T1V10500	X0E41PDC	1255828
Palatino TYPO	RB	10	6219	C0E40P00	T1V10500	X0E41P0C	1255829
Palatino TYPO	IM	10	6327	C0E30P00	T1V10500	X0E31P0C	1255829
Palatino TYPO	IB	10	6347	C0E50P00	T1V10500	X0E51P0C	1255829
Baskerville TYPO	RM	12	8503	C0E20BB0	T1V10500	X0E21BBC	1255836
Baskerville TYPO	RM	10	8503	C0E20B00	T1V10500	X0E21B0C	1255837

Figure 300 (Page 7 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Baskerville TYPO	RM	8	8503	C0E20B80	T1V10500	X0E21B8C	1255837
Baskerville TYPO	RM	6	8503	C0E20B60	T1V10500	X0E21B6C	1255837
Baskerville TYPO	RB	18	8523	C0E40BH0	T1V10500	X0E41BHC	1255836
Baskerville TYPO	RB	14	8523	C0E40BD0	T1V10500	X0E41BDC	1255836
Baskerville TYPO	RB	10	8523	C0E40B00	T1V10500	X0E41B0C	1255837
Baskerville TYPO	IM	10	8631	C0E30B00	T1V10500	X0E31B0C	1255837
Baskerville TYPO	IB	10	8651	C0E50B00	T1V10500	X0E51B0C	1255837
Times Roman Narkissim TYPO	RM	12	12855	C0E20KB0	T1000424	X0E26KB3	1255811
Times Roman Narkissim TYPO	RM	12	12855	C0E20KB0	T1000803	X0E26KB4	1255811
Times Roman Narkissim TYPO	RM	10	12855	C0E20K00	T1000424	X0E26K03	1255819
Times Roman Narkissim TYPO	RM	10	12855	C0E20K00	T1000803	X0E26K04	1255819
Times Roman Narkissim TYPO	RM	8	12855	C0E20K80	T1000424	X0E26K83	1255819
Times Roman Narkissim TYPO	RM	8	12855	C0E20K80	T1000803	X0E26K84	1255819
Times Roman Narkissim TYPO	RB	24	12875	C0E40KN0	T1000424	X0E46KN3	1255840
Times Roman Narkissim TYPO	RB	24	12875	C0E40KN0	T1000803	X0E46KN4	1255840
Times Roman Narkissim TYPO	RB	18	12875	C0E40KH0	T1000424	X0E46KH3	1255840
Times Roman Narkissim TYPO	RB	18	12875	C0E40KH0	T1000803	X0E46KH4	1255840
Times Roman Narkissim TYPO	RB	12	12875	C0E40KB0	T1000424	X0E46KB3	1255811
Times Roman Narkissim TYPO	RB	12	12875	C0E40KB0	T1000803	X0E46KB4	1255811
Times Roman Narkissim TYPO	RB	10	12875	C0E40K00	T1000424	X0E46K03	1255819
Times Roman Narkissim TYPO	RB	10	12875	C0E40K00	T1000803	X0E46K04	1255819
Times Roman Narkissim TYPO	RB	8	12875	C0E40K80	T1000424	X0E46K83	1255819
Times Roman Narkissim TYPO	RB	8	12875	C0E40K80	T1000803	X0E46K84	1255819
Century Schoolbook TYPO	RM	12	16951	C0E20CB0	T1V10500	X0E21CBC	1255832
Century Schoolbook TYPO	RM	10	16951	C0E20C00	T1V10500	X0E21C0C	1255833
Century Schoolbook TYPO	RM	8	16951	C0E20C80	T1V10500	X0E21C8C	1255833
Century Schoolbook TYPO	RM	6	16951	C0E20C60	T1V10500	X0E21C6C	1255833
Century Schoolbook TYPO	RB	18	16971	C0E40CH0	T1V10500	X0E41CHC	1255832
Century Schoolbook TYPO	RB	14	16971	C0E40CD0	T1V10500	X0E41CDC	1255832
Century Schoolbook TYPO	RB	10	16971	C0E40C00	T1V10500	X0E41C0C	1255833
Century Schoolbook TYPO	IM	10	17079	C0E30C00	T1V10500	X0E31C0C	1255833
Century Schoolbook TYPO	IB	10	17099	C0E50C00	T1V10500	X0E51C0C	1255833
Optima TYPO	RM	12	33335	C0E20OB0	T1V10500	X0E21OBC	1255830
Optima TYPO	RM	10	33335	C0E20O00	T1V10500	X0E21O0C	1255831
Optima TYPO	RM	8	33335	C0E20O80	T1V10500	X0E21O8C	1255831
Optima TYPO	RM	6	33335	C0E20O60	T1V10500	X0E21O6C	1255831
Optima TYPO	RB	18	33355	C0E40OH0	T1V10500	X0E41OHC	1255830
Optima TYPO	RB	14	33355	C0E40OD0	T1V10500	X0E41ODC	1255830
Optima TYPO	RB	10	33355	C0E40O00	T1V10500	X0E41O0C	1255831
Optima TYPO	IM	10	33463	C0E30O00	T1V10500	X0E31O0C	1255831
Optima TYPO	IB	10	33483	C0E50O00	T1V10500	X0E51O0C	1255831
Futura Book TYPO	RM	12	33591	C0E20FB0	T1V10500	X0E21FBC	1255838

Figure 300 (Page 8 of 8). 4028 Font Metrics In Ascending FGID Order

Typeface and Pitch	Attribute	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Futura Book TYPO	RM	10	33591	C0E20F00	T1V10500	X0E21F0C	1255839
Futura Book TYPO	RM	8	33591	C0E20F80	T1V10500	X0E21F8C	1255839
Futura Book TYPO	RM	6	33591	C0E20F60	T1V10500	X0E21F6C	1255839
Futura Heavy TYPO	RB	18	33601	C0E40FH0	T1V10500	X0E41FHC	1255838
Futura Heavy TYPO	RB	14	33601	C0E40FD0	T1V10500	X0E41FDC	1255838
Futura Heavy TYPO	RB	10	33601	C0E40F00	T1V10500	X0E41F0C	1255839
Futura Book TYPO	IM	10	33719	C0E30F00	T1V10500	X0E31F0C	1255839
Futura Heavy TYPO	IB	10	33729	C0E50F00	T1V10500	X0E51F0C	1255839
Helvetica TYPO	RM	12	34103	C0E20HB0	T1V10500	X0E21HBC	1255825
Helvetica TYPO	RM	10	34103	C0E20H00	T1V10500	X0E21H0C	1255800
Helvetica TYPO	RM	8	34103	C0E20H80	T1V10500	X0E21H8C	1255826
Helvetica TYPO	RM	6	34103	C0E20H60	T1V10500	X0E21H6C	1255826
Helvetica TYPO	RB	18	34123	C0E40HH0	T1V10500	X0E41HHC	1255825
Helvetica TYPO	RB	14	34123	C0E40HD0	T1V10500	X0E41HDC	1255825
Helvetica TYPO	RB	10	34123	C0E40H00	T1V10500	X0E41H0C	1255826
Helvetica TYPO	IM	10	34231	C0E30H00	T1V10500	X0E31H0C	1255800
Helvetica TYPO	IB	10	34251	C0E50H00	T1V10500	X0E51H0C	1255826
Engravers' Old English TYPO	RM	18	37431	C0E20EH0	T1V10500	X0E21EHC	1255821
Engravers' Old English TYPO	RM	14	37431	C0E20ED0	T1V10500	X0E21EDC	1255821
Engravers' Old English TYPO	RM	12	37431	C0E20EB0	T1V10500	X0E21EBC	1255821
Cursive TYPO	IM	12	41783	C0E30SB0	T1V10500	X0E31SBC	1255827
Cursive TYPO	IB	18	41803	C0E50SH0	T1V10500	X0E51SHC	1255827
Cursive TYPO	IB	14	41803	C0E50SD0	T1V10500	X0E51SDC	1255827



Figure 301. Code Pages for the 4028 Printer

Name	HEX GCSGID	HEX CPGID	Code Page
Code page 37	0000	0025	T1V10037 or T1GDP037
Code page 273	0000	0111	T1V10273 or T1GDP273
Code page 274	0000	0112	T1V10274 or T1GDP274
Code page 277	0000	0115	T1V10277 or T1GDP277
Code page 278	0000	0116	T1V10278 or T1GDP278
Code page 280	0000	0118	T1V10280 or T1GDP280
Code page 281	0000	0119	T1V10281 or T1GDP281
Code page 284	0000	011C	T1V10284 or T1GDP284
Code page 285	0000	011D	T1V10285 or T1GDP285
Code page 297	0000	0129	T1V10297
Code page 500	0000	01F4	T1V10500 or T1GDP500
Code page 871	0000	0367	T1V10871
Code page 259	0000	0103	T1000259
Code page 290	0000	0122	T1V10290
Code page 293	0000	0125	T1000293
Code page 310	0000	0136	T1000310
Code page 420	0000	01A4	T1000420
Code page 423	0000	01A7	T1000423
Code page 424	0000	01A8	T1000424
Code page 803	0000	0323	T1000803
Code page 870	0000	0366	T1000870
Code page 875	0000	036B	T1000875
Code page 880	0000	0370	T1000880
Code page 892	0000	037C	T1000892
Code page 893	0000	037D	T1000893
Code page 905	0000	0905	T1000905
Code page 1002	0000	03EA	T1001002 or T1D0BASE
Code page 1026	0000	0402	T1001026
Code page 256	0000	0100	T1GDP256
Code page 290 subset	0000	0122	T1L02773
Code page 290 subset	0000	0122	T1L02774
Code page 437 (363)	0000	01B5	T1GPI363

This appendix does not list all the possible font cards. Refer to *IBM Supplies/Options Catalog for the IBM LaserPrinter 4028* for more information about font cards.

You can insert up to two IBM LaserPrinter Font Cards at the same time in the 4028 slots. The cards are labeled to identify specific font information about typeface, pitch, point, FGID (a decimal font identifier), and the part number. The last two positions of the part number represent the Font Card Identifier. Note that the code page information is not printed on the font card.

The fonts on the IBM LaserPrinter Font Card use specific code pages. If one font uses several different code pages, that font can appear on several font cards; an example of this situation follows.

One of several ways you can specify a code page on the host is by using a coded font. When you use a coded font, PSF resolves the coded font to a specific code page and character set.

You can use Figure 302 through Figure 341 on page 527 when determining what IBM LaserPrinter Font Cards need to be in the 4028 when a coded font or code page and character set are specified on the host.

**Note:** In some cases, two IBM LaserPrinter Font Cards are required to be in the 4028 at the same time (for example, Letter Gothic, 15 pitch, FGID 222, with code page 1002).

## FGID Sequence of 4028 Font Cards

The relationship of the coded font and code page to the IBM LaserPrinter Font Card is shown in Figure 300 on page 507. For example, this table indicates that if coded font X0E0DE09 is specified, PSF resolves to character set COE0DE10 (FGID 2) and code page T1V10500. For this to print, IBM LaserPrinter Font Card part number 1255804 must be in the IBM LaserPrinter 4028.

**Note:** Character sets that show T1V10500 in the code page column also support the following country extended code pages (CECPs):

T1V10037	T1V10278	T1V10285
T1V10273	T1V10280	T1V10297
T1V10274	T1V10281	T1V10871
T1V10277	T1V10284	

However, coded fonts for these CECPs are not provided and must be created, if they are needed.

## Card Number Sequence of 4028 Font Cards

Figure 302 through Figure 341 on page 527 show the valid coded font, character set, and code page combinations that can be used to print using specific IBM LaserPrinter Font Card part numbers. In the tables, the FGID column indicates decimal values that correspond to the values that are identified on the IBM LaserPrinter Font Card and in *IBM Supplies/Options Catalog for the IBM LaserPrinter 4028*.

Figure 302. 4028 Resident Fonts with Part Number RESIDENT

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface	RS	PS	12	159	C0E0BRTR	T1V10500	X0E0BRR9	Resident
Boldface	RS	PS	12	159	C0E0BRTR	T1001002	X0E0BRRE	
Courier	RM	10	12	11	C0E0CR10	T1001002	X0E0CROE	
Courier	RM	10	12	11	C0E0CR10	T1V10500	X0E0CR09	
Courier	IM	10	12	18	C0E0CI10	T1V10500	X0E0CI09	
Courier	IM	10	12	18	C0E0CI10	T1001002	X0E0CI0E	
Courier	RB	10	12	46	C0E0CB10	T1V10500	X0E0CB09	
Courier	RB	10	12	46	C0E0CB10	T1001002	X0E0CB0E	
Courier	RM	12	10	85	C0E0CR12	T1V10500	X0E0CRE9	
Courier	RM	12	10	85	C0E0CR12	T1001002	X0E0CREE	
Courier	IM	12	10	92	C0E0CI12	T1V10500	X0E0CIE9	
Courier	IM	12	10	92	C0E0CI12	T1001002	X0E0CIEE	
Courier	RM	15	9	223	C0E0CR15	T1V10500	X0E0CR59	
Courier	RM	17.1	8.5	254	C0E0CR17	T1V10500	X0E0CR79	
Letter Gothic	RM	20	7.5	281	C0E0LR20	T1V10500	X0E0LRF9	
OCR A	RM	10	12	19	C0E0OCRA	T1000892	X0E0OCRA	
OCR B	RM	10	12	3	C0E0OCRB	T1000893	X0E0OCRB	
Prestige	RM	PS	12	164	C0E0PRTR	T1V10500	X0E0PRR9	
Prestige	RM	PS	12	164	C0E0PRTR	T1001002	X0E0PRRE	
Prestige	RM	15	9	221	C0E0PR15	T1V10500	X0E0PR59	
Prestige	RM	17.1	8.5	256	C0E0PR17	T1V10500	X0E0PR79	
Prestige Elite	RM	12	10	86	C0E0PR12	T1001002	X0E0PREE	
Prestige Elite	RM	12	10	86	C0E0PR12	T1V10500	X0E0PRE9	
Prestige Elite	RB	12	10	111	C0E0PB12	T1V10500	X0E0PBE9	
Prestige Elite	RB	12	10	111	C0E0PB12	T1001002	X0E0PBEE	
Prestige Elite	IM	12	10	112	C0E0PI12	T1V10500	X0E0PIE9	
Prestige Elite	IM	12	10	112	C0E0PI12	T1001002	X0E0PIEE	
Prestige Pica	RM	10	12	12	C0E0PR10	T1V10500	X0E0PR09	
Prestige Pica	RM	10	12	12	C0E0PR10	T1001002	X0E0PR0E	
Times Roman	RM	TYPO	12	5687	C0E20TB0	T1V10500	X0E21TBC	
Times Roman	RM	TYPO	10	5687	C0E20T00	T1V10500	X0E21TOC	
Times Roman	RM	TYPO	8	5687	C0E20T80	T1V10500	X0E21T8C	
Times Roman	RM	TYPO	6	5687	C0E20T60	T1V10500	X0E21T6C	
Times Roman	RB	TYPO	24	5707	C0E40TN0	T1V10500	X0E41TNC	
Times Roman	RB	TYPO	18	5707	C0E40TH0	T1V10500	X0E41THC	
Times Roman	RB	TYPO	14	5707	C0E40TD0	T1V10500	X0E41TDC	
Times Roman	RB	TYPO	12	5707	C0E40TB0	T1V10500	X0E41TBC	
Times Roman	RB	TYPO	10	5707	C0E40T00	T1V10500	X0E41T0C	
Times Roman	IM	TYPO	12	5815	C0E30TB0	T1V10500	X0E31TBC	
Times Roman	IM	TYPO	10	5815	C0E30T00	T1V10500	X0E31T0C	
Times Roman	IB	TYPO	12	5835	C0E50TB0	T1V10500	X0E51TBC	
Times Roman	IB	TYPO	10	5835	C0E50T00	T1V10500	X0E51T0C	

Figure 303. 4028 Resident Fonts with Part Number 1049450

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface Naseem	RB	PS	12	753	C0E0BNTR	T1000420	X0E0BNRJ	1049450
Courier Naseem	RM	12	10	103	C0E0NR12	T1000420	X0E0NREJ	
Courier Naseem	IM	12	10	104	C0E0NI12	T1000420	X0E0NIEJ	
Courier Naseem	RM	15	9	213	C0E0NR15	T1000420	X0E0NR5J	
Courier Naseem	RB	7.9	12	266	C0E0NB08	T1000420	X0E0NBJJ	
Courier Naseem	IB	7.9	12	267	C0E0NM08	T1000420	X0E0NMJJ	
Courier Naseem	RM	17.1	8.5	279	C0E0NR17	T1000420	X0E0NR7J	
Courier Naseem 10	RM	10	12	61	C0E0NR10	T1000420	X0E0NR0J	
Courier Naseem 10	IM	10	12	62	C0E0NI10	T1000420	X0E0NIOJ	
Courier Naseem 10	RB	10	12	63	C0E0NB10	T1000420	X0E0NB0J	
Courier Naseem 10	IB	10	12	64	C0E0NM10	T1000420	X0E0NM0J	
Gothic Nasseem	RM	20	7.5	283	C0E0GN20	T1000420	X0E0GNFJ	

Figure 304. 4028 Resident Fonts with Part Number 1049451

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Baskerville Nasseem	RM	TYPO	12	752	C0E20NB0	T1000420	X0E26NB1	1049451
Baskerville Nasseem	RB	TYPO	12	753	C0E40NB0	T1000420	X0E46NB1	
Baskerville Nasseem	RB	TYPO	18	754	C0E40NH0	T1000420	X0E46NH1	
Baskerville Nasseem	RB	TYPO	24	755	C0E40NN0	T1000420	X0E46NN1	

Figure 305. 4028 Resident Fonts with Part Number 1049452

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Baskerville Nasseem	IM	TYPO	12	756	C0E30NB0	T1000420	X0E36NB1	1049452
Baskerville Nasseem	IB	TYPO	12	757	C0E50NB0	T1000420	X0E56NB1	
Baskerville Nasseem	IB	TYPO	18	758	C0E50NH0	T1000420	X0E56NH1	
Baskerville Nasseem	IB	TYPO	24	759	C0E50NN0	T1000420	X0E56NN1	

Figure 306. 4028 Resident Fonts with Part Number 1049453

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface Greek	IS	PS	12	155	C0E0BIRN	T1000875	X0E0BIRN	1049453
Boldface Greek	RS	PS	12	159	C0E0BRRN	T1000875	X0E0BRRN	
Boldface Greek 183	IS	PS	12	155	C0E0BIRK	T1000423	X0E0BIRK	
Boldface Greek 183	RS	PS	12	159	C0E0BRRK	T1000423	X0E0BRRK	
Courier Greek	RM	10	12	11	C0E0CR0N	T1000875	X0E0CR0N	
Courier Greek	RM	15	9	223	C0E0CR5N	T1000875	X0E0CR5N	
Courier Greek 183	RM	10	12	11	C0E0CR0K	T1000423	X0E0CR0K	
Courier Greek 183	RM	15	9	223	C0E0CR5K	T1000423	X0E0CR5K	
Letter Gothic Greek	RM	12	12	87	C0E0LREN	T1000875	X0E0LREN	
Letter Gothic Greek	RB	12	12	110	C0E0LBEN	T1000875	X0E0LBEN	
Letter Gothic Greek 183	RM	12	12	87	C0E0LREK	T1000423	X0E0LREK	
Letter Gothic Greek 183	RB	12	12	110	C0E0LBEK	T1000423	X0E0LBEK	

Figure 307. 4028 Resident Fonts with Part Number 1049454

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Adjutant Symbol	RM	12	10	95	C0E0AJER	T1000259	X0E0AJER	1049454
Boldface Symbol	IB	PS	10	155	C0E0BIRR	T1000259	X0E0BIRR	
Boldface Symbol	RB	PS	10	159	C0E0BRRR	T1000259	X0E0BRRR	
Courier	RM	15	9	223	C0E0CR15	T1001002	X0E0CR5E	
Courier	RM	17.1	8.5	254	C0E0CR17	T1001002	X0E0CR7E	
Courier Symbol	RM	10	12	11	C0E0CR0R	T1000259	X0E0CR0R	
Courier Symbol	IM	10	12	18	C0E0CI0R	T1000259	X0E0CI0R	
Courier Symbol	RB	10	12	46	C0E0CB0R	T1000259	X0E0CB0R	
Courier Symbol	RM	12	10	85	C0E0CRER	T1000259	X0E0CRER	
Courier Symbol	IM	12	10	92	C0E0CIER	T1000259	X0E0CIER	
Courier Symbol	RB	12	10	108	C0E0CBER	T1000259	X0E0CBER	
Courier Symbol	RM	15	9	223	C0E0CR5R	T1000259	X0E0CR5R	
Courier Symbol	RM	17.1	8.5	254	C0E0CR7R	T1000259	X0E0CR7R	
Cyrillic 22 Symbol	RL	10	12	10	C0E0CY0R	T1000259	X0E0CY0R	
Delegate Symbol	RM	10	12	2	C0E0DE0R	T1000259	X0E0DE0R	
Essay Symbol	RM	PS	10	160	C0E0ESRR	T1000259	X0E0ESRR	
Essay Symbol	IM	PS	10	162	C0E0EIRR	T1000259	X0E0EIRR	
Foundry Symbol	RB	PS	10	191	C0E0FBRR	T1000259	X0E0FBRR	
Foundry Symbol	IM	PS	10	194	C0E0FIRR	T1000259	X0E0FIRR	
Foundry Symbol	IB	PS	10	195	C0E0FMRR	T1000259	X0E0FMRR	
Letter Gothic	RM	20	7.5	281	C0E0LR20	T1001002	X0E0LRFE	
Letter Gothic Symbol	RM	12	10	87	C0E0LRSR	T1000259	X0E0LRSR	
Letter Gothic Symbol	IM	12	10	109	C0E0LISR	T1000259	X0E0LISR	
Letter Gothic Symbol	RB	12	10	110	C0E0LBSR	T1000259	X0E0LBSR	
Letter Gothic Symbol	RM	15	9	222	C0E0LR5R	T1000259	X0E0LR5R	
Letter Gothic Symbol	RM	17.1	8.5	255	C0E0LR7R	T1000259	X0E0LR7R	
Letter Gothic Symbol	RM	20	7.5	281	C0E0LRFR	T1000259	X0E0LRFR	
Light Italic Symbol	IM	12	10	91	C0E0LTER	T1000259	X0E0LTER	
Modern Symbol	RM	PS	10	158	C0E0MRRR	T1000259	X0E0MRRR	
Press Roman Symbol	RM	PS	10	186	C0E0RRRR	T1000259	X0E0RRRR	
Press Roman Symbol	RB	PS	10	187	C0E0RBRR	T1000259	X0E0RBRR	
Press Roman Symbol	IM	PS	10	188	C0E0RIRR	T1000259	X0E0RIRR	
Press Roman Symbol	IB	PS	10	189	C0E0RMRR	T1000259	X0E0RMRR	
Prestige	RM	15	9	221	C0E0PR15	T1001002	X0E0PR5E	
Prestige	RM	17.1	8.5	256	C0E0PR17	T1001002	X0E0PR7E	
Prestige Elite Symbol	RM	12	10	86	C0E0PRER	T1000259	X0E0PRER	
Prestige Elite Symbol	RB	12	10	111	C0E0PBER	T1000259	X0E0PBER	
Prestige Elite Symbol	IM	12	10	112	C0E0PIER	T1000259	X0E0PIER	
Prestige Pica Symbol	RM	10	12	12	C0E0PR0R	T1000259	X0E0PR0R	
Prestige Symbol	RM	PS	10	164	C0E0PRRR	T1000259	X0E0PRRR	
Prestige Symbol	RM	15	9	221	C0E0PR5R	T1000259	X0E0PR5R	
Prestige Symbol	RM	17.1	8.5	256	C0E0PR7R	T1000259	X0E0PR7R	
Title Symbol	RB	PS	10	157	C0E0TBRR	T1000259	X0E0TBRR	

Figure 308. 4028 Resident Fonts with Part Number 1255800

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Helvetica	RM	TYPO	10	34103	C0E20H00	T1V10500	X0E21H0C	1255800
Helvetica	IM	TYPO	10	34231	C0E30H00	T1V10500	X0E31H0C	
Letter Gothic Symbol	RM	12	12	87	C0E0LRER	T1000259	X0E0LRER	
Presentor	RM	10	14	25	C0E0PS10	T1V10500	X0E0PS09	
Presentor	RM	10	14	25	C0E0PS10	T1001002	X0E0PS0E	

Figure 309. 4028 Resident Fonts with Part Number 1255801

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface	IS	PS	12	155	C0E0BITR	T1V10500	X0E0BIR9	1255801
Boldface	IS	PS	12	155	C0E0BITR	T1001002	X0E0BIRE	

Figure 310. 4028 Resident Fonts with Part Number 1255803

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Letter Gothic	RM	10	14	36	C0E0LR10	T1V10500	X0E0LR09	1255803
Letter Gothic	RM	10	14	36	C0E0LR10	T1001002	X0E0LR0E	
Letter Gothic	RM	12	12	87	C0E0LR12	T1V10500	X0E0LR0E	
Letter Gothic	RM	12	12	87	C0E0LR12	T1001002	X0E0LR0E	
Letter Gothic	IM	12	12	109	C0E0LI12	T1V10500	X0E0LIE9	
Letter Gothic	IM	12	12	109	C0E0LI12	T1001002	X0E0LIEE	
Letter Gothic	RB	12	12	110	C0E0LB12	T1V10500	X0E0LBE9	
Letter Gothic	RB	12	12	110	C0E0LB12	T1001002	X0E0LBEE	

Figure 311. 4028 Resident Fonts with Part Number 1255804

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Adjutant	RM	12	10	95	C0E0AJ12	T1V10500	X0E0AJE9	1255804
Adjutant	RM	12	10	95	C0E0AJ12	T1001002	X0E0AJEE	
Delegate	RM	10	12	2	C0E0DE10	T1V10500	X0E0DE09	
Delegate	RM	10	12	2	C0E0DE10	T1001002	X0E0DE0E	
Essay	RM	PS	12	160	C0E0ESTR	T1V10500	X0E0ESR9	
Essay	RM	PS	12	160	C0E0ESTR	T1001002	X0E0ESRE	
Essay	IM	PS	12	162	C0E0EITR	T1V10500	X0E0EIR9	
Essay	IM	PS	12	162	C0E0EITR	T1001002	X0E0EIRE	
Modern	RM	PS	12	158	C0E0MRTR	T1V10500	X0E0MRR9	
Modern	RM	PS	12	158	C0E0MRTR	T1001002	X0E0MRRE	

Figure 312. 4028 Resident Fonts with Part Number 1255805

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
APL	RM	12	10	76	C0E0AP12	T1000310	X0E0APET	1255805
APL	RM	12	10	76	C0E0AP12	T1000293	X0E0APES	
Olde World	RB	12	10	96	C0E0WB12	T1V10500	X0E0WBE9	
Olde World	RB	12	10	96	C0E0WB12	T1001002	X0E0WBEE	
Script	IM	12	10	84	C0E0SR12	T1V10500	X0E0SRE9	
Script	IM	12	10	84	C0E0SR12	T1001002	X0E0SREE	
Title	RB	PS	12	157	C0E0TBTR	T1V10500	X0E0TBR9	
Title	RB	PS	12	157	C0E0TBTR	T1001002	X0E0TBRE	

Figure 313. 4028 Resident Fonts with Part Number 1255806

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Orator	RM	10	14	5	C0E0OR10	T1V10500	X0E0OR09	1255806
Orator	RM	10	14	5	C0E0OR10	T1001002	X0E0OR0E	
Orator	RB	8.1	16	434	C0E0OB08	T1V10500	X0E0OBH9	
Orator	RB	6.5	18	435	C0E0OB06	T1V10500	X0E0OB69	

Figure 314. 4028 Resident Fonts with Part Number 1255807

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Letter Gothic	RM	15	9	222	C0E0LR15	T1V10500	X0E0LR59	1255807
Letter Gothic	RM	17.1	8.5	255	C0E0LR17	T1V10500	X0E0LR79	
Letter Gothic	RM	25	6	285	C0E0LR25	T1V10500	X0E0LRG9	
Light Italic	IS	12	10	91	C0E0LT12	T1V10500	X0E0LTE9	
Light Italic	IS	12	10	91	C0E0LT12	T1001002	X0E0LTEE	

Figure 315. 4028 Resident Fonts with Part Numbers 1255807 and 1049454

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Letter Gothic	RM	15	9	222	C0E0LR15	T1001002	X0E0LR5E	1255807 and 1049454
Letter Gothic	RM	17.1	8.5	255	C0E0LR17	T1001002	X0E0LR7E	

Figure 316. 4028 Resident Fonts with Part Number 1255808

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Press Roman	RM	PS	10	186	C0E0RRTR	T1V10500	X0E0RRR9	1255808
Press Roman	RM	PS	10	186	C0E0RRTR	T1001002	X0E0RRRE	
Press Roman	RB	PS	10	187	C0E0RBTR	T1V10500	X0E0RBR9	
Press Roman	RB	PS	10	187	C0E0RBTR	T1001002	X0E0RBRE	
Press Roman	IM	PS	10	188	C0E0RITR	T1V10500	X0E0RIR9	
Press Roman	IM	PS	10	188	C0E0RITR	T1001002	X0E0RIRE	
Press Roman	IB	PS	10	189	C0E0RMTR	T1V10500	X0E0RMR9	
Press Roman	IB	PS	10	189	C0E0RMTR	T1001002	X0E0RMRE	

Figure 317. 4028 Resident Fonts with Part Number 1255809

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Foundry	RM	PS	10	190	C0E0FRTR	T1V10500	X0E0FRR9	1255809
Foundry	RM	PS	10	190	C0E0FRTR	T1001002	X0E0FRRE	
Foundry	RB	PS	10	191	C0E0FBTR	T1V10500	X0E0FBR9	
Foundry	RB	PS	10	191	C0E0FBTR	T1001002	X0E0FBRE	
Foundry	IM	PS	10	194	C0E0FITR	T1V10500	X0E0FIR9	
Foundry	IM	PS	10	194	C0E0FITR	T1001002	X0E0FIRE	
Foundry	IB	PS	10	195	C0E0FMTR	T1V10500	X0E0FMR9	
Foundry	IB	PS	10	195	C0E0FMTR	T1001002	X0E0FMRE	
Foundry Symbol	RM	PS	10	190	C0E0FRRR	T1000259	X0E0FRRR	

Figure 318. 4028 Resident Fonts with Part Number 1255810

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface Latin3	RS	PS	12	159	C0E0BRRG	T1000905	X0E0BRRG	1255810
Boldface Latin5	RS	PS	12	159	C0E0BRRH	T1001026	X0E0BRRH	
Courier Latin3	RM	10	12	11	C0E0CR0G	T1000905	X0E0CR0G	
Courier Latin3	RM	12	10	85	C0E0CREG	T1000905	X0E0CREG	
Courier Latin3	RM	15	9	223	C0E0CR5G	T1000905	X0E0CR5G	
Courier Latin3	RM	17.1	8.5	254	C0E0CR7G	T1000905	X0E0CR7G	
Courier Latin5	RM	10	12	11	C0E0CR0H	T1001026	X0E0CR0H	
Courier Latin5	RM	12	10	85	C0E0CREH	T1001026	X0E0CREH	
Courier Latin5	RM	15	9	223	C0E0CR5H	T1001026	X0E0CR5H	
Courier Latin5	RM	17.1	8.5	254	C0E0CR7H	T1001026	X0E0CR7H	
Letter Gothic Latin3	RM	12	12	87	C0E0LREG	T1000905	X0E0LREG	
Letter Gothic Latin5	RM	12	12	87	C0E0LREH	T1001026	X0E0LREH	
Prestige Elite Latin3	RM	12	10	86	C0E0PREG	T1000905	X0E0PREG	
Prestige Elite Latin5	RM	12	10	86	C0E0PREH	T1001026	X0E0PREH	
Prestige Pica Latin3	RM	10	12	12	C0E0PROG	T1000905	X0E0PROG	
Prestige Pica Latin5	RM	10	12	12	C0E0PR0H	T1001026	X0E0PR0H	

Figure 319. 4028 Resident Fonts with Part Number 1255811

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface Barak	RM	PS	12	167	C0E0BKTR	T1000424	X0E0BKRL	1255811
Boldface Barak	RM	PS	12	167	C0E0BKTR	T1000803	X0E0BKRM	
Courier Shalom	RM	10	12	49	C0E0HR10	T1000424	X0E0HR0L	
Courier Shalom	RM	10	12	49	C0E0HR10	T1000803	X0E0HR0M	
Courier Shalom	RB	10	12	50	C0E0HB10	T1000424	X0E0HB0L	
Courier Shalom	RB	10	12	50	C0E0HB10	T1000803	X0E0HB0M	
Courier Shalom	RM	12	10	98	C0E0HR12	T1000424	X0E0HREL	
Courier Shalom	RM	12	10	98	C0E0HR12	T1000803	X0E0HREM	
Courier Shalom	RM	15	9	226	C0E0HR15	T1000424	X0E0HR5L	
Courier Shalom	RM	15	9	226	C0E0HR15	T1000803	X0E0HR5M	
Letter Gothic Aviv	RM	20	7.5	282	C0E0LV20	T1000424	X0E0LVFL	
Letter Gothic Aviv	RM	20	7.5	282	C0E0LV20	T1000803	X0E0LVFM	
Times Roman Narkissim	RM	TYPO	12	12855	C0E20KB0	T1000424	X0E26KB3	
Times Roman Narkissim	RM	TYPO	12	12855	C0E20KB0	T1000803	X0E26KB4	
Times Roman Narkissim	RB	TYPO	12	12875	C0E40KB0	T1000424	X0E46KB3	
Times Roman Narkissim	RB	TYPO	12	12875	C0E40KB0	T1000803	X0E46KB4	



Figure 320. 4028 Resident Fonts with Part Number 1255814

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Katakana	RM	17.1	8.5	249	C0E0KA17	T1V10290	X0E0KA7P	1255814
Katakana 10	RM	10	12	21	C0E0KA10	T1V10290	X0E0KA0P	
Katakana 12	RM	12	12	78	C0E0KA12	T1V10290	X0E0KAEP	

Figure 321. 4028 Resident Fonts with Part Number 1255816

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Courier Latin2	RM	10	12	11	C0E0CR0F	T1000870	X0E0CR0F	1255816
Courier Latin2	RM	12	10	85	C0E0CREP	T1000870	X0E0CREP	
Courier Latin2	RM	17.1	8.5	254	C0E0CR7F	T1000870	X0E0CR7F	
Letter Gothic Latin2	RM	12	12	87	C0E0LREF	T1000870	X0E0LREF	
Prestige Elite Latin2	RM	12	10	86	C0E0PREF	T1000870	X0E0PREF	
Title Latin2	RB	PS	12	157	C0E0TBRF	T1000870	X0E0TBRF	

Figure 322. 4028 Resident Fonts with Part Number 1255817

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Boldface Cyrillic	RS	PS	12	159	C0E0BRRQ	T1000880	X0E0BRRQ	1255817
Courier Cyrillic	RM	10	12	11	C0E0CR0Q	T1000880	X0E0CR0Q	
Courier Cyrillic	RM	12	10	85	C0E0CREQ	T1000880	X0E0CREQ	
Cyrillic 22	RL	10	12	10	C0E0CY10	T1000880	X0E0CY0Q	
Letter Gothic Cyrillic	RM	12	12	87	C0E0LREQ	T1000880	X0E0LREQ	
Prestige Elite Cyrillic	RM	12	10	86	C0E0PREQ	T1000880	X0E0PREQ	

Figure 323. 4028 Resident Fonts with Part Number 1255819

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Times Roman Narkissim	RM	TYPO	10	12855	C0E20K00	T1000424	X0E26K03	1255819
Times Roman Narkissim	RM	TYPO	10	12855	C0E20K00	T1000803	X0E26K04	
Times Roman Narkissim	RM	TYPO	8	12855	C0E20K80	T1000424	X0E26K83	
Times Roman Narkissim	RM	TYPO	8	12855	C0E20K80	T1000803	X0E26K84	
Times Roman Narkissim	RB	TYPO	10	12875	C0E40K00	T1000424	X0E46K03	
Times Roman Narkissim	RB	TYPO	10	12875	C0E40K00	T1000803	X0E46K04	
Times Roman Narkissim	RB	TYPO	8	12875	C0E40K80	T1000424	X0E46K83	
Times Roman Narkissim	RB	TYPO	8	12875	C0E40K80	T1000803	X0E46K84	

Figure 324. 4028 Resident Fonts with Part Number 1255820

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Testimonial	RM	TYPO	18	5943	C0E20MH0	T1V10500	X0E21MHC	1255820
Testimonial	RM	TYPO	14	5943	C0E20MD0	T1V10500	X0E21MDC	
Testimonial	RM	TYPO	12	5943	C0E20MB0	T1V10500	X0E21MBC	

Figure 325. 4028 Resident Fonts with Part Number 1255821

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Engravers' Old English	RM	TYPO	18	37431	C0E20EH0	T1V10500	X0E21EHC	1255821
Engravers' Old English	RM	TYPO	14	37431	C0E20ED0	T1V10500	X0E21EDC	
Engravers' Old English	RM	TYPO	12	37431	C0E20EB0	T1V10500	X0E21EBC	

Figure 326. 4028 Resident Fonts with Part Number 1255825

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Helvetica	RM	TYPO	12	34103	C0E20HB0	T1V10500	X0E21HBC	1255825
Helvetica	RB	TYPO	18	34123	C0E40HH0	T1V10500	X0E41HHC	
Helvetica	RB	TYPO	14	34123	C0E40HD0	T1V10500	X0E41HDC	

Figure 327. 4028 Resident Fonts with Part Number 1255826

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Helvetica	RM	TYPO	8	34103	C0E20H80	T1V10500	X0E21H8C	1255826
Helvetica	RM	TYPO	6	34103	C0E20H60	T1V10500	X0E21H6C	
Helvetica	RB	TYPO	10	34123	C0E40H00	T1V10500	X0E41H0C	
Helvetica	IB	TYPO	10	34251	C0E50H00	T1V10500	X0E51H0C	

Figure 328. 4028 Resident Fonts with Part Number 1255827

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Cursive	IM	TYPO	12	41783	C0E30SB0	T1V10500	X0E31SBC	1255827
Cursive	IB	TYPO	18	41803	C0E50SH0	T1V10500	X0E51SHC	
Cursive	IB	TYPO	14	41803	C0E50SD0	T1V10500	X0E51SDC	

Figure 329. 4028 Resident Fonts with Part Number 1255828

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Palatino	RM	TYPO	12	6199	C0E20PB0	T1V10500	X0E21PBC	1255828
Palatino	RB	TYPO	18	6219	C0E40PH0	T1V10500	X0E41PHC	
Palatino	RB	TYPO	14	6219	C0E40PD0	T1V10500	X0E41PDC	

Figure 330. 4028 Resident Fonts with Part Number 1255829

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Palatino	RM	TYPO	10	6199	C0E20P00	T1V10500	X0E21P0C	1255829
Palatino	RM	TYPO	8	6199	C0E20P80	T1V10500	X0E21P8C	
Palatino	RM	TYPO	6	6199	C0E20P60	T1V10500	X0E21P6C	
Palatino	RB	TYPO	10	6219	C0E40P00	T1V10500	X0E41P0C	
Palatino	IM	TYPO	10	6327	C0E30P00	T1V10500	X0E31P0C	
Palatino	IB	TYPO	10	6347	C0E50P00	T1V10500	X0E51P0C	

Figure 331. 4028 Resident Fonts with Part Number 1255830

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Optima	RM	TYPO	12	33335	C0E20OB0	T1V10500	X0E21OBC	1255830
Optima	RB	TYPO	18	33355	C0E40OH0	T1V10500	X0E41OHC	
Optima	RB	TYPO	14	33355	C0E40OD0	T1V10500	X0E41ODC	

Figure 332. 4028 Resident Fonts with Part Number 1255831

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Optima	RM	TYPO	10	33335	C0E20O00	T1V10500	X0E21O0C	1255831
Optima	RM	TYPO	8	33335	C0E20O80	T1V10500	X0E21O8C	
Optima	RM	TYPO	6	33335	C0E20O60	T1V10500	X0E21O6C	
Optima	RB	TYPO	10	33355	C0E40O00	T1V10500	X0E41O0C	
Optima	IM	TYPO	10	33463	C0E30O00	T1V10500	X0E31O0C	
Optima	IB	TYPO	10	33483	C0E50O00	T1V10500	X0E51O0C	

Figure 333. 4028 Resident Fonts with Part Number 1255832

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Century Schoolbook	RM	TYPO	12	16951	C0E20CB0	T1V10500	X0E21CBC	1255832
Century Schoolbook	RB	TYPO	18	16971	C0E40CH0	T1V10500	X0E41CHC	
Century Schoolbook	RB	TYPO	14	16971	C0E40CD0	T1V10500	X0E41CDC	

Figure 334. 4028 Resident Fonts with Part Number 1255833

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Century Schoolbook	RM	TYPO	10	16951	C0E20C00	T1V10500	X0E21C0C	1255833
Century Schoolbook	RM	TYPO	8	16951	C0E20C80	T1V10500	X0E21C8C	
Century Schoolbook	RM	TYPO	6	16951	C0E20C60	T1V10500	X0E21C6C	
Century Schoolbook	RB	TYPO	10	16971	C0E40C00	T1V10500	X0E41C0C	
Century Schoolbook	IM	TYPO	10	17079	C0E30C00	T1V10500	X0E31C0C	
Century Schoolbook	IB	TYPO	10	17099	C0E50C00	T1V10500	X0E51C0C	

Figure 335. 4028 Resident Fonts with Part Number 1255834

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Goudy Old Style	RM	TYPO	12	4919	C0E20GB0	T1V10500	X0E21GBC	1255834
Goudy Old Style	RB	TYPO	18	4939	C0E40GH0	T1V10500	X0E41GHC	
Goudy Old Style	RB	TYPO	14	4939	C0E40GD0	T1V10500	X0E41GDC	

Figure 336. 4028 Resident Fonts with Part Number 1255835

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Goudy Old Style	RM	TYPO	10	4919	C0E20G00	T1V10500	X0E21G0C	1255835
Goudy Old Style	RM	TYPO	8	4919	C0E20G80	T1V10500	X0E21G8C	
Goudy Old Style	RM	TYPO	6	4919	C0E20G60	T1V10500	X0E21G6C	
Goudy Old Style	RB	TYPO	10	4939	C0E40G00	T1V10500	X0E41G0C	
Goudy Old Style	IM	TYPO	10	5047	C0E30G00	T1V10500	X0E31G0C	
Goudy Old Style	IB	TYPO	10	5067	C0E50G00	T1V10500	X0E51G0C	

Figure 337. 4028 Resident Fonts with Part Number 1255836

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Baskerville	RM	TYPO	12	8503	C0E20BB0	T1V10500	X0E21BBC	1255836
Baskerville	RB	TYPO	18	8523	C0E40BH0	T1V10500	X0E41BHC	
Baskerville	RB	TYPO	14	8523	C0E40BD0	T1V10500	X0E41BDC	

Figure 338. 4028 Resident Fonts with Part Number 1255837

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Baskerville	RM	TYPO	10	8503	C0E20B00	T1V10500	X0E21B0C	1255837
Baskerville	RM	TYPO	8	8503	C0E20B80	T1V10500	X0E21B8C	
Baskerville	RM	TYPO	6	8503	C0E20B60	T1V10500	X0E21B6C	
Baskerville	RB	TYPO	10	8523	C0E40B00	T1V10500	X0E41B0C	
Baskerville	IM	TYPO	10	8631	C0E30B00	T1V10500	X0E31B0C	
Baskerville	IB	TYPO	10	8651	C0E50B00	T1V10500	X0E51B0C	

Figure 339. 4028 Resident Fonts with Part Number 1255838

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Futura Book	RM	TYPO	12	33591	C0E20FB0	T1V10500	X0E21FBC	1255838
Futura Heavy	RB	TYPO	18	33601	C0E40FH0	T1V10500	X0E41FHC	
Futura Heavy	RB	TYPO	14	33601	C0E40FD0	T1V10500	X0E41FDC	

Figure 340. 4028 Resident Fonts with Part Number 1255839

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Futura Book	RM	TYPO	10	33591	C0E20F00	T1V10500	X0E21F0C	1255839
Futura Book	RM	TYPO	8	33591	C0E20F80	T1V10500	X0E21F8C	
Futura Book	RM	TYPO	6	33591	C0E20F60	T1V10500	X0E21F6C	
Futura Book	IM	TYPO	10	33719	C0E30F00	T1V10500	X0E31F0C	
Futura Heavy	RB	TYPO	10	33601	C0E40F00	T1V10500	X0E41F0C	
Futura Heavy	IB	TYPO	10	33729	C0E50F00	T1V10500	X0E51F0C	

Figure 341. 4028 Resident Fonts with Part Number 1255840

Typeface	Attribute	Pitch	Point	FGID DEC	Font Character Set	Code Page	Coded Font	4028 Card Number
Times Roman Narkissim	RB	TYPO	24	12875	C0E40KN0	T1000424	X0E46KN3	1255840
Times Roman Narkissim	RB	TYPO	24	12875	C0E40KN0	T1000803	X0E46KN4	
Times Roman Narkissim	RB	TYPO	18	12875	C0E40KH0	T1000424	X0E46KH3	
Times Roman Narkissim	RB	TYPO	18	12875	C0E40KH0	T1000803	X0E46KH4	



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## Appendix C. Related Publications

The following publications contain additional information about AFP printers and the licensed programs that support the printers.

You can use any of the following methods to send comments about the publications:

- Reader's Comment Form in each publication
- Internet id: pennant\_pubs@vnet.ibm.com
- IBM Mail Exchange id: IEA USIB4TDB
- Fax number: 1-800-524-1519

The titles and the order numbers for publications can change from time to time. To verify the current title or order number for a publication, contact your IBM representative.

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### Advanced Function Presentation

*Figure 342. Advanced Function Presentation Publications*

<b>Publication</b>	<b>Order Number</b>
<i>Printing and Publishing Collection Kit</i>	SK2T-2921
<i>Guide to Advanced Function Presentation</i>	G544-3876
<i>Advanced Function Presentation: Printer Summary</i>	G544-3135
<i>AFP Application Programming Interface: Programming Guide and Reference</i>	S544-3872
<i>AFP Application Programming Interface: COBOL Language Reference</i>	S544-3873
<i>AFP Application Programming Interface: PL/I Language Reference</i>	S544-3874
<i>AFP Conversion and Indexing Facility: Application Programming Guide</i>	G544-3824
<i>Advanced Function Presentation: Programming Guide and Line Data Reference</i>	S544-3884
<i>AFP Migration Aids for 3200 User's Guide</i> (Japanese language version)	N:SC18-0835
<i>Introduction to Advanced Function Printing</i> (Japanese language version)	N:GG18-9126
<i>AFP Guide for Application Programmers</i> (Japanese language version)	N:ZR18-8920

## Data Stream and Object Architectures

<i>Figure 343. Data Stream and Object Architectures Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Mixed Object Document Content Architecture Reference</i>	SC31-6802
<i>Intelligent Printer Data Stream Reference</i>	S544-3417
<i>Bar Code Object Content Architecture Reference</i>	S544-3766
<i>Presentation Text Object Content Architecture Reference</i>	SC31-6803
<i>Graphics Object Content Architecture Reference</i>	SC31-6804
<i>Image Object Content Architecture Reference</i>	SC31-6805

## IBM AFP Font Collection

<i>Figure 344. IBM AFP Fonts Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IBM AFP Fonts: Font Summary</i>	G544-3810
<i>IBM AFP Fonts: Font Samples</i>	S544-3792
<i>IBM AFP Fonts: Type Transformer User's Guide</i>	G544-3796
<i>IBM AFP Fonts: Introduction to Typography</i>	G544-3122
<i>IBM AFP Fonts: Licensed Program Specifications</i>	G544-5229
<i>IBM AFP Fonts: Technical Reference for IBM Expanded Core Fonts</i>	S544-5228
<i>IBM AFP Fonts: Technical Reference for Code Pages</i>	S544-3802
<i>AFP Japanese Font Catalog</i>	N:SC18-2332
<i>AFP Simplified Chinese Font Catalog</i>	N:SC18-0133
<i>AFP Traditional Chinese Font Catalog</i>	N:SC18-0124
<i>AFP Korean Font Catalog</i>	N:SB09-1421
<i>AFP Thai Font Catalog</i>	N:SC18-0137



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## Advanced Function Presentation Workbench For Windows

<i>Figure 345. Advanced Function Presentation Workbench For Windows Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>AFP Workbench for Windows: Using the Viewer Application</i>	G544-3813

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## 3130 Advanced Function Printer

<i>Figure 346. 3130 Advanced Function Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3130 Advanced Function Printer User's Guide</i>	S544-3975
<i>3130 Advanced Function Printer Introduction and Planning Guide</i>	G544-3974
<i>IPDS Handbook for Printers that Use the Advanced Function Common Control Unit</i>	S544-3895

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## 3800 Printing Subsystem

<i>Figure 347. 3800 Printing Subsystem Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Forms Design Reference Guide for IBM 3800 Printing Subsystem</i>	GA26-1633
<i>3800 Printing Subsystem Model 3 Programmer's Guide</i>	SH35-0051
<i>3800 Printing Subsystem Operator's Guide</i>	GA32-0068
<i>Reference Manual for the IBM 3800 Printing Subsystem Models 3 and 6</i>	GA32-0050
<i>Reference Manual for the IBM 3800 Printing Subsystem Models 8</i>	GA32-0065

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## 3812 Page Printer

<i>Figure 348. 3812 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3812 and 3816 Page Printers IPDS Handbook</i>	GA34-2082
<i>3812 Page Printer Guide to Operations</i>	S544-3267

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## 3816 Page Printer

<i>Figure 349. 3816 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3816 Page Printer Operating Instructions</i>	GA34-2075
<i>3812 and 3816 Page Printers IPDS Handbook</i>	GA34-2082

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## 3820 Page Printer

<i>Figure 350. 3820 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3820 Page Printer Introduction and Planning Guide</i>	G544-3520
<i>3820 Page Printer Reference Manual</i>	S544-3175
<i>3820 Page Printer Operator's Guide</i>	S544-3080

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## 3825 Page Printer

<i>Figure 351. 3825 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3825 Page Printer Product Description</i>	G544-3482
<i>3825 Page Printer Operator's Guide</i>	G544-3481
<i>3825 Page Printer Introduction and Planning Guide</i>	G544-3480
<i>3825 Page Printer Paper Reference</i>	G544-3483

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## 3827 Page Printer

<i>Figure 352. 3827 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3827 Page Printer Product Description</i>	G544-3194
<i>3827 Page Printer Operator's Guide</i>	G544-3189
<i>3827 Page Printer Introduction and Planning Guide</i>	G544-3193
<i>3827 Page Printer Paper Reference</i>	G544-3195

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## 3828 Advanced Function MICR Printer

<i>Figure 353. 3828 Advanced Function MICR Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3828 Advanced Function MICR Printer Product Description</i>	G544-3361
<i>3828 Advanced Function MICR Printer Operator's Guide</i>	G544-3360
<i>3828 Advanced Function MICR Printer Introduction and Planning Guide</i>	G544-3359
<i>3828 Advanced Function MICR Printer Paper Reference</i>	G544-3362

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## 3829 Advanced Function Printer

<i>Figure 354. 3829 Advanced Function Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3829 Advanced Function Printer Product Description</i>	GA32-0255
<i>3829 Advanced Function Printer Introduction and Planning Guide</i>	GA32-0256
<i>3829 Advanced Function Printer Operator's Guide</i>	GA32-0254

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## 3831 Page Printer

<i>Figure 355. 3831 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3831 Page Printer Product Description</i>	N:GA18-7028
<i>3831 Page Printer Introduction and Planning Guide</i>	N:GA18-7029
<i>3831 Page Printer Operator's Guide</i>	N:GA18-7030

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## 3835 Page Printer

<i>Figure 356. 3835 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3835 Page Printer Product Description</i>	G544-3498
<i>3835 Page Printer Operator's Guide</i>	G544-3208
<i>3835 Page Printer Introduction and Planning Guide</i>	G544-3207
<i>3835 Page Printer Forms Design Reference</i>	G544-3206

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## Enhanced 3835 Advanced Function Printer

<i>Figure 357. Enhanced 3835 Advanced Function Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3835 Advanced Function Printer Model 002 Forms Design Reference</i>	GA32-0247
<i>3835 Advanced Function Printer Model 002 Introduction and Planning Guide</i>	GA32-0248
<i>3835 Advanced Function Printer Model 002 Operators Guide</i>	GA32-0237

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## 3900 Advanced Function Printer

<i>Figure 358. 3900 Advanced Function Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IPDS Handbook for Printers that Use the Advanced Function Common Control Unit</i>	S544-3895
<i>3900 Advanced Function Printer Operator's Guide</i>	GA37-0210
<i>3900 Advanced Function Printer Introduction and Planning Guide</i>	GA32-0136
<i>3900 Advanced Function Printer Forms Design Reference</i>	GA32-0137

## 3900 Advanced Function Duplex Printing System

<i>Figure 359. 3900 Advanced Function Duplex Printing System Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Forms Design Reference for Advanced Function Continuous Forms Printers</i>	G544-3921
<i>IPDS Handbook for Printers that Use the Advanced Function Common Control Unit</i>	S544-3895
<i>3900 Advanced Function Duplex Printing System and 3900 Advanced Function Wide Duplex Printing System Introduction and Planning Guide</i>	G544-3919
<i>3900 Advanced Function Duplex Printing System and 3900 Advanced Function Wide Duplex Printing System Operator's Guide</i>	G544-3920

## 3900-0W1 Advanced Function Printer

<i>Figure 360. 3900-0W1 Advanced Function Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IPDS Handbook for Printers that Use the Advanced Function Common Control Unit</i>	S544-3895
<i>3900-0W1 Advanced Function Printer Operator's Guide</i>	G544-3951
<i>3900-0W1 Advanced Function Printer Introduction and Planning Guide</i>	G544-3948

## 3900 Advanced Function Wide Duplex Printing System

<i>Figure 361. 3900 Wide Duplex Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3900 Advanced Function Duplex Printing System and 3900 Advanced Function Wide Duplex Printing System Operator's Guide</i>	G544-3920
<i>IPDS Handbook for Printers that Use the Advanced Function Common Control Unit</i>	S544-3895
<i>3900 Advanced Function Duplex Printing System and 3900 Advanced Function Wide Duplex Printing System Introduction and Planning Guide</i>	G544-3919

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## 3912 Page Printer and 3916 Page Printer

<i>Figure 362. 3912 Page Printer and 3916 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3912 Page Printer and 3916 Page Printer User's Guide</i>	S544-3904
<i>3912 Page Printer and 3916 Page Printer Getting Started</i>	S544-3898
<i>3912 Page Printer and 3916 Page Printer Options Installation</i>	S544-3899
<i>3912 Page Printer and 3916 Page Printer Models AS1 and NS1 Intelligent Printer Data Stream Handbook</i>	S544-3901
<i>3912 Page Printer and 3916 Page Printer Models AS0 and AS1 Programming Reference for Application System/400 Attachment (Twinaxial)</i>	S544-3902
<i>3912 Page Printer and 3916 Page Printer Models NS0 and NS1 Programming Reference for 3270 Attachment (Coaxial)</i>	S544-3903

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## 3930 Page Printer

<i>Figure 363. 3930 Page Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3930 Page Printer Models 02D, 02S, 03D, and 03S Introduction and Planning Guide</i>	GA24-4375
<i>3930 Page Printer Models 02D, 02S, 03D, and 03S User's Guide</i>	SA24-4382

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## 3935 Advanced Function Printer

<i>Figure 364. 3935 Advanced Function Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>3935 Advanced Function Printer Introduction and Planning Guide</i>	G544-3894
<i>IPDS Handbook for Printers that Use the Advanced Function Common Control Unit</i>	S544-3895
<i>3935 Advanced Function Printer Operator's Guide</i>	G544-3893

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## LaserPrinter 4019

<i>Figure 365. LaserPrinter 4019 Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Getting Started with the IBM LaserPrinter</i>	SA40-0538
<i>User's Guide for the IBM LaserPrinter</i>	SA40-0539
<i>IBM LaserPrinter Software Applications/Driver Information</i>	SB40-0200
<i>Technical Reference for the IBM LaserPrinter 4019</i>	SA40-0562

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## LaserPrinter 4028

<i>Figure 366. LaserPrinter 4028 Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>LaserPrinter 4028 Introduction and Planning Guide</i>	S544-4258
<i>LaserPrinter 4028 Model NS1 Guide to Operations</i>	S544-4263
<i>LaserPrinter 4028 Model AS1 Guide to Operations</i>	S544-4254
<i>LaserPrinter 4028 IPDS Handbook</i>	S544-4260

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## Laserprinter 4029 Series

<i>Figure 367. Laserprinter 4029 Series Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>User's Guide for the IBM LaserPrinter 4029 Series</i>	SA40-0542
<i>User's Guide for the IBM LaserPrinter 5E Model 4029-010</i>	SA40-0598
<i>Technical Reference for the IBM LaserPrinter 4029 Series</i>	SA40-0559

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## Laserprint 4039 Series

<i>Figure 368. Laserprinter 4039 Series Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IBM LaserPrinter 4039 Series by Lexmark: User's Guide</i>	SA40-0739
<i>Getting Started with the IBM LaserPrinter 4039 Series</i>	SA40-0736
<i>Software Applications/Driver Information for the IBM LaserPrinter 4039 Series</i>	SA40-0730

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## 4224 Printer

<i>Figure 369. 4224 Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>4224 Printer Operating Instructions for Model 1xx</i>	GC31-2546
<i>4224 Printer Operating Instructions for Model 2xx</i>	GC31-2547
<i>4224 Printer Guide to Operations</i>	GC31-3621
<i>4224 Printer Models 1xx and 2xx Product and Programming Description Manual</i>	GC31-2551

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## 4230 Printer

<i>Figure 370. 4230 Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>4230 Printer User's Guide Models 102 and 202</i>	SA40-0564
<i>4230 Printer Product and Programming Description Models 102 and 202</i>	GC40-1701
<i>4230 Printer Operator Panel Instructions Models 102 and 202</i>	SA40-0565

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## 4234 Printer

<i>Figure 371. 4234 Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>4234 Printer Models 007 and 011 Operating Instructions</i>	GC31-3736
<i>4234 Printer Models 008 and 012 Operating Instructions</i>	GC31-3737
<i>4234 Printer Models 007, 008, 011, 012, and 013 Principles of Operation</i>	GC31-3878
<i>4234 Printer Models 007, 008, 011 and 012 Product and Programming Description</i>	GC31-3879

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## 64xx Printer

<i>Figure 372 (Page 1 of 2). 64xx Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>6408 and 6412 CTA Operator's Guide</i>	G246-0057
<i>6408 and 6412 CTA Setup Guide</i>	G246-0065
<i>6408 and 6412 CTA Programmer's Reference</i>	G246-0073



<i>Figure 372 (Page 2 of 2). 64xx Printer Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>6408 and 6412 IPDS Programmer's Reference</i>	G246-0074

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## **Print Services Facility/MVS**

<i>Figure 373. Print Services Facility/MVS Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Print Services Facility/MVS: Application Programming Guide</i>	S544-3673
<i>Print Services Facility/MVS: System Programming Guide</i>	S544-3672

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## **Print Services Facility/VM**

<i>Figure 374. Print Services Facility/VM Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Print Services Facility/VM: Application Programming Guide</i>	S544-3677
<i>Print Services Facility/VM: System Programming Guide</i>	S544-3680

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## Print Services Facility/VSE

<i>Figure 375. Print Services Facility/VSE Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Print Services Facility/VSE: Application Programming Guide</i>	S544-3666
<i>Print Services Facility/VSE: System Programming Guide</i>	S544-3665

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## Print Services Facility for OS/2

<i>Figure 376. Print Services Facility for OS/2 Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IBM Print Services Facility for OS/2: A Guide to Using PSF/2</i>	G544-5225
<i>IBM Print Services Facility for OS/2: Facts about PSF/2</i>	G544-3890
<i>IBM Print Services Facility for OS/2: An Installation Cookbook for System/370 and Token Ring Networks</i>	G544-3965
<i>IBM Print Services Facility for OS/2: An Installation Cookbook for AS/400 and Token Ring Networks</i>	G544-3966
<i>IBM Print Services Facility for OS/2: Network Configuration Guide for System/370 and Communication Manager/2</i>	S544-3911
<i>IBM Print Services Facility for OS/2: Printer Attachments Guide</i>	G544-5215

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## Print Services Facility for OS/400

<i>Figure 377. Print Services Facility for OS/400 Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>AS/400 Printer Device Programming</i>	SC41-3713
<i>AS/400 Data Description Specifications</i>	SC41-9620

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## Print Services Facility for AIX

<i>Figure 378 (Page 1 of 2). Print Services Facility for AIX Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IBM Print Services Facility for AIX: Print Administration</i>	S544-3817

<i>Figure 378 (Page 2 of 2). Print Services Facility for AIX Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>IBM Print Services Facility for AIX: Print Submission</i>	S544-3878
<i>IBM Print Services Facility for AIX: Print Services Facility for AIX Users</i>	G544-3814
<i>IBM Print Services Facility for AIX: AFP Conversion and Indexing Facility Version 2.1</i>	G544-3930
<i>IBM Page Printer Formatting Aid/6000: User's Guide Version 2.1</i>	S544-3918

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## Personal System/55

The Personal System/55 is the Japanese equivalent of the Personal System/2.

<i>Figure 379. Personal System/55 Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>PS/55 AFP Overlay Generator Brochure</i>	N:G518-3608

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## Other AFP Products

<i>Figure 380. Other AFP Products Publications</i>	
<b>Publication</b>	<b>Order Number</b>
<i>Composed Document Print Facility: Data Stream Interface, Typographic Fonts Interface</i>	SC33-6134
<i>Document Composition Facility and Document Library Facility: General Information</i>	GH20-9158
<i>Overlay Generation Language/370: User's Guide and Reference</i>	S544-3702
<i>Page Printer Formatting Aid/370: User's Guide and Reference</i>	S544-3700
<i>Using Image Handling Facility</i>	SH12-5280



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# Glossary

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## Source Identifiers

This publication includes terms and definitions from the *IBM Dictionary of Computing*, SC20-1699.

Definitions reprinted from the *American National Dictionary for Information Processing Systems* are identified by the symbol (A) following the definition.

Definitions reprinted from a published section of the International Organization for Standardization (ISO) *Vocabulary—Information Processing* or from a published section of *Vocabulary—Office Machines* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Committee (ISO/IEC JTC1/SC1) are identified by the symbol (I) following the definition. Because many ISO definitions are also reproduced in the *American National Dictionary for Information Processing Systems*, ISO definitions may also be identified by the symbol (A).

Definitions reprinted from working documents, draft proposals, or draft international standards of ISO Technical Committee 97, Subcommittee 1 (Vocabulary), Joint Technical Committee 1 are identified by the symbol (T) following the definition, indicating that final agreement has not yet been reached among its participating members.

Definitions that are specific to IBM products are so labeled; for example, "In SNA," or "In the 3820."

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## References

The following cross-references are used in this glossary:

**Contrast with.** This refers to a term that has an opposite or substantively different meaning.

**See.** This refers the reader to multiple-word terms in which this term appears.

**See also.** This refers the reader to terms that have a related, but not synonymous, meanings.

**Synonym for.** This appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

**Synonymous with.** This appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

## A

**ABIC.** See *Adaptive Bilevel Image Compression*.

**accumulator.** (1) A register in which the result of an operation is formed. (I) (A) (2) A 3800 hardware feature that provides a separate storage area to hold data in raster form. It can be used either for composing a sheet of data that combines a large amount of variable and constant data or for storing an electronic overlay in raster form so that the overlay is merged with variable data as the page is printed.

**Adaptive Bilevel Image Compression (ABIC).** A 4-bit image capable of displaying up to 16 shades of gray.

**Advanced Function Image and Graphics feature.** A hardware feature that can be purchased and installed on an AFP printer to support printer microcode image decompression of IOCA data streams that were compressed using standard compression routines. AFIG also corrects the resolution of an input image to match the printer's resolution, thereby providing resolution independence for scanned input.

**Advanced Function Presentation (AFP).** A set of licensed programs, together with user applications, that use the all-points-addressable concept to print on presentation devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information. See *presentation device*.

**AFIG.** See *Advanced Function Image and Graphics feature*.

**AFP.** See *Advanced Function Presentation*.

**AFP data stream.** A presentation data stream that is processed in AFP environments. MO:DCA-P is the strategic AFP interchange data stream, and IPDS is the strategic AFP printer data stream.

**AFPDS.** A term formerly used to identify the composed-page MO:DCA-based data stream interchanged in AFP environments. See also MO:DCA and *AFP data stream*.

**all points addressable (APA).** The ability to address, reference, and position text, overlays, and images at any defined position or pel on the printable area of the paper. This capability depends on the ability of the hardware to address and to display each picture element.

**alternate medium source.** The ability to select print medium from more than one source (bin).

**APA.** All points addressable.

**APAR.** See *Authorized program analysis report*.

**application program.** (1) A program that performs a particular data processing task, such as inventory control or payroll. (2) A program that produces the print data set.

**authorized program analysis report (APAR).** A report of a problem caused by a suspected defect in a current unaltered release of a program.

**A4 paper.** Paper size that is 210 by 297 mm (8.27 by 11.7 inch).

**A5 paper.** Paper size that is 148 by 210 mm (5.83 by 8.27 inch).

## B

**Bar Code Object Content Architecture (BCOCA).** An architected collection of constructs used to interchange and present bar code data.

**bar code symbology.** A bar code language. Bar code symbologies are defined and controlled by various industry groups and standards organizations. Bar code symbologies are described in the public domain bar code specifications. Synonymous with *symbology*.

**baseline.** The imaginary line on which successive characters are aligned in the inline direction.

**BCOCA.** See *Bar Code Object Content Architecture*

**bin.** A paper source on cut-sheet printers. See also *cassette*.

**bounded-box font.** A font designed to use bounded character boxes. Contrast with *unbounded-box font*.

**BTS.** Burster-trimmer-stacker.

**burst.** To separate continuous-forms paper into single sheets.

**burster-trimmer-stacker (BTS).** A printer hardware feature that separates continuous forms into single sheets, trims the carrier strip from both edges of the forms, and stacks the sheets.

## C

**cassette.** In a cut-sheet printer, a movable paper storage enclosure. See also *bin*.

**CCITT.** See *International Telegraph and Telephone Consultative Committee*.

**changeable media origin.** The ability of the printer to accept a command that changes the point on the medium where printing begins.

**channel-attached.** In PSF, a device that is linked to the host system using only S/390 channel protocols. For example, a 3800 printer cabled to the host system with a S/390 channel adapter is considered a channel-attached printer. Contrast with *SNA-attached*.

**character.** (1) A member of a set of elements used for the representation, organization, or control of data. Characters may be letters, digits, punctuation marks, or other symbols represented in the form of a spatial arrangement of adjacent or connected strokes or in the form of other physical conditions in data media. (2) A letter, numeral, punctuation mark, or special graphic used for the production of text. (3) In bar codes, a single group of bars and spaces that represent an individual number, letter, punctuation mark, or other symbol. (4) A byte of data. (5) See also *graphic character*.

**character graphic.** A visual representation of a character, other than a control character, that is normally produced by writing, printing, or displaying. (T)

**character identifier.** The standard identifier for a character regardless of its style. For example, all uppercase A's have the same character identifier.

**character rotation.** The alignment of a character with respect to its character baseline, measured in degrees in a clockwise direction. Examples are 0°, 90°, 180°, and 270°. Zero-degree character rotation exists when a character is in its customary alignment with the baseline.

**character set.** (1) A finite set of different graphic or control characters upon which agreement has been reached and that is considered complete for some purpose; for example, each of the characters in ISO Standard 646 *7-bit Coded Character Sets for Information Processing Interchange*. (2) For page printers, the font library member that contains the character graphics and their descriptions.

**code page.** A set of assignments, each of which assigns a code point to a character. Each code page has a unique name or identifier. Within a given code page, a code point is assigned to one character. More than one character set can be assigned code points from the same code page. See also *coded font*.

**code page global identifier (CPGID).** (1) A 5-digit registered identifier used to specify a particular assignment of code points to graphic characters. (2) See also *graphic character set global identifier*.

**code point.** A 1-byte code representing one of 256 potential characters.

**coded font.** (1) A font library member that associates a code page and a font character set. For double-byte fonts, a coded font associates more than one pair of code pages and font character sets. (2) A font that can be fully described using a code page, character set, type style, posture, weight classification, and width classification. For actual presentation, a size must be specified. Some coded fonts require all of these attributes. Others, called symbol sets, require only code page and character set. See also *code page* and *character set*.

**coded overlay.** An overlay that is stored in the printer in a coded (not raster) format. Contrast with *raster pattern overlay*.

**color selection.** The ability to specify a color other than black to achieve more than one color of printed data. For example, the 4224-2C2 supports selection of several colors, depending on the color of ribbon installed in the printer. Other printers support the selection of black or the *color of the medium*, which can cause white lettering on a background that has been shaded black, for example.

**command.** A request from a terminal or a specification in a batch-processing print file for the operation of a particular program.

**common-use forms.** A set of paper sizes selected as being the most common in use throughout the world.

**communication attached.** In PSF, a device that is SNA-attached and that uses a communication controller. For example, a 3812 printer attached to a 3174 control unit that is attached to a 3175 Communication Controller can be considered to be a communication-attached printer. Contrast with *local attached*.

**compatibility mode.** A mode of operation for printing the output of 3800 Model 1 application programs on a 3800 page printer with little or no change to the application or JCL. Contrast with *page mode*.

**composed text.** Text data and text-control information that dictates the format, placement, and appearance of data to be printed.

**composed-text data.** Obsolete term for text data that has been composed into pages. Text formatting programs such as DCF can create text data consisting entirely of structured fields. Synonym for *MO:DCA-P data*.

**compressed pattern storage (CPS).** Storage that holds the extended (double-byte) fonts for the 3800 Model 6 or Model 8 printers.

**compression algorithm.** An algorithm used to compress image data. Compression of image data can decrease the volume of data required to represent an image.

**concatenated data set.** In MVS, a group of logically connected data sets that are treated as one data set for the duration of a job step. See also *data set*, *partitioned data set*, and *library*.

**conditional processing.** A page-definition function that allows input data records to partially control their own formatting.

**continuous forms.** A series of connected forms that feed continuously through a printing device. The connection between the forms is perforated to allow the user to tear them apart. Before printing, the forms are folded in a stack arrangement with the folds along the perforations. Contrast with *cut-sheet paper*.

**continuous-forms stacker.** An output assembly on a continuous-forms printer that refolds and stacks the continuous forms after printing.

**copy group.** (1) One or more copies of a sheet of paper. Each copy can have modifications, such as text suppression, page position, forms flash, overlays, paper-source, and duplex printing. (2) In Print Services Facility, an internal object in a form definition that identifies the overlays and defines page placement and modifications to the form. (3) Synonymous with *medium map*.

**copy modification.** In the 3800 Printing Subsystem Model 1, a feature that allows the printing of predefined data on all pages of specified copies of a print file.

**Core Interchange font.** Synonym for *IBM Core Interchange font*.

**CPGID.** See *code page global identifier*.

**CPS.** Compressed pattern storage.

**current print position.** The picture element that defines the character reference point or the upper-left corner of an image.

**cut-sheet paper.** The medium that is cut into uniform-size sheets before being loaded into the printer. Contrast with *continuous forms*.

## D

**DASD.** Direct access storage device.

**data check.** A synchronous indication of a condition caused by invalid data or incorrect positioning of data. Reporting of some data checks can be suppressed.

**data control block (DCB).** A control block used by access method routines in storing and retrieving data.

**data map.** An internal object in a page definition that specifies fonts, page segments, fixed text, page size, and the placement and orientation of text. Synonymous with *page format*.

**data set.** A named set of records stored and processed as a unit. See also *file*, *concatenated data set*, *partitioned data set*, and *sequential data set*.

**data types.** The type of data objects that can be printed by the printer. Each type of data object has its own architecture. An overview of the architectures is presented in *Mixed Object Document Content Architecture Reference*.

Two types of text data are: PTOCA PT1 and PTOCA PT2. PT1 provides the basic function needed to control text data. PT2 provides additional migration controls for underscoring, overstriking, and making a temporary baseline move.

Two types of image data are: IOCA FS10 image and IM image. IOCA image provides more function than IM Image; for example, compression and resolution independence is possible with IOCA image.

Some printers support vector graphics called GOCA DR/2V0.

Some printers also have the capability of printing BCOCA BCD1 bar code data without requiring special fonts or special processing in the host system.

**DCB.** Data control block.

**DCF.** See *Document Composition Facility*.

### **Decompression Performance Enhancement feature.**

A feature you can purchase and install on your AFP printer to provide printer hardware image decompression of IOCA data streams that were compressed using standard compression routines. The DPE capability improves the decompression performance offered with the AFIG feature.

**default.** An alternate value, attribute, or option that is assumed when none has been specified, and one is needed to continue processing.

**deferred printing mode.** A printing mode that spools output through JES to a data set instead of printing it

immediately. Output is controlled using JCL statements. Contrast with *direct printing mode*.

**direct access storage device (DASD).** A computer storage device in which access time is effectively independent of the location of the data.

**direct printing.** A PSF/MVS printing mode that allows PSF exclusive use of the printer. Output is printed directly and is not controlled by the Job Entry Subsystem (JES).

**disabled mechanisms.** The ability to identify one mechanism of the printer as disabled. An example is the ability to print from one medium source when the other source is disabled.

**Distributed Print Function (DPF).** A component of PSF/2 that you can use to print jobs sent to PSF/2 from PSF/MVS, PSF/VM, PSF/VSE, or PSF/400. DPF receives host PSF output and resources for spooling and printing with PSF/2. DPF also stores PSF/MVS and PSF/VSE resources in the DPF resource library, so that the host system does not have to send PSF resources each time documents are spooled. Through DPF, PSF/2 under OS/2 2.0 provides a function similar to that provided by Remote PrintManager (RPM) Version 3.0 under DOS.

**document.** (1) A machine-readable collection of one or more objects that represent a composition, a work, or a collection of data. (2) A publication or other written material.

**Document Composition Facility (DCF).** An IBM licensed program that provides a text formatter called SCRIPT/VS. SCRIPT/VS can process files marked up with a unique set of controls and tags.

**double-byte coded font.** A font in which the characters are defined by 2 bytes; the first defining a coded font section, and the second defining a code point. Double-byte coded fonts are required to support languages requiring more than 256 graphic characters. Two bytes are required to identify each graphic character. Kanji is printed using a double-byte font. Contrast with *single-byte coded font*.

**download.** To transfer data from one computer for use on another one. Typically, users download to a printer, from a larger computer to a diskette or fixed disk on a smaller computer, or from a system unit to an adapter.

**downloaded fully described fonts.** The IPDS form of host fonts downloaded to a printer. PSF converts pairs of host font character sets and code pages into IPDS form before downloading to the printer for printing.

**DPE.** See *Decompression Performance Enhancement feature*.



**DPF.** See *Distributed Print Function*.

**drain.** An operator action to halt the flow of jobs to a printer, usually to stop the printer or to change print options.

**duplex printing.** Printing on both sides of a sheet of paper. Contrast with *simplex printing*. See also *normal duplex printing* and *tumble duplex printing*.

## E

**EBCDIC.** Extended binary-coded decimal interchange code.

**electronic overlay.** A collection of constant data, such as lines, shading, text, boxes, or logos, that is electronically composed in the host processor and stored in a library, and that can be merged with variable data during printing. Contrast with *page segment*. See also *page overlay* and *medium overlay*.

**Enterprise System Connection.** See *ESCON channel*.

**ESA.** Enterprise System Architecture.

**ESCON channel.** A channel having an Enterprise Systems Connection channel-to-control unit I/O interface that uses serial-by-bit optical cable as a transmission medium.

**exception.** A condition that exists when the printer:

- Detects an invalid or unsupported command, order, control, or parameter value from the host
- Finds a condition requiring host-system notification
- Detects a condition that requires the host system to resend data

**exception highlighting.** The markings placed on the printed page to indicate the source of a data stream error. Two types of highlight markings are used:

- *Print-error marker.* a solid rectangle
- *Print-error vector.* a line drawn from a printed error code to the point on the page where the error occurred

**extended binary-coded decimal interchange code (EBCDIC).** A coded character set of 256 eight-bit characters.

## F

**FCB.** See *forms control buffer*.

**FGID.** See *font global identifier*.

**file.**

- In PSF/6000, a collection of related data
- In PSF/2, a collection of related data
- In PSF/MVS, a member of a partitioned data set or a sequential data set
- In PSF/MM, a CMS file
- In PSF/VSE, a member in a library.sublibrary

**fixed metrics.** Measurement information in specific units such as pels, inches, or centimeters for individual or collections of graphic characters. See also *font metrics*.

**fold memory.** The ability of a form to refold at the fold perforation after exposure to heat during the fusing process.

**font.** (1) A family or assortment of characters of a given size and style; for example, 9 point Bodoni Modern. (A) (2) One size and one typeface in a particular type family, including letters, numerals, punctuation marks, special characters, and ligatures. (3) A paired character set and code page that can be used together for printing a string of text characters. A double-byte font can consist of multiple pairs of character sets and code pages. (4) See *coded font*, *double-byte coded font*, and *symbol set*.

**font character set.** Synonym for *character set*.

**font global identifier.** (1) A number that identifies the character style and size for certain printers. (2) A unique value that identifies the type family, typeface, and, sometimes, the point size of a character set.

**font metrics.** Measurement information that defines individual character values, such as height, width, and space, as well as overall font values, such as averages and maximums. Font metrics may be expressed in specified fixed units, such as pels, or in relative units that are independent of both the resolution and size of the font.

**font pruning.** An action in which PSF reduces the number of characters downloaded to the printer by sending only those characters in a character set that are actually referenced by the code page. Font pruning can save time needed to download the characters and can reduce the amount of raster pattern storage used by the printer but can increase processor use.

**font width.** (1) A characteristic value, parallel to the character baseline, that represents the size of all graphic characters in a font. (2) In a font character set, nominal font width is a font-designer defined value corresponding to the nominal character increment for a font character set. The value is generally the width of the space character and is defined differently for fonts with different spacing characteristics.

- For fixed-pitch, uniform character increment fonts: the fixed character increment, which is also the space character increment.
- For PSM fonts: the width of the space character.
- For typographic, proportionally-spaced fonts: 1/3 of the vertical font size, which is also the default size of the space character.

The font designer can also define a minimum and a maximum horizontal font size to represent the limits of scaling. (3) In font referencing, the specified font width is the desired size of the font when the characters are presented. If this size is different from the nominal horizontal font size specified in a font character set, the character shapes and character metrics might need to be scaled prior to presentation.

**form.** A division of the physical medium; multiple forms can exist on a physical medium. For example, a roll of paper might be divided by a printer into rectangular pieces of paper, each representing a form. Envelopes are an example of a physical medium that comprises only one form. The IPDS architecture defines four types of forms: cut-sheets, continuous forms, envelopes, and computer output on microfilm. Each type of form has a top edge. A form has two sides, a front side and a back side. Synonymous with *sheet*.

**form definition.** A resource used by PSF that defines the characteristics of the form that includes overlays to be used (if any), paper source (for cut-sheet printers), duplex printing, text suppression, the position of composed-text data on the form, and the number and modifications of a page.

**format.** (1) The shape, size, and general makeup of a printed document. (2) To prepare a document for printing. (3) The arrangement of text on the page.

**forms control buffer (FCB).** A buffer for controlling the vertical format of printed output. The forms control buffer is a line-printer control that is similar to the punched-paper, carriage-control tape used on IBM 1403 printers. On AFP page printers, the forms control buffer is replaced by the page definition. See *page definition*.

**forms flash.** In the 3800, a printer function that prints photographic images with variable text data that is composed into pages. The printer operator must insert a frame containing a photographic negative into the printer to use the forms-flash function.

**fully described font.** In the IPDS architecture, an LF1-type raster font containing font metrics, descriptive information, and the raster representation of character shapes, for a specific graphic character set. A fully described font can be downloaded to the printer using the Load Font Control and Load Font commands. Synonym for *raster font*. See *downloaded fully described fonts* and *resident fully described fonts*.

## G

**GCSGID.** See *graphic character set global identifier*.

**GDDM.** See *Graphical Data Display Manager*.

**global resource identifier (GRID).** An 8-byte identifier used to identify an external name of a font, or, in OS/400, to identify fonts used in text. A GRID, which identifies a character-set and code-page combination, consists of the GCSGID, CPGID, FGID, and font width.

**GOCA.** See *Graphics Object Content Architecture*.

**graphic character.** A visual representation of a character, other than a control character, that is normally produced by writing, printing, or displaying. (T)

**graphic character set global identifier (GCSGID).** (1) A unique value that identifies the list of graphic character identifiers included in a component. (2) See also *code page global identifier*.

**Graphical Data Display Manager.** A series of IBM programs that can create, among other functions, device-independent visual data such as page segments and send it to devices such as displays, plotters, printers, and personal computers.

**Graphics Object Content Architecture (GOCA).** An architected collection of constructs used to interchange and present graphics data.

**gray-scale image.** The ability to print an image in shades of gray as well as in black.

**GRID.** See *global resource identifier*.

**guaranteed print labeling.** A method of print labeling that ensures the integrity of the identification label by preventing the user from writing over the label. If attempts are made to override print labeling, processing of the print file is terminated, and an audit record is written.

## H

**hard page segment.** (1) A page segment that is declared in the Map Page Segment structured field and loaded in the printer as a resource that can be reused during the job without being reloaded to the printer. (2) Within another element, as an inline resource. (3) Contrast with *soft page segment*.

**hardcopy.** (1) A copy of a display image generated on an output device such as a printer or plotter, and which can be carried away. (T) (2) A printed copy of machine output in a visually readable form; for example, printed reports, listings, documents, and summaries.

**hardware default font.** The font used by the printer if no other font is specified.

**hexadecimal.** Pertaining to a numbering system with base of 16; valid numbers use the digits 0 through 9 and characters A through F, where A represents 10 and F represents 15.

**host system.** (1) A data processing system that prepares programs and the operating environments for another computer or controller. (2) The data processing system to which a network is connected and with which the system can communicate.

**HP-PCL.** Hewlett-Packard Printer Control Language, the data stream used by a type of Hewlett-Packard printer, some of which are supported by PSF/2 and PSF/6000.

I

**IBM Compatibility fonts.** A group of fonts supplied as part of Print Services Facility, Print Management Facility, and Application System/400. Many of these fonts are derived from fonts created for specific IBM printers (such as the IBM 3800 Model 1, the IBM 6670 Information Distributor, and the IBM Proprinter) or applications (such as Document Composition Facility). The fonts are called compatibility fonts because they allow applications created for the 3800 Model 1 and 6670 to be migrated to newer page printers without having to change the fonts specified in the applications. Examples of IBM compatibility fonts include APL, Boldface, Document, Essay, Format, Gothic, Letter Gothic, Orator, Prestige, Roman, Script, Serif, and Text type families as well as a set of Proprinter Emulation fonts.

**IBM Core Interchange fonts.** A group of fonts supplied as part of Print Services Facility that are common across all SAA and AIX operating systems and whose objective is to facilitate document interchange across these systems with full fidelity. These fonts are also compatible with fonts provided by Microsoft on their DOS/Windows workstations and with the base fonts provided by Adobe on their PostScript printers, providing document portability across both IBM and non-IBM computer systems. The fonts are provided in the Courier, Times New Roman, and Helvetica type families in both roman medium and bold weights and in italic medium and bold weights.

**IBM MMR.** See *IBM Modified Modified Read*.

**IBM Modified Modified Read (MMR).** A compression algorithm.

**IM image command set.** In the IPDS architecture, a collection of commands used to present IM image data in a page, page segment, or overlay.

**image.** Toned and untoned pels arranged in a pattern.

**image data.** Rectangular arrays of raster information that define an image.

**Image Object Content Architecture.** An architected collection of constructs used to interchange and present images.

**IMM.** See *IBM Modified Modified Read*.

**impact printer.** A printer in which printing results from mechanical impacts. (I) (A) Contrast with *nonimpact printer*.

**impression.** The data printed on one side of a sheet. Printer speed is often measured in terms of impressions per minute (ipm).

**inline.** Synonymous with *inline direction*.

**inline direction.** The direction of successive characters in a line of text. Synonym for *inline*.

**Intelligent Printer Data Stream (IPDS).** An architected host-to-printer data stream that contains both data and controls defining how the data is to be presented.

**interface.** A shared boundary. An interface may be a hardware component to link two devices or a portion of storage or registers accessed by two or more computer programs. (A)

**International Telecommunications Union-Telecommunications Standardization Sector (ITU-TSS).** See *International Telegraph and Telephone Consultative Committee (CCITT)*.

**International Telegraph and Telephone Consultative Committee.** An organization (one of four permanent organs of the International Telecommunication Union [ITU], headquartered in Geneva, Switzerland) that is concerned with the problems relating to international telephony and telegraphy. The CCITT Plenary Assembly meets at regular intervals to prepare a list of technical questions related to telephone and telegraph services. The Assembly assigns these questions to study groups, which then prepare recommendations to be presented at the next plenary meeting. Approved recommendations are published for the use of engineers, scientists, and manufacturers around the world.

The committee's name has been changed to International Telecommunications Union-Telecommunications Standardization Sector (ITU-TSS).

**IOCA.** See *Image Object Content Architecture*.

**IPDS.** See *Intelligent Printer Data Stream*.

## J

**JCL.** Job control language.

**JES.** Job entry subsystem.

**job control language (JCL).** A control language used to identify a job to an operating system and to describe the requirements of the job.

**job entry subsystem (JES).** A system facility for spooling, job queuing, and managing I/O.

## K

**kanji.** Nonphonetic Chinese characters used in Japanese written language. In a font representing kanji characters, each character is represented by a double-byte font.

## L

**landscape page presentation.** The position of a printed sheet that has its long edges as the top and bottom and its short edges as the sides. Contrast with *portrait page presentation*.

**library.**

- In PSF/6000, a directory, a list of files stored on a disk or diskette
- In PSF/2, a directory, a list of files stored on a disk or diskette
- In PSF/MVS, a partitioned data set or a series of concatenated data sets
- In PSF/VM, a collection of CMS files, generally with the same file type
- In PSF/VSE, a library.sublibrary

**line data.** Data prepared for printing on a line printer, such as a 3800 Model 1. Line data is usually characterized by carriage-control characters and table reference characters. Contrast with *MO:DCA-P data*.

**line merging.** Printing two or more records of line data at the same location on the page. Line merging is used with line data to mix different fonts on the same line, to underscore or overstrike, and on impact printers to create darker print.

**line printer.** A device that prints a line of characters as a unit. (I) (A) Contrast with *page printer*.

**lines per inch (lpi).** (1) The number of lines that can be printed vertically within an inch. (2) A unit of

measurement for the specification of the placement of the baseline.

**local attached.** In PSF, an SNA-attached device that does not have a communications controller in its configuration. For example, a 3812 printer connected to a channel-attached 3174 control unit defined to the host system through VTAM is considered to be a local-attached printer. Contrast with *communication attached*.

**logical page.** A presentation space. One or more object areas or data blocks may be mapped to a logical page. A logical page has specifiable characteristics, such as size, shape, orientation, and offset. The shape of a logical page is the shape of a rectangle. Orientation and offset are specified relative to a medium coordinate system. See also *page*.

**logical page origin.** (1) The point on the logical page from which positions of images, graphics, page overlays, and text with 0-degree inline direction are measured. (2) The point on the logical page represented by Xp=0, Yp=0 in the Xp coordinate system.

**lpi.** Lines per inch.

**LU type 1.** An SNA logical unit type that provides a communication protocol among host application programs and terminals. Some printers also use this protocol to communicate with host application programs.

**LU type 6.2.** An SNA logical unit type that converges functions from existing LU types to provide a single, interchangeable communication protocol.

## M

**macro.** Synonym for *macroinstruction*.

**macroinstruction.** An instruction that causes the execution of a predefined sequence of instructions.

**magnetic ink character recognition (MICR).** Character recognition of characters printed with ink that contains particles of a magnetic material. (I) (A)

**magnetic toner.** Toner used with specific printers to print magnetic ink character recognition (MICR) fonts.

**manual forms feed.** The ability to manually feed a medium into a printing device rather than having the device automatically feed the medium.

**Map Page Segment structured field (MPS).** The Map Page Segment structured field identifies the page segments to be loaded into the printer and to remain in the printer while the entire print file is printed.

**marking.** A method that refers to the updating of certain structured fields that identifies a resource for use by Remote PrintManager or as being printer resident.

**maximum speed.** The highest speed of which the printer is capable in characters per second (cps), lines per minute (lpm), or impressions per minute (ipm), for a given size sheet.

**media destination.** The destination to which sheets are sent as the last step in the print process. Some printers support several media destinations to allow options such as print job distribution to one or more specific destinations, collated copies without having to send the document to the printer multiple times, and routing output to a specific destination for security reasons. Contrast with *media source*.

**media origin.** The first hardware addressable point on the physical medium. The point from which the logical page origin is positioned by the medium map. This point is represented by  $X_m=0$ ,  $Y_m=0$  in the  $X_m$ ,  $Y_m$  coordinate system. The media origin is defined relative to the top edge of the medium. Synonymous with *medium origin*.

**media source.** The source from which sheets are obtained for printing. Some printers support several media sources, so that media with different characteristics (such as size, color, and type) can be selected. Contrast with *media destination*.

**medium.** The physical material (for example, paper) on which data is printed. See also *form*.

**medium map.** An internal object in a form definition that controls the modifications to a form, page placement, and overlays. Synonymous with *copy group*.

**medium origin.** Synonym for *media origin*.

**medium overlay.** An electronic overlay that is invoked by the medium map of a form definition for printing at a fixed position on the form. See *page overlay*.

**metric-only fonts.** See *4028 Font Metrics*.

**MICR.** See *magnetic ink character recognition*.

**MICR printing.** The ability of a printer to either print with magnetic toner or to allow MICR printing through a postprocessing device.

**microfilm device.** An output device that presents a hardcopy on microfilm.

**Mixed Object Document Content Architecture.** An architected, device-independent data stream for interchanging documents.

**mixed-pitch font.** A font that simulates a typographic font. The characters are in a limited set of pitches; for example, 10 pitch, 12 pitch, and 15 pitch.

**MO:DCA.** See *Mixed Object Document Content Architecture*.

**MO:DCA-P data.** Print data that has been composed into pages. Text formatting programs such as DCF can produce composed text data consisting entirely of structured fields.

**MOF.** Metric-only font.

**monospaced font.** A font in which the graphics characters have a uniform character increment. Synonymous with *uniformly spaced font*. Contrast with *proportionally spaced font*.

**MPS.** See *Map Page Segment structured field*.

**Multiple Virtual Storage (MVS).** An IBM operating system consisting of MVS/System Product Version 1 and the MVS/370 Data Facility Product operating on a System/370 processor.

**multiple-up.** The printing of more than one page of application data on a single surface of a sheet of paper.

**MVS.** See *Multiple Virtual Storage*.

**Multiple Virtual Storage.** An IBM operating system running on a S/370 or S/390 processor.

## N

**N\_UP printing.** In basic N\_UP printing, the dividing of a side of a sheet into a fixed number of equal-size partitions. For example, N\_UP 4 divides each side of the sheet into four equal partitions. In enhanced N\_UP printing, the sheet can be divided into 8 partitions, anywhere on the sheet.

**NACK.** See *negative acknowledgment reply*.

**narrow forms.** Forms that have their longer edges at the sides and their shorter edges at the top and bottom.

**negative acknowledge reply (NACK).** A reply from a printer to a host indicating that an exception has occurred.

**nonimpact printer.** A printer in which printing is not the result of mechanical impacts; for example, thermal printers, electrostatic printers, and photographic printers. (I) (A) Contrast with *impact printer*.

**normal duplex printing.** Printing on both sides of the paper so that the sheets can be bound on the long

edge of the paper. Contrast with *simplex printing*. See also *tumble duplex printing*.

## O

**object.** A resource or a sequence of structured fields contained within a larger entity, such as a page segment or a page.

**offset stacking.** A function that allows the printed output pages to be offset for easy separation of print jobs.

**OGL/370.** See *Overlay Generation Language/370*.

**operator-adjustable forms.** On certain printers, the ability of the operator to adjust the page image on the medium to align data for correct placement on preprinted forms.

**option.** (1) A specification in a statement that may be used to influence the execution of the statement. (2) A choice offered from a list of possibilities.

**orientation.** The number of degrees an object is rotated relative to a reference; for example, the orientation of an overlay relative to the logical page origin. Orientation usually applies to blocks of information, whereas character rotation applies to individual characters. See also *text orientation*.

**origin.** A picture element (pel) position from which the placement and orientation of text, images, and page segments are specified. For example, pages, overlays, and page segments have origins.

**outline font.** A font technology in which the graphic character shapes are represented in digital form by a series of mathematical expressions that define the outer edges of the strokes. The resulting graphic character shapes can be either solid or hollow. Outline fonts can be scaled (sized) to any size. The IBM outline font character sets have a CZ prefix. Contrast with *raster font*.

**overlay.** A collection of constant data, such as lines, shading, text, boxes, or logos, that is electronically composed in the host processor and stored in a library and that can be merged with variable data during printing. See also *forms flash*, *page overlay*, *medium overlay*, and *electronic overlay*.

**Overlay Generation Language/370 (OGL/370).** An IBM licensed program you can use to design objects for electronic overlays, such as lines, boxes, shadings, and irregular shapes, to create graphics.

## P

**page.** (1) A data stream object delimited by a Begin Page structured field and an End Page structured field. A page can contain text, image, graphics, and bar code data. (2) The final representation of such an object on a physical medium. (3) See also *logical page*.

**page definition.** A resource used by PSF that defines the rules of transforming line data into pages and text controls.

**page format.** Synonym for *data map*.

**page mode.** The mode of operation in which a page printer can accept a page of data from a host processor to be printed on an all-points-addressable output medium. Data may consist of pages comprised of text, images, overlays, or page segments. Contrast with *compatibility mode*.

**page origin.** Synonym for *logical page origin*.

**page overlay.** An electronic overlay that can be invoked for printing and positioned at any point on the page by an Include Page Overlay structured field in the print data. See *medium overlay*.

**page position.** A control in the copy group to assign the top-left boundary point of the logical page on a sheet for a data set. The page position is determined from the media origin.

**page printer.** Any of a class of printers that accepts MO:DCA-P pages, constructed of page data and images, among other things. Contrast with *line printer*.

**Page Printer Data Stream.** The type of data stream produced by PSF/2 and PSF/6000 to support such AFP printers as the 4019, 4029, and 4039.

**Page Printer Formatting Aid/370 (PPFA/370).** An IBM licensed program you can use to create and store form definitions and page definitions, which are resource objects used for managing print jobs. By writing a command stream specifying form definitions, page definitions, or both, for executing PPFA/370, you can store the objects specified in the library. You can then use these objects to format printed output.

**page segment.** A resource containing MO:DCA data and images, prepared before formatting and included during printing. A page segment can contain text and images and can be included on any addressable point on a page or electronic overlay. A page segment assumes the environment of an object in which it is included.

**PAGEDEF.** A JCL parameter that specifies a page definition. See *page definition*.

**parameter.** (1) A variable that is given a constant value for a specified application and that may denote the application. (I) (A) (2) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

**partial page.** A page that does not contain all the intended data. Partial pages can be printed after an error is sensed.

**partition.** In basic N\_UP printing, the division of the medium presentation space into a specified number of equal-sized areas in a manner determined by the current physical medium.

**partitioned data set (PDS).** A data set in direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data. Contrast with *sequential data set*.

**pattern storage (PST).** An area of storage that holds the raster patterns for fonts and images.

**PDS.** See *partitioned data set*.

**pel.** Synonym for *picture element*.

**PEM.** Print-error marker. See *exception highlighting*

**Personal System/2.** IBM's personal computers that use an 80286, 80386, or 80486 processor.

**PEV.** Print-error vector. See *exception highlighting*

**physical medium.** A physical entity on which information is presented. Examples of a physical medium are a display screen, paper, foils, microfilm, or labels.

**picture element.** (1) In computer graphics, the smallest element of a physical medium that can be independently assigned color and intensity. (T) (2) The smallest element that can be printed or displayed on a physical medium. Picture elements per inch is often used as a measurement of presentation granularity. Synonymous with *pel*.

**pitch.** The character size represented by the number of characters that can be printed horizontally in an inch; for example, 10 pitch has 10 graphic characters per inch. Uniformly spaced fonts are measured in pitch. Contrast with *point*.

**point.** A unit of about 1/72 inch used in measuring type. Contrast with *pitch*.

**point size.** The height of a font in points.

**portrait page presentation.** The position of a printed sheet that has its short edges as the top and bottom

and its long edges as the sides. Contrast with *landscape page presentation*.

**PPDS.** See *Page Printer Data Stream*.

**PPFA/370.** See *Page Printer Formatting Aid/370*.

**presentation device.** A device that produces character shapes, graphics pictures, images, or bar code symbols on a physical medium. Examples of a physical medium are a display screen, paper, foils, microfilm, or labels.

**Presentation Text Object Content Architecture (PTOCA).** An architected collection of constructs used to interchange and present presentation text data.

**print data stream.** The data stream created by PSF and transmitted to the printer.

**print direction.** (1) The direction in which characters are added to a line. (2) In PSF, the specification of inline direction for the printing of text.

**print-error marker.** See *exception highlighting*

**Print-error vector.** See *exception highlighting*

**print job.** The data that the user submits to PSF to be printed. A print job can request the printing of multiple data sets.

**print labeling.** A controlled method of placing identification labels on each page of PSF printed output. See also *guaranteed print labeling*.

**print position.** Any location on a medium where a character can be printed.

**print quality.** (1) The measure of printed output against existing standards and in comparison with jobs printed previously. (2) The ability of some page printers to print data at more than one level of print quality, such as *draft* and *near-letter* quality.

**print-quality levels.** The capability on certain printers for you to specify more than one level of print quality, such as *draft* or *near letter quality*.

**print server.** (1) A functional unit that provides shared services to workstations over a network; for example, a file server, a print server, or a mail server. (T) (2) In a network, a data station that provides facilities to other stations; for example, a file server, a print server, or a mail server. (A) (3) In the AIX operating system, an application program that usually runs in the background and is controlled by the system program controller. (4) In TCP/IP, a system in a network that handles the requests of a system at another site, called a client-server,

**Print Services Facility (PSF).** A licensed program that manages and controls the input data stream and output data stream required by supported IBM page printers. PSF combines print data with other resources and printing controls to produce AFP output.

**printable area.** The area on a sheet of the paper where print can be placed.

**printer.** (1) A presentation device that produces character shapes, graphics pictures, images, or bar-code symbols on a physical medium. Examples of a physical medium are a display screen, paper, foils, microfilm or labels. See *presentation device*.

**printer-parameter member.** In PSF/VSE, the member of a phase library containing user-specified printer parameters to print a job on a page printer. The printer-parameter macroinstruction provided with PSF/VSE stores the user-specified parameters as a member of a phase library.

**printhead resolution.** The number of pels that can be printed in an inch, both horizontally and vertically.

**program temporary fix (PTF).** A temporary solution or bypass of a problem diagnosed by IBM as resulting from a defect in a current unaltered release of the program.

**programming request for price quotation (PRPQ).** A customer request for a price quotation on alterations or additions to the functional capabilities of system control programming or licensed programs. The RPQ may be used in conjunction with computing system RPQs to solve unique data processing problems.

**proportionally spaced font.** A typographic font, or in some usages a mixed-pitch font. See *typographic font* and *mixed-pitch font*.

**PSF.** See *Print Services Facility*.

**PSF Direct.** A function of PSF/2 of PSF/6000 that enables another PSF program (PSF/MVS, PSF/VM, PSF/VSE, or PSF/400), using the LU6.2 SNA protocol, to print remotely on PSF/2 or PSF/6000 printers. The PSF program sends the print data stream directly to the PSF/2 or PSF/6000 printer, bypassing the OS/2 or RISC/6000 spool. The operator of the originating system controls printing on the PSF/2 or PSF/6000 printers, as though the printers were attached to the originating system.

**PS/2.** Personal System/2.

**PTF.** Program temporary fix.

**PTOCA.** See *Presentation Text Object Content Architecture*.

## R

**raster font.** A font technology in which the graphic characters are defined directly by the raster bit map. Contrast with *outline font*.

**raster pattern.** A pattern of bits with 0 (off) and 1 (on) that define the pels in an image. A 1-bit is a toned pel.

**raster pattern overlay.** An overlay loaded in the printer as a raster pattern rather than as a sequence of printer commands. Contrast with *coded overlay*.

**raster pattern storage (RPS).** An area of storage that holds raster patterns for fonts and images.

**Remote PrintManager Version 2.0.** A program that runs on a personal computer and stores MVS and VSE printer resources (fonts, overlays, and page segments) in the personal computer's fixed-disk for use by an attached printer. As of September, 1994, RPM 2.0 is no longer marketing, because it has been replaced by the PSF Direct function on OS/2 and AIX/6000. See *PSF Direct*.

**Remote PrintManager Version 3.0.** A program that runs on a personal computer connected to a Local Area Network (LAN) and that connects printers to the LAN. ASCII files created on the personal computer and files sent from an MVS, VM, VSE, or OS/400 host are placed on the remote print spool by RPM, which then acts as a print server and schedules the converted ASCII files and host files for printing. RPM 3.0 also stores MVS and VSE resource files in its resource library, which eliminates the need to download the resources each time a file using these stored resources is printed. RPM 3.0 is no longer sold or serviced, because it has been replaced by the Distributed Print Facility (DPF) of PSF/2 1.10.

**repositioning.** A process in which Print Services Facility, following an indication from the printer or from JES of a potentially recoverable error, locates the correct spool record for recomposing one or more pages for printing.

**request for price quotation (RPQ).** A customer request for a price quotation on alterations or additions to the functional capabilities of a computing system, hardware product, or device. The RPQ may be used in conjunction with programming RPQs to solve unique data processing problems.

**resident fully described fonts.** Fonts stored in a printer but that have most of the attributes that can be specified for host fonts.

**resident symbol sets.** A type of font stored in a printer that has fewer attributes than can be specified for fully described fonts.



**resolution.** (1) In computer graphics, a measure of the sharpness of an image, expressed as the number of lines and columns on the display screen. (2) The number of pels per unit of linear measure.

**resource.** (1) A collection of printing instructions used by Print Services Facility in addition to the print data set, to produce the printed output. PSF resources include coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions. (2) Any source of aid used for performing a task, for example disk storage space, computer processing time, and communications lines.

**rotation.** Synonym for *character rotation*. See also *orientation*.

**routine.** A program or sequence of instructions called by a program that may have some general or frequent use. (I) (A)

**RPM.** See *Remote PrintManager*.

**RPQ.** See *request for price quotation*.

**rule.** A solid or patterned line of any weight, extending horizontally or vertically across a column, row, or page.

## S

**SCS.** See *SNA Character String*.

**SDLC.** Synchronous Data Link Control.

**security label.** In a trusted computing base, a security label used to maintain multiple levels of security on a system. This label is a combination of a security class and a security level.

**sense data.** (1) Data describing an I/O error. Sense data is presented to a host system in response to a Sense I/O command. (2) In SNA, the data sent with a negative response indicating the reason for the response.

**sequential data set.** In MVS, a data set whose records are organized on the basis of their physical positions, such as on magnetic tape. Contrast with *partitioned data set*.

**sheet.** A division of the physical medium on which data is presented. The IPDS architecture defines four types of sheets: cut-sheet forms, continuous forms, envelopes, and computer output on microfilm. Each sheet has a front and a back side. Some types of media consist of multiple sheets. For example, a roll of continuous forms can be divided at the perforations into rectangular sheets. Each sheet usually has carrier or tractor-feed strips, also. Microfilm is another example of a medium comprising multiple sheets, whereas

envelopes comprise only one sheet. Synonymous with *form*.

**simplex printing.** Printing on only one side of the paper. Contrast with *duplex printing*.

**single-byte coded font.** A font in which the characters are defined by a 1-byte code point. A single-byte coded font has only one coded font section. Contrast with *double-byte coded font*.

**SNA.** Systems Network Architecture.

**SNA Character String.** In SNA, a character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

**SNA-attached.** In PSF, a device linked to the host system through VTAM that uses an SNA protocol to transfer data. The device does not need to be physically connected to the host; some printers are attached to a control unit, a communication controller, or both, and they can transfer data over telecommunication lines. For example, a 3820 attached to a communication controller using the LU 6.2 communication protocol to transfer data to a communication controller is considered an SNA-attached printer. Contrast with *channel-attached*.

**soft page segment.** A resource that is not declared in the Map Page Segment structured field but is sent to the printer inline with data. Contrast with *hard page segment*.

**spooled printing.** A printing mode in which a print file is sent to a spooling subsystem. The spooling subsystem then directs the file to a printer.

**storage.** (1) A unit into which recorded text can be entered, in which it can be retained and processed, and from which it can be retrieved. (T) (2) The action of placing data into a storage device. (I) (3) A storage device. (A)

**structured field.** A self-identifying string of bytes and its data or parameters.

**subgroup.** A set of modifications within a copy group that applies to a certain number of copies of a form. A copy group can contain more than one subgroup.

**suppression.** Synonym for *text suppression*.

**symbol set.** A coded font that is usually simpler in structure than a fully described coded font. Symbol sets are used where typographic quality is not required. Examples of devices that may not provide typographic quality are dot-matrix printers and displays.

**symbology.** Synonym for *bar code symbology*.

**Synchronous Data Link Control (SDLC).** A discipline for managing synchronous information transfer over a data link connection.

**SYSOUT.** See *system output stream*.

**system output stream (SYSOUT).** An indicator used in a data definition (DD) statement to signify that a data set is to be written on a system output unit.

**Systems Network Architecture (SNA).** In IBM networks, the description of the layered logical structure, formats, protocols, and operational sequences that are used for transmitting information units through networks, as well

## T

**table reference character (TRC).** An optional control character in an input record that identifies the font to be used to print the record. The table reference character corresponds to a font number defined in a page definition font list or to the order of font names listed in the job control CHARS parameter.

**text.** A graphic representation of information on an output medium. Text can consist of alphanumeric characters and symbols arranged in paragraphs, tables, and columns.

**text orientation.** A description of the appearance of text as a combination of print direction and character rotation.

**text suppression.** The intentional omission of portions of text, specified in a copy group in the form definition.

**throughput.** (1) A measure of the amount of work performed by a printer over a period of time, for example, the number of impressions per minute. (2) A measure of the amount of work performed by a computer system over a period of time, for example, the number of jobs per day. (I) (A)

**token ring.** A network configuration in which tokens are passed in a circuit from node to node. A node that is ready to send can capture the token and insert data for transmission.

**trace.** A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (A)

**TRC.** Table reference character.

**tumble duplex printing.** Duplex printing for sheets that are to be bound on the short edge of the paper regardless of whether the printing is portrait or landscape. Contrast with *normal duplex printing*.

**two-channel switch.** A hardware feature that allows an I/O device to be attached to two channels. A dynamic switch can be added, which allows both interfaces to be enabled at the same time with channel selection determined by programming.

**type size.** (1) A measurement in pitch or points of the height and width of a graphic character in a font. (2) One of the many attributes of a font; other attributes, for example, are weight and width.

**typeface.** A collection of fonts all having the same style, weight, and width. Each font differs from the others by point size or type family.

**typographic font.** A font in which the distance between characters varies. The distance from one character to another is adjusted to improve the visual flow of text by eliminating excess space.

## U

**UCS.** See *universal character set*.

**unbounded-box font.** A font designed to use unbounded character boxes. Contrast with *bounded-box font*.

**unformatted print records.** Line data made up of fields of data that have not been formatted into print lines. PSF uses a page definition to format these records for printing on page printers.

**uniformly spaced font.** A font in which the characters have the same character increment. Contrast with *proportionally spaced font*.

**universal character set (UCS).** A printer feature that permits the use of a variety of character arrays.

**UPA.** See *user printable area*.

**user printable area (UPA).** The area within the valid printable area (VPA) where user-generated data can print without causing an exception condition. See also *valid printable area*.

## V

**valid printable area (VPA).** The intersection of a logical page with the area of the medium presentation space in which printing is allowed. If the logical page is a secure overlay, the area in which printing is allowed is the physical printable area. If the logical page is not a secure overlay, and if a user printable area is defined, the area in which printing is allowed is the intersection of the physical printable area with the user printable area. If a user printable area is not defined, the area in

which printing is allowed is the physical printable area. See also *logical page* and *user printable area*.

**value.** A quantity assigned to a constant, a variable, a parameter, or a symbol in a command.

**Virtual Telecommunications Access Method (VTAM).** A set of programs that maintains control of the communication between terminals and application programs running under DOS/VS, OS/VS1, and OS/VS2 operating systems.

**VPA.** See *valid printable area*.

**VTAM.** Virtual Telecommunications Access Method.

## W

**wide forms.** (1) Forms that have their longer edges at the top and bottom and their shorter edges at the sides.  
(2) Forms that have perforations on the longer edge of the paper and tractor holes on the shorter edge.

## X

**XA.** Extended Architecture.

**X-axis.** In printing, an axis perpendicular to the direction in which the paper moves through the printer. See also *Y-axis*.

## Y

**Y-axis.** In printing, an axis parallel with the direction in which the paper moves through the printer. See also *X-axis*.

## NUMERICS

**4028 Font Metrics.** 4028 Font Metrics contain font values that correspond to the 4028 resident fonts and are used to format text on the host and print the text on 4028 or 39xx printers. 4028 Font Metrics contain all the information for formatting characters but do not contain the characters themselves, which means they cannot be downloaded.



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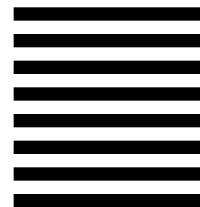
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