IBM Network Printers 12, 17, 24
IBM Infoprint 20, 21, 32, 40, 45
IBM Infoprint 70

IPDS and SCS Technical Reference

S544-5312-07

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Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page xiii.

Eighth Edition (April 2000)

This version obsoletes S544-5312-06.

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About This Book

The *IBM Network Printers: IPDS and SCS Technical Reference* provides technical reference information about how Network Printers support the IPDS data stream.

Audience

This publication is intended for the system programmers, application programmers, and systems engineers who are familiar with data streams and are writing or modifying programs to operate the IBM network printers with IPDS and SCS data streams.

Conventions Used

The following typeface conventions are used in this publication.

Table 1. Typographic Conventions

Typographic Convention	Meaning
clearable warnings	Italics are used for variables
-**duplex***boolean*	Plain italics and lowercase are used for options and switches for either commands or variables
[. . . .]	Items in brackets [.....] indicate optional parameters. (Do not type the brackets when you enter the command.)
< >	Identifies a control code character, such as <CR> for carriage return, or a special identifier.
<	Indicates that the current line of code is a continuation of the previous line.

Terminology

Network Printers

In the manual, the term *network printers* refers to the Network Printer 12, Network Printer 17, Infoprint 20, Infoprint 21, Network Printer 24, Infoprint 45, Infoprint 32, and Infoprint 40.

Paper Input and Output Receptacles

Input receptacles are called trays. Output receptacles are called stackers or bins.

Related Publications

Each network printer ships with setup documentation and a CD-ROM which includes the entire printer library for viewing and printing. The following books may be of particular interest:

- *IBM Network Printers: PCL and PostScript Technical Reference*, S544-5344
- *IBM Network Printers: IPDS and SCS Technical Reference*, S544-5312
- *IBM Network Printers: Twinax/Coax Configuration Guide*, G544-5241

In addition, this book refers to the following non-IBM publications:

- PostScript Language Reference Manual, second edition, by Adobe Systems, Inc.
- PCL 5 Printer Language Technical Reference Manual by Hewlett-Packard, Inc.
- PCL 5 Comparison Guide by Hewlett-Packard, Inc.
- Printer Job Language Technical Reference Manual by Hewlett-Packard, Inc.

Chapter 1. Introduction

This chapter introduces the Intelligent Printer Data Stream (IPDS) and describes some of the capabilities of IPDS when used with the Network Printers (with an IPDS feature).

About IPDS

IPDS lets you print pages containing an unlimited mix of different types of data: high-quality text, images, vector graphics, and bar codes.

You can send IPDS data to printers attached to the IBM Application System/400 (AS/400) intelligent work stations, local area networks, IBM 3270-family controllers, Twinax (5270), Token-ring (UTP, STP/4 and 16 Mbps), Ethernet (10base-T and 10base2), and spooled systems. In some of these environments, you can create applications to directly control IPDS printers such as this printer. For more information about IPDS as a component of printing subsystems, refer to *Intelligent Printer Data Stream Reference*.

IBM provides a variety of host software products with components that generate IPDS commands for this printer or other IPDS printers. These software products vary in their use of IPDS functions. Some of the software products available are:

- Graphical Data Display Manager (GDDM) Release 2.3 or higher
- OS/400 Version 2.1 or higher
- Print Service Facility (PSF/VM) Release 2.1.1 or higher
- Print Service Facility (PSF/MVS) Release 2.1.0 or higher
- Print Service Facility (PSF/VSE) Release 2.2.1 or higher
- Print Service Facility (PSF/400) Release 3.1 or higher
- Print Service Facility (PSF/2) Release 1.0 or higher
- Print Service Facility (PSF/6000) Release 1.2 or higher
- OfficeVision/400 Version 2.2 or higher
- Business Graphics Unit (BGU)
- Control Language (CL) and Data Description Specifications (DDS)
- OS/400 Graphics
- AFP Utilities/400 Version 2.2 or higher

These software utilities accept a variety of input data streams from a wide assortment of applications and transform this data to IPDS. Examples of such applications are:

- DisplayWrite System 370 (DW/370) Version 2
- Document Composition Facility (DCF), including GML/Script, in the VM and MVS environments.
  - Overlay Generation Language (VM and MVS)
  - Print Services Access Facility (VM and MVS)
  - Page Printer Formatting Aid (VM and MVS).

Note: The capabilities of the printer depend on the host software and the IPDS functions that the software enables.

Capabilities of IPDS

A printer controlled by IPDS has a number of advantages over conventional printers. With IPDS you can:

- Use the printer's all-points-addressable printing to print text, graphics, images, or bar codes at any point on a page or that is within the printers printable area.
- Print text in a variety of type styles and switch fonts within a printed page.
- Use both images and vector graphics (explained later in this chapter) to print line drawings, pie charts, bar charts, graphics, logos, tables, and signatures.
- Combine text with images and graphics on the same page (creating what is known as a *composite document*).
- Electronically store and later print forms and letterheads that are always printed in the same predetermined type style.
- Electronically store and later print text where the type style printed is the same as that used in the rest of the text.
- Print any of 16 different kinds of bar codes in many sizes and with a number of variations.
- Print either portrait (upright, letter orientation) or landscape (printing "on the side", with the page wider than it is tall).
- Print on either one side or both sides of the paper (with duplex option).

Printing a Letter

IPDS lets you print a letter in just one step. In conventional printing (Figure 1), you must load letterhead paper into your printer, print the text of your letter, and then manually sign the letter.

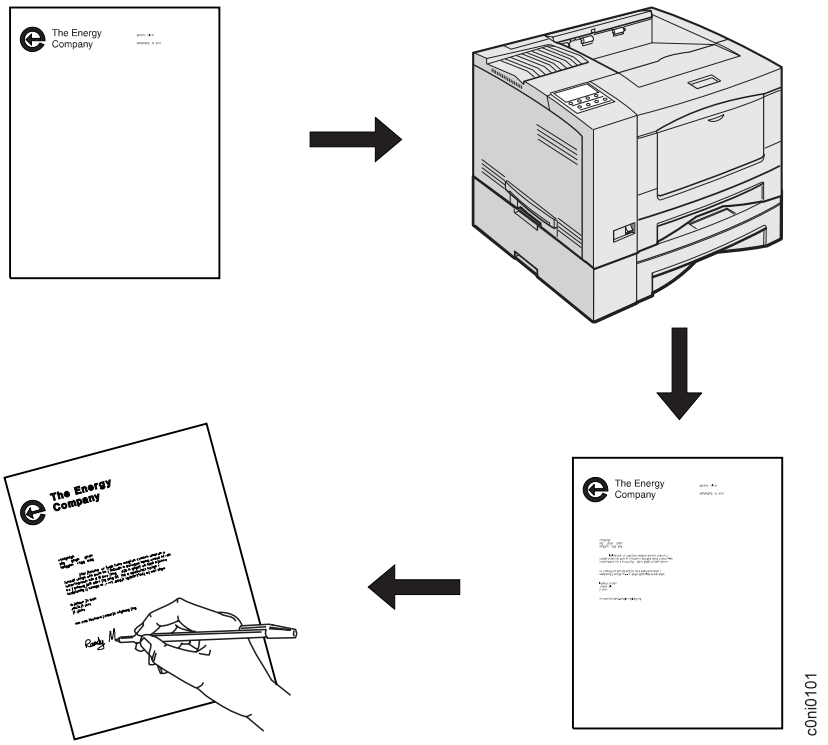


Figure 1. Conventional Letter Preparation

Using IPDS (Figure 2), you can temporarily store your letterhead and signature in the printer's memory and then merge the letterhead, text, and signature with additional data to form a complete letter. You can also include graphics, such as a line chart or bar chart, in your letter, creating a composite document.

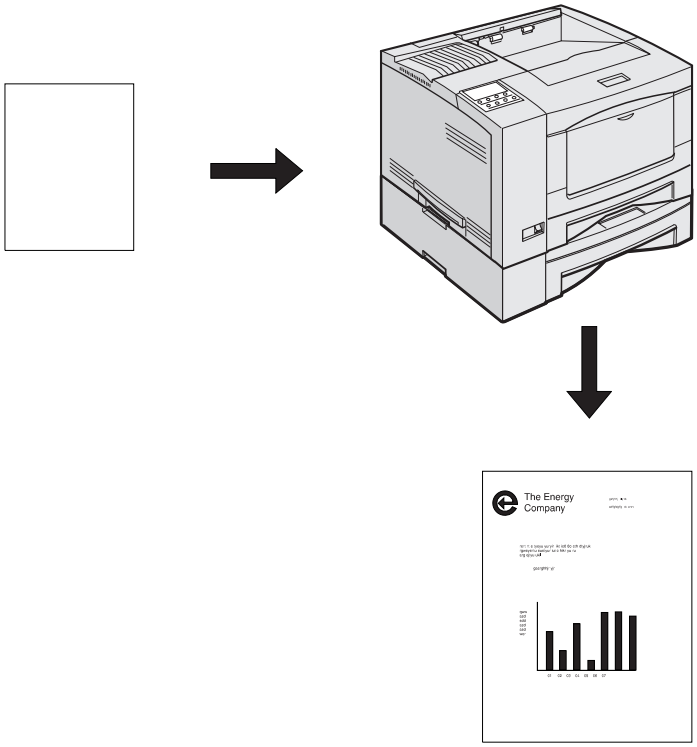


Figure 2. IPDS Letter Preparation

An IPDS-driven printer offers flexibility. For example, you can highlight a list of items by printing the list in a different type style from the rest of the text; or you can print your letterhead in one font and your text in another font.

You can electronically store your letterhead so it is always printed in the same type style. This printing concept is discussed in "Using Overlays".

You can store your printed signature block so it is printed in the type style used in the rest of the letter or memo. That way the signature block's type style matches the letter in which it appears, no matter how many different fonts you use for different kinds of letters. This printing concept is discussed in "Using Page Segments" on page 4.

You can include bar charts or line graphs in your letter. Such graphic material can be generated through either the Image function or the Graphics function. See "Using Images and Graphics" on page 5.

Using Overlays

Overlays are stored constructs (text, graphics, images, and bar codes), often in complex configurations, with all the instructions needed to print. An overlay always prints in the type style used when it was stored and can be positioned anywhere on the page.

Overlays are useful for letterheads and for forms, as shown below in Figure 3.

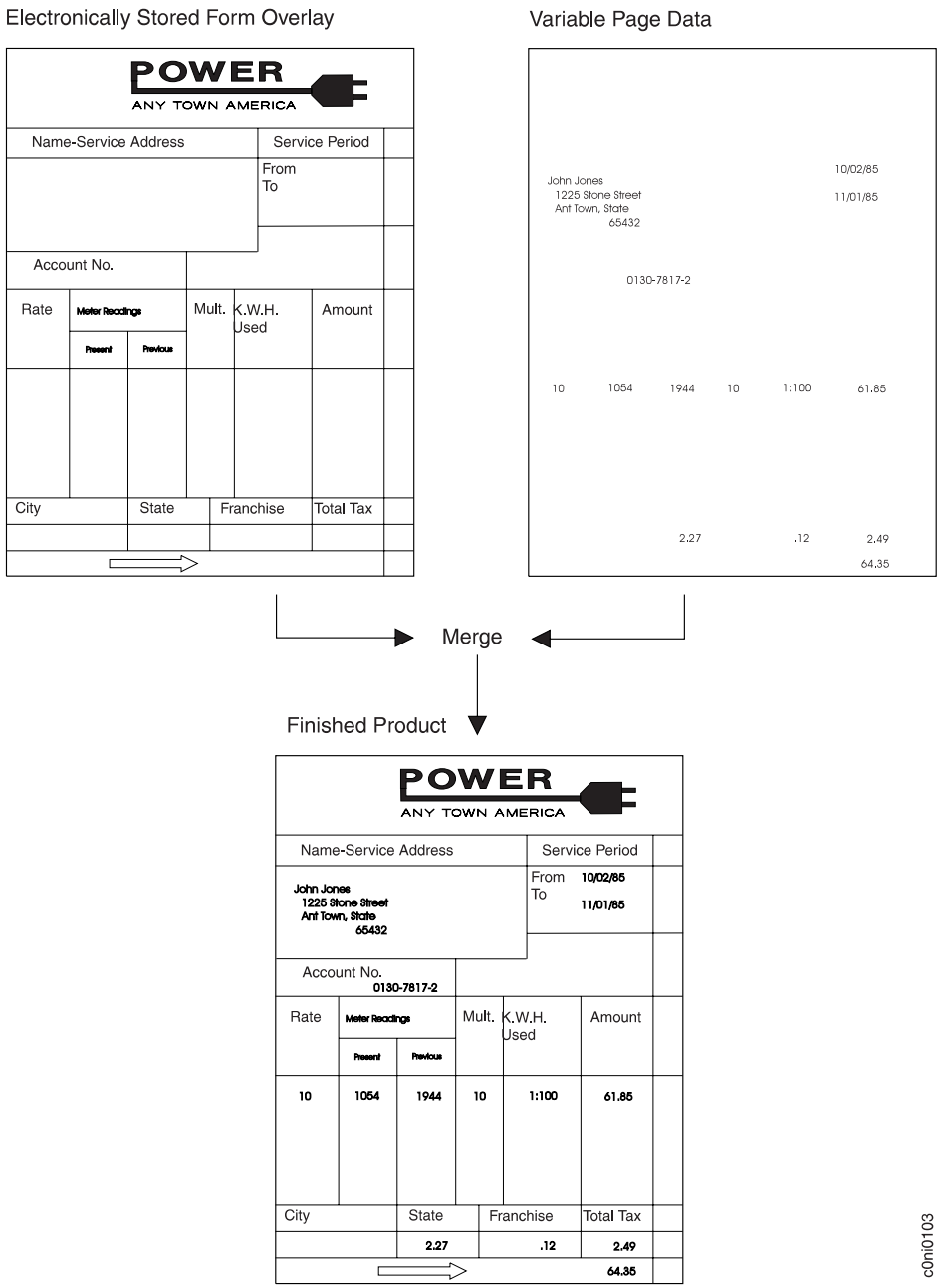


Figure 3. Using Overlays

Using Page Segments

Page segments are similar to overlays, except that the construct is stored without specific instructions for type styles and position on the page. Page segments are printed in the type style in use at print time. You can place a page segment anywhere on the page.

One way to use a page segment is as text under a signature, as shown in Figure 4.

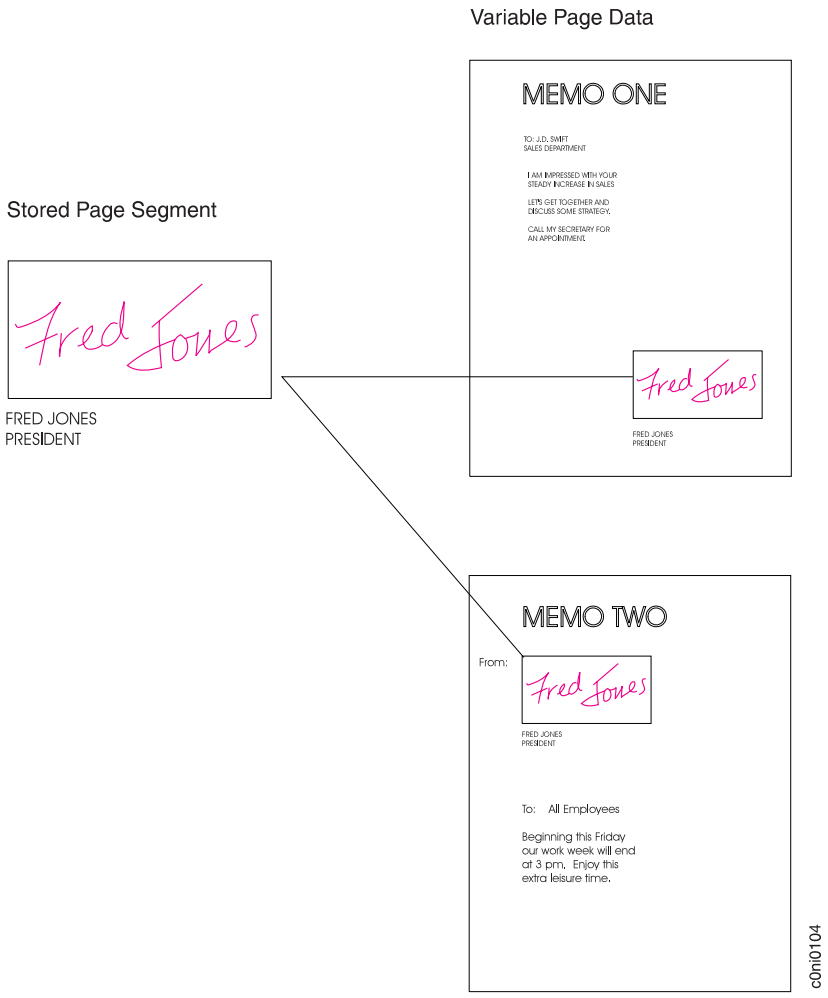


Figure 4. Using Page Segments

Using Images and Graphics

Graphic material—charts, engineering drawings, and line drawings—can be sent to the printer as IM Images, IO Images, or Graphics.

In all-points-addressable printing by the printer, a page can consist of 300 points per inch, 7.8 million printable points, each one of which is individually addressable. These addressable points are called *picture elements* or *pels*.

IM and IO Images

Images are figures on the page created by explicitly specifying each pel in the figure. There is one bit of image data per pel, so a large quantity of data is needed to create an image.

IM images are uncompressed raster data images. A raster pattern is composed of a series of pels arranged in scan lines.

IO images are compressed or uncompressed raster data images. Compression generally reduces the amount of data sent to the printer and should significantly

save transmission time. IO images may be arbitrarily scaled and corrected for resolution differences between the scanner and the printer.

Graphics

Graphics are line drawings created from separate lines, arcs, and markers. With vector graphics, only control information such as the end points of a line are sent to the printer. This process lets you create complex figures with a minimum of data.

For details on graphics commands, see *IBM Data Stream and Object Architectures Graphics Object Content Architecture (GOCA) Reference*, SC31-6804. For details on IO image commands, see *IBM Data Stream and Object Architectures Image Object Content Architecture (IOCA) Reference*, SC31-6805.

Using Bar Codes

Bar code data is encoded information that is recognized by optical scanning devices. The printer can print the bar code types shown in Figure 5 on page 7 in many sizes and variations, such as with or without the human-readable characters.

Figure 5. Bar Codes from the printer (IPDS)

Printing in Duplex Mode

The printer can print on one or both sides of the paper. All of the printer's IPDS capabilities are provided in either mode.

Duplex printing is controlled through the IPDS Load Copy Control (LCC) command.

Chapter 2. IPDS Overview

The Intelligent Printer Data Stream (IPDS) is a structured field data stream designed to manage and control All Points Addressable (APA) printers. APA is a printing concept that allows users to position text, images, graphics, and overlays at any defined point on a printed page.

IPDS allows both data and commands to be streamed to the printer via channels, controllers or any type of networking link which supports the transparent transmission of data to print processes that are resident in the device.

Commands within the data stream also allow the "Host" process to control the media handling capabilities of the device, select source drawers, jog output and other operations dealing with paper. In addition, the commands provide the means for managing the down-loading of fonts and other stored resources such as overlays and page segments that are required at presentation time to construct the printed page. Finally, the commands provide the means for returning error information and performing recovery actions. The source IPDS architecture document is the *Intelligent Printer Data Stream Reference*.

Network Printers support the following IPDS Architecture command sets.

- Device Control (DC1)
- Text (TX1 with PTOCA PT1 and PTOCA PT2)
- IM Image (IM1 with IMD1)
- IO Image (IO1 with IOCA FS10 + 8-bit Grayscale via halftoning)
- Graphics (GR1 with GOCA DR/2V0)
- Page Segments (PS1)
- Overlay (OL1)
- Loaded Font (LF1 and LF3)
- Bar Code (BC1 with BCD1)

IPDS Operating States

If the host sends a command inappropriate for the printer state, the printer returns an error code identifying the error and follows Exception Handling Control processing.

Home State

The following actions can force the printer to home state, regardless of the current state of the printer:

1. The Set Home State (SHS) command
2. The Execute Order Anystate--Discard Buffered Data (XOA/DBD) command
3. The printer's transmission of a NACK to the host
4. The Arctic link-level Clear command
5. Any non-IPDS print order in NDS (New Display System)
6. An NDS Reset order
7. An NDS System Status Available No Mode order

All these actions will also force the printer to an IPDS command boundary if it is not already on one. To interpret SHS or XOA/DBD, the printer and the host must already be in agreement as to where the IPDS command boundaries are.

Deactivation of fonts with the DF command occurs in Home State.

Overlay State

Overlays can be nested to a depth of 6 as indicated in the STM Overlay Command-Set Vector (Table 44 on page 68).

Font State

An operating state for downloading single-byte and double-byte Coded Font patterns, Font Character Sets, and Code Pages.

IPDS Command Format

All IPDS commands are encoded in the following pattern:

Table 2. IPDS Command Format

Data Area	Value	Description	Error Code
Byte 0-1	X'0005' - X'7FFF'	LENGTH	X'0202..02'

Table 2. IPDS Command Format (continued)

Data Area	Value	Description	Error Code
Byte 2-3		COMMAND	X'8001..00'
	X'D601'	Manage IPDS Dialog	
	X'D603'	No Operation	
	X'D60F'	Load Font Index	
	X'D619'	Load Font Character Set Control	
	X'D61A'	Load Code Page Control	
	X'D61B'	Load Code Page	
	X'D61D'	Load Equivalence	
	X'D61F'	Load Font Control	
	X'D62D'	Write Text	
	X'D62E'	Activate Resource	
	X'D62F'	Load Font	
	X'D633'	Execute Order Anystate	
	X'D63D'	Write Image Control	
	X'D63E'	Write Image Control 2	
	X'D63F'	Load Font Equivalence	
	X'D64D'	Write Image	
	X'D64E'	Write Image 2	
	X'D64F'	Deactivate Font	
	X'D65D'	End	
	X'D65F'	Begin Page Segment	
	X'D66D'	Logical Page Position	
	X'D66F'	Deactivate Page Segment	
	X'D67D'	Include Overlay	
	X'D67F'	Include Page Segment	
	X'D680'	Write Bar Code Control	
	X'D681'	Write Bar Code	
	X'D684'	Write Graphics Control	
	X'D685'	Write Graphics	
	X'D68F'	Execute Order Homestate	
	X'D697'	Set Home State	
	X'D69F'	Load Copy Control	
	X'D6AF'	Begin Page	
	X'D6BF'	End Page	
	X'D6CF'	Logical Page Descriptor	
	X'D6DF'	Begin Overlay	
	X'D6E4'	Sense Type and Model	
	X'D6EF'	Deactivate Overlay	
Byte 4		FLAGS (Active when Bit value = 1)	X'0204..02'
	Bit 0 0/1	Acknowledgement Required (ARQ)	
	Bit 1 0/1	Correlation Number Present	
	Bit 2 0/1	Acknowledgement Continuation	
	Bit 3-6 000	Reserved	
	Bit 7 0/1	Persistent NACK (DSC non-SNA ONLY) (Otherwise Reserved)	
Byte 5-6	X'0000'-X'FFFF'	CORRELATION ID	
Byte 7		DATA - The specific operands, parameters and/or data fields as appropriate for the given command.	

Reserved Bytes

Throughout the command descriptions in the following chapters, some data fields, bytes, and bits are specified as *reserved*.

When the description for a reserved field, byte, or bit specifies “should be zero,” the printer does not check the contents of the bytes or bits. The reserved data should be set to zero, because they could be defined in future changes to the printer. However, non zero values do not cause an error and are ignored by the printer.

When the description for a reserved field, byte, or bit specifies it “must be zero,” the printer checks the contents of the bytes or bits and will return error status to the host if the field contains a non zero value.

Flag Byte

Bit 7 is the Persistent NACK bit for 3270 Non-SNA DSC (Data Stream Compatability) Mode NACKs. This bit has no meaning in other attachment environments. Valid values for the Acknowledge Reply Flag byte are described in the *Intelligent Printer Data Stream Reference*.

Correlation ID (CID)

The correlation ID (CID) is an identifier of a specific instance of an IPDS command. It is used to correlate errors with the command that generated them.

It is not possible to correlate all errors with particular IPDS commands. Mechanism errors (for example, out of paper position checks and unpopulated character positions in resident fonts) are never correlated. Therefore, it is possible for some NACKs to be returned without correlation numbers even if all downstream commands had correlation numbers.

Error Processing

Network Printers support Page Continuation Action error processing. See *Intelligent Printer Data Stream Reference* for details.

The printer stops if there is a probability that it is not parsing commands correctly. This means that, regardless of the setting of the Exception Handling Control (EHC) the printer will stop processing, send a NACK, and enter home state immediately if one of the following conditions occurs:

1. The command length is less than 5 (No correlation number present).
2. The command length is less than 7 (Correlation number present).
3. The command length is greater than 32767.
4. The command does not have X’D6’ as the first byte of the command code.
5. The command does have X’D6’ as the first byte but is otherwise unrecognized.
6. A resource download is interrupted, resulting in a purge of the partial resource object.

The maximum number of queued asynchronous and synchronous errors are as followed.

- One for ARCTIC and NDS DSC mode
- Seven for NDS LU1 mode
- Seven for TCP/IP mode

Intervention required and equipment check exception types will be reported for NDS and TCP/IP interface type.

Exception Highlight Support

If a position exception occurs and the "position-check highlight" flag (XOA-EHC byte 2, bit 6) is on (B'1'), or if a Page Continuation Action (PCA) is taken for a position check, the approximate location of each unique occurrence of the position check will be highlighted with a Print-Error-Marker (PEM). Other exceptions detected in page state, or a derivative of page state, or when printing a medium overlay, which have a PCA defined, are also indicated by a PEM when the PCA is taken.

A PEM is a distinguishing mark which is placed in close proximity to the area on the page where the exception has occurred.

- The PEM for Position Check processing is a solid rectangular mark, placed in close proximity to the area on the page where the exception occurred. For the exception detected, the associated code (08C100) will be located at the top of the logical page, starting in the left hand corner.
- The PEM for PCA processing is a hollow rectangular mark enclosing a +, placed in close proximity to the area on the page where the exception has occurred, if the location can be accurately specified. For the exception detected, the associated code (040B00) will be located at the top of the logical page, starting in the left hand corner.
- Multiple exception code highlighting is limited to only the codes that will fit across the top of the logical page (10).
- PEM Size: 600 Pel (80 by 80)

If error exception handling is set to allow printing of an undefined character, the undefined character will appear as:

- A Space if it is unprintable.
- The Character itself if printable.

Page and Copy Counters

Page and Copy Counter information is reported using the 18-byte counter format described in *Intelligent Printer Data Stream Reference*, section "Acknowledge Reply". The following counters are supported:

- Received Page
- Committed Page
- Committed Copy
- Operator Viewing Page
- Operator Viewing Copy
- Jam Recovery Page
- Jam Recovery Copy
- Stacked Page
- Stacked Copy

For Action Code 22, counters are adjusted as follows:

- Received Page - Actual Received Count
- Committed Page - Mapped to Stacked Page
- Committed Copy - Mapped to Stacked Copy
- Operator Viewing Page Counter - Mapped to Stacked Page Counter
- Operator Viewing Copy Counter - Mapped to Stacked Copy Counter
- Jam Recovery Page Counter - Mapped to Stacked Page Counter
- Jam Recovery Copy Counter - Mapped to Stacked Copy Counter
- Stacked Page Counter - Last value
- Stacked Copy Counter - Last Value

Data Types

Network Printers support four different types of data that may be used to create an output page. These are: text, graphics, images, and bar codes. The printed page can include any combination of these data types.

Blocks of graphics, bar code or image data are presented as a single unit to the printer. The printer enters the appropriate " Block" State (graphics block, image block, bar code block) to create the entire data group for that block of data.

Page segments and *Overlays* are any combinations of text, graphics, bar codes and images. The printer can store these segments and overlays for later use as the page is created.

Text

Presentation Text is the data type used to present lines of character information on a logical page.

The information to be presented is represented as a string of graphic character IDs and X'2B' control sequences that are sent to the printer in the Write Text command (See "Write Text" on page 103). The initial conditions governing the presentation of the data are established via control parameters that are sent to the printer in the Logical Page Description command (See "Logical Page Descriptor" on page 62).

The source architecture document for Text is *Presentation Text Object Content Architecture Reference*.

Image

Image is the data type used to present rectangular arrays of raster data in an Image block area on a page. This data may have been created originally by a scanning process or generated by a computer program.

Network Printers support the IM Image Function Set (see "Chapter 6. IM Image Command Set" on page 115). and the IO Image Function Set (See "Chapter 7. IO Image Command Set" on page 117) The IM Image Function Set has a syntax and functional content that is based on AFPDS image arrays and cells. The IO Image Function Set has a syntax and functional content based on the IOCA architecture for image data (see *Image Object Content Architecture Reference*).

The raster data to be presented is represented as a sequence of scan lines 'm' lines deep by 'n' picture elements (pels) wide. In IO image data, there may be more than one bit per pel if the image data is grayscale encoded. The format of the data and the recording algorithms used to encode the image array are sent to the printer as control parameters of the Write Image Control 2 command that prepares the printer for processing image data. The data itself is sent in the Write Image 2 command.

Graphics

Graphics is the data type used to present line art picture drawings in a graphics block area on a page.

The information to be presented is represented by a sequence of primitive drawing orders that are used by the device to construct arcs, lines, fillets, character strings,

markers and other elements that define the drawing. These primitive orders, in turn, are grouped into one or more drawing segments that are executed to present the picture.

The Write Graphics Control command (See "Chapter 8. Graphics Command Set" on page 123) is sent to the printer to establish the clipping window control parameters and initial drawing conditions to be used in presenting the picture data. The picture segments are sent to the printer as data in zero or more Write Graphics commands of the architecture.

The graphics drawing orders are summarized in "Drawing Orders" on page 127. The source architecture document for graphics data is the *Graphics Object Content Architecture Reference*.

Bar Code

Bar Code is the data type used to present machine-scannable bar code symbols in a bar code block area on a page.

The Write Bar Code Control command (See "Chapter 9. Bar Code Command Set" on page 135) is sent to the printer to establish the bar code pattern parameters to be used in presentation. Data for the bar code symbols is sent to the printer in zero or more Write Bar Code commands.

Coordinate System

Xm, Ym Coordinate System (Medium Presentation Space)

The Xm, Ym coordinate system is the medium presentation space coordinate system. The origin of this system (Xm=0, Ym=0) can be set by the IPDS XOH Set Media Origin command to any of the four corners of the media. If this command is not sent to the printer the origin is the top-left corner (viewed from the center). In this case, positive Xm values begin at the origin and increase along the top edge from left to right. Positive Ym values begin at the origin and increase along the left side from top to bottom. Top is defined as the short edge which leads into the printer. See *Intelligent Printer Data Stream Reference* for a description of the Xm, Ym Coordinate System and default media origin for envelopes.

Xp, Yp Coordinate System (Logical Page Presentation Space)

Identifying the Size of the Logical Page or Overlay

The size of the logical page or overlay presentation space is set during a printer initialization using the "IPDS Initialization Defaults" on page 19 or by the host program when it sends a Logical Page Descriptor command.

Overlays are logical pages and are handled as such by the printer with the following special considerations:

1. Overlays are positioned in relationship to the logical page presentation space origin (Xp=0, Yp=0) when they are merged with the Include Overlay command.
2. Overlays are positioned in relationship to the origin of the medium presentation space (Xm=0, Ym=0) when they are merged with the Merge Overlay keyword in a copy control record.

I, B Coordinates System (Text)

The +I and +B directions for the logical page or overlay are specified in degrees of rotation in relationship to the +Xp direction on the logical page.

The printer sets the +I and +B directions during the initialization through the "IPDS Initialization Defaults" on page 19. The host program can change the +I and +B directions through the Logical Page Descriptor command (See *Intelligent Printer Data Stream Reference*).

The host program can also change the +I and +B directions as it builds a page or overlay through text controls in the print data sent by a Write Text command (See "Write Text" on page 103).

Note: Setting the orientations of the +I and +B axes also implicitly sets their origins as one of the four corners of the logical page or overlay.

Other Text Positioning Terms

Some other terms that relate to text positioning and fonts include:

Text Orientation

The combination of the *inline sequence direction* (the direction which characters are added to a line) and the *baseline sequence direction* (the direction which lines are added to a page or overlay) identify the text orientation for a page. The inline sequence direction can be 0, 90, 180 or 270 degrees. Network Printers support baseline sequence directions that are always rotated plus or minus 90 degrees from the inline sequence direction. Therefore, there are eight text orientations for printing pages or overlays.

Printing Baseline

An imaginary line that extends across the page or overlay in the positive inline sequence direction (+I), between pels, and beginning from the baseline sequence printing coordinate (Bc). (Sometimes shown as *baseline* as in the font terms baseline offset and baseline extent.)

In languages with a right to left or left to right reading order (for example, English), the printing baseline is the imaginary line on which the main body of the character appears to rest. Descenders (the "tails" of lower case g, j, p, q, and y characters) usually extend below the printing baseline.

In languages with a top to bottom reading order (for example, Kanji), the printing baseline is an imaginary vertical line that passes through the center of the character.

Each font index record contains a Font Inline Sequence field. The field value specifies a relationship between the inline sequence direction and the font rotation (the character pattern rotation for the font). The printer uses the font index record to identify how to place characters on the printing baseline for a page or overlay. The characters are placed in the combination of the inline sequence direction (the printing direction) and the font rotation.

The Baseline Offset value is another field in the font index record. This value locates the printing baseline relationship to a specified character box reference edge.

Notation Conventions

Some field values (or ranges of values) are specified assuming a unit of measure of 14400 L-units per 10 inches (5670 L-units per 10 centimeters). To determine supported values for a unit of measure of 2400 L-units per 10 inches (945 L-units per 10 centimeters) use the following steps.

1. Convert the specified value from hex (2's complement) to decimal.
2. Divide the + or - decimal number by 6
3. Round to the nearest integer
4. Convert the + or - decimal value back to hex (2's complement).

For example, if the specified value is X'8000' the following steps would be performed.

```
1.  8000(H)   =  -32768(D)

2. -32768/6   =  -5461.333

3. -5461(D)   =  EAAB(H)
```

Chapter 3. Summary of IPDS Commands

This chapter lists the IPDS commands that can be used with the printer. For more information about how to use these commands, see the *Intelligent Printer Data Stream Reference*

Printer commands listed on the following pages are the valid values as identified in *Intelligent Printer Data Stream Reference* unless otherwise noted. Where the IPDS architecture allows choices, those choices are indicated.

IPDS Initialization Defaults

When you set the printer power switch to the On (|) position, various IPDS data stream parameters are set to their *initialization default* values. These values are used for control parameters when:

- The command stream specifies that the printer default should be used,
- No explicit values are specified in the command stream sent to the printer, or
- Previously transmitted values are lost and initial machine settings are reestablished at POR time.

These values remain in effect until overridden by specific data stream commands from the host application program. The following list of values remain in effect until explicitly overridden by the following IPDS commands:

- Load Copy Control
- Load Font Equivalence
- Logical Page Descriptor
- Logical Page Position
- XOA Exception Handling Control
- XOH Select Input Media Source
- XOH Set Media Origin
- XOH Set Media Size
- Text Control Sequences (STO, SIM, SIA, SBI, SCFL, STC, DIR, and DBR)

The following table shows the initialization defaults:

Description	Default Value
L-Units Base Value	X'00' (10 inches)
L-Units per Base	X'3840' (14400 per 10 inches)
Input Media Source	Determined by Operator Panel, Forms Device Setting
Media Origin	X'00' (top-left)
Width of the Physical Page	Derived from X-Extent of Medium Presentation Space
Length of the Physical Page	Derived from Y-Extent of Medium Presentation Space
Width of the Logical Page in L-Units (X_p-Extent)	Derived from X-Extent of Medium Presentation Space
Length of the Logical Page in L-Units (Y_p-Extent)	Derived from Y-Extent of Medium Presentation Space
Ordered Data Flags	X'00' (Unordered page, block, and text flags)
Inline Sequence	X'0000' (0 degrees)

Description	Default Value
Baseline Sequence	X'2D00' (90 degrees)
Initial I Print Coordinate	X'0000'
Initial B Print Coordinate	X'00C0'(192 L-Units below the logical page origin) **Note:** Text printing on the first line requires the Current B Text Position to be large enough to accommodate the height of the current font.
X_m-Coordinate page origin	X'000000' Logical page X-displacement from the physical page origin (0 in)
Y_m-Coordinate page origin	X'000000' Logical page Y-displacement from the physical page origin (0 in)
Initial Inline Margin in L-Units	X'0000'
Inter-character Adjustment	X'0000'
Baseline Increment	X'00F0' (240 L-Units)
Text Color	Black
Code Page ID	From configuration settings.
Font Type	Font selection from configuration settings. **Note:** The default font may be changed to another font which supports the selected Code Page. For printer generated bar codes with human readable information (HRI), the default font is OCR-B (UPC and EAN bar code types) or OCR-A (other bar code types with HRI).
Exception Handling Control	X'C10101' Report undefined characters, position checks, and all other exceptions. Do not take Alternate Exception Action. Terminate, print page, and go to home state. No highlighting of position checks.
Number of Copy Groups	X'01'
X-Extent of Medium Presentation Space	Determined by Configuration
Y-Extent of Medium Presentation Space	Determined by Configuration
X Coordinate (logical page origin)	X'0000'
Y Coordinate (logical page origin)	X'0000'
X_p-Extent of Logical Page	Derived from X-Extent of Medium Presentation Space
Y_p-Extent of Logical Page	Derived from Y-Extent of Medium Presentation Space
Code Page Global ID (CPGID)	Determined by Configuration
Font Global ID (FGID)	Determined by Configuration
Font Width (FW)	Determined by Configuration
Copy Group Definition Length	X'04' (The Default Copy Group definition is four bytes long.)
Number of Identical Copies	X'01' (The printer prints one copy of each page.)
Keyword Entry	X'C100' (The printer prints simplex, no text suppression, no overlays.)

Page Printer Initialization Sequence

Before printing begins, the host may determine characteristics of the printer and its resources and may specify certain parameters related to subsequent printing. Following is a typical sequence of initialization commands.

- Sense Type and Model (STM) with ARQ
- XOH Obtain Printer Characteristics (OPC) with ARQ
- Set Home State (SHS)
- Logical Page Descriptor (LPD)
- Logical Page Position (LPP)
- Load Copy Control (LCC)
- Load Font Equivalence (LFE) with ARQ

Chapter 4. Device Control Command Set

Device Control commands control basic device operations, error reporting and recovery, and construction of logical pages on the physical medium.

Before the host program sends the Begin Page command tobegin defining a page to be printed, it should establish the printing environment in which the page is tpo be printed.

The following Device Control commands are described in this section:

Acknowledgement Reply

The Acknowledge Reply returns device status, sense data, and other information the host program requests. The printer sends an acknowledgement when it finds either of the following:

1. A datastream or device error that requires the printer to return a negative acknowledgement (NACK).
2. The Acknowledgement Required (ARQ) flag bit in the command the printer receives is set to 1.

The Acknowledge Reply is returned to the host in the standard IPDS command format although it goes from the printer to the host. See *Intelligent Printer Data Stream Reference* for details.

The following table lists Bit Codes for IPDS command stream flags for Acknowledgement Reply

Table 3. Bit Codes and their Meanings

Bit Code	Meaning
Bit 0	Reserved
Bit 1	Correlation Number Present
Bit 2	Acknowledgement Continuation
Bits 3-6	Reserved
Bit 7	The Persistent NACK bit is for Non-SNA DSC Mode NACKs only. This bit has no meaning in other attachment environments.

Notes:

1. When a command is received with Bit 1 set, the Acknowledgement Reply will be returned with this bit set, indicating that a two byte "Correlation Number" follows.

   The Correlation Number, a two byte identifier, is returned if available for:

   a. Synchronous NACKs
   b. Response to information request commands
   c. Acknowledgement requested (Flag byte bit 0 = 1)

2. The Special Data area of the Acknowledgement Reply contains:
   a. Error sense bytes when reporting an exception.
   b. Response to the following information request commands:
      1) Sense Type and Model
      2) XOH Obtain Printer Characteristics
      3) XOA Request Resource List

Table 4. Acknowledgement Reply X'D6FF'

Data Area	Value	Description	Error Code
Byte 0	 X'40' X'41' X'44' X'46' X'C0'	ACKNOWLEDGEMENT TYPE: A one byte field that identifies the type of acknowledgement record and contents (if any) of the Special Data area. None Sense Type and Model Request Resource List Obtain Printer Characteristics Sense Bytes	
Bytes 1-2	X'0000' - X'FFFF'	Received Page Counter* *Incremented when the End Page processing is completed.	
Bytes 3-4	X'0000'-X'FFFF'	Committed Page Counter* *Incremented by the number of pages on a sheet when the last copy of the sheet is stacked.	
Bytes 5-6	X'0000'-X'FFFF'	Committed Copy Counter * *Incremented by the number of pages on a sheet when the sheet is stacked.	

Table 4. Acknowledgement Reply X'D6FF' (continued)

Data Area	Value	Description	Error Code
Bytes 7-8	X'0000'-X'FFFF'	Operator Viewing Page Counter* *Incremented by the number of pages on a sheet when the last copy of the sheet is stacked.	
Bytes 9-10	X'0000'-X'FFFF'	Operator Viewing Copy Counter * *Incremented by the number of pages on a sheet when the sheet is stacked.	
Bytes 11-12	X'0000'-X'FFFF'	Jam Recovery Page Counter* *Incremented by the number of pages on a sheet when the last copy of the sheet is stacked.	
Bytes 13-14	X'0000'-X'FFFF'	Jam Recovery Copy Counter * *Incremented by the number of pages on a sheet when the sheet is stacked.	
Bytes 15-16	X'0000'-X'FFFF'	Stacked Page Counter* *Incremented by the number of pages on a sheet when the last copy of the sheet is stacked.	
Bytes 17-18	X'0000'-X'FFFF'	Stacked Copy counter * *Incremented by the number of pages on a sheet when the sheet is stacked.	
Bytes 19-n		SPECIAL DATA AREA: This area contains zero or more bytes of additional data as requested by the host program defined by the Acknowledgement Type.	

Activate Resource

This command maps a 6-byte Host Assigned Resource ID (HAID/FIS/Section) to a resident Resource ID of the format specified in the Resource ID Format parameter (Byte 6). The Resource ID formats which are supported by Network Printers may be determined using the XOH OPC command (See "XOH Obtain Printer Characteristics" on page 74).

An AR mapping (HAID to Resource ID mapping) remains in effect until:

- an XOH Erase Residual Font Data command or Deactivate Font (See "Deactivate Font" on page 29) command is received (the mapping is removed and font deactivated)
- the printer performs an IML (the mapping is removed)

If a Deactivate Font command is received for a single byte font, the font identified by the HAID is deactivated (made unavailable for use by the host), but all other current font mappings remain in effect until one of the actions described in the preceding paragraph occurs. If a Deactivate Font command is received which specifies all single byte fonts, all font mappings are removed as those fonts are deactivated.

The maximum of Activate Resource ID mappings that may be received is limited only by the available memory.

Note: IPDS architecture describes the mapping and activation of resident resources as two conceptually separate processes. Network Printers, however, implement mapping and activation as one inseparable process. Un-map and de-activate are also inseparable operations. Thus, a Deactivate Font command, directed at a mapped and activated resident font, both un-maps and de-activates the specified font(s).

Table 5. Activate Resource X'D62E'

Data Area	Value	Description	Error Code
Bytes 0-1	 X'0002' X'000C' X'000E' X'0010' X'0014' X'001E' X'00B8'	ENTRY LENGTH Null entry Specifying without an equivalence Valid for RT=X'06' with RIDF=X'03' Valid for RT=X'06' or X'07' with RIDF=X'03' Valid for RT=X'01', X'08', X'09', X'10' with RIDF=X'03' Valid for RT=X'01', X'08', X'09', X'10' with RIDF=X'07' Valid for RT=X'01' or X'08' with RIDF=X'06'	X'028F..01'
Byte 2	 X'01' X'03' X'06' X'07' X'08' X'09' X'10'	RESOURCE TYPE (RT) Single byte LF1 coded font Double-byte LF1-type coded font section Code Page Font Character Set Single byte font index Double-byte coded-font index Coded Font	X'028F..01'
Bytes 3-4	X'0001'-X'7EFF'	HOST ASSIGNED ID	X'028F..01'
Byte 5	 X'41'-X'FE'	Ignored for RT=X'01', X'06', X'07', X'08' and X'10' Double-byte font section ID (RT=X'03' and X'09')	
Byte 6	 X'03' X'06' X'07'	RESOURCE ID FORMAT (RIDF) IBM Registered Global Resource ID parts MVS host unalterable remote font environment Coded font	X'028F..01'
Bytes 7 - 8	 X'0000' X'2D00' X'5A00' X'8700'	FONT INLINE SEQUENCE 0 Degrees 90 Degrees 180 Degrees 270 Degrees Note that the Font Inline Sequence is ignored for RT=X'06' and X'07'. For outline fonts with RT=X'10', FIS is used to select the character metrics for a specific writing mode.	X'028F..01'
Bytes 9 - 10	X'0000'	Reserved	
Byte 11	 Bit 0 0/1 Bit 1 0 Bit 2 0/1 Bit 3 0/1 Bit 4 0/1 Bits 5-7 0	RESOURCE CLASS FLAGS Public/Private (Resource Capture) Retired Ignored (Reset) AR NACK Enabled Outline Font Substitution Reserved	
Bytes 12 - n		RESOURCE ID and triplets	X'028F..01'
Note: Zero or more additional entries, analogous to bytes 0 - n above			

Resource ID example with RIDF = GRID

Table 6. AR Resource ID (RIDF = X'03')

Data Area	Value	Description	Error Code
Bytes 12-13	X'0000' X'0001' - X'FFFE' X'FFFF'	GRAPHIC CHARACTER SET GLOBAL ID No value supplied GCSGID All characters with assigned code points in the associated code page	X'028F..02'
Bytes 14-15	X'0000' X'0001' - X'FFFE' X'FFFF'	CODE PAGE GLOBAL ID No value supplied CPGID Default Code Page (Configuration Settings)	X'028F..02'
Bytes 16-17	X'0000' X'0001' - X'FFFE' X'FFFF'	FONT GLOBAL ID No value supplied FGID Default FGID (Configuration Settings)	X'028F..02'
Bytes 18-19	X'0000' X'0001' - X'FFFE' X'FFFF'	FONT WIDTH No value supplied FW Default FW (Configuration Settings)	X'028F..02'

Resource ID example with RIDF = MVS Host Unalterable Remote Font Environment

Table 7. AR Resource ID (RIDF = X'06')

Data Area	Value	Description	Error Code
Bytes 12-13		CRC	
Bytes 14-21		Ignored (MVS Host System ID)	
Bytes 22-27		Ignored (VOLSER of Host library)	
Bytes 28-71		Ignored (DSNAME of Host library)	
Bytes 72-77		Date Stamp	
Bytes 78-85		Time Stamp	
Bytes 86-93		Ignored (Host Library Member Name)	
Bytes 94-95	X'0000' X'0001' - X'FFFE' X'FFFF'	GRAPHIC CHARACTER SET GLOBAL ID No value supplied GCSGID All characters with assigned code points in the associated code page	X'028F..02'
Bytes 96-97	X'0000' X'0001' - X'FFFE' X'FFFF'	CODE PAGE GLOBAL ID No value supplied CPGID Default Code Page (Configuration Settings)	X'028F..02'
Bytes 98-99		CRC	
Bytes 100-107		Ignored (MVS Host System ID)	
Bytes 108-113		Ignored (VOLSER of Host library)	
Bytes 114-157		Ignored (DSNAME of Host library)	
Bytes 158-163		Date Stamp	

Table 7. AR Resource ID (RIDF = X'06') (continued)

Data Area	Value	Description	Error Code
Bytes 164-171		Time Stamp	
Bytes 172-179		Ignored (Host Library Member Name)	
Bytes 180-181	X'0000' X'0001' - X'FFFE' X'FFFF'	FONT GLOBAL ID No value supplied FGID Default FGID (Configuration Settings)	X'028F..02'
Bytes 182-183	X'0000' X'0001' - X'FFFE' X'FFFF'	FONT WIDTH No value supplied FW Default FW (Configuration Settings)	X'028F..02'

Resource ID example with RIDF = Coded Font

Table 8. AR Resource ID (RIDF = X'07')

Data Area	Value	Description	Error Code
Bytes 12-13	X'0000' X'0001' - X'7FFF'	FONT CHARACTER SET HAID No Value supplied FCS HAID	
Bytes 14-15	X'0000' X'0001' - X'7FFF'	CODE PAGE HAID No Value supplied CP HAID	
Bytes 16-17	X'0000' X'0001' - X'FFFE' X'FFFF'	GRAPHIC CHARACTER SET GLOBAL ID No value supplied GCSGID All characters that with assigned code points	
Bytes 18-19	X'0000' X'0001' - X'FFFE' X'FFFF'	CODE PAGE GLOBAL ID No value supplied CPGID Default Code Page (Configuration Settings)	
Bytes 20-21	X'0000' X'0001' - X'FFFE' X'FFFF'	FONT GLOBAL ID No value supplied FGID Default FGID (Configuration Settings)	
Bytes 22-23	X'0000' X'0001' - X'FFFE' X'FFFF'	FONT WIDTH No value supplied FW Default FW (Configuration Settings)	
Byte 24	X'00' X'1E' X'1F'	PATTERN TECHNOLOGY ID No value supplied Composite technology Adobe Type-1 PFB	
Byte 25		Reserved	
Bytes 26-27	X'0000' X'0001' - X'7FFF'	VERTICAL SCALE FACTOR No Value supplied VSF in 1440th of an inch	
Bytes 28-29	X'0000' X'0001' - X'7FFF'	HORIZONTAL SCALE FACTOR No Value supplied HSF in 1440th of an inch	

Begin Page

This command is only valid in home state and causes the printer to enter page state. See the *Intelligent Printer Data Stream Reference* for details.

Note: At Begin Page processing time a test for media source and destination compatibility will be performed. If it is determined that the processing of this page with the media source and media destination specified is incompatible an exception X'0237..04' will be reported. An example of this occurrence would be a media source containing legal size media and a media destination that cannot accept legal size media (ie. media destination is mailbox unit on the Network Printer 17 printer).

Deactivate Font

The Deactivate Font command carries one to six bytes of data used by the host to deactivate one or more coded fonts, coded font indexes, font character sets, or code pages.

Table 9. Deactivate Font X'D64F'

Data Area	Value	Description	Error Code
Byte 0		DEACTIVATION TYPE	X'0217..02'
	X'11'	Deactivate one single-byte LF1 Coded Font and related indexes	X'02C5..01' X'02C6..01'
	X'12'	Deactivate one single-byte font index	
	X'1E'	Deactivate all single-byte LF1 Coded Fonts and all indexes	
	X'1F'	Deactivate all single-byte LF1 Coded Fonts and all indexes (same as above)	
	X'20'	Deactivate double-byte LF1 Coded Font section and related indexes	
	X'21'	Deactivate double-byte LF1 Coded Font section, all higher sections and all related indexes	
	X'22'	Deactivate a font index for a double-byte Coded Font section	
	X'2F'	Deactivate all double-byte LF1 Coded Fonts and all releated indexes	
	X'30'	Deactivate one Code Page	
	X'3F'	Deactivate all Code Pages	
	X'40'	Deactivate one Font Character Set	
	X'4F'	Deactivate all Font Character Sets	
	X'50'	Deactivate one LF1 or LF3 Coded Font	
	X'51'	Deactivate one LF1 or LF3 Coded Font and all associated components	
	X'5D'	Deactivate all resident Coded Fonts and all associated components	
	X'5E'	Deactivate all Coded Fonts	
	X'5F'	Deactivate all Coded Fonts and all associated components	
Bytes 1-2	X'0001' - X'7EFF'	HOST ASSIGNED ID (Deactivation Types X'11', X'12', X'20', X'21',	X'0214..02' X'0215..02' X'02C5..01' X'02C6..01'

Table 9. Deactivate Font X'D64F' (continued)

Data Area	Value	Description	Error Code
Byte 3	X'00' X'41'-X'FE'	SECTION ID Single-byte font Double-byte font (Deactivation Types X'20', X'21' and X'22')	
Bytes 4-5	X'0000' X'2D00' X'5A00' X'8700'	FONT INLINE SEQUENCE (Deactivation Type X'12' and X'22') 0 deg. 90 deg. 180 deg. 270 deg.	X'0240..02'

End

The End command is the ending control for a series of Write Image, Write Image 2, Write Graphics, Write Bar Code, Load Code Page, or Load Font commands. This command marks either the end of an image object, a graphics object, a bar code object, or the end of a downloaded font sequence. See the Intelligent Printer Data Stream Reference, S544-3417, for more details.

End Page

The End Page (EP) command causes the printer to return to home state from page state, page segment state, or overlay state and thus marks the end of a page, a page segment, or an overlay. The EP command is an implicit command to schedule that page for printing if the command is being used to exit page state; all data for that page is available to the printer. Zero or more data bytes can be transmitted but are ignored. See the Intelligent Printer Data Stream Reference, S544-3417, for more details.

Load Copy Control

A copy control record 2 to 32760 bytes long specifies how the printer is to modify and print logical pages in one or more copy subgroup definitions. Each copy subgroup definition can be from 2 to 254 bytes long (divisible by 2). The maximum number of key-words that the host program can specify in a copy subgroup definition is:

- X'80nn' specify 1 time
- X'90nn' specify 1 time
- X'91nn' specify 1 time
- X'C1nn' specify 1 time
- X'C2nn' specify 1 time
- X'D1nn' specify 1 to 126 times
- X'E1nn' specify 1 to 126 times

Notes:

1. Actual tray capacity is determined by media weight.
2. For Network Printer 12, Network Printer 17, Infoprint 20, Network Printer 24, and Infoprint 32/40, duplicate page copies may be printed after recovery from a paper jam when an LCC command has requested multiple copies.

3. Infoprint 21, Infoprint 45, and Infoprint 70 support media source tray mapping. Media source values in the LCC support tables represent the default settings when the printer is initially installed. Users can change settings in the operator panel IPDS Menu to re-map the source tray numbers to meet requirements of legacy applications.
4. Infoprint 20 and Infoprint 21 support the ability to designate an input media tray as an envelope tray instead of a paper tray. For Infoprint 20, this is done by installing a special envelope tray into one of the paper drawers. For Infoprint 21 and Infoprint 45 this is done by setting the media type (TRAYnTYPE on the Paper Menu) to ENV. This scheme allows paper trays to be designated as envelope trays while also allowing legacy applications to run without alteration.

   For envelope trays (excluding the optional Envelope Feeder on the Infoprint 21), assignment of the host media identifier starts with the first tray configured for envelopes, not its actual position in the printer. Therefore, making Tray 3 an envelope tray causes it to have a media identifier of X'41' instead of X'43'. If Tray 1 and Tray 3 are envelope trays and Tray 2 is a paper tray, Tray 1 is addressed as x'41', Tray 2 is addressed as x'00', and Tray 3 is addressed as x'42'.

Network Printer 12 Load Copy Control X'D69F'

Table 10. Network Printer 12 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 10. Network Printer 12 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source	
	X'8000'	CUT SHEET Tray 1 (250)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500)	X'02C8..01'
	X'8040'	ENVELOPE Tray (60) The Envelope Tray is Mutually Exclusive of Cut Sheet Tray 2	X'40E8..nn'
	X'8063'	MANUAL Tray (80)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destination (Byte Pairs)	
	X'9000'	Output Tray 1 (Face Down) (250)	X'0236..01'
	X'9101'		X'0237..03'
	X'9000'	Output Tray 2 (Face Up) (20)	X'0237..04'
	X'9102'		X'02C1..01'
			X'02C3..01'
	X'C100'	Simplex Printing	X'02C0..01'
			X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01'
			X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01'
			X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01'
			X'02C0..02'
			X'02C0..03'
			X'02C0..04'
			X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01'
			X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Network Printer 17 Load Copy Control X'D69F'

Table 11. Network Printer 17 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 11. Network Printer 17 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source	
	X'8000'	CUT SHEET Tray 1 (250)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (500)	X'40E8..nn'
	X'8040'	ENVELOPE Tray (75)	
	X'8063'	MANUAL Tray (100)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destination (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Output Tray 1 (Face Down) (250)	X'0237..04'
	X'9102'	Output Tray 2 (Face Down) (500) Tray 2 is Mutually Exclusive of the Mailbox Output Unit	X'02C1..01' X'02C3..01'
	X'9103'	Mailbox Output Tray 1 (Face Down) (45)	
	X'9104'	Mailbox Output Tray 2 (Face Down) (45)	
	X'9105'	Mailbox Output Tray 3 (Face Down) (45)	
	X'9106'	Mailbox Output Tray 4 (Face Down) (45)	
	X'9107'	Mailbox Output Tray 5 (Face Down) (45)	
	X'9108'	Mailbox Output Tray 6 (Face Down) (45)	
	X'9109'	Mailbox Output Tray 7 (Face Down) (45)	
	X'910A'	Mailbox Output Tray 8 (Face Down) (45)	
	X'910B'	Mailbox Output Tray 9 (Face Down) (45)	
	X'910C'	Mailbox Output Tray 10 (Face Down) (45)	
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01' X'02C0..02' X'02C0..03' X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Infoprint 20 Load Copy Control X'D69F'

Table 12. Infoprint 20 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 12. Infoprint 20 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source (See notes at end of this section.)	
	X'8000'	CUT SHEET Tray 1 (500)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500) (2000)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (500) (2000)	X'40E8..nn'
	X'8040'	ENVELOPE Tray 1 (75)	
	X'8041'	ENVELOPE Tray 2 (75)	
	X'8042'	ENVELOPE Tray 3 (75)	
	X'8063'	MANUAL Tray (150)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destination (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Output Tray 1 (Face Down) (500)	X'0237..04' X'02C1..01' X'02C3..01'
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01' X'02C0..02' X'02C0..03' X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Infoprint 21 Load Copy Control X'D69F'

Table 13. Infoprint 21 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 13. Infoprint 21 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source (See notes at end of this section.)	
	X'8000'	CUT SHEET Tray 1 (550)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (550)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (550)	X'40E8..nn'
	X'8040'	ENVELOPE Tray 1 (75)	
	X'8041'	ENVELOPE Tray 2 (75)	
	X'8042'	ENVELOPE Tray 3 (75)	
	X'8063'	MANUAL Tray (150)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destination (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Output Tray 1 (Face Down) (500)	X'0237..04'
	X'9102'	Output Tray 2 (Face Down) (500)	X'02C1..01' X'02C3..01'
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01' X'02C0..02' X'02C0..03' X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Network Printer 24 Load Copy Control X'D69F'

Table 14. Network Printer 24 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 14. Network Printer 24 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source	
	X'8000'	CUT SHEET Tray 1 (500)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (2000)	X'40E8..nn'
	X'8040'	ENVELOPE Tray (100)	
	X'8063'	MANUAL Tray (100)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destination (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Output Tray 1 (Face Down) (500)	X'0237..04'
	X'9102'	Output Tray 2 (Face Up) (100) Tray 2 is Mutually Exclusive of the High Capacity Output Finisher	X'02C1..01' X'02C3..01' X'027C..0A'
	X'9103'	Finisher Output Tray 1 (Face Down) (600)	
	X'9104'	Finisher Output Tray 2 (Face Down) (700)	
	X'9105'	Finisher Output Tray 3 (Face Down) (700)	
	X'9106'	Finisher Output Tray 1 (Face Up) (600)	
	X'9107'	Finisher Output Tray 2 (Face Up) (700)	
	X'9108'	Finisher Output Tray 3 (Face Up) (700)	
	X'9109'	High Capacity Output (Linked Trays, Face Down, 2000)	
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01' X'02C0..02' X'02C0..03' X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Infoprint 32/40 Load Copy Control X'D69F'

Table 15. Infoprint 32/40 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 15. Infoprint 32/40 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source (See notes that follow.)	
	X'8000'	CUT SHEET Tray 1 (500)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (500) (2500-Sheet Input 1)	X'40E8..nn'
	X'8003'	CUT SHEET Tray 4 (1000) (2500-Sheet Input 2)	
	X'8004'	CUT SHEET Tray 5 (1000) (2500-Sheet Input 3)	
	X'8040'	ENVELOPE Tray 1 (50)	
	X'8063'	AUXILIARY Tray (50)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destintation (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Output Bin 1 (Face Down) (500)	X'0237..04'
	X'9102'	Output Bin 2 (Face Up) (200)	X'02C1..01'
	X'9103'	Finisher Output Bin 1 (Face Down) (670)	X'02C3..01'
	X'9104'	Finisher Output Bin 2 (Face Down) (670)	
	X'9105'	Finisher Output Bin 3 (Face Down) (670)	
	X'9106'	Finisher High Capacity Output (Linked Trays) (Face Down) (2000)	
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01' X'02C0..02' X'02C0..03' X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Infoprint 45 Load Copy Control X'D69F'

Table 16. Infoprint 45 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 16. Infoprint 45 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source (See notes that follow.)	
	X'8000'	CUT SHEET Tray 1 (500)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (500) (2500-Sheet Input 1)	X'40E8..nn'
	X'8003'	CUT SHEET Tray 4 (1000) (2500-Sheet Input 2)	
	X'8004'	CUT SHEET Tray 5 (1000) (2500-Sheet Input 3)	
	X'8040'	ENVELOPE Tray 1 (100) the auxiliary tray and the envelope tray are mutually exclusive	
	X'8063'	AUXILIARY Tray (50)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destination (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Output Bin 1 (Face Down) (450) Bin 1 capacity is 300 when the Finisher is installed	X'0237..04'
	X'9102'	Output Bin 2 (Face Up) (200)	X'02C1..01'
	X'9103'	Finisher Output Bin 1 (Face Down) (3000)	X'02C3..01'
	X'9104'	Finisher Output Bin 2 (Face Down) (250)	
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01'
	X'C202'	2-up Partitioning	X'02C0..02'
	X'C203'	3-up Partitioning	X'02C0..03'
	X'C204'	4-up Partitioning	X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Infoprint 70 Load Copy Control X'D69F'

Table 17. Infoprint 70 Load Copy Control X'D69F'

Data Area	Value	Description	Error Code
Byte 0	X'02' - X'FE'	COPY SUBGROUP DEFINITION LENGTH	
Byte 1	X'01' - X'FF'	NUMBER OF IDENTICAL COPIES	X'0231..01'

Table 17. Infoprint 70 Load Copy Control X'D69F' (continued)

Data Area	Value	Description	Error Code
Bytes 2-n		COPY MODIFICATION KEYWORDS	X'0232..01'
		Media Source (See notes that follow.)	
	X'8000'	CUT SHEET Tray 1 (2000)	X'02C2..02'
	X'8001'	CUT SHEET Tray 2 (500)	X'02C8..01'
	X'8002'	CUT SHEET Tray 3 (500)	X'40E8..nn'
	X'8003'	CUT SHEET Tray 4 (3000) (HCF)	
	X'8063'	AUXILIARY Tray (150)	
	X'80FF'	DEFAULT (Customer Configurable)	
		Media Destintation (Byte Pairs)	
	X'9000'	High Order Byte is Always 00	X'0236..01' X'0237..03'
	X'9101'	Finisher Main Stacker (Face Down) (2000)	X'0237..04'
	X'9102'	Finisher Upper Stacker (Face Down) (2000)	X'02C1..01' X'02C3..01'
	X'C100'	Simplex Printing	X'02C0..01' X'02C2..01'
	X'C101'	Normal Duplex Printing (Ym-Axis)	X'02C0..01' X'02C2..01'
	X'C102'	Tumble Duplex Printing (Xm-Axis)	X'0298..01' X'0239..01'
	X'C201'	1-up Partitioning	X'0237..01' X'02C0..02' X'02C0..03' X'02C0..04' X'02C0..05'
	X'D101' - X'D1FF'	Suppression	X'0290..01' X'0238..01'
	X'E101' - X'E1FE'	Medium Overlay	

Media Source and Destination Support Matrices

The following tables are provided to document the Media Source and Destination support for Network Printers. This information is provided to ensure better overall understanding of the media handling characteristics of Network Printers. For more details on the actual X and Y media extents see "Printable Area Self-Defining Field" on page 75.

Network Printer 12 Media Source and Destination Support Matrices

Table 18. Network Printer 12 SOURCE Media Configurations and Capabilities

MEDIA	Tray 1 (Capacity: 250)	Tray 2 (Capacity: 500)	Auxiliary Tray (Capacity: 80)	Envelope Tray (Capacity: 60)	Duplex Supported	Lead Feed Edge
Paper						
Statement (8.5 in x 5.5 in)			Yes			top
Executive (7.25 in x 10.5 in)	Yes		Yes			top
Letter (8.5 in x 11 in)	Yes	Yes	Yes		Yes	top
Folio (8.5 in x 13 in)	Yes	Yes	Yes		Yes	top
Legal (8.5 in x 14 in)	Yes	Yes	Yes		Yes	top
Ledger (11 in x 17 in)						
A6 (105 x 148.5 mm)			Yes			top
A5 (148.5 x 210 mm)			Yes			top
B5 (ISO) (176 x 250 mm)			Yes			top
B5 (JIS) (182 x 257 mm)	Yes		Yes			top
A4 (210 x 297 mm)	Yes	Yes	Yes		Yes	top
B4 (257 x 364 mm)						
A3 (297 x 420 mm)						
Envelopes						
Monarch (3.875 in x 7.5 in)			Yes	Yes		left
COM10 (4.125 in x 9.5 in)			Yes	Yes		left
DL (110 x 220 mm)			Yes	Yes		left
C5 (162 x 229 mm)			Yes	Yes		left
B5 (176 x 250 mm)						

Table 19. Network Printer 12 DESTINATION Media Configurations and Capabilities

MEDIA	Output Tray 1 (Capacity: 250)	Output Tray 2 (Capacity: 20)	Duplex Supported
Paper			
Statement (8.5 in x 5.5 in)	Yes	Yes	
Executive (7.25 in x 10.5 in)	Yes	Yes	
Letter (8.5 in x 11 in)	Yes	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes	Yes
Legal (8.5 in x 14 in)	Yes	Yes	Yes
Ledger (11 in x 17 in)			
A6 (105 x 148.5 mm)	Yes	Yes	
A5 (148.5 x 210 mm)	Yes	Yes	
B5 (ISO) (176 x 250 mm)	Yes	Yes	
B5 (JIS) (182 x 257 mm)	Yes	Yes	
A4 (210 x 297 mm)	Yes	Yes	Yes
B4 (257 x 364 mm)			
A3 (297 x 420 mm)			
Envelopes			
Monarch (3.875 in x 7.5 in)	Yes	Yes	
COM10 (4.125 in x 9.5 in)	Yes	Yes	
DL (110 x 220 mm)	Yes	Yes	
C5 (162 x 229 mm)	Yes	Yes	
B5 (176 x 250 mm)			

Network Printer 17 Media Source and Destination Support Matrices

Table 20. Network Printer 17 SOURCE Media Configurations and Capabilities

MEDIA	Cutsheet Tray 1 (Capacity: 250)	Cutsheet Tray 2 (Capacity: 500)	Cutsheet Tray 3 (Capacity: 500)	Manual Feed Tray (Capacity: 100)	Envelope Tray (Capacity: 75)	Duplex Supported	Lead Feed Edge
Paper							
Statement (8.5 in x 5.5 in)				Yes			top
Executive (7.25 in x 10.5 in)	Yes			Yes			top
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes		Yes	top
Folio (8.5 in x 13 in)	Yes	Yes	Yes	Yes		Yes	top
Legal (8.5 in x 14 in)	Yes	Yes	Yes	Yes		Yes	top
Ledger (11 in x 17 in)							
A6 (105 x 148.5 mm)				Yes			top
A5 (148.5 x 210 mm)				Yes			top
B5 (ISO) (176 x 250 mm)				Yes			top
B5 (JIS) (182 x 257 mm)	Yes			Yes			top
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes		Yes	top
B4 (257 x 364 mm)							
A3 (297 x 420 mm)							
Envelopes							
Monarch (3.875 in x 7.5 in)				Yes	Yes		left
COM10 (4.125 in x 9.5 in)				Yes	Yes		left
DL (110 x 220 mm)				Yes	Yes		left
C5 (162 x 229 mm)				Yes	Yes		left
B5 (176 x 250 mm)							

Table 21. Network Printer 17 DESTINATION Media Configurations and Capabilities

MEDIA	Output Tray 1 (Capacity: 250)	Output Tray 2 (Capacity: 500)	Mailbox Output Trays (Capacity: 10@45)	Duplex Supported
Paper				
Statement (8.5 in x 5.5 in)	Yes	Yes		
Executive (7.25 in x 10.5 in)	Yes	Yes		
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes		Yes
Legal (8.5 in x 14 in)	Yes	Yes		Yes
Ledger (11 in x 17 in)				
A6 (105 x 148.5 mm)	Yes	Yes		
A5 (148.5 x 210 mm)	Yes	Yes		
B5 (ISO) (176 x 250 mm)	Yes	Yes		
B5 (JIS) (182 x 257 mm)	Yes	Yes		
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes
B4 (257 x 364 mm)				
A3 (297 x 420 mm)				
Envelopes				
Monarch (3.875 in x 7.5 in)	Yes	Yes		
COM10 (4.125 in x 9.5 in)	Yes	Yes		
DL (110 x 220 mm)	Yes	Yes		
C5 (162 x 229 mm)	Yes	Yes		
B5 (176 x 250 mm)				

Infoprint 20 Media Source and Destination Support Matrices

Table 22. Infoprint 20 SOURCE Media Configurations and Capabilities

MEDIA	Letter Cassette (US IML) (Capacity: 500)	Letter Cassette (E/J IML) (Capacity: 500)	Ledger Cassette (US IML) (Capacity: 500)	Letter Cassette (E/J IML) (Capacity: 500)	High Capacity Feeder (Cap: 2000)	Manual Feed Tray (Capacity: 150)	Envelope Tray (Capacity: 75)
Paper							
Statement (8.5 in x 5.5 in)	Simplex LEF		Simplex LEF			Simplex LEF	
Executive (7.25 in x 10.5 in)	Simplex LEF		Simplex LEF			Simplex LEF	
Letter (8.5 in x 11 in)	Duplex LEF/SEF	Duplex LEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
Folio (8.5 in x 13 in)			Duplex SEF	Duplex SEF		Duplex SEF	
Legal (8.5 in x 14 in)			Duplex SEF	Duplex SEF		Duplex SEF	
Ledger (11 in x 17 in)			Duplex SEF	Duplex SEF		Duplex SEF	
Japan Official Postcard (Hagaki) (100 x 148 mm)						Simplex SEF	
A6 (105 x 148.5 mm)							
A5 (148.5 x 210 mm)		Simplex LEF		Simplex LEF		Simplex LEF	
B5 (ISO) (176 x 250 mm)							
B5 (JIS) (182 x 257 mm)		Simplex LEF		Simplex LEF		Simplex LEF	
A4 (210 x 297 mm)	Duplex LEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF/SEF	
B4 (257 x 364 mm)			Duplex SEF	Duplex SEF		Duplex SEF	
A3 (297 x 420 mm)			Duplex SEF	Duplex SEF		Duplex SEF	
Custom (88 x 148 mm to 330 x 508 mm)						Simplex SEF Portrait (Note 4)	
Envelopes							
Monarch (3.875 in x 7.5 in)						Simplex SEF (UNI-ENV)	Simplex SEF
COM10 (4.125 in x 9.5 in)						Simplex SEF (UNI-ENV)	Simplex SEF

Table 22. Infoprint 20 SOURCE Media Configurations and Capabilities (continued)

MEDIA	Letter Cassette (US IML) (Capacity: 500)	Letter Cassette (E/J IML) (Capacity: 500)	Ledger Cassette (US IML) (Capacity: 500)	Letter Cassette (E/J IML) (Capacity: 500)	High Capacity Feeder (Cap: 2000)	Manual Feed Tray (Capacity: 150)	Envelope Tray (Capacity: 75)
DL (110 x 220 mm)						Simplex SEF (UNI-ENV)	Simplex SEF
C5 (162 x 229 mm)						Simplex SEF (UNI-ENV)	Simplex SEF
B5 (176 x 250 mm)							
Custom (Env) (88 x 148 mm to 330 x 508 mm)						Simplex SEF Portrait	
Transparencies and Labels							
Letter (8.5 in x 11 in)						Simplex LEF/SEF	
A4 (210 x 297 mm)						Simplex LEF/SEF	

Notes:

1. US and E/J (Europe/Japan) IML columns indicate paper sizes that the Letter and Legal cassettes will support based on the IML Cold Reset (Letter or A4).
2. SEF (Short-Edge Feed) and LEF (Long-Edge Feed) parameters are reported by the paper cassettes and the High-Cap Feeder along with paper size. This information is not reported back to the host or application, and is provided here for clarification of the Infoprint 20 paper-handling capabilities.
3. The Manual tray supports a range of variable paper sizes with a granularity of either 1 mm or 0.1 inches.
4. Duplexing is supported from the auxiliary tray for the same paper sizes as Tray 1. Paper is fed through the paper path one sheet at a time, though multiple sheets can be stacked in the destination tray. Duplex jobs printed from the Manual Tray will result in reduced printer performance.
5. Duplexing of Custom Paper (variable paper size) is enabled, however some small sizes may jam or exhibit registration problems due to print engine limitations.

Table 23. Infoprint 20 DESTINATION Media Configurations and Capabilities

MEDIA	Output Tray 1 (Capacity: 500)	Offset Stacking
Paper		
Statement (8.5 in x 5.5 in)	Yes	Yes
Executive (7.25 in x 10.5 in)	Yes	Yes
Letter (8.5 in x 11 in)	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes

Table 23. Infoprint 20 DESTINATION Media Configurations and Capabilities (continued)

MEDIA	Output Tray 1 (Capacity: 500)	Offset Stacking
Legal (8.5 in x 14 in)	Yes	Yes
Ledger (11 in x 17 in)	Yes	Yes
Japan Official Postcard (Hagaki) (100 x 148 mm)	Yes	Yes
A6 (105 x 148.5 mm)		
A5 (148.5 x 210 mm)	Yes	Yes
B5 (ISO) (176 x 250 mm)		
B5 (JIS) (182 x 257 mm)	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes
B4 (257 x 364 mm)	Yes	Yes
A3 (297 x 420 mm)	Yes	Yes
Custom (88 x 148 to 330 x 508 mm)	Yes	Yes **Note:** Universal sizes (also called variable paper sizes or custom form sizes) support offsetting only for IPDS and only when the paper width is less than 297 mm.
Envelopes		
Monarch (3.875 in x 7.5 in)	Yes	Yes
COM10 (4.125 in x 9.5 in)	Yes	Yes
DL (110 x 220 mm)	Yes	Yes
C5 (162 x 229 mm)	Yes	Yes
B5 (176 x 250 mm)		
Custom (88 x 148 to 330 x 508 mm)	Yes	Yes **Note:** Universal sizes (also called variable paper sizes or custom form sizes) support offsetting only for IPDS and only when the paper width is less than 297 mm.
Transparencies and Labels		
Letter (8.5 in x 11 in)	Yes	Yes

Table 23. Infoprint 20 DESTINATION Media Configurations and Capabilities (continued)

MEDIA	Output Tray 1 (Capacity: 500)	Offset Stacking
A4 (210 x 297 mm)	Yes	Yes

Infoprint 21 Media Source and Destination Support Matrices

Table 24. Infoprint 21 SOURCE Media Configurations and Capabilities

MEDIA	Tray 1/2/3 (Capacity: 550)	Manual Feed Tray (Capacity: 100)	Envelope Tray (Capacity: 75)
Paper			
Statement (8.5 in x 5.5 in)	Simplex (CUSTOM)	Simplex	
Executive (7.25 in x 10.5 in)	Duplex	Duplex	
Letter (8.5 in x 11 in)	Duplex	Duplex	
Folio (8.5 in x 13 in)	Duplex	Duplex	
Legal (8.5 in x 14 in)	Duplex	Duplex	
Japan Official Postcard (Hagaki) (100 x 148 mm)	Simplex	Simplex	Simplex
A5 (148.5 x 210 mm)	Simplex	Simplex	
B5 (ISO) (176 x 250 mm)	Simplex (Custom)	Simplex	
B5 (JIS) (182 x 257 mm)	Duplex	Duplex	
A4 (210 x 297 mm)	Duplex	Duplex	
Custom (182 mm x 257 mm to 215.9 x 355.6 mm)	Duplex	Duplex	
Custom (98.4 x 148 mm to 215.9 x 355.6 mm)	Simplex		
Custom (76.2 x 127 mm to 215.9 x 355.6 mm)		Simplex	
Custom (Env) (98.4 x 148.5 mm to 178 x 254 mm)			Simplex
Envelopes			
Monarch (3.875 in x 7.5 in)	Simplex	Simplex	Simplex
COM10 (4.125 in x 9.5 in)	Simplex	Simplex	Simplex
DL (110 x 220 mm)	Simplex	Simplex	Simplex
C5 (162 x 229 mm)	Simplex	Simplex	Simplex
Custom (Env) (98.4 x 148 mm to 215.9 x 355.6 mm)	Simplex		
Custom (Env) (76.2 x 127 mm to 215.9 x 355.6 mm)		Simplex	
Custom (Env) (98.4 x 148.5 mm to 178 x 254 mm)			Simplex
Transparencies and Labels			
Letter (8.5 in x 11 in)	Simplex	Simplex	
A4 (210 x 297 mm)	Simplex	Simplex	

Table 25. Infoprint 21 DESTINATION Media Configurations and Capabilities

MEDIA	Main Output Bin (Capacity: 500) No offsetting available	Optional Paper Bin (Offset Stacker)
Paper		
Statement (8.5 in x 5.5 in)	Yes	Yes

Table 25. Infoprint 21 DESTINATION Media Configurations and Capabilities (continued)

MEDIA	Main Output Bin (Capacity: 500) No offsetting available	Optional Paper Bin (Offset Stacker)
Executive (7.25 in x 10.5 in)	Yes	Yes
Letter (8.5 in x 11 in)	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes
Legal (8.5 in x 14 in)	Yes	Yes
Japan Official Postcard (Hagaki) (100 x 148 mm)	Yes	Yes
A5 (148.5 x 210 mm)	Yes	Yes
B5 (ISO) (176 x 250 mm)		
B5 (JIS) (182 x 257 mm)	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes
Custom Width: 76.2 x 127 mm Length: 215.9 x 355.6 mm	Yes	Yes **Note:** Universal sizes (also called variable paper sizes or custom form sizes) support offsetting only when the paper range is 98.4 x 148 mm to 215.9 x 355.6 mm.
Envelopes		
Monarch (3.875 in x 7.5 in)	Yes	Yes
COM10 (4.125 in x 9.5 in)	Yes	Yes
DL (110 x 220 mm)	Yes	Yes
C5 (162 x 229 mm)	Yes	Yes
Custom Width: 76.2 x 127 mm Length: 215.9 x 355.6 mm	Yes	Yes
Transparencies and Labels		
Letter (8.5 in x 11 in)	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes

Network Printer 24 Media Source and Destination Support Matrices

Table 26. Network Printer 24 SOURCE Media Configurations and Capabilities

MEDIA	Cutsheet Tray 1 (Capacity: 500)	Cutsheet Tray 2 (Capacity: 500)	Cutsheet Tray 3 (Capacity: 2000)	Manual Feed Tray (Capacity: 100)	Envelope Tray (Capacity: 100)	Duplex Supported	Lead Feed Edge
Paper							
Statement (8.5 in x 5.5 in)				Yes			top
Executive (7.25 in x 10.5 in)				Yes		Yes	top
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes		Yes	left
Folio (8.5 in x 13 in)				Yes			top
Legal (8.5 in x 14 in)	Yes	Yes	Yes	Yes		Yes	top
Ledger (11 in x 17 in)		Yes	Yes	Yes		Yes	top
A6 (105 x 148.5 mm)							
A5 (148.5 x 210 mm)				Yes		Yes	top
B5 (ISO) (176 x 250 mm)				Yes		Yes	top
B5 (JIS) (182 x 257 mm)				Yes		Yes	top
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes		Yes	left
B4 (257 x 364 mm)	Yes	Yes	Yes	Yes		Yes	top
A3 (297 x 420 mm)		Yes	Yes	Yes		Yes	top
Envelopes							
Monarch (3.875 in x 7.5 in)				Yes	Yes		left
COM10 (4.125 in x 9.5 in)				Yes	Yes		left
DL (110 x 220 mm)				Yes	Yes		left
C5 (162 x 229 mm)				Yes	Yes		left
B5 (176 x 250 mm)				Yes	Yes		left

Table 27. Network Printer 24 DESTINATION Media Configurations and Capabilities

MEDIA	Output Tray 1 (Capacity: 500)	Output Tray 2 (Capacity: 100)	Finisher Output Trays (Capacity: 3 @ 600/700/700 or 1 @ 2000)	Duplex Supported
Paper				
Statement (8.5 in x 5.5 in)	Yes	Yes	Yes	
Executive (7.25 in x 10.5 in)	Yes	Yes	Yes	Yes
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes	Yes	
Legal (8.5 in x 14 in)	Yes	Yes	Yes	Yes
Ledger (11 in x 17 in)	Yes	Yes	Yes	Yes
A6 (105 x 148.5 mm)				
A5 (148.5 x 210 mm)	Yes	Yes	Yes	Yes
B5 (ISO) (176 x 250 mm)	Yes	Yes	Yes	Yes
B5 (JIS) (182 x 257 mm)	Yes	Yes	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes
B4 (257 x 364 mm)	Yes	Yes	Yes	Yes
A3 (297 x 420 mm)	Yes	Yes	Yes	Yes
Envelopes				
Monarch (3.875 in x 7.5 in)	Yes	Yes	Yes (Face Up)	
COM10 (4.125 in x 9.5 in)	Yes	Yes	Yes (Face Up)	
DL (110 x 220 mm)	Yes	Yes	Yes (Face Up)	
C5 (162 x 229 mm)	Yes	Yes	Yes (Face Up)	
B5 (176 x 250 mm)	Yes	Yes	Yes (Face Up)	

Infoprint 32/40 Media Source and Destination Support Matrices

Table 28. Infoprint 32/40 SOURCE Media Configurations and Capabilities

MEDIA	Tray 1 (Capacity: 500)	Tray 2 (Capacity: 500)	Tray 3 (2500-Sheet Input 1) (Cap:1000)	Tray 4 (2500-Sheet Input 2) (Cap:1000)	Tray 5 (2500-Sheet Input 3) (Cap:1000)	Auxiliary Tray (Capacity:50) (Note 4)	Envelope Feeder (Cap:50)
Paper							
Statement (8.5 in x 5.5 in)	Duplex LEF					Duplex LEF/SEF	
Executive (7.25 in x 10.5 in)	Duplex LEF	Duplex LEF	Duplex LEF	Duplex LEF	Duplex LEF	Duplex LEF	
Letter (8.5 in x 11 in)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
Folio (8.5 in x 13 in)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Legal (8.5 in x 14 in)	Duplex SEF	Duplex SEF	Simplex SEF			Duplex SEF	
Ledger (11 in x 17 in)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Japan Official Postcard (Hagaki) (100 x 148 mm)						Simplex SEF	
A6 (105 x 148.5 mm)							
A5 (148.5 x 210 mm)	Duplex LEF					Duplex LEF/SEF	
B5 (ISO) (176 x 250 mm)							
B5 (JIS) (182 x 257 mm) (E/J IML)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
A4 (210 x 297 mm)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
B4 (257 x 364 mm) (E/J IML)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
A3 (297 x 420 mm)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Custom (100 x 148 mm to 297 x 431.8 mm)						Duplex SEF Portrait (Note 5)	
Envelopes							
Monarch (3.875 in x 7.5 in)						Simplex LEF	Simplex LEF
COM10 (4.125 in x 9.5 in)						Simplex LEF	Simplex LEF
DL (110 x 220 mm)						Simplex LEF	Simplex LEF
C5 (162 x 229 mm)						Simplex LEF	Simplex LEF

Table 28. Infoprint 32/40 SOURCE Media Configurations and Capabilities (continued)

MEDIA	Tray 1 (Capacity: 500)	Tray 2 (Capacity: 500)	Tray 3 (2500-Sheet Input 1) (Cap:1000)	Tray 4 (2500-Sheet Input 2) (Cap:1000)	Tray 5 (2500-Sheet Input 3) (Cap:1000)	Auxiliary Tray (Capacity:50) (Note 4)	Envelope Feeder (Cap:50)
B5 (176 x 250 mm)							
Custom (Env) (100 x 148 mm to 215.9 x 245 mm)							Simplex LEF
Transparencies and Labels							
Letter (8.5 in x 11 in)	Duplex LEF/SEF	Duplex LEF/SEF				Simplex LEF/SEF	
A4 (210 x 297 mm)	Duplex LEF/SEF	Duplex LEF/SEF				Simplex LEF/SEF	

Notes:

1. US and E/J (Europe/Japan) IML indicate paper sizes supported based on the IML Cold Reset (Letter or A4).
2. SEF (Short-Edge Feed) and LEF (Long-Edge Feed) parameters are reported by the paper cassettes and the 2500-Sheet Input along with paper size. This information is not reported back to the host or application, and is provided here for clarification of the Infoprint 32/40 paper-handling capabilities.
3. The auxiliary tray supports a range of variable paper sizes with a granularity of either 1 mm or 0.1 inches.
4. Duplexing is supported from the auxiliary tray for the same paper sizes as Tray 1. Paper is fed through the paper path one sheet at a time, though multiple sheets can be stacked in the destination tray. Duplex jobs printed from the Manual Tray will result in reduced printer performance.
5. Duplexing of Universal Paper (variable paper size) is enabled, however some small sizes may jam or exhibit registration problems due to print engine limitations.

Table 29. Infoprint 32/40 DESTINATION Media Configurations and Capabilities

MEDIA	Face-Down Output Bin (Capacity: 500)	Face-Up Output Bin (Capacity: 200)	Upper Bin (2000-Sheet Finisher) (Cap:670)	Middle Bin (2000-Sheet Finisher) (Cap:670)	Lower Bin (2000-Sheet Finisher) (Cap:670)	Offest Stacking
Paper						
Statement (8.5 in x 5.5 in)	Yes	Yes	Yes (LEF only)	Yes (LEF only)	Yes (LEF only)	
Executive (7.25 in x 10.5 in)	Yes	Yes	Yes	Yes	Yes	
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes	Yes	Yes	Yes	Yes
Legal (8.5 in x 14 in)	Yes	Yes	Yes	Yes	Yes	Yes
Ledger (11 in x 17 in)	Yes	Yes	Yes	Yes	Yes	Yes

Table 29. Infoprint 32/40 DESTINATION Media Configurations and Capabilities (continued)

MEDIA	Face-Down Output Bin (Capacity: 500)	Face-Up Output Bin (Capacity: 200)	Upper Bin (2000-Sheet Finisher) (Cap:670)	Middle Bin (2000-Sheet Finisher) (Cap:670)	Lower Bin (2000-Sheet Finisher) (Cap:670)	Offest Stacking
Japan Official Postcard (Hagaki) (100 x 148 mm)	Yes	Yes				
A6 (105 x 148.5 mm)						
A5 (148.5 x 210 mm)	Yes	Yes	Yes (LEF only)	Yes (LEF only)	Yes (LEF only)	
B5 (ISO) (176 x 250 mm)						
B5 (JIS) (182 x 257 mm)	Yes	Yes	Yes	Yes	Yes	
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes	Yes	Yes
B4 (257 x 364 mm)	Yes	Yes	Yes	Yes	Yes	
A3 (297 x 420 mm)	Yes	Yes	Yes	Yes	Yes	Yes
Universal (100 x 148 mm to 297 x 431.8 mm)	Yes	Yes				
Envelopes						
Monarch (3.875 in x 7.5 in)	Yes	Yes				
COM10 (4.125 in x 9.5 in)	Yes	Yes				
DL (110 x 220 mm)	Yes	Yes				
C5 (162 x 229 mm)	Yes	Yes				
B5 (176 x 250 mm)						
Universal (Env) (100 x 148 mm to 215.9 x 245 mm)	Yes	Yes				
Transparencies and Labels						
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes	Yes	Yes

Infoprint 45 Media Source and Destination Support Matrices

Table 30. Infoprint 45 SOURCE Media Configurations and Capabilities

MEDIA	Tray 1 (Capacity: 500)	Tray 2 (Capacity: 500)	Tray 3 (2500-Sheet Input 1) (Cap:1000)	Tray 4 (2500-Sheet Input 2) (Cap:1000)	Tray 5 (2500-Sheet Input 3) (Cap:1000)	Auxiliary Tray (Capacity:50) (Note 4)	Envelope Feeder (Cap:50)
Paper							
Statement (8.5 in x 5.5 in)	Duplex LEF					Duplex LEF/SEF	
Executive (7.25 in x 10.5 in)	Duplex LEF	Duplex LEF	Duplex LEF	Duplex LEF	Duplex LEF	Duplex LEF	
Letter (8.5 in x 11 in)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
Folio (8.5 in x 13 in)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Legal (8.5 in x 14 in)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Ledger (11 in x 17 in)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Japan Official Postcard (Hagaki) (100 x 148 mm)						Simplex SEF	
A5 (148.5 x 210 mm)	Duplex LEF					Duplex LEF/SEF	
B5 (JIS) (182 x 257 mm) (E/J IML)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
A4 (210 x 297 mm)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Duplex LEF	Duplex LEF/SEF	
B4 (257 x 364 mm) (E/J IML)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
A3 (297 x 420 mm)	Duplex SEF	Duplex SEF	Duplex SEF			Duplex SEF	
Custom Tray 1 (140 x 182 mm to 297 x 431.8 mm)	Simplex SEF/LEF (Note 5)						
Custom Tray 2 (182 x 182 mm to 297 x 431.8 mm)		Simplex SEF/LEF (Note 5)	Simplex SEF/LEF (Note 5)				
Custom Aux Tray (100 x 148 mm to 297 x 431.8 mm)						Duplex SEF (Note 5)	
Envelopes							
Monarch (3.875 in x 7.5 in)						Simplex LEF	Simplex LEF
COM10 (4.125 in x 9.5 in)						Simplex LEF	Simplex LEF

Table 30. Infoprint 45 SOURCE Media Configurations and Capabilities (continued)

MEDIA	Tray 1 (Capacity: 500)	Tray 2 (Capacity: 500)	Tray 3 (2500-Sheet Input 1) (Cap:1000)	Tray 4 (2500-Sheet Input 2) (Cap:1000)	Tray 5 (2500-Sheet Input 3) (Cap:1000)	Auxiliary Tray (Capacity:50) (Note 4)	Envelope Feeder (Cap:50)
DL (110 x 220 mm)						Simplex LEF	Simplex LEF
C5 (162 x 229 mm)						Simplex LEF	Simplex LEF
B5 (176 x 250 mm)							
Custom (Env) (100 x 148 mm to 215.9 x 245 mm)							Simplex LEF
Transparencies and Labels							
Letter (8.5 in x 11 in)	Simplex LEF/SEF	Simplex LEF/SEF	Simplex LEF/SEF			Simplex LEF/SEF	
A4 (210 x 297 mm)	Simplex LEF/SEF	Simplex LEF/SEF	Simplex LEF/SEF			Simplex LEF/SEF	

Notes:

1. US and E/J (Europe/Japan) IML indicate paper sizes supported based on the IML Cold Reset (Letter or A4).
2. SEF (Short-Edge Feed) and LEF (Long-Edge Feed) parameters are reported by the paper cassettes and the 2500-Sheet Input along with paper size. This information is not reported back to the host or application, and is provided here for clarification of the Infoprint 45 paper-handling capabilities.
3. The auxiliary tray supports a range of variable paper sizes with a granularity of either 1 mm or 0.1 inches.
4. Duplexing is supported from the auxiliary tray for the same paper sizes as Tray 1. Paper is fed through the paper path one sheet at a time, though multiple sheets can be stacked in the destination tray. Duplex jobs printed from the Manual Tray will result in reduced printer performance.
5. Duplexing of custom paper sizes is enabled, however some small sizes may jam or exhibit registration problems due to print engine limitations.

Table 31. Infoprint 45 DESTINATION Media Configurations and Capabilities

MEDIA	Face-Down Output Bin (Capacity: 450)	Face-Up Output Bin (Capacity: 200)	Finisher Bin (2000-Sheet Finisher) (Cap: 3000)	Upper Finsher Bin (2000-Sheet Finisher) (Cap: 250)	Offest Stacking
Paper					
Statement (8.5 in x 5.5 in)	Yes	Yes	No	No	Yes (LEF only)
Executive (7.25 in x 10.5 in)	Yes	Yes	Yes	Yes	Yes
Letter (8.5 in x 11 in)	Yes	Yes	Yes	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes	Yes	Yes	Yes

Table 31. Infoprint 45 DESTINATION Media Configurations and Capabilities (continued)

MEDIA	Face-Down Output Bin (Capacity: 450)	Face-Up Output Bin (Capacity: 200)	Finisher Bin (2000-Sheet Finisher) (Cap: 3000)	Upper Finsher Bin (2000-Sheet Finisher) (Cap: 250)	Offest Stacking
Legal (8.5 in x 14 in)	Yes	Yes	Yes	Yes	Yes
Ledger (11 in x 17 in)	Yes	Yes	Yes	Yes	Yes
Japan Official Postcard (Hagaki) (100 x 148 mm)	Yes	Yes	No	No	No
A5 (148.5 x 210 mm)	Yes	Yes	No	No	Yes (LEF only)
B5 (JIS) (182 x 257 mm)	Yes	Yes	Yes	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes	Yes	Yes	Yes
B4 (257 x 364 mm)	Yes	Yes	Yes	Yes	No
A3 (297 x 420 mm)	Yes	Yes	Yes	Yes	Yes
Custom (100 x 148 mm to 297 x 431.8 mm)	Yes	Yes	No	No	No
Envelopes					
Monarch (3.875 in x 7.5 in)	Yes	Yes	No	No	No
COM10 (4.125 in x 9.5 in)	Yes	Yes	No	No	No
DL (110 x 220 mm)	Yes	Yes	No	No	No
C5 (162 x 229 mm)	Yes	Yes	No	No	No
Custom (Env) (100 x 148 mm to 215.9 x 245 mm)	Yes	Yes	No	No	No
Transparencies and Labels					
Letter (8.5 in x 11 in)	Yes	Yes	No	No	Yes
A4 (210 x 297 mm)	Yes	Yes	No	No	Yes

Infoprint 70 Media Source and Destination Support Matrices

Table 32. Infoprint 70 SOURCE Media Configurations and Capabilities

MEDIA	Tray 1 (Capacity: 2000)	Tray 2 (Capacity: 500)	Tray 3 (Capacity: 500)	Tray 4 (HCF) (Capacity: 3000)	Manual Feed Tray (Capacity: 150)
Paper					
Statement (8.5 in x 5.5 in)		Duplex SEF	Duplex SEF		Simplex SEF
Executive (7.25 in x 10.5 in)		Duplex LEF	Duplex LEF		Simplex LEF
Letter (8.5 in x 11 in)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Simplex LEF/SEF
(8.5 in x 12.4 in)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex LEF
Tabstock (9 in x 11 in)	Simplex LEF	Simplex LEF	Simplex LEF		Simplex SEF
Folio (8.5 in x 13 in)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex SEF
Legal (8.5 in x 14 in)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex SEF
Ledger (11 in x 17 in)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex SEF
Ledger (12 in x 18 in)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex SEF
Japan Official Postcard (Hagaki) (100 x 148 mm)					
A6 (105 x 148.5 mm)					
A5 (148.5 x 210 mm)		Duplex SEF	Duplex SEF		Simplex SEF
B5 (ISO) (176 x 250 mm)					
B5 (JIS) (182 x 257 mm)	Duplex LEF	Duplex LEF	Duplex LEF		Simplex LEF
A4 (210 x 297 mm)	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF/SEF	Duplex LEF	Simplex LEF/SEF
B4 (257 x 364 mm)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex SEF
A3 (297 x 420 mm)	Duplex SEF	Duplex SEF	Duplex SEF		Simplex SEF
Custom (139 x 182 mm to 305 x 458 mm)					Simplex SEF
Transparencies and Labels					
Letter (8.5 in x 11 in)	Simplex LEF/SEF	Simplex LEF/SEF	Simplex LEF/SEF	Simplex LEF	Simplex LEF/SEF
A4 (210 x 297 mm)	Simplex LEF/SEF	Simplex LEF/SEF	Simplex LEF/SEF	Simplex LEF	Simplex LEF/SEF

Notes:

1. SEF (Short-Edge Feed) and LEF (Long-Edge Feed) parameters are reported by the paper cassettes and the 2500-Sheet Input along with paper size. This information is not reported back to the host or application, and is provided here for clarification of the Infoprint 70 paper-handling capabilities.
2. The Offsetter is physically part of the finisher. It is not possible to offset stack into the finisher upper stacker.
3. The auxiliary tray supports a range of variable paper sizes with a granularity of either 1 mm or 0.1 inches.

Table 33. Infoprint 70 DESTINATION Media Configurations and Capabilities

MEDIA	Finisher Main Stacker (Capacity: 2000)	Finisher Upper Stacker (Capacity: 200)	Offset Stacking
Paper			
Statement (8.5 in x 5.5 in)	Yes	Yes	Yes
Executive (7.25 in x 10.5 in)	Yes	Yes	Yes
Letter (8.5 in x 11 in)	Yes	Yes	Yes
(8.5 in x 12.4 in)	Yes	Yes	Yes
Tabstock (9 in x 11 in)	Yes	Yes	Yes
Folio (8.5 in x 13 in)	Yes	Yes	Yes
Legal (8.5 in x 14 in)	Yes	Yes	Yes
Ledger (11 in x 17 in)	Yes	Yes	Yes
12 in x 18 in	Yes		Yes
Japan Official Postcard (Hagaki) (100 x 148 mm)			
A6 (105 x 148.5 mm)			
A5 (148.5 x 210 mm)	Yes	Yes	Yes
B5 (ISO) (176 x 250 mm)			
B5 (JIS) (182 x 257 mm)	Yes	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes	Yes
B4 (257 x 364 mm)	Yes	Yes	Yes
A3 (297 x 420 mm)	Yes	Yes	Yes
Custom (139 x 182 mm to 305 x 458 mm)	Yes	Yes	Yes
Transparencies and Labels			

Table 33. Infoprint 70 DESTINATION Media Configurations and Capabilities (continued)

MEDIA	Finisher Main Stacker (Capacity: 2000)	Finisher Upper Stacker (Capacity: 200)	Offset Stacking
Letter (8.5 in x 11 in)	Yes	Yes	Yes
A4 (210 x 297 mm)	Yes	Yes	Yes

Load Font Equivalence

The font equivalence record is a list of 0 to 254 font equivalence entries (each entry is 16 bytes). The font equivalence record permits the host program to equate a Local-Font ID (specified in text control "Set Coded Font Local" on page 108, graphics order "Set Character Set" on page 128 or Write Bar Code Control "Bar Code Data Descriptor" on page 136) with:

- Font Host Assigned ID (HAID)
- The Font Inline Sequence or character rotation table to be used when processing characters
- Global Resource ID (GRID) for resident fonts. The GRID is made up of the following components:

  GCSGID Graphic Character Set Global ID

  CPGID Code Page Global ID

  FGID Font Global ID

  FW Font width in 1/1440 inch units.

If a GRID is specified in bytes 5-12, the entry is requesting the activation of a coded font and assigning a HAID to it. Network Printers will use the information provided in the GRID to locate the component parts of the coded font. First, the GCSGID and FGID values are used to find the font character set, and GCSGID and CPGID are used to find the code page. In some cases, the printer will locate the code page using just the CPGID value. If the character set and code page are not found in the above manner, information in the GRID will be used together with the Font Inline Sequence value (Bytes 3-4) to locate a single-byte fully described font and font index.

The set of supported GCSGID/CPGID/FGID/FW (GRID) combinations is described in "Chapter 14. Code Page and Font Identification" on page 177 and is available to the host PSF by means of the XOA-RRL command. For typographic and scalable fonts, a Font Width (FW) must be specified in order to uniquely select a point size, unless FW=0 or X'FFFF', in which case the operator panel CPI setting is used (CPI on the IPDS Menu).

Exception X'021D..02' is reported back if a non-zero GRID is requested with parts that are not supported in the printer, except in the case of GCSGID subset substitution or LFE Bold Attribute substitution.

For outline coded fonts, the FW value is used to derive a scale factor as follows:

- For typographic and proportionally spaced fonts, both horizontal and vertical scale factors are 3 (FW).
- For fixed pitch, uniform character increment fonts, both horizontal and vertical scale factors are derived using the following algorithm (fractions are truncated):

```
V_Scale = H_Scale = 1000*FW/SPACE
```

Where SPACE is the value of the Space Character increment in relative units.

Note: *4028-type font substitution is provided as an operator panel feature. It is independent of the Device emulation mode setting (native or 4028). Default is No Font Substitution.

Table 34. Load Font Equivalence X'D63F'

Data Area	Value	Description	Error Code
Byte 0	X'00' - X'FE' X'FF'	LOCAL-FONT ID Reserved	X'0219..02' X'0218..02'
Bytes 1-2	X'0001' - X'7EFF'	FONT HOST ASSIGNED ID	X'0218..02' X'021F..02'
Bytes 3 - 4	 X'0000' X'2D00' X'5A00' X'8700'	FONT INLINE SEQUENCE 0 Degrees 90 Degrees 180 Degrees 270 Degrees	X'0247..02'
Bytes 5 - 6	 X'0000' X'0001' - X'FFFE' X'FFFF'	GCSGID No value assigned (Note 2) Graphic Character Set Global ID All characters with assigned code points in the associated code page	
Bytes 7 - 8	 X'0000' X'0001' - X'FFFE' X'FFFF'	CPGID No value assigned (Note 2) Code Page Global ID Printer Default (Configuration Setting)	X'021D..02'
Bytes 9 - 10	 X'0000' X'0001' - X'FFFE' X'FFFF'	FGID No value assigned (Note 2) Font Global ID Printer Default (Configuration Setting)	X'021D..02'
Bytes 11 - 12	 X'0000' X'0001' - X'7FFF' X'FFFF'	FW No value assigned (Note 2) Font Width (Ignored for Fixed Pitch Fonts) Printer Default as specified by Configuration Settings	
Byte 13;	X'00'	Reserved	
Byte 14	 Bit 0 0/1 Bits 1-2 00 Bit 3 0/1 Bit 4 0/1 Bit 5 0/1 Bit 6 0/1 Bit 7 0/1	FONT ATTRIBUTES (Note 3) Ignored (Symbol Sets) Reserved Ignored (Double High) Ignored (Italics) Ignored (Double Strike) Bold = 1 Ignored (Double Wide)	
Byte 15	X'00'	Reserved	
Bytes 16-n		Additional LFE ENTRIES	X'023A..02'

Notes:

1. For LF1 coded fonts, FIS specifies the font index table for character rotation. For LF3 coded fonts, FIS is used to select the metrics for a specific writing mode.

2. Global Resource IDs (bytes 5-12) apply to printer resident fonts only. If these fields are all X'0000', then an activation is not done. If GCSGID and/or FW are 0 or X'FFFF':
   - CPGID (non-zero) defines the CPGID/GCSGID
   - FGID (non-zero) defines the FGID/FW (Non-Typographic)
   - FGID (non-zero) and operator panel CPI defines the FGID/FW (Typographic)
3. When the chosen font and attribute combination is restricted by a licensing agreement the font attributes may be executed by substitution or other means. If an appropriate font is not available, the attribute may not occur. Also, with font substitution, the available characteristics may change. Combinations of attributes may not be available. Font attributes will not be applied to host downloaded fonts.

Logical Page Descriptor

Before the printer can present a page of data it must know the following:
- the units in which distances have been measured
- the boundaries of the logical page
- initialization values for control parameters (Margins, Line spacing...)

The controls established in a Logical Page Descriptor command remain in effect until the next Logical Page Descriptor is received unless superseded by explicit controls in other commands (see "Write Text" on page 103). In any case, the latest LPD control values are restored with each Begin Page or Begin Overlay command.

The LPD command is valid with 24, 28, 34, 36, 38, 40, 41 or 43 bytes. Network Printers accepts the LPD command using any of these valid lengths.

Table 35. Logical Page Descriptor X'D6CF'

Data Area	Value	Description	Error Code
Byte 0	X'00' X'01'	UNIT-BASE (Measurement Units) 10 inches 10 centimeters	X'0264..02'
Byte 1		Reserved	
Bytes 2-3	X'3840' X'1626' X'0960' X'03B1'	Xp AND I L-units PER UNIT-BASE 14400 L-units per 10 inches 5670 L-units per 10 centimeters 2400 L-units per 10 inches 945 L-units per 10 centimeters	X'0260..02'
Bytes 4-5	X'3840' X'1626' X'0960' X'03B1'	Yp AND B L-units PER UNIT-BASE 14400 L-units per 10 inches 5670 L-units per 10 centimeters 2400 L-units per 10 inches 945 L-Units per 10 centimeters	X'0261..02'
Byte 6		Reserved	
Bytes 7-9	X'000001' - X'007FFF'	Xp-EXTENT OF LOGICAL PAGE (Width) See "Notation Conventions" on page 17	X'0262..02'
Byte 10		Reserved	
Bytes 11-13	X'000001' - X'007FFF'	Yp-EXTENT OF LOGICAL PAGE (Height) See "Notation Conventions" on page 17	X'0263..02'
Byte 14		Reserved	
Byte 15		Ignored (Ordered Data)	

Table 35. Logical Page Descriptor X'D6CF' (continued)

Data Area	Value	Description	Error Code
Bytes 16-23		Reserved	
Bytes 24-25	X'0000' X'2D00' X'5A00' X'8700' X'FFFF'	I-AXIS ORIENTATION 0 Degrees 90 Degrees 180 Degrees 270 Degrees Printer Default	X'0268..02'
Bytes 26-27	X'0000' X'2D00' X'5A00' X'8700' X'FFFF'	B-AXIS ORIENTATION 0 Degrees 90 Degrees 180 Degrees 270 Degrees Printer Default	X'0269..02'
Note: See "Set Text Orientation" on page 111 for valid combinations of I-axis and B-axis orientations.			
Bytes 28-29	X'0000' - X'7FFF'	INITIAL I PRINT COORDINATE See "Notation Conventions" on page 17	X'026A..02'
Bytes 30-31	X'0000' - X'7FFF'	INITIAL B PRINT COORDINATE See "Notation Conventions" on page 17	X'026B..02'
Bytes 32-33	X'0000' - X'7FFF' X'FFFF'	INLINE MARGIN See "Notation Conventions" on page 17 Printer Default	X'0210..01'
Bytes 34-35	X'0000' - X'7FFF' X'FFFF'	INTERCHARACTER ADJUSTMENT (+) See "Notation Conventions" on page 17 Printer Default	X'0212..01'
Bytes 36-37		Reserved	
Bytes 38-39	X'0000' - X'7FFF' X'FFFF'	BASELINE INCREMENT See "Notation Conventions" on page 17 Printer Default	X'0211..01'
Byte 40	X'00' - X'FE' X'FF'	LOCAL FONT ID Printer Default	
Bytes 41-42	X'0000' X'0001'-X'0007' X'0008' X'0009'-X'0010' X'FF00' X'FF01'-X'FF06' X'FF07' X'FF08' X'FFFF'	TEXT COLOR Printer Default (Black) Limited Simulated Color Support (Black) Black Limited Simulated Color Support (Black) Printer Default (Black) Limited Simulated Color Support (Black) Printer Default (Black) Color of Medium Printer Default (Black)	X'0258..03'

Logical Page Position

This command defines the position on the physical sheet of paper where the logical page is to be placed.

Table 36. Logical Page Position X'D66D'

Data Area	Value	Description	Error Code
Byte 0	X'00'	RESERVED	

Table 36. Logical Page Position X'D66D' (continued)

Data Area	Value	Description	Error Code
Bytes 1-3	X'FF8000' - X'007FFF'	Xm OFFSET of the LOGICAL PAGE ORIGIN in L-Units See "Notation Conventions" on page 17	X'02A4..01' X'02AD..01'
Byte 4	 X'00' X'10' X'11' X'20' X'21' X'30' X'31' X'40' X'41'	PAGE PLACEMENT Default placement Partition 1, front side Partition 1, back side Partition 2, front side Partition 2, back side Partition 3, front side Partition 3, back side Partition 4, front side Partition 4, back side	
Bytes 5-7	X'FF8000' - X'007FFF'	Ym OFFSET of the LOGICAL PAGE ORIGIN in L-Units See "Notation Conventions" on page 17	X'02A5..01' X'02AD..01'
Bytes 8-9	 X'0000' X'2D00' X'5A00' X'8700'	PAGE ORIENTATION 0 Degrees 90 Degrees 180 Degrees 270 Degrees **Note:** Explicit placement is supported on IP45 only.	

Sense Type and Model

Causes the printer to place into the Special Data Area of the Acknowledge Reply (See "Acknowledgement Reply" on page 23) a record containing type and model information and the functions the printer supports.

This command is effectively a NOP if the ARQ bit is NOT ON in the command header.

Table 37. Sense Type and Model X'D6E4'

Special Data Area	Value	Description
Byte 0	X'FF'	System/370 convention
Bytes 1-2	 X'4312' X'4317' X'4320' X'4322' X'4324' X'4332' X'4332' X'4345' X'2770' X'4028'	Product Code Network Printer 12 (4312) Network Printer 17 (4317) Infoprint 20 (4320) Infoprint 21 (4322) Network Printer 24 (4324) Infoprint 32 (4332) Infoprint 40 (4332) Infoprint 45 (4345) Infoprint 70 (2770) 4028 Emulation (4028)
Byte 3	 X'00' X'00' X'12'	Model Network Printers 4028 Emulation (Duplex) 4028 Emulation (Duplex)
Bytes 4-5	X'0000'	Reserved

Table 38. Device-Control Command Set

Special Data Area	Value	Description
Bytes 0-1	X'0042'	VECTOR LENGTH
Bytes 2-3	X'C4C3'	DEVICE CONTROL Command-Set ID
Bytes 4-5	X'FF10'	DC1 Subset ID
Bytes 6-7	X'6001'	MULTIPLE COPY and COPY-SUBGROUP support in LCC
Bytes 8-9	X'6002'	Media-source-selection support in LCC
Bytes 10-11	X'6003'	Media-destination_selection support in LCC
Bytes 12-13	X'6101'	Explicit Page Placement and Orientation Support **Note:** Supported only on Infoprint 45.
Bytes 14-15	X'7001'	MANAGE IPDS DIALOG (MID) Command support **Note:** Supported only on Infoprint 45.
Bytes 16-17	X'702E'	ACTIVATE RESOURCE Command support
Bytes 18-19	X'8008'	XOA Order MARK FORM
Bytes 20-21	X'800A'	XOA Order ALTERNATE OFFSET STACKER
Bytes 22-23	X'80F2'	XOA Order DISCARD BUFFERED DATA
Bytes 24-25	X'80F4'	XOA Order REQUEST RESOURCE LIST
Bytes 26-27	X'80F6'	XOA Order EXCEPTION HANDLING CONTROL
Bytes 28-29	X'80F8'	XOA Order PRINT QUALITY CONTROL **Note:** Supported only for direct control of print quality for toner saving on the Infoprint 20, Infoprint 21, Infoprint 32/40, and Infoprint 45.
Bytes 30-31	X'9001'	XOH Order PRINT BUFFERED DATA
Bytes 32-33	X'9003'	XOH Order SPECIFY GROUP OPERATION
Bytes 34-35	X'9004'	XOH Order DEFINE GROUP BOUNDARY
Bytes 36-37	X'9005'	XOH Order ERASE RESIDUAL PRINT DATA
Bytes 38-39	X'9007'	XOH Order ERASE RESIDUAL FONT DATA
Bytes 40-41	X'900D'	XOH Order STACK RECEIVED PAGES
Bytes 42-43	X'9013'	XOH Order EJECT to FRONT FACING
Bytes 44-45	X'9015'	XOH Order SELECT INPUT MEDIA SOURCE
Bytes 46-47	X'9016'	XOH Order SET MEDIA ORIGIN
Bytes 48-49	X'9017'	XOH Order SET MEDIA SIZE
Bytes 50-51	X'90F3'	XOH Order OBTAIN PRINTER CHARACTERISTICS
Bytes 52-53	X'90F5'	XOH Order PAGE COUNTERS CONTROL
Bytes 54-55	X'F001'	END PERSISTENT NACK Without Leaving IPDS
Bytes 56-57	X'F200'	OBJECT DATE AND TIME STAMP TRIPLETS SUPPORTED
Bytes 58-59	X'F201'	ACTIVATION (AR) FAILED NACK SUPPORTED
Bytes 60-61	X'F202'	Font resolution and metric technology triplets supported
Bytes 62-63	X'F203'	Metric adjustment triplets supported in AR commands
Bytes 64-65	X'F601'	Position check highlighting support in XOA EHC

Table 38. Device-Control Command Set (continued)

Special Data Area	Value	Description
Bytes 66-67	X'F602'	Independent exception page print in XOA-EHC **Note:** Independent Exception Page Print is only present in Native mode, not 4028 Emulation mode.
Bytes 68-69	X'F701' or X'F801' or X'F704' or X'F804'	SIMPLEX 1-UP supported in LCC SIMPLEX and DUPLEX 1-UP supported in LCC SIMPLEX 4-UP supported in LCC SIMPLEX and DUPLEX 4-UP supported in LCC
Bytes 70-71	X'FF01'	POSITION EXCEPTION SENSE FORMAT (1)

Notes:

1. Independent Exception Page Print is only supported in Native mode by the network printers.
2. XOA-PQC is only supported for the direct control of print quality for toner saving on the Infoprint 20, Infoprint 32, Infoprint 21, Infoprint 40, and Infoprint 45 printers.
3. Object date and timestamp triplets, font resolution, and metric technology triplets are supported only on the Infoprint 20, Infoprint 32, Infoprint 21, Infoprint 40, Infoprint 45, and Infoprint 70 printers.
4. Full N-up is supported on the Infoprint 45 only.

Table 39. Presentation Text Command Set

Special Data Area	Value	Description
Bytes 0-1	X'000C'	VECTOR LENGTH
Bytes 2-3	X'D7E3'	PRESENTATION TEXT Command Set - TX1 Subset
Bytes 4-5	X'FF20'	PT2 Data
Bytes 6-7	X'1001'	UNORDERED TEXT
Bytes 8-9	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED
Bytes 10-11	X'50FF'	8 TEXT ORIENTATIONS supported

Table 40. IM Image Command Set

Special Data Area	Value	Description
Bytes 0-1	X'000C'	VECTOR LENGTH
Bytes 2-3	X'C9D4'	IM IMAGE Command Set - IM1 Subset
Bytes 4-5	X'FF10'	IMD1 Data
Bytes 6-7	X'1001'	UNORDERED IMAGE BLOCKS
Bytes 8-9	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED
Bytes 10-11	X'A004'	ALL 4 ORIENTATIONS Supported

Table 41. IO Image Command Set

Special Data Area	Value	Description
Bytes 0-1	X'001C'	VECTOR LENGTH
Bytes 2-3	X'C9D6'	IO Image Command Set
Bytes 4-5	X'FF10'	IO/1 Level
Bytes 6-7	X'1001'	Unordered Image Blocks
Bytes 8-9	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED
Bytes 10-11	X'5001'	MMR Compression algorithm supported
Bytes 12-13	X'5003'	Uncompressed Image supported
Bytes 14-15	X'5006'	RL4 Compression supported
Bytes 16-17	X'5081'	G3 Facsimile Coding Scheme (CCITT G3MR)
Bytes 18-19	X'5082'	G4 Facsimile Coding Scheme (CCITT G4MMR)
Bytes 20-21	X'5101'	Bit ordering supported
Bytes 22-23	X'5204'	Unpadded RIDIC Recording Algorithm supported
Bytes 24-25	X'A004'	All four orientations supported
Bytes 26-27	X'F300'	Replicate and Trim mapping supported

Notes:

1. The Replicate and Trim Mapping Control Option is not supported when IPDS Print Mode = STD (Standard 300 dpi).
2. The Unpadded RIDIC Recording Algorithm is supported on Infoprint 21, Infoprint 45, and Infoprint 70 only.

Table 42. Graphics Command Set

Special Data Area	Value	Description
Bytes 0-1	X'0012'	VECTOR LENGTH
Bytes 2-3	X'E5C7'	GRAPHICS Command Set - GR1 Subset
Bytes 4-5	X'FF20'	DR/2V0 Data
Bytes 6-7	X'1001'	UNORDERED GRAPHICS BLOCKS
Bytes 8-9	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED
Bytes 10-11	X'4101'	GOCA Box Drawing supported (on Infoprint 20, Infoprint 21, and Infoprint 32/40 Infoprint 45, Infoprint 70)
Bytes 12-13	X'4102'	Partial Arc drawing supported (on Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, Infoprint 70)
Bytes 14-15	X'4106'	Set Fractional Line Width Supported (on Infoprint 21 and Infoprint 70 only)
Bytes 16-17	X'A004'	All 4 orientations supported

Notes:

1. GOCA Box Drawing and Partial Arc Drawing is supported on Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, and Infoprint 70 only.

2. Set Fractional Line Width is supported on Infoprint 21, Infoprint 45, and Infoprint 70 only.

Table 43. Page Segment Command Set

Special Data Area	Value	Description
Bytes 0-1	X'0006'	VECTOR LENGTH
Bytes 2-3	X'D7E2'	PAGE SEGMENT Command Set
Bytes 4-5	X'FF10'	PS1 Subset

Table 44. Overlay Command Set

Special Data Area	Value	Description
Bytes 0-1	X'0008'	VECTOR LENGTH
Bytes 2-3	X'D6D3'	OVERLAY Command Set
Bytes 4-5	X'FF10'	OL1 Subset
Bytes 6-7	X'1506'	OVERLAY NESTING = 6 Levels

Table 45. Loaded Font Command Set (LF1)

Special Data Area	Value	Description
Bytes 0-1	X'0012'	VECTOR LENGTH
Bytes 2-3	X'C3C6'	LOADED FONT Command Set
Bytes 4-5	X'FF10'	LF1 subset - fully described font + font index
Bytes 6-7	X'A004'	4 CHARACTER ROTATIONS (LFI command)
Bytes 8-9	X'B001'	DOUBLE-BYTE CODED FONTS SUPPORTED
Bytes 10-11	X'B002'	LFI UNDERSCORE Width and Position USED
Bytes 12-13	X'C005'	BOUNDED BOX RASTER FONT TECHNOLOGY
Bytes 14-15	X'C100'	FIXED METRICS
Bytes 16-17	X'C101'	RELATIVE METRICS

Table 46. Loaded Font Command Set (LF3)

Special Data Area	Value	Description
Bytes 0-1	X'0016'	VECTOR LENGTH
Bytes 2-3	X'C3C6'	LOADED FONT Command Set
Bytes 4-5	X'FF30'	LF3 subset - code page + font character set
Bytes 6-7	X'A004'	4 CHARACTER ROTATIONS (LFI command)
Bytes 8-9	X'B001'	DOUBLE-BYTE CODED FONTS SUPPORTED
Bytes 10-11	X'B002'	LFI UNDERSCORE Width and Position USED
Bytes 12-13	X'B004'	GRID PARTS REQUIRED IN LFC, LFCSC and LCPC COMMANDS
Bytes 14-15	X'B003'	Default Character Parameters in LCPC Supported
Bytes 16-17	X'C01E'	CID-keyed OUTLINE FONT TECHNOLOGY

Table 46. Loaded Font Command Set (LF3) (continued)

Special Data Area	Value	Description
Bytes 17-18	X'C01F'	ADOBE TYPE-1 PFB OUTLINE FONT TECHNOLOGY
Bytes 19-20	X'C101'	RELATIVE METRICS

Table 47. Bar Code Command Set

Special Data Area	Value	Description
Bytes 0-1	X'000C'	VECTOR LENGTH
Bytes 2-3	X'C2C3'	BAR CODE Command Set - BC1 Subset
Bytes 4-5	X'FF10'	BCD1 Data
Bytes 6-7	X'1001'	UNORDERED BAR CODE BLOCKS
Bytes 8-9	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED
Bytes 10-11	X'A004'	All four orientations supported

Note: See "Bar Code Type and Modifier Description and Values" on page 138 for a list of Bar Code Types supported by the Network Printers.

Execute Order Any State (XOA)

This command identifies a set of subcommands which take effect immediately, regardless of the current printer operating state.

Each Execute Order Anystate command consists of a two-byte order code followed by zero or more bytes of parameters.

XOA Mark Form

The MF order causes the printer to place two rectangular blocks of job separation marks on the current or the next sheet. One block is printed on the leading edge of the sheet and one block is printed on the trailing edge of the sheet.

If the MF order is included in a page that is part of a Load Copy Control copy group (See "Load Copy Control" on page 30) all the copies of the page will have a job separator mark included.

Table 48. Mark Form

Data Area	Value	Description	Error Code
Bytes 0-1	X'0800'	MARK FORM	

XOA Exception Handling Control

The Exception-Handling Control command allows the host to control how the printer reports and processes exceptions. A data-stream exception exists when the printer detects an invalid or unsupported command, control, or parameter value.

Table 49. Exception Handling Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'F600'	EXCEPTION HANDLING CONTROL (EHC)	
Byte 2	 Bit 0 0 Bit 0 1 Bit 1 0 Bit 1 1 Bits 2-5 00 Bit 6 0 Bit 6 1 Bit 7 0 Bit 7 1	EXCEPTION REPORTING Do not Report Undefined Character Check Report Undefined Character Check Do not Report Page Position Check Report Page Position Check Reserved Do not Highlight Position Checks Highlight Position Checks (08C1..00 and 0411..00) Do not Report All other Exceptions with AEA's Report All other Exceptions with AEA's	
Byte 3	 Bits 0-6 0 Bit 7 0 Bit 7 1	ALTERNATE EXCEPTION ACTIONS Reserved Take AEA (if defined) Don't take AEA	
Byte 4	 Bits 0-5 0 Bit 6 0 Bit 6 1 Bit 7 0 Bit 7 1	EXCEPTION PRESENTATION PROCESSING Reserved No Page Continuation Page Continuation Action *Independent Exception Page Print Supported* Discard Page Print to point of Exception (Process limits may apply) **Note:** Independent Exception Page Print is only present in Native mode, not 4028 Emulation mode.	

XOA Print Quality Control

This order selects the level of print quality at which subsequent data will be printed on the Infoprint 20, Infoprint 21, Infoprint 32/40, and Infoprint 45. This is used primarily for toner saving. It affects only the presentation of page data; it does not affect the downloading of resources such as fonts, overlays, or page segments.

Table 50. XOA Print Quality Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'F800'	PRINT QUALITY CONTROL (PQC)	
Byte 2	 X'01' - X'55' X'56' - X'AA' X'AB' - X'FE' X'FF'	PRINT QUALITY LEVEL ECONO (Toner Saving Mode) Operator panel setting NORMAL (No Toner Saving) Operator panel setting	X'0292..02'

Notes:

1. The lowest value of each print quality range of values is used in the XOH OPC Print Quality Support SDF. See "PQC Support Self-Defining Field" on page 85.
2. XOA QPC is supported only on the Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, and Infoprint 70.

XOA Request Resource List

This order causes the Resource List (see "Resource List Reply" on page 72) to be placed in the Special Data Area of the Acknowledge Reply (see "Acknowledgement

Reply" on page 23) requested with this order. If the ARQ flag was not set for this XOA subcommand, it is treated as a NOP.

A Resource List Reply may consist of multiple entries. If the Resource List Reply contains an entry that does not fit in the space available in the Special Data Area of Acknowledge Reply, Network Printers will follow either the acknowledge continuation method or the RRL-continuation method, depending on the host, as described in *Intelligent Printer Data Stream Reference*.

Table 51. XOA Request Resource List

Data Area	Value	Description	Error Code
Bytes 0-1	X'F400'	REQUEST RESOURCE LIST (RRL)	
Byte 2	X'05' X'00' or X'FF'	QUERY TYPE Resource Activation Status General Resource Status	X'0291..02'
Bytes 3-4	X'0000'-X'FFFF'	ENTRY CONTINUATION Indicator	
Byte 5	X'03'-X'xx'	ENTRY LENGTH	X'0291..02'
Note: Network Printers do not support multiple-entry queries. Byte 5 indicates the length of the command.			
Byte 6	X'01' X'02' X'03' X'04' X'05' X'06' X'07' X'08' X'09' X'10' X'11' X'12' X'FF'	RESOURCE TYPE Single Byte Coded Fonts Double Byte Coded Fonts Double Byte Coded Font sections Page Segments Overlays Device Version Code Pages Font Character Sets Single-byte coded-font indexes Double-byte coded-font section indexes Coded Fonts (treated as RT 01) Graphic Character Sets supported in a font character set Specific Code Pages All Resources	X'0291..02'
Byte 7	X'00' X'03'	RESOURCE ID FORMAT Host-Assigned Resource ID IBM Registered Global Resource ID parts	X'0291..02'
Bytes 8-n		RESOURCE IDENTIFIER	

Notes:

1. Network Printers do not support multiple-entry queries. Byte 5 indicates the length of the entry.
2. If the entire resource list does not fit in the Special Data area of the Acknowledge Reply, continuation is necessary which Network Printers will indicate using the acknowledgement continuation bit in the flag byte of the Acknowledge Reply. If the host requests Acknowledgement continuation by sending a command with ARQ bit and the Continuation bit set, the printer will complete the RRL reply using Acknowledgement continuation. If the host requests RRL continuation (by sending an RRL command with non-zero value in bytes 3 and 4) the printer will use conventional RRL continuation to finish the reply. If the host requests both RRL and ACK continuation, the printer will default to RRL continuation.
3. Bytes 8 and 9 are ignored when the resource type is ALL.

4. Exception ID 0291..02 in bytes 6 and 7 are for invalid values. If either value is unsupported, then the query is not understood and the reply is a single entry that sets the resource type to zero, echoes other values, and sets the resource size to zero (not present).

Resource List Reply

Table 52. Resource Reply List

Data Area	Value	Description	Error Code
Byte 0	X'FF'	UNORDERED LIST	
Byte 1	X'01' X'04' - X'E1'	END of LIST LENGTH of this ENTRY	
Byte 2	 X'00' X'01' X'02' X'03' X'04' X'05' X'06' X'07' X'08' X'09' X'11' X'12' X'FF'	RESOURCE TYPE Resource Size=0. The queried Resource Type, ID Format, or ID is unknown, unsupported, or inconsistent Single Byte Coded Font Double Byte Coded Fonts Double Byte Coded-font Sections Page Segment Overlay Device Version Code Pages Font Character Sets Single Byte Coded Font Index Double Byte Coded-font Section Indexes Graphic Character Sets supported in a font character set Specific Code Pages All Resources	
Byte 3	 X'00' X'03'	RESOURCE ID FORMAT Host-Assigned Resource ID IBM Registered Global Resource ID parts	
Byte 4	 X'00' X'01'	RESOURCE SIZE Indicator Resource not present Resource present	
Byte 5-6	X'xxxx'	Resource ID	

Notes:

1. Bytes 2-6 repeat for each resource type.
2. A query for a HARID that maps to a GCSGID/CPGID/FGID/FW combination which is not supported in the current configuration will result in a negative response (Reply Byte 4 = 0).
3. See "Chapter 14. Code Page and Font Identification" on page 177 for a description of the supported GCSGID/CPGID/FGID/FW combinations.

XOA Alternate Offset Stacker(AOS)

The AOS order command signals the printer to jog the current sheet. If copies of the current sheet are stacked in more than one media destination, the jogging will occur in each selected media destination, if the media destination supports offset stacking.

Table 53. Alternate Offset Stacker

Data Area	Value	Description	Error Code
Bytes 0-1	X'0A00'	Alternate Offset Stacker	

Media Jogging Support Matrices

Table 54. Paper Jogging Support

MEDIA	4312	4317	IP20	IP21	4324	IP32/40	IP 45	IP 70
Paper								
Statement			Yes	Yes			Yes	Yes
Executive			Yes	Yes			Yes	Yes
Letter		Yes	Yes	Yes	Yes	Yes	Yes	Yes
8.5 in x 12 in								Yes
Tabstock								Yes
Folio		Yes	Yes	Yes		Yes	Yes	Yes
Legal		Yes	Yes	Yes	Yes	Yes	Yes	Yes
12 x 18 in								Yes
Ledger			Yes		Yes	Yes	Yes	Yes
Hagaki			Yes	Yes				
A6								
A5			Yes	Yes			Yes	Yes
B5 (ISO)				Yes				
B5 (JIS)		Yes	Yes	Yes	Yes		Yes	Yes
A4			Yes	Yes	Yes	Yes	Yes	Yes
B4			Yes		Yes		Yes	Yes
A3			Yes			Yes	Yes	Yes
Custom			Yes	Yes				Yes
Envelopes								
Monarch			Yes	Yes				
COM10			Yes	Yes				
DL			Yes	Yes				
C5			Yes	Yes				
B5								
Custom (Env)			Yes	Yes				
Transparencies and Labels								
Letter			Yes	Yes		Yes	Yes	Yes
A4			Yes	Yes		Yes	Yes	Yes

Notes:

1. On the Network Printer 17, Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, and Infoprint 70, jogging results in the next page and subsequent pages being offset.
2. On the Infoprint 20, the Offsetter (jogger) is physically part of the optional Duplex unit. Both functions may be activated or de-activated independent of each other.
3. On the Infoprint 21, Infoprint 45, and Infoprint 70, the Offsetter (jogger) is physically part of the optional Offset Paper Output bin (Output Tray 2). The printer cannot offset into the main output bin (Output Tray 1).

4. Universal (Custom) paper sizes can be offset only in IPDS mode, and only for paper sizes from 98.4mm x 148mm to 215.9mm x 355.6mm.
5. On the Network Printer 24:
   a. Media jogging is only available if the finisher is installed.
   b. Media jogging will result in only the next page (and all of its copies) being offset. Subsequent pages are stacked in the other (unjogged) position.
   c. Media jogging is only supported for finisher face down output. If face up output and jogging are selected, face up output takes precedence.
   d. The media jog and staple functions are mutually exclusive. If both are specified the staple request takes precedence.
6. On the Infoprint 32/40:
   a. Media jogging is only available for output trays 1, 2, and 3.
   b. Media jogging is only supported for face-down output. If face-up output and jogging are selected, face-up output takes precedence.
   c. The media jog and staple functions are mutually exclusive. If both are specified the staple request takes precedence.
   d. Media jogging may be disabled using the IPDS menu on the printer operator panel.
7. On the Infoprint 45:
   a. Media jogging is only available for output bins 1, and finisher bins 1 and 2.
   b. Media jogging is only supported for face-down output. If face-up output and jogging are selected, face-up output takes precedence.
   c. The media jog and staple functions are mutually exclusive. If both are specified the staple request takes precedence.
8. On the Infoprint 70:
   a. The Offsetter (jogger) is physically part of the finisher. It is not possible to offset stack into the finisher upper stacker.
   b. The media jog and staple functions are mutually exclusive. If both are specified the staple request takes precedence.

Execute Order Home State (XOH)

Each Execute Order Homestate command consists of a two-byte order code followed by zero or more bytes of parameters.

XOH Obtain Printer Characteristics

This order causes a set of device self-defined fields describing printer characteristics to be placed in the Special Data Area of the requested Acknowledgement Reply and is identified with an acknowledgement type of X'46'. **If the ARQ flag was not set on the XOH command containing this order, then this order is equivalent to a No Operation.**

Table 55. XOH Obtain Printer Characteristics

Data Area	Value	Description	Error Code
Bytes 0-1	X'F300'	OPC Order Code	

Printable Area Self-Defining Field

Notes:

1. The IBM Network Printers provide two (2) modes that determine the specification of the Xm Offset, Ym Offset, Xm Extent and Ym Extent of the Printable Area.
   a. Restricted (No Print Border) (Guaranteed Print Legibility) (Default)
   b. Unrestricted (Edge-to-Edge Addressability)

      There is no edge-to-edge addressability for the Network Printer 24.
2. The Xm Extent and Ym Extent of the Printable Area parameters documented in the following table are representative of the standard printer source media configuration. These extents can be modified as a result of receiving a XOH-SMO command, as described in "XOH Set Media Origin" on page 96.
3. Infoprint 21, Infoprint 45, and Infoprint 70 support media source tray mapping. Media source values in the LCC support tables represent the default settings when the printer is initially installed. Use the TRAYn, AUX, and ENV items on the IPDS Menu to re-map the tray.
4. Infoprint 20, Infoprint 21, and Infoprint 32/40 support the ability to designate an input media tray as an envelope tray instead of a paper tray. For Infoprint 20, this is done by installing a special envelope tray into one of the paper drawers. For Infoprint 21 this is done by setting the media type (TRAYnTYPE on the Paper Menu) to ENV. This scheme allows paper trays to be designated as envelope trays while also allowing legacy applications to run without alteration.

   For envelope trays (excluding the optional Envelope Feeder on the Infoprint 21), assignment of the host media identifier starts with the first tray configured for envelopes, not its actual position in the printer. Therefore, making Tray 3 an envelope tray causes it to have a media identifier of X'41' instead of X'43'. If Tray 1 and Tray 3 are envelope trays and Tray 2 is a paper tray, Tray 1 is addressed as x'41', Tray 2 is addressed as x'00', and Tray 3 is addressed as x'42'.
5. Actual tray capacities are determined media weight. The capacities in the following table are the maximum allowable.

Table 56. Printable Area

Special Data Area	Value	Description
Bytes 0-1	X'0018' or X'0018' or X'0024' or X'0025'	LENGTH of this Self-Defining Field NP12, NP17, IP20, NP24, IP32, IP40 IP21, IP45, IP70 with no Media OID IP21, IP45, IP70 with single Media OID IP21, IP45, IP70 with double Media OID
Bytes 2-3	X'0001'	PRINTABLE AREA Self-Defining Field ID

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Byte 4 (NP12, NP17, NP24)		Network Printer 12 INPUT MEDIA SOURCE
	X'00'	CUT SHEET Tray 1 (250)
	X'01'	CUT SHEET Tray 2 (500)
	X'40'	ENVELOPE Tray (60) Mutually Exclusive of Cut Sheet Tray 2
	X'63'	MANUAL Tray (80)
	X'FF'	DEFAULT (Customer Configurable)
		Network Printer 17 INPUT MEDIA SOURCE
	X'00'	CUT SHEET Tray 1 (250)
	X'01'	CUT SHEET Tray 2 (500)
	X'02'	CUT SHEET Tray 3 (500)
	X'40'	ENVELOPE Tray (75)
	X'63'	MANUAL Tray (100)
	X'FF'	DEFAULT (Customer Configurable)
		Network Printer 24 INPUT MEDIA SOURCE
	X'00'	CUT SHEET Tray 1 (500)
	X'01'	CUT SHEET Tray 2 (500)
	X'02'	CUT SHEET Tray 3 (2000)
	X'40'	ENVELOPE Tray (100)
	X'63'	MANUAL Tray (100)
	X'FF'	DEFAULT (Customer Configurable)

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Byte 4 (IP20, IP21, IP32, IP40, IP45, IP70)		Infoprint 20 INPUT MEDIA SOURCE (see notes above)
	X'00'	CUT SHEET Tray 1 (500)
	X'01'	CUT SHEET Tray 2 (500) (2000)
	X'02'	CUT SHEET Tray 3 (500) (2000)
	X'40'	ENVELOPE Tray 1 (75)
	X'41'	ENVELOPE Tray 2 (75)
	X'42'	ENVELOPE Tray 3 (75)
	X'63'	MANUAL Tray (150)
	X'FF'	DEFAULT (Customer Configurable)
		IP21 INPUT MEDIA SOURCE (see notes above)
	X'00'	CUT SHEET Tray 1 (550)
	X'01'	CUT SHEET Tray 2 (550)
	X'02'	CUT SHEET Tray 3 (550)
	X'40'	ENVELOPE Feeder (75)
	X'41'	ENVELOPE Tray 1 (75)
	X'42'	ENVELOPE Tray 2 (75)
	X'43'	ENVELOPE Tray 3 (75)
	X'63'	MANUAL Tray (100)
	X'FF'	DEFAULT (Customer Configurable)
		Infoprint 32/40, Infoprint 45 INPUT MEDIA SOURCE (see notes above)
	X'00'	CUT SHEET Tray 1 (500)
	X'01'	CUT SHEET Tray 2 (500)
	X'02'	CUT SHEET Tray 3 (500) (2500-Sheet Input 1)
	X'03'	CUT SHEET Tray 4 (1000) (2500-Sheet Input 2)
	X'04'	CUT SHEET Tray 5 (1000) (2500-Sheet Input 3)
	X'40'	ENVELOPE Feeder (100)
	X'63'	AUXILIARY Tray (50)
	X'FF'	DEFAULT (Customer Configurable)
		Infoprint 70 INPUT MEDIA SOURCE (see notes above)
	X'00'	CUT SHEET Tray 1 (2000)
	X'01'	CUT SHEET Tray 2 (500)
	X'02'	CUT SHEET Tray 3 (500)
	X'03'	CUT SHEET Tray 4 (3000) (HCF)
	X'63'	AUXILIARY Tray (50)
	X'FF'	DEFAULT (Customer Configurable)
Byte 5	X'00'	Reserved
Byte 6	X'00'	UNIT BASE 10 inches
Byte 7	X'00'	Reserved
Bytes 8-9	X'3840'	L-units per UNIT BASE
Bytes 10-11	X'0001' - X'xxxx'	WIDTH of the Medium Presentation Space in L-units (determined by configuration)
Bytes 12-13	X'0001' - X'xxxx'	LENGTH of the Medium Presentation Space in L-units (determined by configuration)

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Bytes 14-15		Xm OFFSET of the Printable Area in L-Units
	X'00E3'	Restricted (NP12, NP17, NP24) (4 mm)
	X'00E3'	Restricted (IP20, IP21, IP32/40, IP45) (4 mm)
	X'00E3'	Restricted (IP70) (4 mm) Note: IP70 has a unique print engine tolerance for registration (guaranteed fidelity) of 6 mm (Xm and Ym Offset) when the printer is operating in a restricted print mode (IPDS Edge-to-edge mode is set to OFF)
	X'0000'	Unrestricted (NP12, NP17, NP24) (0 mm)
	X'0000'	Unrestricted (IP20, IP21, IP32/40, IP45) (0 mm)
Bytes 16-17		Ym OFFSET of the Printable Area in L-units
	X'00E3'	Restricted (NP12, NP17, NP24) (4 mm)
	X'00E3'	Restricted (IP20, IP21, IP32/40, IP45) (4 mm)
	X'00E3'	Restricted (IP70) (4 mm) Note: IP70 has a unique print engine tolerance for registration (guaranteed fidelity) of 6 mm (Xm and Ym Offset) when the printer is operating in a restricted print mode (IPDS Edge-to-edge mode is set to OFF)
	X'0000'	Unrestricted (NP12, NP17, NP24) (0 mm)
	X'0000'	Unrestricted (IP20, IP21, IP32/40, IP45, IP70) (0 mm)

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Bytes 18-19		Xm EXTENT of the Printable Area in L-units (Restricted: No Print Border)
		Paper
	X'1D2A'	Statement (All printers) (5.185 inches)
	X'2702'	Executive (All printers) (6.935 inches)
	X'2E0A'	Letter (All printers) (8.185 inches)
	X'2E0A'	8.5 in x 12.4 in (IP70) (8.185 inches)
	X'30DA'	Tabstock (IP70) (8.685 inches)
	X'2E0A'	Folio (All printers) (8.185 inches)
	X'2E0A'	Legal (All printers) (8.185 inches)
	X'157B'	A6 (NP12, NP17) (97 mm)
	X'3C1A'	Ledger (IP20, NP24, IP 32/40, IP45, IP70) (10.685 inches)
	X'41BA'	12 in x 18 in (IP70) (11.685 inches)
	X'145F'	Hagaki (IP20, IP21, IP 32/40, IP45) (92 mm)
	X'1F1D'	A5 (All printers) (140.5 mm)
	X'2534'	B5 (ISO) (NP12, NP17, IP21, NP24) (168 mm)
	X'2688'	B5 (JIS) (All printers) (174 mm)
	X'2CBC'	A4 (All printers) (202 mm)
	X'3724'	B4 (IP20, NP24, IP 32/40, IP45, IP70) (249 mm)
	X'4000'	A3 (IP20, NP24, IP 32/40, IP45, IP70) (289 mm)
	X'11B7' - X'474F'	Universal (IP20) (80 mm to 322 mm)
	X'1405' - X'2E0A'	Custom (IP21 LTR/A4) (90.4 mm to 207.9 mm)
	X'0F1A' - X'2E0A'	Custom (IP21 Aux) (68.2 mm to 207.9 mm)
	X'1D2A' - X'4000'	Custom (IP45 Tray 1) (131.7 mm to 289 mm)
	X'2688' - X'4000'	Custom (IP45 Tray 2, 3) (174 mm to 289 mm)
	X'1460' - X'4000'	Custom (IP45 Aux) (92 mm to 239 mm)
	X'1460' - X'4000'	Custom (IP 32/40) (92 mm to 289 mm)
	X'1D02' - X'41C6'	Custom (IP70 Aux) (131 mm to 297 mm)
		Envelopes
	X'286A'	Monarch (All printers) (7.185 inches)
	X'33AA'	COM10 (All printers) (9.185 inches)
	X'2EF2'	DL (All printers) (212 mm)
	X'30F1'	C5 (All printers) (221 mm)
	X'3597'	B5 (NP24) (242 mm)
	X'11B7' - X'474F'	Universal (IP20) (80 mm to 322 mm)
	X'1405' - X'2E0A'	Custom (IP21 LTR/A4) (90.4 mm to 207.9 mm)
	X'0F1A' - X'2E0A'	Custom (IP21 Aux) (68.2 mm to 207.9 mm)
	X'1405' - X'2E0A'	Custom (IP45 Env) (90.4 mm to 207.9 mm)
	X'1460' - X'2E0A'	Universal (IP 32/40) (60 mm to 207.9 mm)
		Labels and Transparencies
	X'2E0A	Letter (IP20, IP21, IP 32/40, IP45, IP70) (8.185 inches)
	X'2CBC'	A4 (IP20, IP21, IP 32/40, IP45, IP70) (202 mm)

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Bytes 18-19		Xm EXTENT of the Printable Area in L-units (Unrestricted: Edge-to-Edge Addressability)
		Paper
	X'1EF0'	Statement (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (5.5 inches)
	X'28C8'	Executive (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (7.25 inches)
	X'2FD0'	Letter (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (8.5 inches)
	X'2FD0'	8.5 in x 12.4 in (IP70) (8.5 inches)
	X'32A0'	Tabstock (IP70) (9 inches)
	X'2FD0'	Folio (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (8.5 inches)
	X'2FD0'	Legal (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (8.5 inches)
	X'3DE0'	Ledger (IP20, IP 32/40, IP45, IP70) (11 inches)
	X'4380'	12 in x 18 in (IP70) (18 inches)
	X'1625'	Hagaki (IP20, IP21, IP 32/40, IP45) (100 mm)
	X'1741'	A6 (NP12, NP17) (105 mm)
	X'20E3'	A5 (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (148.5 mm)
	X'26FA'	B5 (ISO) (NP12, NP17) (176 mm)
	X'284E'	B5 (JIS) (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (182 mm)
	X'2E82'	A4 (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (210 mm)
	X'38EA'	B4 (IP20, IP 32/40, IP45, IP70) (257 mm)
	X'41C6'	A3 (IP20, IP 32/40, IP45, IP70) (297 mm)
	X'137D' - X'4915'	Universal (IP20) (88 to 330 mm)
	X'15CB' - X'2FD0'	Custom (IP21 LTR/A4) (98.4 mm to 215.9 mm)
	X'10E0' - X'2FD0'	Custom (IP21 Aux) (76.2 mm to 215.9 mm)
	X'1EF0' - X'41C6'	Custom (IP45 Tray 1) (139.7 mm to 297 mm)
	X'284E' - X'41C6'	Custom (IP45 Tray 2, 3) (182 mm to 297 mm)
	X'1625' - X'41C6'	Custom (IP45 Aux) (100 mm to 247 mm)
	X'1625' - X'41C6'	Universal (IP 32/40) (100 to 297.9 mm)
	X'1EC8' - X'438B'	Universal (IP70) (139 to 305 mm)
		Envelopes
	X'2A30'	Monarch (NP12, NP17, IP20, IP21, IP 32/40, IP45) (7.5 inches)
	X'3570'	COM10 (NP12, NP17, IP20, IP21, IP 32/40, IP45) (9.5 inches)
	X'30B8'	DL (NP12, NP17, IP20, IP21, IP 32/40, IP45) (220 mm)
	X'32B7'	C5 (NP12, NP17, IP20, IP21, IP 32/40, IP45) (229 mm)
	X'137D' - X'4915'	Universal (IP20) (88 to 330 mm)
	X'15CB' - X'2FD0'	Custom (IP21 LTR/A4) (98.4 mm to 215.9 mm)
	X'10E0' - X'2FD0'	Custom (IP21 Aux) (76.2 mm to 215.9 mm)
	X'15CB' - X'2FD0'	Custom (IP45 Env) (98.4 mm to 215.9 mm)
	X'1625' - X'2FD0'	Universal (IP 32/40) (100 to 215.9 mm)
		Labels and Transparencies
	X'2FD0'	Letter (IP20, IP21, IP 32/40, IP45, IP70) (8.5 inches)
	X'2E84'	A4 (IP20, IP21, IP 32/40, IP45, IP70) (210 mm)

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Bytes 20-21		Ym EXTENT of the Printable Area in L-units (Restricted: No Print Border)
		Paper
	X'2E0A'	Statement (All printers) (8.185 inches)
	X'394A'	Executive (All printers) (10.185 inches)
	X'3C1A'	Letter (All printers) (10.685 inches)
	X'43FA'	8.5 in x 12.4 in (IP70) (12.085 inches)
	X'3C1A'	Tabstock (IP70) (10.685 inches)
	X'475A'	Folio (All printers) (12.685 inches)
	X'4CFA'	Legal (All printers) (13.685 inches)
	X'5DDA'	Ledger (IP20, NP24, IP 32/40, IP45, IP70) (16.685 inches)
	X'637A'	12 in x 18 in (IP70) (17.685 inches)
	X'1F01'	Hagaki (IP20, IP21, IP 32/40, IP45) (140 mm)
	X'20E3'	A6 (NP12, NP17) (148.5 mm)
	X'2CBC'	A5 (All printers) (202 mm)
	X'3597'	B5 (ISO) (NP12, NP17, IP21, NP24) (242 mm)
	X'3724'	B5 (JIS) (All printers) (249 mm)
	X'4000'	A4 (All printers) (289 mm)
	X'4ED6'	B4 (IP20, NP24, IP 32/40, IP45, IP70) (356 mm)
	X'5B3D'	A3 (IP20, NP24, IP 32/40, IP45, IP70) (412 mm)
	X'1F01' - X'6EBA'	Universal (IP20) (140 to 500 mm)
	X'1F01' - X'4CFA'	Custom (IP21 LTR/A4) (140 mm to 347.6 mm)
	X'1A5A' - X'4CFA'	Custom (IP21 Aux) (119 mm to 347.6 mm)
	X'2688' - X'5DDA'	Custom (IP45 Tray 1) (174 mm to 423.8 mm)
	X'2688' - X'5DDA'	Custom (IP45 Tray 2, 3) (174 mm to 423.8 mm)
	X'1F01' - X'5DDA'	Custom (IP45 Aux) (140 mm to 423.8 mm)
	X'1F01' - X'5DDA'	Universal (IP 32/40) (140 to 423.8 mm)
	X'2688' - X'63A7'	Universal (IP70) (174 to 450 mm)
		Envelopes
	X'1406'	Monarch (All printers) (3.560 inches)
	X'156E'	COM10 (All printers) (3.810 inches)
	X'1696'	DL (All printers) (102 mm)
	X'221A'	C5 (All printers) (154 mm)
	X'2534'	B5 (NP24) (168 mm)
	X'1F01' - X'6EBA'	Universal (IP20) (140 to 500 mm)
	X'1F01' - X'4CFA'	Custom (IP21 LTR/A4) (140 mm to 347.6 mm)
	X'1A5A' - X'4CFA'	Custom (IP21 Aux) (119 mm to 347.6 mm)
	X'286A' - X'347C'	Custom (IP45 Env) (182.5 mm to 237 mm)
	X'1F01' - X'347C'	Universal (IP 32/40) (140 to 237 mm)
		Transparencies and Labels
	X'3C1A'	Letter (IP20, IP21, IP 32/40, IP45) (10.685 inches)
	X'4000'	A4 (IP20, IP21, IP 32/40, IP45) (289 mm)

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Bytes 20-21		Ym EXTENT of the Printable Area in L-units (Unrestricted: Edge-to-Edge Addressability)
		Paper
	X'2FD0'	Statement (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (8.5 inches)
	X'3B10'	Executive (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (10.5 inches)
	X'3DE0'	Letter (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (11 inches)
	X'45C0'	8.5 in x 12.4 in (IP70) (12.4 inches)
	X'3DE0'	Tabstock (IP70) (11 inches)
	X'4920'	Folio (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (13 inches)
	X'4EC0'	Legal (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (14 inches)
	X'5FA0'	Ledger (IP20, IP 32/40, IP45, IP70) (17 inches)
	X'6540'	12 in x 18 in (IP70) (18 inches)
	X'20C7'	Hagaki (IP20, IP 32/40, IP45) (148 mm)
	X'20E3'	A6 (NP12, NP17) (148.5 mm)
	X'2E82'	A5 (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (210 mm)
	X'375D'	B5 (ISO) (NP12, NP17, IP21) (250 mm)
	X'38EA'	B5 (JIS) (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (257 mm)
	X'41C6'	A4 (NP12, NP17, IP20, IP21, IP 32/40, IP45, IP70) (297 mm)
	X'509C'	B4 (IP20, IP 32/40, IP45, IP70) (364 mm)
	X'5D03'	A3 (IP20, IP 32/40, IP45, IP70) (420 mm)
	X'20C7' - X'7080'	Universal (IP20) (148 to 508 mm)
	X'20C7' - X'4EC0'	Custom (IP21 LTR/A4) (148 to 355.6 mm)
	X'1C20' - X'4EC0'	Custom (IP21 Aux) (127 to 355.6 mm)
	X'284E' - X'5FA0'	Custom (IP45 Tray 1) (182 mm to 431.8 mm)
	X'284E' - X'5FA0'	Custom (IP45 Tray 2, 3) (182 mm to 431.8 mm)
	X'20C7' - X'5FA0'	Custom (IP45 Aux) (148 mm to 431.8 mm)
	X'20C7' - X'5FA0'	Universal (IP 32/40) (148 to 431.8 mm)
	X'284E' - X'656D'	Universal (IP70 Aux) (182 to 458 mm)
		Envelopes
	X'15CC'	Monarch (NP12, NP17, IP20, IP21, IP 32/40) (3.875 inches)
	X'1734'	COM10 (NP12, NP17, IP20, IP21, IP 32/40) (4.125 inches)
	X'185C'	DL (NP12, NP17, IP20, IP21, IP 32/40) (110 mm)
	X'23E0'	C5 (NP12, NP17, IP20, IP21, IP 32/40) (162 mm)
	X'20C7' - X'7080'	Universal (IP20) (148 to 508 mm)
	X'20C7' - X'4EC0'	Custom (IP21 LTR/A4) (148 to 355.6 mm)
	X'1C20' - X'4EC0'	Custom (IP21 Aux) (127 to 355.6 mm)
	X'2A30' - X'3642'	Custom (IP45 Env) (190.5 mm to 245 mm)
	X'20C7' - X'3642'	Universal (IP 32/40) (148 to 245 mm)
		Transparencies and Labels
	X'3DE0'	Letter (IP20, IP 32/40, IP45, IP70) (11 inches)
	X'41C6'	A4 (IP20, IP 32/40, IP45, IP70) (297 mm)
Bytes 22-23		INPUT MEDIA SOURCE CHARACTERISTICS
	Bit 0 0/1	0 = No Duplex; 1 = Duplex
	Bits 1-2 10	10 = Cut Sheet Media
	Bit 3 1	0 = Tray Not Available; 1 = Tray Available
	Bit 4 0	0 = Reserved
	Bit 5 0/1	0 = No Envelopes; 1 = Auto or Manual Envelope Feature
	Bit 6 0/1	0 = Auto Media Feed; 1 = Manual Media Feed
	Bit 7 0	0 = No Computer Output on Microfilm (COM)
	Bit 8 0	0 = No Carrier Strips (Ignored for Cut Sheet Media)
	Bit 9 0	0 = Not an Inserter Bin
	Bits 10-15 all 0	Reserved

Table 56. Printable Area (continued)

Special Data Area	Value	Description
Bytes 24-25	 X'000C' X'000D'	INPUT MEDIA ID LENGTH IP21, IP45, IP70 with single OID byte IP21 with double OID byte
Byte 26	 X'10'	INPUT MEDIA ID Type MO:DCA Input Media Type OID
Byte 27	X'06'	OID Encoding
Byte 28	 X'07' X'08'	OID Length Single OID Byte Double OID Byte
Bytes 29-34	X'2B1200040301'	Input Media ID (Common Part)
Bytes 35-36	 X'45' X'41' X'32' No OID returned No OID returned X'3F' X'3C' X'43' No OID returned X'51' X'14' X'28' X'2B' X'00' X'1E' X'0A' No OID returned X'4C' X'4B' X'4D' X'4F' No OID returned	Input Media ID (Media Specific part) *Paper* Statement (69) IP21, IP45, IP70 Executive (65) IP21, IP45, IP70 Letter (50) IP21, IP45, IP70 8.5 in x 12.4 in IP70 Tabstock IP70 Folio (63) IP21, IP45, IP70 Legal (60) IP21, IP45, IP70 Ledger (67) IP45, IP70 12 in x 18 in IP70 Hagaki (81) IP21, IP45 A5 (20) IP21, IP45, IP70 B5 (ISO) (40) IP21 B5 (JIS) (43) IP21, IP45, IP70 A4 (00) IP21, IP45, IP70 B4 (30) IP45, IP70 A3 (10) IP45, IP70 Custom IP21, IP45, IP70 *Envelopes* Monarch (76) IP21, IP45 COM10 (75) IP21, IP45 DL (77) IP21, IP45 C5 (79) IP21, IP45 Custom IP21, IP45

Notes:

1. In the OPC Acknowledgement Reply, the Printable Area SDF repeats for every installed Media Source. Therefore, since Network Printers are capable of supporting multiple installed input trays, multiple Printable Area SDF's may be returned in a single XOH-OPC Acknowledgement Reply.
2. The Input Media Source Characteristics (Bit 0), of the Printable Area SDF indicates the duplexability of a given media source. Refer to "Media Source and Destination Support Matrices" on page 39, for specific details on media duplexability for Network Printers.

Image and Coded Font Resolution Self-Defining Field

Table 57. Image and Coded Font Resolution Self-Defining Field

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0003'	IMAGE and CODED FONT RESOLUTION Self-Defining Field
Byte 4	X'00'	UNIT BASE 10 inches
Byte 5	X'00' X'FF'	FONT RESOLUTIONS Resolution Acceptance Mode (Only value in bytes 6-9) Resolution Independence Mode (Bytes 6-9 specify highest resolution) (240 DPI or 300 DPI or 600 DPI)
Bytes 6-7	X'0960' X'0BB8' X'1770'	X PELS per Unit Base 2400 pels/10 inches 3000 pels/10 inches 6000 pels/10 inches
Bytes 8-9	X'0960' X'0BB8' X'1770'	Y PELS per Unit Base 2400 pels/10 inches 3000 pels/10 inches 6000 pels/10 inches

Notes:

1. Value for byte 5 is controlled by the operator panel IPDS Resolution setting for the Infoprint 20, Infoprint 21, Infoprint 32, Infoprint 40, Infoprint 45, and Infoprint 70 printers. Byte 5 will indicate Resolution Acceptance mode X'00' if the IPDS Resolution setting is 240, 300 or 600 DPI. Byte 5 will indicate Resolution Independence mode X'FF' if the IPDS Resolution setting is Auto.
2. Values for bytes 6-9 are controlled by the setting of byte 5 (Font Resolutions) for the Infoprint 20, Infoprint 21, Infoprint 32, Infoprint 40, Infoprint 45, and Infoprint 70 printers. If byte 5 indicates Resolution Acceptance mode X'00', bytes 6-9 reflect the operator panel IPDS Resolution setting. If byte 5 indicates Resolution Independence mode X'FF', bytes 6-9 reflect the operator panel IPDS Print Mode setting.
3. If the operator panel IPDS Print Mode = STD (Standard 300 DPI), then the operator panel IPDS Resolution setting is ignored. Byte 5 will indicate Resolution Acceptance mode X'00' and bytes 6-9 will reflect the IPDS Print Mode setting (300 DPI).
4. For IP20, IP21, IP32/40, IP45, and IP70, in order to specify IPDS Resolution support of 240, 600, or AUTO, The IPDS Print Mode must be set to Enhanced (PRINT MODE = ENH on the IPDS Menu). In enhanced print mode, complex (full page) image jobs may not yield optimal print performance due to the increased print fidelity required to accurately render 240 and 600 DPI print objects.

Storage Pools Self-Defining Field

Table 58. Storage Pools

Special Data Area	Value	Description
Bytes 0-1	X'0037'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0004'	STORAGE POOLS Self-Defining Field
Byte 4	X'35'	LENGTH of each Storage Pool Self-Defining Field
Byte 5	X'01'	Triplet ID

Table 58. Storage Pools (continued)

Special Data Area	Value	Description
Byte 6	X'00'	STORAGE POOL ID
Bytes 7-10	X'nnnnnnnn'	Storage pool varies based on installed memory and features
Bytes 11-14	X'00000000'	Reserved
Bytes 15-16	X'0011'	PAGE GRAPHICS Data
Bytes 17-18	X'0012'	PAGE IMAGE Data
Bytes 19-20	X'0013'	PAGE TEXT Data
Bytes 21-22	X'0014'	PAGE BAR CODE Data
Bytes 23-24	X'0021'	OVERLAY GRAPHICS Data
Bytes 25-26	X'0022'	OVERLAY IMAGE Data
Bytes 27-28	X'0023'	OVERLAY TEXT Data
Bytes 29-30	X'0024'	OVERLAY BAR CODE Data
Bytes 31-32	X'0031'	PAGE SEGMENT GRAPHICS Data
Bytes 33-34	X'0032'	PAGE SEGMENT IMAGE Data
Bytes 35-36	X'0033'	PAGE SEGMENT TEXT Data
Bytes 37-38	X'0034'	PAGE SEGMENT BAR CODE Data
Bytes 39-40	X'0040'	Single-Byte CODED FONT Index Tables
Bytes 41-42	X'0041'	Single-Byte CODED FONT Descriptors
Bytes 43-44	X'0042'	Single-Byte CODED FONT Patterns
Bytes 45-46	X'0048'	Double-Byte CODED FONT Index Tables
Bytes 47-48	X'0049'	Double-Byte CODED FONT Descriptors
Bytes 49-50	X'004A'	Double-Byte CODED FONT Patterns
Bytes 51-52	X'0050'	CODE PAGES
Bytes 53-54	X'0060'	FONT CHARACTER SETS
Bytes 55-56	X'0070'	CODED FONTS

Color Support Self-Defining Field

Table 59. Color Support Self-Defining Field

Special Data Area	Value	Description
Bytes 0-1	X'0006'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0005'	COLOR SUPPORT Self-Defining Field
Bytes 4-5	X'0008'	BLACK

PQC Support Self-Defining Field

Table 60. PQC Support Self-Defining Field

Special Data Area	Value	Description
Bytes 0-1	X'0007'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0009'	PQC SUPPORT Self-Defining Field

Table 60. PQC Support Self-Defining Field (continued)

Special Data Area	Value	Description
Byte 4	X'01'	ECONO Mode (Toner Saving)
Byte 5	X'56'	Operator panel setting
Byte 6	X'AB'	Normal Mode (No Toner Saving)

Notes:

1. The PQC Support Self-Defining Field is supported to allow applications to directly control the printer quality setting for toner saving.
2. XOA QPC is supported only on the Infoprint 20, Infoprint 21, Infoprint 32, Infoprint 40, Infoprint 45, and Infoprint 70.

Installed Features Self-Defining Field

Since Network Printers are capable of supporting multiple features, multiple configuration combinations are possible. All installable features for Network Printers are described below.

Table 61. Network Printer 12 Installed Features

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0006'	INSTALLED FEATURES Self-Defining Field
Bytes 4-5	X'0100'	DUPLEX
Bytes 6-7	X'0300'	CUT SHEET Output
Bytes 8-9	X'0700'	ENVELOPES

Table 62. Network Printer 17, Network Printer 24, Infoprint 20, Infoprint 21, Infoprint 32/40 and Infoprint 45 Installed Features

Special Data Area	Value	Description
Bytes 0-1	X'000C'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0006'	INSTALLED FEATURES Self-Defining Field
Bytes 4-5	X'0100'	DUPLEX
Bytes 6-7	X'0300'	CUT SHEET Output
Bytes 8-9	X'0600'	OFFSET STACKER
Bytes 10-11	X'0700'	ENVELOPES

Table 63. Infoprint 70 Installed Features

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0006'	INSTALLED FEATURES Self-Defining Field
Bytes 4-5	X'0100'	DUPLEX
Bytes 6-7	X'0300'	CUT SHEET Output
Bytes 8-9	X'0600'	OFFSET STACKER

Available Features Self-Defining Field

Since Network Printers are capable of supporting multiple features, multiple configuration combinations are possible. All available features for Network Printers are described below.

Table 64. Network Printer 12 Available Features

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0007'	AVAILABLE FEATURES Self-Defining Field
Bytes 4-5	X'0100'	DUPLEX
Bytes 6-7	X'0300'	CUT SHEET Output
Bytes 8-9	X'0700'	ENVELOPES

Table 65. Network Printer 17, Network Printer 24, Infoprint 20, Infoprint 21, Infoprint 32/40 and Infoprint 45 Available Features

Special Data Area	Value	Description
Bytes 0-1	X'000C'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0007'	AVAILABLE FEATURES Self-Defining Field
Bytes 4-5	X'0100'	DUPLEX
Bytes 6-7	X'0300'	CUT SHEET Output
Bytes 8-9	X'0600'	OFFSET STACKER
Bytes 10-11	X'0700'	ENVELOPES

Table 66. Infoprint 70 Available Features

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0007'	AVAILABLE FEATURES Self-Defining Field
Bytes 4-5	X'0100'	DUPLEX
Bytes 6-7	X'0300'	CUT SHEET Output
Bytes 8-9	X'0600'	OFFSET STACKER

RRL Resource Type and ID Format Self-Defining Field

Table 67. RRL Resource Type and ID Format

Special Data Area	Value	Description
Bytes 0-1	X'002A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'000A'	RRL RESOURCE TYPE Self-Defining Field
Note: RRL query combinations that receive a non-zero Resource Type reply (See "XOA Request Resource List" on page 70)		
Bytes 4-5	X'0100'	Single-Byte Coded Fonts as Host Assigned Resource ID
Bytes 6-7	X'0103'	Single-Byte Coded Fonts as IBM Global Resource ID

Table 67. RRL Resource Type and ID Format (continued)

Special Data Area	Value	Description
Bytes 8-9	X'0200'	Double-Byte Coded Fonts as Host Assigned Resource ID
Bytes 10-11	X'0203'	Double-Byte Coded Fonts as IBM Global Resource ID
Bytes 12-13	X'0300'	Double-byte Coded-font Sections as Host Assigned Resource ID
Bytes 14-15	X'0400'	Page Segments as Host Assigned Resource ID
Bytes 16-17	X'0500'	Overlays as Host Assigned Resource ID
Bytes 18-19	X'0600'	Device Version Code Pages as Host Assigned Resource ID
Bytes 20-21	X'0603'	Device Version Code Pages as IBM Global Resource ID
Bytes 22-23	X'0700'	Font Character Set as Host Assigned Resource ID
Bytes 24-25	X'0703'	Font Character Set as IBM Global Resource ID
Bytes 26-27	X'0800'	Single-Byte Coded Font Index as Host Assigned Resource ID
Bytes 28-29	X'0900'	Double-byte Coded-font Section Indexes as Host Assigned Resource ID
Bytes 30-31	X'1000'	Coded Fonts as Host Assigned Resource ID (treated as
Bytes 32-33	X'1003'	Coded Fonts as IBM Global Resource ID (treated as
Bytes 34-35	X'1103'	Graphic Character Sets/Subsets as IBM Global Resource ID
Bytes 36-37	X'1200'	Specific Code Pages as Host Assigned Resource ID
Bytes 38-39	X'1203'	Specific Code Pages as IBM Global Resource ID
Bytes 40-41	X'FF00'	All Resources as Host Assigned Resource ID

Activate Resource RT and ID Format Self-Defining Field

Table 68. Activate Resource RT and ID Format

Special Data Area	Value	Description
Bytes 0-1	X'001C'	LENGTH of this Self Defining Field
Bytes 2-3	X'000B'	AR RESOURCE TYPE Self-Defining Field
Note: RRL query combinations that receive a non-zero Resource Type reply (See "XOA Request Resource List" on page 70)		
Bytes 4-5	X'0103'	Single-Byte LF1 Coded Fonts with IBM Global Resource IDs
Bytes 6-7	X'0106'	Single-Byte LF1 Coded Fonts with MVS Host Unalterable Remote Font Environment
Bytes 8-9	X'0303'	Double-Byte Coded-font Sections with Global Resource IDs
Bytes 10-11	X'0306'	Double-Byte Coded-font Sections with MVS Host Unalterable Remote Font Environment
Bytes 12-13	X'0603'	Code Pages with IBM Global Resource IDs

Table 68. Activate Resource RT and ID Format (continued)

Special Data Area	Value	Description
Bytes 14-15	X'0703'	Font Character Sets with IBM Global Resource IDs
Bytes 16-17	X'0803'	Single-Byte LF1 Coded Font Index with IBM Global Resource IDs
Bytes 18-19	X'0806'	Single-Byte LF1 Coded Fonts Index with MVS Host Unalterable Remote Font Environment
Bytes 20-21	X'0903'	Double-Byte Coded-font section indexes with Global Resource IDs
Bytes 22-23	X'0906'	Double-Byte Coded-font section indexes with MVS Host Unalterable Remote Font Environment
Bytes 24-25	X'1003'	Single and/or Double-Byte Coded Fonts with IBM Global Resource ID
Bytes 26-27	X'1007'	Single and/or Double-Byte Coded Fonts with Coded-font format

Bar Code Type Self-Defining Field ID

Table 69. Bar Code Type Self-Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'0009'	LENGTH of this Self-Defining Field
Bytes 2-3	X'000E'	BAR CODE TYPE Self-Defining Field
Byte 4	X'0D'	CODABAR Modifier Byte Options X'01' and X'02'
Byte 5	X'11'	CODE 128 Modifier Byte Options X'02'
Byte 6	X'18'	POSTNET Modifier Byte Options X'00' - X'03'
Byte 7	X'1A'	RM4SCC Modifier Byte Option X'00'
Byte 8	X'1B'	Japan Postal Barcode Modifier Byte Option X'00' and X'01'
Byte 9	X'1F'	Australia Postal Barcode Modifier Byte Options X'00' -
Byte 10	X'9A'	RM4SCC Modifier Byte Option X'01'

Notes:

1. See "Bar Code Type and Modifier Description and Values" on page 138 for all Bar-Codes supported by Network Printers.
2. Japan Postal bar codes are supported only on Infoprint 20, Infoprint 21, Infoprint 32, Infoprint 40, Infoprint 45 and Infoprint 70.
3. RM4SCC Modifier Byte Option is supported only on Infoprint 21, Infoprint 45, and Infoprint 70.
4. Australia Postal bar code is supported only on Infoprint 45 and Infoprint 70.

Media-Destinations Self_Defining Field

Table 70. Network Printer 12 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field

Table 70. Network Printer 12 Media-Destinations Self_Defining Field ID (continued)

Special Data Area	Value	Description
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Bytes 6-7	X'0001'	Output Tray 1 (First)
Bytes 8-9	X'0002'	Output Tray 2 (Last)

Table 71. Network Printer 17 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A' or X'000E'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Byte 6-n	 X'0001' X'0002' X'0001' X'0001' X'0003' X'000C'	RANGES OF MEDIA DESTINATION IDs Output Tray 1 (First) Output Tray 2 (Last) OR Output Tray 1 (First) Output Tray 1 (Last) Mailbox Output Tray 1 (First) Mailbox Output Tray 10 (Last)

Table 72. Infoprint 20 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Bytes 6-7	X'0001'	Output Tray 1 (First)
Bytes 8-9	X'0001'	Output Tray 1 (Last)

Table 73. Infoprint 21 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Byte 6-9	 X'0001' X'0001' X'0001' X'0002'	RANGES OF MEDIA DESTINATION IDs Output Tray 1 (First) Output Tray 1 (Last) OR Output Tray 1 (First) Output Tray 2 (Last)

Table 74. Network Printer 24 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'or X'000E'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Byte 6-n	 X'0001' X'0002' X'0001' X'0001' X'0003' X'0009'	RANGES OF MEDIA DESTINATION IDs Output Tray 1 (First) Output Tray 2 (Last) OR Output Tray 1 (First) Output Tray 1 (Last) Output Tray 3 (First) Output Tray 9 (Last)

Table 75. Infoprint 32/40 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Byte 6-9	 X'0001' X'0002' X'0001' X'0006'	RANGES OF MEDIA DESTINATION IDs Output Tray 1 (First) Output Tray 2 (Last) OR Output Tray 1 (First) Output Tray 6 (Last)

Table 76. Infoprint 45 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)

Table 76. Infoprint 45 Media-Destinations Self_Defining Field ID (continued)

Special Data Area	Value	Description
Byte 6-9		RANGES OF MEDIA DESTINATION IDs
	X'0001'	Output Tray 1 (First)
	X'0001'	Output Tray 1 (Last)
		OR
	X'0001'	Output Tray 1 (First)
	X'0002'	Output Tray 2 (Last)
		OR
	X'0001'	Output Tray 1 (First)
	X'0004'	Finisher Top Output Bin (Last)
		OR
	X'0001'	Output Tray 1 (First)
	X'0001'	Output Tray 1 (Last)
	X'0003'	Output Tray 3 (First)
	X'0004'	Finisher Top Output Bin (Last)

Table 77. Infoprint 70 Media-Destinations Self_Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'000A'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0010'	Media-Destinations self-defining ID
Bytes 4-5	X'nnnn'	Default media-destination ID (determined by configuration)
Byte 6-9		RANGES OF MEDIA DESTINATION IDs
	X'0001'	Output Tray 1 (First)
	X'0002'	Output Tray 2 (Last)

Supported Group Operations Self-Defining Field ID

Table 78. Network Printer 12, Network Printer 17, Infoprint 20 Infoprint 21 (No Finisher) Supported Group Operations SDF ID

Special Data Area	Value	Description
Bytes 0-1	X'0005'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0012'	SUPPORTED GROUP OPERATIONS Self-Defining Field
Byte 4	X'01'	Keep group together as a print unit

Table 79. Network Printer 24, Infoprint 32/40, Infoprint 45, and Infoprint 70 (Finisher) Supported Group Operations SDF ID

Special Data Area	Value	Description
Bytes 0-1	X'0006'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0012'	SUPPORTED GROUP OPERATIONS Self-Defining Field
Byte 4	X'01'	Keep group together as a print unit
Byte 5	X'04'	Finish

Product Identifier Self-Defining Field ID

Table 80. Product Identifier Self-Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'004F'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0013'	PRODUCT IDENTIFIER Self-Defining Field ID
Byte 4	X'38'	LENGTH of Self-Defining Product ID Parameter
Bytes 5-6	X'0001'	Unique PRODUCT IDENTIFIER Parameter ID
Bytes 7-12	X'F0F0F4F3F1F2' X'F0F0F4F3F1F7' X'F0F0F4F3F2F0' X'F0F0F4F3F2F2' X'F0F0F4F3F2F4' X'F0F0F4F3F3F2' X'F0F0F4F3F4F5' X'F0F0F2F7F7F0'	DEVICE TYPE Network Printer 12 (4312) Network Printer 17 (4317) Infoprint 20 (4320) Infoprint 21 (4322) Network Printer 24 (4324) Infoprint 32/40 (4332) Infoprint 45 (4345) Infoprint 70 (2770)
Bytes 13-15	X'F0F0F0' X'F0F0F1'	MODEL NUMBER IP21, IP45, NP12, NP17, IP20, NP24, IP32/40, IP70
Bytes 16-18	X'C9C2D4'	IBM MANUFACTURER
Bytes 19-20	X'0000'	PLANT
Bytes 21-32	X'F0F0F0F0F0F0F0F2F9F6F5F3F8' (296538) X'000000000000000000000000'	SEQUENCE NUMBER IP20, IP21, IP 32/40, IP45, IP70 NP12, NP17, NP24
Bytes 33-34	X'0000'	TAG
Bytes 35-43	X'C9D7C4E2F0F14BF0F0' (IPDS 1.00) X'F0F0F0F0F0F0F0F0F0' (no level)	IPDS CODE LEVEL IP45, IP70 NP12, NP17, IP20, NP24, IP32/40
Bytes 44-59	X'F0F0F0F0F0F0F0E6C3E4F0F14BF0F5F7' (WCU 1.057) X'00000000000000000000000000000000' (no level)	IPDS CODE LEVEL IP45, IP70 NP12, NP17, IP20, IP21, NP24, IP32/40
Byte 60	X'13'	LENGTH of Self-Defining Product ID Parameter
Bytes 61-62	X'0003'	PRINTER NAME Parameter ID
Byte 63-78	X'C9C2D440C995869697998995A340F2F1' X'C9C2D440C995869697998995A340F4F5' X'C9C2D440C995869697998995A340F7F0'	PRINTER NAME Infoprint 21 Infoprint 45 Infoprint 70

Finishing Operations Self-Defining Field ID

Table 81. Network Printer 24, Infoprint 32/40, Infoprint 45, Infoprint 70 Product Identifier Self-Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'0006'	LENGTH of this Self-Defining Field
Bytes 2-3	X'0018'	FINISHING OPERATIONS self-defining field
Byte 4	X'01'	Corner Staple
Byte 5	X'03'	Edge Stitch
Byte 5	X'0A'	Punch (Infoprint 45)

XOH Select Input Media Source

This order selects the input media source and, indirectly, the input media, for subsequent physical sheets.

The set of valid values differs according to which forms module configuration is installed and selected by the operator. Since Network Printers are capable of supporting multiple installed input bins, multiple configuration combinations are possible. All input media sources for Network Printers are described below.

When the number of installed input bins changes, the printer is POR'd and initial machine settings are established. When the bin configuration changes exception X'0101..00' is reported to the host.

Notes:

1. Infoprint 20 and Infoprint 21 support the ability to designate an input media tray as an envelope tray instead of a paper tray. For Infoprint 20, this is done by installing a special envelope tray into one of the paper drawers. For Infoprint 21, Infoprint 45, and Infoprint 70, this is done by setting the media type (TRAY1TYPE, TRAY2TYPE, or TRAY3TYPE on the Paper Menu) to ENV. This scheme allows paper trays to be designated as envelope trays while also allowing legacy applications to run without alteration.

   For envelope trays (excluding the optional Envelope Feeder on the Infoprint 21), assignment of the host media identifier starts with the first tray configured for envelopes, not its actual position in the printer. Therefore, making Tray 3 an envelope tray causes it to have a media identifier of X'41' instead of X'43'. If Tray 1 and Tray 3 are envelope trays and Tray 2 is a paper tray, Tray 1 is addressed as x'41', Tray 2 is addressed as x'00', and Tray 3 is addressed as x'42'.
2. Actual tray capacities are determined by media weight. The capacities indicated in the table are the maximum allowable.
3. Infoprint 21, Infoprint 45, and Infoprint 70 support media source tray mapping. Media source values in the LCC support tables represent the default settings when the printer is initially installed. For Infoprint 21 and Infoprint 45 the TRAY n, AUX, and ENV items on the IPDS Menu allow you to re-map the source tray numbers to meet the requirements of legacy applications.

Table 82. XOH Select Input Media Source for Network Printer 12

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	

Table 82. XOH Select Input Media Source for Network Printer 12 (continued)

Data Area	Value	Description	Error Code
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (250)	
	X'01'	CUT SHEET Tray 2 (500)	
	X'40'	ENVELOPE Tray (60) Mutually Exclusive of Cut Sheet Tray 2	
	X'63'	MANUAL Tray (80)	
	X'FF'	Printer Default Tray	

Table 83. XOH Select Input Media Source for Network Printer 17

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (250)	
	X'01'	CUT SHEET Tray 2 (500)	
	X'02'	CUT SHEET Tray 3 (500)	
	X'40'	ENVELOPE Tray (75)	
	X'63'	MANUAL Tray (100)	
	X'FF'	Printer Default Tray	

Table 84. XOH Select Input Media Source for Infoprint 20

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (500)	
	X'01'	CUT SHEET Tray 2 (500) (2000)	
	X'02'	CUT SHEET Tray 3 (500) (2000)	
	X'40'	ENVELOPE Tray 1 (75)	
	X'41'	ENVELOPE Tray 2 (75)	
	X'42'	ENVELOPE Tray 3 (75)	
	X'63'	MANUAL Tray (150)	
	X'FF'	Printer Default Tray	

Table 85. XOH Select Input Media Source for Infoprint 21

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (550)	
	X'01'	CUT SHEET Tray 2 (550)	
	X'02'	CUT SHEET Tray 3 (550)	
	X'40'	ENVELOPE Feeder (75)	
	X'41'	ENVELOPE Tray 1 (75)	
	X'42'	ENVELOPE Tray 2 (75)	
	X'43'	ENVELOPE Tray 3 (75)	
	X'63'	MANUAL Tray (100)	
	X'FF'	Printer Default Tray	

Table 86. XOH Select Input Media Source for Network Printer 24

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	

Table 86. XOH Select Input Media Source for Network Printer 24 (continued)

Data Area	Value	Description	Error Code
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (500)	
	X'01'	CUT SHEET Tray 2 (500)	
	X'02'	CUT SHEET Tray 3 (2000)	
	X'40'	ENVELOPE Tray (100)	
	X'63'	MANUAL Tray (100)	
	X'FF'	Printer Default Tray	

Table 87. XOH Select Input Media Source for Infoprint 32/40 and Infoprint 45

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (500)	
	X'01'	CUT SHEET Tray 2 (500)	
	X'02'	CUT SHEET Tray 3 (500) (2500-Sheet Input 1)	
	X'03'	CUT SHEET Tray 4 (1000) (2500-Sheet Input 2)	
	X'04'	CUT SHEET Tray 5 (1000) (2500-Sheet Input 3)	
	X'40'	ENVELOPE Feeder (100)	
	X'63'	AUXILIARY Tray (50)	
	X'FF'	Printer Default Tray	

Table 88. XOH Select Input Media Source for Infoprint 70

Data Area	Value	Description	Error Code
Byte 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	
Byte 2		INPUT MEDIA SOURCE	X'02C8..01'
	X'00'	CUT SHEET Tray 1 (2500)	
	X'01'	CUT SHEET Tray 2 (500)	
	X'02'	CUT SHEET Tray 3 (500)	
	X'03'	CUT SHEET Tray 4 (3000) (HCF)	
	X'63'	AUXILIARY Tray (150)	
	X'FF'	Printer Default Tray	

XOH Set Media Origin

The XOH Set Media Origin (SMO) command specifies the origin of the media. This order takes effect on the next-received page. The media origin will not change until either another XOH-SMO command is processed or the printer is reinitialized.

Table 89. XOH Set Media Size

Data Area	Value	Description	Error Code
Byte 0-1	X'1600'	SET MEDIA ORIGIN	
Byte 2		MEDIA ORIGIN	X'026F..02'
	X'00'	Top-left corner	
	X'01'	Top-right corner (Bottom-left corner if back side of duplex sheet)	
	X'02'	Bottom-right corner	
	X'03'	Bottom-left corner (Top-right corner if back side of duplex sheet)	

XOH Set Media Size

This order specifies SIZE of the physical medium.

Table 90. XOH Set Media Size

Data Area	Value	Description	Error Code
Byte 0-1	X'1700'	SET MEDIA SIZE	
Byte 2	X'00' X'01'	UNIT BASE (Measurement Units) 10 inches 10 centimeters	X'0274..02'
Bytes 3-4	X'3840' X'1626' X'0960' X'03B1'	L-Units per UNIT BASE 14400 L-Units/10 inches 5670 L-Units/10 centimeters 2400 L-Units/10 inches 945 L-Units/10 centimeters	X'0270..02'
Bytes 5-6	X'0001' - X'7FFF' X'FFFF'	Xm EXTENT of MEDIUM See "Notation Conventions" on page 17 Printer Default (OP Panel Setting or Tray sensors)	X'0272..02'
Bytes 7-8	X'0001' - X'7FFF' X'FFFF'	Ym EXTENT of MEDIUM See "Notation Conventions" on page 17 Printer Default (OP Panel Setting or Tray sensors)	X'0273..02'

XOH Page Counter Control

The XOH Page Counter Control (PCC) command provides a counter synchronization function that should only be used to recover from an exception or after a XOA Discard Buffer Data command.

Table 91. XOH Page Counter Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'F500'	OPC Order Code	
Byte 2	X'00' X'01'	Do Nothing (default) Synchronize Counters	

XOH Define Group Boundary

This order initiates or terminates a grouping of pages. When a grouping of pages is initiated the page that next increments the received apge counter is the first sheet in the designated group.

Table 92. XOH Define Group Boundary

Data Area	Value	Description	Error Code
Bytes 0-1	X'0400'	Define Group Boundary	X'018F..00' X'0277..01' X'0278..01' X'027A..01' X'027B..01'
Byte 2	X'00' X'01'	Initiate Group Terminate Group	
Byte 3	X'00' - X'FF'	Group Level	

Table 92. XOH Define Group Boundary (continued)

Data Area	Value	Description	Error Code
Bytes 4-end of command	See specific triplet description.	X'00' Group ID triplet X'6E' Group information triplet X'85' Finishing Operation triplet	 X'027C..01' X'027C..02'

Group ID Triplet

The Group ID triplet specifies host specific print-data formats for print job identification. The Infoprint 45 and Infoprint 70 printers utilize this information to provide IPDS print job identification on the printer console display.

Table 93. XOH DGB Group ID Triplet

Data Area	Value	Description	Error Code
Byte 0	X'02'-X'FF'	LENGTH	X'027A..01' X'027B..02'
Byte 1	X'01'	Group ID Triplet	
Byte 2	 X'01' X'02' X'03' X'06' X'13'	HOST FORMAT MVS and VSE print-data VM print-data OS/400 print-data (4 char spool file #) AIX and NT print-data OS/400 print-data (6 char spool file #)	
Bytes 4-11	 X'C2E4C4C7C5E3F0F1' (ie. BUDGET01)	MVS and VSE ID DATA Job Name (EBCDIC) (8 bytes)	
Bytes 4-11	 X'C2E4C4C7C5E3F0F1' (ie. BUDGET01)	VM ID DATA Filename (EBCDIC) (8 bytes)	
Bytes 23-32	 x'C2E4C4C7C5E3F2F0F0F1' (ie. BUDGET2000)	OS/400 ID DATA Filename (EBCDIC) (10 bytes)	
Bytes 3-End	 X'44455054425544474554323030 30' (ie. DEPTBUDGET2000)	AIX and NT ID DATA Name (ASCII) (1-251 bytes)	

Group Information Triplet

The Group Information is accepted, although no specific processing will occur.

Finishing Operation Triplet

The Finishing Operation triplet specifies a specific finishing operation to be applied to a collection of sheets. The finishing operation is only supported for the Infoprint 32/40, Infoprint 45, and Infoprint 70 printers. Only the staple, stitching, and punch operations are supported.

Table 94. XOH DGB Finishing Operation Triplet

Data Area	Value	Description	Error Code
Byte 0	X'09'	LENGTH	 X'027A..01' X'027B..01'
Byte 1	 X'85'	Finishing Triplet ID	

Table 94. XOH DGB Finishing Operation Triplet (continued)

Data Area	Value	Description	Error Code
Byte 2	 X'01' X'03' X'0A'	OPERATION TYPE Corner Staple Edge Staple Punch (IP45 only)	 X'27C..03' X'27C..09'
Bytes 3-4	X'0000'	Reserved	
Byte 5	 X'01' X'02' X'03' X'FF' X'02' X'03' X'FF'	REFERENCE CORNER Top-right corner (SEF only) Top-left corner Bottom-left corner Device default corner (top left corner) REFERENCE EDGE Top edge (SEF only) Left edge (LEF only) Device default edge (top edge-SEF, left edge-LEF)	X'027C..04'
Byte 6	X'00'	FINISHING OPERATION COUNT Device Default Number, Default Position	X'27C..05' X'27C..07'
Byte 7-8	X'FFFF'	FINISHING OPERATION AXIS OFFSET Device Default Axis Offset	X'027C..06'

Paper Finishing (Stapler and Punch) Support:

Note: Punch support is available only on the Infoprint 45.

Table 95. Infoprint 32/40, Infoprint 45, Infoprint 70 Staple/Punch Paper Support

Paper	Supported?
Statement	IP32, IP40
Executive	IP32, IP40, IP45
Letter	IP32, IP40, IP45 (Punch LEF), IP70
8.5 x 12.4 in	IP70
Tabstock	IP70
Folio	IP32, IP40, IP45, IP70
Legal	IP32, IP40, IP45, IP70
Ledger	IP32, IP40, IP45 (Punch SEF), IP70
12 x 18 in	No
Hagaki	No
A6	No
A5	IP32, IP40
B5 (ISO)	No
B5 (JIS)	IP32, IP40, IP70
A4	IP32, IP40, IP45 (Punch LEF), IP70
B4	IP32, IP40, IP45, IP70

Table 95. Infoprint 32/40, Infoprint 45, Infoprint 70 Staple/Punch Paper Support (continued)

Paper	Supported?
A3	IP32, IP40, IP45 (Punch SEF), IP70
Universal	No

Notes:

1. The printer must know about the finishing operation before the first page of a group is received. The printer will ignore finishing operation triplets on the XOH DGB command that terminates the group.
2. The media jog and staple functions are mutually exclusive. If both are specified the staple request takes precedence.
3. A single sheet cannot be stapled. If a job specifies only one sheet for finishing, stapling will not occur.
4. Stapled or stiched job groups may contain only a single media size.
5. For Infoprint 32/40:
   - Media stapling is only available when the finisher feature is installed.
   - Media stapling is only supported for output bins 1, 2, or 3 in face-down mode. If a job requests face-up output and stapling, face-up output takes precedence.
   - The finisher can only accomodate 50 sheets for stapling in a group. If a job specifies more than 50 sheets for finishing, stapling will not occur.
   - Simplex and duplex pages cannot be stapled or stitched within the same job.
6. For Infoprint 45:
   - Media stapling is only available when the finisher feature is installed.
   - Media stapling is only supported for in face-down mode.
   - The finisher can only accomodate 50 sheets for stapling in a group. If a job specifies more than 50 sheets for finishing, stapling or stitching will not occur.
   - Simplex and duplex pages can be stapled or stitched within the same job.
7. For Infoprint 70:
   - Media stapling is only supported to the Finisher Main Stacker in face-down mode.
   - The finisher can only accomodate 50 sheets for stapling in a group. If a job specifies more than 50 sheets for finishing, stapling will not occur. The maximum number of sheets in a group for stapling or stitching is determined by media weight, with a maximum staple group thickness of 5 mm.
   - Simplex and duplex pages can be stapled or stitched within the same job.

XOH Specify Group Operation

This order indicates to an attached printer, pre-processor, or post-processor that the specified processing option is to be performed upon subsequent boundary groups of the group level identified in this command.

Table 96. XOH Specify Group Operation

Data Area	Value	Description	Error Code
Byte 0-1	X'0300'	Define Group Boundary	

Table 96. XOH Specify Group Operation (continued)

Data Area	Value	Description	Error Code
Byte 2	X'00'-X'FF'	Operation Identifier	
	X'01'	Keep group together as a print unit	
	X'04'	Finish (IP32/40, IP45, IP70 with finisher)	
Bytes 3	X'00'-X'FF'	Group Level	

Note: The SGO Identifier (Byte 2) X'01' is the only supported operation by Network Printers. All other identifiers are accepted, although no specific processing will occur.

Chapter 5. Presentation Text Command Set

Table 97. Presentation Text Commands

Name	Command	Sub-command	Where to Look
Load Equivalence	X'D61D'		"Load Equivalence" on page 103
Write Text	X'D62D'		"Write Text" on page 103

Load Equivalence

This command permits text-suppression values imbedded in text data stored within the printer to be referenced externally using different values. For example, the Internal Suppression value of X'02' may be referenced externally on a Load Copy Control as a X'06' provided that an appropriate Load Equivalence command was previously received.

If more than 127 LE entries are specified, exception X'0202..02' is reported.

Table 98. Load Equivalence X'D61D'

Data Area	Value	Description	Error Code
Bytes 0-1	X'0100'	MAPPING TYPE Suppression Mapping	X02C6..02'
Bytes 2-3	X'0001' - X'00FF'	INTERNAL VALUE from BS..ES Pair	X'02C1..02' X'02C8..02'
Bytes 4-5	X'0001' - X'007F'	EXTERNAL VALUE from LCC	X'02C8..02'
Bytes 6-509		Zero or more additional entries analogous to Bytes 2-5	

Write Text

In this Write Text description, references made to pages also apply to overlays and page segments.

The print data is a string of 1-byte code points. To determine the character raster pattern, the printer uses the code point to identify the character metrics obtained from:

- Load Font Index (See "Load Font Index" on page 152)
- Load Font Control (See "Load Font Index" on page 152)
- Font Local ID (See "Load Font Equivalence" on page 60) or
- Resident Font Data

When the printer processes a Begin Page, it uses the values from the existing Logical Page Descriptor (See "Logical Page Descriptor" on page 62) or Initialization Default (See "IPDS Initialization Defaults" on page 19) until it processes one of the following text control sequences

- Draw B-Axis Rule
- Draw I-Axis Rule
- Set Baseline Increment
- Set Coded Font Local
- Set Extended Text Color
- Set Inline Margin

- Set Intercharacter Adjustment
- Set Text Color
- Set Text Orientation
- Set Variable Space Character Increment
- Temporary Baseline Move

The text control sequence value supersedes the Logical Page Descriptor or Initialization Default value and it remains in effect until it is changed by another text control sequence, or End Page is received.

For a complete description of the following text control sequences see the *Presentation Text Object Content Architecture Reference* and the *Intelligent Printer Data Stream Reference*.

Absolute Move Baseline

Absolute Move Baseline Control Sequence moves the baseline coordinate relative to the I-axis of the Presentation Text Space.

Table 99. Absolute Move Baseline

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	X'D2' X'D3'	ABSOLUTE MOVE BASELINE Unchained Chained	
Bytes 4-5	X'0000' - X'7FFF'	DISPLACEMENT (Bc) See "Notation Conventions" on page 17	X'0213..01'

Absolute Move Inline

Absolute Move Inline Control Sequence moves an inline coordinate position relative to the B-axis of the Presentation Text Space.

Table 100. Absolute Move Inline

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	X'C6' X'C7'	ABSOLUTE MOVE INLINE Unchained Chained	
Bytes 4-5	X'0000' - X'7FFF'	DISPLACEMENT (Ic) See "Notation Conventions" on page 17	X'0214..01'

Begin Line

Begin Line Control Sequence begins a new line.

Table 101. Begin Line

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'02'	LENGTH	X'021E..01'

Table 101. Begin Line (continued)

Data Area	Value	Description	Error Code
Byte 3	 X'D8' X'D9'	BEGIN LINE Unchained Chained	

Begin Suppression

Begin Suppression Control Sequence marks the beginning of a string of presentation text that may be suppressed from the visible output.

Table 102. Begin Suppression

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'03'	LENGTH	X'021E..01'
Byte 3	 X'F2' X'F3'	BEGIN SUPPRESSION Unchained Chained	
Byte 4	X'01' - X'FF'	SUPPRESSION ID	X'0298..01'

Draw B-Axis Rule

Draw B-axis Rule Control Sequence draws a rule in the b-direction.

Table 103. Draw B-Axis Rule

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'04' or X'07'	LENGTH	X'021E..01'
Byte 3	 X'E6' X'E7'	DRAW B-AXIS RULE Unchained Chained	
Bytes 4-5	X'8000' - X'7FFF'	LENGTH (Bl) See "Notation Conventions" on page 17	
Bytes 6-7	 X'8000' - X'7FFF' X'FFFF'	WIDTH (Bw) Printer Default 24/1440 inch	
Byte 8		IGNORED	

Draw I-Axis Rule

Draw I-axis Rule Control Sequence draws a rule in the i-direction.

Table 104. Draw I-Axis Rule

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'04' or X'07'	LENGTH	X'021E..01'
Byte 3	 X'E4' X'E5'	DRAW I-AXIS RULE Unchained Chained	
Bytes 4-5	X'8000' - X'7FFF'	LENGTH (Il) See "Notation Conventions" on page 17	

Table 104. Draw I-Axis Rule (continued)

Data Area	Value	Description	Error Code
Bytes 6-7	X'8000' - X'7FFF' X'FFFF'	WIDTH (Iw) Printer Default 24/1440 inch	
Byte 8		IGNORED	

End Suppression

End Suppression Control Sequence marks the end of a string of presentation text that may be suppressed from the visible output.

Table 105. End Suppression

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'03'	LENGTH	X'021E..01'
Byte 3	X'F4' X'F5'	END SUPPRESSION Unchained Chained	
Byte 4	X'01' - X'FF'	SUPPRESSION ID	X'0202..01' X'0204..01' X'0298..01'

No Operation

No Operation Control Sequence has no effect on presentation.

Table 106. No Operation

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'02' - X'FF'	LENGTH	X'021E..01'
Byte 3	X'F8' X'F9'	NO OPERATION Unchained Chained	
Bytes 4-255		DATA (Ignored)	

Overstrike

The Overstrike control identifies text that is to be overstruck with a specified character.

Table 107. Overstrike

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'05'	LENGTH	X'021E..01'
Byte 3	X'72' X'73'	OVERSTRIKE Unchained Chained	

Table 107. Overstrike (continued)

Data Area	Value	Description	Error Code
Byte 4	Bits 0-3 Bit 4 0 Bit 4 1 Bit 5 0 Bit 5 1 Bit 6 0 Bit 6 1 Bit 7 0 Bit 7 1	BYPASS IDENTIFIERS Reserved Overstrike white space from RMI Bypass white space from RMI Overstrike white space from AMI Bypass white space from AMI Overstrike white space from Space or Variable Space Character Bypass white space from Space or Variable Space Character BYPASS Treat Bits 0-6 according to their set values NO BYPASS Treat Bits 0-6 as if their values are set to zero	
Byte 5		IGNORED	
Byte 6	X'00' - X'FF'	OVERSTRIKE CHARACTER	

Relative Move Baseline

Relative Move Baseline Control Sequence moves a baseline coordinate relative to the current baseline coordinate position.

Table 108. Relative Move Baseline

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	X'D4' X'D5'	RELATIVE MOVE BASELINE Unchained Chained	
Bytes 4-5	X'8000' - X'7FFF'	INCREMENT (Br) See "Notation Conventions" on page 17	

Relative Move Inline

Relative Move Inline Control Sequence moves the inline coordinate of the presentation position relative to the current inline position.

Table 109. Relative Move Inline

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	X'C8' X'C9'	RELATIVE MOVE INLINE Unchained Chained	
Bytes 4-5	X'8000' - X'7FFF'	INCREMENT (Ir) See "Notation Conventions" on page 17	

Repeat String

Repeat String Control Sequence contains a string of coded graphic characters that is repeated on the current line.

Table 110. Repeat String

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04' - X'FF'	LENGTH	X'021E..01'
Byte 3	X'EE' X'EF'	REPEAT STRING Unchained Chained	
Bytes 4-5	X'0000' - X'7FFF'	REPEAT LENGTH (RL)	X0219..01'
Bytes 6-n		REPEAT DATA	X021F..01'

Set Baseline Increment

Set Baseline Increment Control Sequence specifies the distance to be added to the current baseline coordinate when a Begin Line control sequence is executed.

Table 111. Set Baseline Increment

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	X'D0' X'D1'	SET BASELINE INCREMENT Unchained Chained	
Bytes 4-5	X'8000' - X'7FFF' X'FFFF'	INCREMENT (Bi) See "Notation Conventions" on page 17 Use LPD value. If no LPD is received, use printer default	

Set Coded Font Local

Set Coded Font Local Control Sequence specifies the character attributes to be used and invokes a coded font.

Table 112. Set Coded Font Local

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'03'	LENGTH	X'021E..01'
Byte 3	X'F0' X'F1'	SET CODED FONT LOCAL Unchained Chained	
Byte 4	X'01' - X'FE' X'FF'	LOCAL FONT ID Use LPD value. If no LPD is received, use printer default	X'0218..02' X'023F..02'

Set Extended Text Color

The Set Text Color control specifies the color value and defines the color space and encoding for that value. The specified color value is applied to foreground areas of the presentation text space. Foreground areas consist of the following:

- The stroked and filled areas of solid text characters, including overstrike characters. With hollow characters, only the stroked portion of the character is considered foreground.
- The stroked area of a rule.
- The stroked area of an underscore.

Note: The current implementation of the Set Extended Text Color command is an acceptance mode, where parameters are validated and black is substituted.

Table 113. Set Extended Text Color

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'14' - X'16'	LENGTH	X'021E..01'
Byte 3	X'80' X'81'	SET EXTENDED TEXT COLOR Unchained Chained	
Byte 4	X'00'	RESERVED	
Bytes 5	X'01' X'04' X'06' X'08' X'40'	COLOR SPACE RGB - Limited Simulated Color Support (Black) CMYK - Limited Simulated Color Support (Black) HCS - Limited Simulated Color Support (Black) CIELAB - Limited Simulated Color Support (Black) Standard OCA - Limited Simulated Color Support (Black)	X'020E..02'
Bytes 6-9	X'00000000'	RESERVED	
Byte 10	X'01' - X'08' X'10'	1ST COLOR COMPONENT BITS (Limited Simulated Color Support (Black)) Standard OCA Color Space	X'020E..05'
Byte 11	X'00' - X'08'	2ND COLOR COMPONENT BITS (Limited Simulated Color Support (Black))	X'020E..05'
Byte 12	X'00' - X'08'	3RD COLOR COMPONENT BITS (Limited Simulated Color Support (Black))	X'020E..05'
Byte 13	X'00' - X'08'	4TH COLOR COMPONENT BITS (Limited Simulated Color Support (Black))	X'020E..05'
Bytes 14 -17	X'0000' X'0001'-X'0007' X'0008' X'0009'-X'0010' X'FF00' X'FF01'-X'FF06' X'FF07' X'FF08'	COLOR VALUE Standard OCA Color Space Printer Default (Black) Limited Simulated Color Support (Black) Black Limited Simulated Color Support (Black) Printer Default (Black) Limited Simulated Color Support (Black) Printer Default (Black) Color of Medium	X'020E..03'

Set Inline Margin

Set Inline Margin Control Sequence specifies position of an inline margin.

Table 114. Set Inline Margin

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	 X'C0' X'C1'	SET INLINE MARGIN Unchained Chained	
Bytes 4-5	X'0000' - X'7FFF' X'FFFF'	DISPLACEMENT (Ia) See "Notation Conventions" on page 17 Use LPD value. If no LPD is received, use printer default	X'0210..01'

Set Intercharacter Adjustment

Set Intercharacter Adjustment Control Sequence specifies additional increment or decrement between graphic characters.

Table 115. Set Intercharacter Adjustment

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04' or X'05'	LENGTH	X'021E..01'
Byte 3	 X'C2' X'C3'	SET INTERCHARACTER ADJUSTMENT Unchained Chained	
Bytes 4-5	X'0000' - X'7FFF' X'FFFF'	ADJUSTMENT (ica) See "Notation Conventions" on page 17 Use LPD value. If no LPD is received, use printer default	X'0212..01'
Byte 6	 X'00' X'01' X'FF'	DIRECTION Increment Direction Decrement Direction Same as X'00'	X'0212..01'

Set Text Color

The Set Text Color control specifies the foreground color attribute that selects the color for subsequent text characters.

Table 116. Set Text Color

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04' or X'05'	LENGTH	X'021E..01'
Byte 3	 X'74' X'75'	SET TEXT COLOR Unchained Chained	

Table 116. Set Text Color (continued)

Data Area	Value	Description	Error Code
Bytes 4-5	X'0000' X'0001'-X'0007' X'0008' X'0009'-X'0010' X'FF00' X'FF01'-X'FF06' X'FF07' X'FF08' X'FFFF'	COLOR Printer Default (Black) Limited Simulated Color Support (Black) Black Limited Simulated Color Support (Black) Printer Default (Black) Limited Simulated Color Support (Black) Printer Default (Black) Color of Medium Use LPD color value	X'0258..03'
Byte 6	X'00' - X'01' X'FF'	PRECISION Same as X'00'	X'0258..03'

Set Text Orientation

Set Text Orientation Control Sequence establishes i-direction and b-direction for the following presentation text.

Table 117. Set Text Orientation

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'06'	LENGTH	X'021E..01'
Byte 3	X'F6' X'F7'	SET TEXT ORIENTATION Unchained Chained	
Bytes 4-5	X'0000' X'2D00' X'5A00' X'8700' X'FFFF'	I-AXIS ORIENTATION 0 Degree (+X direction) 90 Degree (+Y direction) 180 Degree (-X direction) 270 Degree (-Y direction) Use LPD value. If no LPD is received, use printer default	X'020F..01'
Bytes 6-7	X'0000' X'2D00' X'5A00' X'8700' X'FFFF'	B-AXIS ORIENTATION 0 Degree (+X direction) 90 Degree (+Y direction) 180 Degree (-X direction) 270 Degree (-Y direction) Use LPD value. If no LPD is received, use printer default	X'020F..01'

The permitted combinations are those where the difference between the I-axis orientation and the B-axis orientation are 90 deg.

```
INLINE-DIRECTION  BASELINE-DIRECTION
 0 deg. rotation    90 deg. rotation
 0 deg. rotation   270 deg. rotation
90 deg. rotation   180 deg. rotation
90 deg. rotation     0 deg. rotation
180 deg. rotation  270 deg. rotation
180 deg. rotation   90 deg. rotation
270 deg. rotation  180 deg. rotation
270 deg. rotation    0 deg. rotation
```

Set Variable Space Character Increment

Set Variable Space Character Increment Control Sequence specifies the increment of a Variable Space Character.

Table 118. Set Variable Space Character Increment

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3	 X'C4' X'C5'	SET VARIABLE SPACE CHARACTER INCREMENT Unchained Chained	
Bytes 4-5	X'0000' - X'7FFF' X'FFFF'	INCREMENT (vsi) See "Notation Conventions" on page 17 Default Variable Space Increment for Current Font	X'0217..01'

Temporary Baseline Move

The Temporary Baseline Move Control Sequence is used to change the position of the sequential baseline without change to the established baseline.

Table 119. Temporary Baseline Move

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'03' or X'06'	LENGTH	X'021E..01'
Byte 3	 X'78' X'79'	TEMPORARY MOVE BASELINE Unchained Chained	
Byte 4	 X'00' X'01' X'02' X'03' X'FF'	DIRECTION Baseline is Unchanged Return to Established Baseline Shift Baseline away from I-axis (Subscript) Shift Baseline toward I-axis (Superscript) Same as X'00'	X'0298..03'
Byte 5	 X'00' X'01' X'FF'	PRECISION Accurate placement and character representation is required using the current font. A substitute font with characteristics identical to the current font may be used to simulate baseline shift (superscript/subscript). Network Printers accepts this value but treats it as X'00'. Same as X'00'	X'0298..03
Bytes 6-7	X'0000' - X'7FFF' X'FFFF'	TEMPORARY BASELINE INCREMENT See "Notation Conventions" on page 17 Half the current baseline increment	X'0298..03'

Transparent Data

Transparent Data Control Sequence contains a sequence of coded characters that are presented without a scan for embedded control sequences.

Table 120. Transparent Data

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'02' - X'FF'	LENGTH	X'021E..01'
Byte 3	X'DA' X'DB'	TRANSPARENT DATA Unchained Chained	
Bytes 4-255		CHARACTER STRING	

Underscore

The Underscore control sequence identifies text that is to be underscored.

Table 121. Underscore

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'03'	LENGTH	X'021E..01'
Byte 3	X'76' X'77'	UNDERSCORE Unchained Chained	
Byte 4	Bits 0-3 Bit 4 0 Bit 4 1 Bit 5 0 Bit 5 1 Bit 6 0 Bit 6 1 Bit 7 0 Bit 7 1 X'FF'	BYPASS IDENTIFIERS Reserved Underscore white space from Relative Move Inline Bypass white space from Relative Move Inline Underscore white space from Absolute Move Inline Bypass white space from Absolute Move Inline Underscore white space from Space or Variable Space Character Bypass white space from Space or Variable Space Character BYPASS Treat Bits 0-6 according to their set values NO BYPASS Treat Bits 0-6 as if their values are set to zero NO BYPASS in EFFECT	

Chapter 6. IM Image Command Set

IM Image Commands

Table 122. IM Image Commands

Name	Command	Sub-command	Where to Look
Write Image Control	X'D63D'		"Write Image Control" on page 115
Write Image	X'D64D'		"Write Image" on page 116

Write Image Control

The Write Image Control command is the first command in the sequence to send raster image data to the printer. The command contains fields to define the input, scale, and image placement parameters. Several Write Image commands may be required to a complete raster image.

Table 123. Write Image Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001' - X'7FFF'	Pels per scan line in the output image	X'0242..01' X'0243..01'
Bytes 2-3	X'0001' - X'7FFF'	Number of scan lines in the output image	X'0244..01' X'0245..01'
Bytes 4-5	X'0001' - X'7FFF'	Pels per scan line in the input image	X'0242..01' X'0243..01'
Bytes 6-7	X'0001' - X'7FFF'	Number of scan lines in the input image	X'0244..01' X'0245..01'
Byte 8	X'00'	Uncompressed input image	X'0246..01'
Byte 9	X'00'	One bit per pel in the input image format	X'0246..01'
Byte 10	 X'01' X'02'	PEL MAGNIFICATION FACTOR No Magnification Factor Magnification Factor of 2	X'0247..01'
Byte 11	 X'01' X'02'	SCAN LINE MAGNIFICATION FACTOR No Magnification Factor Magnification Factor of 2	X'0247..01'
Bytes 12-13	 X'0000' X'2D00' X'5A00' X'8700'	SCAN LINE DIRECTION 0 Degrees 90 Degrees 180 Degrees 270 Degrees	X'0248..01'
Bytes 14-15	 X'0000' X'2D00' X'5A00' X'8700'	SCAN LINE SEQUENCE DIRECTION 0 Degrees 90 Degrees 180 Degrees 270 Degrees	X'0249..01'

Table 123. Write Image Control (continued)

Data Area	Value	Description	Error Code
Byte 16	X'00' X'20' X'40' X'60' X'A0'	REFERENCE COORDINATE SYSTEM Absolute I, Absolute B Absolute I, Relative B Relative I, Absolute B Relative I, Relative B Xp, Yp	X'024A..01'
Bytes 17-19	X'FF8000' - X'007FFF'	Xp, I or I offset coordinate of the IM image block origin	X'024A..01'
Bytes 20	X'00'	Reserved	
Bytes 21-23	X'FF8000' - X'007FFF'	Yp, B or B offset coordinate of the IM image block origin	X'024A..01'
Bytes 24-25	X'0000' X'0001'-'X'0007' X'0008' X'0009'-X'0010' X'FF00' X'FF01'-X'FF06' X'FF07' X'FF08'	IMAGE COLOR 'Printer Default (Black) Limited Simulated Color Support (Black) Black Limited Simulated Color Support (Black) Printer Default (Black) Limited Simulated Color Support (Black) Printer Default (Black) Color of Medium	X'0253..01'

Write Image

The data is a binary representation of the raster image. In the binary data, a 1-bit represents a colored pel and a 0-bit represents a pel left unchanged in the page map. In other words, if a pel is set black by another block on the page (for example, text), it will not be reset to white if it is written with a 0-bit in the image block. Several Write Image commands may be required to a complete raster image.

An error occurs if the host program sends the End command and the total number of bytes of image data is a different number than specified in the image control record.

Table 124. Write Image X'D64D'

Data Area	Value	Description	Error Code
Bytes 0-End		Binary RASTER IMAGE	X'026A..01' X'026B..01' X'0264..01'

Chapter 7. IO Image Command Set

Table 125. IO Image Commands

Name	Command	Sub-command	Where to Look
Write Image Control 2	X'D63E'		"Write Image Control 2" on page 117
Image Area Position		X'AC6B'	"Image Area Position" on page 118
Image Output Control		X'A66B'	"Image Output Control" on page 118
Image Data Descriptor		X'A6FB'	"Image Data Descriptor" on page 119
Write Image 2	X'D64E'		"Write Image 2" on page 120
Begin Segment		X'70'	"Begin Segment" on page 120
Begin Image Content		X'91'	"Begin Image Content" on page 120
Image Size Parameter		X'94'	"Image Size Parameter" on page 120
Image Encoding Parameter		X'95'	"Image Encoding Parameter" on page 121
Image Data Element Size Parameter		X'96'	"Image Data Element Size Parameter" on page 121
Image Look Up Table ID Parameter		X'97'	"Image Look-up Table ID Parameter" on page 122
Image Data		X'FE92'	"Image Data" on page 122
End Image Content		X'93'	"End Image Content" on page 122
End Segment		X'71'	*Image Object Content Architecture Reference*

Write Image Control 2

The Write Image Control 2 data consists of three consecutive structured fields:

- Image Area Position Control (IAP)
- Image Output Control (IOC)
- Image Data Descriptor (IDD)

The Write Image Control 2 command and the command sequence that follows defines the image presentation block area on the current page. The parameters of this command define the size, placement and orientation of the image block and establish the parameters required to interpret the image segments.

Positive acknowledgement of image commands in Overlay State or Page Segment State means that the command or command sequence has been accepted for processing, but does not imply that its parameters have been checked in any way.

Image Area Position

This data structured field specifies the position and orientation of the image output area relative to a reference coordinate system. It is a REQUIRED data field in the Write Image Control 2 command.

Table 126. Image Area Position

Data Area	Value	Description	Error Code
Bytes 0-1	X'000B' - X'xxxx'	LENGTH of Image Area Position	X'0202..05'
Bytes 2-3	X'AC6B'	STRUCTURED FIELD ID	X'020B..05'
Bytes 4-5	X'8000' - X'7FFF'	Image Object Area Origin Xp, I, or I-offset Coordinate Position See "Notation Conventions" on page 17	
Bytes 6-7	X'8000 - X'7FFF'	Image Object Area Origin Yp, B, or B-offset Coordinate Position See "Notation Conventions" on page 17	
Bytes 8-9	 X'0000' X'2D00' X'5A00' X'8700'	ORIENTATION OF IMAGE BLOCK 0 degrees 90 degrees 180 degrees 270 degrees	X'0203..05'
Byte 10	 X'00' X'20' X'40' X'60' X'A0'	COORDINATE REFERENCE SYSTEM Absolute I, absolute B Absolute I, relative B Relative I, absolute B Relative I, relative B Page Xp, Yp	X'0204..05'
Bytes 11-n		Ignored	

Image Output Control

This data structured field specifies the mapping option for the image object. It is an ELECTIVE data field in the Write Image Control 2 command. If this field is omitted, the printer will use the following default values:

Mapping option = X'30' (Position and Trim)
X, Y Offset = 0.
X, Y Extent = Image Presentation Space extent defined by the Image Data Descriptor structured field.

Table 127. Image Output Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'0010' - X'xxxx'	LENGTH of Image Output Control	X'0202..05'
Bytes 2-3	X'A66B'	Structured Field ID	X'020B..05'
Byte 4	 X'00' X'01'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters	X'0205..05'
Bytes 5-6	X'0001'-X'7FFF'	L-units per UNIT BASE	X'0206..05'
Bytes 7-8	X'0001'-X'7FFF' X'FFFF'	X extent of IO image block in L-units for Page, Overlay and Page Segment (see "Notation Conventions" on page 17 Use Load Page Descriptor Value	X'0207..05'

Table 127. Image Output Control (continued)

Data Area	Value	Description	Error Code
Bytes 9-10	X'0001'-X'7FFF' X'FFFF'	Y extent of IO image block in L-units for Page, Overlay and Page (see "Notation Conventions" on page 17 Use Load Page Descriptor Value	X'0207..05'
Byte 11	 X'10' X'20' X'30' X'41' X'42' X'50'	MAPPING CONTROL OPTION Scale to fit Center and trim Position and trim Point to pel Point to pel with double dot Replicate and Trim	X'0208..05'
Bytes 12-13	X'8000'-X'7FFF'	X OFFSET L-units See "Notation Conventions" on page 17	X'0209..05'
Bytes 14-15	X'8000'-X'7FFF'	Y OFFSET L-units See "Notation Conventions" on page 17	X'0209..05'
Bytes 16-n		Ignored	

Note: The Replicate and Trim Mapping Control option is supported only when the IPDS Menu PRINT MODE item is set to ENH (Enhanced 600 dpi).

Image Data Descriptor

This is a REQUIRED data structured field in the Write Image Control 2 command. It specifies parameters that define the image presentation space size and resolution.

Table 128. Image Data Descriptor

Data Area	Value	Description	Error Code
Bytes 0-1	X'000F' - X'xxxx'	LENGTH of Image Data Descriptor	X'0202..05'
Bytes 2-3	X'A6FB'	STRUCTURED FIELD ID	X'020B..05'
Bytes 4-5	X'0000'	Reserved	
Byte 6	 X'00' X'01'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters	X'0205..05'
Bytes 7-8	X'0001'-X'7FFF'	X image points per unit base	X'0206..05'
Bytes 9-10	X'0001'-X'7FFF'	Y image points per unit base	X'0206..05'
Bytes 11-12	X'0001'-X'7FFF'	X EXTENT of image presentation space (in image points) See "Notation Conventions" on page 17	X'0207..05'
Bytes 13-14	X'0001'-X'7FFF'	Y EXTENT of image presentation space (in image points) See "Notation Conventions" on page 17	X'0207..05'

Table 128. Image Data Descriptor (continued)

Data Area	Value	Description	Error Code
Bytes 15-end	X'0000' X'0001'-X'0006' X'0008' X'0009'-X'0010' X'FF00' X'FF01'-X'FF06' X'FF07' X'FF08' X'FFFF'	Set Bilevel Image Color SDF Color Support Printer Default (Black) Limited Simulated Color Support (Black) Black Limited Simulated Color Support (Black) Printer Default (Black) Limited Simulated Color Support (Black) Printer Default (Black) Color of Medium Printer Default (Black)	

Note: Refer to the *Intelligent Printer Data Stream Reference* and the *Image Object Content Architecture Reference* for specifics on the Set Bilevel Image Color SDF format.

Write Image 2

The image segment is processed as it is received by the printer and is not retained or stored as a named image segment.

Write Image 2 command carries the IO image data within a hierarchical sequence of self-defining fields. See the *Intelligent Printer Data Stream Reference* and the *Image Object Content Architecture Reference*.

Begin Segment

Table 129. Begin Segment

Data Area	Value	Description	Error Code
Byte 0	X'70'	Begin Segment	X'0570..0F'
Byte 1	X'00'-X'FF'	Length	

Begin Image Content

Table 130. Begin Image Content

Data Area	Value	Description	Error Code
Byte 0	X'91'	Begin Image Content	X'0591..0F'
Byte 1	X'01'-X'FF'	Length	X'0500..03'
Byte 2	X'FF'	Format Specification	X'0500..04'

Image Size Parameter

The Image Size Parameter specifies the size of the image defined within the image segment. Mapping of the image into the image presentation space (See "Image Data Descriptor" on page 119) is on a 1 image point to 1 image point basis (one image point of an IO-Image segment is mapped to one image point of the image presentation space).

Table 131. Image Size Parameter

Data Area	Value	Description	Error Code
Byte 0	X'94'	IMAGE SIZE	X'0594..0F'
Byte 1	X'09'-X'FF'	LENGTH of the following bytes	X'0500..03'
Byte 2	X'00' X'01' X'02'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters Logical (resolution ratio)	
Bytes 3-4	X'0000' - X'7FFF'	X image points per unit base	
Bytes 5-6	X'0000' - X'7FFF'	Y image points per unit base	
Bytes 7-8	X'0000'-X'7FFF'	X extent of the image in image points	X'0500..04' X'0594..11' X'0595..11' X'05A9..02'
Bytes 9-10	X'0000'-X'7FFF'	Y extent of the image in image points	X'0500..04' X'05A9..02'

Image Encoding Parameter

Table 132. Image Encoding Parameter

Data Area	Value	Description	Error Code
Byte 0	X'95'	IMAGE ENCODING	X'0595..0F'
Byte 1	X'02'-X'FF'	LENGTH of the following bytes	X'0500..03'
Byte 2	X'01' X'03' X'06' X'81' X'82'	COMPRESSION ALGORITHM IBM MMR compression No compression RL4 compression G3 MR (CCITT T.4 G3 facsimile 2-D) G4 MMR (CCITT T.6 G4 facsimile 2-D)	X'0595..10' X'0595..11'
Byte 3	X'01'	RECORDING ALGORITHM RIDIC (Recording Image Data Inline Code) Unpadded RIDIC	X'0595..10'
Byte 4	X'00' X'01'	BIT ORDER within each image data byte Left-to-Right Right-to-Left	

Image Data Element Size Parameter

Table 133. Image Data Element Size Parameter

Data Area	Value	Description	Error Code
Byte 0	X'96'	IMAGE DATA ELEMENT SIZE	X'0596..0F'
Byte 1	X'01'-X'FF'	LENGTH of the following bytes	X'0500..03'
Byte 2	X'01' X'08'	NUMBER of BITS per PEL 1 bit per pel 8 bits per pel	X'0596..10' X'0500..04' X'0596..11'

If 1 is specified, the image is binary, with 1-bits representing black pels and 0-bits representing pels unchanged in the page map. If the image is uncompressed, each raster scan in the image data must be padded so that it is an integral number of bytes.

If 8 is specified, the image is gray scale. Each image byte is considered to be a value 0 to 255, where 0 is maximum black, 255 is no black at all, and the values in between are shades of gray.

The printer implements 8 bit per pel images by halftoning. Halftoning significantly degrades image detail. For that reason, resolutions of gray scale data greater than 120 pels per inch are not recommended except for draft printing purposes.

If 8 is specified, the Image Compression, if specified with the Image Encoding command, must be uncompressed. This error is detected when the first Image Data command is received.

Image Look-up Table ID Parameter

Table 134. Image Look-up Table ID Parameter

Data Area	Value	Description	Error Code
Byte 0	X'97'	Image Look-up Table ID Parameter	X'0597..0F'
Byte 1	X'01'-X'FF'	LENGTH of the following bytes	X'0500..03'
Byte 2	X'00'	Look up table ID	X'0597..10'

Image Data

Table 135. Image Data

Data Area	Value	Description	Error Code
Bytes 0-1	X'FE92'	Image Data	X'0592..0F'
Bytes 2-3	X'0001'-X'FFFF'	Length	X'0500..03' X'0594..01'
Bytes 4-end	X'x...x'	Image Data	

End Image Content

Table 136. End Image Content

Data Area	Value	Description	Error Code
Byte 0	X'93'	End Image Content	X'0593..0F'
Byte 1	X'00'-X'FF'	Length	

End Segment

Table 137. End Segment

Data Area	Value	Description	Error Code
Byte 0	X'71'	End Segment	X'0571..0F'
Byte 1	X'00'-X'FF'	Length	

Chapter 8. Graphics Command Set

The base reference for graphic drawing orders is the *Graphics Object Content Architecture Reference*.

Table 138. Graphics Commands

Name	Command	Sub-command	Where to Look
Write Graphics Control	X'D684'		"Write Graphics Control" on page 123
Graphics Area Position		X'AC6B'	"Graphics Area Position" on page 123
Graphics Output Control		X'A66B'	"Graphics Output Control" on page 124
Graphics Data Descriptor		X'A6BB'	"Graphics Data Descriptor" on page 124
Write Graphics	X'D685'		"Write Graphics" on page 126
Begin Segment Introducer		X'70'	"Begin Segment Introducer" on page 127

Write Graphics Control

Graphics Area Position

Table 139. Graphics Area Position

Data Area	Value	Description	Error Code
Bytes 0-1	X'000B'-X'xxxx'	LENGTH of Graphics Area Position	X'0202..05'
Bytes 2-3	X'AC6B'	Structured Field ID.	X'020B..05'
Bytes 4-5	X'8000'-X'7FFF'	GRAPHICS BLOCK ORIGIN Xp, I, or I-offset Coordinate Position. See "Notation Conventions" on page 17	
Byte 6-7	X'8000'-X'7FFF'	GRAPHICS BLOCK ORIGIN Yp, B, or B-offset Coordinate Position. See "Notation Conventions" on page 17	
Bytes 8-9	X'0000' X'2D00' X'5A00' X'8700'	ORIENTATION of Graphic Block 0 Degrees 90 Degrees 180 Degrees 270 Degrees	X'0203..05'
Byte 10	X'00' X'20' X'40' X'60' X'A0'	COORDINATE REFERENCE SYSTEM Absolute I, Absolute B Absolute I, Relative B Relative I, Absolute B Relative I, Relative B Page Xp, Yp	X'0204..05'
Byte 11-n		Ignored	

Graphics Output Control

Table 140. Graphics Output Control

Data Area	Value	Description	Error Code
Byte 0-1	X'0010'-X'xxxx'	LENGTH of Graphics Output Control (GOC)	X'0202..05'
Byte 2-3	X'A66B'	STRUCTURED FIELD ID	X'020B..05'
Byte 4	X'00' X'01'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters	X'0205..05'
Byte 5-6	X'0001' - X'7FFF'	L-Units per UNIT BASE	X'0206..05'
Byte 7-8	X'0001' - X'7FFF' X'FFFF'	X EXTENT of GRAPHICS BLOCK in L-units See "Notation Conventions" on page 17 Use Load Page Descriptor Value	X'0207..05'
Byte 9-10	X'0001' - X'7FFF' X'FFFF'	Y EXTENT of GRAPHICS BLOCK in L-units See "Notation Conventions" on page 17 Use Load Page Descriptor Value	X'0207..05'
Byte 11	X'10' X'20' X'30'	MAPPING Control Option Scale to Fit Center and Trim Position and Trim	X'0208..05'
Byte 12-13	X'8000' - X'7FFF'	X OFFSET L-units. See "Notation Conventions" on page 17	X'0209..05'
Byte 14-15	X'8000' - X'7FFF'	Y OFFSET L-units. See "Notation Conventions" on page 17	X'0209..05'
Byte 16-n		Ignored	

Note: The Graphics Output Control Self Defining Field is optional and may be omitted from the WGC command. If the GOC is omitted Network Printers use the following:

- Mapping Control Option X'30' (Position and Trim)
- X Offset = 0
- Y Offset = 0
- Graphics Block size equals the Graphics Presentation Space Window size which is defined in the Graphics Data Descriptor (GDD) Self Defining Field (See "Graphics Data Descriptor" on page 124).

Graphics Data Descriptor

Table 141. Graphics Data Descriptor

Data Area	Value	Description	Error Code
Bytes 0-1	X'001C'-X'xxxx'	LENGTH of Graphics Data Descriptor (GDD)	X'0202..05'
Bytes 2-3	X'A6BB'	STRUCTURED FIELD ID	X'020B..05'
Byte 4	X'00' X'01'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters	X'0205..05'
Byte 5	X'00'	Reserved	
Bytes 6-7	X'0001' - X'7FFF'	Xg UNITS per UNIT BASE	X'0206..05'

Table 141. Graphics Data Descriptor (continued)

Data Area	Value	Description	Error Code
Bytes 8-9	X'0001' - X'7FFF'	Yg UNITS per UNIT BASE *Yg = Xg*	X'0206..05'
Bytes 10-13	X'00000000'	Reserved	
Bytes 14-15	X'8000'-X'7FFF'	Xg LEFT LIMIT of Graphic Presentation Space Window. See "Notation Conventions" on page 17	
Bytes 16-17	X'8000'-X'7FFF'	Xg RIGHT LIMIT of Graphic Presentation Space Window. See "Notation Conventions" on page 17	
Bytes 18-19	X'8000'-X'7FFF'	Yg TOP LIMIT of Graphic Presentation Space Window. See "Notation Conventions" on page 17	
Bytes 20-21	X'8000'-X'7FFF'	Yg BOTTOM LIMIT of Graphic Presentation Space Window. See "Notation Conventions" on page 17	
Bytes 22-27	X'000000000000'	Reserved	
Bytes 28-n		INITIAL GRAPHICS DEFAULTS. See "GDD Initial Graphics Defaults Self Describing Instructions" on page 125	

GDD Initial Graphics Defaults Self Describing Instructions

Table 142. GDD Initial Graphics Defaults Self Describing Instructions

Data Area	Value	Description	Error Code
Byte 0	X'21'	SET CURRENT DEFAULTS	X'0300..21'
Byte 1	X'04'-X'FF'	LENGTH of Data	X'0300..03'
Byte 2	X'00' X'01' X'02' X'03' X'04' X'0B'	SET Byte Drawing Attributes Line Attributes Character Attributes Marker Attributes Pattern Attributes Arc Parameters	X'0300..02'
Byte 3-4		MASK Bytes. See "Graphics Drawing Order Defaults and Masks" on page 125 for explanation	X'0300..03'
Byte 5	X'0F' X'8F'	DEFAULT Byte Use Standard Default Use the following Data Bytes	X'0300..02' X'0300..03'
Byte 6-n		Data bytes	X'0300..21'
Note: See "Drawing Orders" on page 127 for valid drawing order defaults.			

Graphics Drawing Order Defaults and Masks

Table 143. Graphics Drawing Order Defaults and Masks

Set Byte	Mask Bit	Description
X'00'	 0 1-15	DRAWING ATTRIBUTES Color Reserved
X'01'	 0 1 2-15	LINE ATTRIBUTES Line Type Line Width Reserved

Table 143. Graphics Drawing Order Defaults and Masks (continued)

Set Byte	Mask Bit	Description
X'02'		CHARACTER ATTRIBUTES
	0	Angle X, Y
	1	Character Cell Size CW, CH
	2	Direction
	3	Precision
	4	Character Set
	5	Shear X, Y
	6-15	Reserved
X'03'		MARKER ATTRIBUTES
	0-2	Reserved
	3	Precision
	4	Marker Set
	5-6	Reserved
	7	Marker Symbol
	8-15	Reserved
X'04'		PATTERN ATTRIBUTES
	0-6	Reserved
	7	Pattern Symbol
	8-15	Reserved
X'0B'		ARC PARAMETERS
	0	P Value
	1	R Value
	2	Q Value
	3	S Value
	4-15	Reserved

Write Graphics

Write Graphics Defaults

The following defaults will be used if not previously defined by "Graphics Drawing Order Defaults and Masks" on page 125. The current value of an attribute is taken into account when the drawing order is received.

Table 144. Write Graphics Defaults

Description	Value
Color	Black
Line Type	Solid
Line Width	Normal (4 pel)
Character Cell	10 CPI
Character Set	Courier 10
Character Angle	No Rotation
Character Direction	Left to Right
Marker Symbol	Cross
Pattern Symbol	Solid Shading
Current Position	X,Y = 0,0
Arc Parameters	P=Q=1; R=S=0
Foreground Mix	Overpaint

Table 144. Write Graphics Defaults (continued)

Description	Value
Background Mix	Leave Alone
Character Precision	Character Precision
Marker Precision	Character Precision
Marker Symbol Set	Resident Set in Printer

Begin Segment Introducer

Table 145. Begin Segment Introducer

Data Area	Value	Description	Error Code
Byte 0	X'70'	BEGIN SEGMENT code	
Byte 1	X'0C'	LENGTH of the following parameters	X'0370..C1'
Byte 2-5		SEGMENT ID (Ignored)	
Byte 6	X'00'	Reserved	
Byte 7	 Bits 0-2 00 Bit 3 0/1 Bit 4 0 Bits 5-6 00 11 Bit 7 0	FLAGS Reserved No Prolog (0); Prolog (1) Reserved New Segment (reinitialize graphics defaults) Append Segment (do not reinitialize defaults) Reserved	X'0370..01' X'0370..82'
Byte 8-9	X'0000'-X'FFFF'	Length of this segment (SEGLEN)	
Byte 10-13	X'00000000'	Reserved	
Byte 14-n		See "Drawing Orders" on page 127	

Drawing Orders

Network Printers support all DR2 Drawing Orders and valid data values as defined in the *Intelligent Printer Data Stream Reference*. The following are those Drawing Orders which define specific data values.

Set Background Mix:

Table 146. Set Background Mix

Data Area	Value	Description	Error Code
Byte 0	X'0D'	Order code	
Byte 1	 X'00' X'05'	BACKGROUND MIX ATTRIBUTE Drawing default Leave Alone	X'0300..04' X'0300..0E'

Set Character Angle:

Table 147. Set Character Angle

Data Area	Value	Description	Error Code
Byte 0	X'34'	Order code	
Byte 1	X'04'	Length	X'0300..03'
Byte 2-3	X'8000' - X'7FFF'	Xg COORDINATE	X'0334..00'

Table 147. Set Character Angle (continued)

Data Area	Value	Description	Error Code
Byte 4-5	X'8000' - X'7FFF'	Yg COORDINATE	X'0334..00'

- If Xg = 0 and Yg = 0 then the character angle is 0 degrees (default)
- If Xg > 0 and Yg = 0 then the character angle is 0 degrees
- If Xg = 0 and Yg > 0 then the character angle is 90 degrees
- If Xg < 0 and Yg = 0 then the character angle is 180 degrees
- If Xg = 0 and Yg < 0 then the character angle is 270 degrees

Note: Exception X'0334..00' applies when both Xg and Yg are non-zero values.

Set Character Precision:

Table 148. Set Character Precision

Data Area	Value	Description	Error Code
Byte 0	X'39'	Order code	
Byte 1	X'00' X'01' X'02'	PRECISION TYPE Current default String Precision Character Precision	X'0300..04' X'0300..0E'

Set Character Set:

Table 149. Set Character Set

Data Area	Value	Description	Error Code
Byte 0	X'38'	Order code	
Byte 1	X'00' X'01' - X'FE' X'FF'	LOCAL CHARACTER SET ID Current default Local ID for Character Set Printer Default	X'03C3..00'

Set Color:

Table 150. Set Color

Data Area	Value	Description	Error Code
Byte 0	X'0A'	Order code	
Byte 1	X'00' X'01'-X'07' X'08'	COLOR Current default Limited Simulated Color Support (Patterns or Black) Color of Medium	X'0300..04'

Set Extended Color:

Table 151. Set Extended Color

Data Area	Value	Description	Error Code
Byte 0	X'26'	Order code	
Byte 1	X'02'	Length	X'0300..03'

Table 151. Set Extended Color (continued)

Data Area	Value	Description	Error Code
Byte 2		EXTENDED COLOR	X'0300..04'
	X'0000'	Current default	
	X'0001'-X'0007'	Limited Simulated Color Support (Patterns or Black)	
	X'0008'	Black	
	X'0009'-X'0010'	Limited Simulated Color Support (Patterns or Black)	
	X'FF00'	Current default	
	X'FF01'-X'FF06'	Limited Simulated Color Support (Patterns or Black)	
	X'FF07'	Current default (Black)	
	X'FF08'	Color of Medium	
	X'FFFF'	Printer default (Black)	

Set Line Type:

Table 152. Set Line Type

Data Area	Value	Description	Error Code
Byte 0	X'18'	Order code	
Byte 1		LINE TYPE	X'0300..04'
	X'00'	Current default	X'0300..0E'
	X'01'	Dotted Line	
	X'02'	Short Dashed Line	
	X'03'	Dashed and Dotted Line	
	X'04'	Double Dotted Line	
	X'05'	Long Dashed Line	
	X'06'	Dashed Double Dotted Line	
	X'07'	Solid Line	
	X'08'	Invisible Line	

Set Fractional Line Width (4028 Emulation Mode):

Table 153. Set Fractional Line Width (4028 Emulation Mode)

Data Area	Value	Description	Error Code
Byte 0	X'11'	Order code	
Byte 1	X'02'	Length	X'0300..03'
Bytes 2-3		FRACTIONAL LINE WIDTH	X'0300..04'
	X'0000'	Current default	X'0300..0E'
	X'0001' - X'00FF'	2 Pel Wide	
	X'0100' - X'017F'	4 Pels Wide	
	X'0180' - X'01FF'	6 Pels Wide	
	X'0200' - X'0F7F'	8-60 Pels Wide	
	X'0F80' - X'FFFF'	62 Pels Wide	

Set Fractional Line Width (Native Mode):

Table 154. Set Fractional Line Width (Native Mode)

Data Area	Value	Description	Error Code
Byte 0	X'11'	Order code	
Byte 1	X'02'	Length	X'0300..03'

Table 154. Set Fractional Line Width (Native Mode) (continued)

Data Area	Value	Description	Error Code
Bytes 2-3	X'0000' X'0001' - X'007F' X'0080' - X'00BF' X'00C0' - X'00FF' X'0100' - X'013F' X'013F' - X'017F' X'0180' - X'01BF' X'01C0' - X'01FF' X'0200' - X'0F7F' X'0F80' - X'FFFF'	FRACTIONAL LINE WIDTH Current default 1 Pel Wide 2 Pels Wide 3 Pels Wide 4 Pel Wide 5 Pels Wide 6 Pels Wide 7 Pels Wide 8-60 Pels Wide 62 Pels Wide	X'0300..04' X'0300..0E'

Set Line Width:

Table 155. Set Line Width

Data Area	Value	Description	Error Code
Byte 0	X'19'	Order code	
Byte 1	X'00' X'01' - X'0F' X'10' - X'FF'	LINE WIDTH Current default 2-58 Pels Wide *(4 pel increments)* 62 Pels Wide	X'0300..04' X'0300..0E'

Set Marker Precision:

Table 156. Set Marker Precision

Data Area	Value	Description	Error Code
Byte 0	X'3B'	Order code	
Byte 1	X'00' X'01' X'02'	MARKER PRECISION Drawing default Character Precision Stroke Precision	X'0300..04' X'0300..0E'

Set Mix:

Table 157. Set Mix

Data Area	Value	Description	Error Code
Byte 0	X'0C'	Order code	
Byte 1	X'00' X'02'	MIX ATTRIBUTE Drawing default Overpaint	X'0300..04' X'0300..0E'

Set Pattern Set:

Table 158. Set Pattern Set

Data Area	Value	Description	Error Code
Byte 0	X'08'	Order code	
Byte 1	X'00'	PATTERN SET ID	X'0368..03'

Set Pattern Symbol:

Table 159. Set Pattern Symbol

Data Area	Value	Description	Error Code
Byte 0	X'28'	Order code	
Byte 1	 X'00' X'01' - X'08' X'09' X'0A' X'0B' X'0C' X'0D' X'0E' X'0F' X'10' X'40'	PATTERN SYMBOL ID Use Current default Decreasing Density Vertical Lines Horizontal Lines Diagonal Lines 1 (Bot L/Top R) Diagonal Lines 2 (Bot L/Top R) Diagonal Lines 1 (Top L/Bot R) Diagonal Lines 2 (Top L/Bot R) No Shading Solid Shading Blank	X'0368..04'

Set Process Color

The Set Process Color control specifies a process color, highlight color or named color that sets the following color attributes to the same value:

- Character color
- Image color
- Line color
- Marker color
- Pattern color

Note: The current implementation of the Set Extended Text Color command is an acceptance mode, where parameters are validated and black is substituted.

Table 160. Set Process Color

Data Area	Value	Description	Error Code
Byte 0	X'B2'	Order Code	
Byte 1	X'12' - X'14'	LENGTH	X'0300..03'
Byte 2	X'00'	RESERVED	
Byte 3	 X'01' X'04' X'06' X'08' X'40'	COLOR SPACE RGB - Limited Simulated Color Support (Black) CMYK - Limited Simulated Color Support (Black) HCS - Limited Simulated Color Support (Black) CIELAB - Limited Simulated Color Support (Black) Standard OCA - Limited Simulated Color Support (Black)	X'020E..02'
Bytes 4-7	X'00000000'	RESERVED	
Byte 8	 X'01' - X'08' X'10'	1ST COLOR COMPONENT BITS (Limited Simulated Color Support (Black)) Standard OCA Color Space	X'020E..05'
Byte 9	 X'00' - X'08'	2ND COLOR COMPONENT BITS (Limited Simulated Color Support (Black))	X'020E..05'
Byte 10	 X'00' - X'08'	3RD COLOR COMPONENT BITS (Limited Simulated Color Support (Black))	X'020E..05'
Byte 11	 X'00' - X'08'	4TH COLOR COMPONENT BITS (Limited Simulated Color Support (Black))	X'020E..05'

Table 160. Set Process Color (continued)

Data Area	Value	Description	Error Code
Bytes 12 -15		COLOR VALUE Standard OCA Color Space	X'020E..03'
	X'0000'	Printer Default (Black)	
	X'0001'-X'0007'	Limited Simulated Color Support (Black)	
	X'0008'	Black	
	X'0009'-X'0010'	Limited Simulated Color Support (Black)	
	X'FF00'	Printer Default (Black)	
	X'FF01'-X'FF06'	Limited Simulated Color Support (Black)	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium	
	X'FFFF'	Use LPD color value	

Drawing Order Summary

Zero or more drawing orders follow each Begin Segment Introducer. These drawing orders either specify graphics to be printed or assign drawing attributes.

Given below is a list of the drawing orders supported by the Network Printers. Please refer to the AFP GOCA Reference, S544-5498, for complete descriptions of all GOCA drawing orders.

Table 161. Summary of the Graphics Drawing Orders

Code	Drawing Order
X'68'	Begin Area
X'D1'	Begin Image
X'91'	Begin Image at Current Position
X'C0'	Box
X'80'	Box at Current Position
X'C3'	Character String
X'83'	Character String at Current Position
X'01'	Comment
X'60'	End Area
X'93'	End Image
X'3E'	End Prolog
X'71'	End Segment (treated like a No Operation command)
X'C5'	Fillet
X'85'	Fillet at Current Position
X'C7'	Full Arc
X'87'	Full Arc at Current Position
X'92'	Image Data
X'C1'	Line
X'81'	Line at Current Position
X'C2'	Marker
X'82'	Marker at Current Position
X'00'	No Operation
X'E1'	Relative Line
X'E3'	Partial Arc
X'A3'	Partial Arc at Current Position
X'A1'	Relative Line at Current Position
X'04'	Segment Characteristics (treated like a No Operation command)

Table 161. Summary of the Graphics Drawing Orders (continued)

Code	Drawing Order
X'22'	Set Arc Parameters
X'OD'	Set Background Mix
X'34'	Set Character Angle
X'33'	Set Character Cell
X'3A'	Set Character Direction
X'39'	Set Character Precision
X'38'	Set Character Set
X'35'	Set Character Shear
X'0A'	Set Color
X'21'	Set Current Position
X'26'	Set Extended Color
X'11'	Set Fractional Line Width
X'18'	Set Line Type
X'19'	Set Line Width
X'37'	Set Marker Cell
X'3B'	Set Marker Precision
X'3C'	Set Marker Set
X'29'	Set Marker Symbol
X'0C'	Set Mix
X'08'	Set Pattern Set
X'28'	Set Pattern Symbol
X'43'	Set Pick Identifier (treated like a No Operation command)
X'B2'	Set Process Color

Chapter 9. Bar Code Command Set

The base reference for Bar Code commands is the Bar Code Object Content Architecture Reference.

Table 162. Bar Code Commands

Name	Command	Sub-command	Where to Look
Write Bar Code Control	X'D680'		"Write Bar Code Control" on page 135
Bar Code Area Position		X'AC6B'	"Bar Code Area Position" on page 135
Bar Code Output Control		X'A66B'	"Bar Code Output Control" on page 136
Bar Code Data Descriptor		X'A6EB'	"Bar Code Data Descriptor" on page 136
Write Bar Code	X'D681'		"Write Bar Code" on page 141

Write Bar Code Control

Bar Code Area Position

Table 163. Bar Code Area Position

Data Area	Value	Description	Error Code
Byte 0-1	X'000B'-X'xxxx'	LENGTH of Bar Code Area Position (BCAP)	X'0202..05'
Byte 2-3	X'AC6B'	STRUCTURED FIELD ID	X'020B..05'
Byte 4-5	X'8000'-X'7FFF'	Bar Code BLOCK ORIGIN Xp, I, or I-OFFSET coordinate position (in 1440ths)	X'0411..00'
Byte 6-7	X'8000'-X'7FFF'	Bar Code BLOCK ORIGIN Yp, B, or B-OFFSET coordinate position (in 1440ths)	X'0411..00'
Byte 8-9	X'0000' X'2D00' X'5A00' X'8700'	ORIENTATION OF Bar Code BLOCK 0 degrees 90 degrees 180 degrees 270 degrees	X'0203..05'
Byte 10	X'00' X'20' X'40' X'60' X'A0'	COORDINATE REFERENCE SYSTEM Absolute I, Absolute B Absolute I, Relative B Relative I, Absolute B Relative I, Relative B Page Xp, Yp	X'0204..05'
Byte 11-n :c	Ignored		

Bar Code Output Control

Table 164. Bar Code Output Control

Data Area	Value	Description	Error Code
Byte 0-1	X'0010'-X'xxxx'	LENGTH of Bar Code Output Control (BCOC)	X'0202..05'
Byte 2-3	X'A66B'	STRUCTURED FIELD ID	X'020B..05'
Byte 4	X'00' X'01'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters	X'0205..05'
Byte 5-6	X'0001' - X'7FFF'	L-Units per UNIT BASE	X'0206..05'
Byte 7-8	X'0001' - X'7FFF' X'FFFF'	X EXTENT of Bar Code BLOCK in L-units See "Notation Conventions" on page 17 Use Load Page Descriptor Value	X'0207..05'
Byte 9-10	X'0001' - X'7FFF' X'FFFF'	Y EXTENT of Bar Code BLOCK in L-units See "Notation Conventions" on page 17 Use Load Page Descriptor Value	X'0207..05'
Byte 11	X'30'	MAPPING CONTROL OPTION (Position)	X'0208..05'
Byte 12-13	X'8000' - X'7FFF'	X OFFSET L-units See "Notation Conventions" on page 17	X'0209..05'
Byte 14-15	X'8000' - X'7FFF'	Y OFFSET L-units See "Notation Conventions" on page 17	X'0209..05'
Byte 16-n		Ignored	

Bar Code Data Descriptor

Table 165. Bar Code Data Descriptor

Data Area	Value	Description	Error Code
Byte 0-1	X'001B'-X'xxxx'	LENGTH of Bar Code Data Descriptor (BCDD)	X'0202..05'
Byte 2-3	X'A6EB'	STRUCTURED FIELD ID	X'020B..05'
Byte 4	X'00' X'01'	UNIT BASE (Measurement Units) 10 Inches 10 Centimeters	X'0205..05'
Byte 5	X'00'	Reserved	
Byte 6-7	X'0001' - X'7FFF'	Xbc Units per UNIT BASE	X'0206..05'
Byte 8-9	X'0001' - X'7FFF'	Ybc Units per UNIT BASE	X'0206..05'
Byte 10-11	X'0001' - X'7FFF' X'FFFF'	X EXTENT of Bar Code Presentation Space in L-units. See "Notation Conventions" on page 17 Use BCOC X EXTENT	X'0207..05'
Byte 12-13	X'0001' - X'7FFF' X'FFFF'	Y EXTENT of Bar Code Presentation Space in L-units. See "Notation Conventions" on page 17 Use BCOC Y EXTENT	X'0207..05'
Bytes 14-15	X'0000'	Reserved	
Byte 16		BAR CODE TYPE See "Bar Code Type and Modifier Description and Values" on page 138	X'0403..00'
Byte 17		BAR CODE MODIFIER See "Bar Code Type and Modifier Description and Values" on page 138	X'040B..00'
Byte 18	X'01' - X'FE' X'FF'	FONT LOCAL ID Default Font Local ID (Note 1)	X'0404..00'

Table 165. Bar Code Data Descriptor (continued)

Data Area	Value	Description	Error Code
Byte 19-20	X'0000' X'0001'-X'0007' X'0008' X'0009'-X'0010' X'FF00' X'FF01'-X'FF06' X'FF07' X'FF08' X'FFFF'	BAR CODE COLOR Printer Default (BLACK) Limited Simulated Color Support (Black) Black Limited Simulated Color Support (Black) Printer Default (Black) Limited Simulated Color Support (Black) Printer Default (Black) Color of Medium Printer Default (Black)	X'0405..00'
Byte 21	X'07' - X'38' X'FF'	UNIT MODULE WIDTH Default (0.013 Inches)	X'0406..00'
Byte 22-23	X'0001' - X'7FFF' X'FFFF'	ELEMENT HEIGHT in L-units See "Notation Conventions" on page 17 Printer Default as specified by Bar Code Type in Byte 16	X'0407..00'
Byte 24	X'01'-X'FF'	Height multiplier	X'0408..00'
Bytes 25-26	X'0000' X'0002' X'0003' X'0014' to X'001E' X'00C8' to X'012C' X'FFFF'	WIDE-TO-NARROW RATIO (WE|NE) Not Applicable Note 2 2:1 3:1 2.0:1 - 3.0:1 2.00:1 - 3.00:1 Printer Default as specified by Bar Code Type (Byte 16) Note 3	X'0409..00'
Byte 27-end		Ignored	

Notes:

1. The Font Local ID specified in BCDD Byte 18 should be OCR-A, OCR-B or Code 128 dependent on the Bar Code Type specified in BCDD Byte 16. The default Font Local ID and Bar Code Type relationships are as follows:

Table 166. Bar Code Default Font ID

OCR-A	OCR-B
Code 128 Code 3 of 9 MSI 2 of 5 Industrial 2 of 5 Matrix 2 of 5 Interleaved Codabar	UPC-A UPC-E UPC 2-Digit Add-on UPC 5-Digit Add-on EAN-8 EAN-13 EAN 2-Digit Add-on EAN 5-Digit Add-on

2. Wide-to-Narrow Ratio (BCDD Bytes 25-26) is only valid for the following Bar Code Types:

   X'01' 3 of 9

   X'02' MSI

   X'0A' 2 of 5 Industrial

   X'0B' 2 of 5 Matrix

   X'0C' Interleaved 2 of 5

X'0D' Codabar

3. Default wide-to-narrow ratio for Codabar, Code 3 of 9, and the 2-of-5 types is dictated by the lowest unit module width that results in a readable bar code. The default wide-to-narrow ratio for MSI is 2:1 unless it can't be printed with the selected unit module width.

Bar Code Type and Modifier Description and Values

Table 167. Bar Code Type and Modifier Description and Values

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
X'01'	3 of 9 Code, AIM USS-39	X'01'	Print Bar Code with no Printer-Generated Check Character
		X'02'	Generate Check Character and Print with Bar Code
X'02'	MSI	X'01'	Print Bar Code with no Printer-Generated Check Character
		X'02'	Print Bar Code with IBM Modulus 10 Check Digit Generated by Printer and Put at End of Data
		X'03'	First check digit IBM Modulus 10
		X'04'	First check digit NCR Modulus 11. Check digit equals remainder. Check digit of 10 equals error.
		X'05'	First check digit IBM Modulus 11. Check digit equals remainder. Check digit of 10 equals error.
		X'06'	First check digit NCR Modulus 11. Check digit equals 11 minus remainder. Check digit of 10 equals zero.
		X'07'	First check digit IBM Modulus 11. Check digit equals 11 minus remainder. Check digit of 10 equals error.
		X'08'	First check digit NCR Modulus 11. Check digit equals 11 minus remainder. Check digit of 10 equals error.
		X'09'	First check digit IBM Modulus 11. Check digit equals 11 minus remainder. Check digit of 10 equals error.
X'03'	UPC/CGPC Version A	X'00'	Generate check digit and Print standard symbol
X'05'	UPC/CGPC Version E	X'00'	Print bar code. Six digits are encoded.
X'06'	UPC 2-Character Supplemental (Periodicals)	X'00'	Print the 2 supplemental digits (bar/space pattern and HRI)
X'07'	UPC 5-Character Supplemental (Paperbacks)	X'00'	Print the 5 supplemental digits (bar/space pattern and HRI)
X'08'	EAN-8 (JAN Short)	X'00'	Print bar code symbol. Input variable data is 7 digits (2 flag and 5 article ID digits).
X'09'	EAN-13 (JAN Standard)	X'00'	Print bar code symbol. Input variable data is 12 digits (2 flag and 10 article ID digits).
X'0A'	2 of 5 Industrial	X'01'	Print bar code with no printer-generated check character
		X'02'	Generate check character and print with bar code

Table 167. Bar Code Type and Modifier Description and Values (continued)

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
X'0B'	2 of 5 Matrix	X'01'	Print bar code with no printer-generated check character
		X'02'	Generate check character and print with bar code
X'0C'	Interleaved 2 of 5, AIM USS-I 2/5	X'01'	Print bar code with no printer-generated check character
		X'02'	Generate check character and print with bar code
X'0D'	Codabar, 2 of 7 Code, AIM USS-Codabar	X'01'	Print bar code with no printer-generated check character
		X'02'	Generate check character and print with bar code
X'11'	Code 128, AIM USS-128		
		X'02'	Generate check character and print with bar code
X'16'	EAN 2 Digit Add-on	X'00'	Print the 2 digit add-on (bar/space pattern and HRI)
X'17'	EAN 5 Digit Add-on	X'00'	Print the 5 digit add-on (bar/space pattern and HRI)
X'18'	POSTNET		USPS Specification
		X'00'	Print 5 digit POSTNET 'Zip Code' bar code with leading frame bar and trailing correction digit and frame.
		X'01'	Print 9 digit POSTNET 'Zip + 4' bar code with leading frame bar and trailing correction digit and frame.
		X'02'	Print 11 digit POSTNET 'ABC' bar code with leading frame bar and trailing correction digit and frame.
		X'03'	Print variable length data POSTNET bar code with leading frame bar and trailing correction digit and frame. Data length checking is not performed with modifier X'03'.
X'1A'	RM4SCC (Royal Mail 4 State Customer Code)	X'00'	Variable Length Data. Printer will generate Start bit, Checksum Character and Stop bit. Checksum algorithm is performed on the data characters only. User is responsible for 2 mm quiet zone (all around) and proper sequencing of the Postal Code data (including International Prefix, Outward Code, Inward Code and Delivery Point Suffix).
X'1A'	RM4SCC (Dutch KIX Postal Bar Code)	X'01'	Present s RM4SCC bar code symbol with NO Start bit, NO Checksum Character and NO Stop bit. Checksum algorithm is performed on the data characters only. User is responsible for 2 mm quiet zone (all around) and proper sequencing of the Postal Code data (including International Prefix, Outward Code, Inward Code and Delivery Point Suffix).
X'1B'	Japan Postal Bar Code	X'00'	Present a Japan Postal Bar Code symbol with a generated start character, checksum character and stop character. Present a Japan Postal Bar Code symbol directly from the bar code data.
		X'01'	

Table 167. Bar Code Type and Modifier Description and Values (continued)

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
X'1F'	Australia Post	X'01'	Standard Customer Bar Code (Format Code 11) - An 8 digit number representing the Sorting Code.
		X'02'	Customer Bar Code 2 using Table N (Format Code 59) An 8 digit number representing the Sorting Code, followed by up to 8 numeric digits representing the Customer Information.
		X'03'	Customer Bar Code 2 using Table C (Format Code 59) An 8 digit number representing the Sorting Code, followed by up to 5 characters (A-Z, a-z, 0-9, space, #) representing the Customer Information.
		X'04'	Customer Bar Code 2 using proprietary encoding (Format Code 59) - An 8 digit number representing the Sorting Code, followed by up to 16 numeric digits (0-3) representing the Customer Information. Each of the 16 digits specify one of the 4 types of bar.
		X'05'	Customer Bar Code 3 using Table N (Format Code 62) An 8 digit number representing the Sorting Code, followed by up to 15 numeric digits representing the Customer Information.
		X'06'	Customer Bar Code 3 using Table C (Format Code 62) An 8 digit number representing the Sorting Code, followed by up to 10 characters (A-Z, a-z, 0-9, space, #) representing the Customer Information.
		X'07'	Customer Bar Code 3 using proprietary encoding (Format Code 62) - An 8 digit number representing the Sorting Code, followed by up to 31 numeric digits (0-3) representing the Customer Information. Each of the 31 digits specify one of the 4 types of bar.
		X'08'	Reply Paid Bar Code (Format Code 45) - An 8 digit number representing the Sorting Code.

Notes:

1. Japan Postal bar codes are supported only on Infoprint 20, Infoprint 21, Infoprint 32, Infoprint 40, Infoprint 45 and Infoprint 70.
2. RM4SCC Modifier Byte Option is supported only on Infoprint 21, Infoprint 45, and Infoprint 70.
3. Australia Postal bar code is supported only on Infoprint 45 and Infoprint 70.

Write Bar Code

Table 168. Write Bar Code

Data Area	Value	Description	Error Code
Byte 0		FLAGS	
	Bit 0	HRI PRINTING	
	0	Print HRI	X'0410..00'
	1	No HRI	
	Bits 1-2	HRI LOCATION	
	00	Printer Default (Below symbol)	
	01	Below symbol (Except UPC/EAN with 2 or 5 digit add-on)	
	10	Above symbol (UPC/EAN with 2 or 5 digit add-on only)	
	Bit 3	START/STOP HRI for 3 of 9 Code (Asterisk)	
	0	Do not print HRI for 3 of 9 Start/Stop pattern	
	1	Print HRI for 3 of 9 Start/Stop pattern	
	Bits 4-7	RESERVED for 4224 (PC ASCII version)	
	Bits 5-6	RESERVED (Ignore)	
Bytes 1-2	X'0001' - X'7FFF'	X COORDINATE of the symbol ORIGIN See "Notation Conventions" on page 17	X'040A..00'
Bytes 3-4	X'0001' - X'7FFF'	Y COORDINATE of the symbol ORIGIN See "Notation Conventions" on page 17	X'040A..00'
Bytes 5-End		DATA to be bar encoded	X'040C..00'

Chapter 10. Overlay Command Set

Table 169. Overlay Function Set Commands

Name	Command	Sub-command	Where to Look
Begin Overlay	X'D6DF'		*Intelligent Printer Data Stream Reference*
Deactivate Overlay	X'D6EF'		*Intelligent Printer Data Stream Reference*
Include Overlay	X'D67D'		*Intelligent Printer Data Stream Reference*

Notes:

1. Network Printers do not support Secure Overlay (value X'01' in byte 2 of Include Overlay is not supported).
2. See "Notation Conventions" on page 17 regarding the notation convention for Include Overlay bytes 3-5 and 7-9.

Chapter 11. Page Segment Command Set

Table 170. Page Segment Fuction Set Commands

Name	Command	Sub-command	Where to Look
Begin Page Segment	X'D65F'		*Intelligent Printer Data Stream Reference*
Deactivate Page Segment	X'D66F'		*Intelligent Printer Data Stream Reference*
Include Page Segment	X'D67F'		*Intelligent Printer Data Stream Reference*

Chapter 12. Loaded Font Command Set

Table 171. Loaded Font Function Set Commands

Name	Command	Sub-command	Where to Look
Load Code Page	X'D61B'		"Load Code Page" on page 147
Load Code Page Control	X'D61A'		"Load Code Page Control" on page 147
Load Font	X'D62F'		"Load Font" on page 148
Load Font Character Set Control	X'D619'		"Load Font Character Set Control" on page 150
Load Font Control	X'D61F'		"Load Font Control" on page 150
Load Font Index	X'D60F'		"Load Font Index" on page 152

Load Code Page

This command assigns each code point of a code page to a specific Graphic Character Global ID (GCGID). One or more Load Code Page (LCP) commands follow the Load Code Page Control command. A sequence of LCP commands are used to transmit the entire code page. This sequence is initiated by the first LCP command that contains data and terminates with an End command. Entries may be split across LPC commands on any byte boundary and are restricted in size by the standard IPDS 32767 byte command length limit.

Table 172. Load Code Page X'D61B'

Data Area	Value	Description	Error Code
Bytes 0-7	(8 Bytes)	GRAPHIC CHARACTER GLOBAL ID	
Byte 8	Bit 0 0 1 Bit 1 0 1 Bit 2 0 1 Bits 3-7	PROCESSING FLAGS Defined Undefined Printing Nonprinting Incrementing Nonincrementing Reserved	
Bytes 9-n		CODE POINT	X'02B0..07'

Load Code Page Control

This command describes a code page resource which will be used to carry code page data. The Load Code Page Control (LCPC) command is followed by one or more Load Code Page (LCP) commands that specify the code page data.

The LCPC command is valid only in Home State and causes a transition to Code Page State. Code Page State ends when the printer receives the End command following receipt of at least one LCP command.

Table 173. Load Code Page Control X'D61A'

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001' - X'7EFF'	CODE PAGE HOST ASSIGNED ID	X'02B0..00' X'02B0..01'
Bytes 2-3	 Bits 0-3 0000 Bits 4-7 0001 0010 Bits 8-15 00000000	ENCODING SCHEME Reserved Number of Bytes Fixed single byte Fixed double byte Reserved	X'02B0..02'
Bytes 4-7	X'0000000A'- X'FFFFFFFF'	BYTE COUNT for subsequent LCP commands	X'02B0..04' X'02B0..05'
Bytes 8-9	X'0000'	Reserved	
Bytes 10-n	 X'nn' X'nnnn'	VARIABLE SPACE CODE POINT SBCS DBCS	
Bytes n+1 to n+2	 X'0000' X'0001' - X'FFFE' X'FFFF'	GCSGID No Value Supplied Specific GCSGID Use Default	
Bytes n+3 to n+4	 X'0001' - X'FFFE'	CPGID Specific CPGID	
Bytes n+5 to n+12	 X'nnnnnnnnnnnnnnnn'	GCGID Default GCGID	
Bytes n+13	 Bit 0 0 1 Bit 1 0 1 Bit 2 0 1 Bit 3 0 Bit 4 0 1 Bits5-7 0 1	GCGID Default GCGID	

Notes:

1. If the code point specified in VARIABLE SPACE CODE POINT is not contained in the associated font character set, the printer will use a character increment of 333 relative units for typographic and proportionally spaced fonts and 600 relative units for fixed pitch, uniform character increment fonts.
2. GCSGID/CPGID will be used for CMAP matching (DBCS), in all other instances they will be ignored.

Load Font

LF1 Format

When downloading a fully described font (LF1 format), the Load Font (LF) carries a series of character raster pattern bit strings. Consecutive Load Font commands are supported for downloading the LF1 font character patterns.

Table 174. Load Font X'D62F' (LF1 Example)

Data Area	Value	Description	Error Code
Bytes 0-n	Any Value in conformance with LFC Font Byte Count	FONT DATA in LF1 FORMAT (Character Patterns)	X'022E..02' X'0232..02'

LF3 Format

When downloading a font character set (LF3 format), the LF consists of a character ID map followed by zero or more (technology specific) Adobe Type-1 PFB objects. Consecutive LF commands are supported for downloading the LF3 font data.

Character ID Map

Table 175. Load Font X'D62F' (LF3 Character ID Map)

Data Area	Value	Description	Error Code
Byte 0	X'02'	IBM CHARACTER ID FORMAT (IBM Registered EBCDIC GCGID)	X'02B1..01'
Byte 1	X'03' X'04'	TECHNOLOGY SPECIFIC CHARACTER ID FORMAT Font-specific ASCII Character name used with Type-1 PFB fonts ASCII numeric Glyph ID (used with Adobe Composite fonts)	
Note: Zero of more entries in the following format			
Bytes +0-7		IBM CHARACTER ID (GCGID)	X'02B1..04'
Bytes +8-11		OFFSET into the following list of Adobe Type-1 Character ID entries (each GCGID maps to exactly one Adobe Type-1 Character ID)	
Note: Zero or more Adobe Type-1 Character ID entries in the following format			
Byte ++0	X'02'-X'80'	LENGTH of Adobe Type-1 Character ID entry (including this field)	X'02B1..03'
Bytes +1-n		ADOBE Type-1 CHARACTER ID	

Technology Specific Font Objects

The technology specific LF3 font object supported by Network Printers is a form of Adobe Type-1 PFB file. Each PFB object contains the following information.

Table 176. LF3 Technology Specific Objects

Data Area	Value	Description	Error Code
Bytes 0-3	X'0000000A' - X'FFFFFFFF'	LENGTH of Adobe Type-1 PFB file (including this field)	X'02B1..08'
Bytes 4-7		CHECKSUM	X'02B1..09'
Bytes 8-9	X'0002' - X'FFFF'	LENGTH of Adobe PFB object NAME	X'02B1..0A
Bytes 10-n		Adobe PFB Object NAME	
Bytes (n+1)-z		OBJECT DATA for Adobe Type-1 PFB fonts (PFB file)	

Load Font Character Set Control

This command provides control information for each font character set that the host downloads to the printer. The command is only used for LF-3 type coded fonts. The LFCSC command is followed by one or more Load Font commands that contain the actual font character set information. This command is valid only in home state and causes a transition to font state. Font state ends when the printer receives the End command following receipt of at least one LF command.

Table 177. Load Font Character Set Control X'D619'

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001' - X'7EFF'	FONT CHARACTER SET HAID	X'02B0..0A' X'02B0..0B'
Bytes 2-3	X'0000'	Reserved	
Byte 4	X'1F'	PATTERN TECHNOLOGY ID Type 1 PFB	X'02B0..0C'
Byte 5	X'0'	Reserved	
Byte 6	Bit 0 0 1 Bit 1 0 1 Bits 2-7 000000	INTENDED USE FLAGS Not intended for MICR printing Intended for MICR printing (ignored) This is NOT a FCS extension This IS a FCS extension Reserved	X'02B2..04' X'02B2..01' X'02B2..02'
Bytes 7-10	X'00000002' - X'FFFFFFFF'	NUMBER of BYTES in the LOAD FONT COMMANDS	X'022E..02' X'0232..02' X'02B0..0E'
Bytes 11-14	X'00000002' - X'FFFFFFFF'	NUMBER of BYTES in the CHARACTER ID MAP	X'02B0..0F'
Bytes 15-16		NUMBER of GCGIDs in the CHARACTER ID MAP	
Bytes 17 to 18	X'0000' X'0001' - X'FFFE' X'FFFF'	GCSGID No Value Supplied Specific GCSGID Use Default	
Bytes 19 to 20	X'0001' - X'FFFE'	FGID Specific FGID	

Notes:

1. GCSGID/FGID will be used for CMAP matching (DBCS), in all other instances they will be ignored.

Load Font Control

This command is 40 + (8 x n) bytes long, where n (4090 max) is the number of font characters that have associated raster patterns. The command contains font id, overall font characteristics, and the information needed to parse the font raster patterns. There is only one Load Font Control command for each font or font section. This command can only be issued in Home State and causes a transition to Font State.

Table 178. Load Font Control X'D61F'

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001'-X'7EFF'	FONT HOST ASSIGNED ID	X'0218..02' X'0239..02'
Byte 2	 X'00' X'41'-X'FE'	SECTION ID Single-byte fonts Double-byte font sections	X'0243..02'
Byte 3	X'00'	Reserved (Font-index Format)	X'0221..02'
Byte 4	X'05'	Pattern Data Format (bounded box)	X'0222..02'
Byte 5	 Bits 0-1 00 Bits 2-3 01 10 Bits 4-5 00 Bit 6 1 0 Bit 7 0	FONT TYPE BITS Reserved FONT TYPE Single byte Double byte Reserved CHARACTER BOX SIZE Uniform size (see bytes 6-7) Individual size (see bytes 40-End) Reserved	X'0223..02'
Bytes 6-7	X'0001' - X'7FFF'	UNIFORM or MAXIMUM CHARACTER BOX X SIZE	X'0226..02'
Bytes 8-9	X'0001' - X'7FFF'	UNIFORM or MAXIMUM CHARACTER BOX Y SIZE	X'0227..02'
Byte 10	 X'00' X'02'	UNIT BASE for L-units Ten inches (fixed metric technology) Relative units (relative metric technology)	X'021B..02'
Byte 11	X'00'	Reserved	
Bytes 12-13	 X'03E8' X'0960' X'0BB8' X'1770'	L-units per UNIT BASE in the X direction Byte 10 = X'02' 1000 Byte 10 = X'00' 2400 (240 DPI) 3000 (300 DPI) 6000 (600 DPI)	X'022A..02'
Bytes 14-15	 X'03E8' X'0960' X'0BB8' X'1770'	L-units per UNIT BASE in the Y direction Byte 10 = X'02' 1000 Byte 10 = X'00' 2400 (240 DPI) 3000 (300 DPI) 6000 (600 DPI)	X'022B..02'
Bytes 16-17	X'0000'	Reserved	
Bytes 18-20	X'000001' - X'7FFFFF'	FONT BYTE COUNT	X'021C..02'
Byte 21	 X'01' X'04' X'08'	CHARACTER DATA ALIGNMENT Starting address 1 byte aligned Starting address 4 byte aligned Starting address 8 byte aligned	X'022D..02'
Bytes 22-23	X'nnnn'	GCSGID (ignored)	
Bytes 24-25	X'nnnn'	CPGID (ignored)	
Byte 26	 X'00'	UNIT BASE for PEL-Units Ten inches	X'0287..02'
Byte 27	X'00'	Reserved	

Table 178. Load Font Control X'D61F' (continued)

Data Area	Value	Description	Error Code
Bytes 28-29	 X'0960' X'0BB8' X'1770'	PEL-Units per UNIT BASE in the X direction (only applicable if byte 10 = x'02' 2400 Units per 10 inches (240 dpi) 3000 Units per 10 inches (300 dpi) 6000 Units per 10 inches (600 dpi)	X'0288..02'
Bytes 30-31	 X'0960' X'0BB8' X'1770'	PEL-Units per UNIT BASE in the Y direction (only applicable if byte 10 = x'02' 2400 Units per 10 inches (240 dpi) 3000 Units per 10 inches (300 dpi) 6000 Units per 10 inches (600 dpi)	X'0289..02'
Bytes 32-33	X'0001' - X'7FFF'	RELATIVE METRIC MULTIPLYING FACTOR	X'028A..02'
Bytes 34-35	X'nnnn'	FGID (ignored)	
Byte 36	 X'01'	STAGEABILITY Font is not stageable (retired)	X'0220..02'
Byte 37	Bit 0 0 1 Bits 1-7 0000000	INTENDED USE FLAGS Not intended for MICR printing Intended for MICR printing(ignored) Reserved	
Bytes 38-39	X'nnnn'	Font width (ignored)	
Bytes 40-n		Zero or more CHARACTER PATTERN DESCRIPTORS in the following format	
+ 0-1 bytes + 2-3 bytes + 4-7 bytes	X'0000' - X'7FFF' X'0000' - X'7FFF' X'00000000' - X'007FFFFE'	CHARACTER BOX X SIZE CHARACTER BOX Y SIZE CHARACTER PATTERN ADDRESS	X'0226..02' X'0227..02' X'023E..02'

Load Font Index

This command is 32 + (256 x 16) (the (256 x 16) byte field is not always required) bytes long. It contains general information needed to print the patterns and a description of the characteristics of each of the 256 possible code points. Each font can have from one to four associated font indices. Each index is loaded by a separate Load Font Index command. This command can only be issued in Home State.

Table 179. Load Font Index X'D60F'

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001'-X'7EFF'	FONT HOST ASSIGNED ID (HAID)	X'0218..02'
Byte 2	 X'00' X'41' - X'FE'	SECTION ID Single byte Double byte section	X'0243..02'
Byte 3	 Bit 0 0 1 Bits 1-7 0000000	FLAGS VARIABLE SPACE Disabled Enabled Reserved	

Table 179. Load Font Index X'D60F' (continued)

Data Area	Value	Description	Error Code
Bytes 4-5	X'0000' X'2D00' X'5A00' X'8700'	FONT INLINE SEQUENCE 0 deg. 90 deg. 180 deg. 270 deg.	X'0240..02' X'0246..02'
Byte 6-7	X'0000'	Reserved	
Byte 8-9	X'8000' - X'7FFF'	UNIFORM or MAXIMUM BASELINE OFFSET	X'023C..02'
Byte 10-11	X'8000' - X'7FFF'	UNIFORM or MAXIMUM CHARACTER INCREMENT	X'023C..02'
Byte 12-13	X'0000'	Reserved	
Byte 14-15	X'0000' - X'7FFF'	MAXIMUM BASELINE EXTENT	
Byte 16	Bits 0-4 00000 Bit 5 1 0 Bit 6 1 0 Bit 7 1 0	ORIENTATION FLAGS Reserved UNIFORM A-SPACE Bytes 18, 19 specify uniform value Bytes 18, 19 specify minimum value A-space for each character is in the character index entry UNIFORM BASELINE OFFSET Bytes 8, 9 specify uniform baseline offset Bytes 8, 9 specify minimum baseline offset (Baseline offset for each character is in the character index entry) UNIFORM CHARACTER INCREMENT Bytes 10, 11 specify uniform character increment Bytes 10, 11 specify minimum character increment (Character increment for each character is in the character index entry)	
Byte 17	X'00'	Reserved	
Bytes 18-19	X'8000' - X'7FFF'	UNIFORM or MINIMUM A-SPACE	X'023C..02'
Bytes 20-21	X'0000' - X'FFFF'	VARIABLE SPACE CODE	
Bytes 22-23	X'8000' - X'7FFF'	DEFAULT VARIABLE INCREMENT	
Bytes 24-25	X'0000' X'0001' - X'7FFF'	RECOMMENDED UNDERSCORE WIDTH No recommendation Underscore width in L-units	X'023C..02'
Bytes 26-27	X'8000' - X'7FFF'	RECOMMENDED UNDERSCORE POSITION (L-units)	
Bytes 28-31	X'00000000'	Reserved	
Bytes 32-4127		256 CHARACTER INDEX ENTRIES in the following format	

Table 179. Load Font Index X'D60F' (continued)

Data Area	Value	Description	Error Code
+ 0-1 bytes		CHARACTER FLAGS	
	X'0000'	Defined, printing, incrementing	
	X'2000'	Defined, printing, non-incrementing	
	X'4000'	Defined, non-printing, incrementing	
	X'6000'	Defined, non-printing, non-incrementing	
	X'8000'	Undefined, printing, incrementing	
	X'A000'	Undefined, printing, non-incrementing	
	X'C000'	Undefined, non-printing, incrementing	
	X'E000'	Undefined, non-printing, non-incrementing	X'023C..02'
+ 2-3 bytes	X'0000' - X'xxxx'	PATTERN INDEX	X'023C..02'
+ 4-5 bytes	X'8000' - X'7FFF'	CHARACTER INCREMENT	
+ 6-7 bytes	X'8000' - X'7FFF'	A-SPACE	
+ 8-13 bytes	X'000000000000'	Reserved	X'023C..02'
+ 14-15 bytes	X'8000' - X'7FFF'	BASELINE OFFSET	

Chapter 13. Exception Reporting, Sense Data, and Recovery

This chapter supplies information about Acknowledge Reply, which the IPDS uses for exception reporting. The chapter begins with general information followed by tables of the exception-reporting codes for the printer. The tables contain details about the specific exceptions. The chapter concludes with a section on printer counter adjustments.

Note: When you have questions about codes from the printer, use this chapter instead of the exception-reporting chapter in the *Intelligent Printer Data Stream Reference*. Although the two chapters are similar, this chapter contains only those exception codes that the printer returns.

General Reply Rules

IPDS uses the Acknowledge Reply command to return both positive and negative replies to the host. Positive messages are Acknowledge Replies. The negative messages (exception messages) are NACKs and are sent as sense-byte information in the special data area. For more information about Acknowledge Replies, see "Chapter 4. Device Control Command Set" on page 23.

The following general rules apply to printer replies:

- The printer reports a data-stream exception with a NACK. Only one exception can be returned in each NACK.
- The printer sends an ACK or a NACK in response to an Acknowledgement Required (ARQ) flag. If there is an exception, the printer sends a NACK without receiving an ARQ.
- If the printer receives a command requesting an acknowledgement, it expects the host to wait for the acknowledgement before sending more commands.
- Any data received after an exception is reported is discarded until all queued NACKs have been either sent to the host or cleared by an appropriate link-level command.

  An exception on a command can be reported before receiving the entire command data. When an Alternate Exception Action (AEA) or Page Continuation Action (PCA) is not to be taken, the next data received should be part of a new command. Otherwise, an 8001..00 exception may result. The printer might not discard the remaining bytes in a command with an error when reported. Therefore, the next data received should be the start of a new command. As a result, begin the host data re-transmission only after a synchronizing command (such as XOH Print Buffered Data or XOA Discard Buffered Data) is successfully acknowledged.

  A terminating condition causes the first NACK to be reported. The next NACK is reported when the next five bytes of data are received. This is usually an IPDS command header. Reporting a NACK discards all data currently received. The process of receiving five bytes and sending a NACK repeats until the NACK queue is exhausted or cleared by the appropriate link-level command.
- An ACK indicates that the data stream was checked and that commands were transformed into the printer's internal command language, with the following exceptions:
  - Asynchronous-position exceptions and undefined character exceptions are not detected until print time.

  - The data stream is not checked when IPDS is being saved for future use, as in overlays and page segments, and when more than one copy group is specified in a Load Copy Control (LCC) command.

    An exception in an overlay or page segment is reported synchronously with the End Page (EP) command on the page it is used. An exception in a saved copy group is reported synchronously after the EP command; that is, in the next command after the EP.
- The XOA Exception-Handling Control (EHC) order tells the printer how to handle exceptions. More information about the EHC order follows.

Exception-Handling Control (EHC)

The EHC order lets you control the three exception-handling functions listed below. Brief descriptions of the functions follow this listing.

- **Exception Reporting.** You can record three types of exception conditions and related exception information and have them reported at specified times using NACKs.
- **Alternate Exception Actions (AEA).** You can specify whether the printer is to take Alternate Exception Actions (AEAs), which prescribe actions to take when the printer is given an IPDS command or parameters it does not support.
- **Exception-Presentation Processing.** The exception-presentation processing function has two parts:
  - **Page Continuation Actions (PCA).** You can specify whether to end or continue processing a page that has an exception.
  - **Exception Page Print.** You can specify whether the printer is to print or discard a page that was terminated.

Exception Reporting

Use the exception-reporting bits in the Exception-Handling Control (EHC) record to control the recording and reporting of three classes of exceptions:
- Undefined characters
- Position exceptions
- All other exceptions that have AEAs.

When you instruct the printer to record a given class of exception, it always records exceptions that fit in that class. If you instruct the printer not to record a given class of exception, the printer still records such exceptions if the printer was told not to take the AEA.

Classes of Data Stream Exceptions

All printer data stream exceptions are returned in 24 bytes of detailed sense information in the special data area of the NACK. The exception-code identifier consists of three bytes: 0, 1, and 19. Byte 0 specifies the exception class; bytes 1 and 19 identify the particular exception.

The six classes of data-stream exceptions are:
- Command Reject
- Intervention Required
- Equipment Check
- Data Check
- Specification Check

  - IO Images
  - Bar Codes
  - Graphics
  - General
- Conditions Requiring Host Notification.

See “Exception Classes” on page 160 for more information.

Sense Byte Information

The following list gives details of the information in each sense byte.

Byte(s)	Description
0	Defines the exception class for the specific exception, It is the first byte of each 3-byte exception ID.
1	Together with sense byte 19, byte 1 defines the specific exception within an exception class. It is the second byte of each 3-byte exception ID.
2	Contains exception-recovery action codes that specify the required actions for the exception conditions. For more information, see “Action Codes in Sense Byte 2”.
3	Reserved
4 through 18	Describe the specific cause in three separate formats: **Format 0** Provides details about all data stream exceptions other than data check positioning exceptions. **Format 2** Provides details about device exceptions, including intervention-required exceptions, equipment-check exceptions, and conditions requiring host notification. **Format 7** Provides details about data check positioning exceptions. For more information about formats, see “Formats 0, 1, and 2 for Sense Bytes 4-18 and 20-23” on page 158.
19	Together with sense byte 1, byte 19 defines the specific exception within an exception class. It is the third byte of each 3-byte exception ID.
20 through 23	Contain additional information about the state of the printer when it senses an exception.

Action Codes in Sense Byte 2

The action codes in sense byte 2 classify the exception to assist host-exception recovery and allow printing to continue. The action codes listed are the only ones returned by the printer.

Action Code (in hex)	Exception-Recovery Action
01 Data Stream Exception	A syntax error exists in the IPDS data stream. The specific recovery actions depend on the specific exception (sense bytes 0, 1, and 19 in the tables of printer exception codes) and host support requirements. Data stream exceptions occur on the page or resource just before the received page counter.
08 Paper Jam	The printer detects a paper jam. Retransmit all pages and associated resources (overlays, page segments, and fonts) that have not passed the printer-defined jam recovery point.
09 Data-Related Print Exception	A sheet cannot be printed because of something within the data stream. The data might be too complex, too dense, or the media source selected might be incompatible with the media destination selected. The printer has discarded all buffered pages and modified the page and copy counters.
0C Resource Storage Exception	The printer cannot accept a page or resource (overlay, page segment, or font) because the storage area is full. Delete all resources not necessary to continue printing and retransmit the page in progress. If this action fails, the recovery action depends on host-support requirements.
15 Cancel	The printer operator requests that the current job be canceled. Cancel the job containing the page at the host-defined canceling point.
1A Re-drive Buffered Pages	The printer may not be in Ready State, may need paper or toner, or may have a full exit tray. Take the appropriate recovery action for the exception code and retransmit all pages and associated resources that have not been committed for printing, if any.
1D Printer Characteristics Changed	At least one of the printer characteristics that is reported in the reply to an XOH OPC command has changed. The host should issue an XOH OPC command to obtain the new printer characteristics.
1E Asynchronous Out-of-Storage Exception	A resource or a page that is not currently being received at the Received Page ID caused an out-of-storage exception. The printer has discarded all buffered pages and reset the page and copy counters. The page on which this exception was discovered will not print. The host must issue an XOH PBD to ensure that the page and copy counters are accurately adjusted. After the XOH PBD has returned an ACK, the page in error is the page just before the Committed Page Counter. Cancel the printed data containing the page just before the Committed Page ID.
22 Printer Communications Inoperative	A printer condition exists from which the printer cannot recover without operator intervention. End the communication and the session.

Formats 0, 1, and 2 for Sense Bytes 4-18 and 20-23

Sense bytes 4 through 18 and 20 through 23 describe the cause of each exception condition. (Sense byte 19 is byte 3 of the exception code.) These descriptions are presented in three separate formats, which are explained below.

Format 0

Format 0 provides detailed information for all data stream exceptions except data check positioning exceptions. This format applies to all data check, specification-check, and command-reject exceptions, except for exceptions X'08C1..00', X'020A..05', and X'0411..00'.

Byte **Description**

4	Data exception, X'DE'
5	Format Identifier, X'00'
6,7	Count of occurences of the exception (the printer provides an approximate count of occurrences of some exceptions)
8,9	ID of overlay that has an exception
10,11	ID of page segment that has an exception
12,13	Command in process when exception found
14,15	Object Identifier (other than overlay or page segment that has an exception, such as a font exception)
16,17	Identifies a part within an object that has the exception, such as " font"
18	Reserved
20-23	Page Identifier for the page that has the exception

Format 1

Format 1 provides detailed information for both data check positioning exceptions. This format applies only to data check exceptions X'08C1..00', X'020A..05', and X'0411..00'.

Byte	Description
4	Data exception, X'DE'
5	Format Identifier, X'01'
6, 7	Count of occurrences of the exception (the printer provides an approximate count of occurrences of some exceptions)
8, 18	Reserved
20-23	Page Identifier for the page that has the exception

Format 2

Format 2 provides detailed information for all device exceptions. This format applies to all intervention-required and equipment-check exceptions and for conditions requiring host notification.

Byte	Description
4	System Reference Code, X'BF'
5	Format Identifier, X'02'
6-23	Reserved

Exception-Reporting Codes

The following tables describe all printer exception codes that are returned to the host in the special data area of a NACK.

Each exception code is identified by three bytes: byte 0, byte 1, and byte 19. The first table lists the names of the exception classes which are returned in byte 0. The subsequent tables give detailed information about each of the groups listed in the first table.

Note: The printer provides an approximate count of occurrences for some exceptions.

Exception Classes

Sense Byte 0	Exception Class and Description
X'80'	**Command Reject**—the printer cannot recognize a received command.
X'50'	**Equipment Check with Intervention Required**—the printer detects a condition caused by hardware failure or hardware limitations, and manual intervention at the printer is required.
X'40'	**Intervention Required**—the printer detects a condition that requires manual intervention, such as "out of paper."
X'20'	Reserved
X'10'	**Equipment Check**—the printer detects an equipment malfunction or hardware error.
X'08'	**Data Check**—the printer detects a position exception or an undefined character exception.
X'05'	**Specification Check - IO Images**—the printer detects an invalid or unsupported data value in an IO image command.
X'04'	**Specification Check - Bar Codes**—the printer detects an invalid or unsupported data value in a bar code command.
X'03'	**Specification Check - Graphics**—the printer detects an invalid or unsupported data value in a graphics command.
X'02'	**Specification Check - General**—the printer detects an invalid or unsupported data value in a received command.
X'01'	**Conditions Requiring Host Notification**—the printer detects a condition that requires action by the host.

Tables of Printer Exception Codes

The following tables list specific exception classes and are arranged in three columns. The first column lists the 3-byte ID given in sense bytes 0, 1, and 19. The second column gives a description of each exception. The third column lists the action code given in sense byte 2.

Typically, when an exception has a defined AEA, the PCA is the AEA. Also, no PCA is taken when the command is received in Home state or Font state.

In each table, the exceptions are listed in ascending numeric order.

Note: The term *architecturally valid* refers to the range of values permitted by the IPDS architecture. An "invalid" value denotes one outside the range defined by the architecture. " Supported" values are those that the printer accepts. Therefore, " unsupported" values may be valid by architecture but not in the printer implementation.

The IBM Network Printers support 24 Byte Sense data (See "Sense Type and Model" on page 64) The Network Printers support AEA and PCA error processing. See *Intelligent Printer Data Stream Reference* for details on Sense byte information and error processing.

The maximum number of queued asynchronous and synchronous errors is 1 for Twinax and Coax DSC mode and 7 for Coax LU1 mode and TCP/IP mode).

The cause of the exception and the Alternate Exception Action (AEA) are the same as specified in *Intelligent Printer Data Stream Reference* unless otherwise noted.

TCP/IP Sense Data

Intervention Required Sense Data

Table 180. Intervention Required Sense Data

Exception ID	Description	Action Code
X'4000..00'	Printer not ready	03
X'4001..00'	Out of paper	03
X'4002..00'	Output bin full	03
X'4004..00'	Out of toner	03
X'4031..00'	Paper Length Check	03
X'4033..00'	Paper Width Check	03
X'407C..00'	Out of Staples	03
X'407C..01'	Staple jam	03
X'407C..03'	Punch waste bin full	03
X'40E6..00'	Cover open	03

IPDS Exceptions Reported

Command Reject Exceptions

Table 181. Command Reject Exceptions

Exception ID	Description	Action Code
X'8001..00'	Invalid IPDS command code	01
X'8002..00'	Invalid IPDS command sequence	01
X'8004..00'	Data received after ARQ	01
X'80E0..00'	Invalid IPDS command length	01

Equipment Check with Intervention Required

Table 182. Equipment Check with Intervention Required Exceptions

Exception ID	Description	Action Code
50F8..00	Media Source X'nn' is not available (has been disabled).	01

Intervention Required Exceptions

Table 183. Intervention Exceptions

Exception ID	Description	Action Code
X'4000..00'	Printer is not ready: • The printer is in a not-ready state. • Alternate Exception Action: none. • Page Continuation Action: none.	1A

Table 183. Intervention Exceptions (continued)

Exception ID	Description	Action Code
X'4001..00'	Printer is out of paper: • The printer is out of paper, and paper was not added within specified amount of time. • Alternate Exception Action: none. • Page Continuation Action: none.	1A
X'4002..00'	The printer's exit tray is full: • The printer's exit tray is full and it was not emptied within a specified amount of time. • Alternate Exception Action: none. • Page Continuation Action: none.	1A
X'4004..00'	Printer is out of toner: • The printer is out of toner, and toner was not added within a specified amount of time. • Alternate Exception Action: none. • Page Continuation Action: none.	1A
X'4031..00'	Paper Length Check • The printer has detected a paper-length check, and it has not been corrected by the operator after a specified amount of time. • Alternate Exception Action: none. • Page Continuation Action: none.	1A
X'4033..00'	Paper Width Check • The printer has detected a paper-width check, and it has not been corrected by the operator after a specified amount of time. • Alternate Exception Action: none. • Page Continuation Action: none.	1A
X'407C..00'	Out of Staples	1A
X'407C..01'	Staple jam	08
X'407C..03'	Punch waste bin full	1A
X'40E5..00'	Paper jam recovery needed: • A paper jam has occurred and has not been cleared within a specified amount of time. Any lost pages must be resent. • Alternate Exception Action: none. • Page Continuation Action: none.	08
X'40E6..00'	Cover open	03
X'40E8..nn'	Supported but not installed media source ID	1A

Equipment Check Exceptions

Table 184. Equipment Check Exceptions

Exception ID	Description	Action Code
X'10F1..00'	Permanent hardware exception: • A permanent hardware failure exists. • The microcode detected either a logic exception from which the printer could not recover or a condition that should not have occurred. • Alternate Exception Action: none. • Page Continuation Action: none.	22

Data Check Exceptions

Table 185. Data Check Exceptions

Exception ID	Description	Action Code
X'0821..00'	Undefined character	01
X'0829..00'	Double-byte coded font section is not activated or is invalid	01
X'0860..00'	Numeric representation precision check	01
X'08C1..00'	Position check	01

IO-Image Specification Exceptions

Table 186. IO-Image Exceptions

Exception ID	Description	Action Code
X'0500..01'	Invalid or unsupported IO Image SDF code	01
X'0500..03'	Invalid or unsupported IO Image SDF	01
X'0500..04'	Invalid IO Image SDF value	01
X'0570..0F'	IO Image Begin Segment out of sequence	01
X'0571..0F'	IO Image End Segment out of sequence	01
X'0591..0F'	IO Image Begin Image Content out of sequence	01
X'0592..0F'	IO Image Data SDF out of sequence	01
X'0593..0F'	IO Image End Image Content out of sequence	01
X'0594..01'	Inconsistent Image Size Parameter value and Image data	01
X'0594..0F'	IO Image Image Size Parameter missing or out of sequence	01
X'0594..11'	IO Image Image Size cannot be determined	01
X'0595..0F'	IO Image Image Encoding Parameter out of sequence	01
X'0595..10'	IO Image Image Encoding Parameter unsupported value	01
X'0595..11'	IO Image Decompression error	01
X'0596..0F'	IO Image Image Data Element Size Parameter out of sequence	01
X'0596..10'	IO Image Image Data Element Size Parameter unsupported value	01
X'0596..11'	IO Image Image Data Element Size Parameter and Image Encoding Parameter inconsistent	01
X'0597..0F'	IO Image Image Look Up Table ID Parameter out of sequence	01
X'0597..10'	IO Image Image Look Up Table ID Parameter unsupported value	01
X'05A9..02'	IO Image data outside the Image Presentation Space	01

Bar Code Specification Exceptions

Table 187. Bar Code Exceptions

Exception ID	Description	Action Code
X'0403..00'	Invalid or unsupported bar code type	01
X'0404..00'	Unsupported local-font ID or font not available	01
X'0405..00'	Invalid or unsupported bar code color	01
X'0406..00'	Invalid or unsupported module width	01
X'0407..00'	Invalid or unsupported element height	01
X'0408..00'	Invalid or unsupported height multiplier	01
X'0409..00'	Invalid or unsupported wide-to-narrow ratio	01
X'040A..00'	Invalid or unsupported symbol origin	01
X'040B..00'	Invalid or unsupported bar code modifier	01
X'040C..00'	Invalid or unsupported bar code data length	01
X'040E..00'	Check-digit calculation exception	01
X'0410..00'	Invalid or unsupported human-readable interpretation location	01
X'0411..00'	Attempt to print portion of symbol outside block or VPA	01

Graphics Specification Exceptions

Table 188. Graphics Exceptions

Exception ID	Description	Action Code
X'0300..01'	Unallocated or unsupported graphics order or command code	01
X'0300..02'	Reserved byte exception or invalid attribute set	01
X'0300..03'	Incorrect drawing order length	01
X'0300..04'	Invalid attribute value	01
X'0300..08'	Truncated order exception	01
X'0300..0C'	Segment prolog exception	01
X'0300..0E'	Unsupported attribute value	01
X'0300..21'	Invalid or unsupported default	01
X'0334..00'	Character angle value not supported	01
X'033E..00'	Invalid End Prolog	01
X'0360..00'	Area bracket exception	01
X'0368..00'	Begin Area received incorrectly	01
X'0368..01'	Area truncated exception	01
X'0368..02'	Supported order invalid in area	01
X'0368..03'	Pattern Symbol Set not supported	01
X'0368..04'	Undefined pattern symbol	01
X'0370..01'	Unsupported Begin Segment Introducer segment flag	01
X'0370..82'	Invalid Begin Segment Introducer segment flag	01
X'0370..C1'	Invalid Begin Segment Introducer length	01

Table 188. Graphics Exceptions (continued)

Exception ID	Description	Action Code
X'0370..C5'	Insufficient Segment Data	01
X'0392..00'	Graphics image order sequence exception	01
X'0392..01'	Image data discrepancy	01
X'0393..00'	Graphics image bracket exception	01
X'0393..01'	Incorrect number of Image Data drawing orders	01
X'03C2..00'	Marker Symbol Set not supported	01
X'03C2..01'	Undefined marker code	01
X'03C3..00'	Font not available	01
X'03C3..01'	Undefined graphics character code	01
X'03C6..01'	Arc drawing check	01
X'03D1..00'	Truncated graphics image exception	01
X'03D1..01'	Invalid order in graphics image	01
X'03D1..02'	Graphics image format not supported	01
X'03D1..03'	Image width greater than maximum supported	01
X'03D1..04'	Image height greater than maximum supported	01
X'03E1..00'	Relative line outside coordinate space	01

General Specification Exceptions

Table 189. General Exceptions

Exception ID	Description	Action Code
X'0200..01'	Embedded Control Sequence Code Exception	01
X'0202..01'	End Suppression (ESU) text-control exception	01
X'0202..02'	Invalid or unsupported IPDS command length	01
X'0202..05'	Invalid data self-defining-field length	01
X'0203..02'	IPDS Command Header Length too small	01
X'0203..05'	Invalid or unsupported block orientation	01
X'0204..01'	EP command encountered	01
X'0204..02'	Invalid use of Acknowledgement Continuation Bit	01
X'0204..05'	Invalid or unsupported area-position reference system	01
X'0205..01'	Invalid spanning sequence	01
X'0205..05'	Invalid or unsupported self-defining-field unit base	01
X'0206..01'	Invalid Begin Suppression (BSU)	01
X'0206..05'	Invalid or unsupported self-defining field L-units	01
X'0207..05'	Invalid or unsupported self-defining-field extents or Graphic Window values inconsistent	01
X'0208..05'	Invalid or unsupported mapping option	01
X'0209..05'	Invalid or unsupported axis offsets	01
X'020B..05'	Invalid self-defining-field identifier	01
X'020E..02'	Invalid or unsupported Color Space	01

Table 189. General Exceptions (continued)

Exception ID	Description	Action Code
X'020E..03'	Invalid or unsupported Color value	01
X'020E..05'	Invalid or unsupported number of bits for a color component	01
X'020F..01'	Invalid or unsupported Set Text Orientation (STO)	01
X'0210..01'	Invalid or unsupported Set Inline Margin (SIM)	01
X'0211..01'	Invalid or unsupported Set Baseline increment (SBI)	01
X'0212..01'	Invalid or unsupported inter-character adjustment	01
X'0213..01'	Invalid or unsupported Absolute Move Baseline (AMB)	01
X'0214..01'	Invalid or unsupported Absolute Move Inline (AMI)	01
X'0214..02'	The font resource to be deactivated is not found	01
X'0215..01'	Invalid or unsupported Relative Move Inline (RMI)	01
X'0215..02'	Invalid or unsupported DF command font or font-section ID	01
X'0216..01'	Invalid or unsupported Relative Move Baseline (RMB)	01
X'0217..01'	Invalid or unsupported Set Variable-Space Increment (SVI)	01
X'0217..02'	Invalid or unsupported DF command deletion type	01
X'0218..02'	Invalid, unsupported, or unavailable font ID	01
X'0219..01'	Invalid or Unsupported value for Repeat String (RPS) repeat length	01
X'0219..02'	Multiple occurrences of the same LFE font-equivalence number	01
X'021A..01'	Repeat String (RPS) or Transparent Data (TRN) exception	01
X'021B..01'	Repeat String (RPS) target-string length exception	01
X'021B..02'	Invalid or unsupported Load Font Control unit base for L-units	01
X'021C..01'	Invalid escape sequence	01
X'021C..02'	Invalid LFC command byte-count value	01
X'021D..02'	Invalid or unsupported the Load Font Equivalence global font ID	01
X'021E..01'	Invalid WT text-control length	01
X'021F..01'	Repeat String (RPS) length exception	01
X'021F..02'	Mismatch of LFE command font Host-Assigned IDs	01
X'0220..02'	Invalid Load Font Control (Byte 36 value)	01
X'0221..02'	Invalid or unsupported Load Font Control font-index format	01
X'0222..02'	Invalid or unsupported Load Font Control data pattern format	01
X'0223..02'	Invalid or unsupported Load Font Control font-type bits	01
X'0226..02'	Invalid or unsupported LSS or LFC X-box size	01

Table 189. General Exceptions (continued)

Exception ID	Description	Action Code
X'0227..02'	Invalid or unsupported LSS or LFC Y-box size	01
X'022A..02'	Invalid or unsupported Load Font Control L-Units per unit base in the X-direction	01
X'022B..02'	Invalid or unsupported Load Font Control L-Units per unit base in the Y-direction	01
X'022D..02'	Invalid or unsupported Load Font Control character-data alignment	01
X'022E..02'	Insufficient font data received	01
X'0231..01'	Invalid or unsupported Load Copy Control number of copies	01
X'0232..01'	Invalid or unsupported Load Copy Control Keyword in copy-group entry	01
X'0232..02'	Excess font data received	01
X'0234..01'	Invalid or unsupported Load Copy Control entry-byte count	01
X'0236..01'	Invalid or unsupported Load Copy Control simplex/duplex parameter	01
X'0237..01'	Invalid or Unsupported LCC N-up Parameter	01
X'0237..03'	Invalid or Unsupported LCC Media Destination Parameter	01
X'0237..04'	Incompatible Media Source and Media Destination	09
X'0237..05'	Mixture of Media Source or Destination IDs in a duplex copy-subgroup pair	01
X'0238..01'	Maximum supported number of Overlays per LCC copy-group exceeded	01
X'0239..01'	Maximum supported number of Suppressions per LCC copy-group exceeded	01
X'0239..02'	Load Font Control font Host-Assigned ID already assigned	01
X'023A..02'	Maximum number of Fonts allowed by printer exceeded	01
X'023C..02'	Invalid or unsupported value within Load Font Index command	01
X'023E..02'	Invalid Load Font Control character-pattern address	01
X'023F..02'	STO-SCFL-LFE mismatch	01
X'0240..02'	Invalid or unsupported value for Font Inline Sequence	01
X'0242..01'	WIC pel count is less than the minimum required	01
X'0243..01'	WIC command pel count is greater than the maximum supported value	01
X'0243..02'	Invalid double-byte font-section identifier	01
X'0244..01'	WIC command scan count is less than the minimum required	01
X'0244..02'	Non-matching double-byte coded font sections	01

Table 189. General Exceptions (continued)

Exception ID	Description	Action Code
X'0245..01'	WIC command scan count is greater than the maximum supported value	01
X'0246..01'	Invalid WIC source image format	01
X'0246..02'	Invalid parameter for the Load Font Index command	01
X'0247..01'	Invalid or unsupported Write Image Control magnification factor	01
X'0247..02'	Invalid or unsupported Load Font Equivalence font-inline sequence	01
X'0248..01'	Invalid or unsupported Write Image Control scan-line direction	01
X'0249..01'	Invalid scan-line-sequence direction in the WIC command	01
X'024A..01'	Invalid or unsupported Write Image Control image block location	01
X'0253..01'	Invalid or unsupported Write Image Control image color	01
X'0258..03'	Invalid or unsupported text color	01
X'0260..02'	Invalid or unsupported Load Page Descriptor Xp and I L-units per unit base	01
X'0261..02'	Invalid L-Units (Yp) Value in the LPD command	01
X'0262..02'	Invalid or unsupported Load Page Descriptor Xp-extent	01
X'0263..02'	Invalid or unsupported Load Page Descriptor Yp-extent	01
X'0264..02'	Invalid or unsupported Load Page Descriptor unit base	01
X'0268..02'	Invalid or unsupported Load page Descriptor	01
X'0269..02'	Invalid baseline-sequence direction in the LPD command	01
X'026A..01'	Insufficient source image data	01
X'026A..02'	Invalid or unsupported LPD initial I print coordinate	01
X'026B..01'	Excess source image data received	01
X'026B..02'	Invalid or unsupported LPD initial B print coordinate	01
X'026F..02'	Invalid XOH-SMO Media Origin	01
X'0270..02'	Invalid or unsupported XOH Set Media Size L-units per unit base	01
X'0272..02'	Invalid or unsupported XOH Set Media Size Xm-extent	01
X'0273..02'	Invalid or unsupported XOH Set Media Size Ym-extent	01
X'0274..02'	Invalid or unsupported XOH Set Media Size unit base	01
X'0277..01'	Group Termination Exception	01
X'027A..01'	Invalid triplet length value in a group triplet	01

Table 189. General Exceptions (continued)

Exception ID	Description	Action Code
X'027B..01'	Incorrect number of triplet data bytes in a group triplet	01
X'027C..01'	Incompatible finishing operations	01
X'027C..02'	Too many or too few sheets for a finishing operation	01
X'027C..03'	Invalid or unsupported finishing operation type	01
X'027C..04'	Invalid or unsupported finishing operation reference corner and edge	01
X'027C..05'	Unsupported finishing operation count	01
X'027C..06'	Invalid or unsupported finishing operation axis offset	01
X'027C..07'	Invalid or unsupported number of finishing positions	01
X'027C..09'	Finishing operation incompatible with physical media or media destination	06
X'027C..0A'	Incompatible media destination change in a group to be finished	06
X'0280..02'	Invalid or unsupported rule width	06
X'0282..02'	Invalid or unsupported rule length	01
X'0285..01'	Invalid or unsupported Delete Overlay command overlay ID	01
X'0287..02'	Invalid or unsupported Load Font Control unit base for Pel-units	01
X'0288..02'	Invalid or unsupported Load Font Control Pel-units per unit base in the X-direction	01
X'0289..02'	Invalid or unsupported Load Font Control Pel-units per unit base in the Y-direction	01
X'028A..01'	Invalid or unsupported Delete Page Segment command page segment Host-Assigned ID	01
X'028A..02'	Invalid or unsupported Load Font Control Relative-Metric Multiplying Factor	01
X'028F..01'	Invalid or unsupported AR command parameter values	01
X'028F..02'	AR activation command failed	01
X'028F..03'	Invalid Resource ID triplet length	01
X'028F..04'	Invalid or unsupported resolution or metric-technology value	01
X'028F..10'	Invalid or unsupported value in a Metric Adjustment triplet	01
X'028F..11'	Baseline adjustment value too large or too small	01
X'0290..01'	Invalid or unsupported Overlay ID	01
X'0291..01'	BO overlay ID already loaded	01
X'0291..02'	Invalid or unsupported XOA Request Resource list entry	01
X'0292..01'	Overlay ID not loaded	01
X'0293..01'	Recursive overlay invocation	01

Table 189. General Exceptions (continued)

Exception ID	Description	Action Code
X'0294..01'	Invalid or unsupported page segment Host-Assigned ID	01
X'0295..01'	Page segment Host-Assigned ID already loaded	01
X'0295..02'	Invalid or unsupported XOH Page Counters Control page-counter update	01
X'0296..01'	Page segment Host-Assigned ID not loaded	01
X'0297..01'	Overlay nesting limit exceeded	01
X'0298..01'	Invalid or unsupported suppression number	01
X'0298..03'	Invalid or unsupported Temporary Baseline Move text control	01
X'029A..01'	Invalid overstrike character increment	01
X'02A4..01'	Page boundary in the X-direction cannot be presented by the printer	01
X'02A5..01'	Page boundary in the Y-direction cannot be presented by the printer	01
X'02AC..01'	Insufficient Main Storage to print the Sheet	09
X'02AD..01'	Invalid or unsupported Load Page Position command	01
X'02AE..01'	Invalid or unsupported parameter in an IO command	01
X'02AF..01'	Insufficient storage to print the sheet	0C
X'02AF..01'	Asynchronous Insufficient storage to print the sheet	1E
X'02B0..00'	LCPC Code Page HAID already in use	01
X'02B0..01'	Invalid LCPC Code Page HAID	01
X'02B0..02'	Invalid or Unsupported LCPC Encoding Scheme	01
X'02B0..04'	Too much or too little code page data	01
X'02B0..05'	Invalid or Unsupported LCPC Byte count	01
X'02B0..07'	Code points out of order in LCP command	01
X'02B0..0A'	LFCSC HAID already assigned	01
X'02B0..0B'	Invalid LFCSC HAID	01
X'02B0..0C'	Invalid or Unsupported LFCSC pattern technology ID	01
X'02B0..0E'	Invalid or Unsupported LFCSC Byte count	01
X'02B0..0F'	Invalid or Unsupported LFCSC Map size	01
X'02B1..01'	Invalid or Unsupported LF Character ID format	01
X'02B1..02'	Invalid LF technology specific ID offset	01
X'02B1..03'	Invalid LF technology specific ID length	01
X'02B1..04'	GCGIDs out of order in a Font Character Set	01
X'02B1..08'	Invalid LF technology specific object length	01
X'02B1..09'	LF checksum mismatch	01
X'02B1..0A'	Invalid Name Length in LF3 technology specific object	01
X'02B1..0B'	Invalid data within a LF3 technology specific object	01

Table 189. General Exceptions (continued)

Exception ID	Description	Action Code
X'02B2..01'	Parent character set not activated	01
X'02B2..02'	Font character set extension not valid with pattern technology	01
X'02B2..03'	Mismatched character ID format in a LF command	01
X'02B2..04'	Mismatched MICR printing flag in a LFCSC command	01
X'02C0..01'	Mixture of Xm-axis duplex and Ym-axis duplex copy groups	01
X'02C0..02'	Mixture of N-up copy subgroups in a LCC command	01
X'02C0..03'	More than one N-up keyword specified in a copy subgroup	01
X'02C0..04'	Duplexing and N-up not supported together	01
X'02C0..05'	N-up partitioning not supported with envelope media	01
X'02C1..01'	Maximum number of simplex or duplex keywords in an LCC command	01
X'02C1..02'	Internal value not unique in an LE command	01
X'02C2..01'	Odd number of duplex copy groups in an LCC command	01
X'02C2..02'	More than one Media Source or Destination Keyword specified in a copy subgroup.	01
X'02C3..01'	Mixture of simplex and duplex parameters in an LCC command	01
X'02C4..01'	Unequal copy counts in an LCC command	01
X'02C5..01'	Unable to delete resource (needed on duplex side)	01
X'02C5..02'	Physical media not compatible with duplex printing	01
X'02C6..01'	Unable to deactivate a component of an activated coded font	01
X'02C6..02'	Invalid mapping type in an LE command	01
X'02C8..01'	An unsupported Input Media Source ID was specified	01
X'02C8..02'	Invalid or unsupported internal value or external value in an Load Equivalence command	01
X'02FF..02'	Exceptions detected but not queued	01

Host Notification Exceptions

Table 190. Host Notification Exceptions

Exception ID	Description	Action Code
X'0100..00'	Normal Printer Restart (Printer IMLed or IPDS Dialog Resources Deleted)	0D
X'0101..00'	Media Size or Input Media Source ID Changed	1D
X'0180..00'	Request to end IPDS Dialog	05
X'018F..00'	Error Printer Restart (Printer IMLed)	0D

Table 190. Host Notification Exceptions (continued)

Exception ID	Description	Action Code
X'01E4..00'	Cancel Key Pressed	15

Page Counter Adjustments

To identify which page or pages to send to the printer after an exception occurs, the host program must determine the position of the sheets in the paper path.

Count fields in the ACK command identify the state of a virtual paper path that includes a count of the number of pages received, the number of pages past the jam-recovery point, and the number of pages stacked.

The printer tracks the following:
- Received Page Counter
- Committed Page Counter
- Committed Copy Counter
- Stacked Page Counter
- Stacked Copy Counter

All other counters are mapped to the Stacked Page Counter (for pages) and the Stacked Copy Counter (for copies).

The following rules define how the counters are updated:

1. After power is switched on, all counter values equal X'0000'.
2. When a counter containing X'FFFF' increments, the counter wraps to X'0000'.
3. The counters are updated as shown in the following table as each condition is detected.
4. The Copy Counters are incremented when more than one copy of a page is printed. When all copies have passed a station, the Copy Counter is then reset to zero and the Page Counter is incremented. The Copy Counters are not reset to zero during exception recovery.

Condition (in hex)	Counters	Counter Adjustments
Action Codes 08 22	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	Set to Jam Recovery Page Counter Set to Jam Recovery Page Counter Set to Jam Recovery Page Counter Set to Jam Recovery Page Counter Set to Jam Recovery Page Counter No change No change Set to Jam Recovery Page Counter Set to Jam Recovery Copy Counter
Action Codes 15 1A 1D	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	Set to Committed Page Counter No change No change No change No change No change No change No change No change

Condition (in hex)	Counters	Counter Adjustments
Action Code 0C	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	No change[1] No change No change No change No change No change No change No change No change
Action Code 01	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	No change[2] No change No change No change No change No change No change No change No change
Action Code 1E	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	Set to Committed Page Counter[3] No change No change No change No change No change No change No change No change
All other action codes	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	No change[2] No change No change No change No change No change No change No change No change
Command XOA - Discard Buffered Data	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	Set to Committed Page Counter No change No change No change No change No change No change No change No change
Normal Counter Wrap (on a Per-Counter Basis)	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	Reset to 0 Reset to 0 Reset to 0 Reset to 0 Reset to 0 Reset to 0 Reset to 0 Reset to 0 Reset to 0

Condition (in hex)	Counters	Counter Adjustments
Command XOH - Page Counters Control	Received Page Counter Committed Page Counter Committed Copy Counter Operator Viewing Page Counter Operator Viewing Copy Counter Jam Recovery Page Counter Jam Recovery Copy Counter Stacked Page Counter Stacked Copy Counter	See XOH PCC command under Chapter 4. Device Control Command Set in the *Intelligent Printer Data Stream Reference*

Notes:

1. Should not be incremented for page in error (that is, any partial page is discarded).
2. The Received Page Counter should be incremented if a partial or complete page is printed.
3. For Action Code X'1E', the host should issue an XOH Print Buffered Data command with the ARQ bit on and a unique correlation ID (to ensure that the Acknowledge Reply matches the Print Buffer Data [PBD] command) to cause the Committed Page/Copy Counter to reflect the page in error.

Page and Copy Counter Adjustments for Data-Stream Exceptions

The following are counter adjustments for **simplex copy groups.**

Condition (in hex)	Counters	Counter Adjustments
Action Code 01 and the page is printed	Received Page Counter	Does not reflect the page in which the error occurs.
	Committed Page Counter	No change
	Committed Copy Counter	Reflects any committed copies resulting from prior error-free copy groups.
	Operator Viewing Page Counter	No change
	Operator Viewing Copy Counter	No change
	Jam Recovery Page Counter	No change
	Jam Recovery Copy Counter	No change
	Stacked Page Counter	No change
	Stacked Copy Counter	No change
Action Code 01 and the page is not printed	Received Page Counter	Reflects the page in which the error occurs, only if the error occurred on the last copy group.
	Committed Page Counter	No change
	Committed Copy Counter	Reflects any committed copies resulting from prior error-free copy groups or from the copy group in error.
	Operator Viewing Page Counter	No change
	Operator Viewing Copy Counter	No change
	Jam Recovery Page Counter	No change
	Jam Recovery Copy Counter	No change
	Stacked Page Counter	No change
	Stacked Copy Counter	No change

The following are counter adjustments for **duplex copy groups.**

Condition (in hex)	Counters	Counter Adjustments
Action Code 01 on the front side and the page is printed	Received Page Counter	Reflects the page in which the error occurs (the front side) only if the error occurred on the other in a copy group other than the first copy group.
	Committed Page Counter	No change
	Committed Copy Counter	Reflects any committed copies resulting from prior error-free copy group pairs.
	Operator Viewing Page Counter	No change
	Operator Viewing Copy Counter	No change
	Jam Recovery Page Counter	No change
	Jam Recovery Copy Counter	No change
	Stacked Page Counter	No change
	Stacked Copy Counter	No change
Action Code 01 on back side and the page is not printed	Received Page Counter	Does not reflect the page in the error occurs (the back side) it does reflect the front side.
	Committed Page Counter	No change
	Committed Copy Counter	Reflects any committed copies resulting from prior error-free copy group pairs.
	Operator Viewing Page Counter	No change
	Operator Viewing Copy Counter	No change
	Jam Recovery Page Counter	No change
	Jam Recovery Copy Counter	No change
	Stacked Page Counter	No change
	Stacked Copy Counter	No change
Action Code 01 on the front side and the page is not printed	Received Page Counter	Reflects the page in which the error occurs (front side).
	Committed Page Counter	No change
	Committed Copy Counter	Reflects any committed copies resulting from prior error-free copy group pairs.
	Operator Viewing Page Counter	No change
	Operator Viewing Copy Counter	No change
	Jam Recovery Page Counter	No change
	Jam Recovery Copy Counter	No change
	Stacked Page Counter	No change
	Stacked Copy Counter	No change
Action Code 01 on the back side and the page is printed	Received Page Counter	Reflects the page in which the error occurs (back side) only if the error occurred on the last copy group. Reflects front side.
	Committed Page Counter	No change
	Committed Copy Counter	Reflects any committed copies resulting from prior error-free copy group pairs or from the copy group in error.
	Operator Viewing Page Counter	No change
	Operator Viewing Copy Counter	No change
	Jam Recovery Page Counter	No change
	Jam Recovery Copy Counter	No change
	Stacked Page Counter	No change
	Stacked Copy Counter	No change

Chapter 14. Code Page and Font Identification

The Network Printer 12, Network Printer 17, and Network Printer 24 printers are LF1 printers, whose resident fonts are all generated using outline font technology: the IBM Core Interchange Font Set, the IBM Coordinated Font Set, and the 4028 Compatibility Font Set. From these outline fonts all the supported LF1 ″raster″ fonts are created.

The Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, and Infoprint 70 printers support both raster and outline technology fonts: single and double byte. The resident single-byte LF1 ″raster″ fonts are generated using outline font technology (IBM AFP Font Collection): the IBM Core Interchange Font Set, the IBM Coordinated Font Set and the 4028 Compatibility Font Set.

The valid combinations of GCSGID/CPGID, GCSGID/FGID/FW, or GCSGID/CPGID/FGID/FW are too numerous to list here. They can be obtained by the host using the Anystate command “XOA Request Resource List” on page 70 with the appropriate Resource Type and RIDF.

Notes:

1. The Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, and Infoprint 70 printers support Download and Capture of Font Resources. There is Date/Time stamp information to help identify versions of font resources. “IBM Network Printers Resident IPDS Fonts” on page 325 includes the Date/Time stamps for the resident fonts.
2. The Infoprint 20, Infoprint 21, Infoprint 32/40, Infoprint 45, and Infoprint 70 printers will report DBCS raster fonts (and any captured raster fonts) using the RRL command when the IPDS Resolution (op panel) setting is Independence Mode. If the IPDS Resolution (op panel) setting is an Acceptance Mode, only those raster fonts with resolutions that match the current Acceptance mode resolution setting (240 or 300 or 600 DPI), will be reported via RRL.

They can also be determined by using the information under “IBM Network Printers Resident IPDS Fonts” on page 325 with the criteria described in the following sections:

RRL RT’06’ Code Page (CPGID)

- Values are listed in Table 202 on page 329, Table 204 on page 334, Table 206 on page 335, and Table 284 on page 366, and will be reported via XOA-RRL RT 06 RIDF 03.

RRL RT’12’ Specific Code Pages (GCSGID/CPGID)

- Valid combinations are listed in Table 202 on page 329, Table 204 on page 334, Table 206 on page 335, and Table 284 on page 366, and will be reported via XOA-RRL RT 12 RIDF 03.

RRL RT’11’ Graphic Character Sets (GCSGID SUB/SUPERSETS)

- Valid combinations are listed in Table 207 on page 336 and Table 285 on page 366, and will be reported via XOA-RRL RT 11 RIDF 03.

RRL RT'07' Font Character Sets (GCSGID/FGID/FW)

1. Valid combinations for the IBM Core Interchange Set are listed in Table 200 on page 326, and will be reported via XOA-RRL RT 07 RIDF 03.
   - Scalable Font Width (FW) will be reported as 0 to the host PSF. This indicates that any width/scale-factor is valid.
   - Table 201 on page 328 shows the subset GCSGIDs for each of the listed superset GCSGIDs in Table 200 on page 326. These subset GCSGIDs are valid combinations for the associated superset GCSGIDs in the GCSGID/FGID/FW, but will not be added to the RRL 0703 response unless required by the host PSF's.
2. Valid combinations for the IBM Coordinated Set are listed in Table 205 on page 335 and will be reported via XOA-RRL RT 07 RIDF 03.
   - Scalable Font Width (FW) will be reported as 0 to the host PSF. This indicates that any width/scale-factor is valid.
   - Table 207 on page 336 shows the subset GCSGIDs for each of the listed superset GCSGIDs in Table 205 on page 335. These subset GCSGIDs are valid combination entries for the associated superset GCSGIDs in the GCSGID/FGID/FW, but will not be added to the RRL 0703 response unless required by the host PSF's.
3. Valid combinations for the 4028 Compatibility Set require Table 203 on page 333 (FGID/FW) and Table 204 on page 334 (GCSGID), and will be reported via XOA-RRL RT 07 RIDF 03.
   - The FW's for these fonts are non-zero, because they represent fixed-width fonts.
   - The Alternate FGIDs are valid values for GCSGID/FGID/FW combinations.
   - Native Mode - These fonts (which are representing 4028 raster fonts) don't have a GCSGID of their own, so the GCSGID used is from the associated Code Pages (CPGIDs).
     a. The GCSGIDs are obtained by finding the Code Page(s) in Table 204 on page 334 that matches the Code Page(s) listed for a given FGID/FW entry in Table 203 on page 333 The GCSGID for each of the Code Pages listed with an FGID is a valid combination entry.
     b. Since these fonts don't have a superset GCSGID, there is no subset condition. So each of these unique GCSGID/FGID/FW combinations will be added to the XOA-RRL 0703 report to the host PSF.
   - 4028 Emulation Mode - These fonts (which are representing 4028 raster fonts) don't have a GCSGID of their own, so the GCSGID used is 0.
4. Valid combinations for the DBCS outline fonts are listed in Table 283 on page 365 and will be reported via XOA-RRL RT 07 RIDF 03.
   - Scalable Font Width (FW) will be reported as 0 to the host PSF. This indicates that any width/scale-factor is valid.
   - Table 285 on page 366 shows the subset GCSGIDs for each of the listed superset GCSGIDs in Table 283 on page 365. These subset GCSGIDs are valid combinations for the associated superset GCSGIDs in the GCSGID/FGID/FW, but will not be added to the RRL 0703 response unless required by the host PSFs.

RRL RT'01'/'03'/'10' RIDF'03' (GCSGID/CPGID/FGID/FW = GRID)

1. Valid combinations for the IBM Core Interchange Set require Table 200 on page 326 (superset GCSGID/FGID/FW), Table 201 on page 328 (GCSGID subsets) and Table 202 on page 329 (GCSGID/CPGID), and will be reported via XOA-RRL RT 01 RIDF 03 (also RT 10 RIDF 03). In all GRIDs, the GCSGID chosen will belong to the Code Page, as this is almost always the subset of the outline font GCSGID.
   - Scalable Font Width (FW) will be reported as 0 to the host PSF. This indicates that any width/scale-factor is valid.
   - CPGIDs and GCSGIDs are listed in Table 202 on page 329. For each pair, determine which FGIDs in Table 200 on page 326 can combine with them. This is done by finding the superset GCSGID in Table 201 on page 328 which contains the Table 202 on page 329 GCSGID as a subset. An example is that there would be 51 GRID combinations for the Times New Roman Medium font...FGID is always 2308, FW is always 0, and there are 51 unique CPGID/GCSGID pairs in Table 202 on page 329 which are subsets of the superset GCSGID 1269.
2. Valid combinations for the IBM Coordinated Set require Table 205 on page 335 (superset GCSGID/FGID/FW), Table 207 on page 336 (GCSGID subsets) and Table 202 on page 329 and Table 206 on page 335 (GCSGID/CPGID), and will be reported via XOA-RRL RT 01 RIDF 03 (also RT 10 RIDF 03). In all GRIDs, the GCSGID chosen will belong to the Code Page, as this is almost always the subset of the outline font GCSGID.
   - Scalable Font Width (FW) will be reported as 0 to the host PSF. This indicates that any width/scale-factor is valid.
   - CPGIDs and GCSGIDs are listed in Table 202 on page 329 and Table 206 on page 335. For each pair, determine which FGIDs in Table 205 on page 335 can combine with them. This is done by finding the superset GCSGID in Table 207 on page 336 which contains the Table 202 and Table 206 GCSGID as a subset. An example is that there would be 41 GRID combinations for the Letter Gothic font...FGID is always 400, FW is always 0, and there are 41 unique CPGID/GCSGID pairs in Table 202 and Table 206. which are subsets of the superset GCSGID 2039.
3. Valid combinations for the 4028 Compatibility Set require Table 203 on page 333 (FGID/FW) and Table 204 on page 334 (GCSGID/CPGID), and will be reported via XOA-RRL RT 01 RIDF 03. In all GRIDs, the GCSGID chosen will belong to the Code Page, as this is almost always the subset of the outline font GCSGID.
   - The FW's for these fonts are non-zero, because they represent fixed-width fonts.
   - The Alternate FGIDs are valid values for FGID/FW combinations.
   - The GCSGID/CPGID pairs for each font are obtained by finding the Code Page(s) in Table 204 on page 334 that match the Code Page(s) listed for a given FGID/FW pair in Table 203 on page 333.
4. Valid combinations of the DBCS outline fonts require Table 283 on page 365 (superset GCSGID/FGID/FW), Table 285 on page 366 (GCSGID subsets) and Table 284 on page 366 (GCSGID/CPGID), and will be reported via XOA-RRL RT '03' RIDF '03' (and also RT '10' RIDF '03'). In all GRIDs, the GCSGID chosen will belong to the Code Page, as this is almost always the subset of the outline font GCSGID.
   - Scalable Font Width (FW) will be reported as 0 to the host PSF. This indicates that any width/scale-factor is valid.

- CPGIDs and GCSGIDs are listed in Table 284 on page 366. For each pair, determine which FGIDs in Table 283 on page 365 can combine with them. This is done by finding the superset GCSGID in Table 285 on page 366, which contains the Table 284 on page 366 GCSGID as a subset.

5. Valid GRID combinations of the DBCS Raster fonts are listed in Table 208 on page 337, Table 209 on page 337, Table 210 on page 338, Table 211 on page 338, and Table 212 on page 338. CRC values for the individual sections (one for character set and one for code page) are listed in Table 208 on page 337 through Table 282 on page 365.

Chapter 15. Using the Printer in IPDS Mode with AS/400

This chapter explains the Application System/400 (AS/400) applications that can be used to control the printer with an IPDS feature and in Emulation=IPDS mode. These explanations include descriptions of parameters in the following applications:

- Control Language (CL)
- Data Description Specifications (DDS)
- AS/400 OfficeVision
- Operating System/400 (OS/400) Graphics
- Business Graphics Utility (BGU)
- Personal Computer Image Document Utility (PCIDU)
- PC Support/400
- AFP Utilities (refer to AS/400 documentation for more information)

Using Control Language (CL) Commands

Use printer files to control the print format of your data. In printer files, use CL command parameters for selections such as page length, page width, overlays, and page segments, and fonts to be used. Printer files are used in conjunction with applications. Depending on your application, some of the parameters specified by your printer file (PRTF) may be overridden. Use the following CL commands to select format attributes in a printer file:

- Create Printer File (CRTPRTF)
- Change Printer File (CHGPRTF)
- Override Printer File (OVRPRTF).

For more information about these commands, refer to *IBM AS/400 Programming Control Language Reference*.

Printer File Command Parameters

The following pages list some of the key parameters of CRTPRTF. They are also common to the CHGPRTF and OVRPRTF commands. The values that are valid for the printer when you use these commands are included.

CDEFNT Parameter

Specifies a coded font for the system to use. It is valid only for print files with DEVTYPE(*AFPDS) specified.

CHRID Parameter

This parameter specifies the character identifier (character set and code page) for the printer file. CHRID(*SYSVAL) is the code page specified by the system on which the application is running.

If you do not use the CHRID parameter, the system default value (*DEVD) causes the printer to default to the code page specified in the configuration settings. The printer factory default character set is 697 and the code page is 037, Version 1.

Certain fonts require special code pages. To determine whether the requested font requires a special code page, refer to the code page and font information in this book. For example, OCR-B requires special code page 893.

CPI Parameter

This parameter specifies the character density in characters per inch (CPI). Normally, the CPI is implied by the font global identifier (FGID) specified by the FONT parameter value. If the font parameter specifies (*CPI) instead of an FGID, the CPI parameter is used. Refer to the font and code page information elsewhere in this book. for the CPI or pitch of each font. The upright courier font of the correct CPI value is used by the printer.

If Font (*CPI) is specified, the font used is based on the CPI value. The following list gives the printed CPI value for each requested CPI value:

Requested	Printed Result
5	10
10	10
12	12
13.3	13.3
15	15
16.7	17
17	17
20	20

DEVTYPE Parameter

This parameter specifies the type of data stream that OS/400 generates for a printer file. This parameter affects the level of function and performance available because of the differences between various data streams. The data streams are:

- AFPDS: When *AFPDS is specified, the system generates The Advanced Function Presentation data stream, which is now called Mixed Object Document Content Architecture (MO:DCA) data stream.

  MO:DCA is the highest level of printer function and is required if you use AFP resources such as downloaded (soft) fonts, page segments, or overlays (electronic forms).

  When using DEVTYPE(*AFPDS), set the printer device description AFP parameter to *YES in the CRTDEVPRT command.
- IPDS: When *IPDS is specified, the system generates the Intelligent Printer Data Stream (IPDS). IPDS is the second highest level of printer function, and it enables IPDS printers to use OS/400 support for special print functions such as bar codes, images, and graphics. It does not permit using AFP resources.
- SCS: When *SCS is specified, the system generates the SNA Character String (SCS). SCS is the lowest level of printer function. If *SCS is specified and the spooled printer file is directed to an IPDS printer, the system converts the file to IPDS.

DRAWER Parameter

This parameter selects the paper/envelope source used when automatic, cut-sheet feed mode is specified using FORMFEED(*AUTOCUT). The values for selection are:

1 Paper is fed from the primary paper tray.

2 Paper is fed from the secondary paper tray.

3 Paper is fed from the 100-sheet Auxiliary Feeder

***E1** Envelopes are fed from the Envelope+ Feeder.

See the discussion about envelopes in "Select Format and Change Format Menus" on page 193.

DUPLEX Parameter

This parameter specifies whether to print on one side or both sides of the paper.

***NO** Print on one side of the paper.

***YES** Print on both sides of the paper with the top of each page at the same end of the paper.

***TUMBLE** Print on both sides of the paper such that the top of one side is at the same end as the bottom of the other side of the paper. This is for output that is usually bound at the top.

FONT Parameter

The FONT parameter specifies the font with the font's FGID and point size. Fixed-pitch fonts do not require the point size. The printer does not require operator intervention to change fonts. When selected fonts are internal, the printer automatically selects the font and continues printing without interruption. For more information, see "CRTPRTF" in the *IBM AS/400 Programming: Control Language Reference*. Valid values range from 1 to 32767.

OS/400 may substitute some fonts for other fonts and issues a message indicating that substitution has occurred.

When a requested font is not resident in the printer, the printer performs a *Font Best Fit* algorithm to substitute the requested font with a resident font. The printer does not report an error message.

For a list of valid fonts and IDs for the printer, refer to the font and code page information in this book. The manual also contains more information on typographic font selection and details on Font Best Fit. The font parameter cannot access fonts on font cards or font cartridges.

FORMFEED Parameter

This parameter specifies the method by which forms are fed into the printer. Specify *AUTOCUT for single sheets or envelopes to be fed automatically. If you are using manual feed, specify *CUT.

See the discussion about envelopes in "Select Format and Change Format Menus" on page 193.

FRONTMGN/BACKMGN Parameters

These parameters specify the offset, down from the top edge of the media, and to the right, from the left edge of the media on the front and back sides. The offsets are in the unit of measure specified on the units of measure (UOM) parameter. You can use this parameter only for printer files with *DEVTYPE(*AFPDS) specified.

When *DEVD is specified, the margin values that AS/400 uses depend on the printer device configuration as follows:

AFP(*YES):
Margins equivalent to the no-print borders as reported by the IPDS printer. Thus you should set printer configuration setting Margins to System to Yes.

AFP(*NO):
Margin of 0

When you specify offsets down and across, make them large enough to position the page in the printable area.

FIDELITY Parameter

Specifies whether or not printing continues after print errors occur for printers configured for AFP(*YES).

***ABSOLUTE**
Printing stops if a print error (invalid print data) occurs.

***CONTENT**
Printing continues if a print error occurs.

FNTCHRSET Parameter

Specifies a downloaded font consisting of a character set and a code page. It is valid only for print files with DEVTYPE(*AFPDS) specified.

FRONTOVL/BACKOVL Parameter

Specifies the qualified name of the object that contains the overlay that is printed on the front and back sides of the page.

LPI Parameter

This parameter specifies the line spacing on the printer in lines per inch (LPI).

MULTIUP Parameter

For spooled output only, specifies the number of pages to print on a single physical page. If you request a value of 2 or 4, consider the size of the output and the paper.

OVRFLW Parameter

This parameter specifies the line number on the page when overflow to a new page occurs. Generally, after the specified line is printed, text overflows to the next page before printing continues. For example, if the parameter specifies the line number as 60, after line 60 has printed, text overflows to a new page. The OVRFLW parameter enables an application program to avoid printing in the no-print border at the bottom of the page. See IBM Network Printers: Twinax/Coax Configuration Guide for more information on unprintable areas.

PAGESIZE Parameter

This parameter specifies the length and width of the printer forms used by this printer.

Notes:

1. Because this parameter specifies the physical size of the paper, it cannot be adjusted to reflect the size of the printable area. printing in the unprintable areas.

When the measurement method is set to *UOM, the page length and width are in the units of measure (centimeters or inches) specified in the UOM parameter.

When the measurement method is set to *ROWCOL, the page length is specified in lines per page, and the width is specified in print positions (characters) per line. To determine the page width (in columns), multiply the characters-per-inch (CPI) by the forms width in inches. For example, 10 CPI x 8.5 produces a page width of 85. Specify page length values based on the LPI parameter and the forms length.

The following table contains the appropriate page length values for several paper sizes and LPI values.

Table 191. Paper Length Values

If Lines per Inch equals:	Then Lines per Page must be:			
	for 8.5 by 11 inch page length	**for 8.5 by 14 inch page length**	**for A4- size paper**	**for B5- size paper**
4	44	56	46	40
6	66	84	70	60
8	88	112	93	80
9	99	126	105	90

Specify page sizes with reference to the way the data is printed on the page. For example, if you are using an 8.5-by-11 inch page in portrait orientation and format for six LPI (with a 10-pitch font), specify PAGESIZE(66 85) and PAGRTT(0). If you rotate the page, specify page size for an 8.5-by-11 inch page in landscape orientation and enter PAGESIZE(51 110) and PAGRTT(90).

PAGRTT Parameter

This parameter specifies the degree of clockwise page rotation for the printer file. Options of (0), (90), (180), and (270) rotate the file 0°, 90°, 180°, and 270°, respectively.

Option (*COR) forces computer output reduction (COR). COR allows printed output intended for a 13.2-by-11 inch form to be printed on an 8.5-by-11 inch (landscape) page.

In Non-IPDS mode, the printer calculates the COR reduction.

In IPDS mode, OS/400 calculates the COR reduction

When *COR is specified, a 10-pitch font is converted to a 13.3-pitch font, a 12-pitch font is converted to a 15-pitch font, and a 15-pitch font is converted to a 20-pitch font. Top and left margins of 0.5 inches are added to the printed output and the PAGESIZE is set to 8.5 by 11 inches.

Option (*AUTO) may cause page rotation or COR. OS/400 uses the PAGESIZE, LPI, and FONT parameters to determine when to perform page rotation or COR. For example, specifying PAGESIZE(66 132), LPI(6), and FONT(011)–pitch of 10 CPI–results in a page length of 11 inches (66/6 = 11) and a page width of 13.2 inches (132/10 = 13.2). In this example, the resulting text is reduced, using COR. The length and width are matched against a default page size of 8.5 by 14 inches to determine whether to perform page rotation or COR. Use the following table to determine printed results when *AUTO is specified:

*Table 192. Results of *AUTO*

	L ≤ 8.5	**8.5 < L ≤ 14**
W ≤ 8.5	No change (See note.)	No change
8.5 < W ≤ 14	Rotation	COR
W > 14	Rotation	COR

Note: When page width is greater than page length, page rotation occurs.

Applications that do not specify margins to move text out of the unprintable border, but which use printer file parameters causing rotation only, may have characters or lines of text missing in the output. To move text into the print area, specify margins, change the printer file parameters given in the previous example, or specify *COR.

Note: Table 192 and the discussion above also apply when PAGRTT(*DEVD) and PRTQLTY(*DRAFT) have been specified in the printer file.

Automatic rotation from the PAGRTT parameter does not occur through the printer file if the file contains elements such as the following:

- Graphics
- Bar codes
- Varying LPI
- Varying fonts
- Varying page rotations
- Varying drawer options

PRTTXT Parameter

This parameter prints a footer at the bottom of each page. To ensure that the footer prints in the print area, use the PAGESIZE (Page-length) and OVRFLW parameters to adjust the amount of text on the page.

QPRTVAL Parameter

With Printable Area = Expanded with rotated overlays on the AS/400, you many need to change the QPRTVALS data area position 2 to ″Y″. This tells PSF not to offset the logical page when rotating text 90 degrees.

RPLUNPRT Parameter

Use this parameter to specify substitution characters to be used in place of unprintable characters. If you specify DEVTYPE (*IPDS), a hyphen (**-**) or a space ( ) prints instead of the unprintable character. If you specify RPLUNPRT (*YES), the specified substitution character prints instead of each unprintable character. If you specify RPLUNPRT (*NO) and the value of the unprintable character is Hex 00 through 3F, or is Hex FF, undesirable results may occur. If you specify RPLUNPRT (*NO) and the value of the unprintable character is Hex 40 through FE, the device signals a recoverable error and sends an inquiry message to the operator.

UOM Parameter

This parameter specifies the unit of measure to use for values specified in PAGESIZE, FRONTMGN, and BACKMGN parameters, and the offsets for FRONTOVL and BACKOVL parameters.

Additional Information for Create Printer File (CRTPRTF)

The following additional information may be helpful when specifying CRTPRTF parameters:

- IBM recommends that you print using a printer writer (specify SPOOL (*YES) on the printer file) rather than printing directly to the printer (specify SPOOL (*NO) on the printer file).
- If a character in a specific font is too tall to fit on the presentation surface, the character may not print. When using tall fonts, you may have to adjust your print line accordingly.
- You can use the DDS keyword PAGRTT to rotate pages within a printer file. The keyword is valid only on page boundaries and can have values of 0, 90, 180, or 270. Page rotation applies only to the page where you used the keyword. After the printer completes the page, rotation returns to the file level (as defined by the CRTPRTF, CHGPRTF, and OVRPRTF commands).

If your printer file PAGRTT parameter is set to *AUTO and the text is positioned in the unprintable area, see "PAGRTT Parameter" on page 185.

Using Data Description Specifications (DDS)

The printer file description contains information that is specified in two places:

- The source file that contains the DDS
- The CRTPRTF command.

DDS lets you describe various user-defined printer configurations to your host system. DDS contains the specifications for each printer file.

Several DDS parameters are similar in name and function to parameters on the CRTPRTF command. DDS parameters often allow you to modify these functions on a field, record, or page basis.

For more information on defining a DDS printer file, or for information about any of the following parameters, refer to *IBM AS/400 Data Description Specifications Reference Manual*, SC41-9620.

The CRTPRTF command creates the printer file and specifies the file name. You can use the CHGPRTF or OVRPRTF commands in a program to change or to override, respectively, the parameter values specified in the printer file description.

You can define the following printer parameters in keyword entries, positions 45 through 80:

BARCODE Parameter

Use this field-level keyword to print a named field as a user-specified bar code. The bar code ID and height are required parameters. Specify the height of the bar code in number of lines with valid values of 1 to 9.

The following bar codes are supported by the printer and the host system. See the *IBM AS/400 Data Description Specifications Reference Manual* for the bar code IDs supported by DDS.

Table 193. Bar Codes Supported by the Printer and the Host System

Bar Code ID	Bar Code Name
CODEABAR	AIM USS-Codabar

Table 193. Bar Codes Supported by the Printer and the Host System (continued)

Bar Code ID	Bar Code Name
CODE128	Code 128, AIM USS-128
CODE30F9	3 of 9 Code, AIM USS-39
EAN2	EAN Two-Digit Add-On
EAN5	EAN Five-Digit Add-On
EAN8	EAN-8 (JAN Short)
EAN13	EAN-13 (JAN Standard)
INDUST2OF5	2 of 5 Industrial
INTERL2OF5	2 of 5 Interleaved AIM USS-I 2/5
MATRIX2OF5	2 of 5 Matrix
MSI	MSI
POSTNET	POSTNET
UPCA	UPC/CGPC Version A
UPCE	UPC/CGPC Version E
UPC2	UPC Two-Character Supplemental Encodation (Periodicals)
UPC5	UPC Five-Character Supplemental Encodation (Paperbacks)

For Code 128 bar codes, use “Code 128 Character Set” to determine the hex value of the desired character.

Note: Also can have 2-digit and 5-digit supplemental the same as EAN 13 below.

Figure 6. Bar Codes from the IPDS Printer

Print bar codes only in the recommended print area. If you place a bar code so that a portion of it is in the unprintable area, a portion of the bar code prints in solid black. For an example, see Figure 7 on page 190.

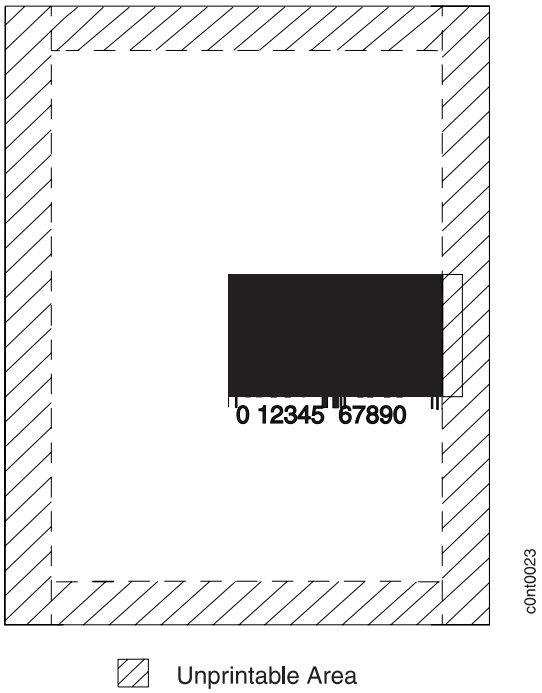


Figure 7. Bar Code Printed Outside of Print Area

The following example prints the Universal Product Code (UPCA) bar codes beginning at line 20 with a height of 4 lines.

```
5728PW1 R02M00  891006               SEU SOURCE LISTING

SOURCE FILE . . . . . .  SAMPLE/DDSSRC
MEMBER  . . . . . . . .  EXAMPLE

SEQNBR*...+...1...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+...
  100               R RECORD1                   FONT(087)
  200                 FIELD1        11S  0 20  9BARCODE(UPCA 4)
  300                 FIELD2        11S  0 20 45BARCODE(UPCA 4)


                            * * * *  E N D  O F  S O U R C E  * * * *
```

BOX Parameter

Use this record-level parameter to print a rectangle. The horizontal and vertical positions of diagonal corners of the box, plus with the width of the lines, are required elements.

Horizontal and vertical positions are specified relative to the margins specified on the FRONTMGN or BACKMGN parameter of the CRTPRTF command. The UOM parameter on the CRTPRTF command determines the units of measure for these positions. Valid values are 0 to 57.790 cm (0 to 22.750 inches). An error message is issued at application run time if the box extends beyond the page boundaries.

The line-width element defines the width of the lines. Valid values are 0.001 to 57.790 cm (0.001 to 22.750 inches). You also can specify the following special values:

Value	Line Width

***NARROW** 0.022 cm (12/1440 in; 0.008 in)

***MEDIUM** 0.042 cm (24/1440 in; 0.017 in)

***WIDE** 0.064 cm (36/1440 in; 0.025 in)

The line width is drawn on the inside of the box.

The BOX parameter is valid only when DEVTYPE(*AFPDS) is specified on the CRTPRTF command.

CHRSIZ Parameter

Use this record-level or field-level parameter to expand the width and height of a character in a record or field. This parameter allows you to scale the printer fonts by integer values or the GDDM graphic symbol sets by decimal values.

You may also use the CHRSIZ parameter to specify the size of graphic fonts.

Note: To maintain desirable character spacing when scaling typographic fonts, a font with a point size less than or equal to 12 must be used.

GDF Parameter

Use the Graphic Data File, record-level parameter to print a graphic data file. The graph file and graph member elements identify the chart to be printed and are required.

You can specify the graph file and member names and the optional library-name elements as constants, as program-to-system fields, or a combination of both.

The horizontal and vertical positions define the starting point of the chart and are required elements. These positions are specified relative to the margins specified on the FRONTMGN or BACKMGN parameter of the CRTPRTF command. The UOM parameter on the CRTPRTF command determines the units of measure for these positions. Valid values are 0 to 57.790 cm (0 to 22.750 inches).

The graph depth and graph width elements are required and define the depth and the width of the chart respectively. The chart is scaled to fit within the area specified by these elements. Valid values are 0.001 to 57.790 cm (0.001 to 22.750 inches). You also can specify the following special values.

The graph rotation element is required and defines the orientation of the chart with respect to the text on the page. Valid values are 0, 90, 180, and 270.

An error message is issued at print time if the chart is not positioned on the page.

The GDF parameter is valid only when DEVTYPE(*AFPDS) is specified on the CRTPRTF command.

HIGHLIGHT Parameter

Use this record-level or field-level parameter to print a field in bold letters. You may not use “Highlight” if a graphic symbol set is specified.

LINE Parameter

Use this record-level parameter to print a horizontal or vertical line. The horizontal and vertical positions of one end point, and the length, direction, and width of the line are required elements.

The horizontal and vertical positions are specified relative to the margins specified on the FRONTMGN or BACKMGN parameter of the CRTPRTF command. The UOM parameter on the CRTPRTF command determines the units of measure for these positions. Valid values are 0 to 57.790 cm (0 to 22.750 inches).

The line length element defines the length of the line. Valid values are 0.001 to 57.790 cm (0.001 to 22.750 inches).

The line direction element can have a value of horizontal (*HRZ) or vertical (*VRT).

The line-width element defines the width of the lines. Valid values are 0.001 to 57.790 cm (0.001 to 22.750 inches). The following special values can also be specified.

Value	Line Width
***NARROW**	12/1440 inches (0.008 inches, 0.022 cm)
***MEDIUM**	24/1440 inches (0.017 inches, 0.042 cm)
***WIDE**	36/1440 inches (0.025 inches, 0.064 cm)

You can use an optional line pad parameter to specify where the line width value is placed relative to the actual line coordinates. Valid values are *TOP and *BOT for horizontal lines, and *LEFT and *RIGHT for vertical lines.

An error message is issued at application run time if the line extends beyond the page boundaries.

The LINE parameter is valid only when DEVTYPE(*AFPDS) is specified on the CRTPRTF command.

OVERLAY Parameter

Use this record-level parameter to print an overlay. The overlay name, and the horizontal and vertical position of the starting point are required elements.

The overlay name, and the optional library name, elements can be specified as constants, as program-to-system fields, or a combination of both.

The horizontal and vertical positions are specified relative to the margins specified on the FRONTMGN or BACKMGN parameter of the CRTPRTF command. The UOM parameter on the CRTPRTF command determines the units of measure for these positions. Valid values are 0 to 57.790 cm (0 to 22.750 inches).

An error message is issued at print time if the overlay does not fit on the page. A maximum of 10 overlays can be used per page.

The OVERLAY parameter is only valid when DEVTYPE(*AFPDS) is specified on the CRTPRTF command.

PAGSEG Parameter

Use this record-level parameter to print a page segment. The page segment name and the horizontal and vertical position of the starting point are required elements. You can specify the page segment name, and the optional library name elements as constants, as program-to-system fields, or a combination of both.

The horizontal and vertical positions are specified relative to the margins specified on the FRONTMGN or BACKMGN parameter of the CRTPRTF command. The UOM parameter on the CRTPRTF command determines the units of measure for these positions. Valid values are 0 to 57.790 cm (0 to 22.750 in). An error message is issued at print time if the page segment does not fit on the page. A maximum of 10 page segments can be on a page.

The PAGSEG parameter is valid only when DEVTYPE(*AFPDS) is specified on the CRTPRTF command.

TXTRTT Parameter

Use the TXTRTT (Text Rotation) field-level parameter to rotate any text contained in the field. The field rotation element is required and controls the rotation of the field. Valid values are 0, 90, 180, and 270.

The TXTRTT parameter is valid only when DEVTYPE(*AFPDS) is specified on the CRTPRTF command.

UNDERLINE Parameter

Use this field-level parameter to specify that the field is underlined when it prints.

Using OfficeVision/400

When working with documents using Office menu screens, you can edit text for printer output (bold, underlining), or you can change the printer parameters by document format changes (page rotation or LPI). For complete information and instructions on making these changes, refer to *IBM AS/400 Office: Using OfficeVision/400 Word Processing*. For office functions, see the IPDS Printer Function chart in Appendix A of the same publication.

Notes:

1. If characters such as the exclamation point print differently than expected, you may need to change the printer default code page. Refer to the appendix on code pages for more information.
2. When using superscripts and subscripts, a half-line index is performed. This may cause lines to overlap.
3. When using Underline, underlining always occurs at the baseline.
4. When using Word Underline, underlining occurs at the current level, for example, with superscript and subscript.

Select Format and Change Format Menus

The following options are controlled from the Select Format and Change Format menus of OfficeVision. The printer default configuration settings must be set properly for the options to function correctly.

- ***Font (pitch) or FGID***

  Notes:

  1. Font selection by FGID supports IDs in the range 1 to 65534 under Word Processing. The font range is from 1 to 32767 for other office options.
  2. When using an application or host operating system that does not allow selection of point size, use the alternate FGID to access internal Times New Roman and/or Sonoran Serif typographic fonts.
  3. When using typographic fonts, justification and centering are not supported. You are responsible for determining line endings (or how many characters will fit on a line).

4. When using large fonts, adjust the line spacing to prevent lines from overlapping.

- ***Paper***
  - Paper width and length
  - Paper source
    - Paper drawer
    - Manual feed
    - Envelope feed
  - Rotation option.
- ***LPI and line spacing options***
- ***First and last typing line***

  Note: If Unprintable Area is set to Normal, there is an unprintable area on all edges of each printed page. Make sure you set the first typing line in the header or body of the document, the last typing line in the body of the document or in the footer, and the left and right margins to allow for this.
- ***Envelopes***

  Set the AS/400 rotation value to 2 for 0° rotation. The printer automatically prints the text on the envelope in landscape orientation. You can select other rotation values too. For values other than 2, you may have to adjust the text to position it correctly on the envelope.
- ***Symbols and Cursor Draw***

  Symbols and Cursor Draw use the symbol code page 259.

  Note: Symbol code page 259 does not exist for all fonts. Refer to the font appendix for more information.

Using the Print Options Menu

The following functions are available from the Print Options menu:

- ***Supported Print Qualities***

  The printer supports letter-quality printing only. Text-print or draft-print options print as letter quality.
- ***Large Print***

  Large print can only be selected for the entire document (not on a line-by-line basis). Use it to print characters that are twice the size of 15-pitch fonts. This supports all major functions except justification, centering, and bolding.

  Note: Because this function uses graphics, it may print more slowly than normal print.
- ***Error Log Page***

  This page contains information about errors in your document, such as interchange errors, print resolve errors, and printing errors. To print the error log page, select it in the Print Options menu.

Using Graphics in OfficeVision/400

You can use graphics in your document to add visual effects to your letters and reports. *Graphics* are pictorial representations of relationships by means of dots, lines, or curves. Graphics include graphs and images. A *graph* is a series of points to represent variables such as percentages or bar graphs. An *image* is a likeness of an object created photographically.

A graph can be sent from another system, or created with BGU or PC products such as DisplayGraphics, and stored in a graphics data format (GDF) file or a PC File document. You can create images using either PCIDU or the IBM AFP drivers for Microsoft Windows and OS/2 that are supplied with PC Support/400 on a personal computer.

AS/400 Office supports the following graphic formats:

PIF Picture Interchange Format

GDF Graphic Data Format

GOCA
Graphics Object Content Architecture.

AS/400 supports the following image formats:

IMDF Image Data Format

IOCA Image Object Content Architecture.

Both formats can be stored in a PC File document or a file.

For information on how to create a graph and store it in a GDF, refer to *BGU User's Guide and Reference*, SC09-1167.

The following example shows a document with an embedded graph created using BGU:

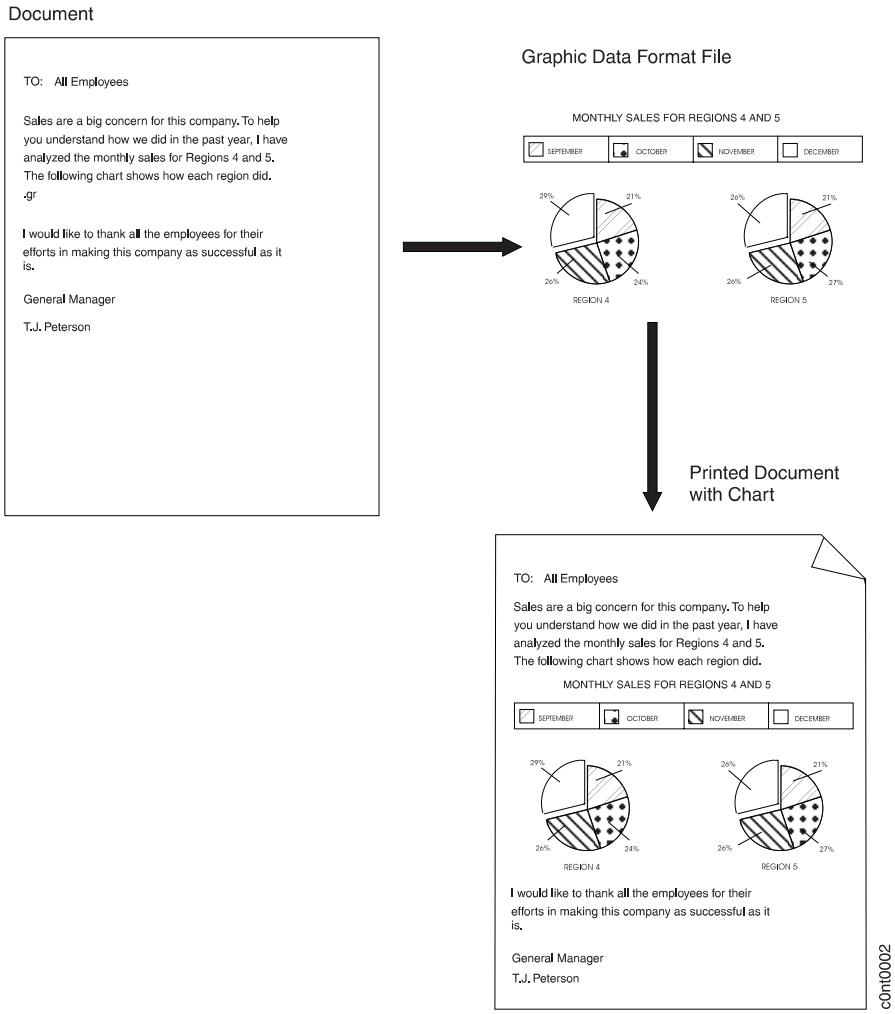


Figure 8. BGU Example

If you use PC Support/400 and PC Organizer, you can store your graphs and images in a shared folder, and you can also view and print your graph or image PC File documents from the Work with Documents display. You may view graphs and images while editing your OfficeVision/400 documents.

Inserting Graphics in a Document: You use the Graphic text instruction (.gr) to mark the place in the document where the graphic will be printed. You must also store the graphic in the document using the Get Graphic display before you print the document. If you do not store the graphic in the document before you print it, a blank space will be left at the location where the graphic would be placed.

If you wish to print the graphic on a page by itself, you should type a value for the Top Margin prompt to leave at least one line of blank space above the graphic. If the Top Margin prompt is left blank, the graphic starts printing on the first print line, which may be in the unprintable area. You must also specify the value of the amount of space you want to leave for the left margin. This is the indent from the paper edge prompt. If you leave this prompt blank, the graphic prints at the left margin.

If you have a graphic stored in another document, you can copy the graphic into this document. If you do not have the graphic stored in another document, you

will have to store the graphic in a file or a PC File document before you can copy the graphic into your document. See “Operating System/400 (OS/400) Graphics” on page 197 for information on storing a graphic.

A graphic can be printed with text above and below it or on a page by itself. Text cannot be printed to the left or right of the graphic unless you are using multiple text columns. If the graphic is in multiple text columns, the columns continue after the graphic. When a graphic prints on a page by itself, no headers, footers, or active running headings print on the page with the graphic.

A graph is automatically scaled to fit the available white space without distorting the shape of the graph. An image is not scaled to fit. It is trimmed to adjust to the specified size. If images are scanned at 300 dots per inch (dpi), the printer does not need to convert the image to 300 dpi and printing performance is improved. Images that are not 300 dpi are automatically converted to 300 dpi.

A signature or logo could also be treated as an image and included in the document with the OfficeVision/400 Graphic instruction. When treated as an image, signatures and logos are fully contained within their own image block. Any text part of the document would be printed before or after that block and could not print over or within the image block. Text can only be printed on either side of an image block and only if multiple text columns are used.

Operating System/400 (OS/400) Graphics

OS/400 Graphics includes both Graphical Data Display Manager (GDDM) and Presentation Graphics Routines (PGR). GDDM is a means of displaying, printing, or plotting pictures. PGR are a means of displaying, printing, or plotting charts.

GDDM and PGR are part of OS/400. To use OS/400 Graphics, you must write CALL statements in application programs using a high-level language.

Using Graphical Data Display Manager (GDDM) OS/400 Graphics

GDDM uses printer files to communicate with work station printers. The DEVICE-TOKEN parameter of the DSOPEN routine identifies the program to GDDM as one that is to generate printer output.

The printer can print graphics directly from an application program by selecting SPOOL (*NO) output on the CRTPRTF, CHGPRTF, and OVRPRTF commands. You may also print from a previously spooled file from an Output Queue. You can open graphics printer files by using the DSOPEN routine to specify printer using the device identifier. The device token (IPDS) identifies the device type. The DSUSE routine then uses the device identifier to make the printer the current device.

Creating or Storing Graphics Data Format (GDF) Files: A Graphics Data File (GDF) is used as a lower level programming interface within GDDM and allows you to define graphics for use in the printer.

You can create GDF files on the AS/400 in the following ways:

- From a GDDM application using the GSGET routine
- From a BGU chart format
- From a System/370 ADMGDF file (converted and sent to AS/400)

Note: System/370 GDDM creates ADMGDF files, which may then be converted to AS/400 GDF using tools provided on the System/370.

Printing Graphics Data Format (GDF) Files: To print a GDF file on an AS/400, you can use the DSPGDF CL command and specify (*PRINT) for the OUTPUT keyword and IPDS for the DEVTYPE keyword.

Note: You can print the spooled file after spooling it to your output queue.

For more information on printing a GDF file, see "Printing BGU Charts" on page 199.

For more detailed information, see the *IBM AS/400 GDDM Programming Guide*, SC33-0536, the *IBM AS/400 GDDM Programming Reference Manual*, SC33-0537, or the *IBM AS/400 Programming: Control Language Reference*.

Using Business Graphics Utility (BGU)

BGU is a menu-driven interface to GDDM. After creating a chart using BGU, you can save the business graphics in the form of a GDF file. The GDF file allows you to use your system or any other GDF-compatible system to print the chart. You can also transfer graphics to and from the GDDM application program by saving the chart as a GDF file.

BGU creates *chart formats* that contain attributes such as chart type and axis definition. The data for the BGU chart resides in AS/400 data base files. When you request a display or a printed chart, BGU combines chart formats with the data. It then executes a combination of GDDM instructions and PGR to draw the chart.

Notes:

1. There is an unprintable area on all edges of each printed page.
2. Both GDDM and PGR are programming interfaces for integrating graphics into application programs and for generating charts as program output.

Creating BGU Charts

You can use BGU to create:

- Line graphs
- Bar charts
- Surface charts
- Pie charts
- Text charts
- Venn diagrams
- Scatter diagrams
- Histograms

Note: Using the BGU/400 Easy Path to design charts and print them on the printer is not recommended. The Easy Path method limits your ability to move data out of the unprintable area. Use the Create Chart Format or Change Chart Format commands that allow flexibility in placing data.

When you create or change a BGU chart, avoid placing data in the unprintable area by selecting the location of the chart heading, the chart legend, a chart note, or the text on a text chart. Adjusting the margin of a chart on the Specify Margins menu can also prevent data from being positioned in the unprintable area. Selecting page dimensions slightly smaller than the actual page size prevents data

from being positioned in the right and bottom margins of the unprintable area. To specify page dimensions, create a new printer file or change an existing printer file and then specify this printer file on the Specify Printer menu. On this menu, you also may specify that the default printer options should be changed. If you do this, the Change Printer Options menu is displayed. You may specify a new page size on this menu. If part of the vertical axis title does not print, complete the following steps to correct the problem:

- Increase the size of the left margin. In most cases, this may solve the problem.
- Decrease the scale of the axis title characters.
- Use shorter axis labels, decrease the character scale, and change the orientation of the labels.
- Move the axis title to a position above the axis.

For more information on creating BGU charts on the AS/400, see the *IBM AS/400 Business Graphics Utility User's Guide and Reference Manual*, SC09-1167.

Printing BGU Charts

You can select a printer from the Select or Specify Printer menu and then select the device you want to use. You can also specify a printer file with the printing characteristics required for the chart.

The current printer file characteristics can be reviewed or changed before printing.

The following characteristics can be changed before printing:

- Output queue
- Library
- Number of copies
- Form type
- Page size
  - Length of page
  - Width of page
- Overflow line
- Rotation.

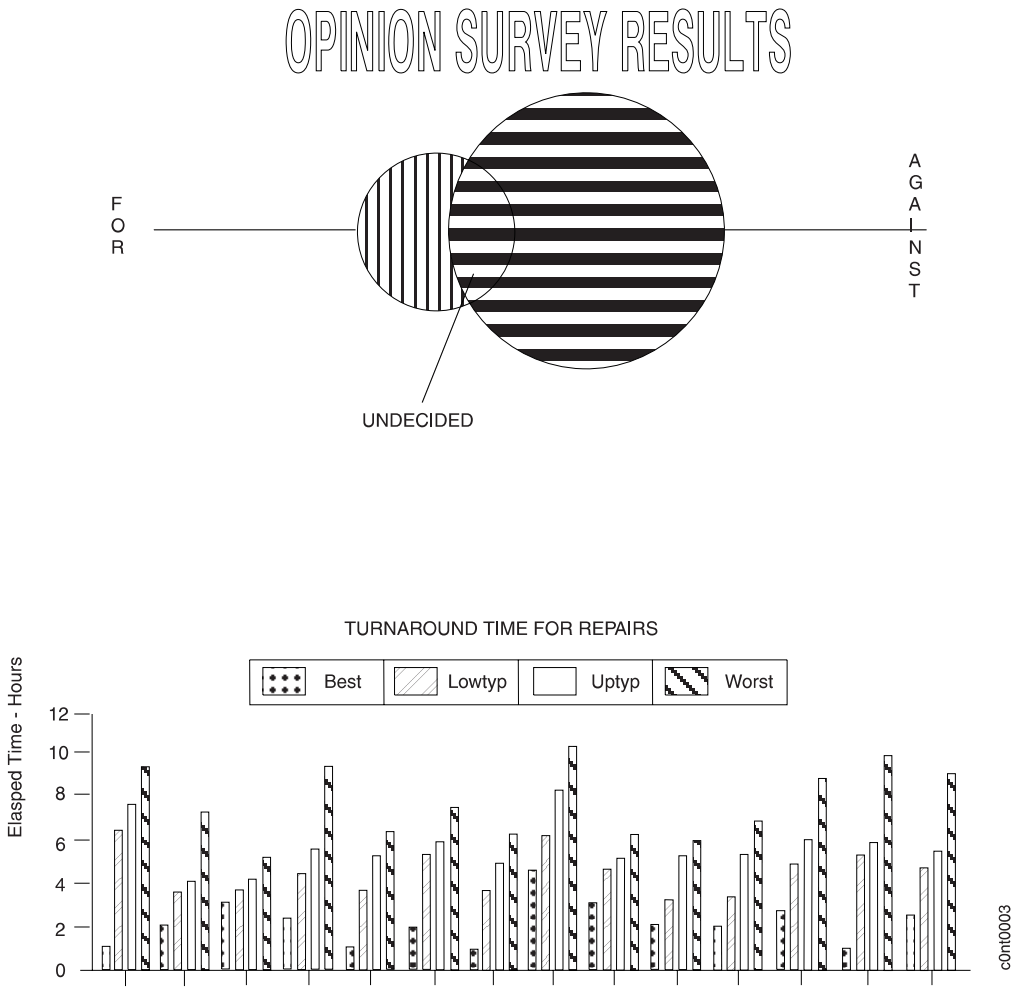


Figure 9. BGU Chart Examples

You may print an existing BGU chart by following instructions on menus, or you may use the Display Graphics Data Format (DSPGDF) command. An example of the DSPGDF command is:

```
DSPGDF FILE(KHABGU/PBGUA001) MBR(PBGUA001) OUTPUT(*PRINT) DEVTYPE(IPDS)
```

where:

DSPGDF Is the command.

FILE Specifies that you must enter the name of the library and the file name of the chart.

KHABGU Is the name of the library in this example. The chart is stored in this library.

PBGUA001 Is the file name for the chart in this example.

MBR Stands for member. There may be multiple members within a file. Multiple members allow you to have different versions of a chart in the same file.

PBGUA001 Is the name of the member in this example.

OUTPUT Specifies what output type you can choose (either print or plot).

***PRINT** Specifies the output is to be printed.

DEVTYPE Stands for device type. Specify the name of the device type you want to use to print.

IPDS Is the device type in this example.

Using a Network Printer as a Virtual Printer with PC Support/400

AS/400 PC Support allows the user of a personal computer to take advantage of the printers that are attached to the AS/400 system. An AS/400 printer is typically shared or used by more than one program or person and allows the system to manage the printing on these printers more efficiently. The term virtual printer means that, although the printer is attached to the AS/400 system, it is used as though it were a PC printer. The virtual printer is accessed by the same commands used to control a PC printer.

You can define multiple printers when using PC Support/400. You can define LPT ports as virtual printers, or they can be a combination of locally-attached PC printers and virtual printers.

When setting up the virtual printer, you must specify a device name. Use the device name of the printer as defined in the OS/400 to specify this as a printer attached with a twinaxial cable connection. You also may specify the name of the OS/400 printer file if you want to override the virtual printer setup values.

Printout format and printer setup options, such as CPI, LPI, and page length in lines, can be selected for a virtual printer. Other options are available. Refer to *AS/400 PC Support User's Guide* for more information.

When using DisplayWrite* (DW) Versions 3, 4, 5, or 5/2 to print documents on printer attached to the AS/400, choose data type 3 (Final-Form Text). DW3, DW4, DW5, and DW5/2 should be configured to print using FFTDCA.PFT. [1] If the document does not print as expected, choose data type 1. The printer function table, FFTDCA.PFT, outputs an Extended Binary-Coded Decimal Interchange Code (EBCDIC) print data stream in Final-Form Text format (L2DCA). The L2DCA data stream is translated to IPDS by the AS/400 operating system.

When assigned with data types 1 and 3, the virtual printer assumes that the data created by the personal computer is already in EBCDIC and does not have to be translated from American National Standard Code for Information Exchange (ASCII) to EBCDIC. Use data type 2 (ASCII to SCS) when printing with most other PC programs. When assigned with data type 2, the virtual printer assumes that the ASCII to be translated to SCS is at the IBM Proprinter level; therefore, configure the PC program for an IBM Proprinter. The AS/400 operating system translates the SCS data stream to IPDS. Graphics data cannot be printed using this virtual printer data type.

Refer to the *IBM AS/400 PC Support: Technical Reference* for details on specific programs and their functions, as well as other special considerations when using virtual printers.

Notes:

1. If printable area is set to normal, an unprintable area is on all edges of each printed page. This can be changed.

1. Final-Form Text Document Content Architecture printer data stream.

2. AFP printer drivers supplied with PC Supoort/400 allow you print output from Microsoft Windows and OS/2 applications to any AFP-compatible IPDS printer attached to an AS/400. The Microsoft Windows version is available in Version 2 Release 2 of PC/Support 400. The OS/2 version is available in Version 2 Release 3 of PC Support/400.
3. Use Printer Data Type 5 when printing data from IBM AFP drivers. Use Printer Data Type 4 when printing data from PCL on the printer and you don't want AS/400 to convert the data. Use only PCL data; with other types, the results are unpredictable. This option is not valid when the twinaxial attachment is in IPDS mode.

Chapter 16. Data Streams– Non-IPDS Mode with AS/400

Data stream controls consist of device controls, page controls, font controls, and cursor controls. They prepare the printer to receive data, set up the layout and appearance of the page, identify which fonts to use, and tell the printer where to place a character (when to start a new line, tabs, and so on).

In the following descriptions, "Ignored" means that it does not cause printing; it does not cause the horizontal (or vertical) position to move; nor does it move the printer off of a line or page boundary if it is already on one.

Device Control

Device controls set up the printer environment and prepare it to receive data.

Set Initial Conditions (SIC)

0 1	2	3	4
X'2BD2'	X'03'	X'45'	IS

Sets the environment of the EBCDIC data stream transform. The one byte parameter IS (Initialization Set) has the following meanings:

1 Word processing initialization

255 Data processing initialization, the default

All others Invalid.

Note: These changes do not affect the *logical* meanings of the defaults of the DP environment. Logically, the application assumes it is printing at six lines per inch, ten characters per inch. If the application were to set the right margin to column 85, for example, the printer interprets that as a setting of 8.5 in., regardless of whether it is in COR mode or not.

Exceptions:

Class 2 Control not encountered on a page boundary. When continuing, the printer ejects the current page then executes the control. Indicator=U35.

Class 4 Invalid *IS* parameter. When continuing, the printer initializes the word processing environment. Indicator=U36.

The printer ignores this control.

Set Exception Action (SEA)

0 1	2	3	4-n
X'2BD2'	length	X'85'	EC/AC Pairs

Introduces a sequence of byte pairs of *length*-2 bytes. The first byte of each pair is the Exception Class; the second byte is the Action for that Exception Class.

The Exception Class byte has the following meanings:

0 All exception classes

1-4 Exception classes 1-4, respectively

All others Invalid.

At least one EC/AC pair is required. The Action byte has the following meanings:

0 Accept. On the printer, this is treated the same as "Ignore."

1 Ignore. Ignore error and continue processing in as was described for each command. No error indicator is signalled, printed, or displayed.

2 Terminate. Print the corresponding 'Uxx' error indicator at the cursor location, inject a form feed to cause printing of the offending page, signal error status, and stop processing the input data stream. Unit not available is *not* posted on the interface. The error posted to the host in poll response byte 2 on the Arctic interface will only be cleared by an Arctic CLEAR.

3 Suspend. Print the corresponding 'Uxx' error indicator and do the continuation action as described for each control. Processing continues (no need to press Start), and no status is signalled.

All others Invalid.

The error display is blanked by the SEA and SIC commands and also when the attachment card issues an expedited Clear, or Power-on Reset.

The printed error indicator consists of a "U" followed by a 2-digit error code taken from the list that follows. The indicator is printed in the lower left corner of the page. Normally an exception will only result in the first error indicator being reported, but if more than one exception is reported, succeeding error indicators follow the first (left-to-right), not to exceed one full line. A vector is drawn from each error indicator to the location of the cursor when the exception was detected (provided the cursor is not off the physical page). If the user is printing at the extreme bottom of page, there is a chance that the error indicators will overlay user text.

01 Illegal parameter on BUS (not 0, 1, or 80).

02 BUS when underline already active.

03 EUS when underline not active.

04 Illegal parameter on BOS (not 0, 1, or 80).

05 BOS when overstrike already active.

06 EOS when overstrike not active.

07 Unrecognized control character.

08 Invalid STO sequence – too few parameters.

09 Illegal parameter on SJM (not 0 or 1).

10 Reserved.

11 Overstrike character not present on BOS.

12 Unrecognized ESC sequence X'2B D4 xx' –xx unrecognized.

13 Unrecognized ESC sequence X'2B D4' – no other data.

14 SJM not at start of line.

15 SGEA default graphic character less than X'40'.

16 Unrecognized PP sequence 34 xx–xx not X'4C', X'C0', X'C4', or X'C8'.

17 Horizontal tab encountered with no tab defined for it.

18 Indent tab encountered with no tab defined for it.

19 SEA not on line boundary.

20 SEA class parameter not 0, 1, 2, 3, or 4.

21 SEA action parameter not 0, 1, 2, or 3.

22 Odd number of parameters on SEA sequence.

23 Illegal JTF sequence (too short).

24 Illegal SJM sequence (too short).

25 Reserved.

26 Reserved.

27 Reserved.

28 Reserved.

29 Reserved.

30 Unrecognized ESC sequence X'2B xx' –xx unrecognized.

31 Unrecognized ESC sequence X'2B D2 xx' –xx unrecognized.

32 Unrecognized ESC sequence X'2B D2' with no other data.

33 Reserved.

34 Reserved.

35 SIC not on page boundary.

36 Illegal SIC parameter not 1 or 255.

37 PPM not on page boundary.

38 FC parameter of PPM not 0, 1 or 2.

39 QUALITY parameter of PPM not 0, 1, 2, or 3.

40 Illegal PPM sequence -- count less than 5.

41 SPPS not on a page boundary.

42 DX parameter of PPM not 0, 1, 2, or 3.

43 Reserved.

44 Reserved.

45 Illegal STO parameter.

46 SVM not on page boundary.

47 SHM not on line boundary.

48 Illegal code page on SCG.

49 Reserved.

50 Illegal SCD parameter

51 Illegal SCD sequence – no parameter specified (need 2 bytes).

52 STAB not on line boundary.

53 FF parameter on STAB illegal – not 0 or 1.

54 Illegal length on STAB; incomplete tab definition.

55 Reserved.

56 No tab defined for SIL level.

57 BES when emphasis already active.

58 EES when emphasis not active.

59 Unrecognized ESC sequence X'2B D1 xx yy'–yy unrecognized.

60 ESC sequence too short X'2B D1' – with no other data.

61 Illegal SFG sequence; count less than 6.

62 Reserved.

63 SCGL parameter illegal (X'0F' < LCID < X'FF').

64 Illegal SCGL sequence – no parameter specified.

65 Reserved.

66 Typographic font selected with justification on.

67 Reserved.

68 JTF command received when a typographic font is selected or SJM is active.

69 Reserved.

70 Reserved.

71 Reserved.

72 Reserved.

73 Reserved.

74 SPPS width is invalid (<0).

75 SPPS depth is invalid (<0).

76 SHM left margin is invalid.

77 SHM right margin is invalid.

78 SVM top margin is invalid.

79 SVM bottom margin is invalid.

80 SIL not on line boundary.

81 SSLD not on line boundary.

82 SLS not on line boundary.

83 Invalid SPPS sequence – too few parameters.

84 Invalid overstrike character (< X'40').

85 Invalid SSLD parameter (<=0).

86 Invalid SSLD sequence – too few parameters.

87 Invalid SLD sequence – too few parameters.

88 Reserved.

89 Reserved.

90 Tab value on STAB illegal (<0).

91 Illegal parameter on JTF command (<0).

92 Illegal SJM activation – either a typographic font is in use or JTF is active.

93 Invalid parameter in SFG (FWD=0).

94 Reserved.

95 Reserved.

96 Attempt to backspace off the left edge of the page.

97 Printing off the right edge of the page as set by SPPS.

98 Printing off the bottom edge of the page as set by SPPS.

If the Exception Class has two or more actions listed for it, the latest one encountered is taken.

Exceptions:

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U19.

Class 4 The Exception Class byte and/or Action byte is an invalid value. When continuing, the pair is ignored. Indicator=U20(invalid EC) or U21 (invalid AC)

Unpaired Exception Class byte; that is, length is odd. When continuing, the EC byte is ignored. Indicator=U22.

Miscellaneous

Exception	Class	Cont. Act	Ind	Check.
2B seq invalid, 2Bxx-xx unrecog	3	Cmd is ignored	U30	Invalid SCS Ctrl
2B D1 xx yy-yy unrecognized	3	Cmd is ignored	U59	Invalid SCS Ctrl
2B D1-no other data(length 0-1)	3	Cmd is ignored	U60	Invalid SCS Ctrl
2B D2 xx -xx unrecognized	3	Cmd is ignored	U31	Invalid SCS Ctrl
2B D2-no other data(length 0-1)	3	Cmd is ignored	U32	Invalid SCS Ctrl
2B D3 seq invalid,too few param	3	Cmd is ignored	U08	Invalid SCS Ctrl
2B D4 xx -xx unrecognized	3	Cmd is ignored	U12	Invalid SCS Ctrl
2B D4-no other data(length 0-1)	3	Cmd is ignored	U13	Invalid SCS Ctrl
Unrecognized single byte contrl	3	Cmd is ignored	U07	Invalid SCS Ctrl

Null (NUL)

0
X'00'

The printer ignores this control.

Repeat (RPT)

0
X′0A′

The printer ignores this control.

Switch (SW)

0
X′2A′

The printer ignores this control.

ASCII Transparency (ATRN)

0	1	2 n
X′03′	length	ASCII data

Length can be 0 to X'FF'. The length counts only the ASCII data bytes, not the length byte itself. The number of bytes of ASCII data that follow are sent to the ASCII printer without any processing by the host system. Send only PCL data with this control; results are unpredictable in other ASCII data streams.

Bell/Stop (BEL/STP)

0
X′2F′

The printer ignores this control. Unlike the 5219, the printer's higher speed makes it inadvisable to stop.

Set Print Setup (SPSU)

0 1	2	3	4 n
X′2BD2′	length	X′4C′	parameters

Selects the paper source tray.

Parameters have the following meanings:

Length 4–65

Parameter xxpfxxsi

xx	Not Used
pf=00	No Change
pf=01	Manual Feeder
pf=02	Tray 1

pf=03	If currently set to manual, select Tray 1
pf=4 - 255	Ignored
si	Ignored

Page Controls

Page Controls establish the appearance and layout of a page, such as size, margins, and print-quality settings.

Page Presentation Media (PPM)

0 1	2	3	4 5	6	7	8	9	10	11
X'2BD2'	length	X'48'	reserved	FC	SD	DDO	DD	Q	DX

The parameters in bytes 7-11 are optional, and the *length* value indicates whether they are present.

The parameters have the following meanings:

FC Forms Control:

- **X'00'** No change from current selection (use last FC specified).
- **X'01'** Use SD as paper source.
- **X'02'** Select envelope feeder if it exists; otherwise, select auxiliary tray using the paper size specified by the AUXSIZE item in the Paper Menu.
- **X'03'** Select manual feeder.
- **X'04'-X'FF'** No change from current selection.

Note: For IP20, when a tray contains envelopes (or envelope-sized paper), it is selected. If multiple trays contain envelopes, the tray with the lowest tray number (tray 1, tray 2) is selected.

SD Source Drawer. These parameters have the following meanings:

- **X'00'** No change from current selection.
- **X'01'** Select tray 1.
- **X'02'** Select tray 2 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.
- **X'03'** Select tray 3 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.
- **X'04'** Select auxiliary feeder
- **X'05'** Select tray 4 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.
- **X'06'** Select tray 5 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.
- **X'07'-X'FF'** No change from current selection.

DDO Destination Drawer Offset. These parameters have the following meanings:

- **X'00'** No change from current selection.

X'01'-X'FF' Jog.

DD Destination Drawer. These parameters have the following meanings:

X'00' No change from current selection.

X'01' Select standard output bin.

X'02'
NP12: face-up bin.
NP17: 500-sheet offset bin.
NP24: face-up bin.
IP20: default bin.
IP 32/40: face-up bin.

X'03'
NP12: default bin.
NP17: default bin.
NP24: finisher bin 1 (face-down).
IP20: default bin.
IP 32/40: finisher bin 1 (face-down).

X'04'
NP12: default bin.
NP17: mailbox bin 1.
NP24: finisher bin 2 (face-down).
IP20: default bin.
IP 32/40: finisher bin 2 (face-down).

X'05'
NP12: default bin.
NP17: mailbox bin 2.
NP24: finisher bin 3 (face-down).
IP20: default bin.
IP 32/40: finisher bin 3 (face-down).

X'06'
NP12: default bin.
NP17: mailbox bin 3.
NP24: finisher bin 1 (face-up).
IP20: default bin.
IP 32/40: default bin.

X'07'
NP12: default bin.
NP17: mailbox bin 4.
NP24: finisher bin 2 (face-up).
IP20: default bin.
IP 32/40: default bin.

X'08'
NP12: default bin.
NP17: mailbox bin 5.
NP24: finisher bin 3 (face-up).

IP20: default bin.

IP 32/40: default bin.

X'09' NP12: default bin.

NP17: mailbox bin 6.

NP24: auto-output (face-down).

IP20: default bin.

IP 32/40: auto-output (face-down).

X'0A' NP12, NP24, IP20, IP 32/40: default bin.

NP17: mailbox bin 7.

X'0B' NP12, NP24, IP20, IP 32/40: default bin.

NP17: mailbox bin 8.

X'0C' NP12, NP24, IP20, IP 32/40: default bin.

NP17: mailbox bin 9.

X'0D' NP12, NP24, IP20, IP 32/40: default bin.

NP17: mailbox bin 10.

Q Quality

- **0** Do not change the quality setting.
- **1** Allow COR mode. This is the default if this field is not specified.
- **2 or 3** Do not allow COR mode, regardless of the configuration settings.
- **4-255** Invalid

DX Duplex.

- **0** Do not change current duplex or simplex mode of printer.
- **1** Print simplex mode.
- **2** Print duplex mode.
- **3** Print tumble duplex mode.
- **4-255** Invalid

Exceptions:

Class 2 Current page will be ejected and the control is executed. Indicator=U37.

Class 3 Too short PPM sequence. Indicator=U40.

Class 4 Invalid FC parameter (Indicator=U38), Q parameter (U39) or DX parameter (U42).

Set Presentation Page Size (SPPS)

0 1	2	3	4 5	6 7
X'2BD2'	length	x'40'	width	depth

Sets the presentation surface *width*, and optionally the *depth*, in units of 1440ths of an inch. Valid values for width and depth are 0 through 32767. Values of 0 result in no change.

The presentation surface is a different concept from the physical paper size. It describes a maximum area of print on a page, but does not guarantee that area will be filled with printed characters. Therefore, you can specify an area larger than the physical paper, as long as no characters are actually printed off the paper.

This control causes the page orientation to be calculated according to the following rules:

1. If the page orientation is not currently "default" (that is, if the orientation has been explicitly set by Set Text Orientation), explicit orientation is used.
2. Otherwise, if the APO setting in the operator panel specifies disabling automatic orientation, the decision is made based on the Orientation setting in the operator panel. The printer has four possible settings.
   a. COR (landscape orientation, reduced fonts and spacings)
   b. Normal portrait orientation
   c. Normal landscape orientation
   d. Compressed portrait (text within each line is compressed)

   You can change these settings; the factory default setting is for COR.
3. Otherwise, if the APO setting on the operator panel specifies automatic orientation (the default), then the following two cases are based on the presentation surface size:
   a. If the presentation surface is a size larger than the printer can feed, the decision is made based on the customer-selected setting for the current paper. If that decision results in COR, and quality mode is active (Q=2 or 3) due to a previous PPM control, normal portrait output is selected instead.
   b. If the presentation surface size is legal for current physical paper size of the source drawer, then the dimensions are compared. If the shorter dimension is specified as the depth, then landscape is used; otherwise, portrait is used.

If 0 is specified for either of the dimensions, that dimension will not be changed from its current setting.

This control implicitly deactivates the Auto New Line and Auto New Page functions.

Exceptions:

Class 1 An attempt was made to print off the right side of the presentation surface. When continuing, text generation continues. Indicator=U97

Class 2 Control not encountered on a page boundary. When continuing, the printer ejects the current page then executes the control. Indicator=U41

An attempt was made to print off the bottom side of the presentation surface. When continuing, an auto page end is done. Indicator=U98

Class 3 Invalid SPPS sequence- too few parameters Indicator=U83

Class 4 An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Invalid width Parameter (U74) or Depth Parameter (U75).

Set Horizontal Format (SHF)

0 1	2	3
X'2BC1'	length	MPP

Specifies the presentation surface width by specifying the number of characters per line in the *MPP* parameter.

The specification in characters is converted to a specification in inches, based on the current setting of the font width (the width of one character, see "Set FID Through GFID (SFG)" on page 218 and "Set Character Distance (SCD)" on page 219.

This control implicitly activates the Auto New Line function; that is, when the right margin is reached, a new line is automatically generated even if the New Line control is not present in the data stream. If the auto new line point is to the left of the current cursor position, the next character generated will cause a new line.

The *MPP* parameter is optional. If specified, it is a number of characters referenced to the left edge of the paper; it does not change the left margin. Valid values are 0 to 255. If omitted, or if its value is zero, the right margin is set to 13.2 in.

Each valid SHF control resets MPP to either the specified or default values.

If this control is encountered on a page boundary, it causes the page orientation to be recalculated according to the rules given in "Set Presentation Page Size (SPPS)" on page 211. Otherwise, it changes only the Auto New Line point (MPP).

Set Vertical Format (SVF)

0 1	2	3
X'2BC2'	length	MPL

Specifies the presentation surface depth by specifying the number of lines per page in the *MPL* parameter.

The specification in lines is converted to a specification in inches, based on the current setting of the lines per inch (see "Set Single Line Distance (SSLD)" on page 225).

This control implicitly activates the Auto Page End function; that is, when the bottom margin is reached, the page is automatically ejected even if the Page End control is not present in the data stream.

The *MPL* parameter is optional. If specified, valid values are 0 to 255. If omitted, or if its value is zero, the MPL is set to 66.

If received on a page boundary, this control causes the page orientation to be recalculated according to the rules given in "Set Presentation Page Size (SPPS)" on page 211.

Each valid SHF control resets MPL to either the specified or default values.

Form Feed/Page End (FF/PE)

0
X′0C′

Prints the current page in process.

Required Form Feed/Required Page End (RFF/RPE)

0
X′3A′

Prints the current page in process like a Form Feed, but in addition restores the indent level to the left margin.

Set Text Orientation (STO)

0 1	2	3	4 5	6 7
X′2BD3′	length	X′F6′	cccc	pppp

Sets the orientation of characters on a page. Its parameters are:

cccc Character rotation. Ignored by the printer; characters are always in the same orientation as the page.

pppp Page rotation.

- **X'0000'** Normal portrait (upright) orientation.
- **X'2D00'** Landscape left (270 degrees clockwise rotation of text).
- **X'5A00'** Portrait upside down (180 degrees clockwise rotation of text).
- **X'8700'** Landscape right (90 degrees clockwise rotation of text).
- **X'FFFE'** Select COR mode.
- **X'FFFF'** Default. This causes the orientation to be calculated based on the rules given in “Set Presentation Page Size (SPPS)” on page 211.
- **All others** Invalid

This control can occur anywhere on the page, any number of times on a page. If this control is encountered on a page boundary, it will move the print position to the new upper left hand corner. If it is encountered at any other time, it does not change the print position. All subsequent characters on the current page will be printed in the new orientation starting at the current print position. At the next page boundary, the last received STO remains in effect.

Note: When printing envelopes the page rotation is offset 90 degrees clockwise.

Exceptions:

Class 3 Invalid length parameter. When continuing, the printer ignores the control. Indicator=U08.

Class 4 Invalid pppp parameter. When continuing, the printer ignores the control. Indicator=U45.

Set Horizontal Margins (SHM)

0 1	2	3	4 5	6 7
X'2BD2'	length	X'11'	LM	RM

Sets the left margin (*LM*) and optionally the right margin (*RM*) in terms of 1440ths of an inch from the left edge of the paper. Valid values for LM and RM are 0 through 32767. If a value of 0 is specified for a margin, the margin remains unchanged. The specified margin setting is not verified against either the physical machine limit or defined page width.

In COR mode, the margin locations are scaled by a factor of (requested pitch/emulated pitch). See "Set Character Distance (SCD)" on page 219 for details on emulated pitch.

Exceptions:

Class 1 Auto New Line is inactive and an attempt is made to print outside the presentation surface. When continuing, the printer prints outside the presentation surface. Indicator=U97

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U47

Class 4 Invalid parameter. When continuing, the particular margin remains unchanged. Indicator=U76(LM invalid) or U77(RM invalid)

Set Vertical Margins (SVM)

0 1	2	3	4 5	6 7
X'2BD2'	length	X'49'	TM	BM

Sets the top margin (*TM*) and optionally the bottom margin (*BM*) in terms of 1440ths of an inch from the top edge of the paper. Valid values for TM and BM are 0 through 32767.

If a value of 0 is specified for a margin, the margin remains unchanged.

In COR mode, the margin locations are scaled appropriately.

Note: The printer follows the Final Form Text definition that the top margin line is the *baseline* of the first writing line. See "Set Vertical Format (SVF)" on page 213 for a discussion of this.

Exceptions:

Class 2 Control not encountered on a page boundary. When continuing the printer ejects to the next page and activates the new margins. Indicator=U46.

Class 4 Invalid parameter. When continuing, the particular margin remains unchanged. Indicator=U78(invalid TM) or U79(invalid BM)

Set Form Feed Control (SFFC)

0 1	2	3	4
X'2BD1'	X'03'	X'87'	nn

Specifies the number of form feeds to be issued before the page is printed. The default is x'01'. Valid range is x'00' (no change) to x'ff'.

Font Controls

The 5219 and similar products distinguish between the *code page*, the set of graphics mapped to EBCDIC codes X'40' through X'FF'; and the *character set*, the subset of the code page that fits on a particular print wheel or keyboard. The printer does not need to make that distinction and, therefore, ignores the character set specification; in theory, it will print all characters on the code page (in practice, not all characters have been digitized for all possible fonts and code pages).

Set CGCS Through Local ID (SCGL)

0 1	2	3	4
X'2BD1'	X'03'	X'81'	LCID

Specifies the code page through a "local ID." The printer supports the 5219's local IDs as shown in Table 194.

Table 194. 5219 Local IDs

Character Set Country Name	Code Page	LCID
Multinational	500	X'00'
USA/Canada	37	X'01'
Austria/Germany	273	X'02'
Belgium	274	X'03'
Brazil	275	X'04'
Canada/French	297	X'05'
Denmark/Norway	277	X'06'
Finland/Sweden	278	X'07'
France	297	X'08'
Italy	280	X'09'
Japan-English	281	X'0A'
Japan-Katakana (Mapped to Japan English)	281	X'0B'
Portugal	282	X'0C'
Spain	284	X'0D'
Spanish Speaking	284	X'0E'
United Kingdom	285	X'0F'
Switch-set Default		X'FF'

Exceptions:

Class 4 LCID parameter illegal. When continuing, the code page remains unchanged. Indicator=U63.

Missing LCID parameter. When continuing, the code page remains unchanged. Indicator=U64.

Set GCGID Through GCID (SCG)

0 1	2	3	4	5
X'2BD1'	X'06'	X'01'	GCGID	CPGID

Sets the code page. The parameters are:

GCGID Graphic Character Set Global ID. This parameter is ignored.

CPGID Code Page Global ID. This parameter selects the code page.

Supported code pages are:

Code Page	Character Set Country Name.
500	International Set 5
029	Obsolete (mapped to CP 871)
037	USA/Canada
038	Obsolete (mapped to CP 500)
256	International Set 1 (mapped to CP 500)
259	Symbols (limited support)
260	Canada/French (mapped to CP 297)
273	Austria/Germany
274	Belgium
275	Brazil
276	Canada/French (mapped to Cp 297)
277	Danish/Norwegian
278	Finnish/Swedish
279	(same as CP 297)
280	Italy
281	Japanese-English
282	Portuguese
283	Spain (mapped to CP 284)
284	Spanish Speaking
285	United Kingdom
290	Japanese_Katakana (mapped to CP 281)
297	French
340	OCR (mapped to 037)
871	Icelandic

Exceptions:

Class 4 Invalid code page. When continuing, the code page remains unchanged. Indicator=U48.

Set FID Through GFID (SFG)

0 1	2	3	4 5	6 7	8
X'2BD1'	X'07'	X'05'	GFID	FWD	FA

Selects the font. The parameters are:

GFID Global Font ID. If the GFID is not recognized, and is not in the range 154 through 200, the printer will automatically map to a font with a font width (FWD) that is closest (absolute) to the FWD specified in this command. The Courier fonts are used for such substitutions.

If the GFID is not recognized, and is in the range 154 through 200, 12-pitch Courier is used with PSM metrics for spacing.

The specified FWD is used even if the substituted font does not exactly match it. Typographic fonts are not used as substitutes for GFIDs below 400. For FGIDS of 400 and above, the "Compugraphics Times" typographic font is used if the ID is not recognized.

FWD Font Width. The width of the space character in the font, specified in 1440ths of an inch. This width is the "column width" for the Set Horizontal Format and Presentation Position controls. Zero is an invalid value.

If the font selected by the GFID was designed so that the space character had a different width than that specified, the difference will be added to or subtracted from the space allowed *every* character in the font. The difference will be rounded to the nearest value of 300th of an inch. It may not exceed 127/300ths.

FA Font Attribute.

X'01'	Mono-spaced font
X'02'	Proportional-spaced font
X'04'	Typographic font <point size=(FWD*3/20)>

If FA is omitted, the FA remains unchanged.

The printer does not recalculate the right margin because of a change in the font width.

This control is ignored in COR mode; however, when terminating COR mode, the printer remembers the GFID set by this command and restores that font.

Exceptions:

Class 2	Justify selected with a typographic font. When continuing, the printer ignores the justify mode. Indicator=U66.
Class 3	Length in < X'06'. Indicator=U61.
Class 4	An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U93.

Set Character Distance (SCD)

0 1	2	3	4 5
X'2BD2'	X'04'	X'29'	CD

Note: This control is also known as Set Print Density (SPD).

This is the SCS alternative method of selecting the fonts. The following values of *CD* are supported:

X'0000' Leave the font selection unchanged.

X'0005' Select 5 pitch Courier 5

X'000A' Select 10-pitch: Prints Courier 10.

X'000B' Select document proportionally spaced: Prints Courier 12

X'000C' Select 12-pitch: Prints Courier 12

X'000F' Select 15-pitch: Prints Courier 15.

X'00FF' Select default characters per inch from op panel.

All others Invalid

If CD is omitted, the pitch and font remain unchanged.

When terminating COR mode, the printer remembers the CD selected by this command and restores that font.

Exceptions:

Class 3 Incomplete parameter. When continuing, the font remains unchanged. Indicator=U51

Class 4 An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U50

Cursor Controls

The printer keeps track of the current print position, which it calls the *cursor* position. This position can be anywhere, even off of the physical sheet of paper, without raising an exception.

The printer keeps track of two left margins: a permanent one called the left margin and a temporary one called the *effective left margin* or *indent level* which may be set to the right of the permanent one to indent a block of text.

Presentation Position (PP)

0 1	2	3
X'34'	function	value

Moves the current cursor position based on the parameters:

function A byte with the following interpretation:

X'4C'	Relative move down
X'C0'	Absolute horizontal move
X'C4'	Absolute vertical move
X'C8'	Relative move to the right
All others	Invalid.

value Either the distance or the absolute coordinate, depending on whether the move is relative or absolute. In either case, the units of measure are unsigned and are columns (that is, font widths) for horizontal and lines for vertical. Valid values are 0 thru 255.

Absolute horizontal moves to the left of the current cursor position are allowed. If they are used, the cursor is offset two pels to produce **bold** printing if characters are overstruck.

Absolute vertical moves above the current cursor position cause the current page to be printed and the cursor to be positioned at that line on the next page. An absolute vertical move to line 1 guarantees that the printer is on a page boundary and will not cause a form feed of a blank sheet if the printer is already on line 1. Absolute vertical moves below the bottom margin trigger a new page. Absolute vertical moves are done relative to the top edge of the page and not the top margin.

Horizontal moves are considered tab-type controls during justification. Vertical moves end a justified field See “Justify Text Field (JTF)” on page 228 for more information.

Exceptions:

Class 4 Invalid function parameter. When continuing, the control is ignored. Indicator=U16.

Attempts to print off the physical page (as explained in “Page Presentation Media (PPM)” on page 209) generate a Class 1 exception. Moving the cursor using PP will not generate an exception.

Subscript (SBS)

0
X’38’

Moves the cursor down 1/2 line. The printer may process any number of SBS controls on a line, each one moving 1/2 line.

Superscript (SPS)

0
X’09’

Moves the cursor up 1/2 line. The printer may process any number of SPS controls on a line.

New Line (NL)

0
X'15'

Moves the cursor horizontally to the current effective left margin and down one line spacing increment.

Interchange Record Separator (IRS)

0
X'1E'

Processed as a New Line control.

Required New Line (RNL)

0
X'06'

Processed as a New Line, with the additional effect that it resets any indent level.

Index Return (IRT)

0
X'33'

Processed as a Required New Line.

Set Horizontal Tab Stops (STAB)

0 1	2	3	4	5 n
X'2BD2'	length	X'01'	FF	tab ...

Sets tab stops. The parameter *FF* is required and has the following meanings:

0 Floating. Tabs are specified in character positions and change anytime the font width changes.

1 Fixed. Tabs are specified in 1440ths of an inch.

All others Invalid

The remaining bytes specify the tab stops. Each tab stop is specified with three bytes as follows:

0	1 2
AL	TAB

Where:

AL Alignment. Ignored by the printer.

TAB Tab stop. The actual tab stop specified with two bytes.

The tab stops specified totally replace the current tab rack. It is permissible to have no tab stops. The tab stops may be specified in any order. Tab stops of zero are ignored, while a value of 1 sets a stop at the left margin. Values that exceed the maximum presentation position are permissible.

In COR mode, positions specified in inches are scaled appropriately.

A Set Horizontal Tabs control does not change the current indent position.

Exceptions:

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U52.

Class 3 Invalid Length. Processing is terminated. Indicator=U54.

Class 4 An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U53(invalid FF) or U90(invalid tab).

Horizontal Tab (HT)

0
X'05'

Moves the cursor to the right to the next tab stop.

Exceptions:

Class 2 No tab stop to the right of the current position. When continuing, the printer moves the cursor, but not the margin, right one space character. Indicator=U17.

Indent Tab (IT)

0
X'39'

Processed as a Horizontal Tab, with the additional function that the indent level (the effective left margin) is set one tab stop further to the right. Note that this tab stop may be *before* the tab stop arrived at by the control if normal Horizontal Tabs have been executed on the line.

Exceptions:

Class 2 No tab stop to the right of the current position. When continuing, the printer moves right one space character. Indicator=U18.

Set Indent Level (SIL)

0 1	2	3	4

X'2BD2'	X'03'	X'07'	IL

Sets the indent level to tab stop #*IL*. If *IL=0*, the indent level is set to the left margin.

Exceptions:

Class 2 Undefined tab stop. When continuing, the printer leaves the indent level unchanged. Indicator=U56.

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U80.

Line Feed/Index (LF/INX)

0
X'25'

Moves the vertical position down one line increment. The horizontal position remains unchanged.

Carriage Return/Zero Index Carriage Return (CR/ZICR)

0
X'0D'

With BAC=On (Bolding Algorithm Control), returns the cursor to a position two pels to the right of the effective left margin. This emulates using the ZICR for multiple strikes of the same character for emphasis. Multiple ZICRs on a single line have no additional effect.

With BAC=Off, move cursor to the left margin.

ZICR changes the Auto New Line point by one pel; if 85 characters per line are allowed, the printer will attempt to place up to 85 characters on a line following the ZICR. Since there is one less pel to place these characters in, it is possible for the last character to be off the page to the right.

The vertical position is unchanged by this control.

Space (SP)

0
X'40'

Causes the cursor to move right by an amount that is either the font width (in non-justified mode) or an appropriate amount to cause the right margin to be justified.

Required Space (RSP)

0
X'41'

Processed as a graphic that happens to be blank in all IBM-supplied fonts.

Numeric Space (NSP)

0
X'E1'

Processed as a graphic that happens to be blank in all IBM-supplied fonts.

Backspace (BS)

0
X'16'

Causes the cursor to move to the left one font width. If BAC=On, cursor is offset two pels to produce bold printing. The printer ignores the left margin when processing this control.

Exceptions:

Class 2 An attempt is being made to backspace off the left edge of the presentation surface. When continuing, printing begins at the left edge of the presentation surface. Indicator=U96.

Unit Backspace (UBS)

0
X'1A'

Moves the cursor 1/60th of an inch to the left for proportionally spaced fonts. If BAC=On, the cursor is also offset two pels to produce bold printing. For fixed-pitch fonts, this control is ignored.

Exceptions:

Class 2 An attempt is being made to backspace off the left edge of the presentation surface. When continuing, printing begins at the left edge of the presentation surface. Indicator=U96.

Numeric Backspace (NBS)

0
X'36'

Is identical to backspace.

Exceptions:

Class 2 An attempt is being made to backspace off the left edge of the presentation surface. When continuing, printing begins at the left edge of the presentation surface. Indicator=U96.

Release Left Margin (RLM)

0 1	2	3
X'2BD2'	X'02'	X'0B'

This control releases the left margin for other printers, but ignored because the 3112/3116 allows backspacing to the left of the left margin. Only used in combination with NL and IRS to determine end of paragraph while justifying.

Set Line Density (SLD)

0 1	2	3
X'2BC6'	length	LD

Sets the vertical distance occupied by one line to *LD*/72nds of an inch. All values of LD from 0–255 are valid. (0 means set to 12/72.)

The default is LD=12 (6 LPI)

This control causes recalculation of the bottom margin.

In COR mode, 70% of LD is used. When terminating COR mode, the printer remembers the LD value specified.

If this control is encountered on a page boundary, and auto page end is active, it causes the page orientation to be recalculated according to the rules given in "Set Presentation Page Size (SPPS)" on page 211.

Exceptions:

Class 3 Invalid length parameter LD parameter was omitted. When continuing, LD value is unchanged. Indicator=U87.

Set Single Line Distance (SSLD)

0 1	2	3	4 5
X'2BD2'	X'04'	X'15'	distance

Sets the vertical distance occupied by one line to *distance*/1440ths of an inch. Values of *distance* from 1 to +32767 are valid.

The default is 240 (6 LPI).

In COR mode, 70% of the distance is used. When terminating COR mode, the printer remembers the distance value. in "Set Presentation Page Size (SPPS)" on page 211.

If SSLD is not received on a line boundary, it forces a next new line.

Exceptions:

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U81.

Class 3 Too short SSLD sequence. When continuing, the printer ignores the control. Indicator=U86.

Class 4 Invalid *distance* parameter. When continuing, the line distance remains unchanged. Indicator=U85.

Set Line Spacing (SLS)

0 1	2	3	4
X'2BD2'	X'03'	X'09'	LS

Sets the number of lines spaced by a new line control to be *LS*/2 lines. The power-on default is *LS*=2 (that is, one line). All values of *LS* are valid, from 0-255.

Exceptions:

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U82.

Generation Controls

Generation controls establish emphasis and substitution, such as underscoring and justification of text.

Bolding Algorithm Control (BAC)

Bolding On

0 1	2	3	4
X'2BD1'	X'03'	X'8B'	X'00'

Bolding Off

0 1	2	3	4
X'2BD1'	X'03'	X'8B'	X'01'

With Bolding On, a backspace or absolute move to the same line causes the data that follows on that line to be offset two pels to the right. This technique produces bold text. With Bolding Off, no data offset occurs.

Bolding On is the printer default. Bolding On/Off remains On or Off until you switch the printer off or until the printer receives the next BAC control command.

Word Underscore (WUS)

0
X'23'

Causes the entire word immediately preceding the control to be underscored. The beginning of the word is marked by one of the following controls: BS, NBS, NL, IRS, HT, LF, IT, JTF, FF, RNL, IRT, RFF, SP, NSP, UBS, WUS, CR, US, and PP.

Note: If you use this control with typographic fonts, the results are unpredictable.

Underscore (US)

0
X'6D'

Processed as a graphic character with the addition that it marks the beginning of a word for Word Underscore.

Substitute (SUB)

0
X'3F'

Processed as a graphic character. The Graphic Exception character is always printed in its place.

Eight Ones (EO)

0
X'FF'

Processed as a graphic character. It is not populated in IBM-supplied fonts; so, in those fonts, the Graphic Exception character is printed in its place.

Required Hyphen (HYP)

0
X'60'

Processed as a printable graphic.

Syllable Hyphen (SHY)

0
X'CA'

Processed as a printable graphic. On IBM-supplied fonts, it looks identical to the Required Hyphen.

Set Graphic Error Action (SGEA)

0 1	2	3	4

X'2BC8'	length	DG	UCO

The parameters have the following meanings:

DG Default Graphic. Must be in the range X'40' through X'FF'. The graphic printed if the actual graphic for the character is not supported. At power-on, the hyphen character is the default graphic.

UCO Unprintable Character Option. The printer ignores this option.

If the Default Graphic selected is not a printable character (in the font active at the time it is needed), the printer prints the hyphen.

Exceptions:

Class 4 Invalid *DG* parameter. When continuing, the value for DG is unchanged. Indicator=U15.

Justify Text Field (JTF)

0 1	2	3	4 5	6
X'2BD2'	length	X'03'	RE	PR

Causes the following text to be justified. The text is ended by one of the following controls: CR, NL, RNL, IRT, IRS, FF, RFF, a vertical PP, a succeeding JTF, an auto-new-line, or any exception causing a line end. Tab controls and line feed are not delimiters for JTF. All text to the left of the last tab control, LF, and PP control in the text field is not justified.

The parameters are as follows:

RE Right Edge. x'01' to x'7FFF' specifies the horizontal position which will be the right edge of the justified field. This position is specified in 1440ths of an inch from the left edge of the page. The left edge of the field is the current cursor position. In COR mode, the right edge position is scaled appropriately.

A value of X'00' means terminate justification.

PR Percent Rule. May be omitted. You can specify 0, 50, or 100 percent (default) justification.

If a tab-type control (HT, IT, PP horizontal) occurs in text to be justified, it defines the new left edge of the justified field; that is, any text to the left of the tab is not justified.

Exceptions:

Class 2 Justify selected with a typographic font. When continuing, the printer ignores the justify mode. Indicator=U68.

JTF occurred while SJM was active. When continuing, the printer ignores the JTF. Indicator=U68.

Class 3 Too short JTF sequence. When continuing, the printer ignores the JTF. Indicator=U23.

Class 4 Illegal parameter. When continuing, the printer ignores the JTF. Indicator=U91.

Set Justify Mode (SJM)

0 1	2	3	4	5
X'2BD2'	length	X'0D'	ST	PR

Sets justify mode on or off. The parameters of this control have the following meanings:

ST State. Has the following values:

- **0** Deactivate. Terminate justification.
- **1** Activate. Begin justification.
- **All others** Invalid

PR Percent Rule. May be omitted. You can specify 0, 50, or 100 percent (default) justification.

This control causes each line of text to be justified between the left and right margins. This is done by adding space to any space characters in the line until the right margin is flush.

If a tab-type control (HT, IT, PP horizontal) or leading space(s) occurs in a line to be justified, it defines the new left edge of the justified field.

A line will not be justified to the right edge if it is the end of a paragraph. A paragraph end is determined by the following controls:

- RNL, IRT, RFF, vertical PP; or
- NL or IRS followed by (that is, no intervening graphics but possibly intervening controls) any of the following: NL, IRS, LF, HT, IT, SP, NSP, RSP, BS, NBS, UBS, CR, RNL, RFF, or RLM.

Exceptions:

Class 2 Control not encountered on a line boundary. When continuing, the printer forces a new line then executes the control. Indicator=U14.

SJM occurred while JTF was active or justify was used in combination with a typographic font. When continuing, the printer ignores the SJM. Indicator=U92.

Class 3 Too short SJM sequence. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U24.

Class 4 An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U09.

Begin Underscore (BUS)

0 1	2	3	4	5
X'2BD4'	length	X'0A'	MODE	BYPASS

Begins underscoring. Underscoring is terminated only by the EUS and SIC controls. The parameters have the following meanings:

MODE Ignored by the printer.

BYPASS Controls whether white space caused by space characters, tabs, and the Page Position control is to be underscored or not:

X'00' or X'01' Underscore all white space. This is different from the 5219, which would not underscore space due to tabs when a X'00' is specified here.

X'80' Do not underscore white space.

All others Invalid

The BYPASS parameter is optional; the default is X'00'.

Word Underscore controls are ignored if Begin Underscore is active.

Note: If you use this control with typographic fonts, the results are unpredictable.

Exceptions:

Class 1 Underscore already active. When continuing, the printer ignores the new control. Indicator=U02.

Class 4 An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U01.

End Underscore (EUS)

0 1	2	3
X'2BD4'	X'02'	X'0E'

Ends underscore.

Exceptions:

Class 1 Begin Underscore was not active. When continuing, the printer ignores the End Underscore. Indicator=U03.

Begin Overstrike (BOS)

0 1	2	3	4	5	6 7	8 9
X'2BD4'	length	X'72'	CHAR	BYPASS	GCSGID	CPGID

Controls text overstriking. Overstriking is terminated by either an EOS of SIC command. The parameters have the following meanings:

CHAR The graphic which will be used for the overstrike. Must be in the range X'40' through X'FF'.

BYPASS Controls whether white space caused by space characters, tabs, and the Page Position (absolute or relative horizontal) control is to be overstruck or not:

X'00' or X'01' Overstrike all white space except space due to HT,

IT, or absolute horizontal PP controls. This is the default and is different from the 5219, which would overstrike white space due to tabs in the default.

X'80' Do not overstrike white space.

All others Invalid

The BYPASS parameter is optional; the default is X'00'.

GCSGID Graphic Character Set Global ID. Ignored. May be omitted.

CPGID Cope Page Global ID. Ignored. May be omitted.

CHAR is taken from the font active at the time the overstruck field is terminated and applied to the whole field. Fields may be terminated by space, horizontal tab, Page Position, carriage return, any vertical motion, and, of course, the EOS control. Thus, there may be several fields between one BOS, EOS pair, and each field may be overstruck with CHAR from a different font. Changes in code page, however, will not change the overstrike character.

Each character in the overstruck field is overstruck once. If the font is proportional, the centerline of the overstruck character may not exactly align with the centerline of the overstriking character.

Note: If you use this control with typographic fonts, the results are unpredictable.

Exceptions:

Class 1 Overstrike already active. When continuing, the printer ignores the new control. Indicator=U05.

Class 3 Too few parameters When continuing, the printer ignores the new control. Indicator=U11.

Class 4 An invalid parameter value was encountered. When continuing, the printer ignores the parameter (does not change the current setting). Indicator=U04(BYPASS parameter) or U84(CHAR parameter)

End Overstrike (EOS)

0 1	2	3
X'2BD4'	X'02'	X'76'

Causes the printer to cease overstriking.

Note: If you use this control with typographic fonts, the results are unpredictable.

Exceptions:

Class 1 Begin Overstrike was not active. When continuing, the printer ignores the End Overstrike. Indicator=U06.

Begin Emphasis (BES)

0 1	2	3	4
X'2BD1'	length	X'8A'	CA

Begins emphasizing text. The printer prints emphasized characters by overlaying them with the same pel pattern displaced by two pels horizontally. The recommended emphasis technique on the printer is for the user to switch to a **bold** font.

The parameter *CA* is ignored.

Exceptions:

Class 1 Emphasis already active. When continuing, the printer ignores the new control. Indicator=U57.

End Emphasis (EES)

0 1	2	3	4
X'2BD1'	length	X'8E'	reserved

Ends emphasizing text.

Exceptions:

Class 1 Begin Emphasis was not active. When continuing, the printer ignores the End Emphasis. Indicator=U58.

Execute PMP (EPMP)

0 1	2	3 n
X'2BCA'	length	PMP commands

The printer ignores this control.

List of Controls by Hex Code

Hex Code	Command
00	"Null (NUL)" on page 207
03	"ASCII Transparency (ATRN)" on page 208
05	"Horizontal Tab (HT)" on page 222
06	"Required New Line (RNL)" on page 221
09	"Superscript (SPS)" on page 220
0A	"Repeat (RPT)" on page 208
0C	"Form Feed/Page End (FF/PE)" on page 214
0D	"Carriage Return/Zero Index Carriage Return (CR/ZICR)" on page 223
15	"New Line (NL)" on page 221
16	"Backspace (BS)" on page 224
1A	"Unit Backspace (UBS)" on page 224
1E	"Interchange Record Separator (IRS)" on page 221

Hex Code	Command
23	“Word Underscore (WUS)” on page 226
25	“Line Feed/Index (LF/INX)” on page 223
2A	“Switch (SW)” on page 208
2BC1xxxx	“Set Horizontal Format (SHF)” on page 213
2BC2xxxx	“Set Vertical Format (SVF)” on page 213
2BC6xxxx	“Set Line Density (SLD)” on page 225
2BC8xxxxxx	“Set Graphic Error Action (SGEA)” on page 227
2BCAxxxx...	“Execute PMP (EPMP)” on page 232
2BD1xx01xxxxxxxx	“Set GCGID Through GCID (SCG)” on page 217
2BD1xx05xxxxxxxxxx	“Set FID Through GFID (SFG)” on page 218
2BD1xx81xx	“Set CGCS Through Local ID (SCGL)” on page 216
2BD1xx87xx	“Set Form Feed Control (SFFC)” on page 216
2BD1xx8A	“Begin Emphasis (BES)” on page 231
2BD1xx8B00	“Bolding Algorithm Control (BAC)” on page 226, Bolding On
2BD1xx8B01	“Bolding Algorithm Control (BAC)” on page 226, Bolding Off
2BD1xx8E	“End Emphasis (EES)” on page 232
2BD2xx01FFxx...	“Set Horizontal Tab Stops (STAB)” on page 221
2BD2xx03xxxxxx	“Justify Text Field (JTF)” on page 228
2BD2xx07xx	“Set Indent Level (SIL)” on page 222
2BD2xx09xx	“Set Line Spacing (SLS)” on page 226
2BD2xx0B	“Release Left Margin (RLM)” on page 225
2BD2xx0Dxxxx	“Set Justify Mode (SJM)” on page 229
2BD2xx11xxxxxxxx	“Set Horizontal Margins (SHM)” on page 215
2BD2xx15xxxx	“Set Single Line Distance (SSLD)” on page 225
2BD2xx29xxxx	“Set Character Distance (SCD)” on page 219
2BD2xx40xxxxxxxx	“Set Presentation Page Size (SPPS)” on page 211
2BD2xx45xx	“Set Initial Conditions (SIC)” on page 203
2BD2xx48xx...	“Page Presentation Media (PPM)” on page 209
2BD2xx49xxxxxxxx	“Set Vertical Margins (SVM)” on page 215
2BD2xx4Cxx...	“Set Print Setup (SPSU)” on page 208
2BD2xx85xx...	“Set Exception Action (SEA)” on page 203
2BD3xxF6xxxxxxxx	“Set Text Orientation (STO)” on page 214
2BD4xx0Axxxx	“Begin Underscore (BUS)” on page 229
2BD4xx0E	“End Underscore (EUS)” on page 230
2BD4xx72xx	“Begin Overstrike (BOS)” on page 230
2BD4xx76	“End Overstrike (EOS)” on page 231
2F	“Bell/Stop (BEL/STP)” on page 208
33	“Index Return (IRT)” on page 221
34xxxx	“Presentation Position (PP)” on page 219
36	“Numeric Backspace (NBS)” on page 224
38	“Subscript (SBS)” on page 220

Hex Code	Command
39	“Indent Tab (IT)” on page 222
3A	“Required Form Feed/Required Page End (RFF/RPE)” on page 214
3F	“Substitute (SUB)” on page 227
40	“Space (SP)” on page 223
41	“Required Space (RSP)” on page 224
60	“Required Hyphen (HYP)” on page 227
6D	“Underscore (US)” on page 227
CA	“Syllable Hyphen (SHY)” on page 227
E1	“Numeric Space (NSP)” on page 224
FF	“Eight Ones (EO)” on page 227

List of Controls Alphabetically

Command	Hex Code
“ASCII Transparency (ATRN)” on page 208	03
“Backspace (BS)” on page 224	16
“Begin Emphasis (BES)” on page 231	2BD1xx8A
“Begin Overstrike (BOS)” on page 230	2BD4ss72xx
“Begin Underscore (BUS)” on page 229	2BD4xx0Axxxx
“Bell/Stop (BEL/STP)” on page 208	2F
“Bolding Algorithm Control (BAC)” on page 226, Bolding Off	2BD1xx8B01
“Bolding Algorithm Control (BAC)” on page 226, Bolding On	2BD1xx8B00
“Carriage Return/Zero Index Carriage Return (CR/ZICR)” on page 223	0D
“Eight Ones (EO)” on page 227	FF
“End Emphasis (EES)” on page 232	2BD1xx8E
“End Overstrike (EOS)” on page 231	2BD4xx76
“End Underscore (EUS)” on page 230	2BD4xx0E
“Execute PMP (EPMP)” on page 232	2BCAxxxx...
“Form Feed/Page End (FF/PE)” on page 214	0C
“Horizontal Tab (HT)” on page 222	05
“Indent Tab (IT)” on page 222	39
“Index Return (IRT)” on page 221	33
“Interchange Record Separator (IRS)” on page 221	1E
“Justify Text Field (JTF)” on page 228	2BD2xx03xxxxxx
“Line Feed/Index (LF/INX)” on page 223	25
“New Line (NL)” on page 221	15
“Null (NUL)” on page 207	00
“Numeric Backspace (NBS)” on page 224	36
“Numeric Space (NSP)” on page 224	E1

Command	Hex Code
“Page Presentation Media (PPM)” on page 209	2BD2xx48...
“Presentation Position (PP)” on page 219	34xxxx
“Release Left Margin (RLM)” on page 225	2BD2xx0B
“Repeat (RPT)” on page 208	0A
“Required Form Feed/Required Page End (RFF/RPE)” on page 214	3A
“Required Hyphen (HYP)” on page 227	60
“Required New Line (RNL)” on page 221	06
“Required Space (RSP)” on page 224	41
“Set CGCS Through Local ID (SCGL)” on page 216	2BD1xx81xx
“Set Character Distance (SCD)” on page 219	2BD2xx29xxxx
“Set Exception Action (SEA)” on page 203	2BD2xx85xx...
“Set FID Through GFID (SFG)” on page 218	2BD1xx05xx...
“Set Form Feed Control (SFFC)” on page 216	2BD1xx87xx
“Set GCGID Through GCID (SCG)” on page 217	2BD1xx01xxxxxxxx
“Set Graphic Error Action (SGEA)” on page 227	2BC8xxxxxx
“Set Horizontal Format (SHF)” on page 213	2BC1xxxx
“Set Horizontal Margins (SHM)” on page 215	2BD2xx11xxxxxxxx
“Set Horizontal Tab Stops (STAB)” on page 221	2BD2xx01xx...
“Set Indent Level (SIL)” on page 222	2BD2xx07xx
“Set Initial Conditions (SIC)” on page 203	2BD2xx45xx
“Set Justify Mode (SJM)” on page 229	2BD2xx0Dxxxx
“Set Line Density (SLD)” on page 225	2BC6xxxx
“Set Line Spacing (SLS)” on page 226	2BD2xx09xx
“Set Presentation Page Size (SPPS)” on page 211	2BD2xx40xxxxxxxx
“Set Print Setup (SPSU)” on page 208	2BD2xx4Cxx...
“Set Single Line Distance (SSLD)” on page 225	2BD2ss15xxxx
“Set Text Orientation (STO)” on page 214	2BD3xxF6xxxxxxxx
“Set Vertical Format (SVF)” on page 213	2BC2xxxx
“Set Vertical Margins (SVM)” on page 215	2BD2xx49xxxxxxxx
“Space (SP)” on page 223	40
“Subscript (SBS)” on page 220	38
“Substitute (SUB)” on page 227	3F
“Superscript (SPS)” on page 220	09
“Switch (SW)” on page 208	2A
“Syllable Hyphen (SHY)” on page 227	CA
“Underscore (US)” on page 227	6D
“Unit Backspace (UBS)” on page 224	1A
“Word Underscore (WUS)” on page 226	23

Determining Page Orientation

When operating in non-IPDS emulation mode, the printer uses a combination of commands in the printer data stream and the settings of its configuration switches to determine page orientation. The flowcharts in this section explain how the printer accomplishes this task.

The printer uses the following rules to govern page orientation:

Note: The paragraph numbers correspond to the numbers found in the flowcharts on the following pages.

1 If a Set Text Orientation (STO) command is in the data stream and is not set to 'default', the printer bases page orientation on the STO command parameter. It does not use any other parameters to determine rotation.

2 If there is no STO command or the STO command is set to 'default', and you set the Automatic Print Orientation to **Disable**, the printer uses the Orientation setting. Orientation is set on the **Coax Setup Menu** for each paper source. If you set Orientation to COR, you can override COR by setting the print quality parameters in the Page Presentation Media command (see "Page Presentation Media (PPM)" on page 209).

3 If there is no STO command and you set the Automatic Print Orientation to **Enable**, the printer looks at the parameters of the print image defined in the data stream and calculates the page size in inches.

Calculations are based on the following equations:

```
                          Characters per line (MPP)
Physical Page Width  = ----------------------------
(in inches)                      Font pitch
                        (characters per inch, CPI)

                          Lines per page (MPL)
Physical Page Length  =  --------------------
(in inches)               Lines per inch (LPI)

For example, if:
                          Characters per line = 132
                          Font = Courier 10 (10 pitch)
                          Lines per page = 66
                          Lines per inch = 6

The printer calculates a 335.3 x 279 mm (13.2 x 11 in.) page size.
```

4 The printer defines a valid page size as any page with dimensions equal to or less than the physical size of the media in the source tray.

5 If the page size is valid, the printer bases the orientation on the actual dimensions. The printer prints landscape if the length is less than the width; otherwise, it prints portrait.

6 If the page size is not valid, Orientation setting defines page orientation.

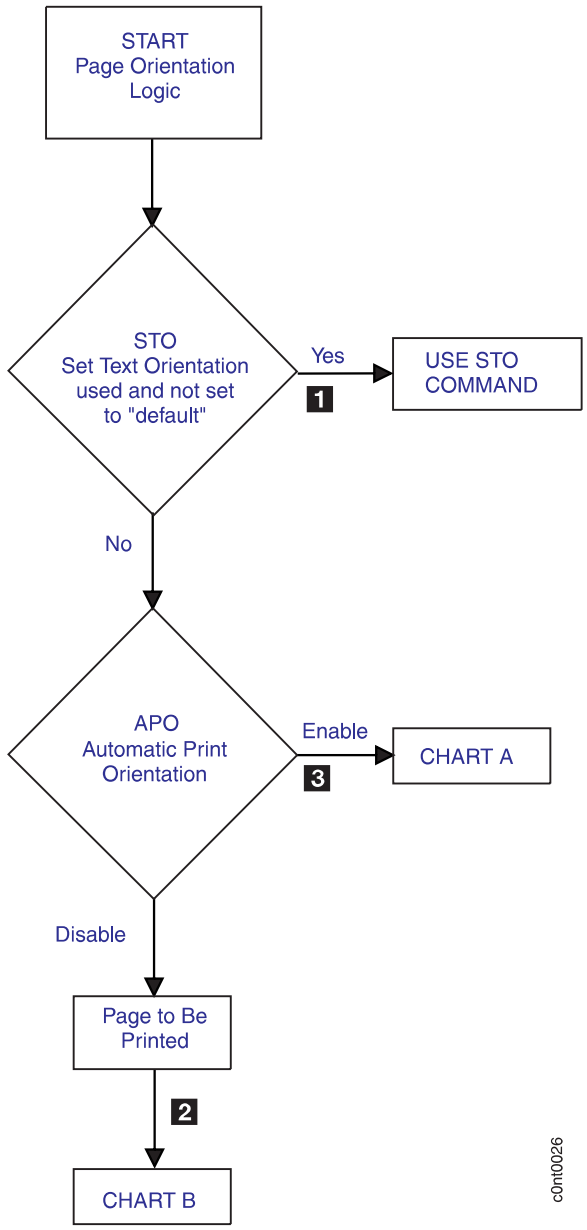
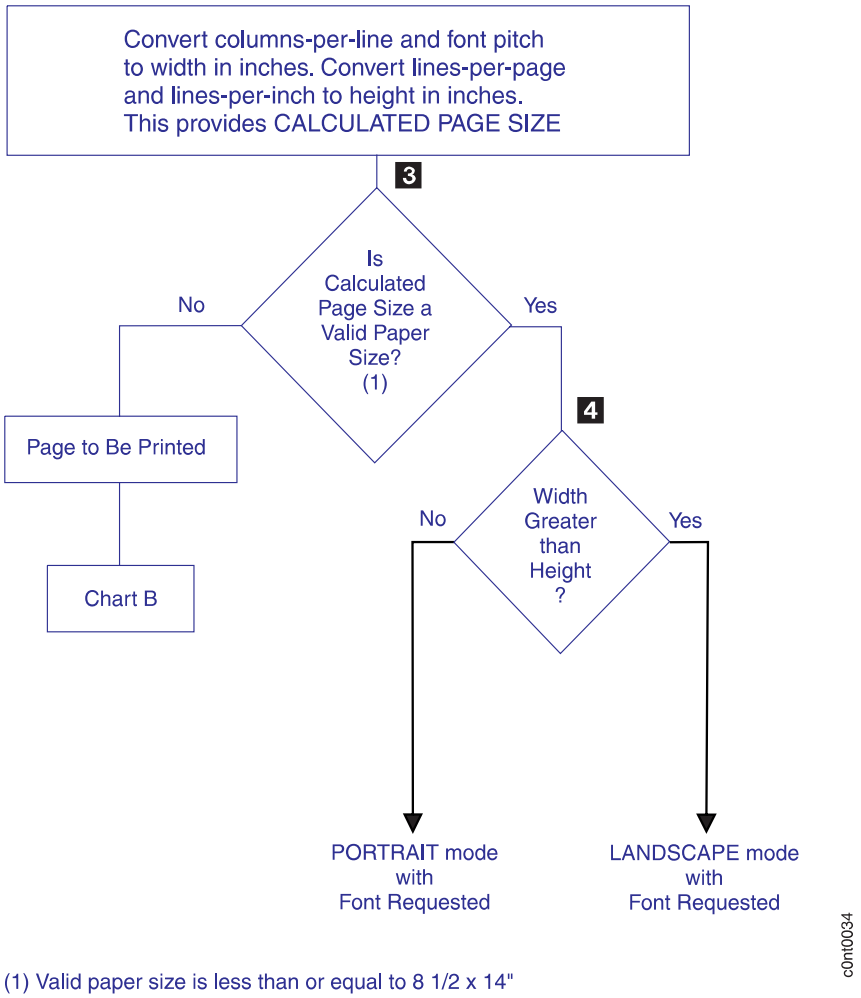


Figure 10. Page Orientation Logic (Start)

The keys (1 2 and so on) refer to paragraph numbers earlier in this section.

CHART A



(1) Valid paper size is less than or equal to 8 1/2 x 14"

Figure 11. Page Orientation Logic (Chart A)

The keys (3 6 and so on) refer to paragraph numbers earlier in this section.

CHART B

2

Table 195. Page Orientation Logic (Chart B)

When Orientation Is One of The Following,			
Portrait	**Compressed Portrait**	**Landscape**	**Computer Output Reduction (COR) [Landscape Mode Reduced]**
Prints with font requested.	Prints with font requested, with spaces between characters reduced to compensate for unprintable left and right borders.	Prints with font requested.	Prints with vertical spacing 70 percent of normal plus: 0.5-in margins 10-pitch fonts to 13-pitch 12-pitch fonts to 15-pitch 15-pitch fonts to 20-pitch

Figure 12. Page Orientation Logic (Chart B)

The key **2** refers to paragraph **2** earlier in this section.

Chapter 17. Format-Control Parameters—DSC/DSE and LU-1 (SCS) Modes

This chapter explains format-control parameters in non-IPDS mode. The non-IPDS modes are: Data Stream Compatible (DSC), Data Stream Emulation (DSE), and Logical Unit-1 (LU-1) SNA Character String (SCS).

Page Control

The printer controls page size by using format-control parameters to specify printing requirements. A line counter exists within the printer for both DSC/DSE and LU-1 (SCS) modes. The counter tracks the current print line.

When the printer is turned on, the line counter is set to 1. The counter then increases by one as each line is sent to the printer. The counter resets to 1 when:

- The printer receives a data-stream-generated form feed.
- The data stream changes the Maximum Page Length (MPL) or the Top Margin (TM).

For all lines to fit on a page, the print area must be greater than or equal to the maximum page length (MPL) minus the Top Margin (TM) divided by lines per inch (LPI).

The printer configuration settings initially control line density and spacing, but a Set Line Density (SLD) command in LU-1 (SCS) mode can change these values. (Programming in DSC/DSE mode cannot change these values.) If the mode changes, the printer uses the new mode's format control parameters.

Figure 13 on page 242 shows the Maximum Print Position and the Maximum Page Length for a page.

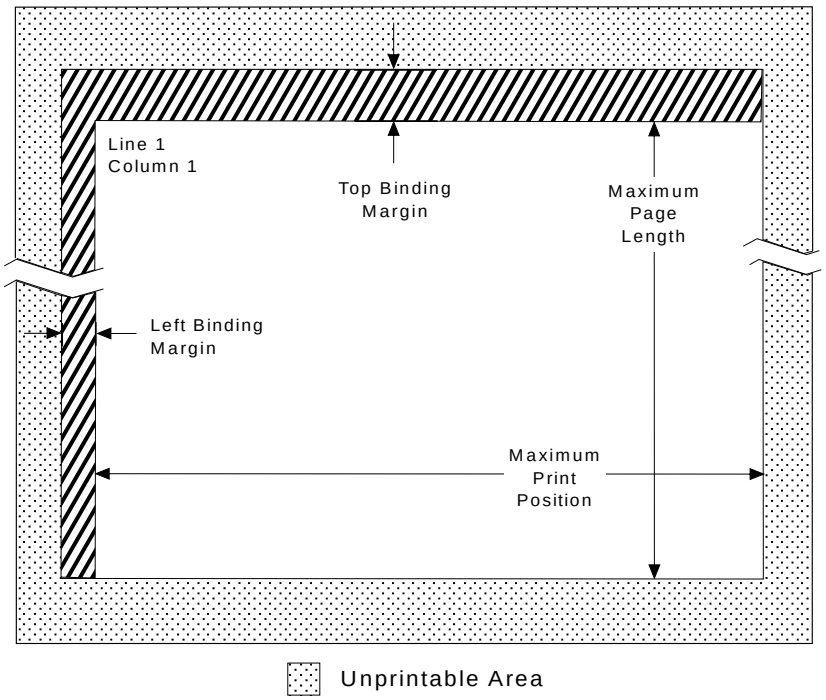


Figure 13. Page Control Using Format-Control Parameters

Format-Control Parameters

When the printer is turned on, the configuration settings determine the format-control parameters.

To prevent unexpected output formats caused by changes made in the configuration settings by previous jobs, the application program must initialize the printer format-control parameters.

Notes:

1. In LU-1 (SCS) mode, programming can override printer format-control parameters with control commands.
2. In DSC/DSE mode, programming can override only the Maximum Print Position (MPP) parameter.

The following information describes each format-control parameter for the printer.

Bottom Margin (BM)

The Bottom Margin defines the last printable line of a page and is measured in the number of lines away from the top of the printable area. When the current line is more than the BM, the print position moves to the bottom of the top margin of the next page.

When the printer is turned on, the BM defaults to the MPL configuration setting (see "Maximum Page Length (MPL)" on page 244). If MPL changes, BM also changes.

- *In DSC/DSE print mode*, BM is not applicable.
- *In LU-1 (SCS) print mode*, the SVF control code can change BM.

Characters Per Inch (CPI)

Characters per Inch, or print density, sets the number of horizontal characters per inch. When the printer is turned on, CPI defaults to the configuration setting. The CPI configuration setting is set in one of the screens of the **Coax Setup Menu** of the printer operator panel. Do the following to get to the **Coax Setup Menu**:

1. Select **Network Setup**.
2. Select **Coax Setup Menu**.
3. Select **MORE** until you see **CPI**.

Refer to *READ THIS FIRST*, G544-5265, for menu details.

- The configuration setting determines the power-on default for CPI.
- *In DSC/DSE print mode*, the printer uses the CPI configuration setting value; the system cannot change CPI.
- *In LU-1 (SCS) print mode*, the printer uses the CPI configuration setting value unless the Set Print Density control code specifies CPI.

Horizontal Tab Stops (HTS)

When the printer is turned on, the horizontal tab stops set column values for the Horizontal Tab (HT) function.

- *In DSC/DSE print mode*, horizontal tab stops are not applicable.
- *In LU-1 (SCS) print mode*, an SHF control code can change horizontal tab stop values.
- *For the power-on default*, the printer sets horizontal tab stops for all print positions.

Left Binding Margin (LBM)

The Left Binding Margin determines the position of column 1 relative to the left edge of the printable area when printing in portrait or landscape orientation. LBM is measured in tenths of an inch.

Notes

1. The Left Margin parameter of the Set Horizontal Format command is added to the LBM to determine the left-most print position.
2. The LBM cannot be changed by the data stream.
3. The power-on default for LBM is determined by this Left Binding Margin control on the operator panel.
4. The LBM is ignored in Computer Output Reduction mode and the printable area begins 1.27 mm (0.5 in) from the left edge of the paper.

Left Margin (LM)

The Left Margin is the left-most print position and is measured in column positions from the Left Binding Margin When the printer is first turned on, LM defaults to 1.

- *In DSC/DSE print mode*, LM is always 1.
- *In LU-1 (SCS) print mode*, LM is 1 unless it is changed by an SHF control code.

Line Spacing (LS)

The Line Spacing parameter permits selection of single-line or double-line spacing. When the printer is turned on, line spacing defaults to the configuration setting. The line spacing configuration setting is set in one of the screens of the **Coax Setup Menu** of the printer operator panel.

To generate double spacing, the printer inserts a blank line after every print line. If the last line prints at one line before the bottom margin, a blank line is inserted at the bottom margin, a form feed occurs, and the next line prints at the first line of the next page. If the last line prints at the bottom margin, a form feed occurs and the next line still prints at the first line of the next page.

- The configuration setting determines the power-on default for line spacing.
- *In DSC/DSE print mode*, the printer uses the line spacing configuration setting value; the system cannot change line spacing.
- *In LU-1 (SCS) print mode*, the printer uses the line spacing configuration setting unless the SLD control code specifies lines per inch.

Lines Per Inch (LPI)

Lines per Inch, or vertical line density, determines the distance (in lines per inch) to be moved for single-line vertical spacing. When the printer is turned on, LPI defaults to configuration setting. The LPI configuration setting is set in one of the screens of the **Coax Setup Menu** of the printer operator panel and can be changed from the panel.

- The configuration setting determines *power-on default* for the LPI.
- *In DSC/DSE print mode*, the printer uses the LPI configuration setting value; the system cannot change LPI.
- *In LU-1 (SCS) print mode*, the Set Line Density (SLD) control code can change LPI.

Maximum Page Length (MPL)

Maximum Page Length is the number of lines from the first print line of one page to the first print line of the next page. The MPL configuration setting is set in one of the screens of the **Coax Setup Menu** of the printer operator panel.

Note: The MPL cannot be more than 255 lines, and MPL should not be more than the Physical Maximum Page Length (PMPL).

- The configuration setting determines *the power-on default* for MPL.
- *In DSC/DSE print mode*, the printer uses the MPL configuration setting value; the system cannot change MPL.
- *In LU-1 (SCS) print mode*, the SVF control code changes the MPL value. If the printer does not receive an SVF control code with an MPL value, the printer uses the MPL configuration setting value.
- Subtract the unprintable border (top and bottom) and Top Binding Margin from the length when calculating PMPL.

Maximum Print Position (MPP) - Print Output Format

The Maximum Print Position value is the right-most print position. When the printer is turned on, it uses the configuration setting to determine MPP. The MPP configuration setting is set in one of the screens of the **Coax Setup Menu** of the printer operator panel.

Note: The MPP cannot exceed the Physical Maximum Print Position (PMPP). See "Physical Maximum Print Position (PMPP)" on page 245.

Consider the following when changing MPP:

- The MPP configuration setting determines *the power-on default* for MPP.

- *In DSC/DSE print mode*, the MPP parameter set by the print order determines MPP. If this MPP parameter is 0, the printer uses the MPP configuration setting. MPP can be overridden using the Write Control Character (WCC), which fixes the MPP at either 40, 64, or 80.
- *In LU-1 (SCS) print mode*, the printer uses the MPP configuration setting unless an MPP value is set by a Set Horizontal Format (SHF) sequence from the host.
- When calculating PMPP, subtract the left binding margin (LBM) and the unprintable border (left and right) from the width.
- Consider *Pitch* when determining MPP.

Monocase or Dualcase

When the printer is turned on, monocase or dualcase (uppercase or mixed case) defaults to the configuration setting. The monocase or dualcase configuration setting is set in one of the screens of the **Coax Setup Menu** of the printer operator panel.

- The configuration setting determines the power-on default for monocase/dualcase.
- *In DSC/DSE print mode*, the printer uses the monocase/dualcase configuration setting unless it is overridden by the configuration.
- *In LU-1 (SCS) print mode*, dualcase is always used.

Physical Maximum Page Length (PMPL)

The Physical Maximum Page Length value is the upper limit of the MPL and is determined by page orientation and a combination of page format parameters as follows:

PMPL = (Length of print area - TBM) × LPI

Any non-integral values of PMPL are truncated. See Table 196 on page 246 for some sample PMPL values.

Physical Maximum Print Position (PMPP)

The Physical Maximum Print Position value is the upper limit of the MPP and is determined by page orientation and a combination of page format parameters as follows:

PMPP = (Width of print area - LBM) × CPI

Any non-integral values of PMPL are truncated. See Table 196 on page 246 for some sample PMPP values.

Physical Page Length (PPL) and Physical Page Width (PPW)

The physical page length is determined from the size and orientation selected with the configuration setting for each media source. This is the length of the paper in the selected tray for a specific orientation. PPL and PPW are measured in inches.

Top Binding Margin (TBM)

The Top Binding Margin determines the position of line 1 relative to the top edge of the printable area when printing in portrait or landscape orientation. TBM is measured in tenths of an inch.

Notes:

- The Top Margin parameter of the Set Vertical Format command is added to the TBM to determine the first print line position.
- The TBM cannot be changed by the data stream.
- The power-on default for TBM is determined by this Top Binding Margin control on the operator panel.
- The TBM is ignored in Computer Output Reduction (COR) mode and the printable area begins 1.27 mm (0.5 In) from the top of the paper.

Top Margin (TM)

Top Margin sets the first print line of a page and is measured from the Top Binding Margin. When the printer is turned on, TM defaults to 1.

- *In DSC/DSE print mode*, TM is always 1.
- *In LU-1 (SCS) print mode*, an SVF control code can change TM.

Vertical Tab Stops (VTS)

When the printer is turned on, the vertical tab stops set line number values for both the Vertical Tab (VT) and the Vertical Channel Select (VCS) functions. The printer's configuration settings cannot change the vertical tab stop settings.

- *In DSC/DSE print mode*, vertical tab stops are not applicable.
- *In LU-1 (SCS) print mode*, the SVF control code can change vertical tab stop values.
- *For the power-on default*, the printer sets vertical tab stops for all vertical print positions. These tab stops cannot be changed through the configuration settings.

Sample PMPP and PMPL Values in Print Page Format

(With TBM and LBM=0)

Table 196. Sample PMPP and PMPL Values in Print Page Format

	PMPP at				PMPL at	
Paper Size	**10 CPI**	**12 CPI**	**15 CPI**	**16.6 CPI**	**6 LPI**	**8 LPI**
Letter						
Portrait	81	98	122	135	64	85
Landscape	106	128	160	177	49	65
COR	137	155	206	278	67	89
Legal						
Portrait	81	98	122	135	82	109
Landscape	136	164	205	266	49	65
COR	177	200	266	359	67	89
A4						
Portrait	78	94	116	129	68	91
Landscape	114	137	171	189	46	62
COR	147	165	221	298	64	86
A4 (203 mm)						
Portrait	80	96	120	132	68	91
Landscape	114	137	171	189	48	64
COR	147	165	221	298	65	87
Executive						
Portrait	69	83	103	114	61	81
Landscape	101	122	152	168	41	55
COR	130	147	196	265	56	75

Table 196. Sample PMPP and PMPL Values in Print Page Format (continued)

Paper Size	PMPP at				PMPL at	
	10 CPI	12 CPI	15 CPI	16.6 CPI	6 LPI	8 LPI
Envelope Size						
7 3/4 Landscape	71	86	107	118	21	28
10 Landscape	91	110	137	152	22	30
DL Landscape	83	99	124	138	23	31
C5 Landscape	86	104	130	144	36	48

Priority of Format-Control Parameters

The application program, data stream commands, and configuration settings control the way the printer formats pages. The chart below lists the codes that can be changed with configuration settings from the printer operator panel. These configuration settings override the power-on defaults; the data stream overrides both the power-on defaults and the configuration settings.

Parameter	Configuration Setting (See Note 1)	DSC/DSE Control Code	LU-1 (SCS) Control Code
MPP	Maximum Print Position	Write Control Character	Set Horizontal Format
MPL	Maximum Page Length	Cannot be changed by data stream	Set Vertical Format
LPI	Lines per Inch	Cannot be changed by data stream	Set Line Density
CPI	Characters per Inch	Cannot be changed by data stream	Set Printer Density
Monocase/ Dualcase	Monocase/Dualcase	Host	Cannot be changed by data stream
Line Spacing	Line spacing	Cannot be changed by data stream	Set Line Density

Notes:

1. The configuration settings are set in one of the screens of the **Coax Setup Menu** of the printer operator panel.
2. Change the configuration settings from the operator panel between jobs only.

Page-Synchronization and Line-Wrap Considerations

A print line that is more than the current MPP continues on the next line (wraps). The additional line feeds generated by these line wraps can go past the page and may interfere with page synchronization (top-of-forms alignment) on pages that follow.

To resolve this, first verify that all of the needed configuration settings and data stream controls are set for the print job. In addition, you can select application parameters to change the output format to get the result you want. In RSCS, for files containing *carriage-control characters,* setting the Vertical Forms Control (VFC) parameter to Yes causes a form feed command to be issued at the end of each page. Line wraps might occur, but top-of-forms alignment is ensured on pages that follow. For more information, see the programming guide for your specific application. For details on RSCS applications, refer to *VM RSCS Networking Version 3 Operation and Use*, SH24-5058.)

Note: Be sure that the MPP is within the printable area; If it in the unprintable area, you will lose data.

Chapter 18. Control Codes—DSC/DSE and LU-1 (SCS)

This chapter describes the printer control codes valid in DSC/DSE and LU-1 (SCS) communication modes.

DSC/DSE Control Codes

The following control codes are valid when the printer is in DSC/DSE mode.

Code	Name	DSC/DSE EBCDIC	Internal Code Value *(as seen in hex dumps)*
CR	Carriage Return	0D	05
EM	End of Medium	19	01
FF	Form Feed	0C	02
NL	New Line	15	03
NUL	Null	00	00

Notes:

1. These codes have different meanings in print and no-print fields in both formatted and unformatted modes, as explained below.
2. The LU-1 and SCS modes are referred to as format mode.
3. In DSC/DSE modes with the extended attribute buffer (EAB) on, groups of characters defined by associated attributes determine print and no-print fields.

Carriage Return (CR)

0D

Carriage Return causes the printer to move to the left margin of the current line in an unformatted print field. In a formatted print field or an unformatted no-print field, the printer treats CR as a space character. In a formatted no-print field, the printer treats CR as a null character.

End of Medium (EM)

19

End of Medium stops printing in an unformatted print field. In a formatted print field or unformatted no-print field, the printer treats EM as a space character. In a formatted no-print field, the printer treats EM as a null character.

Form Feed (FF)

0C

Form Feed causes the printer to move to the top margin of the next page in either print or no-print fields, formatted or unformatted modes.

All print jobs should end with a Form Feed command. This ensures that data on the last page prints and the page ejects.

New Line (NL)

15

New Line causes the printer to move to the first position of the next line in an unformatted print field. In a formatted print field or an unformatted no-print field, the printer treats NL as a space character. In a formatted no-print field, the printer treats NL as a null character.

Null (NUL)

00

Null causes no printer function. In unformatted mode, the printer treats NUL as a space for both print and no-print fields. In formatted print and no-print fields, the printer treats NUL as a null character.

LU-1 (SCS) Control Codes (Non-IPDS)

The rest of the chapter shows the SCS control codes that are valid when the printer is defined to VTAM as an LU-1 device. The control code descriptions are sorted alphabetically by control code abbreviation. ***All values are shown in hexadecimal.*** The following is a cross-reference list, sorted numerically by value.

EBCDIC Value	Reference to.....
04	"Vertical Channel Select (VCS)" on page 263
05	"Horizontal Tab (HT)" on page 252
08	"Graphic Escape (GE)" on page 252
0B	"Vertical Tab (VT)" on page 263
0C	"Form Feed (FF)" on page 251
0D	"Carriage Return (CR)" on page 251
1E	"Inter-Record Separator (IRS)" on page 252
14	"Enable Presentation (ENP)" on page 251
15	"New Line (NL)" on page 253
16	"Backspace (BS)" on page 251
2F	"Bell (BEL)" on page 251
24	"Inhibit Presentation (INP)" on page 252
25	"Line Feed (LF)" on page 253
28	"Set Attribute (SA)" on page 256
35	"Transparent (TRN)" on page 262
2BC1	"Set Horizontal Format (SHF)" on page 257
2BC2	"Set Vertical Format (SVF)" on page 261

2BC6	"Set Line Density (SLD)" on page 259
2BD10683	STO (Set Text Orientation) is not supported
2BD2NN29	"Set Print Density (SPD)" on page 259
2BD2NN48	"Page Presentation Media (PPM)" on page 253

Bell (BEL)

2F

The printer ignores this control.

Backspace (BS)

16

Backspace moves the current print position one column to the left. If the current print position equals the left margin, BS occurs. If the current print position equals column 1, BS is ignored.

Carriage Return (CR)

0D

Carriage Return moves the print position from the current position to the left margin. It does not change the vertical print position. If the current print position equals the left margin, CR is ignored.

Performing a CR without a new line and printing the same data will simulate bolding.

Enable Presentation (ENP)

14

The printer ignores this control.

Form Feed (FF)

0C

Form Feed moves the print position to the top margin and the left margin print position of the next page. If MPL equals 1, FF performs the same function as a New Line (explained below). If the current position equals MPP + 1, FF still occurs as described above.

All print jobs should end with an FF command. This ensures that data on the last page prints and the page ejects.

Graphic Escape (GE)

08

Graphic Escape allows APL/Text/Graphic characters to be sent in an SCS data stream. Each APL/Text/Graphic character is preceded by the graphic escape code (hex 08).

The following example shows the data stream required to send a mixed EBCDIC/APL character string:

Character

```
A  H     §  ¶  Q          ≠  B    ≤     ↑
```

Hex Code

```
C1 C8 08 C8 08 D8 D8 40 08 BE C2 08 8C 08 8A
```

The printer prints the following as a result of the character string above:

```
AH§¶Q ≠B≤↑
```

If the graphic escape code (hex 08) is followed by another control code (hex 00 through hex 3F or hex FF), this two-byte combination is treated as one invalid SCS control code.

Horizontal Tab (HT)

05

Horizontal Tab moves the print position from its current position to the column specified by the next higher tab stop setting.

- If the current print position column value is equal to or greater than the highest tab stop setting (or if no stops have been set), HT performs the same as a space function.
- If HT is specified at MPP + 1, the print position moves to the left margin plus 1 (LM + 1) of the next line. (If the current line is the bottom margin line, the next line is the top margin of the next page.)

Inhibit Presentation (INP)

24

The printer ignores this control.

Inter-Record Separator (IRS)

1E

Inter-Record Separator performs the same function as a New Line (NL).

Line Feed (LF)

25

Line Feed moves the print position vertically from its current position to the next line. It does not change the horizontal print position. If the current line number equals BM or MPL, the print position moves to the top margin of the next page.

New Line (NL)

15

New Line causes a Carriage Return function and an LF function. If the current line number equals BM or MPL, the print position moves to the left margin print position of the top margin of the next page.

Page Presentation Media (PPM)

Page Presentation Media is a text-processing command. This command allows you to select the paper sources and specify simplex/duplex.

PPM Command Format:	**2B**	**D2**	***NN***	**48**	**00**	**00**	***FC***	***SD***	***DDO***	***DD***	**00**	***DX***
Example: Use Paper Menu / SOURCE item from printer menus (See NN)	2B	D2	**02**	48								
Example: Select the envelope feeder.	2B	D2	**05**	48	00	00	**02**					
Example: Select second drawer	2B	D2	**06**	48	00	00	**01**	**02**				
Example: Select second drawer, and duplex	2B	D2	**0A**	48	00	00	**01**	**02**	00	00	00	**02**

NN

Byte NN of PPM is the count byte. It specifies how many more bytes, including NN, are in the command.

X'02' FC is ignored, Paper Menu / SOURCE item setting used instead of SD. DX remains as previously defined (or defaults to simplex if not previously defined).

X'05' FC is used, Paper Menu / SOURCE item setting used instead of SD, DX remains as previously defined (or defaults to simplex if not previously defined).

X'06' FC is used and SD SD is used. DX remains as previously defined (or defaults to simplex if not previously defined).

X'0A' FC is used, SD is used, and DX is used.

X'02' to X'0C' Valid values, but only 02, 05, 06, and 0A are meaningful.

Other Results in an `Invalid Parameter Error` response to the host.

FC

The Forms Control byte of PPM selects manual, envelope, or directs the use of SD.

X'00' No change from current selection (use last FC specified).

X'01' Use SD as paper source.

X'02' Select envelope feeder if it exists; otherwise, select auxiliary tray using the paper size specified by the AUXSIZE item in the Paper Menu.

X'03'-X'04' Select manual feeder.

X'05'-X'FE' Use SD as paper source.

X'FF' Use tray specified by SOURCE item on Paper Menu.

Note: For Infoprint 20, when a tray contains envelopes (or envelope-sized paper), it is selected. If multiple trays contain envelopes, the tray with the lowest tray number (tray 1, tray 2) is selected.

SD

Byte ***SD*** of PPM selects the paper source (Source Drawer), if byte FC directed to use SD.

X'00' No change from current selection.

X'01' Select tray 1.

X'02' Select tray 2 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.

X'03' Select tray 3 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.

X'04' Select auxiliary feeder

X'05' Select tray 4 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.

X'06' Select tray 5 if it exists; otherwise use tray specified by SOURCE item on Paper Menu.

X'07'-X'FE' Select Tray 1.

X'FF' Use tray specified by SOURCE item on Paper Menu.

DD

Byte ***DD*** of PPM selects the destination drawer.

X'00' No change from current selection.

X'01' Select standard output bin.

X'02' NP12: face-up bin.

NP17: 500-sheet offset bin.

NP24: face-up bin.

IP20: default bin.

IP 32/40: face-up bin.

X'03' NP12: default bin.

NP17: default bin.

NP24: finisher bin 1 (face-down).

IP20: default bin.

	IP 32/40: finisher bin 1 (face-down).
X'04'	NP12: default bin.
	NP17: mailbox bin 1.
	NP24: finisher bin 2 (face-down).
	IP20: default bin.
	IP 32/40: finisher bin 2 (face-down).
X'05'	NP12: default bin.
	NP17: mailbox bin 2.
	NP24: finisher bin 3 (face-down).
	IP20: default bin.
	IP 32/40: finisher bin 3 (face-down).
X'06'	NP12: default bin.
	NP17: mailbox bin 3.
	NP24: finisher bin 1 (face-up).
	IP20: default bin.
	IP 32/40: default bin.
X'07'	NP12: default bin.
	NP17: mailbox bin 4.
	NP24: finisher bin 2 (face-up).
	IP20: default bin.
	IP 32/40: default bin.
X'08'	NP12: default bin.
	NP17: mailbox bin 5.
	NP24: finisher bin 3 (face-up).
	IP20: default bin.
	IP 32/40: default bin.
X'09'	NP12: default bin.
	NP17: mailbox bin 6.
	NP24: auto-output (face-down).
	IP20: default bin.
	IP 32/40: auto-output (face-down).
X'0A'	NP12, NP24, IP20, IP 32/40: default bin.
	NP17: mailbox bin 7.
X'0B'	NP12, NP24, IP20, IP 32/40: default bin.
	NP17: mailbox bin 8.
X'0C'	NP12, NP24, IP20, IP 32/40: default bin.
	NP17: mailbox bin 9.

X'0D' NP12, NP24, IP20, IP 32/40: default bin.

NP17: mailbox bin 10.

DDO

Byte *DDO* of PPM selects offsetting for the destination drawer.

X'00' No change from current selection.

X'01'-X'FF' Jog.

DX

Byte *DX* specifies duplex or simplex.

X'00' No change

X'01' Enter simplex mode.

X'02' Enter duplex mode.

X'03' Enter tumble duplex mode.

Notes:

1. SD ignored unless FC is 01 or between 05 and FE.
2. If the PPM control is received when the printer is at a page boundary (that is, after an internal or a data-stream-generated form feed and before any command is received that would change the current print position), the selections are used immediately. If not, the new selections become effective at the next page boundary.

Set Attribute (SA)

28	TT	VV

Set Attribute specifies an attribute for all data following the SA control code. Each attribute uses two subsequent characters in the data stream.

Each attribute type requires one SA code. Each SA code stays in effect for the remainder of the chain unless the host sends another SA code of the same type. The character attribute values specified by SA codes apply to *all* subsequent data characters in the data stream. The codes remain valid until:

- A new SNA chain begins, or
- A new SA code changes the value of the character attribute.

Type

Byte TT specifies the type of attribute. Valid values for byte TT and their definitions are shown in the following table.

Byte TT (in hex)	Selection
00	Reset
41	Highlight
42	Color
43	Select character set

Reset (TT = 00). A value of 00 for byte TT resets the attributes to normal highlighting, black color, and the base character set. Byte VV must be 0.

Highlight (TT = 41). A value of 41 for byte TT uses byte VV to select highlight characteristics. Valid values for byte VV and their selections are shown in the following table.

Byte VV (in hex)	Selection
00	Normal
F1	Blink (Ignored)
F2	Reverse image (Ignored)
F4	Underline

Color (TT = 42). A value of 42 for byte TT selects a color for subsequent printing. Byte VV selects the color. The printer accepts all values shown but prints only in black. Valid values for byte VV and their selections are:

Byte VV (in hex)	Selection
00	Black
F1	Blue
F2	Red
F3	Magenta
F4	Green
F5	Cyan
F6	Yellow
F7	Black

Select Character Set (TT = 43). A value of 43 for byte TT selects either the base character set or the APL character set, using byte VV. Valid values for byte VV and their selections are:

Byte VV (in hex)	Selection
00	Base character set
F1	APL character set

Set Horizontal Format (SHF)

2B	C1	NN	PP	LM	RM	T_1...Tn

Set Horizontal Format sets horizontal formatting controls including Maximum Print Position, Left Margin, Right Margin (RM), and up to 253 horizontal tab stops (T_1...Tn). A count byte defines the total number of bytes that follow, including the count byte. The first three bytes following the count byte define MPP, LM, and RM, respectively. Tab stop column values start in the fourth byte position.

Count

Byte NN is the count byte.

- A count of hex 00 results in an `Invalid Parameter Error` response. Horizontal format controls are reset to their default values.
- A count of hex 01 sets MPP to the configuration setting value and other horizontal formatting controls to their default values.
- All other count values are valid; however, if the count is larger than MPP + 4, some tab stops must be repeated.

Maximum Print Position

Byte PP specifies the maximum print position.

- If byte PP is greater than 0, the MPP is equal to the specified value.
- If byte PP is 0, the MPP is calculated as current CPI value x 13.inch page width. If byte PP is note present, MPP is equal to the op panel values.
- If the printer reads a graphic character at MPP + 1, the printer:
  - Automatically performs a new line function (CR + line feed)
  - Prints the graphic character in the print position defined by the LM value.

Note: For a description of how the printer responds to a specific control function at MPP + 1, see the description for that function. MPP is not validated based on the actual physical page width.

Left Margin

Byte LM is the left margin byte. This value defines the leftmost print position and is the print position that is taken following a NL, CR, or FF function. Valid LM values are less than or equal to the MPP value. The default for LM is column 1. The LM value is stored as the first horizontal tab. The value for LM is as follows:

- If byte LM is greater than 0 and less than or equal to MPP, then the left margin is equal to byte LM's value.
- If byte LM is 0, the left margin defaults to column 1.
- If byte LM is not present (in which case, the count byte, NN, is less than 03), the left margin defaults to column 1.
- If byte LM is greater than MPP, the printer sends an `Invalid Parameter Error` response to the host. Processing of the data stops, and all horizontal format controls except MPP revert to their default values.

Right Margin (RM)

Byte RM is the right margin byte. The printer does not use the RM parameter, but it checks this value.

- Valid RM values are 0 or the range of values from LM to MPP.
- If the RM value is invalid, the printer sends an `Invalid Parameter Error` response to the host. Printing of the data stops, and all horizontal format controls except MPP and LM revert to their default values.

Horizontal Tab Stop (T_1...Tn

Bytes T_1 to Tn are the Horizontal Tab Stop bytes. These bytes set column values for the Horizontal Tab (HT) function to use.

- Valid Horizontal Tab Stop column values are the range of values from LM to MPP.
- If no Horizontal Tab Stops are specified, the printer uses the default (a tab stop at each column from LM to MPP).
- A value of hex 00 is valid but sets no tab stops. If a value of hex 00 is the only tab stop specified, the printer clears all tab stops except the left margin stop.
- There is no check to determine if duplicate tab stops have been specified.
- The maximum number of unique tab stops that can be set is PMPP. The first unique value sets the tab stop; identical values that follow do not set stops. Therefore, duplicate values can exist.
- Tab stop parameters need not be in any ordered sequence.
- If an invalid Horizontal Tab Stop is specified, the printer sends an `Invalid Parameter Error` response to the host. Printing of the data stops. This error does not affect horizontal formats (MPP, LM, and RM), but tab stops enter an undetermined condition.

Note: The print buffer should be reinitialized after an SHF function by performing an NL or a CR, especially if the left margin is changed.

Set Line Density (SLD)

Set Line Density sets the LPI value for the printer. SLD overrides the LPI default value of 6 LPI and the LPI setting in the Coax Setup Menu.

SLD Command Format:	2B	C6	*NN*	*LD*
Example: Use LPI specified in the Coax Setup Menu.	2B	C6	**01**	
Example: Use 8 LPI.	2B	C6	**02**	**09**

NN

Byte *NN* of SLD determines whether the LPI is controlled by the Coax Setup Menu setting, or the SPD byte LD:

X'01' The Coax Setup Menu setting determines LPI. (LD values are ignored.)

X'02' Byte LD determines CPI.

other Any other value results in an `Invalid Parameter Error` response to the host, with LD set to the default of 6 LPI.

LD

Byte *LD* of SLD defines the line density, or the distance (measured in lines per inch) to be moved for single-line vertical spacing.

X'00' 6 (8.57 in COR)—default value

X'0C' 6 (8.57 in COR)

X'09' 8 (11.43 in COR)

X'12' 4 (5.71 in COR)

X'18' 3 (4.29 in COR)

Other All other values for byte LD are invalid and result in an `Invalid Parameter Error` response to the host. The 6 LPI default value is used until a valid SLD specification is received.

Notes:

1. When the SLD count byte is not equal to 01, SLD sets line spacing to single space, overriding the line spacing configuration setting if it is different.
2. The LD change becomes effective when it is received. Printing results are unpredictable unless the command is sent while the printer is at a page boundary, and an SVF accompanies the SLD function to redefine page parameters before printing begins.

Set Print Density (SPD)

Set Print Density sets the number of horizontal characters printed per inch, based on the values of the NN and CD bytes.

SPD Command Format:	**2B**	**D2**	***NN***	**29**	**00**	***CD***
Example: Accept CPI value from COAX SETUP MENU setting.	2B	D2	**02**	29		
Example: Override CPI value from Coax Setup Menu setting; use 10 CPI for the job.	2B	D2	**04**	29	00	**00**

The SPD command becomes **effective immediately** after it is received. Data following for the same print line prints at the new CPI value.

NN

Byte ***NN*** of SPD determines whether CPI is controlled by the Coax Setup Menu setting, or the SPD byte CD:

X'02' The Coax Setup Menu setting determines CPI. (CD values are ignored.)

X'04' Byte CD determines CPI.

other Any other value results in an `Invalid Parameter Error` response to the host. Ignores CD.

CD

When byte N= X'04', SPD byte ***CD*** defines the character density (CPI) to be used by the printer:

X'00' Select 10-CPI, default (in COR mode, prints as 13.3 CPI)

X'0A' Select 10-CPI (in COR mode, prints 13.3 CPI)

X'0C' Select 12-CPI (in COR mode, prints as 15 CPI)

X'0F' Select 15 CPI (in COR mode, prints as 20 CPI)

X'10' Select 16.67 CPI (in COR mode, prints as 27 CPI)

X'11' Select 17.1 CPI (in COR mode, prints as 27 CPI)

other All other values for byte CD are invalid and result in an `Invalid Parameter Error` response to the host. Then uses Coax Setup Menu setting for CPI.

Notes:

1. This command is also called SCD (Set Character Density).
2. Byte CD is ignored unless Byte NN= X'04'
3. When CPI changes, neither the MPP vlaue nor the current print position is changed.
4. The CPI in effect determines the character location in the print line. As CPI changes, the physical location of a given print position also changes. Therefore, print position 50 at 15 CPI is closer to the left margin than print position 50 at 10 CPI. CPI also affects the physical location of the the LM, the MPP, and the HT stop locations. The host must insert spaces or backspaces to position print where desired.

Set Vertical Format (SVF)

Set Vertical Format sets vertical formatting controls including Maximum Page Length, Top Margin, Bottom Margin, and up to 127 vertical tab stops. These tab stops include up to 12 vertical channel-select values.

SVF Command Format:	2B	C2	*NN*	*PL*	*TM*	*BM*	$T_1...Tn$

NN

The *NN* byte of SVF is a count byte to define the total number of bytes that follow, including the count byte.

X'00' `Invalid Parameter Error` response. Vertical format controls are set to their default values.

X'01' Sets MPL to the MPL printer menu setting and other vertical format controls to their default values.

Other All other count values are valid; however, if the count is greater than MPL + 4, some tab settings must be repeated. If the count is greater than 131, bytes 132 through NN are ignored.

PL

Byte *PL* of SVF is the Maximum Page Length. It specifies the number of lines from the first print line of one page to the first print line of the next page, or the MPL.

- If byte PL is greater than 0, the MPL is equal to byte PL's value.
- If byte PL is 0, the MPL is set equal to 1.
- If byte PL is not present (in which case, the count byte, NN, is 01), the MPL is equal to the configuration setting value.

TM

Byte *TM* of SVF is the top margin byte. This value defines the first print line of the page. An SVF function followed by an FF function causes the printer to skip to the new top margin of the next page.

- If byte TM is greater than 0 and less than or equal to MPL, the top margin is equal to byte TM's value.
- If byte TM is 0, the top margin defaults to print line 1.
- If byte TM is not present (in which case, the count byte, NN, is less than 04), the top margin defaults to print line 1.
- If byte TM is greater than MPL, the printer sends an `Invalid Parameter Error` response to the host. Printing of the data stops, and all vertical format controls except MPL revert to their default values.

BM

Byte ***BM*** of SVF is the bottom margin byte. This value defines the last printable line of the page. When the current line value is more than BM, the print position moves to the top margin of the next page.

- If byte BM is greater than or equal to TM and less than or equal to MPL, the bottom margin is equal to byte BM's value.
- If byte BM is 0, the bottom margin is equal to MPL.
- If byte BM is not present (in which case, the count byte, NN, is less than 04), the bottom margin is equal to MPL.
- If byte BM is less than TM or greater than MPL, the printer sends an `Invalid Parameter Error` response to the host. Printing of the data stops, and all vertical format controls except MPL and TM revert to their default values.

T

Bytes ***T_1...Tn*** of SVF are 127 vertical tab stop bytes. These values set line number values for both the Vertical Tab function and for the Vertical Channel Select function.

- Valid vertical tab stop values are the values from TM to BM.
- If an invalid vertical tab stop is specified, the printer sends an `Invalid Parameter Error` to the host. Processing of the data stops.
- Hex 00 is a valid tab stop value but sets no tabs.
- A channel value of hex 00 does not assign a line number to that channel.
- The TM value is also the first tab stop and the vertical channel 1 value.
- Vertical tab stop bytes T1 through T11 are used for vertical channels 2 through 12 and for vertical tab values.
- Vertical tab stop bytes T12 through Tn are used only for vertical tab values.

Notes:

1. The SVF control should be sent only when the printer is at a page boundary (that is, after an internal or data-stream-generated form feed and before any command is received that would change the current print position). If this control is sent at any other time, a form feed is generated.
2. To enhance compatibility with printers that do not have an unprintable border, PL values are accepted as if the unprintable border does not exist. This may cause data to overflow to an additional sheet. However, forms synchronization will be maintained. MPL is not validated based on actual physical page length.

Transparent (TRN)

35	NN	xx...nn

Transparent indicates the start of a transparent data stream. A count byte (NN) defines the number of bytes of transparent data to follow, *not* including the count byte. Valid byte NN values are from hex 01 to hex 255.

Data within a transparent data stream is defined by the user. Therefore, the printer does not scan the data for SCS (SNA character string) control codes; the printer receives the complete field as data.

Note: If TRN data values are from hex 00 through hex 3F, or if TRN has a value of hex FF, it is printed as a hyphen (hex 60).

Vertical Channel Select (VCS)

04	VS

Vertical Channel Select moves the print position to a specific line as defined by the SVF function. Vertical channels are defined by the Top Margin value and the first 11 vertical tab settings that were set with the SVF function.

Channel 1 is always set to the TM value, even if no vertical tabs are set.

Note: Vertical page movement does not change the current horizontal print position.

Byte VS selects one of 12 channels for vertical positioning. The valid values for byte VS and their selections are shown in the following table.

Byte VS	Selection
X'81'	Vertical Channel 1
X'82'	Vertical Channel 2
X'83'	Vertical Channel 3
X'84'	Vertical Channel 4
X'85'	Vertical Channel 5
X'86'	Vertical Channel 6
X'87'	Vertical Channel 7
X'88'	Vertical Channel 8
X'89'	Vertical Channel 9
X'7A'	Vertical Channel 10
X'7B'	Vertical Channel 11
X'7C'	Vertical Channel 12

Other attributes of channel selection are:

- If no line stop values are assigned to a channel, a VOSS function for that channel defaults to an LF function.
- If the select channel function specifies the current line number or specifies a number that is less than the current line number, the print position moves to the specified line on the next page.
- If an invalid select value is received, the printer sends an `Invalid Parameter Error` response to the host.

Vertical Tab (VT)

0B

Vertical Tab moves the print position vertically from its current line number to the line value specified by the next higher vertical tab stop setting.

Note: VT does not change the current horizontal print position.

A VT function results in a Line Feed if:
- No vertical tab stops are set.
- The current line number is equal to or greater than the highest tab stop value.

A vertical tab at MPP + 1 moves the print position to MPP + 1 of the specified tab line.

A vertical tab at MPL or BM moves the print position to the top margin of the next page.

Chapter 19. Query Processing and Replies—DSC/DSE and LU-1 (SCS)

This chapter explains how the printer uses structured fields for query processing and replies.

DSC/DSE Query Processing

A DSC/DSE order requests the printer to process a Read Partition Query. The printer loads a structured field at the address specified by the Message Starting Address (MSA).

FM Header Processing—LU-1 (SCS) Mode

The Function Management (FM) header data stream order begins with an FM header. Data that follow are in structured fields.

The printer uses type 1, subset 0 FM headers. The FM header must begin the chain as follows:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Length (Hex 06)	Type (Hex 01)	Medium Select (Hex 00)	Data Stream Profile (Hex 0B)	FM Header Properties (Hex 60)	Reserved (Hex 00)

Byte	Function
Byte 0	Specifies the FM header length (6 bytes)
Byte 1	Specifies type 1 and no concatenation
Byte 2	Specifies console medium select with logical address 0
Byte 3	Specifies data stream profile select (hex 0B), meaning that structured fields follow
Byte 4	Specifies begin/end destination select; no compression, no compaction
Byte 5	Reserved

If the FM header does not contain the information above, the printer returns an `Invalid FM Header` response to the host and printing stops.

Notes:

1. For LU-1 (SCS) printer-to-host structured fields, byte 3 of the FM header will be hex 8B, indicating an inbound transmission.
2. For IPDS processing, a subset 4 FM header is used. Byte 3 of the FM header will be hex 0D, indicating IPDS selection. For more information about IPDS processing, see "LU-1/IPDS Processing" on page 279.

Structured Fields

The printer uses structured fields to allow the host to save or restore print formats and request printer definition. These fields are either host-to-printer requests or printer-to-host replies.

The general format of a structured field is:

Length	Type	Data
2 bytes	1—3 bytes	If required

- **Length** specifies the length of the structured field in bytes (including the *length* and *type* bytes). If Length equals 00, the structured field continues to the end of the chain.
- **Type** specifies the type of structured field. All values not shown are invalid and result in sending an `Invalid Type Code` response to the host.

The following tables summarize the type codes for structured fields.

DSC (Non-IPDS), DSE, and LU-1 (SCS) Processing

Hex Value (Type)	Structured Field	Direction	Reference
01FF02	Read Partition Query	Host-to-Printer	"Read Partition Query Structured Field (Host-to-Printer)" on page 267
01FF03	Read Partition Query	Host-to-Printer	"Read Partition Query List Structured Field (Host-to-Printer)" on page 267
81	Query Reply	Printer to Host	"Query Reply Structured Fields (Printer-to-Host)" on page 268
10	Save/Restore Formats	Bidirectional	"Save/Restore Formats Structured Field (Bidirectional)" on page 276
41	SCS Data	Host-to-Printer	"SCS Data Structured Field (Host-to-Printer)" on page 276
0F84	Set Printer Characteristics	Host-to-Printer	"Set Printer Characteristics Structured Field (Host-to-Printer)" on page 276

DSC (IPDS) Processing

Hex Value (Type)	Structured Field	Direction	Reference
0F21	Data Chain (in DSC)	Host Unit to Printer	"Data Chain (In DSC) (Host-to-Printer)" on page 277
0F83	Select IPDS Mode	Bidirectional	"Select IPDS Mode (Bidirectional)" on page 278
----	IPDS Structured Fields	Bidirectional	IPDS sections of this book

Note: For non-IPDS processing, the only valid structured fields in DSC/DSE mode are the Read Partition Query and the Query Reply.

Structured Fields for DSC (Non-IPDS), DSE, and LU-1 (SCS) Processing

This section describes the Read Partition Query, Read Partition Query List, and Query Reply Structured fields.

Read Partition Query Structured Field (Host-to-Printer)

0000	01	FF	02

Or

0005	01	FF	02

The Read Partition Query structured field provides a way for the host to determine the following characteristics of the printer: highlighting, character size, and buffer size. The Read Partition Query must be the only or last structured field in the chain and must have the following format.

Byte	Hex Value	Meaning
0, 1	0000 or 0005	Structured Field Length
2	01	Type = Read Partition
3	FF	Query (Partition ID)
4	02	Code = Query

Notes:

1. If byte 4 is not hex 02, a `Function Not Supported` response is returned to the host and the order is stopped.
2. An `Invalid Control Code Parameter` response is returned to the host if any of the following conditions occur:
   - Bytes 0 and 1 (length) do not contain hex 0000 or hex 0005.
   - Byte 3 does not contain hex FF.
   - The structured field is not the last field in the chain.

Read Partition Query List Structured Field (Host-to-Printer)

LLLL	01	FF	03	x0	xx...xx

The Read Partition Query List structured field specifies which query reply the printer should return to the host. This reply must be the only or last structured field in the chain and must have the following format.

Byte	Hex Value	Meaning
0, 1	LLLL	Structured Field Length
2	01	Type = Read Partition
3	FF	Query (Partition ID)
4	03	Code = Query List

Byte	Hex Value	Meaning
5	—	Extend Request 00 = List Only 40 = Query Plus List 80 = All Query Replies All Other Codes Reserved
6–n	xx...xx	Q Codes of Requested Query Replies: 80 = Summary 81 = Usable Area 85 = Character Sets 86 = Color 87 = Highlight 92 = Save/Restore Formats (LU-1 mode only) 98 = Data Chaining (DSC mode only) 9A = 3270 IPDS (DSC mode only) A0 = Device Characteristics (LU-1 mode only) A2 = Data Streams (LU-1 mode only) A9 = Settable Printer Characteristics FF = Null (no listed Q codes are supported)

Query Reply Structured Fields (Printer-to-Host)

The printer supports the following printer-to-host structured fields (Type X'81'):

- Summary Query Reply
- Usable Area Query Reply
- Character Set Query Reply
- Color Query Reply
- Highlight Query Reply
- Save/Restore Formats Query Reply (LU-1 mode only)
- Data Chaining Query Reply (DSC mode only)
- 3270 IPDS Query Reply (DSC mode only)
- Device Characteristics Query Reply (LU-1 mode only)
- Data Streams Query Reply (LU-1 mode only)
- Null Query Reply
- Settable Printer Characteristics Query Reply (DSC mode only)

The printer sends these structured fields to the host when the host sends a structured field query.

Summary Query Reply (DSC Mode):

000C	81	80	xx...xx

The Summary query reply (DSC mode) provides a list of available printer replies and has the following format.

Byte	Hex Value	Description
0, 1	000A	Structured Field Length
2	81	Type = Query Reply
3	80	Summary Indicator
4	80	Summary Reply
5	81	Usable Area
6	85	Character Sets
7	86	Color Query Reply

Byte	Hex Value	Description
8	87	Highlight
9	98	Data Chaining
A	9A	3270 IPDS (Returned only if the IPDS feature is installed)
B	A9	Settable Printer Characteristics

Notes:

1. The printer sends bytes 0 through 3 to the host in the order shown and sends the remaining bytes in any order.
2. The Settable Printer Characteristics query reply is valid only in DSC mode. It is not used by the IBM 3174 Controller prior to microcode Release 3.

Summary Query Reply (DSE Mode):

0009	81	80	xx...xx

The Summary query reply (DSE Mode) provides a list of available printer replies and has the following format.

Byte	Hex Value	Description
0, 1	0009	Structured Field Length
2	81	Type = Query Reply
3	80	Summary Indicator
4	80	Summary Reply
5	81	Usable Area
6	85	Character Sets
7	86	Color Query Reply
8	87	Highlight

Note: The printer sends bytes 0 through 3 to the host in the order shown and sends the remaining bytes in any order.

Summary Query Reply (LU-1 Mode):

000C	81	80	xx...xx

The Summary query reply (LU-1 Mode) provides a list of available printer replies and has the following format.

Byte	Hex Value	Description
0, 1	000C	Structured Field Length
2	81	Type = Query Reply
3	80	Summary Indicator
4	80	Summary Reply
5	81	Usable Area
6	85	Character Sets

Byte	Hex Value	Description
7	86	Color Query Reply
8	87	Highlight
9	92	Save/Restore Formats
A	A0	Device Characteristics
B	A2	Data Stream query supported (returned only if the IPDS feature is installed)

Note: The printer sends bytes 0 through 3 to the host in the order shown and sends the remaining bytes in any order.

Usable Area Query Reply:

LLLL	81	81	xx...xx

The Usable Area query reply specifies the page and print character cell characteristics and has the following format.

Byte	Hex Value	Description
0, 1	LLLL	Structured Field Length (0015 for LU-1, 0017 for DSC/DSE)
2	81	Type = Query Reply
3	81	Usable Area Indicator
4	5F (LU-1) 51 (DSC/DSE)	• Extended Structure Field • A Hard Copy Device • No Explicit Partition Addressing • Page Printer
5	00	• Variable Cell Size Not Available • Non-Matrix Characters
6, 7	XXXX	Usable Area Width (in cells) Width of print area × CPI
8, 9	XXXX	Usable Area Height (in cells) Length of print area × LPI
A–14	00	Reserved
15, 16	0FB0	Buffer Size (DSC/DSE Only)

Notes:

1. In DSC/DSE mode, bytes 6 and 7 and bytes 8 and 9 are not applicable and are 0.
2. Use of the printer bit 1 of byte 4 requires Release 3 or higher of the 3174 Controller microcode.

Character Set Query Reply:

0013	81	85	xx...xx

The Character Set query reply specifies the character sets available with the printer and has the following format.

Byte	Hex Value	Description
0, 1	0013	Structured Field Length
2	81	Type = Query Reply
3	85	Character Sets Supported
4	80	Flags
5	00	Reserved
6	0A	Default Matrix Width (10 Slices)
7	08	Default Matrix Height (8 Rows)
8–B	06000000	Format Types 5 and 6
C	03	Character Set Descriptor Length, Bytes
D	00	Character Set ID: ROS “00”
E	10	• Non-loadable Character Set • Single Plane • 1-Byte Coded Character Set • No LCID Compare Allowed
F	00	LCID = None
10	01	Character Set ID: ROS 1
11	00	• Non-loadable Character Set • Single Plane • 1-Byte Coded Character Set • LCID Compare Allowed
12	F1	LCID = APL

Color Query Reply:

0016	81	86	xx...xx

The Color query reply describes the color features of the printer for all modes, as follows.

Byte	Hex Value	Description
0, 1	0016	Structured Field Length
2	81	Type = Query Reply
3	86	Color Indicator
4	40	Monochrome
5	08	Length of Color Attribute List
6, 7	00F7	Color 1 Accepted Color Printed - Black
8, 9	F100	Color 2 Accepted Color Printed - Black
A, B	F200	Color 3 Accepted Color Printed - Black
C, D	F300	Color 4 Accepted Color Printed - Black
E, F	F400	Color 5 Accepted Color Printed - Black
10, 11	F500	Color 6 Accepted Color Printed - Black
12, 13	F600	Color 7 Accepted Color Printed - Black
14, 15	F700	Color 8 Accepted Color Printed - Black

Highlight Query Reply:

000D	81	87	04	xx...xx

The Highlight query reply specifies the highlighting options available at the printer (only underlining is available) and has the following format.

Byte	Hex Value	Description
0, 1	000D	Structured Field Length
2	81	Type = Query Reply
3	87	Highlight Indicator
4	04	Number of Highlight Options
5, 6	00 F0	First Highlight Option Attribute Value (Default) Highlight Option = Normal
7, 8	F1 00	Second Highlight Option Attribute Value (Blink) Highlight Option = Normal
9–A	F2 00	Third Highlight Option Attribute Value (Reverse Video) Highlight Option = Normal
B, C	F4 F4	Fourth Highlight Option Attribute Value (Underline) Highlight Option = Underline

Note: Normal means printing with no highlighting.

Save/Restore Formats Query Reply:

0006	81	92	xx...xx

Note: The Save/Restore Formats query reply is valid only in LU-1 (SCS) mode.

The Save/Restore Formats query reply specifies the format parameter control block length and has the following format.

Byte	Hex Value	Description
0, 1	0006	Structured Field Length
2	81	Type = Query Reply
3	92	Save/Restore Format
4, 5	0058	FPCB Length

Data Chaining Query Reply:

0006	81	98	80	00

The Data Chaining query reply indicates that data chaining is available on the printer in DSC mode. This reply is valid only in DSC mode. The format for this reply is:

Byte	Hex Value	Description
0, 1	0006	Structured Field Length
2	81	Type = Query Reply
3	98	Data Chaining Indicator
4	80	Direction (to Printer Only)
5	00	Flags (Reserved—Must Be 0)

3270 IPDS Query Reply:

0008	81	9A	0000	0FB0

The 3270 IPDS query reply indicates that IPDS in DSC mode is available on the printer. This reply is valid only in DSC mode. The format for this reply is:

Byte	Hex Value	Description
0, 1	0008	Structured Field Length
2	81	Type = Query Reply
3	9A	3270 IPDS Indicator
4, 5	0000	Flags (Reserved—Must Be 0)
6, 7	0FB0	Maximum Outbound Transmission Size Allowed

Device Characteristics Query Reply:

00LL	81	A0	xx...xx

Note: The Device Characteristics query reply is valid only in LU-1 (SCS) mode.

The Device Characteristics query reply specifies the horizontal and vertical parameters of the printer's fixed-cell geometry. Horizontal parameters are valid combinations of CPI and MPP. Vertical parameters are combinations of points (1/72 inch) and MPL. The Device Characteristics query reply has the following format.

Byte	Value	Description
0–1	00LL	Structured Field Length
2	81	Type = Query Reply
3	A0	Device Characteristics Indicator
	First Descriptor	
	000D	Length of first descriptor
	FF01	Horizontal dimensional parameter Identifier
	80	SPD supported
	0A84	10 CPI, MPP = 132
	0C9E	12 CPI, MPP = 158
	0FC6	15 CPI, MPP = 198
	10DE	16.67 CPI, MPP = 220

Byte	Value	Description
	11E1	17.1 CPI, MPP = 225
Second Descriptor		
	000D	Length of second descriptor
	FF02	Vertical dimension parameter
	80	SLD supported
	0CFF	6 LPI, MPL = FF (255)
	09FF	8 LPI, MPL = FF (255)
	18FF	3 LPI, MPL = FF (255)
	12FF	4 LPI, MPL = FF (255) **Note:** The values for MPP and MPL depend on the values of the configuration settings.
Third Descriptor		
	0016	Length of third descriptor
	FF03	Page Presentation Media Parameters
	80	Page Presentation Media supported
	80	Forms control parameter supported
	05	Number of discrete Forms Controls
	FF	Use Op Panel FC setting
	00	No change to FC setting
	01	Select FC= automatic paper
	02	Select FC= automatic envelope
	03/04	Select paper/envelope.
	C0	Source drawer supported
	05	Number of source drawer parameters
	FF	Use op panel value for SD
	00	No change in SD selection
	01	Primary Drawer selected
	02	Secondary Drawer selected
	03	Auxiliary Drawer selected
	00	DDO not supported
	00	DD not supported
	00	Quality parameter not supported
	00/80	Duplex not supported/supported

Data Streams Query Reply:

0006	81	A2	00	02

Note: The Data Streams query reply is valid only in LU-1 (SCS) mode.

The Data Streams query reply indicates that the printer supports data streams. This reply has the following format.

Byte	Hex Value	Description
0, 1	0006	Structured Field Length
2	81	Type = Query Reply
3	A2	Data Streams Indicator
4	00	SCS Data Stream
5	02	IPDS Data Stream

Null Query Reply:

0004	81	FF

The Null query reply responds to a query list structured field when nothing is specified in the query list. The Null query reply has the following format.

Byte	Hex Value	Description
0, 1	0004	Structured field length
2	81	Type = Query Reply
3	FF	Null indicator

Settable Printer Characteristics Query Reply:

0009	81	A9	xx...xx

The Settable Printer Characteristics query reply indicates support of one or more printer functions or modes that can be set and reset by the Set Printer Characteristics structured field. The Settable Printer Characteristics query reply has the following format.

Note: The Settable Printer Characteristics query reply is valid only in DSC mode. It is not compatible with the IBM 3174 Controller prior to microcode Release 3.

Byte	Hex Value	Description
0, 1	0009	Structured Field Length
2	81	Type = Query Reply
3	A9	Settable Printer Characteristics Indicator
4, 5	0000	Reserved—Must Be 0
6	03	Parameter Length
7	01	Early Print Complete (EPC)
8	Bits 0, 1: 01 10 Bits 2–7: 000000	Printer Operator Control (POC) POC, EPC off POC, EPC on Reserved—Must Be 0

Save/Restore Formats Structured Field (Bidirectional)

This section describes the Save Restore Formats and the SCS Data structured fields.

LLLL	10	34	x0	Data

Note: The Save/Restore Formats structured field is valid only in LU-1 (SCS) mode.

The Save/Restore Formats structured field provides a way to save and restore a Format Parameter Control Block (FPCB) either locally (at the printer) or remotely. The Save/Restore Formats structured field must be the only or last structured field in the chain and must have the following format.

Byte	Hex Value	Meaning
0, 1	LLLL	Structured Field Length
2	10	Type = Save/Restore
3	34	Format ID
4	—	Flag Byte 00 = Save FPCB Locally at the Printer 40 = Save FPCB Remotely 80 = Restore FPCB Locally from the Printer C0 = Restore FPCB Remotely All Other Codes Reserved
5–n	—	FPCB Contents to Remote Save/Restore

Note: When the printer receives a remote `Save Structured Field`, it responds with another remote `Save Structured Field` that contains the FPCB contents. In a remote restore, the contents of the returned bytes (5 through n) must be equal to the contents of the saved bytes. Otherwise, unpredictable results will occur.

SCS Data Structured Field (Host-to-Printer)

LLLL	41	00	Data

The SCS Data structured field allows you to combine SCS data with other structured fields in the same chain. The format is as follows:

Byte	Hex Value	Meaning
0, 1	LLLL	Structured Field Length
2	41	Type = SCS Data
3	00	Partition ID
4–n	Data	SCS Data Stream

Set Printer Characteristics Structured Field (Host-to-Printer)

00LL	0F84	xx	00	03	01	xx

Note: The Set Printer Characteristics structured field is valid only in DSC mode. It is not compatible with the IBM 3174 Controller prior to microcode Release 3.

The Set Printer Characteristics structured field controls the setting and resetting of certain functions and modes. This structured field consists of a base part (bytes 0–5) that is normally followed by one or more self-defining parameters. Of these parameters, early print complete (EPC) is the only one available for your printer. The format of the Set Printer Characteristics structured field is as follows:

Byte	Hex Value	Description
0, 1	00LL	Structured Field Length If 0–5 → 0006 With self-defining parameters → 0009
2, 3	0F84	Set Printer Characteristics Structured Field Indicator
4	 00 01	Reset All Characteristics (RSTALL) Flag Off (no reset) On (reset)
5	00	Reserved—Must be 0
6	03	EPC Self-defining Parameter Length
7	01	EPC Self-defining Parameter Indicator
8	 00 40 80 C0	Set/Reset EPC (SREPC) Enable operator control EPC off, disable operator control EPC on, disable operator control Reserved

Previously sent Set Printer Characteristics structured fields can be reset without setting new ones by sending bytes 0–5 without any self-defining parameters (RSTALL=On). If only the base part is received and RSTALL=Off, no action is taken.

EPC Parameter: The EPC parameter is used to set EPC mode on or off. It allows the Early Print Complete Response Timing configuration setting to be enabled or disabled from one of the screens of the **Coax Setup Menu** of the printer operator panel. The factory default for this configuration setting is enabled (set to YES).

Note: This structured field does not take effect until the EPC configuration setting is changed in the **Coax Setup Menu**.

DSC (IPDS) Processing

In the DSC environment, IPDS mode is contained within the 3270 data stream mode of operation. These two modes are mutually exclusive. The printer rejects the 3270 data stream commands while in IPDS mode. In addition, the printer attempts to interpret the commands in the received data stream in accordance with the current printer mode. This can lead to unpredictable results if the data stream and the structured fields do not match.

DSC Load Structured Fields define parameters for IPDS operations. The three types of valid structured fields are:

- Data Chain (In DSC)
- Select IPDS Mode
- IPDS structured fields

Each of these structured fields is explained below.

Data Chain (In DSC) (Host-to-Printer)

0006	0F21	00

The Data Chain structured field allows a block of structured fields to be broken up into a number of transmissions. The division can be made without consideration for structured field boundaries or splitting control functions. A Data Chain structured field starts each transmission. The format of the Data Chain structured field is as follows:

Byte	Hex Value	Description
0, 1	0006	Structured Field Length
2, 3	0F21	Data Chain Indicator
4	Bit 0 Bits 1, 2 Bits 3, 4 Bits 5–7	Reserved Group (see descriptions below) 00 = Continue 01 = End 10 = Begin 11 = Only Inbound Control Always 00 (No change) Inbound Data Chaining is not valid Reserved—Must be 0
5	00	Reserved—Must be 0

Continue Data Chaining: The transmissions following the first transmission contain a group parameter value of hex 00 - `Continue`. One or more IPDS structured fields follow the `continue data chain` field for each transmission until the last transmission.

End Data Chaining: The last transmission in the data chain contains a group parameter value of hex 20 - End. This indicates that the following group of IPDS structured fields is the last group of structured fields for this chain.

Begin Data Chaining: The first data chain structured field has a group parameter value of hex 40 - Begin. The field immediately after the begin data chain field is the Set IPDS structured field, which selects IPDS mode. One or more IPDS structured fields follow the Set IPDS field.

Only Data Chaining: If the group parameter value equals hex 60, this data chain is a single chain. The field immediately after the data chain field must be a Set IPDS structured field. Following the Set IPDS field is one or more IPDS structured fields.

Note: End Data Chaining and Only Data Chaining reset IPDS mode.

Select IPDS Mode (Bidirectional)

0006	0F83	0000

In DSC mode, a Select IPDS Mode structured field causes the printer to switch from 3270 data stream to IPDS processing. If used with the Data Chaining In DSC structured field, the Select IPDS Mode field must immediately follow the Data Chaining field. If the Data Chain structured field is not used, the Select IPDS Mode

structured field must be the first structured field in the transmission. This field is both inbound and outbound. The Select IPDS Mode structured field has the following format.

Byte	Hex Value	Description
0, 1	0006	Structured Field Length
2, 3	0F83	Select IPDS Mode Indicator
4, 5	0000	Reserved—Must be 0

Note: The Select IPDS Mode command without chaining is treated as an only-in-chain field.

IPDS Structured Fields (Bidirectional)

IPDS structured fields contain the information for processing data in an IPDS environment. For more information about IPDS structured fields, refer to other sections of this book.

LU-1/IPDS Processing

The printer uses type 1, subset 0 FM headers for SCS data stream processing. However, IPDS uses type 1, subset 4 FM header. The format of the IPDS FM header is:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Length (Hex 06)	Type (Hex 01)	Medium Select (Hex 30)	Data Stream Profile (Hex 0D)	FM Header Properties (Hex xx)	Reserved (Hex 00)

Byte	Function
Byte 0	Specifies the FM header length (6 bytes)
Byte 1	Specifies type 1 and no concatenation
Byte 2	Specifies medium select with logical address 0
Byte 3	Specifies data stream profile select (hex 0D), meaning Set or Reset IPDS mode
Byte 4	Specifies begin/end destination select:
	Hex 40 Begin IPDS
	Hex 20 End IPDS
Byte 5	Reserved.

The first FM header contains byte 4 with a value of hex 40, indicating the start of IPDS. This header is sent as only-in-chain (OIC) with no data. IPDS data then follows in one or more chains. The last FM header contains byte 4 with a value of hex 20, indicating the end of IPDS. This header is also sent as only-in-chain with no other data. The structured fields that the printer receives between the begin and end IPDS FM headers contain the IPDS commands.

LU-1 Error Summary

The following tables summarize LU-1 errors. They show:
- The error conditions detected by the printer
- The results of each error condition
- The sense-byte codes returned to the application program
- References to information in this book about each error condition.

Function Not Available: Sense-Byte Code Hex 0863

Cause	Result	Explained In:
Illegal SA LCID selected	Stops the order	"Set Attribute (SA)" on page 256

Function Not Available: Sense-Byte Code Hex 1003

Cause	Result	Explained In:
Invalid SA byte	Stops the order	"Set Attribute (SA)" on page 256
Invalid SA value	Stops the order	"Set Attribute (SA)" on page 256
Invalid LU-1 control code	Terminates the order if the extended-order-parameter-valid bit is on in the print-order parameter byte and if the stop-on-error flag is on; otherwise, a hyphen prints and printing continues.	"LU-1 (SCS) Control Codes (Non-IPDS)" on page 250
Invalid SF type	Stops the order	"Structured Fields" on page 266
Invalid Query Code field	Stops the order	"Read Partition Query Structured Field (Host-to-Printer)" on page 267
Invalid PARMS value	Stops the order	"Structured Fields" on page 266
FM Header Reserved bits not 0	Stops the order	"FM Header Processing—LU-1 (SCS) Mode" on page 265

Invalid Parameter: Sense-Byte Code Hex 1005

Cause	Result	Explained In:
LM > MPP	Stops the order	"Left Margin" on page 258
RM < LM	Stops the order	"Right Margin (RM)" on page 258
RM > MPP	Stops the order	"Right Margin (RM)" on page 258
TAB < LM	Stops the order	"Horizontal Tab Stop (T_1...Tn" on page 258
TAB > MPP	Stops the order	"Horizontal Tab Stop (T_1...Tn" on page 258
TAB < TM	Stops the order	"Set Vertical Format (SVF)" on page 261

Cause	Result	Explained In:
TAB > BM	Stops the order	“Set Vertical Format (SVF)” on page 261
BM > MPL	Stops the order	“Set Vertical Format (SVF)” on page 261
BM < TM	Stops the order	“Set Vertical Format (SVF)” on page 261
TM > MPL	Stops the order	“Set Vertical Format (SVF)” on page 261
SHF Count = 0	Stops the order	“Count” on page 257
SVF Count = 0	Stops the order	“Set Vertical Format (SVF)” on page 261
SLD Count = 0	Stops the order	“Set Line Density (SLD)” on page 259
SLD Count > 2	Stops the order	“Set Line Density (SLD)” on page 259
Invalid SLD parameter	Stops the order	“Set Line Density (SLD)” on page 259
Invalid channel select value	Stops the order	“Vertical Channel Select (VCS)” on page 263
Query or Save/Restore SF not “Only-in-Chain” or “Last-in-Chain”	Stops the order	“Structured Fields” on page 266
Invalid SF length	Stops the order	“Structured Fields” on page 266
Invalid SF extend length	Stops the order	“Structured Fields” on page 266
Invalid SF partition ID	Stops the order	“Structured Fields” on page 266

Invalid FM Header: Sense-Byte Code Hex 1008

See “FM Header Processing—LU-1 (SCS) Mode” on page 265.

Chapter 20. Summary of IPDS for 3270-Family Controllers/Adapters

This chapter summarizes the LU-1 (SCS) and DSC requirements for IPDS communications between the IPDS printer and the:

- 3174 Controller
- 9221 ES/9000 Processor Workstation Subsystem Controller
- 9370 Information System, Workstation Subsystem Controller
- 9371 using the 3270 Adapter
- PS/2 with Micro Channel (R) PSA Card
- i-data 7913-03 and 7914-04 LAN Attachment (Requires RPQ 8B4311 or 8B4312 and Feature 4140 or 4170)

Copy Controls

The following three operations can send print data to the printer and start a print operation:

- **Host-directed copy**. The host sends print data directly to the printer and directs a print operation.
- **Host-initiated local copy**. The host prints information displayed on a terminal.
- **Operator-initiated local copy**. The display-station operator prints information displayed on a terminal.

Communication Methods

The IBM 3270-family controllers and adapters communicate with the printer in one of the communication modes shown in Figure 14 on page 284 and summarized as follows:

Non-IPDS Modes:

- DSE, LU-3 (3270 data stream)–SNA
- SCS, LU-1–SNA
- DSC, LU-0 (3270 data stream)–Non-SNA

IPDS Modes:

- LU-1–SNA
- DSC, LU-0–Non-SNA

While in LU-0 (DSC) mode or LU-1 mode, the printer can use the IPDS command structure. This structure gives the printer additional printing capabilities, such as:

- Graphics
- Font and character-set selection
- Bar code generation
- Page layout
- Stored images, overlays, and retained segments

Figure 14 on page 284 shows connections for 3270-family controllers and adapters. For PS/2 and RISC/6000 connections, refer to the documentation for those systems.

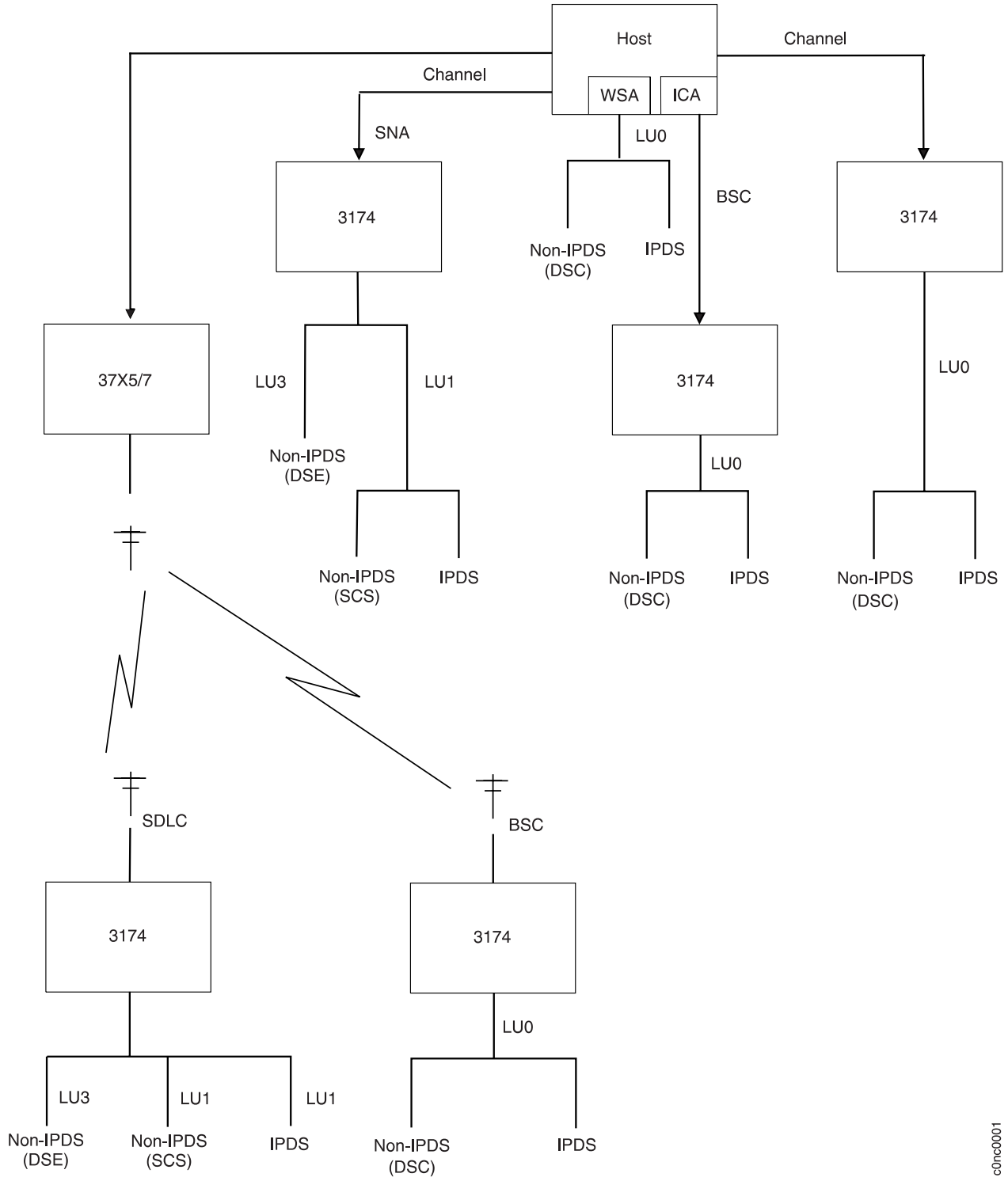


Figure 14. Communication Methods Structure

System Attachment

The printer can operate with both SNA and non-SNA control units. For SNA control units, IPDS is only valid in LU-1 mode. For non-SNA control units, IPDS is only valid in DSC mode.

For SNA (LU-1), the communication protocols with host/control unit are:
- Channel-attachment
- Synchronous Data Link Control (SDLC)-attachment

For Non-SNA (DSC), the communication protocols with host/control unit are:
- Channel-attachment
- Binary Synchronous Communications (BSC)-attachment

Data Stream Summary

The following additions to LU-1 and DSC data streams are necessary for operation with IPDS printers.

LU-1 Mode

FM Header Type 1, subset 4.

This header contains a new data stream profile (DSP) code. A DSP code of hexadecimal D selects IPDS mode of operation.

Data Stream Query Reply structured field.

This query reply indicates the valid data streams for the printer. A new data stream indicator code X'02' indicates that IPDS is valid in LU-1 mode.

DSC Mode

Data Chain structured field.

This new structured field (0F21) defines the data chaining function.

Select IPDS Mode structured field.

This new structured field (0F83) defines the selection of IPDS mode.

Data Chaining Query Reply structured field.

This new query reply structured field (with a Q code of 98) indicates that data chaining is valid in DSC mode.

3270 IPDS Query Reply structured field.

This new query reply structured field (with a Q code of 9A) indicates that IPDS is valid in DSC mode. In addition, this query reply also specifies the maximum outbound transmission size allowed.

IPDS Application in LU-1 Mode

During an LU-1 session, an application program can switch the printer from the SCS data stream to IPDS. The IPDS data stream is carried in the IPDS structured fields and, like SCS data, is processed entirely by the printer.

Determining IPDS Capability

An application can determine the IPDS capability of a printer operating in LU-1 mode by issuing a Read Partition query or a Read Partition Query List structured field. The query list, if used, should contain a Q code of X'A2' (data streams).

The printer returns a Data Stream query reply structured field containing a data stream identifier indicating IPDS (X'02'). This IPDS identifier is in addition to (and following) the base data stream identifier of SCS (X'00').

Both the Read Partition query (or query list) structured field and the query reply structured field are sent in a chain that begins with an FM header of Type 1. This header contains a destination select (DESSEL) of `Begin/End` [DESSEL=begin destination select (BDS)] along with a data stream profile (DSP) of `Structured Fields` (DSP=SF).

An FMH-1 that precedes a Read Partition query or query list has the following format:

```
0601000B6000
```

An FMH-1 that precedes a query reply has the following format:

```
0601008B6000
```

Inbound Structured Fields

When the printer is in LU-1 mode with SCS (extended) data stream, the query reply and the restore are the only structured fields sent inbound. These fields are preceded with an FMH.

When the printer is in LU-1 mode with IPDS, an IPDS acknowledge reply is the only structured field sent inbound. This field, which the printer sends without an FMH, can be an IPDS ACK/NACK.

It is also possible for the control unit to receive a solicited or an unsolicited acknowledgement (ACK/NACK) response from the printer when in LU-1 IPDS mode. When a NACK occurs, the information must be received after a `Change Direction` to allow data to flow inbound to the host.

Selecting and Terminating IPDS Mode

An application can select IPDS mode by sending an FMH-1 containing a destination select of Begin (DESSEL=BDS) along with a data stream profile of IPDS (DSP=IPDS). This FMH-1 must be sent as Only-in-Chain and cannot have any accompanying data. An FMH-1 that selects IPDS mode has the following format:

```
0601300D4000
```

After IPDS mode is selected, IPDS structured fields, in single or multi-element chains, must not have the FMH-1.

To terminate IPDS mode, an application sends an FMH-1 containing a destination select of End (DESSEL=EDS) along with a data stream profile of IPDS (DSP=IPDS). This FMH-1 must be sent as OIC and cannot have any accompanying data. An FMH-1 that terminates IPDS mode has the following format:

```
0601300D2000
```

Terminating IPDS mode causes LU-1 to return to its default data stream (SCS).

BIND

The BIND sent to establish an LU-1 session on which IPDS is used must indicate `FM Headers Allowed` (byte 6, bit 1=1).

End Bracket

If End Bracket (EB) is used with an FM data chain containing IPDS structured fields, IPDS mode is implicitly terminated following the processing of last-in-chain. This results in the loss of printer-generated IPDS ACK/NACKs occurring at last-in-chain.

To avoid this loss, do not use EB to terminate IPDS mode. Instead, use an FMH-1 containing DESSEL=EDS, DSP=IPDS. If you also want to terminate the bracket, EB may be used on the chain carrying the FMH-1. Figure 15 shows the LU-1 data stream modes.

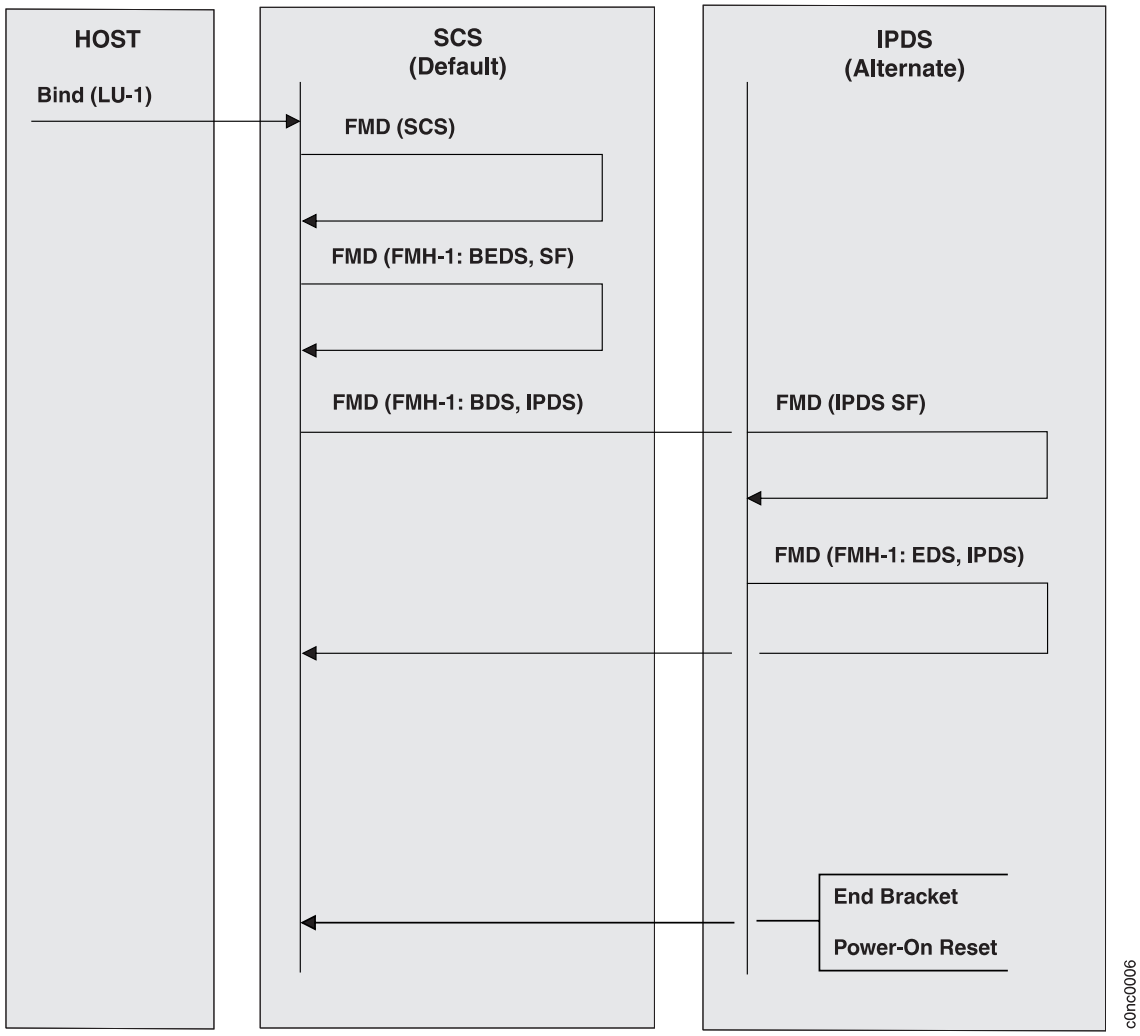


Figure 15. LU-1 Data Stream Modes

Implicit Termination of LU-1/IPDS Mode

If LU-1/IPDS mode is active, any of the following terminates the active destination selection and is an implicit termination of LU-1/IPDS mode:

- End bracket
- Power-On Reset

Note: IPDS always returns to home state upon termination.

IPDS and Local Screen Copy

An IPDS print job consisting of multiple chains is momentarily interrupted by an Operator-Initiated Local Screen Copy (OILC).

You can avoid this situation by sending the IPDS job as a single chain, effectively blocking the OILC until printing is complete. A single chain also improves printer performance.

Since an EB is also an implicit termination of IPDS mode, with-bracket printer-sharing can be used for either operator-initiated or host-initiated copy operations.

Error Recovery in LU-1 IPDS Mode

The unit of error recovery for a spooled device is the entire print job. The unit of error recovery is a page boundary if the printer, while directly attached, receives one of the following:

- OIC data
- A page of data by a sequence of begin, middle, and end chains

A SNA chain is not a unit of error recovery.

To ensure completion of all deferred printing, a complete chain of IPDS structured fields should end in home state. The printer forces IPDS into home state, if necessary, to force deferred printing to occur when IPDS terminates.

IPDS ACK/NACK Sequence in LU-1 Mode

Under certain conditions, the printer can have inbound data to send to the host. This can be because of an `Acknowledgement Request` condition on the prior outbound transmission, or because of an error condition to be reported with a NACK.

When the printer is in LU-1 mode with IPDS and the printer has inbound data to send, the following sequence occurs:

1. The printer returns `Order Complete` to the control unit.
2. The printer also returns `Input Code Available` status with either of the following:
   - Input code X'50' (attention)
   - Input code X'6F' (ACK/NACK data available)
3. The control unit, upon receiving a code X'50', will send a Signal command to the host to get direction if it does not already have it. When the control unit has the direction, it will send a `System Status Available` (SSA) order to the printer, placing the printer in send state. The printer then includes `Input Code Available` (X'6F') in the buffer to indicate ACK/NACK data available. If the printer is already in send state, the attention sequence is not performed.
4. When the control unit receives input code X'6F', it reads the inbound ACK/NACK data. This inbound data is not preceded by an inbound FMH structured field.

Figure 16 on page 289 shows the IPDS error-reporting sequence in LU-1 mode.

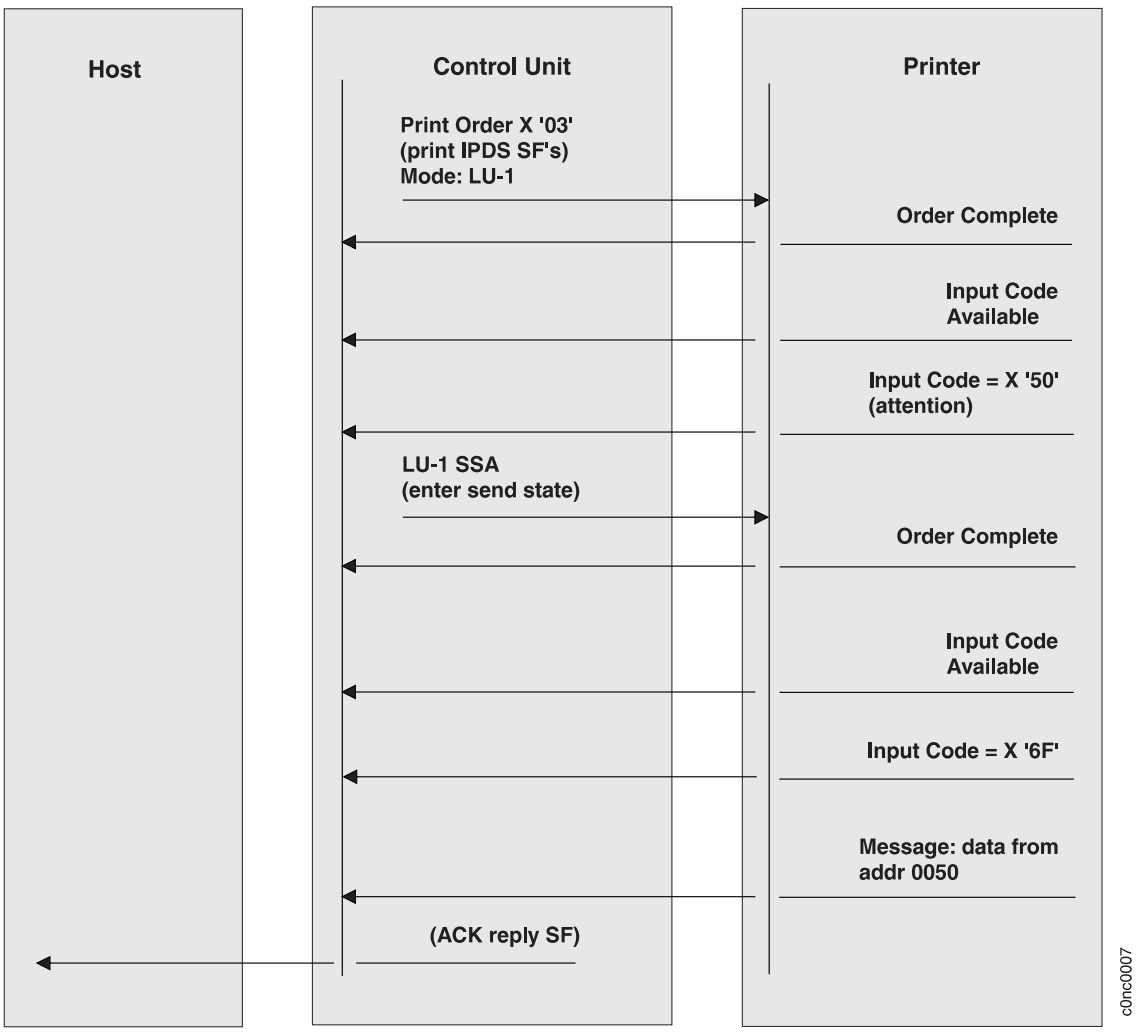


Figure 16. Reporting IPDS Errors Using the ACK in LU-1 Mode

IPDS Application in DSC Mode

An application program can switch the printer from the 3270 data stream to IPDS during a DSC session. The IPDS data stream is carried in the IPDS structured fields and is processed entirely by the printer. This differs from the 3270 data stream, which processes the data in the control unit before sending it to the printer.

Determining IPDS Capability

An application can determine the IPDS and data-chain capability of a printer operating in DSC mode by issuing a Read Partition query or a Read Partition Query List structured field. The query list, if used, should contain a Q code of X'9A' (3270 IPDS) and a Q code of X'98' (data chaining).

The printer returns a 3270 IPDS query reply and a data-chaining query reply.

In DSC mode, all outbound data streams containing structured fields are sent using the Write Structured Field (WSF) command. All inbound data streams containing structured fields begin with the attention identifier (AID) code of X'88'.

Inbound Structured Fields

When the printer is in DSC mode with the 3270 data stream, the query reply is the only structured field sent inbound.

When the printer is in DSC mode with IPDS, Select IPDS Mode (SIM) and IPDS Acknowledge Reply are the only structured fields sent inbound. The printer can send a SIM structured field inbound only if it has previously received an outbound IPDS structured field and a reply is required with the Acknowledge Reply structured field. This field can be an IPDS ACK/NACK.

Selecting and Terminating IPDS Mode

An application can select IPDS mode by sending a SIM structured field (X'0F83') at the beginning of each transmission containing IPDS structured fields. If the application is using data chaining, the SIM structured field must follow in the same transmission. A SIM structured field must not be sent with a continue or end chain.

IPDS mode terminates at the end of the transmission containing the SIM structured field unless data chaining is in effect.

IPDS mode remains in effect until the end of a transmission containing a Data Chain structured field that indicates End is received.

When IPDS mode terminates, the application returns to the base data stream (3270).

Note: For channel-attached control units, a transmission is defined as the data transferred by a WSF command (that is, a channel control word [CCW]).

Figure 17 on page 291 shows the DSC data stream modes.

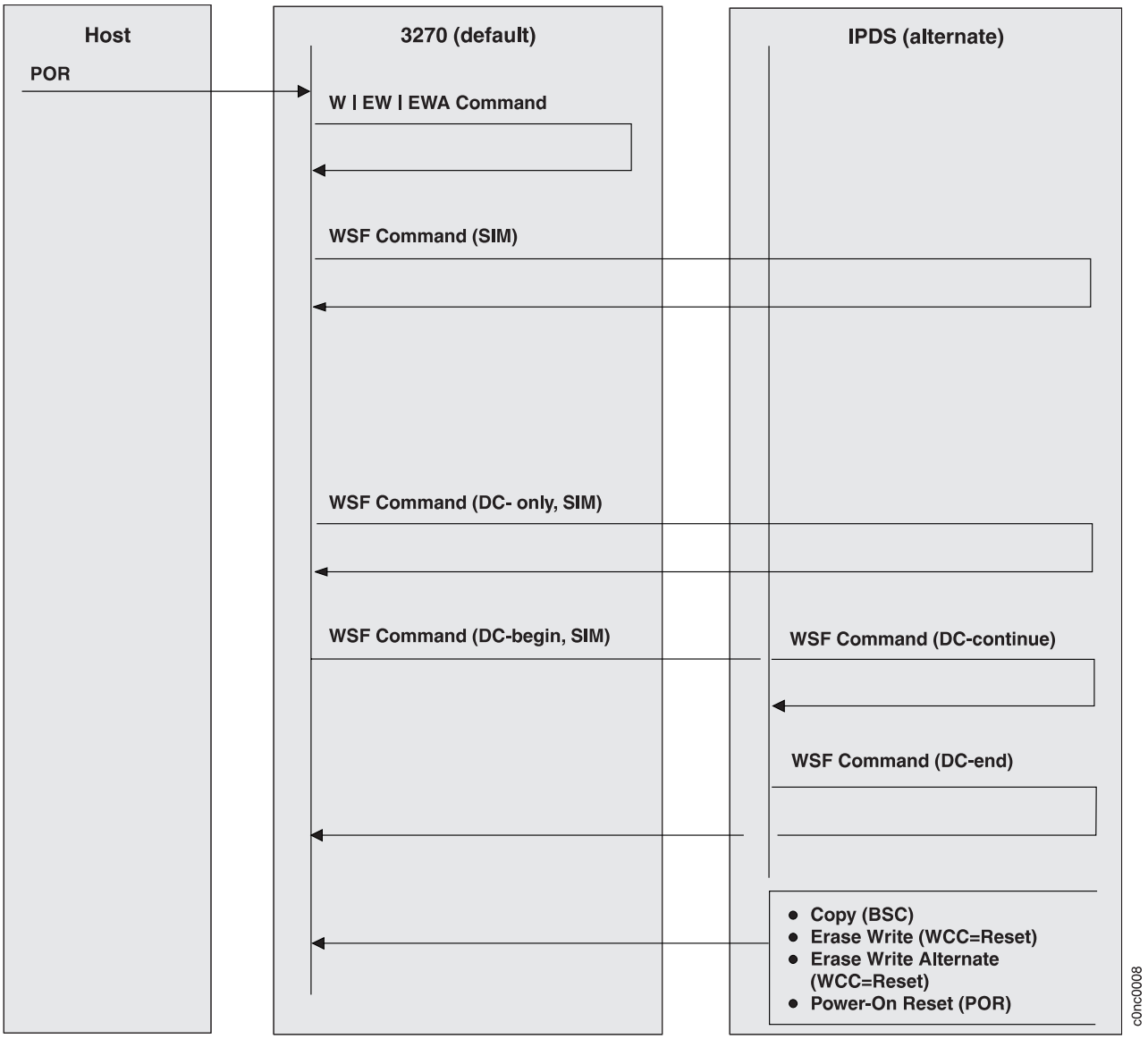


Figure 17. DSC Data Stream Modes

Implicit Termination of DSC/IPDS Mode

If IPDS mode is active across more than one transmission through the use of data chaining, any of the following terminates the in-chain state and is an implicit termination of IPDS:

- Copy (BSC)
- Erase Write (WCC=Reset)
- Erase Write Alternate (WCC=Reset)
- Power-On Reset

Notes:

1. Termination of in-chain state and IPDS does not occur if these commands are received as `Partition Commands` within an outbound 3270 data stream structured field.
2. IPDS always returns to the home state upon termination.

Abnormal Termination of Printer Operation

Any of the following causes rejection of the transmission with sense = `Op Check` and causes the control unit to send an `End` to the addressed printer:

- Receipt of a Data Chain structured field indicating `Continue` or `End` when not in chain state
- Receipt of a Data Chain structured field indicating `Begin` when already in chain state
- Receipt of any 3270 command when in chain state except Write Structured Field, Erase Write (WCC=Reset), or Erase Write Alternate (WCC=Reset)
- Receipt of a WSF command that does not contain a Data Chain structured field.

Copy Considerations

If a BSC Copy command is received when in IPDS mode, IPDS mode terminates and the BSC Copy operation occurs.

The printer is not available for operator-initiated copy operation when in IPDS mode. An OILC momentarily interrupts an IPDS print job consisting of multiple chains. Avoid this situation by sending the IPDS job as a single chain, effectively blocking the OILC until printing is complete. A single chain may also improve printer performance.

Chaining and Error Recovery in 3270 IPDS Mode

A chain is a unit of error recovery. At the end of the chain, the printer delays sending `Operation-Complete` to the control unit until all the received data prints.

To ensure that all deferred printing completes, a chain of IPDS structured fields should end in home state. The printer forces IPDS into home state, if necessary, to force deferred printing to occur when a chain terminates.

If chaining is not used, each transmission should end in home state. If necessary, the printer forces entry into home state.

IPDS ACK/NACK Sequence in DSC Mode

Under certain conditions, the printer can have inbound data to send to the control unit. This can be either because of an `Acknowledgement Request` condition on the prior outbound transmission or because of an error condition to be reported with a NACK.

When the printer is in DSC mode with IPDS and has inbound data to send, the following sequence occurs:

1. The printer returns `Order Complete` to the control unit.
2. The printer also returns `Input Code Available` status with a code of X'6E' (ACK/NACK data in buffer).
3. The control unit, upon receiving a X'6E', reads the inbound ACK/NACK data. This data is preceded by a Select IPDS Mode structured field (X'00060F8300').

Figure 18 on page 293 and Figure 19 on page 294 show the IPDS error-reporting sequence in 3270 mode.

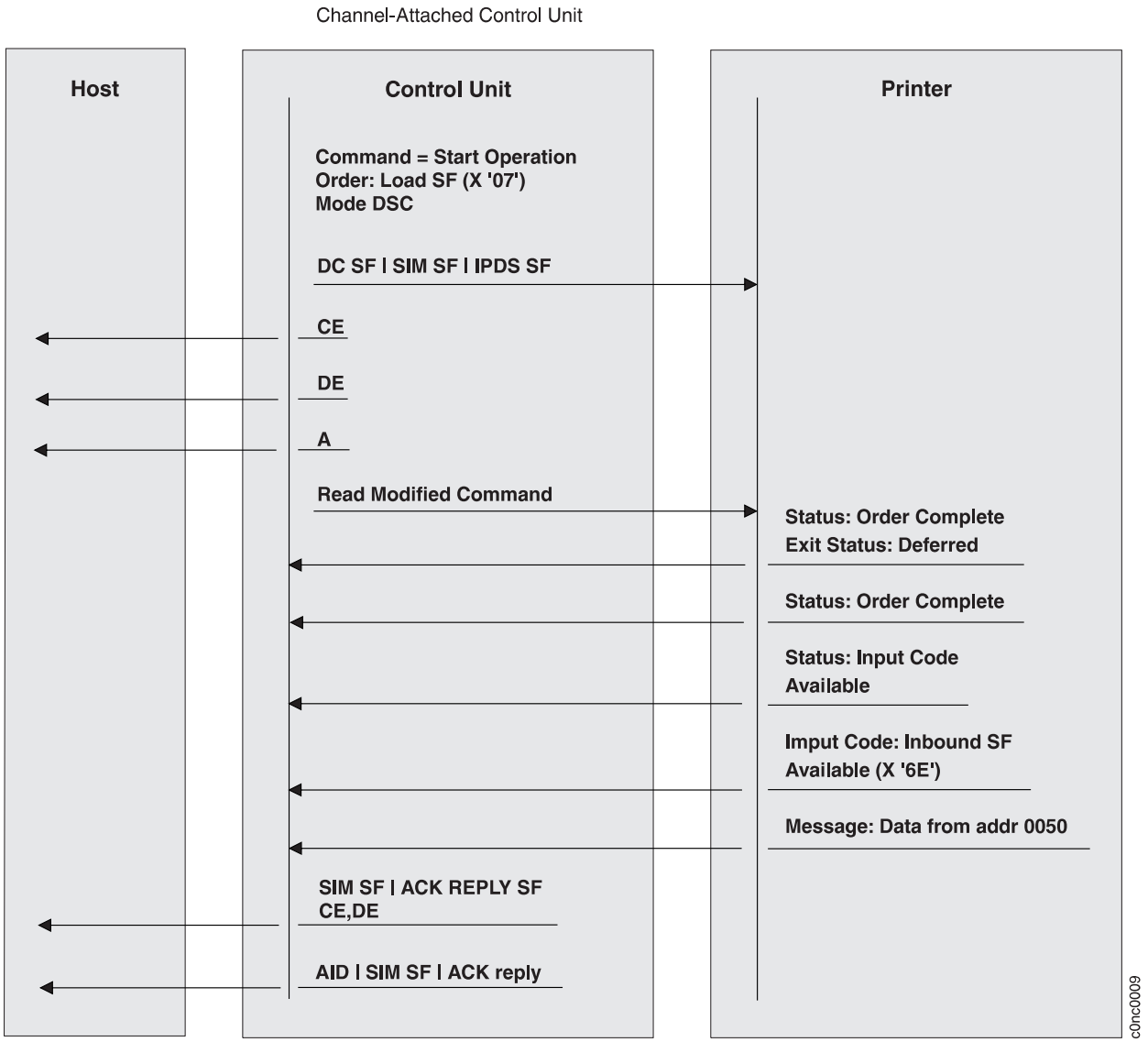


Figure 18. Reporting Errors Using the ACK SF in 3270 Mode

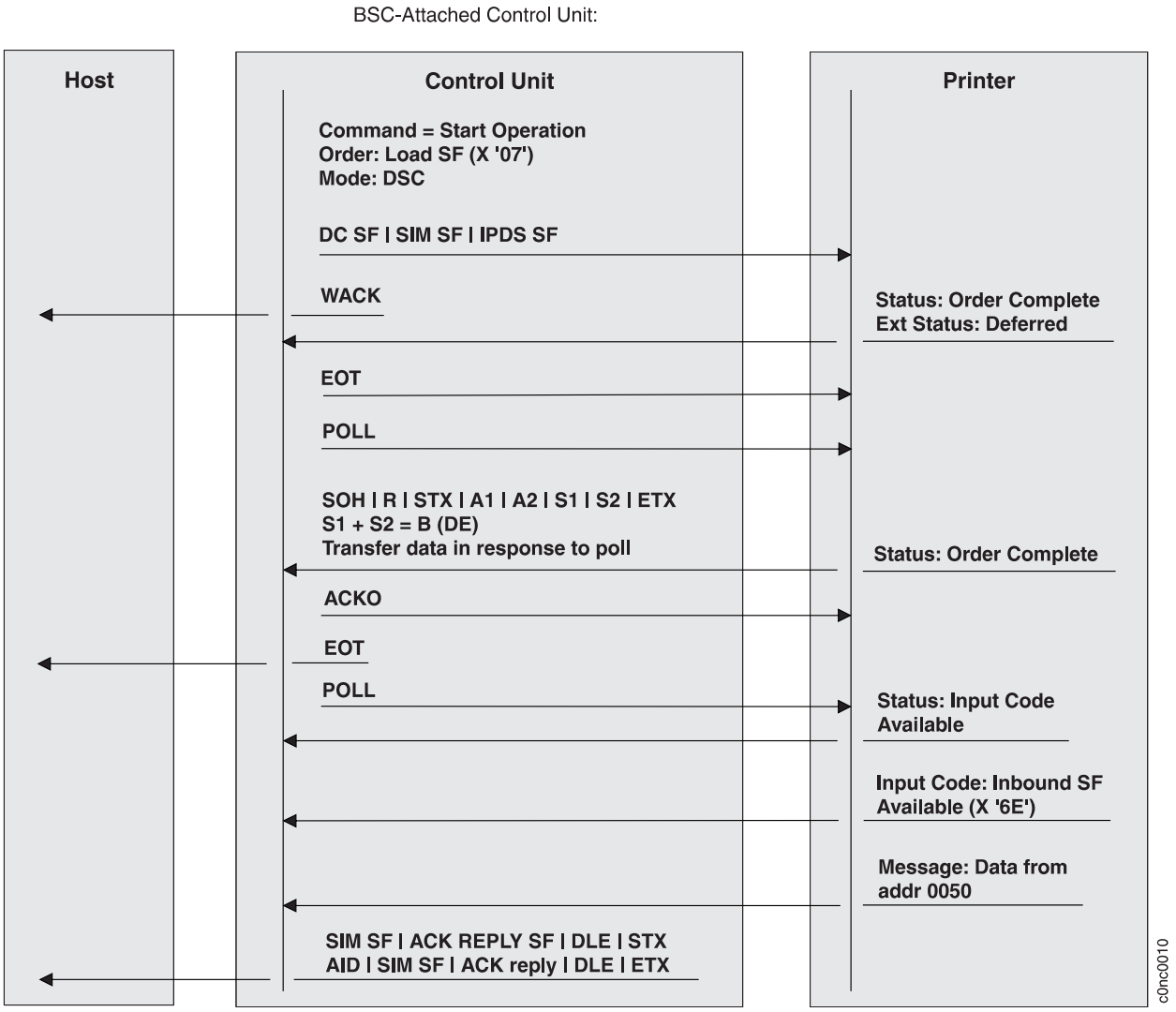


Figure 19. Reporting Errors Using the ACK SF in 3270 Mode

Not-in-Chain

Following the inbound transmission of an IPDS ACK/NACK at data chain end or data chain only (or implied only), a host acknowledgement is required to free the printer for local copy (if so configured).

Valid host acknowledgments are the same as those allowed for inbound transmission of a Query Reply. Examples of valid acknowledgments are an EW or EWA (with or without a WCC) or a WSF (with or without structured fields).

In-Chain

For inbound transmission of an unsolicited IPDS NACK after data chain start but before data chain end, the next WSF command carrying the data chain continue or data chain end can serve as the host acknowledgement of the NACK.

VTAM/NCP Programming Considerations

When using a remote control unit with IPDS, consider the following for programming support.

The VTAM/NCP transmission subsystem supports printer operation to a BSC-attached remote control unit without depending on the presence of a WCC indicating `Start Print` in the data stream.

The WSF command sends IPDS data from the application program to the printer. This data (contained within structured fields) does not include a WCC. In IPDS mode, the start of printing depends on the content of the data stream and conditions within the printer.

Transmissions to a printer in IPDS mode can therefore receive either an ACK response or a writer acknowledge reply (WACK) response from the control unit. The WACK response is the only positive indication that BSC sense/status indicating `Device End` will subsequently be sent by the control unit.

Chapter 21. Sending ASCII Data and PCL Commands to Network Printers over Coax and Twinax

Chapter Overview

This chapter describes the commands, methodology, and pitfalls of sending ASCII data and PCL commands to network printers via non-IPDS coax and twinax. This chapter is intended for the customer who would like to adapt his non-IPDS printing to use PCL resources and enhanced function that PCL can give over the standard SCS, PDS, or DSE/DSC command sets. It also can be used to aid in configuring network printers to accept ASCII data and PCL commands that were previously designed to other coax and twinax converters.

Introduction

IBM printers have a great heritage in printing from IBM hosts over coax and twinax media. Both IPDS and non-IPDS data streams are widely used throughout the world in a wide range of business applications.

The IPDS data stream was developed with the laser printer in mind. Its almost limitless command set and highly structured architecture make it ideal for the forms and complex document application.

The SCS, DSE/DSC, and PDS data streams (referred to as non-IPDS data streams from here on) were developed mainly for impact printers. Their command sets are more simple and there function is more limited than IPDS. They are still very efficient for printing simple documents and obtaining screen printouts and simple text applications.

Some customers now need to use more of the printing options of laser printers (extra fonts, forms or overlays, spacing, and format changes) that are not supported by the non-IPDS command sets. Many are moving to IPDS (especially with the low price for the upgrade on network printers), but others have a large legacy of non-IPDS applications and cannot make the move. Others have a large base of PC based applications and need to distribute the documents generated by those applications to printers via coax and twinax host networks. This is where being able to send PCL commands and ASCII characters becomes necessary.

Overview

IBM Coax and Twinax Network Interface Cards for network printers convert non-IPDS data streams into PCL data streams for printing. This is how ASCII transparency (sending non-EBCDIC encoded data in an EBCDIC based data stream) is possible.

Note: This document only deals with coax and twinax network interface cards. The IBM Ethernet and Token-Ring network interface cards for network printers can be used to enable network printers to receive IPDS, PCL, and PostScript.

One must understand the concept of how the converter works in order to avoid problems in inserting extra PCL in the stream.

- The network interface card does NOT rely on any PCL default parameters that are set in the PCL Menu of the printer.
- Network printers can have multiple connections or interfaces. Each interface is able to request and relinquish control of the printer. This is contrary to non-IPDS data streams. They always expect to have total control of the printer.
- The network interface card requests and obtains control of the printer when there is printable data transmitted on the coax or twinax line. This establishes a session.
- The network interface card relinquishes control of the printer when there has been no printable data sent over the line for the period set in the PORT TMEOUT values on the Coax Setup Menu or the Twinax Setup Menu. This ends a session.
- The network interface card maintains the state of the non-IPDS operator panel settings and non-IPDS data stream commands (NOT any transparent commands) internally between sessions with the printer controller (the PCL interpreter.) It will send all of the parameters to the PCL interpreter at the beginning of each session and each time it re-aquires control of the printer after a timeout.
- The users inserted PCL commands must be sent with each job to ensure that these settings were not lost over a network interface card timeout period.

Below is an example of the initialization commands that the network interface card sends to the PCL interpreter at the beginning of every “session”.

Note: The # character represents the X'1B' (the PCL Escape character.) Some commands are sent more than once. The last call of any command has precedence.

```
#%-12345X@PJL SET LPARM:PCL EDGETOEDGE = OFF
#&l1H#&l1G#&l0S#&l26A#&l3O#&l0;16c124e2306F;
#&l5;6000C#&a0R#;*c5415y0T#(12U#(s0p13.3H#(s3T
#(s0b0S#&k9H;
```

Assigning an ESC (Escape) Character

Assign and use a character called an ESC character to tell the network interface card when a special sequence (data that is not normally in a non-IPDS data stream) is coming.

Note: Do not confuse this ESC character with the ASCII X'1B'. The term is the same, but this new ESC does NOT take the place of the X'1B' in the PCL commands. The ASCII X'1B' is referred to in this chapter as the ASCII escape character or the PCL escape character. When you see ESC it refers to the coax or twinax data stream character that the user has defined for sending special commands or transparent data.

With an ESC character, one can do the following:

1. Send HEX data (00 to FF) directly to the printer
2. Changing the settings of the network interface card (settings that deal solely with the coax and twinax interface). You can also change printer menu settings, although these changes last only until you power off the printer.
3. Send special commands to the network interface card (for example, save the contents of temporary memory in permanent memory).

The special commands in items 2 and 3 above are called FSL (Function Select via the Line.) These commands always start with the defined ESC character and usually end with an ESC. They are used to change the settings in the network interface card and to manipulate the network interface card memory.

This ESC character can be any printable character except:

- “,” “;” and “:” These are used as special command separators
- 0 thru 9 Could be confused as Hex data
- A thru F Could be confused as Hex data
- a thru f Could be confused as Hex data
- K,S,T,X,Y,Z These are introductory letters in FSL commands
- certain national characters
  - EBCDIC HEX - 4A 4C 4F 5A 5F 6A 79 7B 7C 7F A1 C0 D0 E0

    There are times (e.g. when you change printer language) when some of these characters are allowed, but avoid them if possible.
- The single quote (’) character. This is used in FSL to use readable characters in a command. (It makes FSL much easier to read.)
- & and ? These are the intro characters to define a temporary ESC character.

The usual characters to use are $,%,#,@,*,<, or >. Just be sure that it is a character that is not normally within the text the you want printed.

Once a character has been defined as the ESC character, it cannot be printed or used as a normal character. However, it is not necessary to have an ESC character defined permanently. When the ESC character has served its purpose, it can be deleted.

Defining the Temporary Escape Character

No ESC character is defined when you initially install the network interface card. If you wish to change the settings from the host system, you will have to define an ESC character. How to define “%” as the temporary ESC character follows:

```
&&??%
```

The five characters shown should be sent to the printer from the host system via your coax or twinax cable. (Just as if your wanted to print these five characters on the paper.) The ESC character is not defined permanently. When the printer is turned off, it will be lost. See “Defining a Permanent Escape Character” below for information on the definition of a permanent ESC character.

Removing the Temporary Escape Character

If you wish to remove the temporary ESC character order to use that character as a printable character, you can send the following string to define nothing as the ESC character:

```
&&??%
```

Note: The character following the second ? can be a space, new line, or formfeed (something other than a printable character.)

The temporary ESC character will also be removed when the commands for storing and restoring settings are used.

Defining the Permanent Escape Character

If you wish to define and save a permanent ESC character in the network interface card, you will have to define a temporary escape character, use FSL Function Y48, select Permanent Escape Character (this will be our first use of a FSL command,) and save the settings in the permanent memory by the command (ESC) X1 before powering off.

You can define the permanent ESC character in the following manner:

```
In apostrophe notation, e.g. %Y48,'<'%
```

Note: You may also define the permanent ESC character in hex form in FSL Function Y48, but because of translations between LU1 and LU3 characters in coax, the hex value for the character '<' is different between coax and twinax.

```
%Y48,09% would define the '<' as ESC character for coax
%Y48,4C% would define the '<' as ESC character for twinax
```

Note: If the character used in FSL Function Y48, Select Permanent Escape Character, is different from the one specified as temporary ESC character, the latest specified character (i.e. the one you have just specified in the FSL Function Y48) will take precedence immediately after you have defined FSL Function Y48.

Below is an example file that sets the permanent ESC character to < and saves it in permanent memory.

```
&&??%
%Y48,'<'%
<X1
```

Note: The temporary ESC character (%) is overwritten by the defined permanent ESC character (<).

Removing the Permanent Escape Character

The permanent ESC character may be removed again in the following ways:

1. Set FSL Function Y48, Select Permanent Escape Character, to "00" (No ESC character). (See the example following this list.)

   OR

   Define a new temporary ESC character as described above
2. Save the settings using the command "<ESC>X1".

Examples of these commands are shown below: (In the example, the permanent ESC character is "<" and the temporary ESC character is "%".):

```
<Y48,00<
&&??%
%X1
```

Note: This removes the permanent ESC character.

Passing PCL Commands

Passing PCL commands in a non-IPDS data stream would be easy if it were not for the ASCII Escape character (X'1B') that needs to precede them. This is because there is not a simple way to send this X'1B' for it is an "unprintable" character. (It normally would print as a dash or a space if sent as a X'1B' over the non-IPDS

data stream.) All of the other characters in PCL commands are readable and printable and just sent to the PCL interpreter. We therefore have special ways for sending the ASCII escape character in a non-IPDS data stream.

When an ESC character has been defined, you may send any HEX code to your printer. Below you will see an example of how this is done ("%" is the defined ESC character.) This PCL command will select the Roman 8 symbol set.

```
%% 1B 28 38 55 %
```

In the string sent above the two leading ESC characters tell network interface card that the following characters should be treated in pairs as HEX codes until the next ESC character is found in the data stream. Such commands may be found in the PCL and Postscript Technical Reference manual for your printer.

Note: In command strings in hex pair notation, only the hexadecimal characters 0-9 and A-F are allowed. The specifying of any other character will give unpredictable printing results.

Between the two leading and the trailing ESC character all control characters (i.e. new line, carriage return), spaces, and the character "," will be ignored by the network interface card. They may be inserted in command strings to facilitate the reading of the data stream.

There are 5 ways to send transparent data thru non-IPDS. Each are listed below and explained in detail in the next sections.

1. Using the SCS/PDS Transparency command (X'35' for coax, X'03' for twinax.)
2. Single byte transparency where 1 byte of HEX data is sent to the printer by using an escape character followed by 2 HEX characters which will be passed to the printer as 1 byte.
3. Multi-byte transparency with the following methods:
   - one or more bytes of HEX data can be sent to the printer by using two ESC characters to start the transparency and one or two ESC to end it. (As in the previous example in this section.)
   - one ESC character followed by a decimal count byte that defines how many of the following characters are to be sent as transparent.
   - a string consisting of 1 to 5 characters to start the transparency and a string of 1 to 5 characters to end it.
4. Strings that can produce HEX 1B to the printer (**Coax ONLY**)

   ```
   <ESC><ESC>!TEXT<ESC><ESC>          Y47 = 3
   <lead-in>TEXT                      Y48 n2 (lead-in)
   ```

5. Filtered pass-through mode (or filter mode) where only transparent data in pass-through mode is sent to the printer. Filtered pass-through mode can be used to document/comment printer set-up files or other transparency applications. (**Coax ONLY**)

   ```
   <lead-in>-<lead-out>          Y48 n2 (lead-in) and
                                 n3 (lead-out)
   <lead-in>+<lead-out>          Y48 n2 (lead-in)and
                                 n3(lead-out)
   <ESC><ESC>-<ESC><ESC>         Y47 = 3
   <ESC><ESC>=<ESC><ESC>         Y47 = 3
   <ESC><ESC>+<ESC><ESC>         Y47 = 3
   ```

The PCL Reset command 1B45 (45 ASCII or E) will be used as the example PCL command in the detailed descriptions that follow.

SCS Coax Transparency Command (35 .....)

The SCS/PDS command set (not the DSE/DSC) have a built in command for passing non-EBCDIC data to a printer. Unfortunately, by default in past printers, you can only pass what the Coax SCS interpreter “thinks” are printable EBCDIC characters. These are the EBCDIC values X'40' thru X'FE'. This restriction can be circumvented with the use of FSL Function Y37=4. This function setting tells the network interface card to pass any hex value within this command to the printer as received across the Coax line.

FSL Function Y37 Syntax:

```
<ESC>Y37,4<ESC>
```

Note: Unless you include this FSL Function in every job, you will need to save the setting permanently with FSL Function X1. See “FSL Function X1 - Save Settings” on page 314 .

SCS/PDS Transparency Command Syntax:

```
X'35' <length> Hex data
```

Example:

```
35 02 1B 45
```

The above will send a X'1B45' to the printer which is an PCL reset command. (i.e. X'1B' E)

PDS Twinax ASCII Transparency Command (03 .....)

The Twinax version of the Transparency command is much easier to use. There are no restrictions on the hex data that can be sent within the confines of this command. Whatever hex is received across the twinax line that is within the length of this command’s length byte will be sent as the same hex to the PCL interpreter. (i.e. no FSL Function is needed.)

Syntax:

```
03 NN xx xx xx xx .........
   where: NN is the number of Transparent bytes that follow (not
          including the length byte.)
```

Example:

```
03 02 1B 45
```

The above will send a X'1B45' to the printer which is an PCL reset command. (i.e. X'1B' E)

Single Byte Transparency

There are two cases:

1. Twinax and Coax factory default.

   This function is used for sending HEX data transparently to the printer with the following command:

   Syntax: <ESC>HEX pair

   EXAMPLE: (“%” is the temporary ESC character)

   ```
   %1B
   ```

will send ASCII X'1B' to the printer (The PCL Escape character). Therefore, an entire PCL RESET command could be sent with:

```
%1BE
```

which would send ASCII X'1B45' (EscE) to the printer's PCL interpreter.

Note: Be aware of the following situation if your non-IPDS application or printer queue (driver) inserts new lines for formatting. If you place <ESC>1B&l#A; PCL command in your non-IPDS data stream it may come in a place where your host thinks it wants a New Line <NL> for formatting purposes. Therefore, what could get sent over non-IPDS to the printer is <ESC>1B<NL>&l#A; which would not be taken by the PCL interpreter as a PCL command. To avoid this condition, use the <ESC><ESC> multi-byte method because all non-IPDS control codes are ignored within the limits for the initial <ESC><ESC> and the ending <ESC>. See "Multi-byte Transparency" for details.

2. **COAX ONLY** - FSL Function Y47 = 2 (<ESC>Y47,2<ESC> has been sent to the printer)

   This is known as Tel-a-graph mode. (Tel-e-graph mode can be used to send multi-byte transparency too. Here we just illustrate how it can be used to send a single byte.) The first two digits after the ESC character are a counter, in **decimal** format, that is used to determine the length of the string to be sent. (i.e. You are telling the FSL command interpreter ahead of time how many bytes of transparent data are being sent.)

   Syntax: <ESC>01 HEX Pair

   EXAMPLE: ("%" is the temporary ESC character)

   ```
   %011B
   ```

   When FSL Function Y47 = 2, this will send ASCII X'1B' to the printer's PCL interpreter. So to send a PCL Reset to the printer in this mode you send:

   ```
   %011BE
   ```

   across the Coax cable from your host to the network interface card.

Multi-byte Transparency

The syntax for pass-through of more than 1 byte of HEX data (as it is with 1 byte) to the printer will depend on the values set in FSL Function Y47 and/or the values defined for lead-in and lead-out string defined in the FSL Function Y48 n2 and n3 parameters.

Note: FSL Function Y48 was not implemented for parameters n2 and n3 in the IBM 3912/16, and 3112/16 and early releases of the IBM Network Printers. Contact IBM Network Printer Technical Support to find out if your code level supports these parameters.

1. Default - **THIS IS THE BEST WAY TO DO TRANSPARENCY!**

In the factory default case for FSL Functions Y47 and Y48 (i.e. Y47=1 and Y48 parameters n2 and/or n3 have not been defined) The way to enter and exit HEX transparent data mode uses two ESC character preceding the transparent data and one that follows it.

Syntax:

```
<ESC><ESC>HEX data<ESC>
or
<ESC><ESC>'TEXT'<ESC>
or
<ESC><ESC>HEX data'TEXT'<ESC>
```

Examples that will send ASCII X'1B45' to the printer are:

```
%%1B45%
%%1B 45%
%%1B,45%
%%1B'E'%
```

Hexadecimal data must either be in HEX pairs (00-FF) or entered as text within apostrophes (for example, 'text'). See "Apostrophe Notation" on page 309.

Spaces, commas and IBM control codes (such as New Lines, Line Feeds, and Carriage returns) within a multi-byte transparency string are ignored. Therefore, spaces, commas, and New Lines can be used to make the hexadecimal data more readable.

- **COAX ONLY** FSL Function Y47=2 (<ESC>Y47,2<ESC>)

  This FSL Function Y47 setting configures transparency for Tel-a-graph mode (Function Y47=2), the first two decimal digits after the ESC character are used to determine the length of the string to be sent.

  Syntax:

  ```
  <ESC><count>HEX DATA
  ```

  Examples that will send the digits 0123456789 to the printer:

  ```
  %10303132333435363738 39
  %10 30 31 32 33 34 35 36 37 38 39
  ```

  Note: The count byte is in decimal, not hexadecimal (i.e. base 10 not base 16.)

  Hexadecimal data must be in HEX pairs (00-FF). Commas are not allowed in this multi-byte hexadecimal string.

  Apostrophe notation is not supported.

  Spaces and IBM control codes between HEX pairs in this multi-byte hexadecimal string are ignored.

  The following syntax can also be used when FSL Function Y47=2:

  ```
  <ESC><ESC>HEX data<ESC>
  or
  <ESC><ESC>'TEXT'<ESC>
  or
  <ESC><ESC>HEX data'TEXT'<ESC>
  ```

  (i.e. The double ESC character syntax is just like when FSL Function Y47=1.)

- FSL Function Y47=3

  Note: Again remember that FSL Function Y47 has not been implemented in IBM Twinax attachments to date.

  When Function Y47=3, the two leading ESC characters denote that the following characters will be treated in pairs as HEX codes until the next two ESC

characters in the data stream are encountered. (Remember that when Y47=1 you only need one ESC to terminate the transparency.)

This FSL Function setting has been developed to adapt IBM Network Printers Coax and Twinax attachment to other vendors methods of signalling transparent data. Avoid using these parameters if you do NOT have old data streams that you must support.

Syntax:

```
<ESC><ESC>HEX data<ESC><ESC>
or
<ESC><ESC>'TEXT'<ESC><ESC>
or
<ESC><ESC>HEX data'TEXT'<ESC><ESC>
```

Examples that will send ASCII HEX 1B45 to the printer:

```
%%1B45%%
%%1B 45%%
%%1B,45%%
%%1B'E'%%
```

Hexadecimal data must either be in HEX pairs (00-FF) or entered as text within apostrophes: 'text'. See "Apostrophe Notation" on page 309.

Between the two leading and trailing ESC characters, all spaces, IBM control codes (i.e. Carriage Returns and Line Feed's) and commas will be ignored when in HEX transparent mode. They may be inserted in the data stream to make it more readable.

- FSL Function Y48, n2 (lead-in) and n3 (lead-out)

  FSL Syntax:

```
<ESC>Y48,n1{;}{n2}{;}{n3}<ESC>
      where:   n1 - defines the permanent ESC character
                    00 is the default (i.e. no permanent ESC character)
               n2 - lead-in characters in apostrophe notation (note
                    the ; is used as separator here)
               n3 - lead-out characters in apostrophe notation
      note: n2 and n3 parameters are optional
```

  Note: FSL Function Y48 with parameter n1 is valid for the coax versions of the IBM 3912/16 and 3112/16 printers as well as the coax versions of network printers. Parameters n2 and n3 are implemented in coax code levels 1.01 and greater. FSL Function Y48 has never been implemented in any IBM Twinax printer to date. Please contact IBM Network Printer Technical Support to see if your current printer code supports these parameters.

  When the lead-in and lead-out strings defined in the Function Y48 n2 and n3 parameters are used for multi-byte transparency, the lead-in string denotes that the following characters will be treated in pairs as HEX codes until the lead-out string in the data stream is encountered.

  Note: This FSL function has been developed to adapt the IBM Network Printers Coax and Twinax attachments to other vendors methods of signaling transparent data. Avoid using these parameters if you do NOT have old data streams that you must support.

  Syntax:

```
<lead-in>HEX data<lead-out>
```

The lead-in string can be from 1 to 5 characters and must be defined in FSL Function Y48 in apostrophe notation. The only restriction is that it must not begin with the character defined as the ESC character or the ampersand (&) character.

The lead-out string can also be from 1 to 5 characters and must be defined in FSL Function Y48 in apostrophe notation. The lead-out string must not begin with valid HEX values (0-9, A-F, a- f).

FSL Example of a definition of a lead-in and lead-out string:

```
&&??%
%Y48,;'@#';'#@'%
```

Note: There is no permanent ESC character defined in this example.

Example of using the lead-in and lead-out string to send ASCII HEX 1B45 to the printer:

```
@#1B45#@
@#1B 45#@
@#1B,45#@
```

Hexadecimal data must be in HEX pairs (00-FF).

Spaces, commas and IBM control codes between HEX pairs are ignored when in HEX transparent mode. Commas and spaces can be used to make the hexadecimal data more readable.

Strings that can produce HEX 1B to the printer

1. **COAX ONLY** - FSL Function Y47=3 (<ESC>Y47,3<ESC>)

   If FSL Function Y47=3, an ASCII HEX 1B will be produced when an exclamation mark is found inside a multi-byte transparency string.

   An exclamation mark must immediately follow the two leading ESC characters and all other characters inside the multi-byte transparency string have to be text as HEX data is not supported. You may include as many exclamation marks as needed within the boundaries of the beginning and ending ESC's.

   An apostrophe inside a multi-byte transparency string is invalid and terminates the string.

   Syntax:

   ```
   <ESC><ESC>!TEXT<ESC><ESC>
   ```

   Example:

   ```
   %%!E%%
   ```

   will send ASCII X'1B45' to the printer.

   ```
   %%!E!&l1O;%%
   ```

   will send ASCII X'1B45' followed by ASCII X'1B266C314F' to the printer. (i.e. PCL reset followed by PCL orientation landscape.)

   Within the <ESC><ESC>!...<ESC><ESC>, all IBM control codes are ignored.

   After the exclamation mark ("!"), all data should be characters supported by the 7 bit ASCII character set.

2. FSL Function Y48, n2 (lead-in) without n3 (lead-out)

If a string is defined as lead-in in FSL Function Y48, parameter n2, but no lead-out string, parameter n3, is defined in Function Y48, the lead-in string will be translated to ASCII X'1B' when detected in the data stream.

Note: As of November 1996 no IBM Twinax network interface card supports Y48 at all and the IBM 39112/16 and 3112/16 Coax do not support parameters n2 and n3. Network printers support the n2 and n3 parameters at Coax code level 1.01 and greater. Please contact IBM Network Printer Technical Support for information on your IBM Coax network interface card code level.

Example FSL Function Y48 Syntax with no n3 defined:

```
%Y48,'%';'@#'%
```

The lead-in string can be from 1 to 5 characters and must be defined in apostrophe notation. See "Apostrophe Notation" on page 309. The only restriction is that it must not begin with the character defined as escape character or the ampersand (&) character.

Example: The input data stream @#E@#&l1O; will be translated to ASCII HEX 1B451B266C314F (PCL reset followed by PCL orientation Landscape)

Filtered Pass-through Mode

Two filter modes are supported:

1. normal filter mode
2. partial filter mode

Normal Filter Mode

Normal filter mode will suppress all data and control characters which are not defined in multi-byte transparency. See "Multi-byte Transparency" on page 303.

Normal filter mode can be selected by:

```
<ESC><ESC>-<ESC><ESC>
```

if Function Y47 is set to 3 or it can be selected by:

```
<lead-in>-<lead-out>
```

if a lead-in and lead-out string is defined in the Function Y48, n2 (lead-in) and n3 (lead-out).

Normal filter mode is terminated by:

```
<ESC><ESC>+<ESC><ESC>
```

if Function Y47 is set to 3 or by:

```
<lead-in>+<lead-out>
```

if a lead-in and lead-out string is defined in the Function Y48, n2 (lead-in) and n3(lead-out).

Partial Filter Mode

Partial filter mode will suppress all CR and LF. Partial filter mode can only be selected by:

```
<ESC><ESC>=<ESC><ESC>
```

when Function Y47 is set to 3.

Partial filter mode is not supported when using the lead- in and lead-out strings.

Partial filter mode is terminated the same as Normal filter above.

Below is a list of examples:

1. Normal Filter Mode Example With Function Y48:

   Example of Normal Filter Mode by use of a lead-in and lead-out string defined in Function Y48.

   First we need to assign the lead-in and lead-out string:

   ```
   &&??%
   %Y48,'%';'@#';'#@'%
   ```

   Note: Be careful, the following definition will delete the ESC character for it has not assigned the n1 value which is the permanent ESC character

   ```
   %Y48,;'@#';'#@'%
   ```

   Data stream sent to the interface:

   ```
   @#-#@
   This file is used to select landscape orientation by use of a PCL
   command @#1B266C314F#@ Orientation of the printer is now landscape
   @#+#@
   ```

   The only thing sent to the printer in the above example when it is received by the interface is the ASCII X'1B266C314F' which is the PCL command Esc&l1O; (i.e. all of the text around the @#1B266C314F#@ was “filtered” out.)

2. Normal Filter Mode Example With Function Y47:

   Example of Normal Filter Mode by use of <ESC><ESC>- <ESC><ESC> when function Y47 is set to 3.

   Again, we assign the parameters of the FSL function first:

   ```
   &&??%
   %Y47,3%
   ```

   After which the following data stream can be sent to the network interface card

   ```
   %%-%%
   This file is used to select landscape orientation by use
   of a PCL command
   %%1B266C314F%%
   Orientation of the printer is now Landscape
   %%+%%
   ```

   The only thing sent to the PCL interpreter when the above data stream is received by the network interface card is the ASCII X'1B266C314F' which is the PCL command Esc&l1O; (i.e. the network interface card “filtered” out the text around the %%1B266C314F%%)

3. Partial Filter Mode Example:

   Example of Partial Filter Mode by use of <ESC><ESC>=<ESC><ESC> when function Y47 is set to 3.

   Set the parameters of FSL Function Y47.

   ```
   &&??%
   %Y47,3%
   ```

   Then the following data stream can be sent to the network interface card:

```
%%=%%
%%1B45%%
RESET
%%1B2873313648%%
SELECT 16 CPI
%%+%%
```

and the network interface card will send the following to the PCL interpreter:

```
EscE RESET Ec(s16H SELECT 16 CPI4
```

as all Carriage Return's and New Line's have been suppressed.

Apostrophe Notation

Another way of sending printer commands strings is to use the apostrophe notation. The apostrophe tells the network interface card that the characters following should be regarded as ASCII characters in the command. Below is an example of apostrophe notation which shows the PCL Esc character (X'1B) combined with apostrophe notation:

```
%%1B '\12'%
```

The apostrophe notation can only be used when sending command codes which can be found in the ASCII character table. All spaces,carriage returns, new lines, and line feeds and form feeds are ignored within the leading ESCESC and the trailing ESC (i.e. the "%%" and "%" respectively in the above example.)

Note: To ensure correct processing of the data, all spaces inside the apostrophe notation must be sent as the hexadecimal value (X'20'). For example, if the data "Network Printer Coax Interface Card" need be sent to the PCL interpreter, a sequence that could be sent to the network interface card is shown below:

```
%%'Network'20'Printer'20'Coax'20'Int
erface'20'Card'%
```

The above is an example of a command with blanks (spaces) sent in apostrophe notation. Note that the break (i.e. New Line) in the word "Interface" is not sent to the PCL interpreter because the New Line is within two apostrophe's.

Glossary

non-IPDS
The IBM host data streams of DSE/DSC, SCS, and PDS. The two former from a coax attached host and the latter from a twinax attached host.

session
The start of printable data being sent to the coax or twinax network interface card.

network interface card
Network Interface Card. This document only refers to coax and twinax network interface cards.

ASCII Transparency
sending non-EBCDIC encoded data in an EBCDIC based data stream.

ASCII Escape
Hex 1B (also written X'1B') The first byte in a PCL command

ESC character
The special character place in a non-IPDS data stream to signal that special data is following.

FSL Function Selection via the Line

IBM control codes
Carriage Return, Line Feed, or New Line characters

Test Menu Functions

The following Test Menu Functions are valuable in working with and developing applications on network printers. The IBM 3912/16 and 3112/16 have similar functions and can be referenced in the documents that were supplied with your printer.

Test Menu/PRINT CONFIG PAGE

The PRINT CONFIG PAGE function prints a page containing all of the operator panel settings that are current in your printer. This page also contains a list of installed options and all of the micro-code levels installed in the printer that generated the page. Always have this page available to you when you call IBM technical support.

Test Menu/ONLINE HEX PRT

Online Hex Print is the users and applications programmers best tool for debugging problems with any of network printers. This setting enables the printer to print the exact data stream as it is received by the PCL interpreter. An example is shown below:

```
INSERT AN ONLINE HEX PRT HERE
```

The left hand section shows the bytes received in hexadecimal notation and the right hand section shows the ASCII representation of the HEX to the left.

Test Menu/CX HEX PRT or TX HEX PRT

The Coax and Twinax Hex Print settings enable the network interface card to print HEX formatted pages of the data that is coming to the network interface card via the Coax or Twinax cable. An example is shown below:

```
INSERT A CX HEX PRT EXAMPLE HERE
```

The left hand section shows the byte receive in hexadecimal notation and the right hand section shows the EBCDIC representation of the HEX to the left. The section at the very top of a Coax Hex Print shows the values that are currently set in the Printer Controller Information Area (PCIA) which can affect the way some data should be printed.

FSL Function Reference

FSL Function Y47 - ESC Mode Selection

USE - This function is used for selecting of, standard esc-mode, Tel-a-graf support or special transparency.

```
SYNTAX . #Y47,<n1>#
where: n1
1 Standard ESC Mode (default)
  ESC XX sent as 'XX' HEX to the controller
```

```
  ESC ESC XX ESC sent as 'XX' HEX.
  ESC ESC 'ascii' ESC sent as 'ascii'.
2 Tel-a-graf support (See note 1.)
  ESC NNXX sent as 'XX' hex.  (where NN is the byte count)
  ESC ESC XX ESC sent as 'XX' HEX.
  ESC ESC 'ascii' ESC sent as 'ascii'.
3 Special transparency.
  ESC 'X sent as XX' HEX to the controller.
  ESC,ESC XX ESC,ESC sent as 'XX' HEX.
  ESC,ESC !ascii ESC,ESC sent as 1Bhex 'ascii'.
NOTES:
1) In Tel-a-graf mode, the first two decimal digits after the Escape
character are used to determine the length of the string to be sent.
2) Filter mode is a special compatible feature for replacing of protocol
converters.  The filter-modes will suppress control-codes and/or text.
3) To enter filter mode the ESC character has to be used.
Filter mode can be implemented in two ways:
Normal mode:
<ESC><ESC>-<ESC><ESC> sets filter mode on
<ESC><ESC>+<ESC><ESC> sets filter mode off
Normal filter mode will suppress all data which is not defined in an
<ESC> or <ESC><ESC> notation.
Partial mode:
<ESC><ESC>=<ESC><ESC> sets partial filter mode
on
<ESC><ESC>+<ESC><ESC> sets partial filter mode off
In partial filter mode only CR and LF are suppressed.
EXAMPLES:
1)   #Y47,2#
     This selects Tel-a-graf support.
2)   #02 41 42
     This will send HEX codes 41 42 to the printer.
```

FSL Function Y48 - Set Permanent ESC Character

USE - This function is used to set the permanent escape character, and/or define lead-in/lead-out sequences.

```
SYNTAX:  #Y48,n1{;n2};n3}}#   (n2 and n3 are not required)
where:
n1 - Character for permanent ESC character selected from the EBCDIC
character table (Twinax) or the LU3 character table (Coax), can be
stated in apostrophe notation.
 n1=00 is the Default. (i.e. no ESC Character).
n2 - characters:  String of maximum 5 characters to introduce the
transparency, the string must not begin with the same character defined
as n1, or the character '&'.
n3 - characters:  String of maximum 5 characters to end the
transparency, the string must not begin with valid hex-values {'0'-'9'},
{'A'-'F'} or {'a'-'f'}.
NOTES:
1) If parameter n3 is omitted, n2 will be scanned for in the
data-stream, and substituted with ascii-Escape (X'1B').
2) Filtered mode is activated the following way:  <lead-in><-><lead-out>
and is deactivated the following way:  <lead-in><+><lead-out>
EXAMPLES:
1)  #Y48,'>'#
    This will set the character > as permanent escape character.  All
    further FSL escape strings will then require > as escape character.
2)  #Y48,' '#, #48,00#
    Either of these will clear the permanent escape character.
    (No permanent escape character is used).
3)  #Y48,57;'in';'out'#
    Sets the character 57 Hex as permanent escape and the string 'in'
    as lead-in sequence and the string 'out' as lead-out sequence.
```

Testing via the Line

Tests may be selected via the line by a special FSL functions. The syntax of the test selection is as follows:

FSL Function T1 - Offline HEX Print of System Buffer - Coax Only

OFFLINE HEX Dump prints a dump of the buffer received by the network interface card (i.e. across the coax cable) in which the <ESC>T1 command was included.

Offline Hex Dump terminates automatically.

FSL Function T1 - Twinax HEX Print - Twinax Only

Twinax HEX Print sets the interface in HEX print mode. This is the same as the TX HEX PRT from the Test Menu on network printers. The data following the <ESC> T1 command is printed in a combined Hex and EBCDIC format as it is received by the interface. This function is very useful in debugging application problems.

Twinax HEX Print is terminated by pressing the TEST button on the rear of the network interface card or by issuing a CANCEL TX HEX PRT from the Network Printer operator panel.

FSL Function T2 - Coax HEX Print

Coax HEX Print sets the interface in HEX print mode. This is the same as the CX HEX PRT from the Test Menu of the network printers or pressing the TEST button on the back of the Coax network interface card twice in succession. The data following the <ESC> T2 command is printed in a combined Hex and EBCDIC format as it is received by the interface. This function is very useful in debugging application problems.

Coax HEX Print is terminated by pressing the TEST button on the rear of the network interface card or by issuing a CANCEL CX HEX PRT from the Network Printer operator panel.

FSL Function T3 - Online ASCII Print

Online ASCII Hex Print sets the network interface card in ASCII print mode. The data following the <ESC>T3 command is printed in a format depicting how the ASCII data is sent to the PCL interpreter. This is similar, but not exactly the same as Test Menu/ONLINE HEX PRT from the operator panel.

Online ASCII Print is terminated by pressing the TEST key on the rear panel or by selecting FSL Function T6 - Cancel Test 3 which is explain below.

FSL Function T4 - Network Interface Card Settings Print

network interface card Settings Print will print a page containing information on the current FSL settings and firmware revision.

Note: In network printers, this page contains a full firmware version listing that is used by IBM technical support and the network interface card developers to track firmware levels. It may not completely correlate to the CX or TX LVL listed on the Test Menu/PRINT MENUS page. Also, this page contains the current settings of FSL Functions that are not listed in this document.

Network interface card Settings Print may also be activated by pressing the TEST button, located in the back of the printer near the coax or twinax cable connector, once after the printer has come up to a READY prompt on the operator panel. (3912/16 and 3112/16 Twinax cards have a Twinax address setting dial instead of a TEST button. Turn this dial to the T position to produce a network interface card settings printout or use the operator panel menus as listed in your documentation.)

FSL Function T5 - Print SCS Character Sets

Print SCS Character Sets, also available as an operator panel selection, will print the LU1, LU3 and APL character sets for Coax or the PDS character sets for twinax for the current symbol set and translate table. If any changes have been made to the current translate table, these will also be seen in the tables generated.

FSL Function T6 - Cancel Online ASCII Print

Cancel Online ASCII print cancels the state set by FSL Function T3 - Online ASCII Print.

Special FSL Functions

FSL Function X1 - Save Settings

Use FSL Function X1 to permanently save FSL Function parameter settings across power off cycles. X1 will save all FSL function parameters to flash (permanent, non-volatile) memory.

Syntax:

```
<ESC>X1
```

Chapter 22. Fonts

IBM Font Structure

In IBM AFP terminology, a font has three components (Figure 20). They are:
- Coded font
- Character set
- Code page

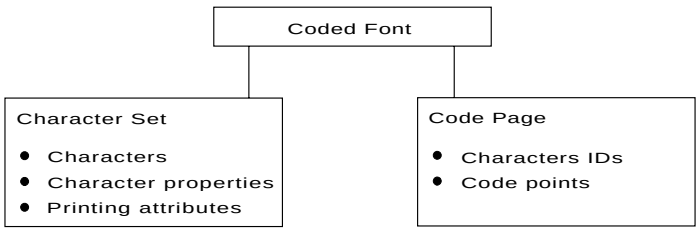


Figure 20. Font Components

Note: These terms have different meanings in Operating System/400 (OS/400). See Table 197 on page 318 for what these terms mean in OS/400.

Coded Font

In IBM font structure, 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 consists of two parts:
- References to specific character sets
- References to specific code pages

A character must be included in the specified character set and listed on the specified code page before it can be printed.

A coded font associates a specific code page with a specific character set. A coded font contains one code-page and one character-set pair.

Character Set

In IBM font structure, a *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 character set specifies *character properties* and printing attributes (Figure 21 on page 316).

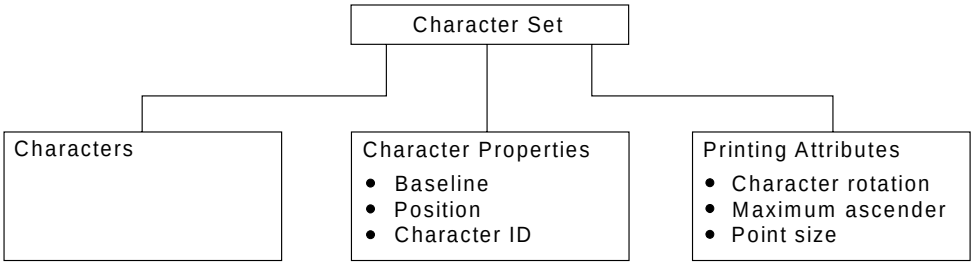


Figure 21. Composition of a Character Set

characters
Characters are the letters, numerals, punctuation marks, or other symbols of a font.

character properties
Character properties detail 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)

One of the character properties is 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 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

For a list of character IDs and the graphic character each represents, refer to *ABOUT TYPE: IBM's Technical Reference for Core Interchange Digitized Type*

printing attributes
The printing attributes define how the character set will be printed. Some printing attributes include rotation of characters, maximum ascender, and point size.

Code Page

A *code page* is a set of symbols that can be printed by your printer. These symbols can be letters, numbers, or graphic elements such as lines or patterns. The symbols may be grouped to be specific to a country, language, or special symbol set. By supporting different code pages, the printer can support different language requirements.

No particular typeface is assumed for any particular code page. The typeface is defined as a font by the assignment of size, weight, and posture. For code page mapping, see Appendix. IBM Code Pages for Non-IPDS Printing.

Character IDs and Code Points

In IBM font structure, a *code page* maps each character of text to the characters in a character set. Figure 22 shows how a code page maps text to the characters in a 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 then is matched to the image (*raster pattern*) of the character in the 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 character set, all character IDs in the code page must be included in that character set.

Every code page has 256 positions, or *code points*, that represent potential

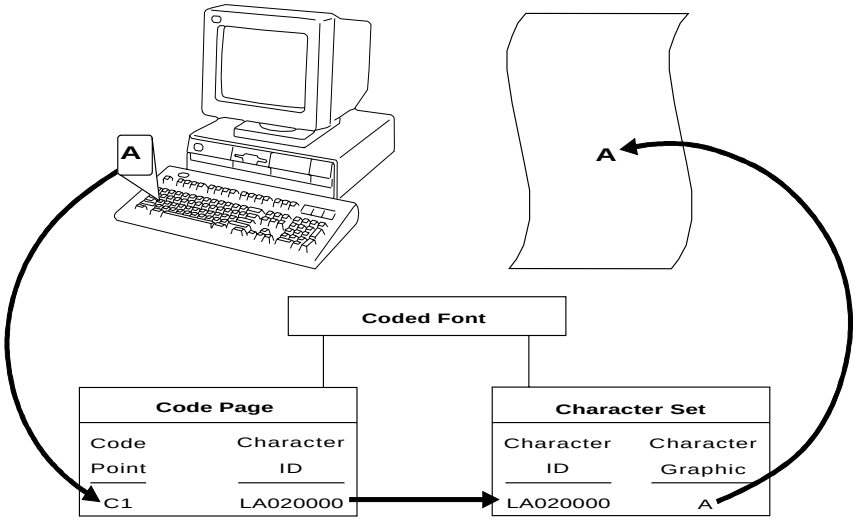


Figure 22. Translation of a Keyboard Character into a Printed Character

characters. Each of the code points is normally identified by its bit configuration in hexadecimal, with two hex characters per byte. The range of values is hex 00 through hex FF, or 256 values. The code page determines which character prints for each of the printable code points.

A character ID is an 8-byte standard identifier for a character regardless of its type family. For example, all uppercase "A"s have the same character ID (LA020000). Character IDs also are called graphic character identifiers (GCIDs).

Binary	11000001
Decimal	193
Hexadecimal	C1

Figure 23 shows an example of a part of a code page. When the printer receives hexadecimal code point C1 for the code page shown (code page 00037 Version 1), it prints an uppercase A (character ID LA020000). Baselines for each character on the example code page show the general alignment of characters.

CPGID: 37
GCSGID: 697

Hex Codes 1st → 2nd ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	^ SD150000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000

Figure 23. IBM Code Page 00037 Version 1

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 00037 Version 1
- Hexadecimal code point 5A in code page 00280 Version 1

Operating System/400 Terms

Table 197 lists the IBM AFP font terminology and describes how it is used with the OS/400 printing interfaces.

Table 197. OS/400 Font Terminology

AFP Term	OS/400 AFP Implementation	OS/400 Print File Term
Coded font	*FNTRSC object with CDEFNT attribute	Coded font
Character set	*FNTRSC object with FNTCHRSET attribute	Font
Code page	*FNTRSC object with CDEPAG attribute	Character ID (CHRID) See note.

Table 197. OS/400 Font Terminology (continued)

AFP Term	OS/400 AFP Implementation	OS/400 Print File Term
Note: This is not the character ID that identifies individual characters within an AFP character set. This is a control object that identifies a code page by two numbers representing a character set ID and a code page ID.		

Font Terms

A *font* is a complete set of characters in a particular typeface, type size, and code page.

The following terms help define a font:

Character Set
A set of numeric, alphabetic, or graphic characters with their assigned code points.

Code Page
A table of alphanumeric characters and graphic characters each of which is assigned a 1-byte value (a *code point*). These values define which characters will print. "Appendix. IBM Code Pages for Non-IPDS Printing" on page 373 shows the values for code points in all code pages supported by the printer.

Code Page Global ID (CPGID)
Identifies a specific set of code points assigned to a specific list of graphic character IDs.

Font Global ID (FGID)
Specifies a value for selecting a font. IBM fonts have a preassigned FGID value.

Graphic Character Set Global ID (GCSGID)
Identifies the list of graphic character IDs included in the code page.

Spacing
Also called *font width* or *escapement.* Spacing is the distance from the start of a character to the start of the next character. Font spacing can be defined by spacing type:

- *Fixed-pitch fonts* – All characters in a fixed-pitch font have the same spacing, which is specified as the number of characters per inch.
- *Typographic fonts* – Typographic fonts are identified as Typo.

  Most documents are easier to read if the widths of the characters vary, that is, if a W is printed wider than an I. Typographic fonts have this variability. These fonts are sized by height, not width. Seventy-two points equals approximately one inch. Therefore, a 10-point font is 10/72 inch high. Type height includes some white space above and below the printed character for adequate minimum spacing between the lines of type.

  Text is most readable when character spacing ranges from 8 to 12 points. For example, the text in this document is 10 point.

  Note: For typographic fonts, it is recommended that the first and last print positions on each line be left blank.
- *Proportionally spaced machine (PSM) fonts* – Proportionally spaced machine fonts are identified by PSM or PS. PSM fonts are a compromise between

the variability of typographic sizes and the simple uniformity of fixed pitch. With PSM fonts, the widths of the characters vary. For example, a lowercase i has a different width than an uppercase W. However, a specific character in one font will be the same width in another font. For example, a W in one PSM font is the same width as the W in every other PSM font. Therefore, it is possible to have only one character-width table that applies to every PSM font.

Posture
Refers to a character's incline, or tilt. Roman posture is upright. *Italic* posture is inclined to the right.

Type Size
Also called *point size*. Specifies the overall height of the font, measured in printer's points. A point is 1/72 inch. For example, a 12-point font is 1/6 inch high.

Typeface
Also called *type style*. Specifies the shape and design of each letter of the alphabet. A complete alphabet of letter designs makes up one typeface.

Weight
Refers to the thickness of the strokes that make up the characters of a font, as in a **bold** font weight.

Font and Code Page Selection

Printers with an IPDS feature receive IPDS commands to specify fonts. The IPDS command set can select any font or code page supported by the printer. See the printer *User's Guide* for a list of the IPDS fonts supported. However, host software may restrict the actual fonts or code pages that can be selected. This includes typographic and nontypographic fonts in all pitches, point sizes, and widths. The information provided to the printer to select a font is called a *GRID* (Global Resource Identifier). The GRID consists of the following (see "Font Terms" on page 319 for a description of these terms):

FGID (Font Global Identifier)
GCSGID (Graphic Character Set Global Identifier)
CPGID (Code Page Global Identifier)
Font Width

For typographic fonts with the same FGID, specify the FONT WIDTH parameter to the printer. The printer needs the font width parameter to identify the font in order to specify the point size. The FONT WIDTH parameter is described in detail in the IPDS section.

Note: When using an application that does not allow selection of font width, use the alternate FGID when available to access typographic fonts.

You can select the code page and code page version from a configuration setting. Refer to your printer's *User's Guide* for instructions on changing code page and code page version configuration settings. Some system software does not allow you to change code pages by software and 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.

Fonts for Non-IPDS Printing

When printing coax or twinax non-IPDS jobs, the printer uses some of the PCL emulation fonts available for parallel/serial printing.

Coax (Non-IPDS)

- Uses the resident PCL 5 scalable Courier font to provide the required pitch.

Twinax (Non-IPDS)

- For fonts requested via CPI values, uses the resident PCL 5 scalable Courier font to provide the required pitch.
- For non-typographic font requests, uses the resident PCL 5 scalable Courier and Letter Gothic fonts.
- For typographical font requests, uses the Times New Roman, CG Times, and Univers resident scalable PCL 5 fonts.

Font Substitution for Non-IPDS

The printer uses its PCL fonts when operating with a non-IPDS host data stream. The IPDS fonts resident in the printer are not available with non-IPDS data streams. The printer selects and uses these PCL fonts differently depending upon whether the attachment is coaxial or twinaxial.

Attachment	Font Selection
Coaxial	Selects fonts only by specifying characters-per-inch (cpi) as described in "Non-IPDS Fonts Specified by CPI - Coax and Twinax".
Twinaxial	Selects fonts in either of two ways: • By specifying characters-per-inch (cpi) as described in "Non-IPDS Fonts Specified by CPI - Coax and Twinax" (same as coaxial). • By specifying an FGID (Font Global Identifier).

This section describes these differences.

Non-IPDS Fonts Specified by CPI - Coax and Twinax

You can specify non-IPDS fonts by cpi, as described in this section, for both coax- and twinax-attached printers. Fonts are selected by specifying characters per inch (cpi) in either of the following ways:

- From the printer's operator panel (see your printer's *User's Guide* for details)
- From the SCS data stream commands:
  Set Print Density
  Set Character Distance

Only non-typographic (fixed-pitch) PCL fonts are available for font substitution that is driven by CPI.

Requested cpi	Infoprint 21
5	Courier 5
10	Courier 10

Requested cpi	Infoprint 21
12	Prestige Elite 12
15	Courier 15
16	Courier 16
20	Courier 20
27	Courier 27
PSM **Note:** Not available from the operator panel; must use SCS command.	Uses Courier 12 with proportional spaced machine (PSM) font

Non-IPDS Fonts Specified by FGID (Twinax Only)

You can specify non-IPDS fonts by FGID, as described in this section, for the twinax-attached printers. (This means either with the standard Twinax SCS printer, or with IPDS but emulation set to non-IPDS.)

In addition to selecting fonts by specifying cpi as described in "Non-IPDS Fonts Specified by CPI - Coax and Twinax" on page 321, AS/400 programs can use FGIDs to specify the desired font. In this case, the printer uses various font characteristics to select substitute fonts.

The mapping from the requested IBM FGID to the available PCL fonts is a font substitution. It does not always provide the exact font specified by FGID. The mapping from FGID characteristics to PCL fonts can only be as accurate as the available PCL fonts allow.

The following tables illustrate the substitutions:

- Table 198 shows Nontypographic (fixed pitch) substitution
- Table 199 on page 324 shows Typographic substitution

Nontypographic FGID

Table 198 lists the fonts used as replacements when non-IPDS *nontypographic* fonts (fixed pitch fonts) are requested for Twinax printing. The FGIDs shown are for fonts resident in some other IBM printers but not resident in the standard IBM network printers.

Table 198. Nontypographic Typefaces Substitution - Twinax only

Typeface	IBM FGID	Substituted typeface
OCR B 10	03	Courier 10
Orator 10	05	Courier 10 (PN 1255824)
Courier 10	11	Courier 10
Prestige Pica 10	12	Prestige Elite 10
Courier 10 Italic	18	Courier 10 Italic
OCR A 10	19	Courier 10
Kateb 10	33	Courier 10
Letter Gothic 10	36	Letter Gothic 10
Gothic Text 10 Bold	39	Letter Gothic 10 Bold
Letter Gothic 10	40	Letter Gothic 10
Roman Text 10	41	Courier 10
Serif Text 10	42	Courier 10

Table 198. Nontypographic Typefaces Substitution - Twinax only (continued)

Typeface	IBM FGID	Substituted typeface
Serif Text Italic 10	43	Courier 10 Italic
Katakana Gothic 10	44	Courier 10
APL 10	45	Courier 10
Courier 10 Bold	46	Courier 10 Bold
Shalom 10	49	Courier 10
Gothic Text 12	66	Letter Gothic 12
Gothic Text Italic 12	68	Letter Gothic 12 Italic
Gothic Text 12 Bold	69	Letter Gothic 12 Bold
Serif Text 12	70	Courier 12
Serif Text Italic 12	71	Courier 12 Italic
APL 12	76	Courier 12
Prestige 12	80	Prestige Elite 12
Script 12	84	Courier 12
Courier 12	85	Courier 12
Prestige Elite 12	86	Prestige Elite 12
Letter Gothic 12	87	Letter Gothic 12
Courier 12 Italic	91	Courier 12 Italic
Courier 12 Italic	92	Courier 12 Italic
Shalom 12	98	Courier 12
Letter Gothic 12 Italic	109	Letter Gothic 12 Italic
Letter Gothic 12 Bold	110	Letter Gothic 12 Bold
Prestige Elite Bold 12	111	Prestige Elite 12 Bold
Prestige Elite Italic 12	112	Prestige Elite 12 Italic
Boldface Italic (PSM)	155	Courier 10 spaced as PSM
Boldface (PSM)	159	Courier 10 spaced as PSM
Essay (PSM)	160	Courier 10 spaced as PSM
Essay Italic (PSM)	162	Courier 10 spaced as PSM
Prestige (PSM)	164	Prestige Elite 10 spaced as PSM
Yasmin (PSM)	166	Courier 10 spaced as PSM
Barak (PSM)	167	Courier 10 spaced as PSM
Yasmin Exp (PSM)	169	Courier 10 spaced as PSM
Essay Light (PSM)	173	Courier 10 spaced as PSM
Document (PSM)	175	Courier 10 spaced as PSM
Shalom 15	211	Courier 15
Shalom Bold 15	212	Courier 15 Bold
Prestige 15	221	Prestige Elite 15
Gothic Text 15	222	Letter Gothic 15
Courier 15	223	Courier 15
Shalom Condensed 15	226	Courier 15
Serif Text 15	229	Courier 15

Table 198. Nontypographic Typefaces Substitution - Twinax only (continued)

Typeface	IBM FGID	Substituted typeface
Courier 5	244	Courier 5
Courier 5 Bold	245	Courier 5 Bold
Courier 17	252	Courier 17
Courier 17.1	254	Courier 17.1
Letter Gothic 17.1	255	Letter Gothic 17.1
Prestige 17.1	256	Prestige Elite 17.1
Kateb 8	265	Courier 8.55
APL 20	280	Courier 20
Letter Gothic 20	281	Letter Gothic 20
Aviv 20	282	Courier 20

Typographic FGID

Table 199 lists the fonts used as replacements when *typographic* fonts are requested for Twinax printing. The FGIDs shown are for fonts resident in some other IBM printers but not resident in the standard IBM Network Printers. Also included are some typographic fonts from 4028 font cards.

The point size is not shown, but it will be as specified to the printer in the Set FID Through GFID (SFG) control command (unless using Alternate FGIDs, which define typeface and point size).

Table 199. Typographic Typefaces Substitution

Typeface	IBM FGID	Substituted typeface
Sonoran Serif	4407	CG Times Alternate FGIDs (1051, 1351) also supported as CG Times.
Sonoran Serif Bold	4427	CG Times Bold Alternate FGIDs (1053, 1653, 1803, 2103) also supported as CG Times Bold.
Sonoran Serif Italic	4535	CG Times Italic Alternate FGID (1056) also supported as CG Times Italic.
Times Roman	5687	Times New Roman Alternate FGIDs (760, 751) also supported as Times New Roman.
Times Roman Bold	5707	Times New Roman Bold Alternate FGIDs (761, 762) also supported as Times New Roman Bold.
Times Roman Italic	5815	Times New Roman Italic Alternate FGID (763) also supported as Times New Roman Italic.

Table 199. Typographic Typefaces Substitution (continued)

Typeface	IBM FGID	Substituted typeface
Times Roman Bold Italic	5835	Times New Roman Bold Italic Alternate FGIDs (764, 765) also supported as Times New Roman Bold Italic.
Narkis	12855	Times New Roman
Narkis Bold	12875	Times New Roman Bold
Helvetica	34103	Univers
Helvetica Bold	34123	Univers Bold
Helvetica Italic	34231	Univers Italic

IBM Network Printers Resident IPDS Fonts

Network Printers will support outline fonts from both the IBM Core Interchange Font Set and the IBM Coordinated Font Set as resident fonts. In addition, a selection of these fonts are grouped into the 4028 Compatibility Font set. This set is used to represent the 4028 base internal raster fonts for limited compatibility. The font technologies used in the printer are:

```
IBM Core Interchange        - Type 1 Outlines
IBM Coordinated             - Type 1 Outlines
4028 Compatibility          - Type 1 Outlines
3820 ROM Font Compatibility - Raster
DBCS Resident               - CID Outlines and Raster
```

Resident Font Activation Methods

Fonts resident within the Network Printers may be activated using the following IPDS commands. Note that some fonts have restrictions on allowable font activation methods.

Load Font Equivalence

The Load Font Equivalence (LFE) command maps font local identifiers, specified within text, graphics or bar code data, to font Host Assigned IDs (HAIDs) and 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)

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 Network Printers have a resource that matches the global name in the AR command, that resource is activated.

The following combinations of Resource Type and Resource ID Format are supported by the Network Printers.

```
     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'
```

```
Double Byte Coded Font Section X'03'    IBM GRID              X'03'
Double Byte Coded Font Section X'03'    MVS Host Unalterable  X'06'
Code Page                      X'06'    IBM GRID              X'03'
Font Character Set             X'07'    IBM GRID              X'03'
Single Byte Coded Font Index   X'08'    IBM GRID              X'03'
Single Byte Coded Font Index   X'08'    MVS Host Unalterable  X'06'
Double Byte Coded Font Index   X'09'    IBM GRID              X'03'
Double Byte Coded Font Index   X'09'    MVS Host Unalterable  X'06'
Coded Font                     X'10'    IBM GRID              X'03'
Coded Font                     X'10'    Coded Font Format     X'07'
```

Note: The Network Printer 12, Network Printer 17 and Network Printer 24 printers only support the IPDS LF1 tower. The scalable outline fonts are activated as raster fonts, using the GRID information listed in this document. Note that Resource Type 10 is treated internally as Resource Type 01.

IBM Core Interchange Resident Scalable Font Set (IPDS only)

The IBM Core Interchange fonts as shown in Table 200 will be supported as resident fonts in the following language groups:

- Latin 1/2/3/4/5
- Symbols
- Arabic
- Cyrillic Greek
- Hebrew

Table 200 lists the typefaces resident in the Network Printers and includes the valid FGID and code pages for each font. The Date Stamp on most of these character sets is 94350, and the Time Stamp used is 00000000. The Date Stamp used on the euro-compatible characters sets is 98152 and the Time Stamp used is 00000000. These character sets have GCSGID 1355.

"GCSGID Subsets" on page 328 provides a mapping of the valid subsets of the GCSGIDs listed for the IBM Core Interchange fonts.

XOA-RRL Replies for Font Character Sets

The resident set as shown in Table 200 will support 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, the resident character sets will be reported with a font width of zero. A font width of zero indicates that the font is scalable.

Valid combinations of the CPGIDs, GCSGIDs, FGIDs and Font Widths for the resident fonts are defined in Chapter 14. Code Page and Font Identification.

Table 200. IBM Core Interchange Resident Scalable Font Set

Typeface	FGID	GCSGID	Font Width	Code Pages
Latin 1/2/3/4/5 with Euro character				
Times New Roman Medium	2308	1355	Scalable	See Table 202 on page 329
Times New Roman Bold	2309	1355	Scalable	See Table 202 on page 329
Times New Roman Italic Medium	2310	1355	Scalable	See Table 202 on page 329
Times New Roman Italic Bold	2311	1355	Scalable	See Table 202 on page 329

Table 200. IBM Core Interchange Resident Scalable Font Set (continued)

Typeface	FGID	GCSGID	Font Width	Code Pages
Helvetica Roman Medium	2304	1355	Scalable	See Table 202 on page 329
Helvetica Roman Bold	2305	1355	Scalable	See Table 202 on page 329
Helvetica Italic Medium	2306	1355	Scalable	See Table 202 on page 329
Helvetica Italic Bold	2307	1355	Scalable	See Table 202 on page 329
Courier Roman Medium	416	1355	Scalable	See Table 202 on page 329
Courier Roman Bold	420	1355	Scalable	See Table 202 on page 329
Courier Italic Medium	424	1269	Scalable	See Table 202 on page 329
Courier Italic Bold	428	1269	Scalable	See Table 202 on page 329
Symbols				
Times New Roman Medium	2308	1275	Scalable	See Table 202 on page 329
Times New Roman Bold	2309	1275	Scalable	See Table 202 on page 329
Helvetica Roman Medium	2304	1275	Scalable	See Table 202 on page 329
Helvetica Roman Bold	2305	1275	Scalable	See Table 202 on page 329
Courier Roman Medium	416	1275	Scalable	See Table 202 on page 329
Courier Roman Bold	420	1275	Scalable	See Table 202 on page 329
Cyrillic Greek				
Times New Roman Medium	2308	1300	Scalable	See Table 202 on page 329
Times New Roman Bold	2309	1300	Scalable	See Table 202 on page 329
Times New Roman Italic Medium	2310	1300	Scalable	See Table 202 on page 329
Times New Roman Italic Bold	2311	1300	Scalable	See Table 202 on page 329
Helvetica Roman Medium	2304	1300	Scalable	See Table 202 on page 329
Helvetica Roman Bold	2305	1300	Scalable	See Table 202 on page 329
Helvetica Italic Medium	2306	1300	Scalable	See Table 202 on page 329
Helvetica Italic Bold	2307	1300	Scalable	See Table 202 on page 329
Courier Roman Medium	416	1300	Scalable	See Table 202 on page 329
Courier Roman Bold	420	1300	Scalable	See Table 202 on page 329
Courier Italic Medium	424	1300	Scalable	See Table 202 on page 329
Courier Italic Bold	428	1300	Scalable	See Table 202 on page 329
Arabic				
ITC Boutros Setting Medium	2308	1264	Scalable	See Table 202 on page 329
ITC Boutros Setting Bold	2309	1264	Scalable	See Table 202 on page 329
ITC Boutros Setting Italic Medium	2310	1264	Scalable	See Table 202 on page 329
ITC Boutros Setting Italic Bold	2311	1264	Scalable	See Table 202 on page 329
ITC Boutros Modern Rokaa Medium	2304	1264	Scalable	See Table 202 on page 329

Table 200. IBM Core Interchange Resident Scalable Font Set (continued)

Typeface	FGID	GCSGID	Font Width	Code Pages
ITC Boutros Modern Rokaa Bold	2305	1264	Scalable	See Table 202 on page 329
ITC Boutros Modern Rokaa Italic Medium	2306	1264	Scalable	See Table 202 on page 329
ITC Boutros Modern Rokaa Italic Bold	2307	1264	Scalable	See Table 202 on page 329
Boutros Typing Medium	416	1264	Scalable	See Table 202 on page 329
Boutros Typing Bold	420	1264	Scalable	See Table 202 on page 329
Boutros Typing Italic Medium	424	1264	Scalable	See Table 202 on page 329
Boutros Typing Italic Bold	428	1264	Scalable	See Table 202 on page 329
Hebrew				
Narkissim Medium	2308	1265	Scalable	See Table 202 on page 329
Narkissim Bold	2309	1265	Scalable	See Table 202 on page 329
Narkissim Italic Medium	2310	1265	Scalable	See Table 202 on page 329
Narkissim Italic Bold	2311	1265	Scalable	See Table 202 on page 329
Narkiss Tam Medium	2304	1265	Scalable	See Table 202 on page 329
Narkiss Tam Bold	2305	1265	Scalable	See Table 202 on page 329
Narkiss Tam Italic Medium	2306	1265	Scalable	See Table 202 on page 329
Narkiss Tam Italic Bold	2307	1265	Scalable	See Table 202 on page 329
Shalom Medium	416	1265	Scalable	See Table 202 on page 329
Shalom Bold	420	1265	Scalable	See Table 202 on page 329
Shalom Italic Medium	424	1265	Scalable	See Table 202 on page 329
Shalom Italic Bold	428	1265	Scalable	See Table 202 on page 329

GCSGID Subsets

Table 201 provides a mapping of the valid subsets of the GCSGIDs listed for the IBM Core Interchange fonts.

Table 201. GCSGID Subsets for IBM Core Interchange Fonts

GCSGID	Valid GCSGID Subsets
1269	0101, 0103, 0119, 0251, 0265, 0269, 0273, 0277, 0281, 0285, 0288, 0289, 0293, 0297, 0301, 0305, 0309, 0313, 0317, 0321, 0325, 0329, 0337, 0341, 0611, 0697, 0919, 0959, 0965, 0980, 0982, 0983, 0987, 0990, 0991, 0993, 0995, 1111, 1132, 1133, 1145, 1146, 1149, 1152, 1166, 1167, 1174, 1188, 1189, 1198, 1220, 1232, 1233, 1237, 1256, 1258, 1259, 1260, 1261, 1268, 1286, 1301, 1302, 2039
1355	1269, 2041
2041	0695, 0988, 1353, 1412, 2039
1275	0340, 0630, 0909, 1191, 1257
1264	0235, 0994, 1154, 1162, 1177, 1244
1265	0941, 0687, 0986, 0992, 1147, 1199, 1217, 1218

Table 201. GCSGID Subsets for IBM Core Interchange Fonts (continued)

GCSGID	Valid GCSGID Subsets
1300	0218, 0925, 0960, 0981, 0985, 0996, 0998, 1150, 1190, 1231, 1235, 1249, 1251, 1276, 1401

IBM Core Interchange Resident Code Page Set

Table 202 lists the code pages used with the IBM Core Interchange Resident Fonts. Not all code Pages apply to each font; this is determined by the character set. Please correlate the GCSGIDs found in Table 202 with the correct IBM Core Interchange Font GCSGID superset in Table 201 on page 328 to determine which code pages apply to a particular font family.

Table 202. IBM Core Interchange Resident Code Page Set

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
Latin 1 Country Extended Code Pages		
037	697	US English, Canadian English, Canadian French, Dutch, Brazilian Portuguese, Portuguese
273	697	Austrian, German
274	697	Belgian
275	697	Brazilian
277	697	Danish, Norwegian
278	697	Finnish, Swedish
280	697	Italian
281	697	Japanese
282	697	Portuguese
284	697	Castillian Spanish, Latin American Spanish
285	697	UK English
297	697	French, Catalan
500	697	Multinational, Belgium French, Belgium Dutch, Swiss French, Swiss German, Swiss Italian
871	697	Icelandic
Latin 1 EBCDIC Publishing Code Pages		
1140	695	US English, Canadian English, Canadian French, Netherlands, Brazil, Portugal
1141	695	Austrian, German
1142	695	Danish, Norwegian
1143	695	Finnish, Swedish
1144	695	Italian
1145	695	Castilian Spanish, Latin American Spanish

Table 202. IBM Core Interchange Resident Code Page Set (continued)

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
1146	695	UK English
1147	695	French
1148	695	Multinational ECECP, Belgian French, Belgian Dutch, Switzerland
1149	695	Iceland
Latin 1 Country Extended Code Pages with Euro Character		
361	1145	Multinational, Belgium French, Belgium Dutch, Swiss French, Swiss German, Swiss Italian
382	1145	German
383	1145	Belgian
384	1145	Brazilian Portuguese
385	1145	Canadian French
386	1145	Danish, Norwegian
387	1145	Finnish, Swedish
388	1145	French, Catalan
389	1145	Italian
390	1145	Japanese
391	1145	Portuguese
392	1145	Castillian Spanish
393	1145	Latin American Spanish
394	1145	UK English
395	1145	US English, Canadian English
Latin 1 ASCII Code Pages		
437	919	Multinational, US English, UK English, Dutch, German, Finnish, French, Italian, Spanish, Swedish
850	980	Multinational PC
858	988	Multinational PC with Euro
860	990	Portugese (Primary = 850)
861	991	Icelandic (Primary = 850)
863	993	Canadian French (Primary = 850)
865	995	Nordic (Primary = 850)
1004	1146	IBM PC Desktop Publishing
819	697	ISO Latin 1
1252	1412	Windows Latin 1
Latin 2/3/4/5 EBCDIC and ASCII Code Pages		

Table 202. IBM Core Interchange Resident Code Page Set (continued)

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
852	982	Croatian, Czech, East German, Hungarian, Polish, Romanian, Slovak, Slovenian
870	959	Latin 2 Multilingual
912	959	Latin 2 ISO/ ANSI 8 Bit
853	983	Latin 3 Multilingual PC
905	1286	Latin 3 Multilingual
1069	1256	Latin 4 EBCDIC
914	1256	Latin 4 ISO/ASCII
857	987	Latin 5 PC
920	1152	Latin 5 ISO/ANSI 8 Bit
1026	1152	Latin 5
Latin 9 EBCDIC and ASCII Code Pages		
923	1353	Latin 9
924	1353	Latin 9 EBCDIC
Latin EBCDIC DCF Code Pages		
1002	1132	DCF Release 2 Compatibility
1003	1133	US Text Subset
1068	1259	Text with Numeric Spacing
1039	1258	GML List Symbols
Cyrillic and Greek EBCDIC and ASCII Code Pages		
880	960	Cyrillic Multilingual (Primary = 1025)
915	1150	Cyrillic ISO/ASCII 8 Bit
855	985	Cyrillic PC
866	996	Cyrillic #2 PC
1025	1150	Cyrillic Multilingual
423	218	Greek 183 (Primary = 875)
813	925	Greek ISO/ASCII 8 Bit
851	981	Greek PC (Primary = 869)
869	998	Greek PC
875	925	Greek
1039	1258	GML List Symbols
Arabic EBCDIC and ASCII Code Pages		
420	235	Arabic Bilingual
864	994	Arabic PC
1008	1162	Arabic ISO/ASCII 8 Bit
1029	1154	Arabic Extended ISO/ASCII 8 Bit
1046	1177	Arabic Extended ISO/ASCII 8 Bit

Table 202. IBM Core Interchange Resident Code Page Set (continued)

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
1039	1258	GML List Symbols
Hebrew EBCDIC and ASCII Code Pages		
916	941	Hebrew ISO/ASCII 8 Bit
1028	1199	Hebrew Publishing
424	941	Hebrew
803	1147	Hebrew Character Set A (Primary = 424)
856	986	Hebrew PC (Primary = 862)
862	992	Hebrew PC
1039	1258	GML List Symbols
Symbols		
259	340	Symbols, Set 7
899	340	Symbols, Set 7 ASCII
1087	1257	Symbols, Adobe
1038	1257	Symbols, Adobe ASCII
1091	1191	Symbols, Modified Set 7
1092	1191	Symbols, Modified Set 7 ASCII
363	630	Symbols, Set 8
829	909	Math Symbols

4028 Compatibility Resident Font Set

Table 203 on page 333 lists the typefaces resident in the Network Printers and includes the valid FGID and code pages for each font. The Date Stamp on most of these character sets is 94350, and the Time Stamp used is 00000000. The Date Stamp on FGIDs 76 and 159(20224) is 96036. The Date Stamp on FGID 164 is 96039 with a Time Stamp 08225100 for all GCSGIDs except 695, where the Data Stamp is 98124 and the Time Stamp is 13491500. Fonts listed with an "Alt FGID", are used as a substitute for the requested "Alt FGID".

The Network Printers will substitute Times New Roman (from the IBM Core Interchange Set) for the Times Roman fonts listed in Table 203 on page 333. The Courier fonts will also come from the IBM Core Interchange Set. All the remaining listed fonts will be from the IBM Coordinated Font Set (see Table 205 on page 335).

See Table 204 on page 334 for an explanation of the groups used in the "Code Pages" column.

Notes:

1. Prestige fonts used with code pages with a CPGID of 259 are mapped to the Courier Roman Medium Symbols font (FGID 416 GCSGID 1275) as shown in Table 200 on page 326. When the printer is in Box-Draw mode, any font which does not indicate CPGID 259 support will print with the Roman Medium Symbols font in a point size of 10 (12 pitch) when used with Code Page 259. This emulates 4028 behavior.

2. Courier FGIDs 11 and 85 and Prestige FGIDs 12 and 86 now support Code Page 259 (when Box-Draw mode is on) to the extent these were supported in the 4028. In this mode, CPGID 1091 is substituted for CPGID 259 in order to print box-draw characters that line up with each other. The registered CPGID 259 does not have such characters, and is used when not in Box-Draw mode.
3. To match the 4028 and 3116 printed font sizes, the FGIDs 254, 256, 281, and 290 are scaled anamorphically (internal to the Network Printers) as follows:

FGID	Vertical x Horizontal Scale Factors (points)
254	7.8 vpt x 7.0 hpt
256	7.8 vpt x 7.0 hpt
281	7.0 vpt x 6.0 hpt
290	5.0 vpt x 4.5 hpt

Table 203. 4028 Compatibility Resident Font Set

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
APL	76		12	10	120	310
Boldface	159		Proportional	12	120	A, B
Courier	11		10	12	144	259, A, B
Courier	85		12	10	120	259, A, B
Courier	223		15	9	96	A, B
Courier Ultra Expanded	244		5	12	288	A, B
Courier.17	252		17.1	11	84	A, B
Courier.17ss	254		17.1	8.5	84	A, B
Courier Bold	46		10	12	144	A, B
Courier Bold	108		12	10	120	A, B
Courier Italic	18		10	12	144	A, B
Courier Italic	92		12	10	120	A, B
Letter Gothic	281		20	7.5	72	A, B
OCR A	19		10	12	144	892
OCR B	03		10	12	144	893
Prestige Pica	12		10	12	144	259, A, B
Prestige Elite	86		12	10	120	259, A, B
Prestige	221		15	9	96	A, B
Prestige	256		17.1	8.5	84	A, B
Prestige PSM	164		Proportional	12	120	A, B
Prestige PSM Roman Bold	701		Proportional	12	120	A, B
Prestige Pica Bold	60		10	12	144	A, B
Prestige Elite Bold	111		12	10	120	A, B
Prestige Elite Italic	112		12	10	120	A, B
Times Roman	5687	760	Typo	6	40	A
Times Roman	5687	751	Typo	8	53	A
Times Roman	5687	1051	Typo	10	67	A
Times Roman	5687	1351	Typo	12	80	A
Times Roman Bold	5707	1053	Typo	10	67	A
Times Roman Bold	5707	761	Typo	12	80	A
Times Roman Bold	5707	762	Typo	14	93	A

Table 203. 4028 Compatibility Resident Font Set (continued)

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
Times Roman Bold	5707	1803	Typo	18	120	A
Times Roman Bold	5707	2103	Typo	24	160	A
Times Roman Italic	5815	1056	Typo	10	67	A
Times Roman Italic	5815	763	Typo	12	80	A
Times Roman Bold Italic	5835	764	Typo	10	67	A
Times Roman Bold Italic	5835	765	Typo	12	80	A
Gothic Text (311x)	203		13.3	9	108	A, B
Gothic Text (311x)	283		20	6	72	A, B
Gothic Text (311x)	290		26.7	5	54	A, B

4028 Compatibility Resident Code Page Set

Table 204 provides an explanation of the groups as used in the Code Pages column of Table 203 on page 333.

Table 204. 4028 Compatibility Resident Code Page Set

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)
Group A	
037, 273, 274, 277, 278, 280, 281, 284, 285, 297, 500, 871	697
1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149	695
038, 367	103
260	341
276	277
286	317
287	321
288	325
1002	1132
437	919
850	980
858	988
1003 (Addition to network printer 4028 font support. Not supported by 4028.)	1133
Group B	
256 (Replaced by 500)	337
289 (Replaced by 500, but missing obsolete “Peseta” character)	329
Miscellaneous	
310	963
259	340
892	968
893	969

Table 204. 4028 Compatibility Resident Code Page Set (continued)

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)
1303 (Used internally for resident Code 128 barcode font and postal bar code font support)	n/a

IBM Coordinated Font Set (IPDS)

Table 205 lists the scalable IBM Coordinated font set typefaces resident in the Network Printers and includes the valid FGID and code pages for each font.

Where the IBM Core Interchange code pages are referenced in Table 202 on page 329, only the Latin 1 Country Extended, Latin 1 EBCDIC Publishing, Latin 1 ASCII and Latin EBCDIC DCF code pages are supported.

GCSGID Subsets

Table 207 on page 336 provides an a mapping of the valid subsets of the GCSGIDs listed for the PSC Strategic Font Set 2.

Table 205. Resident PSCStrategic Scalable Font Set 2

Typeface	FGID	GCSGID	Font width	Code Pages
APL	307	1304	Scalable	293, 310, 910
APL Bold	322	1304	Scalable	293, 310, 910
Boldface	20224	2041	Scalable	See Table 202 on page 329
Gothic Text	304	2041	Scalable	See Table 202 on page 329
Letter Gothic	400	2041	Scalable	See Table 202 on page 329
Letter Gothic Bold	404	2041	Scalable	See Table 202 on page 329
OCR A	305	968	Scalable	876, 892
OCR B	306	969	Scalable	877, 893
Prestige	432	2041	Scalable	See Table 202 on page 329
Prestige Bold	318	2041	Scalable	See Table 202 on page 329
Prestige Italic	319	2041	Scalable	See Table 202 on page 329
Katakana Gothic	304	1306	Scalable	290, 897, 1027, 1041

IBM Coordinated Font Set Code Page Set

Table 206 provides the GCSGIDs and CPGIDs for the individual Code Pages listed in the Code Pages column of Table 205.

Table 206. IBM Coordinated Font Set Code Page Set

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)
293	380
310	963

Table 206. IBM Coordinated Font Set Code Page Set (continued)

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)
910	1113
876, 892	968
877, 893	969
290, 1027	1172
897	1164
1041	1187

Table 207. GCSGID Subsets for the Strategic Font Set 2

GCSGID	Valid GCSGID Subsets
1304	0380, 0963, 1113
2039	0101, 0103, 0119, 0251, 0265, 0269, 0273, 0277, 0281, 0285, 0288, 0289, 0293, 0297, 0301, 0305, 0309, 0313, 0317, 0321, 0325, 0329, 0337, 0341, 0611, 0697, 0919, 0980, 0990, 0991, 0993, 0995, 1132, 1133, 1145, 1146, 1149, 1198, 1220, 1258, 1259, 1260
1306	0332, 1164, 1172, 1187
2041	0695, 0988, 1353, 1412, 2039

DBCS Resident Raster Font Set

The following AFP font products are available in resident form as a feature in Infoprint 20 and Infoprint 32/40 printers. These fonts provide 240 pel capability for Japanese, Korean, Simplified Chinese, Traditional Chinese and Thai languages.

- AFP Japanese Object Font V2R1.1 for MVS and VSE (5771-AGB)
- AFP Japanese Object Font V2R1.0 for MVS and VSE (5771-AGB) **Except for Section 68**
- AFP Korean Object Font V1R1.1 and V1R1.0 for MVS and VSE (5771-AFW)
- AFP Traditional Chinese Object Font V1R1.2 and V1R1.1 for MVS and VSE (5771-AFZ)
- AFP Simplified Chinese Object Font V1R1.1 and V1R1.0 for MVS and VSE (5771-AEK)
- AFP Thai Object Font V1R1.1 and V1R1.0 for MVS and VSE (5771-AEN)

These fonts are only available in raster form at 240 pel. Though AFP Japanese Font 5771-AGB consists of 23 sizes of DBCS fonts and 20 sizes of SBCS fonts, the SBCS fonts are NOT available in this resident raster font set.

Table 208 on page 337, Table 209 on page 337, Table 210 on page 338, Table 211 on page 338, and Table 212 on page 338 list the resident fonts by typeface and size for Japanese, Korean, Traditional Chinese, Simplified Chinese and Thai Languages.

Table 208. AFP Japanese Font Compatibility Set

Typeface	Box Size	Point Size	Font Width	Graphic Character Set Global ID (GCSGID)	Code Page Global ID (CPGID)	Font Global ID (FGID)
Mincho (M16F)	16x16	4.8	96	370	300	53559
Mincho (M24F)	24x24	7	140	370	300	53559
Mincho (Z24F)	24x24	7.2	144	370	300	53559
Mincho (M26F)	26x26	7.8	156	370	300	53559
Mincho (M32F)	32x32	10	180	370	300	53559
Mincho (M36F)	36x36	10.8	216	370	300	53559
Mincho (M40F)	40x40	12	240	370	300	53559
Mincho (M44F)	44x44	13.2	264	370	300	53559
Mincho (M48F)	48x48	14.4	288	370	300	53559
Mincho (M52F)	52x52	15.6	312	370	300	53559
Mincho (M64F)	64x64	19.2	384	370	300	53559
Gothic (G16F)	16x16	5	100	370	300	53815
Gothic (G20F)	20x24	7.2	144	370	300	53813
Gothic (G24F)	24x30	7	140	370	300	53813
Gothic (G32F)	32x32	9.6	192	370	300	53815
Gothic (G36F)	36x36	10.8	216	370	300	53815
Gothic (G40F)	40x40	12	240	370	300	53815
Gothic (G48F)	48x48	14.4	288	370	300	53815
Gothic (G64F)	64x64	19.2	384	370	300	53815
R-Gothic (R36F)	36x36	10.8	216	370	300	54071
R-Gothic (R40F)	40x40	12	240	370	300	54071
R-Gothic (R48F)	48x48	14.4	288	370	300	54071
R-Gothic (R64F)	64x64	19.2	384	370	300	54071

Table 209. AFP Korean Font Compatibility Set

Typeface	Box Size	Point Size	Font Width	Graphic Character Set Global ID (GCSGID)	Code Page Global ID (CPGID)	Font Global ID (FGID)
Mincho (M24K)	24x24	7.2	144	934	834	53559
Mincho (M32K)	32x32	9.6	192	934	834	53559
Mincho (M36K)	36x36	10.8	216	934	834	53559
Mincho (M40K)	40x40	12	240	934	834	53559
Mincho (M48K)	48x48	14.4	288	934	834	53559
Mincho (M64K)	64x64	19.2	384	934	834	53559
Gothic (G16K)	16x16	4.8	96	934	834	53815
Gothic (G24K)	24x30	9	180	934	834	53813

Table 210. AFP Traditional Chinese Font Compatibility Set

Typeface	Box Size	Point Size	Font Width	Graphic Character Set Global ID (GCSGID)	Code Page Global ID (CPGID)	Font Global ID (FGID)
Ming (M24T)	24x24	7.2	144	935	835	54583
Ming (M32T)	32x32	9.6	192	935	835	54583
Ming (M40T)	40x40	12	240	935	835	54583
Gothic (G16T)	16x16	4.8	96	935	835	53815

Table 211. AFP Simplified Chinese Font Compatibility Set

Typeface	Box Size	Point Size	Font Width	Graphic Character Set Global ID (GCSGID)	Code Page Global ID (CPGID)	Font Global ID (FGID)
Song (S26P)	26x26	7.8	144	937	837	54327
Song (S32P)	32x32	9.6	192	937	837	54327
Song (S40P)	40x40	12	240	937	837	54327
Gothic (G16P)	16x16	4.8	96	937	837	53815

Table 212. AFP Thai Font Compatibility Set

Typeface	Box Size	Point Size	Font Width	Graphic Character Set Global ID (GCSGID)	Code Page Global ID (CPGID)	Font Global ID (FGID)
Official (O40F)	24x40	12	240	939	839	57655
Official (O60F)	24x60	18	360	939	839	57655
Italics (I60F)	24x60	18	360	939	839	58039

DBCS Resident Raster Font Code Page Set

Code pages used for the DBCS Resident Raster Fonts are shown in Table 208 on page 337, Table 209 on page 337, Table 210, Table 211, and Table 212.

3820 ROM Font Compatibility

The 5 Kanji DBCS fonts supported by 3820 ROM Font RPQ #8A5014 are included in the AFP Japanese Object Font V2R1.0 (5771-AGB).

Activation of DBCS Resident Raster Font Sections

The DBCS resident raster fonts can only be activated by section and only by using the MVS Host Unalterable Resource ID Format of the Activate Resource command. The allowable resource types and resource ID formats are:

```
    Resource Type              RT Hex   Resource ID Format   RIDF Hex

Double Byte Coded Font Section X'03'    IBM GRID             X'03'
Double Byte Coded Font Section X'03'    MVS Host Unalterable X'06'
Double Byte Coded Font Index   X'09'    IBM GRID             X'03'
Double Byte Coded Font Index   X'09'    MVS Host Unalterable X'06'
```

To activate a coded font section the following items within the MVS Host Unalterable Format must be provided and match the printer values.

Graphic Character Set ID

See Table 208 on page 337, Table 209 on page 337, Table 210 on page 338, Table 211 on page 338, and Table 212 on page 338.

Font Global ID

See Table 208 on page 337, Table 209 on page 337, Table 210 on page 338, Table 211 on page 338, and Table 212 on page 338.

Code Page ID

See Table 208 on page 337, Table 209 on page 337, Table 210 on page 338, Table 211 on page 338, and Table 212 on page 338.

Font Width

See Table 208 on page 337, Table 209 on page 337, Table 210 on page 338, Table 211 on page 338, and Table 212 on page 338.

Date Stamp

The date stamp for each DBCS Resident Raster Fonts must be equal to the value in the following list;

- AFP Japanese Font Compatibility Set
  - M24F,M32F,M40F,G16F,G24F
    - Sections 41 - 67 = 87244
    - Section 68 = 94181
  - All other Japanese Fonts
    - Sections 41 - 67 = 91263
    - Section 68 = 94181
- AFP Korean Font Compatibility Set = 95059
- AFP Traditional Chinese Font Compatibility Set = 93190
- AFP Simplified Chinese Font Compatibility Set = 89305
- AFP Thai Font Compatibility Set = 89305

Time Stamp

The time stamp for all DBCS Resident Raster Fonts must be equal to 00000000.

Note: Each value of the Max Base Line Extent (BLE) field of the LFI record in the following IPDS font files is smaller than that of the Base Line Offset (BLO) field.

- Japanese

  M40F41.000
- Korea

  M24K44.000, M32K44.000, M36K44.000, M40K44.000, M48K44.000, M64K44.000, G24K44.000
- Traditional Chinese

  M24T42.000, M24T44.000, M32T42.000, M32T44.000, M40T42.000, M40K44.000
- Simplified Chinese

  S26P41.000, S26P42.000, S26P43.000, S26P44.000, S32P41.000, S32P42.000, S32P43.000, S32P44.000, S40P41.000, S40P42.000, S40P43.000, S40P44.000
- Thai

  O40F41.000, O40F42.000, O40F43.000, O60F41.000, O60F42.000, O60F43.000, I60F41.000, I60F42.000, I60F43.000

The Base Line Offset (BLO) Value is NOT set in the the Max Base Line Extent (BLE) field of the LFI record in each character set file of IPDS font even if the Max BLE value is smaller than the BLO value.

CRC Values

For the CRC values of Code Page, and character sets for the each DBCS Resident Raster Font, see following tables.

AFP Japanese Font Compatibility Set

Table 213. CRC Values for Character Set for G16F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	46E8	42	28A8	43	4FB9	44	0809
45	8B9A	46	0112	47	66C4	48	A9EE
49	168A	4A	1317	4B	A5C8	4C	EA9D
4D	68F0	4E	C328	4F	EA42	50	BF57
51	9058	52	5BF2	53	15C7	54	9F6B
55	8713	56	05F9	57	6212	58	FE84
59	8755	5A	FD2B	5B	E389	5C	E394
5D	32A7	5E	9A9F	5F	5D4E	60	DB7B
61	3B3E	62	818F	63	CF87	64	F0D0
65	C987	66	C411	67	239A	68	CC92

Table 214. CRC Values for Character Set for G20F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	1C63	42	5F6C	43	A1B2	44	A316
45	F8A7	46	14E2	47	2342	48	5FB5
49	A896	4A	CD05	4B	19BB	4C	DC8F
4D	8E66	4E	68FC	4F	C572	50	8F57
51	7FED	52	DD73	53	4FE5	54	28B6
55	EAB6	56	3C41	57	1929	58	1555
59	AA3B	5A	F3F7	5B	0EDF	5C	CD90
5D	AFC2	5E	B585	5F	6BB5	60	4EFC
61	CE5D	62	C6F5	63	9595	64	2B76
65	6ACA	66	F5CC	67	60AA	68	FFA5

Table 215. CRC Values for Character Set for G24F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	3BBD	42	4438	43	0BA2	44	7A9D
45	F689	46	7F80	47	98E9	48	C89F
49	C4FD	4A	6834	4B	EB29	4C	A1AA
4D	0116	4E	6F93	4F	8FB3	50	4CD6
51	890A	52	2560	53	A235	54	B7FA
55	F427	56	732C	57	85FD	58	AB1F
59	FA93	5A	FF1A	5B	9283	5C	378B
5D	13CB	5E	F8D2	5F	DAB7	60	8D7A
61	5395	62	9E72	63	25F0	64	3181
65	1293	66	65CE	67	3D63	68	8C0D

Table 216. CRC Values for Character Set for G32F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	752B	42	8DE1	43	09BD	44	0494
45	0FD2	46	358C	47	E224	48	35C6
49	2B91	4A	B562	4B	9710	4C	6B98
4D	C43C	4E	6A4A	4F	2776	50	2076
51	CB04	52	984E	53	BDA4	54	10F0
55	AA0A	56	0DC0	57	08C1	58	D20F
59	6B8A	5A	39E3	5B	77F6	5C	D6CD
5D	76EA	5E	FC6B	5F	2F22	60	ACDC
61	3B32	62	8CE0	63	BD4C	64	66B7
65	5D6B	66	E8B7	67	6077	68	EF3C

Table 217. CRC Values for Character Set for G36F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	AEBD	42	4ABD	43	FB3D	44	B3AE
45	092D	46	3674	47	B3DF	48	4336
49	9937	4A	651F	4B	F001	4C	17C7
4D	E452	4E	C7D0	4F	F959	50	C93E
51	AEDD	52	82D8	53	5FD1	54	5D61
55	6DA0	56	5766	57	1A91	58	0EF6
59	F063	5A	E958	5B	F7DF	5C	74A3
5D	5D35	5E	64DC	5F	BCBC	60	321D
61	24CD	62	1081	63	9AD1	64	F3C8
65	852E	66	0FAA	67	DAF8	68	A0C7

Table 218. CRC Values for Character Set for G40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	F272	42	7E9E	43	4DD9	44	1F16
45	5C31	46	56AB	47	8387	48	E44C
49	F4F3	4A	409B	4B	D059	4C	D519
4D	4AF5	4E	50E9	4F	F180	50	AA9E
51	4DD0	52	863D	53	F7DA	54	3CAE
55	95D2	56	831A	57	2A09	58	2084
59	D33B	5A	E4CE	5B	070C	5C	5D2D
5D	40D1	5E	C79A	5F	F42F	60	B5C8
61	BC5C	62	E89F	63	6B7E	64	A8CE
65	DC5F	66	BF97	67	AEB2	68	83C5

Table 219. CRC Values for Character Set for G48F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	A983	42	18A4	43	79DE	44	151A
45	FDEF	46	6C09	47	8255	48	C7FD
49	ADC4	4A	FFF6	4B	F246	4C	CF9E
4D	98A0	4E	DC17	4F	B67C	50	459B
51	1DC7	52	7770	53	21EA	54	1755
55	F6AA	56	CC5C	57	A066	58	AAC0

Table 219. CRC Values for Character Set for G48F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
59	EFE3	5A	67D2	5B	D89B	5C	CDCD
5D	E006	5E	DA11	5F	6275	60	A404
61	273E	62	C240	63	BE54	64	962B
65	19F9	66	5728	67	908C	68	1F9A

Table 220. CRC Values for Character Set for G64F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	E888	42	08DB	43	9831	44	974B
45	DAAB	46	E1A3	47	1652	48	5381
49	E098	4A	1569	4B	DE63	4C	15B6
4D	EBCC	4E	B85B	4F	A461	50	FC55
51	7B1B	52	4D62	53	64D9	54	98A5
55	6B0D	56	61A0	57	9B1A	58	DA92
59	7384	5A	3BCA	5B	4039	5C	B653
5D	71F0	5E	EDFA	5F	44AA	60	9848
61	DF95	62	E492	63	B6E1	64	2DB1
65	E8B7	66	76B0	67	4C05	68	030B

Table 221. CRC Values for Character Set for M16F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	1664	42	BA38	43	BBB3	44	28BE
45	860A	46	D90A	47	9A32	48	6B68
49	5C9D	4A	4ACC	4B	123E	4C	B9F8
4D	9D3F	4E	82DB	4F	EE0C	50	375F
51	4879	52	0115	53	4165	54	E9EB
55	665D	56	9317	57	D8C9	58	62C6
59	27EA	5A	1196	5B	E314	5C	8D70
5D	2F39	5E	EF99	5F	4715	60	9350
61	FF82	62	423C	63	6DB3	64	446B
65	F296	66	9921	67	8BB1	68	8A5D

Table 222. CRC Values for Character Set for M24F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	787D	42	FD50	43	1600	44	7FAC
45	A947	46	711A	47	7DC7	48	24BA
49	AD42	4A	A06D	4B	6C9F	4C	0466
4D	CF2D	4E	5AC2	4F	4ED7	50	F49C
51	BF95	52	3F32	53	6A74	54	A01E
55	659D	56	829B	57	F200	58	3376
59	16F0	5A	3042	5B	A857	5C	A47C
5D	55A1	5E	9F22	5F	0A42	60	AE42
61	6102	62	0FBE	63	011C	64	327E
65	38CB	66	5038	67	6AF7	68	851F

Table 223. CRC Values for Character Set for M26F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	2808	42	6C23	43	0B30	44	B6F9
45	AC09	46	B138	47	30B9	48	854A
49	895E	4A	7C5E	4B	C839	4C	B1BE
4D	4F94	4E	34F9	4F	2FC7	50	C5EA
51	BA12	52	471A	53	475C	54	258A
55	1ECB	56	11EB	57	889D	58	0439
59	4868	5A	751A	5B	617D	5C	315A
5D	B540	5E	82DF	5F	A705	60	3B0E
61	0B73	62	91EF	63	FD7A	64	DD7A
65	D80F	66	B472	67	990A	68	CF2E

Table 224. CRC Values for Character Set for M32F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	6A92	42	5E02	43	FDD6	44	532C
45	7271	46	A526	47	4A4C	48	BDE9
49	32E1	4A	6A55	4B	219F	4C	E422
4D	80E7	4E	45D7	4F	25E7	50	4EAA
51	66F0	52	7A24	53	CA85	54	C969
55	7E50	56	0550	57	3559	58	E591
59	EBCF	5A	BCC7	5B	0350	5C	3B58
5D	2A7B	5E	AB11	5F	2BDA	60	4759
61	A7EC	62	BAC9	63	A2AA	64	7C77
65	732E	66	666E	67	2792	68	8077

Table 225. CRC Values for Character Set for M36F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	FFA5	42	5666	43	0202	44	5943
45	87E4	46	E304	47	5C47	48	5F51
49	7156	4A	0500	4B	D3C9	4C	842F
4D	EFBF	4E	BF15	4F	81F2	50	2EB9
51	3A5D	52	A7E7	53	6610	54	F40E
55	F0B8	56	18CB	57	A5AD	58	DF21
59	C80C	5A	CFEF	5B	3D4B	5C	3A10
5D	5767	5E	BEA7	5F	4C04	60	E189
61	6F50	62	7277	63	700B	64	DFA5
65	F921	66	01BE	67	96B6	68	0496

Table 226. CRC Values for Character Set for M40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	A65A	42	2F4C	43	0F5B	44	5F00
45	9DC9	46	B5D7	47	B7B4	48	8EE4
49	F227	4A	39B3	4B	8CEA	4C	7D4D
4D	3499	4E	70DA	4F	565F	50	CD5E
51	C1CD	52	5F3F	53	3D43	54	ABBD
55	5635	56	B317	57	EE11	58	9429

Table 226. CRC Values for Character Set for M40F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
59	7552	5A	CF5A	5B	7D6E	5C	50E1
5D	B308	5E	990A	5F	8E24	60	6341
61	73F6	62	C342	63	035B	64	1F20
65	1B84	66	06B2	67	0215	68	DFE2

Table 227. CRC Values for Character Set for M44F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	62A7	42	DCE8	43	9CAD	44	BE7F
45	459E	46	4C4C	47	B02E	48	11F2
49	4BC6	4A	B89A	4B	16F4	4C	52BA
4D	9ED6	4E	B057	4F	2826	50	DEFB
51	2D4D	52	DAB1	53	4DCF	54	9286
55	1541	56	5637	57	8B64	58	4E2A
59	5712	5A	4282	5B	EAAF	5C	6A83
5D	4154	5E	5B10	5F	B66E	60	8ED5
61	72F0	62	5193	63	1418	64	1BC6
65	6DFE	66	ACBC	67	5473	68	AA13

Table 228. CRC Values for Character Set for M48F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	0BD1	42	43FC	43	DE68	44	5FFC
45	6AF2	46	E0B3	47	A3D4	48	6105
49	26A6	4A	57B2	4B	4321	4C	9CB2
4D	F420	4E	57E9	4F	533C	50	D2A3
51	316E	52	05CA	53	F6A0	54	2487
55	616F	56	E237	57	5B37	58	E9B5
59	B852	5A	6325	5B	21D5	5C	7381
5D	6D27	5E	E1FE	5F	0D36	60	3DAB
61	E322	62	DD6A	63	3DCA	64	7F9E
65	F02B	66	A902	67	3AFA	68	2F53

Table 229. CRC Values for Character Set for M52F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	3D2C	42	B3FD	43	DEF6	44	2D5C
45	FEA7	46	1661	47	B5EE	48	FADB
49	EF5A	4A	9454	4B	C46D	4C	56EF
4D	53EA	4E	AB1F	4F	6A62	50	E1DF
51	7EFB	52	CD20	53	CA7D	54	95E6
55	42F4	56	E1A3	57	9B73	58	2F89
59	097D	5A	3962	5B	6DDE	5C	8346
5D	1210	5E	B1CC	5F	E53A	60	C3B3
61	02E8	62	344F	63	3A9B	64	0C16
65	5106	66	A5F1	67	0709	68	81FE

Table 230. CRC Values for Character Set for M64F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	71EC	42	C675	43	91B7	44	42BE
45	0210	46	3818	47	5442	48	8B4B
49	BA48	4A	8C7F	4B	C510	4C	F59F
4D	E2A0	4E	DDEE	4F	B65A	50	91BD
51	976D	52	DBE0	53	379E	54	93F5
55	3C04	56	7A81	57	2A3A	58	6912
59	288B	5A	E032	5B	F86E	5C	E91C
5D	5711	5E	1C3E	5F	9B17	60	9E4C
61	B313	62	8E26	63	CFAB	64	E574
65	EDE3	66	9876	67	36A0	68	B5CF

Table 231. CRC Values for Character Set for R36F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	2C04	42	A538	43	678A	44	318E
45	1843	46	0058	47	9C29	48	E68C
49	1C7B	4A	3E95	4B	61AE	4C	DCD5
4D	2D7A	4E	A70F	4F	3EC9	50	BF75
51	D4E7	52	E84A	53	ADAF	54	F2E0
55	6A22	56	62C2	57	1B04	58	D893
59	921D	5A	DA81	5B	7D3E	5C	8C44
5D	7B8E	5E	7BB7	5F	3BB3	60	84A8
61	1EBD	62	10E2	63	BD82	64	8CEE
65	51A1	66	5D73	67	8A8D	68	D096

Table 232. CRC Values for Character Set for R40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	A260	42	382F	43	3DC5	44	1F83
45	C7C8	46	8DD9	47	EB40	48	35AD
49	D814	4A	1F60	4B	4D9B	4C	99E7
4D	A8EC	4E	03DD	4F	70BA	50	C55C
51	4586	52	D293	53	5BBE	54	D9C9
55	161B	56	9787	57	30CA	58	DF79
59	39B8	5A	1049	5B	167C	5C	838D
5D	A038	5E	020D	5F	3585	60	7491
61	E5E2	62	8602	63	1406	64	CC68
65	B137	66	A6E6	67	9F25	68	892F

Table 233. CRC Values for Character Set for R48F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	AD5D	42	BCD9	43	5437	44	FAFB
45	AEE1	46	1B69	47	6CCF	48	69A0
49	AFEA	4A	5419	4B	117E	4C	28B2
4D	E7BB	4E	E331	4F	7E55	50	A290
51	AE7A	52	04C9	53	FBB3	54	2D09
55	8FED	56	E5AF	57	2A31	58	E076

Table 233. CRC Values for Character Set for R48F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
59	C4D7	5A	096D	5B	7FD9	5C	F5A1
5D	F14A	5E	0AE5	5F	4029	60	9BB7
61	A957	62	B8D4	63	C848	64	7C2C
65	90EB	66	77CE	67	9708	68	8868

Table 234. CRC Values for Character Set for R64F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	FCC6	42	96B6	43	D88D	44	295A
45	EAC9	46	6A38	47	23B1	48	73B0
49	C031	4A	7433	4B	1771	4C	257B
4D	A0F4	4E	06B5	4F	30A5	50	93DB
51	09B6	52	1B42	53	2409	54	B208
55	2ADF	56	7824	57	B709	58	5EAC
59	9043	5A	9463	5B	6E2A	5C	E257
5D	5B8F	5E	4B4B	5F	06BF	60	EDE9
61	67C6	62	BFDD	63	F90A	64	91CF
65	26F9	66	1087	67	2D91	68	9796

Table 235. CRC Values for Character Set for Z24F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	2828	42	B74B	43	05F1	44	A809
45	F06B	46	407D	47	DAFC	48	D5F1
49	B36C	4A	BFDB	4B	AA5C	4C	4F0B
4D	C85A	4E	3EB2	4F	377C	50	B029
51	1569	52	77AF	53	7DD6	54	F55E
55	B339	56	B35A	57	D221	58	6600
59	9EC2	5A	96F4	5B	3D18	5C	9B63
5D	BE5A	5E	D367	5F	5BC0	60	0ABA
61	F0BC	62	EBB8	63	0EED	64	068C
65	6A5B	66	4161	67	B624	68	2244

Table 236. CRC Values for Code Page 300 for G16F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	32DE

Table 237. CRC Values for Code Page 300 for G20F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	3E3B

Table 238. CRC Values for Code Page 300 for G24F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	C4F5

Table 239. CRC Values for Code Page 300 for G32F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	CA06

Table 240. CRC Values for Code Page 300 for G36F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88

Table 240. CRC Values for Code Page 300 for G36F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	F64E

Table 241. CRC Values for Code Page 300 for G40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	5FED

Table 242. CRC Values for Code Page 300 for G48F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	3412

Table 243. CRC Values for Code Page 300 for G64F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	A735

Table 244. CRC Values for Code Page 300 for M16F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	32DE

Table 245. CRC Values for Code Page 300 for M24F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	0B85

Table 246. CRC Values for Code Page 300 for M26F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	15A1

Table 247. CRC Values for Code Page 300 for M32F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88

Table 247. CRC Values for Code Page 300 for M32F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	CA06

Table 248. CRC Values for Code Page 300 for M36F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	F64E

Table 249. CRC Values for Code Page 300 for M40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	5FED

Table 250. CRC Values for Code Page 300 for M44F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	70CA

Table 251. CRC Values for Code Page 300 for M48F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	3412

Table 252. CRC Values for Code Page 300 for M52F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	B149

Table 253. CRC Values for Code Page 300 for M64F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	A735

Table 254. CRC Values for Code Page 300 for R36F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88

Table 254. CRC Values for Code Page 300 for R36F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	F64E

Table 255. CRC Values for Code Page 300 for R40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	5FED

Table 256. CRC Values for Code Page 300 for R48F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	3412

Table 257. CRC Values for Code Page 300 for R64F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	A735

Table 258. CRC Values for Code Page 300 for Z24F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	67CA	42	5FD5	43	B896	44	B8A9
45	5A66	46	4214	47	4A3A	48	3380
49	3BAE	4A	EDDF	4B	F5AD	4C	FD83
4D	C549	4E	CD67	4F	D515	50	DDF8
51	D5D6	52	CDA4	53	C58A	54	FD40
55	653F	56	ED1C	57	E532	58	9C88
59	94A6	5A	42D7	5B	5AA5	5C	528B
5D	6A41	5E	626F	5F	7A1D	60	3CC1
61	34EF	62	2C9D	63	24B3	64	1C79
65	1457	66	0C25	67	040B	68	18EA

AFP Korean Font Compatibility Set

Table 259. CRC Values for Character Set for G16K

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	7419	42	7DC8	43	F0EF	44	6776
45	CD4A	46	8DB9	47	8C16	48	713B
49	8ECC	4A	317D	4B	EC38	50	E451
51	832E	52	6B24	53	0520	54	7242
55	69C4	56	3875	57	6F0C	58	8BB1
59	8CAA	5A	931E	5B	E920	5C	973B
5D	48E9	5E	C5DB	5F	ECB0	60	AA0B
61	C99F	62	951C	63	6160	64	51FA
65	91E6	66	F216	67	93CE	68	0113
69	E94A	6A	9DFB	6B	F6FD	6C	B4CE
84	32AA	85	D093	86	B2D8	87	E556
88	A3A3	89	AB8A	8A	486C	8B	C500
8C	6B9C	8D	3E5B	8E	C4F7	8F	DF7A
90	61E6	91	E920	92	2F8D	93	DE55
94	C500	95	6319	96	E5CC	97	C571
98	6C53	99	0A03	9A	A1BA	9B	9505
9C	25B1	9D	7855	9E	85C8	9F	68DC
A0	EBA7	A1	BCE1	A2	7491	A3	D8F1
A4	428D	A5	3391	A6	142E	A7	F60C
A8	BEBE	A9	B6F7	AA	4D7C	AB	2D2B
AC	3839	AD	9D30	AE	7C7E	AF	469B
B0	A9DE	B1	1E38	B2	7AC4	B3	B267
B4	2121	B5	D62C	B6	7552	B7	6927
B8	1A21	B9	B7EA	BA	5E79	BB	282F
BC	17D1	BD	F68D	BE	4D1A	BF	5B08
C0	087F	C1	50BE	C2	DCC5	C3	7161
C4	3ED5	C5	FB47	C6	D105	C7	2832
C8	7CF4	C9	A8B7	CA	46EF	CB	1294
CC	98CF	CD	B5EF	CE	8498	CF	5478
D0	5B05	D1	525B	D2	8F9E	D3	AACF

Table 260. CRC Values for Character Set for M24K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	91FC	42	30CA	43	F42E	44	D7E3
45	4BF6	46	9953	47	0DB3	48	9E77
49	CF77	4A	6E51	4B	B21B	50	1065
51	EF2A	52	BF88	53	6653	54	7888
55	E9E6	56	9BC2	57	444B	58	1FF3
59	3F48	5A	F637	5B	5634	5C	8714
5D	944E	5E	6701	5F	19E3	60	41EF
61	7B51	62	0D03	63	A393	64	825C
65	7196	66	0582	67	D374	68	39C6
69	2F6C	6A	6EE6	6B	E1D3	6C	1AAA
84	09B9	85	CB67	86	6F5E	87	AD1E
88	A34B	89	C4EA	8A	21A7	8B	769C
8C	4667	8D	8181	8E	BC48	8F	5AA3
90	4CF2	91	E9B9	92	4E02	93	0019
94	395C	95	799C	96	B26D	97	9357
98	DB16	99	6FED	9A	FAC9	9B	CE88
9C	336D	9D	033B	9E	C0F6	9F	1FC5
A0	15B3	A1	0C7E	A2	021F	A3	4619
A4	3A91	A5	033E	A6	6655	A7	96BA
A8	24D8	A9	DE78	AA	B257	AB	D205
AC	1530	AD	0EAD	AE	A290	AF	4D77
B0	3230	B1	7051	B2	EE24	B3	7E7F
B4	A774	B5	2905	B6	F943	B7	BC7E
B8	A2C5	B9	CC00	BA	641E	BB	A724
BC	813E	BD	16A3	BE	8867	BF	147C
C0	BDED	C1	D562	C2	DCA6	C3	58C7
C4	C61D	C5	87D3	C6	30E2	C7	3D55
C8	8EB6	C9	37CC	CA	D96A	CB	3409
CC	A2CC	CD	199A	CE	1EA9	CF	83B3
D0	4165	D1	11EC	D2	2ABD	D3	F946

Table 261. CRC Values for Character Set for G24K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	BDE5	42	3AA8	43	245D	44	23B6
45	1D2B	46	CBA2	47	0BB5	48	3F1F
49	1F4A	4A	9411	4B	9243	50	C53D
51	B271	52	5D20	53	D681	54	452F
55	1D4C	56	BBB4	57	1D05	58	F870
59	551E	5A	5AAB	5B	55E7	5C	93B3
5D	0E7F	5E	26B0	5F	837E	60	B2C4
61	0309	62	E80E	63	748D	64	D47C
65	567C	66	D6D2	67	9E7D	68	368D
69	53EF	6A	0E4E	6B	8EFF	6C	4F2E
84	A857	85	0240	86	13EF	87	9490
88	1208	89	93EC	8A	B4B4	8B	8929

Table 261. CRC Values for Character Set for G24K (continued)

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
8C	6874	8D	62B7	8E	8D0D	8F	BA27
90	F0C9	91	4ED9	92	EEBD	93	28C4
94	60B4	95	ADF9	96	E09C	97	F6D0
98	1276	99	682A	9A	7323	9B	5259
9C	9133	9D	83F0	9E	B2BC	9F	089C
A0	F174	A1	9737	A2	2B9D	A3	AFBF
A4	6465	A5	81E9	A6	2AEA	A7	6B18
A8	A8E5	A9	9F04	AA	8A93	AB	44A0
AC	ADFE	AD	23F2	AE	DD54	AF	64E1
B0	8C9F	B1	B1A4	B2	3E75	B3	168E
B4	6143	B5	93FD	B6	A586	B7	8C10
B8	E2A3	B9	56A5	BA	35AB	BB	B341
BC	3067	BD	91F5	BE	326E	BF	3DB8
C0	1426	C1	01D3	C2	CFB3	C3	B00E
C4	5E59	C5	2489	C6	9829	C7	3A57
C8	A85E	C9	72EF	CA	A94B	CB	1027
CC	B59A	CD	4577	CE	1BEA	CF	746B
D0	CA9E	D1	9CCC	D2	793E	D3	EFC0

Table 262. CRC Values for Character Set for M32K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	6A8A	42	EFA9	43	EB34	44	4D4F
45	B4AD	46	B3F3	47	43C4	48	3942
49	6B99	4A	9FFC	4B	40DE	50	662D
51	939B	52	C8C0	53	A738	54	63CC
55	3798	56	6BD4	57	9698	58	ECEC
59	08A8	5A	0EBD	5B	7E17	5C	2801
5D	4E4C	5E	2A09	5F	183C	60	697A
61	7CFD	62	391A	63	2A9A	64	1864
65	93F1	66	9601	67	D264	68	4B84
69	029F	6A	56FF	6B	C809	6C	70AE
84	0C56	85	B88E	86	43DC	87	6CB3
88	3B14	89	A5E3	8A	36DC	8B	9B9C
8C	46B8	8D	76EF	8E	511C	8F	EEB7
90	C485	91	3659	92	3855	93	1292
94	612D	95	A491	96	61D6	97	D7ED
98	98C8	99	65FC	9A	61FA	9B	EDBA
9C	1B14	9D	7B12	9E	2EA9	9F	0D97
A0	A1C5	A1	4236	A2	4655	A3	C6A7
A4	FD28	A5	4CAD	A6	3820	A7	6A5F
A8	D160	A9	7ABC	AA	1ED4	AB	39FE
AC	742D	AD	2875	AE	3F13	AF	B5D3
B0	CD64	B1	803D	B2	2E24	B3	58CD
B4	5C3E	B5	EDF7	B6	A7A2	B7	F68E
B8	DBD2	B9	D89D	BA	E1CE	BB	A505

Table 262. CRC Values for Character Set for M32K (continued)

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
BC	2B95	BD	973B	BE	13CD	BF	CC3C
C0	4EB6	C1	BCCC	C2	F2D1	C3	5C9A
C4	AB87	C5	82BF	C6	0B22	C7	FDF0
C8	66D9	C9	2423	CA	F623	CB	C761
CC	5E00	CD	C220	CE	C696	CF	471A
D0	F9D5	D1	0681	D2	D139	D3	26AF

Table 263. CRC Values for Character Set for M36K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	EDC8	42	75D0	43	C019	44	AFA5
45	BC38	46	F194	47	9B0A	48	954B
49	EB54	4A	70C6	4B	9BF3	50	1144
51	E4EA	52	8058	53	8703	54	33D6
55	4833	56	E9E5	57	2B46	58	5198
59	E0ED	5A	BB4D	5B	435D	5C	57BD
5D	E106	5E	D330	5F	39F0	60	74AC
61	6881	62	755A	63	E108	64	B2B5
65	6436	66	36CF	67	78C3	68	BC16
69	1439	6A	E6A7	6B	A916	6C	E18D
84	C309	85	9731	86	4136	87	4021
88	C437	89	8A93	8A	12AF	8B	EC6E
8C	BD66	8D	8ABC	8E	6A0B	8F	3828
90	1CDD	91	7AF4	92	1B6B	93	EF7D
94	F6A8	95	23A7	96	D3BB	97	1797
98	BAE2	99	21B9	9A	2358	9B	F283
9C	36B2	9D	1B16	9E	4923	9F	85D1
A0	B0AB	A1	B57F	A2	FC02	A3	6CB0
A4	6CD8	A5	97A4	A6	391A	A7	215A
A8	ED81	A9	0787	AA	A88F	AB	D0C0
AC	511F	AD	44F7	AE	89A6	AF	674B
B0	09FE	B1	8D47	B2	BC9E	B3	5130
B4	5116	B5	7D71	B6	5A8A	B7	CC7D
B8	F220	B9	2364	BA	2C6D	BB	E8D1
BC	1EDE	BD	5260	BE	E3B0	BF	8D5C
C0	4CD0	C1	582D	C2	30D6	C3	DA89
C4	A15B	C5	E34E	C6	4DC0	C7	9493
C8	F72B	C9	8DA1	CA	6349	CB	6024
CC	4182	CD	BA96	CE	D2C7	CF	4369
D0	6D73	D1	58D4	D2	60F7	D3	44D7

Table 264. CRC Values for Character Set for M40K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	B062	42	D619	43	F552	44	0B32
45	9BA7	46	7F94	47	35D8	48	BC52
49	F138	4A	6DB4	4B	7EFB	50	62FC

Table 264. CRC Values for Character Set for M40K (continued)

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
51	1119	52	86E0	53	313F	54	DAA6
55	9EA4	56	9067	57	B080	58	8A75
59	B955	5A	1490	5B	BD30	5C	A164
5D	AE1E	5E	30A9	5F	BF8B	60	731F
61	692E	62	5C68	63	F097	64	775D
65	5A4D	66	56C9	67	2E1D	68	1565
69	9D26	6A	17A4	6B	8BE3	6C	F3E1
84	AC27	85	E99C	86	3E6B	87	8CD1
88	5323	89	74D9	8A	FF1D	8B	C236
8C	1D81	8D	3D93	8E	A5F7	8F	D8C6
90	FD1E	91	4B7E	92	308F	93	0A70
94	ECAE	95	26B8	96	F99E	97	F419
98	F8DA	99	26B7	9A	736A	9B	26EC
9C	BA29	9D	DB44	9E	857C	9F	8997
A0	270C	A1	EB89	A2	01B0	A3	C9FD
A4	E82D	A5	69AB	A6	1D0E	A7	54BC
A8	9F64	A9	B863	AA	6F45	AB	06DD
AC	53EB	AD	96A3	AE	FFBC	AF	D4AB
B0	D294	B1	7F6C	B2	2EB1	B3	5CA8
B4	5717	B5	814B	B6	0602	B7	C5B4
B8	252F	B9	4759	BA	83D5	BB	6CC5
BC	30D8	BD	34B2	BE	8D9E	BF	9555
C0	FAF7	C1	4F0E	C2	3006	C3	13D0
C4	0A2E	C5	159C	C6	DF05	C7	1D05
C8	2C34	C9	0865	CA	4D59	CB	6529
CC	D3F5	CD	3441	CE	80EA	CF	0911
D0	249F	D1	51B5	D2	2316	D3	C533

Table 265. CRC Values for Character Set for M48K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	3448	42	1B94	43	FCC5	44	B5EA
45	5E89	46	EC91	47	9BC0	48	8FF8
49	CEE5	4A	5F09	4B	FA4B	50	ACE7
51	7412	52	5C08	53	845D	54	D04C
55	7AE3	56	C071	57	DABE	58	996D
59	C7C2	5A	9A7B	5B	E43B	5C	B07A
5D	5EA2	5E	4160	5F	7477	60	35DD
61	9C18	62	B67F	63	33A4	64	9803
65	2BFD	66	93CD	67	F93D	68	C9AD
69	C38B	6A	F076	6B	A4C1	6C	614D
84	9960	85	DA7A	86	4FFF	87	2BA2
88	757D	89	360C	8A	DDEE	8B	E55F
8C	BC5C	8D	C856	8E	6797	8F	5668
90	2D56	91	DD17	92	5629	93	1AAE
94	4CFD	95	F3CC	96	DFDB	97	4BF1

Table 265. CRC Values for Character Set for M48K (continued)

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
98	82EA	99	0C4D	9A	0DA2	9B	5877
9C	E45F	9D	234C	9E	5715	9F	6CC9
A0	A8EB	A1	D62D	A2	270B	A3	AF3E
A4	B41F	A5	EBD0	A6	CF4E	A7	D626
A8	96F3	A9	89B7	AA	4B83	AB	CF3B
AC	9E09	AD	83FB	AE	2DB5	AF	83BE
B0	3ED3	B1	1C6D	B2	D291	B3	1A10
B4	582E	B5	4B17	B6	67D0	B7	0CED
B8	6073	B9	97DD	BA	F4E3	BB	6C43
BC	F297	BD	99A7	BE	1BB1	BF	CB22
C0	2713	C1	3AA7	C2	F41C	C3	82D4
C4	78CB	C5	EC9B	C6	F42C	C7	2BD8
C8	103B	C9	C944	CA	DB40	CB	01A5
CC	15E9	CD	7F10	CE	0CE5	CF	41F3
D0	CFBC	D1	75E3	D2	C6A3	D3	3E5E

Table 266. CRC Values for Character Set for M64K

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	C7EC	42	B05E	43	F9BC	44	4D84
45	F751	46	5201	47	9B6A	48	993E
49	A5DF	4A	C5DE	4B	2782	50	3932
51	B06B	52	1F07	53	F8E1	54	67E1
55	AC1C	56	F7F6	57	9E44	58	1DE9
59	2CCA	5A	FF37	5B	8587	5C	D46D
5D	DF14	5E	CF6E	5F	AC51	60	A3D3
61	E627	62	B322	63	17A3	64	2F50
65	BA2D	66	821E	67	01A4	68	D19B
69	7968	6A	C80D	6B	FDB6	6C	19D0
84	14A6	85	032F	86	5494	87	346F
88	622D	89	921B	8A	815B	8B	84F6
8C	F050	8D	3A52	8E	01D0	8F	AA1E
90	6EA5	91	5407	92	9831	93	637E
94	CBE1	95	CCC6	96	BE36	97	6F1A
98	6257	99	02C1	9A	A75A	9B	9C3D
9C	A1F8	9D	F354	9E	285A	9F	6962
A0	6F4C	A1	E2FB	A2	09CC	A3	4DB3
A4	F73F	A5	477F	A6	AF5F	A7	452B
A8	7897	A9	74CF	AA	605B	AB	66E9
AC	CE5F	AD	C3A8	AE	2495	AF	6670
B0	34BC	B1	BE63	B2	6DC5	B3	50F3
B4	4810	B5	3404	B6	C645	B7	C16A
B8	F64C	B9	A04B	BA	0BB2	BB	D911
BC	FE93	BD	D419	BE	7EA6	BF	D7CF
C0	E79C	C1	9C1C	C2	EF32	C3	B61E
C4	574F	C5	C600	C6	7B16	C7	639B

Table 266. CRC Values for Character Set for M64K (continued)

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
C8	0363	C9	C1C6	CA	76B5	CB	1C7B
CC	D66E	CD	141D	CE	9AA4	CF	0C99
D0	F3D8	D1	FEEE	D2	D3A4	D3	1EF3

Table 267. CRC Values for Code Page for 834

Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)	Section	CRC (Hex)
41	A821	42	7E0C	43	D113	44	8351
45	6EA5	46	AA10	47	A926	48	2C83
49	B21A	4A	D619	4B	282D	50	A7E0
51	AFCE	52	B7BC	53	BF92	54	8758
55	8F76	56	9704	57	9F2A	58	E690
59	EEBE	5A	38CF	5B	20BD	5C	2893
5D	1059	5E	1877	5F	0005	60	46D9
61	4EF7	62	5685	63	5EAB	64	6661
65	6E4F	66	763D	67	56C7	68	07A9
69	0F87	6A	D9F6	6B	C184	6C	AB63
84	3AAB	85	99E7	86	CEA1	87	0877
88	2CB2	89	852A	8A	67DF	8B	87D4
8C	C123	8D	114B	8E	8CB8	8F	B5BB
90	CC8E	91	5ACA	92	0044	93	A14A
94	C6DF	95	DDF5	96	DDA1	97	46D1
98	2D91	99	16F0	9A	5869	9B	ACF9
9C	9A8B	9D	DDBB	9E	D2D4	9F	8D87
A0	36E6	A1	2611	A2	B7FB	A3	0159
A4	AB61	A5	C178	A6	2F79	A7	60E1
A8	120B	A9	338F	AA	F4A8	AB	12C4
AC	DF1B	AD	3560	AE	3649	AF	4FBB
B0	873C	B1	50C1	B2	ED08	B3	18CD
B4	2630	B5	EC6D	B6	3CA4	B7	DE10
B8	E3F5	B9	CFFC	BA	42CB	BB	E88D
BC	1A97	BD	5297	BE	66D1	BF	F2DE
C0	930F	C1	917A	C2	82E3	C3	8063
C4	9874	C5	E5A6	C6	5966	C7	06AB
C8	C4C7	C9	7D28	CA	9453	CB	3ACA
CC	D0BB	CD	0D32	CE	6E20	CF	A36D
D0	F93D	D1	1193	D2	B9B7	D3	B35E

AFP Traditional Chinese Font Compatibility Set

Table 268. CRC Values for Character Set for G16T

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	AACC	42	12AD	43	BA1E	44	96A3
45	997B	46	C250	47	C263	48	9E72
49	3722	4C	5507	4D	00BC	4E	3532
4F	93D4	50	75A3	51	BC43	52	E704

Table 268. CRC Values for Character Set for G16T (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
53	1CCF	54	A9A4	55	83C8	56	8469
57	80A1	58	8E93	59	3B12	5A	1425
5B	2599	5C	0F09	5D	8869	5E	20FC
5F	9515	60	B865	61	DD40	62	DC78
63	C090	64	27C2	65	1B2C	66	DD2B
67	4139	68	5FB7	69	00FF	6A	2A9D
6B	8E49	6C	12AB	6D	7612	6E	9A53
6F	7899	70	8D4A	71	660F	72	62F7
73	8226	74	673D	75	7ACF	76	0132
77	106C	78	60DE	79	07A8	7A	EA4B
7B	6634	7C	B8CA	7D	0B6F	7E	E967
7F	9F06	80	BA49	81	304B	82	4A68
83	BA76	84	D429	85	4722	86	596C
87	1629	88	42D5	89	9229	8A	D439
8B	E6F7	8C	F369	8D	57EC	8E	ACEB
8F	46A4	90	C000	91	3BA2		

Table 269. CRC Values for Character Set for M24T

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	217B	42	B8CF	43	8D4B	44	555E
45	D715	46	CE3C	47	EF33	48	4D64
49	70C5	4C	62A3	4D	BAAA	4E	EC27
4F	919E	50	942F	51	F3F2	52	FB8C
53	F831	54	501B	55	BFA7	56	2E87
57	6515	58	D81C	59	7051	5A	51A5
5B	C4BA	5C	8521	5D	0BBE	5E	9A37
5F	D423	60	6F59	61	69BB	62	6436
63	EFD2	64	23BB	65	1023	66	D0F2
67	839A	68	2297	69	371C	6A	A6E5
6B	1BD5	6C	8E7C	6D	EAA8	6E	919F
6F	1765	70	DD57	71	CB41	72	E6EB
73	5D4B	74	7301	75	6D49	76	EE55
77	ECBC	78	ED72	79	D0C5	7A	9E04
7B	FB84	7C	B6C9	7D	AE58	7E	3B21
7F	BB36	80	3972	81	65EF	82	DC8C
83	FDF9	84	61C8	85	EB7D	86	5BB7
87	7277	88	D459	89	4D22	8A	65FA
8B	AB25	8C	5A49	8D	B51B	8E	FFEA
8F	3D0A	90	21A8	91	57FF		

Table 270. CRC Values for Character Set for M32T

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	37AB	42	2765	43	5ACD	44	0E4D
45	AB39	46	A83B	47	7399	48	FD2A
49	7F15	4C	5400	4D	6391	4E	4A56

Table 270. CRC Values for Character Set for M32T (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
4F	FDB5	50	047F	51	97EC	52	86EC
53	B6BB	54	B34A	55	16C3	56	EB41
57	94D5	58	0DF7	59	965D	5A	A2CA
5B	B2D8	5C	DDCF	5D	4F41	5E	BC08
5F	DCE8	60	A1D5	61	0142	62	A063
63	FBD0	64	9BD7	65	236B	66	8614
67	223C	68	F05B	69	2DD2	6A	14CC
6B	2E17	6C	793A	6D	A740	6E	4A9F
6F	0D62	70	2789	71	4308	72	993A
73	DBC0	74	7C09	75	D732	76	0A24
77	004E	78	77E7	79	A697	7A	48FD
7B	C472	7C	63E7	7D	8423	7E	081A
7F	FA2D	80	3A74	81	4F05	82	41A9
83	FF76	84	B0FD	85	0A2B	86	369B
87	A391	88	0E8F	89	3692	8A	C418
8B	7779	8C	EE7B	8D	FC7D	8E	C1CC
8F	6D38	90	C4F2	91	B207		

Table 271. CRC Values for Character Set for M40T

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	89F7	42	411A	43	08EB	44	4439
45	9924	46	22F5	47	D8A1	48	6B07
49	894D	4C	27E5	4D	2261	4E	B3D7
4F	19BC	50	6E87	51	48BE	52	930A
53	1267	54	5866	55	B204	56	54A5
57	DB33	58	C43C	59	CC32	5A	CB03
5B	CEC4	5C	6306	5D	34A6	5E	5601
5F	60F7	60	DE58	61	B1F7	62	9BDD
63	AD2C	64	ED9E	65	BCFC	66	484A
67	F9E5	68	8E06	69	7AFB	6A	3F05
6B	F5ED	6C	D320	6D	A1C7	6E	972A
6F	D30F	70	CD89	71	1ACF	72	1BE0
73	527D	74	DDBD	75	0FCA	76	BB73
77	A019	78	847F	79	E28E	7A	CEC0
7B	F701	7C	E91B	7D	B072	7E	CA09
7F	2A0F	80	BF21	81	37E1	82	E584
83	8D11	84	E623	85	CD51	86	94AE
87	5319	88	D0B6	89	9C01	8A	D542
8B	FB05	8C	9D37	8D	D159	8E	F385
8F	AF19	90	D209	91	F837		

Table 272. CRC Values for Code Page 835

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	333B	42	ADCC	43	09B4	44	163E
45	3996	46	83C2	47	5632	48	B0DB

Table 272. CRC Values for Code Page 835 (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
49	0422	4C	3F8B	4D	EDE5	4E	C647
4F	BAA1	50	CAE3	51	E141	52	9DA7
53	B605	54	646B	55	4FC9	56	332F
57	188D	58	87D2	59	AC70	5A	5FC6
5B	2320	5C	0882	5D	DAEC	5E	F14E
5F	8DA8	60	93F8	61	B85A	62	C4BC
63	EF1E	64	3D70	65	16D2	66	6A34
67	4196	68	8350	69	F56B	6A	06DD
6B	7A3B	6C	5199	6D	83F7	6E	A855
6F	D4B3	70	A4F1	71	8F53	72	F3B5
73	D817	74	0A79	75	21DB	76	5D3D
77	769F	78	E9C0	79	C262	7A	31D4
7B	4D32	7C	6690	7D	B4FE	7E	9F5C
7F	E3BA	80	89A7	81	A205	82	DEE3
83	F541	84	272F	85	0C8D	86	706B
87	5BC9	88	C496	89	EF34	8A	1C82
8B	6064	8C	4BC6	8D	99A8	8E	B20A
8F	CEEC	90	BEAE	91	F98D		

AFP Simplified Chinese Font Compatibility Set

Table 273. CRC Values for Character Set for G16P

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	CD0C	42	C89E	43	127C	44	C828
45	BA0C	46	A639	48	D6F3	49	1AE7
4A	CE64	4B	53BD	4C	0E3B	4D	573C
4E	6039	4F	F9AB	50	B402	51	1B3D
52	14F3	53	DB75	54	DAB5	55	2597
56	E2EA	57	964E	58	00AE	59	4D4D
5A	D41D	5B	97D8	5C	5CC3	5D	E5F3
5E	AD41	5F	B192	60	8D77	61	E7EC
62	29C2	63	3351	64	3A04	65	E470
66	0DE9	67	9A79	68	5586	69	C1D6
6A	E3D6	6B	E822	6C	1C14		

Table 274. CRC Values for Character Set for S26P

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	B326	42	C400	43	CFA6	44	B359
45	3FF8	46	1566	48	D3C0	49	2CEE
4A	921A	4B	165A	4C	A28E	4D	E6E8
4E	C4BA	4F	6361	50	675E	51	7912
52	1731	53	A1F0	54	ADC2	55	602E
56	D2F4	57	CC55	58	D362	59	A7AC
5A	FD47	5B	F5A0	5C	2C49	5D	1D44
5E	4660	5F	AD30	60	A2F2	61	9E10

Table 274. CRC Values for Character Set for S26P (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
62	5206	63	D9EA	64	90A2	65	9009
66	0C78	67	2225	68	3446	69	4154
6A	55C3	6B	CAF4	6C	A07B		

Table 275. CRC Values for Character Set for S32P

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	6095	42	0B5C	43	9975	44	A257
45	82EB	46	DEE6	48	467B	49	DE35
4A	DC6D	4B	EAF1	4C	2344	4D	5DF6
4E	A103	4F	6869	50	3381	51	B9E2
52	A3BE	53	9D22	54	1B9A	55	CC5D
56	25F5	57	AEFB	58	8668	59	4A3E
5A	38BE	5B	0C92	5C	A440	5D	99EF
5E	D245	5F	0648	60	FFAF	61	05DD
62	E56C	63	9E9B	64	1328	65	B61F
66	A431	67	8ADA	68	3D86	69	05E8
6A	97BB	6B	90E6	6C	D463		

Table 276. CRC Values for Character Set for S40P

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	838C	42	A481	43	BA53	44	F89C
45	BDF7	46	696E	48	14E2	49	E096
4A	157F	4B	63D4	4C	C202	4D	7C5B
4E	7D7D	4F	A05C	50	D317	51	9953
52	40CF	53	73BD	54	CB4C	55	8773
56	B805	57	2569	58	444D	59	65BD
5A	7203	5B	1814	5C	D944	5D	9A4F
5E	23B3	5F	30D0	60	73E8	61	DB56
62	049B	63	4E4C	64	0E20	65	8EF3
66	DEC2	67	D9F6	68	8E56	69	55A5
6A	16DB	6B	E9EE	6C	EF6F		

Table 277. CRC Values for Code Page 837 for G16P, S26P, and S32P

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	B693	42	2745	43	EFD6	44	1418
45	B54E	46	B562	48	9426	49	35AF
4A	CC07	4B	7C63	4C	13BF	4D	0C8A
4E	6356	4F	D332	50	55B9	51	3A65
52	8A01	53	E5DD	54	FAE8	55	9534
56	2550	57	4A8C	58	1B3A	59	74E6
5A	8D4E	5B	3D2A	5C	2D15	5D	4DC3
5E	221F	5F	927B	60	9662	61	F9BE
62	49DA	63	2606	64	3933	65	56EF
66	E68B	67	8957	68	D8E1	69	B73D
6A	4E95	6B	FEF1	6C	CF5E		

Table 278. CRC Values for Code Page 837 for S40P

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	E3B1	42	AA49	43	A51B	44	337D
45	D617	46	9F88	48	920B	49	75E6
4A	7F2B	4B	36DA	4C	0E75	4D	A538
4E	9D97	4F	D466	50	804B	51	B8E4
52	F115	53	C9BA	54	62F7	55	5A58
56	13A9	57	2B06	58	5512	59	6DBD
5A	6770	5B	2E81	5C	8B4C	5D	BD63
5E	85CC	5F	8725	60	A8A6	61	9009
62	D9F8	63	E157	64	4A1A	65	72B5
66	3B44	67	03EB	68	7DFF	69	4550
6A	4F9D	6B	066C	6C	76C9		

The CRC values for Code Page 837 for S40P are different from those for Code Page 837 for G16P, S26P, and S32P because the comment fields are different though the table is identical.

AFP Thai Font Compatibility Set

Table 279. CRC Values for Character Set for I60F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	CF21	42	9E53	43	BB33	50	D54D
51	C04E	52	5A53	53	251F	54	B791
55	DA04	56	4CC4	57	0DF7	58	F704
59	C8D1	5A	118D	5B	72AD	5C	FB16
5D	35EF	5E	16EE	5F	BD9B	60	6C5B
61	7B81	62	E49B	63	20C6	64	2A81
65	36F8	66	5218	67	253F		

Table 280. CRC Values for Character Set for O40F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	3C18	42	DA88	43	6C86	50	A5EC
51	26B4	52	22B1	53	BD75	54	1366
55	BD84	56	6536	57	88BD	58	9D23
59	128B	5A	99AF	5B	2DBE	5C	1A52
5D	D668	5E	F93D	5F	30B9	60	655E
61	9BE6	62	09B0	63	2D0D	64	0D77
65	F4F5	66	26D9	67	7836		

Table 281. CRC Values for Character Set for O60F

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	71B0	42	A23C	43	EA8F	50	1253
51	0A75	52	C5CF	53	30C1	54	0458
55	22B8	56	BBAD	57	4800	58	B62A
59	6ED4	5A	9513	5B	3100	5C	B811
5D	DE24	5E	F333	5F	6CBA	60	0DAA

Table 281. CRC Values for Character Set for O60F (continued)

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
61	208D	62	8A46	63	7A4A	64	248B
65	1332	66	99D4	67	31B3		

Table 282. CRC Values for Code Page for 839

Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)	Section	CRC(Hex)
41	E85A	42	45E1	43	01EE	50	362A
51	771B	52	B448	53	F579	54	22CF
55	63FE	56	A0AD	57	E19C	58	1FE0
59	5ED1	5A	83A7	5B	40F4	5C	01C5
5D	D673	5E	9742	5F	5411	60	8C05
61	CD34	62	0E67	63	E568	64	98E0
65	D9D1	66	1A82	67	3141		

DBCS Resident Scalable Font Set

Table 283 lists the **scalable** DBCS font set typefaces resident in Infoprint 20 and Infoprint 32/40 printers and included the valid Font Global ID and code pages for each font.

Table 283. DBCS Resident Scalable Font Set

Typeface	FGID	Font Width	Code Page	Character Set
Japanese				
Heisei Mincho	53248	Scalable	300	1067
Heisei Kaku Gothic	53249	Scalable	300	1067
Traditional Chinese				
Sung	54563	Scalable	835	2070
Kai	54568	Scalable	835	2070
Simplified Chinese				
Fang Song	54566	Scalable	837	1082
Hei	54565	Scalable	837	1082
Kai	54568	Scalable	837	1082
Song	54567	Scalable	837	1082
Korean				
Myengjo	53560	Scalable	834	1091
Gothic	53816	Scalable	834	1091

GCSGID Subsets

Table 285 on page 366 provides a mapping of the valid subsets of the GCSGIDs listed for the DBCS Resident Scalable Font Set.

DBCS Resident Code Page Set

Table 284 on page 366 lists the code pages used with the DBCS Resident Scalable Fonts.

Table 284. DBCS Resident Code Page Set

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
Japanese Code Pages		
300	1000	Japanese Full Width
300	1001	Japanese Full Width with UDC support
290	1172	Japanese Half Width
1002	1132	Japanese Half Width
1027	1172	Japanese Half Width
1041	1187	Japanese Half Width
Simplified Chinese Code Pages		
837	1020	Chinese Full Width
837	937	Chinese Full Width with UDC support
836	1174	Chinese Half Width
1115	1240	Chinese Half Width
Traditional Chinese Code Pages		
835	1030	Chinese Full Width
835	935	Chinese Full Width with UDC support
37	1175	Chinese Half Width
1043	1189	Chinese Half Width
1114	1238	Chinese Half Width
Korean Code Pages		
834	1010	Korean Full Width
834	934	Korean Full Width with UDC support
833	1173	Korean Half Width
1088	1327	Korean Half Width

Table 285. GCSGID Subsets for IBM Core Interchange Fonts

GCSGID	Valid GCSGID Subsets
1067	1000, 1132, 1172, 1187
1068	1001, 1067
1082	1020, 1174, 1240
1083	937, 1082
1091	1010, 1173, 1327
1092	934, 1091
2070	1030, 1175, 1189, 1238
2071	935, 2070

IPDS Default Font

Factory Setting

The factory setting for the default font is Courier Roman Medium 10 pitch (12 point) using code page 037, version 1. The GRID for the default font is: FGID=416, GCSGID=697, CPGID=037, FontWidth=144 (CPI setting is 10.0). The default font

may be changed by the operator using the operator panel. It will reset to the Factory Setting upon each IML. It can be reset to the Factory Setting by doing a Cold Reset to the printer.

The default font can be set for Single Byte fonts. It does not contain Double Byte Font Character Sets or Code Pages.

Selectable IPDS Default Font

To change the default font requires the use of the operator panel. The operator panel will present menu choices for selecting the various parts of the font.

The operator may select the default font using any or all of the Code Page (CPGID), Font (FGID), and Characters Per Inch (CPI) parameters. The available parameters will be listed in Groups to help identify valid/invalid combinations. An invalid combination will be resolved inside the printer because the printer must have a valid default font. However, the parameter adjustment will not be visible at the OP Panel display. Detailed information listing the valid combinations and how to select them will be available with the printer.

The selection is based upon a hierarchy: Code Page is highest, Font is next, and Font Width (CPI) is the lowest. Should an invalid combination be selected, the Code Page will override Font and CPI, and Font will override CPI.

There are 5 Groups, A-E, into which all the fonts, code pages, and widths fall. All combinations defined within a Group are valid. When internal modification is necessary, the following rules apply:

1. An invalid/unsupported CPGID becomes Code Page 037 (Group A).
2. An invalid/unsupported Font Width (CPI) becomes 10.0 CPI (which will translate to 12 points).
3. For a Group A CPGID, an invalid/unsupported FGID becomes 416 Courier Roman Medium.
4. For a Group B CPGID, the FGID is automatically 304 Gothic Katakana.
5. For a Group C CPGID, the FGID is automatically 305 OCR A. Font Width is 10.0 CPI.
6. For a Group D CPGID, the FGID is automatically 306 OCR B. Font Width is 10.0 CPI.
7. For a Group E CPGID, an invalid/unsupported FGID becomes 416 Courier Roman Medium.

Note: The 4028 compatibility fonts are a new addition to the OP Panel selection. This is necessary because some of these FGIDs are anamorphically scaled, and therefore cannot be correctly reproduced with just an AFP FGID and a CPI value.

These fonts are handled specially in that all of these FGIDs (except 5687, 5707, 5815, 5835) ignore the OP Panel CPI value, because the FGID fully describes the font. In the case of the 4 typographic FGIDs, there are valid discreet sizes associated with them. If the correct CPI values are not used, the printer will default to the nearest discrete size value. Tie goes to the smaller value.

Selectable Code Pages

The following code pages are selectable by the operator:

Code-Page/Group	Code Page Description
500 A	Belgium, Switzerland / International
037 A	US, Canada, Netherlands, Portugal
038 A	US English ASCII
260 A	Canadian French
273 A	Austrian / German
274 A	Belgium
276 A	Canadian French (94 character set)
277 A	Danish / Norwegian
278 A	Finnish / Swedish
280 A	Italian
281 A	Japanese
284 A	Spanish
285 A	UK English
286 A	Austrian / German (alternate)
287 A	Danish / Norwegian (Alternate)
288 A	Finnish / Swedish (Alternate)
297 A	French
871 A	Icelandic
1140 A	US, Canada, Netherlands, Portugal (Euro)
1141 A	Austrian, German (Euro)
1142 A	Danish Norwegian (Euro)
1143 A	Finnish, Swedish (Euro)
1144 A	Italian (Euro)
1145 A	Spanish (Euro)
1146 A	UK English (Euro)
1147 A	Catalan French (Euro)
1148 A	Multinational (Euro)
1149 A	Icelandic (Euro)
290 B	Japanese / Katakana
892 C	OCR - A
893 D	OCR - B
420 E	Arabic
423 E	Greek
424 E	Hebrew
870 E	Latin 2 Multilingual
875 E	Greek

880 E	Cyrillic
905 E	Turkish
1025 E	Cyrillic (primary)
1026 E	Turkish (primary)

Selectable Fonts

The following fonts (FGID) are selectable by the operator:

FGID/Group	FGID Description
2304 A, E	Helvetica Roman/ITC Boutros Modern Rokaa/Narkiss Tam - Medium
2305 A, E	Helvetica Roman/ITC Boutros Modern Rokaa/Narkiss Tam - Bold
2306 A, E	Helvetica Roman/ITC Boutros Modern Rokaa/Narkiss Tam - Italic Medium
2307 A, E	Helvetica Roman/ITC Boutros Modern Rokaa/Narkiss Tam - Italic Bold
2308 A, E	Times New Roman/ITC Boutros Setting Rokaa/Narkissim - Medium
2309 A, E	Times New Roman/ITC Boutros Setting Rokaa/Narkissim - Bold
2310 A, E	Times New Roman/ITC Boutros Setting Rokaa/Narkissim - Italic Medium
2311 A, E	Times New Roman/ITC Boutros Setting Rokaa/Narkissim - Italic Bold
416 A, E	Courier Roman/Boutros Typing/Shalom - Medium
420 A, E	Courier Roman/Boutros Typing/Shalom - Bold
424 A, E	Courier Roman/Boutros Typing/Shalom - Italic Medium
428 A, E	Courier Roman/Boutros Typing/Shalom - Italic Bold
20224 A	Boldface
304 A	Gothic Text
400 A	Letter Gothic
404 A	Letter Gothic Bold
432 A	Prestige
318 A	Prestige Bold
319 A	Prestige Italic
304 B	Katakana Gothic
305 C	OCR A
306 D	OCR B

4028 Selectable Fonts

The following 4028 fonts (FGID) are also selectable by the operator:

FGID/Group	FGID Description
159 A	Boldface (Proportional Space 12 pt., based on 10 CPI)

11 A	Courier 10.0 CPI
85 A	Courier 12.0 CPI
223 A	Courier 15.0 CPI
254 A	Courier 17.1 CPI
46 A	Courier Bold 10.0 CPI
18 A	Courier Italic 10.0 CPI
92 A	Courier Italic 12.0 CPI
203 A	Gothic Text 13.3 CPI
283 A	Gothic Text 20.0 CPI
290 A	Gothic Text 26.7 CPI
281 A	Letter Gothic 20 CPI
19 C	OCR A
03 D	OCR B
12 A	Prestige Pica 10.0 CPI
86 A	Prestige Elite 12.0 CPI
221 A	Prestige Elite 15.0 CPI
256 A	Prestige Elite 17.1 CPI
111 A	Prestige Elite Bold 12.0 CPI
112 A	Prestige Elite Italic 12.0 CPI
5687 A	Times Roman Typographic 6, 8, 10, 12, pt
5707 A	Times Roman Typographic Bold 10, 12, 14, 18, 24 pt
5815 A	Times Roman Typographic Italic 10, 12, pt
5835 A	Times Roman Typographic Bold Italic 10, 12, pt

Selectable Font Widths

The following Font Widths (CPI) are selectable by the operator:

Group	**Range in characters per inch**
A, B, E	5.0 CPI - 30.0 CPI, in increments of 0.1 CPI.
C, D	10.0 CPI.
4028 Fixed Width	Ignored. Handled internally because the FGID defines the size.
5687 6 pt	20.0 CPI
5687 8 pt	15.1 CPI
5687 10 pt	11.9 CPI
5687 12 pt	10.0 CPI
5707 10 pt	11.9 CPI
5707 12 pt	10.0 CPI
5707 14 pt	8.6 CPI

5707 18 pt 6.7 CPI

5707 24 pt 5.0 CPI

5815 10 pt 11.9 CPI

5815 12 pt 10.0 CPI

5835 10 pt 11.9 CPI

5835 12 pt 10.0 CPI

Normally, IPDS Font Width is in terms of 1440ths of an inch (for example, 144, 120). However, Op Panel Font Width selection is more easily understood (and more universally used) as Characters Per Inch. So the values will range from 5.0 cpi (Font Width 288) to 30.0 cpi (Font Width 48) in increments of 0.1 cpi. The resulting cpi will be translated internally to the nearest integer font width value. Since CPI is inherently a reciprocal, 0.1 cpi increments will be a non-linear font width progression. This should not prove a serious problem since default fonts for IPDS are not the primary selection path.

An extra note is that font widths for fixed width fonts are calculated differently than for typographic fonts. The vertical point size is the real common ground. So to get a 12 point size, a fixed width font will use a font width of 144; 10 cpi. A typographic font will use a font width of 80. To keep compatible sizes this is also translated from 10 cpi. The FGID defines which range to use. For further detail, refer to the LFE and/or AR command sections of the IPDS architecture spec.

IPDS Bar Code Printing

To support the BCOCA tower for printing of bar codes, the OCR-A and OCR-B fonts and their corresponding code pages (892 and 893) must be resident in the printer. These are supported as shown in “4028 Compatibility Resident Font Set” on page 332.

Code page 1303 is also resident to be used for printing code 128 bar codes.

IPDS Font Bolding

The Network Printers will accept the IPDS Load Font Equivalence command and support the bold and double strike bits for both resident Type 1 and loaded raster fonts. No other bits within the LFE flags byte are supported.

The bold/doublestrike attributes are handled the same way within the printer. The function is provided by printing a text block multiple times, each time shifted an appropriate amount. Since the attributes are tied to the font LID and not the font resource, the font resource is not affected.

Font and Code Page Storage Estimates

Following are estimates of the storage required for resident fonts and code pages. Code pages are estimated at 2560 bytes (ASCII) and 1920 bytes (EBCDIC) each. Estimate on Resident Font Character Map is 26 KB. (KB = 1024 bytes)

Table 286. Resident Font and Code Page Storage Requirements

	Font(s)	Code Page(s)	Total
IBM Core Interchange			

Table 286. Resident Font and Code Page Storage Requirements (continued)

	Font(s)	Code Page(s)	Total
Latin 1/2/3/4/5	716.1 KB	104.4 KB (51)	821.0 KB
Symbols	402.4 KB	17.0 KB (8)	419.4 KB
Cyrillic Greek	756.1 KB	22.5 KB (10)	778.6 KB
Arabic	610.2 KB	12.0 KB (5)	622.2 KB
Hebrew	585.5 KB	13.2 KB (6)	598.7 KB
IBM Coordinated Font Set			
12 Fonts	512.0 KB	32.0 KB (16 unique)	544.0 KB

Appendix. IBM Code Pages for Non-IPDS Printing

Information Contained in This Chapter

A code page maps the character IDs in a character set to code points. Code pages accommodate various national languages by using characters and special symbols appropriate to the language. Different code pages may have identical character IDs assigned to different code points.

This chapter contains information about how to read a code page, some special notes about code pages, and code pages for the IBM font products.

Note: To change code pages, use the DEF CD PAG item on the IPDS Menu, or the CODE PAGE item on the Twinax SCS Menu or Coax SCS Menu.

How to Read a Code Page

Each code page includes detailed information. Figure 24 shows how information is arranged on a code page. Definitions of the terms in Figure 24 on page 374 follow the figure.

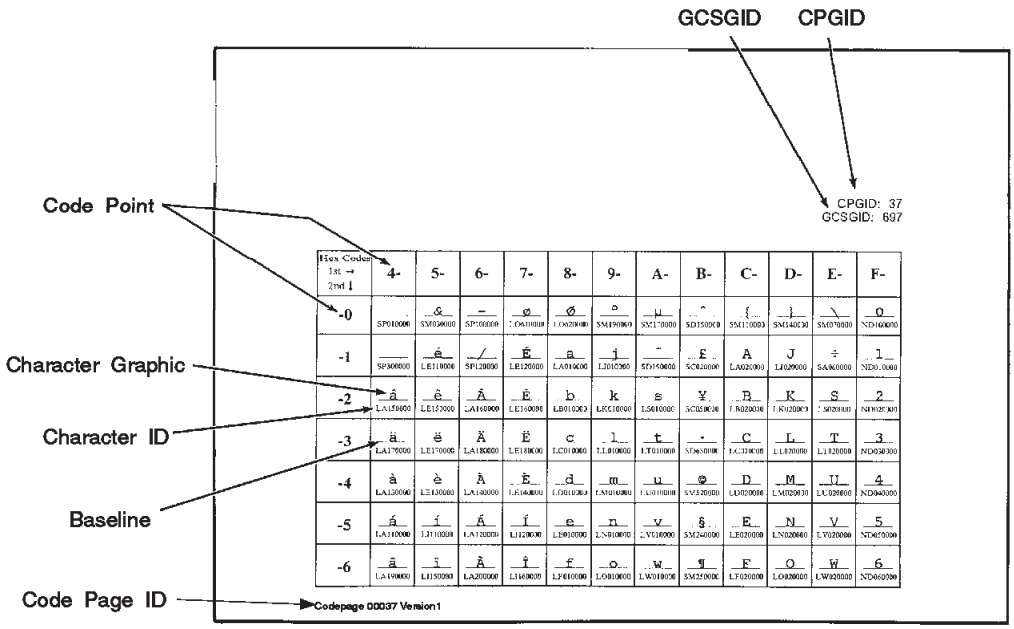


Figure 24. Example of an IBM Code Page

code page ID
The code page ID is the name by which the code page is referenced. The names of code pages shown in this chapter are generic, for example, Code Page 00037 Version 1 instead of T1V10037. However, they are identical.

code point
A 1-byte code point is assigned to each character in the code page. The code points are represented as hexadecimal values; for example, hexadecimal 50 is equivalent to decimal 80. The numeral or letter above the character in the matrix is the first hexadecimal digit of the code point. The numeral or letter to the left of the character is the second hexadecimal digit. In Figure 24, for example, character ID SM030000 (&); is assigned to hexadecimal code point 50.

character graphic
Each character that appears on the code page is associated with its character ID.

character ID
The character ID is the standard identifier for a character regardless of its type family. For example, all uppercase A's have the same character ID (LA020000). Character IDs are also called graphic character identifiers or graphic character IDs.

baseline
The baseline shows where the character is aligned in a line of text.

Special Notes

You can add, delete, and change code point assignments for characters. However, this manual does not describe the methods for doing this.

- ASCII, ANSI, and personal computer code pages

  Code pages that use ASCII code points cannot be processed by Document Composition Facility (DCF) and Print Management Facility (PMF) because DCF and PMF do not support ASCII code pages. These ASCII and ANSI code pages,

however, allow printing of already formatted ASCII data streams on host-attached page printers when used with IBM Systems Application Architecture (SAA) Application Connection Services and IBM SAA PrintManager. ASCII and ANSI code pages have the words “ASCII,” “ANSI”, or “Personal Computer” in their code page name.

- identifying similar code pages

  Two different code pages can appear to be identical. However, they are not identical unless both the code page global identifier (CPGID) and graphic character set global identifier (GCSGID) on one code page are identical to the CPGID and GCSGID on the other code page.

Code Pages

Code pages in this chapter are arranged numerically by code page ID.

Version 1 vs Version 0

Code pages 0037, 0273, 0274, 277, 278, 0280, 0281, 0284, 0285, and 0297 each have a ’Version 1’ and ’Version 0’. In each case, there are only a few differences from Version 0.

Code Point	Version 0	Version 1.
B4	ƒ SC070000	© SM520000
BF	¬ SM100000	× SA070000
DA	1 LI610000	¹ ND010000
E1	(NSP) SP310000	÷ SA060000

Code Page 00037, Version 1: Country Extended: United States and Canada

CPGID 037/1 GCSGID 697/1

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	^ SD150000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	¢ SC040000	! SP020000	¦ SM650000	: SP130000	« SP170000	ª SM210000	¡ SP030000	[SM060000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	] SM080000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	| SM130000	¬ SM660000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00037

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00038: Country Extended: Canada (Bilingual)

CPGID 038 GCSGID 103, 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000						{ SM110000	} SM140000	\ SM070000	0 ND100000
-1			/ SP120000		a LA010000	j LJ010000	~ SD190000		A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3					c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9				` SD130000	i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	[SM060000	] SM080000	| SM130000	: SP130000								
-B	. SP110000	$ SC030000	, SP080000	# SM010000								
-C	< SA030000	* SM040000	% SM020000	@ SM050000								
-D	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	! SP020000	^ SD150000	? SP150000	" SP040000								(EO)

Code Page 00038

Code Page 00260: Canada (French)

CPGID 260 GCSGID 341, 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000						é LE110000	è LE130000	SD410000	0 ND100000
-1			/ SP120000	É LE120000	a LA010000	j LJ010000	¨ SD170000		A LA020000	J LJ020000		1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3		ë LE170000		Ë LE180000	c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4			À LA140000	È LE140000	d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6		î LI150000		Î LI160000	f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7		ï LI170000		Ï LI180000	g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000		Ç LC420000		h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9				` SD130000	i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	à LA130000	′ SD110000	ù LU130000	: SP130000								
-B	. SP110000	$ SC030000	, SP080000	# SM010000					ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000						ü LU170000		Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000								Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	! SP020000	^ SD150000	? SP150000	" SP040000								(EO)

Code Page 00260

Code Page 00273, Version 1: Country Extended: Austria and Germany

CPGID 273/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	ä LA170000	ü LU170000	Ö LO180000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	ß LS610000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	{ SM110000	ë LE170000	[SM060000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	@ SM050000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	~ SD190000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	Ä LA180000	Ü LU180000	ö LO170000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	§ SM240000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	¦ SM650000	} SM140000	\ SM070000	] SM080000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00273

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00274, Version 1: Country Extended: Belgium

CPGID 274/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	é LE110000	è LE130000	ç LC410000	0 ND100000
-1	(RSP) SP300000	{ SM110000	/ SP120000	É LE120000	a LA010000	j LJ010000	¨ SD170000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	• SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	@ SM050000	} SM140000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	\ SM070000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	[SM060000	] SM080000	ù LU130000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	à LA130000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	~ SD190000	ò LO130000	¦ SM650000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00274

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00276: Data Processing (DP 94): Canada (French)

CPGID 276 GCSGID 277

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000						é LE110000	è LE130000	¸ SD410000	0 ND100000
-1			/ SP120000		a LA010000	j LJ010000	¨ SD170000		A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3					c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9				` SD130000	i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	à LA130000	´ SD110000	ù LU130000	: SP130000								
-B	. SP110000	$ SC030000	, SP080000	# SM010000								
-C	< SA030000	* SM040000	% SM020000	@ SM050000								
-D	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	! SP020000	^ SD150000	? SP150000	" SP040000								(EO)

Code Page 00276

Code Page 00277, Version 1: Data Processing: Denmark and Norway

CPGID 277/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	¦ SM650000	@ SM050000	° SM190000	µ SM170000	¢ SC040000	æ LA510000	å LA270000	\ SM070000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	ü LU170000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	} SM140000	ï LI170000	$ SC030000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	# SM010000	¤ SC010000	ø LO610000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	Å LA280000	, SP080000	Æ LA520000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	Ø LO620000	ð LD630000	{ SM110000	Ð LD620000	¯ SM150000	ö LO170000	~ SD190000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	[SM060000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	] SM080000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00277

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00278, Version 1: Data Processing: Finland and Sweden

CPGID 278/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	ä LA170000	å LA270000	É LE120000	0 ND100000
-1	(RSP) SP300000	` SD130000	/ SP120000	\ SM070000	a LA010000	j LJ010000	ü LU170000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	{ SM110000	ë LE170000	# SM010000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	[SM060000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	} SM140000	ï LI170000	$ SC030000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	é LE110000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	§ SM240000	¤ SC010000	ö LO170000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	Å LA280000	, SP080000	Ä LA180000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	Ö LO180000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	¦ SM650000	~ SD190000	@ SM050000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	] SM080000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00278

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00280, Version 1: Data Processing: Italy

CPGID 280/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	[SM060000	µ SM170000	¢ SC040000	à LA130000	è LE130000	ç LC410000	0 ND100000
-1	(RSP) SP300000	] SM080000	/ SP120000	É LE120000	a LA010000	j LJ010000	ì LI130000	# SM010000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	• SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	{ SM110000	} SM140000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	@ SM050000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	\ SM070000	~ SD190000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	ù LU130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	° SM190000	é LE110000	ò LO130000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	£ SC020000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	§ SM240000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	¦ SM650000	` SD130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00280

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00281, Version 1: Data Processing: Japan (Latin)

CPGID 281/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	{ SM110000	} SM140000	$ SC030000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	¯ SM150000	[SM060000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	\ SM070000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	£ SC020000	! SP020000	¦ SM650000	: SP130000	« SP170000	ª SM210000	¡ SP030000	^ SD150000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	¥ SC050000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	] SM080000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000	ð LD630000	æ LA510000	Ð LD620000	~ SD190000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	′ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	| SM130000	¬ SM660000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00281

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00284, Version 1: Data Processing: Spain, Latin America

CPGID 284/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	¨ SD170000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	• SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	¦ SM650000	ß LS610000	# SM010000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	[SM060000	] SM080000	ñ LN190000	: SP130000	« SP170000	ª SM210000	¡ SP030000	^ SD150000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	Ñ LN200000	» SP180000	º SM200000	¿ SP160000	! SP020000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	~ SD190000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	| SM130000	¬ SM660000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00284

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00285, Version 1: Data Processing: United Kingdom

CPGID 285/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	¯ SM150000	[SM060000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	$ SC030000	! SP020000	¦ SM650000	: SP130000	« SP170000	ª SM210000	¡ SP030000	^ SD150000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	£ SC020000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	] SM080000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000	ð LD630000	æ LA510000	Ð LD620000	~ SD190000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	| SM130000	¬ SM660000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00285

Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00286: Alternate (3270) Austria and Germany

CPGID 286 GCSGID 317

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000									0 ND100000
-1			/ SP120000		a LA010000	j LJ010000			A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3					c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9					i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	ö LO170000	ü LU170000	ß LS610000	: SP130000								
-B	. SP110000	Ü LU180000	, SP080000	Ä LA180000								
-C	< SA030000	* SM040000	% SM020000	Ö LO180000								
-D	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	| SM130000	¬ SM660000	? SP150000	ä LA170000								(EO)

Code Page 00286

Code Page 00287: Alternate (3270) Denmark and Norway

CPGID 287 GCSGID 321

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000									0 ND100000
-1			/ SP120000		a LA010000	j LJ010000			A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3					c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9					i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	ø LO610000	å LA270000	¦ SM650000	: SP130000								
-B	. SP110000	Å LA280000	, SP080000	Æ LA520000								
-C	< SA030000	* SM040000	% SM020000	Ø LO620000								
-D	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	| SM130000	¬ SM660000	? SP150000	æ LA510000								(EO)

Code Page 00287

Code Page 00288: Alternate (3270) Finland and Sweden

CPGID 288 GCSGID 325

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000									0 ND100000
-1			/ SP120000		a LA010000	j LJ010000			A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3					c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9					i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	ö LO170000	å LA270000	¦ SM650000	: SP130000								
-B	. SP110000	Å LA280000	, SP080000	Ä LA180000								
-C	< SA030000	* SM040000	% SM020000	Ö LO180000								
-D	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	| SM130000	¬ SM660000	? SP150000	ä LA170000								(EO)

Code Page 00288

Code Page 00289: Alternate (3270) Spain

CPGID 289 GCSGID 329

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000									0 ND100000
-1			/ SP120000		a LA010000	j LJ010000			A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000		B LB020000	K LK020000	S LS020000	2 ND020000
-3					c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7					g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9					i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	¢ SC040000	! SP020000	¦ SM650000	: SP130000								
-B	. SP110000	Pts SC060000	, SP080000	Ñ LN200000								
-C	< SA030000	* SM040000	% SM020000	@ SM050000								
-D	(SP060000	) SP070000	_ SP090000	' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000								
-F	| SM130000	¬ SM660000	? SP150000	ñ LN190000								(EO)

Code Page 00289

Code Page 00290: Japan (Katakana)

CPGID 290 GCSGID 332

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	[SM060000	] SM080000	ソ JS500000	~ SD190000	^ SD150000	{ SM110000	} SM140000	$ SC030000	0 ND100000
-1	。 JQ700000	エ JE010000	/ SP120000	i LI010000	ア JA000000	タ JT100000	¯ SM150000	¢ SC040000	A LA020000	J LJ020000		1 ND010000
-2	「 JQ710000	ォ JO010000	a LA010000	j LJ010000	イ JI000000	チ JT200000	ヘ JH400000	\ SM070000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	」 JQ720000	ャ JY110000	b LB010000	k LK010000	ウ JU000000	ツ JT300000	ホ JH500000	t LT010000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	、 JQ730000	ュ JY310000	c LC010000	l LL010000	エ JE000000	テ JT400000	マ JM100000	u LU010000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	・ JQ740000	ョ JY510000	d LD010000	m LM010000	オ JO000000	ト JT500000	ミ JM200000	v LV010000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ヲ JW500000	ッ JT310000	e LE010000	n LN010000	カ JK100000	ナ JN100000	ム JM300000	w LW010000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	ァ JA010000		f LF010000	o LO010000	キ JK200000	ニ JN200000	メ JM400000	x LX010000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ィ JI010000	ー JX700000	g LG010000	p LP010000	ク JK300000	ヌ JN300000	モ JM500000	y LY010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ゥ JU010000		h LH010000	` SD130000	ケ JK400000	ネ JN400000	ヤ JY100000	z LZ010000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	£ SC020000	! SP020000		: SP130000	コ JK500000	ノ JN500000	ユ JY300000	レ JR400000				
-B	. SP110000	¥ SC050000	, SP080000	# SM010000	q LQ010000	r LR010000	s LS010000	ロ JR500000				
-C	< SA030000	* SM040000	% SM020000	@ SM050000	サ JS100000		ヨ JY500000	ワ JW100000				
-D	(SP060000	) SP070000	_ SP090000	' SP050000	シ JS200000	ハ JH100000	ラ JR100000	ン JN000000				
-E	+ SA010000	; SP140000	> SA050000	= SA040000	ス JS300000	ヒ JH200000	リ JR200000	゛ JX710000				
-F	| SM130000	¬ SM660000	? SP150000	" SP040000	セ JS400000	フ JH300000	ル JR300000	° JX720000				(EO)

Code Page 00290

Code Page 00297, Version 1: Country Extended: France

CPGID 297/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	[SM060000	` SD130000	¢ SC040000	é LE110000	è LE130000	ç LC410000	0 ND100000
-1	(RSP) SP300000	{ SM110000	/ SP120000	É LE120000	a LA010000	j LJ010000	¨ SD170000	# SM010000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	@ SM050000	} SM140000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	] SM080000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	\ SM070000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	µ SM170000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	° SM190000	§ SM240000	ù LU130000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	£ SC020000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	à LA130000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	~ SD190000	ò LO130000	¦ SM650000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

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Note: Version 1 of this code page is shown. For Version 0 details, see "Version 1 vs Version 0" on page 375.

Code Page 00500, Version 1: Country Extended: International # 5

CPGID 500/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	• SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	[SM060000	] SM080000	¦ SM650000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	´ SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	^ SD150000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Code Page 00500

Code Page 00871, Version 1: Country Extended: Iceland

CPGID 871/1 GCSGID 697

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000	° SM190000	µ SM170000	¢ SC040000	þ LT630000	æ LA510000	′ SD110000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	ö LO170000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	ð LD630000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	Þ LT640000	Æ LA520000	¦ SM650000	: SP130000	« SP170000	ª SM210000	¡ SP030000	¬ SM660000	(SHY) SP320000	1 ND011000	2 ND021000	3 ND031000
-B	. SP110000	$ SC030000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	| SM130000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	Ð LD620000	` SD130000	} SM140000	@ SM050000	¯ SM150000	~ SD190000	ü LU170000	^ SD150000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	Ý LY120000	¨ SD170000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	{ SM110000	] SM080000	[SM060000	\ SM070000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	! SP020000	Ö LO180000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

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Code Page 00892: OCR-A

CPGID 892 GCSGID 968

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000		Ø LO620000				{ SM110000	} SM140000	\ SM070000	0 ND100000
-1			/ SP120000		a LA010000	j LJ010000		£ SC020000	A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3			Ä LA180000		c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000		E LE020000	N LN020000	V LV020000	5 ND050000
-6					f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7			Å LA280000	— SO150000	g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9			Ñ LN200000		i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	[SM060000	] SM080000		: SP130000								
-B	. SP110000	$ SC030000	, SP080000	# SM010000				| SO130000	⑁ SO020000	⑀ SO000000	⑂ SO010000	
-C	< SA030000	* SM040000	% SM020000	@ SM050000							Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000		' SP050000								
-E	+ SA010000	; SP140000	> SA050000	= SA040000		Æ LA520000						
-F	! SP020000		? SP150000	" SP040000				█ SO140000		^ SM090000		(EO)

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Code Page 00893: OCR-B

CPGID 893 GCSGID 969

HEX DIGITS 1ST → 2ND ↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	- SP100000	ø LO610000	Ø LO620000				{ SM110000	} SM140000	\ SM070000	0 ND100000
-1			/ SP120000		a LA010000	j LJ010000	˜ SD190000	£ SC020000	A LA020000	J LJ020000		1 ND010000
-2					b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000		Ä LA180000		c LC010000	l LL010000	t LT010000		C LC020000	L LL020000	T LT020000	3 ND030000
-4					d LD010000	m LM010000	u LU010000		D LD020000	M LM020000	U LU020000	4 ND040000
-5					e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6				‾ SD470000	f LF010000	o LO010000	w LW010000		F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000		Å LA280000	— SO150000	g LG010000	p LP010000	x LX010000		G LG020000	P LP020000	X LX020000	7 ND070000
-8					h LH010000	q LQ010000	y LY010000		H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9		ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000		I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	[SM060000	] SM080000		: SP130000								
-B	. SP110000	$ SC030000	, SP080000	# SM010000				| SO130000				
-C	< SA030000	* SM040000	% SM020000	@ SM050000		æ LA510000			ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	‗ SP090000	' SP050000		¸ SD410000		¨ SD170000				
-E	+ SA010000	; SP140000	> SA050000	= SA040000	ij LI510000	Æ LA520000		´ SD110000				
-F	! SP020000	ˆ SD150000	? SP150000	" SP040000	IJ LI520000	¤ SC010000		■ SO140000		∧ SM090000		(EO)

Code Page 00893

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