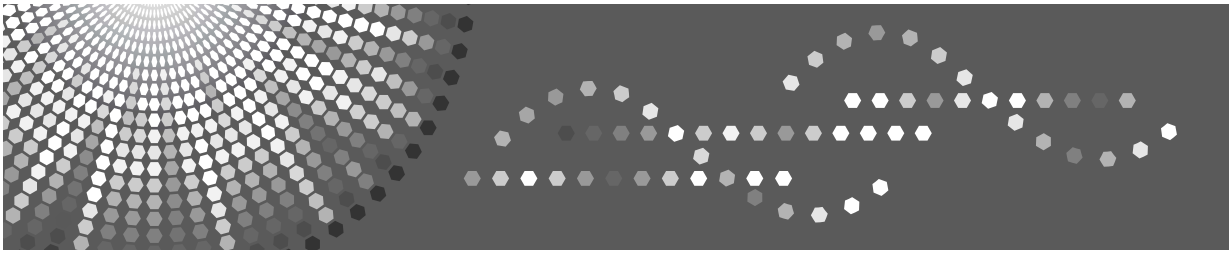

IPDS Technical Reference

Read this manual carefully before you use this product and keep it handy for future reference.

Introduction

This manual contains detailed instructions and notes on the operation and use of this machine. For your safety and benefit, read this manual carefully before using the machine. Keep this manual in a handy place for quick reference.

Important

Contents of this manual are subject to change without prior notice. In no event will the company be liable for direct, indirect, special, incidental, or consequential damages as a result of handling or operating the machine.

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Manuals for the IPDS card

Refer to the manuals that are relevant to what you want to do with the IPDS card.

Important

❒ Adobe Acrobat Reader/Adobe Reader must be installed in order to view the manuals as PDF files.

❖ **IPDS Supplement (IPDS.pdf)**
Explains about how to configure the IPDS card for the machine, and about items selectable from the Web browser.

❖ **IPDS Printing Configuration Guide (IPDS_CONF.pdf) *English Only**
Explains about environment necessary for connecting the mainframe to the machine, and performing IPDS printing.

❖ **IPDS Technical Reference (IPDS_TEC.pdf) *English Only**
Explains about commands necessary for IPDS printing.

Note

❒ For details about the necessary environment, and installation of the IPDS card and machine, consult your sales or service representative. For details about necessary environment and operation of the mainframe, consult IBM.

How to Read This Manual

Symbols

This manual uses the following symbols:

Important

Indicates points to pay attention to when using the machine, and explanations of likely causes of paper misfeeds, damage to originals, or loss of data. Be sure to read these explanations.

Note

Indicates supplementary explanations of the machine's functions, and instructions on resolving user errors.

Reference

This symbol is located at the end of sections. It indicates where you can find further relevant information.

[ ]

Indicates the names of keys that appear on the machine's display panel.

About This Book

This book provides technical reference information about how 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 your printer with the IPDS data stream.

Terminology

Paper Input and Output Receptacles

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

Related Publications

This book refers to the following:

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

Note

❒ For details on the IPDS Architecture, see the Intelligent Printer Data Stream Reference, S544-3417.

About IPDS

This chapter introduces the Intelligent Printer Data Stream (IPDS) and describes some of the capabilities of 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, Ethernet, 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:

- OS/400 Version 5.4 or later
- Graphical Data Display Manager (GDDM) Version 2.3 or later
- Print Service Facility (PSF for z/OS) Version 4.1.0or later
- Print Service Facility (PSF for i5/OS and OS/400) Version 5.4or later
- InfoPrint Manager for AIX Version 4.2 or later
- InfoPrint Manager for Windows Version 2.2 or later
- InfoPrint Process Director for Linux Version 1.3.1 or later
- InfoPrint Process Director for AIX Version 1.3.1 or later

Note

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

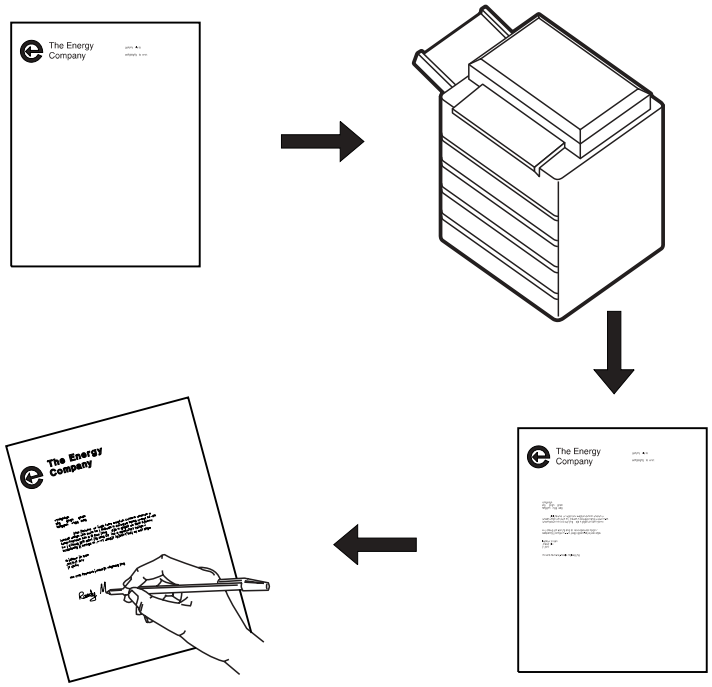
Capabilities of IPDS

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

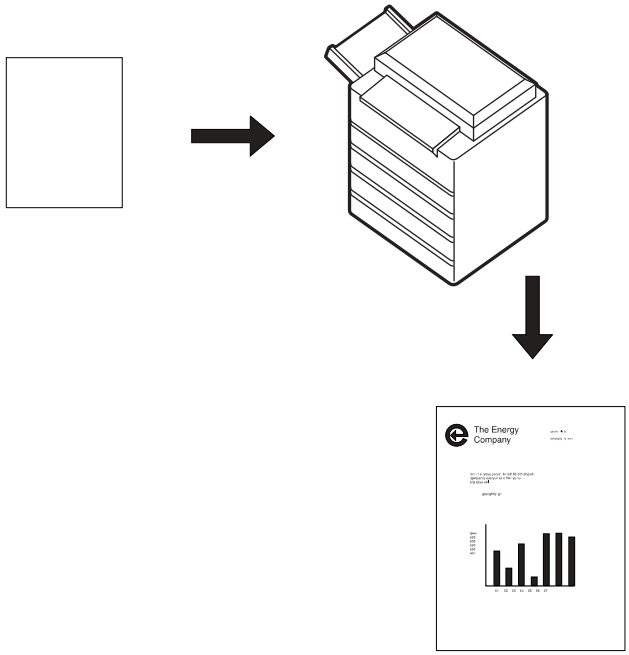
- Use the printer's all-points-addressable printing to print text, graphics, images, or bar codes at any point on a page or that is within the printers printable area.
- Print text in a variety of type styles and switch fonts within a printed page.
- Use both images and vector graphics (explained later 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, you must load letterhead paper into your printer, print the text of your letter, and then manually sign the letter.



Using IPDS, 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.



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 p.8 "Using Overlays".

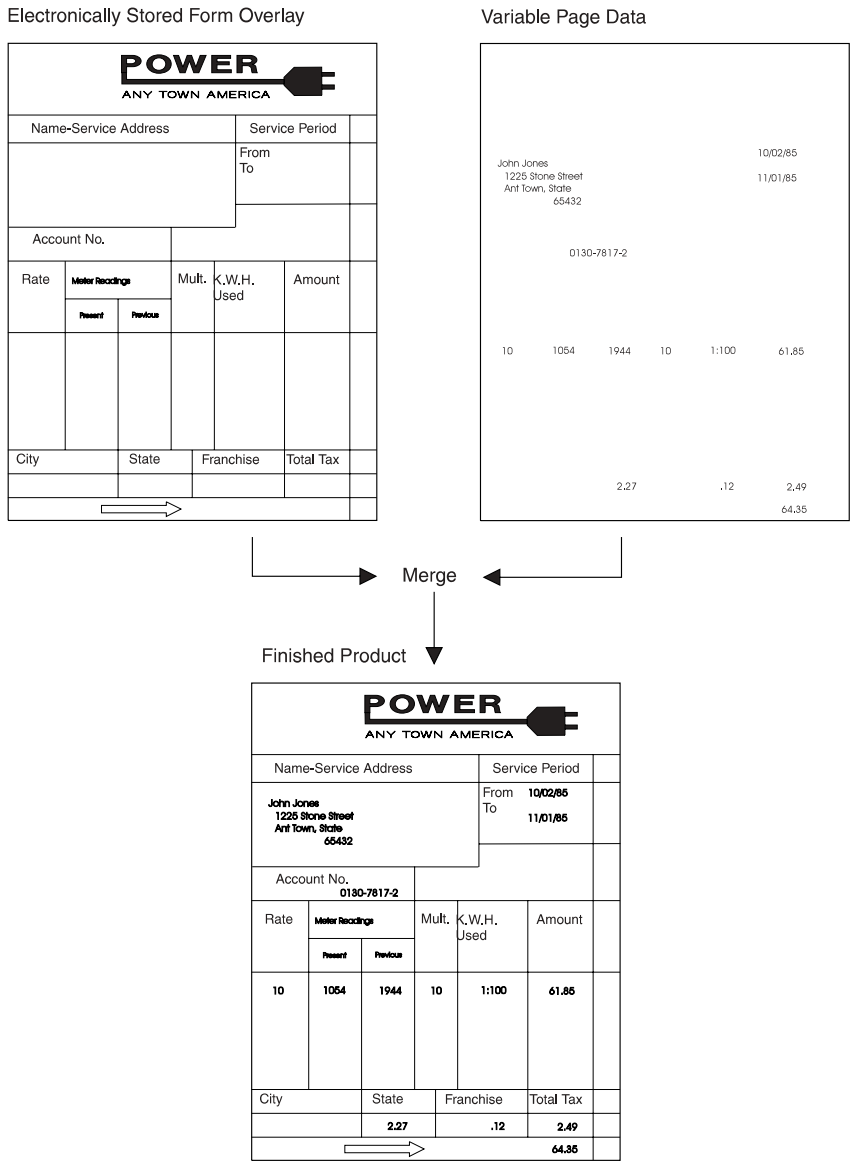
You can store your printed signature block so it is printed in the type style used in the rest of the letter or memo. That way the signature block's type style matches the letter in which it appears, no matter how many different fonts you use for different kinds of letters. This printing concept is discussed in p.9 "Using Page Segments".

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 p.10 "Using Images and Graphics".

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.

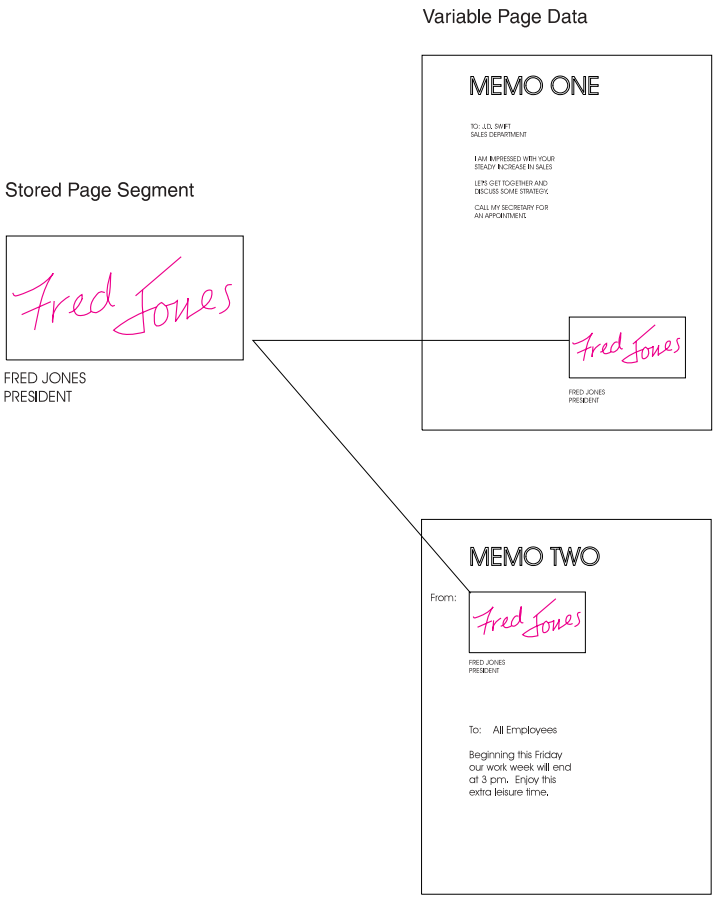
Overlays are useful for letterheads and for forms, as shown below.



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 below.



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 pixels.

IM and IO Images

Images are figures on the page created by explicitly specifying each pixel in the figure. There is one bit of image data per pixel, 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 pixels 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 as shown below in many sizes and variations, such as with or without the human-readable characters.

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.

About the IPDS Feature

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.

The machine supports the following IPDS Architecture command sets.

- Device Control (DC1)
- Text (TX1 with PTOCA PT1, PT2 and PT3)
- IM Image (IM1 with IMD1)
- IO Image (IO1 with IOCA FS10 + 8-bit Grayscale via halftoning), FS11, FS40, FS42 and FS45)
- Graphics (GR1 with GOCA DR/2V0)
- Page Segments (PS1)
- Object Container (OC1)
- 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, see p.205 "Overlay Command Set".

Font State

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

IPDS Command Format

All IPDS commands are encoded in the following patterns:

Data Area	Value	Description	Error Code
Bytes 0-1	X'0005' X'7FFF'	LENGTH	X'0202..02'
Bytes 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'D634'	Presentation Fidelity Control	
	X'D63C'	Write Object Container Control	
	X'D63D'	Write Image Control	
	X'D63E'	Write Image Control 2	
	X'D63F'	Load Font Equivalence	
	X'D64C'	Write Object Container	
	X'D64D'	Write Image	
	X'D64E'	Write Image 2	
	X'D64F'	Deactivate Font	
	X'D65B'	Deactivate Data-Object-Font Component	
	X'D65C'	Deactivate Data Object Resource	
	X'D65D'	End	
	X'D65F'	Begin Page Segment	
	X'D66C'	Data Object Resource Equivalence	
	X'D66D'	Logical Page Position	
	X'D66F'	Deactivate Page Segment	
	X'D67C'	Include Data Object	

Data Area	Value	Description	Error Code
Bytes 2-3	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)	
Bytes 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 Compatibility) 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

The machine supports 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 numbers 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 Pixel (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

The machine supports 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 p.138 "Write Text"). 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 p.69 "Logical Page Descriptor").

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. The machine supports the IM Image Function Set (See p.153 "IM Image Command Set"). and the IO Image Function Set (See p.159 "IO Image Command Set").

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 (pixels) wide. In IO image data, there may be more than one bit per pixel 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 p.169 “Graphics Command Set”) 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 p.177 “Drawing Orders”. 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 p.189 “Bar Code Command Set”) 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 p.33 “IPDS Initialization Defaults” 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 p.33 “IPDS Initialization Defaults”. 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 p.138 “Write Text”).

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. The machine supports 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 pixels, 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)

Color Simulation

This printer provides "limited color simulation" by either simulating with generated grayscales or substituting "black" in special cases.

- Data objects whose colors are simulated with "grayscale":
  - PTOCA (characters, underscores, overscores, text rules)
  - GOCA (characters, lines, arcs, image, solid-area fill, pattern fill)
  - IM1/IOCA (bi-level image)
  - Object Areas (Pages, Overlays, BCOCA and IOCA)
- Data objects whose colors are simulated with "black":
  - GOCA Markers
  - BCOCA Bar Code Symbols and HRI
- Full Color Image is not supported on this printer since the transformation to grayscale would be very costly from a performance perspective. Host utilities are available to convert full color images to bi-level images for printing on monochrome printers.
- Grayscale Image (8 bits/pixel) is supported on this printer, however for very large images unacceptable performance degradation may result, due to the dithering process to produce bi-level image.

Simulation Modes Supported

There are two color simulation modes that may be supported:

- Legacy Mode (Substituting "black" or Pattern Creation)
- Fidelity Mode (Simulation with Grayscale)

The machine supports both the Legacy Mode and the Fidelity Mode of color simulation.

The Legacy Mode is provided to support customer legacy applications where simulation with grayscale would produce unacceptable results. There are console configuration menus to allow customers to select what level of color simulation best meets their needs. There are also console configuration menus to allow customers to select whether or not Color PTOCA (text) Objects should be simulated with grayscale or rendered with black. Rendering all PTOCA objects with black may be desirable, especially when small fonts are utilized.

Color Simulation Processes and Algorithms

To allow printing of documents containing color specifications, the specified colors in the document should be simulated in a consistent and predictable manner.

Color simulation occurs independently at the object level.

- Named Colors
  Convert Named Color to RGB Process Color using the following table.

This table defines the valid color values used to specify named colors in PTOCA, GOCA, BCOCA, IOCA and IM objects. The table also specifies the RGB values for each named color, assuming that each component is specified with 8 bits and that the component intensity range 0 to 1 is mapped to the binary value range 0 to 255. For a definition of the supported colors for individual objects refer to the appropriate OCA specifications, since some objects only support a subset of the colors.

Value	Named Color	Red (R)	Green (G)	Blue (B)
X'0000' or X'FF00'	Printer Default (Black)	0	0	0
X'0001' or X'FF01'	Blue	0	0	255
X'0002' or X'FF02'	Red	255	0	0
X'0003' or X'FF03'	Pink (magenta)	255	0	255
X'0004' or X'FF04'	Green	0	255	
X'0005' or X'FF05'	Turquoise (cyan)	0	255	255
X'0006' or X'FF06'	Yellow	255	255	0
X'0007'	White	255	255	255
X'0008'	Black	0	0	0
X'0009'	Dark Blue	0	0	170
X'000A	Orange	255	128	0
X'000B'	Purple	170	0	170
X'000C'	Dark Green	0	146	0
X'000D'	Dark Turquoise	0	146	170
X'000E'	Mustard	196	160	32
X'000F'	Gray	131	131	131
X'0010'	Brown	144	48	0
X'FF07'	Printer Default (Black)	0	0	0
X'FF08'	Color of Medium (Reset)			

– Simulate RGB Process Color with Grayscale

- Full-process Colors. To maintain output consistency across different printer families, process colors to be simulated are converted to grayscale intensities based on color "luminance" (Y). A luminance of 0 is defined to be black and a luminance of 1 is defined to be white. CIE luminance (Y) is derived using the following "architected" equations:

  ❖ **RGB Color Space:**

  Where Y=0 is black, Y=1 is white
  Y = 0.212(R) + 0.701(G) + 0.087(B)
  assuming 0 R,G,B 1
  Where R, G and B represent the non-gamma-corrected (linear) red, green and blue components.

  ❖ **CIELab Color Space:**
  CIELab space is the exception where the current implementation directly utilizes Lightness (L).

  L = L
  assuming 0 L 100

  ❖ **CMYK Color Space:**

  Where Y=0 is black, Y=1 is white
  Y = 1 - min(1,(0.212C+0.701M+0.087Y+K))
  assuming 0 C,M,Y,K 1
  Where the function min (a,b) selects the smaller of (a,b).

- Highlight Colors

Color Mapping Tables (CMT) are not supported, therefore mapping to process color is not provided.

- Highlight colors are mapped to black with the % coverage applied to produce a gray level.

Logical Page and Object Area Coloring

Color Specification

The Color Specification triplet is used to specify the foreground color of the logical page or object area before any object data is placed on the logical page or object area.

Data Area	Value	Description	Error Code
Byte 0	X'0E'-X'10'	TRIPLET LENGTH	X'020E..01'
Byte 1	X'4E'	COLOR SPECIFICATION TRIPLET	
Byte 2	X'00'	RESERVED	
Byte 3		COLOR SPACE (Note 1)	X'020E..02'
	X'01'	RGB - Limited Simulated Color Support	
	X'04'	CMYK - Limited Simulated Color Support	
	X'06'	Highlight - Limited Simulated Color Support	
	X'08'	CIELAB - Limited Simulated Color Support	
	X'40'	Standard OCA - Limited Simulated Color Support	
Bytes 4-7	X'00000000'	RESERVED	
Byte 8		1ST COLOR COMPONENT BITS	X'020E..05'
	X'01' - X'08'	(RGB, CMYK, CIELAB)	
	X'10'	(Standard OCA, Highlight)	
Byte 9		2ND COLOR COMPONENT BITS	X'020E..05'
	X'00' - X'08'	(RGB, CMYK, Highlight, CIELAB)	
Byte 10		3RD COLOR COMPONENT BITS	X'020E..05'
	X'00' - X'08'	(RGB, CMYK, CIELAB)	
Byte 11		4TH COLOR COMPONENT BITS	X'020E..05'
	X'00' - X'08'	(CMYK)	
Bytes 12-15		COLOR VALUE	X'020E..03'
		RGB Color Space	X'020E..04'
	X'nn'	Red Intensity	
	X'nn'	Green Intensity	
	X'nn'	Blue Intensity	
		CMYK Color Space	

Data Area	Value	Description	Error Code
Bytes 12-15	X'nn'	Cyan Intensity	
	X'nn'	Magenta Intensity	
	X'nn'	Yellow Intensity	
	X'nn'	Black Intensity	
		Highlight Color Space	
	X'nnnn'	Highlight Color Number	
	X'nn'	Percent Coverage	
	X'nn'	Percent Shading	
		CIELAB Color Space	
	X'nn'	Luminance (L)	
	X'nn'	Chrominance Difference (a)	
	X'nn'	Chrominance Difference (b)	
		Standard OCA Color Space	
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue	
	X'0002' or X'FF02'	Red	
	X'0003' or X'FF03'	Pink	
	X'0004' or X'FF04'	Green	
	X'0005' or X'FF05'	Turquoise	
	X'0006' or X'FF06'	Yellow	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0009'	Dark Blue	
	X'000A'	Orange	
	X'000B'	Purple	
	X'000C'	Dark Green	
	X'000D'	Dark Turquoise	
	X'000E'	Mustard	
	X'000F'	Gray	
	X'0010'	Brown	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	

Presentation Space Reset Mixing

The Presentation Space Reset Mixing triplet is used to specify whether or not a logical page or object area is reset to the color of medium before any object data is placed on the logical page or object area.

Data Area	Value	Description	Error Code
Byte 0	X'03'	TRIPLET LENGTH	X'020E..01'
Byte 1	X'70'	PRESENTATION SPACE RESET MIXING TRIPLET	
Byte 2	Bit 0 0	MIXING FLAGS Do not reset to color of the logical page to color of medium.	
	Bit 0 1	Reset to color of the logical page to color of medium.	
	Bits 1-7 0000000	Reserved	

2. Summary of IPDS Commands

IPDS Initialization Defaults

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.

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 the printer's control 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)
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.
Xm-Coordinate page origin	X'000000' Logical page X-displacement from the physical page origin (0 in)
Ym-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).

Description	Default Value
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'
Xp-Extent of Logical Page	Derived from X-Extent of Medium Presentation Space
Yp-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

3. Device Control Command Set

About Device Control Command Set

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

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

- A datastream or device error that requires the printer to return a negative acknowledgement (NACK).
- 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 Acknowledge Reply.

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.

Note

❒ When a command is received with Bit 1 set, the Acknowledge 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:

- Synchronous NACKs
- Response to information request commands
- Acknowledgement requested (Flag byte bit 0 = 1)

❒ The Special Data area of the Acknowledgement Reply contains:

- Error sense bytes when reporting an exception
- Response to the following information request commands:
  - Sense Type and Model
  - XOH Obtain Printer Characteristics
  - XOA Request Resource List

Data Area	Value	Description	Error Code
Byte 0		ACKNOWLEDGEMENT TYPE: A one byte field that identifies the type of acknowledgement record and contents (if any) of the Special Data area.	
	X'40'	None	
	X'41'	Sense Type and Model	
	X'44'	Request Resource List	
	X'46'	Obtain Printer Characteristics	
	X'C0'	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.	
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.	

Data Area	Value	Description	Error Code
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 may be determined using the XOH OPC command (See p.96 "XOH Obtain Printer Characteristics").

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

- an XOH Erase Residual Font Data command or Deactivate Font (See p.49 "Deactivate Font") 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. The printer, however, implements 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).

Data Area	Value	Description	Error Code
Bytes 0-1		ENTRY LENGTH	X'028F..01'
	X'0002'	Null entry	
	X'000C'	Specifying without an equivalence	
	X'000E'	Valid for RT=X'06' with RIDF=X'03'	
	X'000E'-008D'	Valid for RT=X'42' with RIDF=X'09'	
	X'0010'	Valid for RT=X'06' or X'07' with RIDF=X'03'	
	X'0012'	Valid for RT=X'41' with RIDF=X'0A'	
	X'0014'	Valid for RT=X'01', X'08', X'09', X'10' with RIDF=X'03'	
	X'001E'	Valid for RT=X'01', X'08', X'09', X'10' with RIDF=X'07'	
	X'00B8'	Valid for RT=X'01' or X'08' with RIDF=X'06'	
Byte 2		RESOURCE TYPE (RT)	X'028F..01'
	X'01'	Single byte LF1 coded font	
	X'03'	Double-byte LF1–type coded font sections	
	X'06'	Code Page	
	X'07'	Font Character Set	
	X'08'	Single byte font index	
	X'09'	Double-byte LF1–type coded font section indexes	
	X'10'	Coded Font	
	X'40'	Data object resource	
	X'41'	Data-object font	
	X'42'	Data-object font component	
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'	
Byte 6		RESOURCE ID FORMAT (RIDF)	X'028F..01'
	X'03'	IBM Registered Global Resource ID parts	
	X'06'	MVS host unalterable remote font environment	
	X'07'	Coded font	
	X'09'	Object-OID	
	X'0A'	Data-object font	

Data Area	Value	Description	Error Code
Bytes 7-8		FONT INLINE SEQUENCE	X'028F..01'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	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.	
Bytes 9-10	X'0000'	Reserved	
Byte 11		RESOURCE CLASS FLAGS	
	Bit 0 0/1	Public/Private (Resource Capture)	
	Bit 1 0	Retired	
	Bit 2 0/1	Ignored (Reset)	
	Bit 3 0/1	AR NACK Enabled	
	Bit 4 0/1	Outline Font Substitution	
	Bits 5-7 0	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

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

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

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		GRAPHIC CHARACTER SET GLOBAL ID	X'028F..02'
	X'0000'	No value supplied	
	X'0001' - X'FFFE'	GCSGID	
	X'FFFF'	All characters with assigned code points in the associated code page	
Bytes 96-97		CODE PAGE GLOBAL ID	X'028F..02'
	X'0000'	No value supplied	
	X'0001' - X'FFFE'	CPGID	
	X'FFFF'	Default Code Page (Configuration Settings)	
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	
Bytes 164-171		Time Stamp	
Bytes 172-179		Ignored (Host Library Member Name)	
Bytes 180-181		FONT GLOBAL ID	X'028F..02'
	X'0000'	No value supplied	
	X'0001' - X'FFFE'	FGID	
	X'FFFF'	Default FGID (Configuration Settings)	
Bytes 182-183		FONT WIDTH	X'028F..02'
	X'0000'	No value supplied	
	X'0001' - X'FFFE'	FW	
	X'FFFF'	Default FW (Configuration Settings)	

Resource ID example with RIDF = Coded Font

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

Data Area	Value	Description	Error Code
Bytes 28-29		HORIZONTAL SCALE FACTOR	
	X'0000'	No value supplied	
	X'0001' - X'7FFF'	HSF in 1440th of an inch	

Resource ID example with RIDF = Object-OID

Data Area	Value	Description	Error Code
Byte 12		IDENTIFIER	
	X'06'	Short Form OID	
Byte 13		OID LENGTH	
	X'00' - X'7F'		
Bytes 2 to end		Unique OID	
	Any Value		

Resource ID example with RIDF = Data-object font

Data Area	Value	Description	Error Code
Bytes 12-13		Base Font HAID	
	X'0001' - X'7EFF'	TrueType/OpenType font or TrueType/OpenType collection	
Bytes 14-15		CODE PAGE HAID	
	X'0000'	No Value supplied	
	X'0001' - X'7EFF'	CP HAID	
Bytes 16-17		TTC Font Index	
	X'0000' - X'FFFF'	Font Identifier	
Bytes 2 to end		Triplets (One or more of the following triplets)	
	X'02'	Fully Qualified Name triplet	
	X'50'	Encoded Scheme ID triplet	
	X'8B'	Data-Object Font Descriptor triplet	
	X'8D'	Linked Font triplet	

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.

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.

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 related 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	
	X'60'	Deactivate a data-object font	
	X'6E'	Deactivate all data-object fonts	

Data Area	Value	Description	Error Code
Bytes 1-2	X'0001' - X'7EFF'	HOST ASSIGNED ID (Deactivation Types X'11', X'12', X'20', X'21', X'22', X'30', X'40', X'50' and X'51')	X'0214..02' X'0215..02' X'02C5..01' X'02C6..01'
Byte 3		SECTION ID	
	X'00'	Single-byte font	
	X'41' - X'FD'	Double-byte font (Deactivation types X'20', X'21' and X'22')	
Bytes 4-5		FONT INLINE SEQUENCE	X'0240..02'
		(Deactivation Type X'12' and X'22')	
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	

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
- X'E4nn' specify 1 to 63 times
- X'E5nn' specify 1 to 63 times

Note

❒ Actual tray capacity is determined by media weight.

❒ The machine supports media source tray numbering. Media source values in the LCC support tables represent the default settings when the printer is initially installed. The printer's control panel menu mode is provided to allow customers to specify the source tray numbers to meet requirements of legacy applications. Example: customer might want to address the Manual Tray as tray 4 instead of the tray 100 (default).

❒ For the tray in which "envelope" has been specified as the paper type, the tray values of the tray ID are (in ascending for each respective tray that is installed) as follows: X'8040', X'8041', etc. If a different paper type is specified for the tray, the tray values of the tray ID are (in ascending for each respective tray that is installed) as follows: X'8000', X'8001', etc. In regards to the bypass tray and default tray, even if you specify "envelope" as the paper type, the tray value will not be changed.

❒ To ascertain which machine type your model corresponds to, see "Machine Types", About This Machine or Safety Information.

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'
Bytes 2-n		COPY MODIFICATION KEY-WORDS	X'0232..01'
		Media Source (Reference Notes)	
	X'8000'	Tray 1	X'02C2..02'
	X'8001'	Tray 2	X'02C8..01'
		Tray 3* (Machine type: Type 1 or Type 2)	
	X'8002'	Tray 1 +Tray 2 + Tray 3 + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Tray 3* (Machine type: Type 3 or Type 4)	
	X'8002'	Tray 1 +Tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	

Data Area	Value	Description	Error Code
Bytes 2-n	X'8002'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Tray 3 (LCT)*	
	X'8002'	Tray 1 + Tray 2 + Tray3 (LCT) + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Tray3 (LCT) + LCT + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + LCT + Bypass tray	
		Tray 4*	
	X'8003'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'8002'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'8003'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8002'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8002'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8001'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8040'	Small size paper tray 2	
		Small size paper tray 3*(Machine type: Type 1 or Type 2)	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Bypass tray	

Data Area	Value	Description	Error Code
Bytes 2-n	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 +Tray 4 + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Small size paper tray 3*(Machine type: Type 3 or Type 4)	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	

Data Area	Value	Description	Error Code
Bytes 2-n	X'8041'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Small size paper tray 4*	
	X'8040'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'8041'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'8042'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'8040'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8041'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8041'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8042'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		LCT*	
	X'8003'	Tray 1 + Tray 2 + Tray3 (LCT) + LCT + Bypass tray	
	X'8002'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + LCT + Bypass tray	
	X'8004'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8003'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'8003'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'8003'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'8002'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	

Data Area	Value	Description	Error Code
Bytes 2-n	X’8002’	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X’8002’	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X’8001’	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X’8063’	Bypass tray	
	X’80FF’	Default Tray	
		Media Destination (Byte Pairs)	
	X'9101'	Internal shift tray	
	X'9101'	Finisher shift tray	X’0237..04’
	X'9102'	External tray	
	X'9102'	Finisher upper tray	X’02C1..01’
	X'9103'	Finisher booklet tray	X’02C3..01’
		Internal tray 1*(Machine type: Type 1 or Type 2)	
	X'9101'	Internal tray 1	
	X'9101'	Internal tray 1 + Internal tray 2(1 bin tray)	
	X'9101'	Internal tray 1 + External tray	
	X'9101'	Internal tray 1 + External tray + Internal tray 2(1 bin tray)	
	X'9102'	Internal tray 1 + Finisher SR3050	
	X'9102'	Internal tray 1 + Finisher SR3050 + Internal tray 2(1 bin tray)	
	X'9103'	Internal tray 1 + Finisher SR790	
	X'9103'	Internal tray 1 + Finisher SR790 + Internal tray 2(1 bin tray)	
	X'9104'	Internal tray 1 + Booklet Finisher SR3000	
	X'9104'	Internal tray 1 + Booklet Finisher SR3000 + Internal tray 2(1 bin tray)	
		Internal tray 1*(Machine type: Type 3 or Type 4)	
	X'9101'	Internal tray 1	
	X'9101'	Internal tray 1 + Internal tray 2(1 bin tray)	
	X'9101'	Internal tray 1 + External tray	

Data Area	Value	Description	Error Code
Bytes 2-n	X'9101'	Internal tray 1 + External tray + Internal tray 2(1 bin tray)	
	X'9103'	Internal tray 1 + Finisher SR3030	
	X'9103'	Internal tray 1 + Finisher SR3030 + Internal tray 2(1 bin tray)	
	X'9103'	Internal tray 1 + Finisher SR790	
	X'9103'	Internal tray 1 + Finisher SR790 + Internal tray 2(1 bin tray)	
	X'9104'	Internal tray 1 + Booklet Finisher SR3020	
	X'9104'	Internal tray 1 + Booklet Finisher SR3020 + Internal tray 2(1 bin tray)	
		Internal tray 2 (1 bin tray)* (Machine type: Type 1 or Type 2)	
	X'9102'	Internal tray 2 (1 bin tray) + Internal tray 1	
	X'9102'	Internal tray 2 (1 bin tray) + Internal shift tray	
	X'9103'	Internal tray 2 (1 bin tray) + Internal tray 1 + External tray	
	X'9103'	Internal tray 2 (1 bin tray) + Internal tray 1 + Finisher SR3050	
	X'9104'	Internal tray 2 (1 bin tray) + Internal tray 1 + Finisher SR790	
	X'9105'	Internal tray 2 (1 bin tray) + Internal tray 1 + Finisher SR3000	
		Internal tray 2 (1 bin tray)* (Machine type: Type 3 or Type 4)	
	X'9102'	Internal tray 2 (1 bin tray) + Internal tray 1	
	X'9102'	Internal tray 2 (1 bin tray) + Internal shift tray	
	X'9103'	Internal tray 2 (1 bin tray) + Internal tray 1 + External tray	
	X'9104'	Internal tray 2 (1 bin tray) + Finisher SR3030 + Internal tray 1	
	X'9104'	Internal tray 2 (1 bin tray) + Finisher SR790 + Internal tray 1	
	X'9105'	Internal tray 2 (1 bin tray) + Finisher SR3020 + Internal tray 1	

* Available values vary depending on the installed option.

Media Source and Destination Support Matrices

The following tables are provided to document Media Source and Destination support. This information is provided to ensure better overall understanding of the media handling characteristics. For more details on the actual X and Y media extents see p.96 “Printable Area Self-Defining Field”.

❖ Media Source and Destination Support Matrices

A = Tray 1 / Capacity: 550
B = Tray 2 / Capacity: 550
C = Small size paper tray 2 / Capacity: 550
D = Tray 3 / Capacity: 550
E = Tray 3 (LCT) / Capacity: 1000 + 1000
F = Small size paper tray 3 / Capacity: 550
G = Tray 4 / Capacity: 550
H = Small size paper tray 4 / Capacity: 550
I = Bypass tray / Capacity: 100
J = LCT / Capacity: 1200

❍ = Duplex SEF / ▲ = Duplex LEF / ● = SEF / △ = LEF

	A	B	C	D	E	F	G	H	I	J
A3 (297×420mm)		❍		❍			❍		❍	
A4 (210×297mm)	▲	❍ ▲	❍	❍ ▲	▲	❍	❍ ▲	❍	❍ ▲	▲
A5 (210×148mm)	▲	▲	❍ ▲	▲		❍ ▲	▲	❍ ▲	❍ ▲	
A6 (105×148mm)			❍			❍		❍	❍	
B4 (257×364mm)		❍		❍			❍		❍	
B5 (182×257mm)	▲	❍ ▲	❍	❍ ▲		❍	❍ ▲	❍	❍ ▲	▲
B6 (128×182mm)			❍			❍		❍	❍	
DLT (11×17in.)		❍		❍			❍		❍	
Legal (8.5×14in.)		❍		❍			❍		❍	
Foolscap (8.5×13in.)		❍		❍			❍		❍	
Letter (8.5×11in.)	▲	❍ ▲	❍	❍ ▲	▲	❍	❍ ▲	❍	❍ ▲	▲

	A	B	C	D	E	F	G	H	I	J
GovernmentLG (8.25×14in.)		❍		❍			❍		❍	
Folio (8.25×13in.)		❍		❍			❍		❍	
F/GL (8×13in.)		❍		❍			❍		❍	
Eng Quatro (8×10in.)		❍		❍			❍		❍	
Exective (7.25×10.5in.)		❍ ▲	❍	❍ ▲		❍	❍ ▲	❍	❍ ▲	
HalfLetter (5.5×8.5in.)			●			●		●	●	
Com10 (4.125×9.5in.)		△	●	△		●	△	●	● △	
Monarch (3.875×7.5in.)			● △			● △		● △	● △	
C5 (162×229mm)		△	●	△		●	△	●	● △	
C6 (114×162mm)			● △			● △		● △	● △	
DL Env (110×220mm)			● △			● △		● △	● △	
8kai (267×390mm)		❍		❍			❍		❍	
16kai (195×267mm)		❍ △		❍ △			❍ △		❍ △	
12×18in.									●	
11×15in.		❍		❍			❍		❍	
10×14in.		❍		❍			❍		❍	
Custom Sizes		*1	*2	*1		*2	*1	*2	*3	

*1 182.0×148.0 mm to 297.0×432.0 mm
*2 100.0×148.0 mm to 220.0×432.0 mm
*3 90.0×148.0 mm to 305.0×600.0 mm

- Duplexing of Custom Paper (variable paper size) is enabled, however some small sizes may jam or exhibit registration problems due to print engine limitations.
- The post-fuse inserter is a feature on this machine. It is not possible to print on inserter sheets since the sheets are picked after the EP process fusing stage. No NACKs will be reported if an attempt is made to print on an insert, however normal data stream and position checks will be detected and the appropriate NACKs will be reported. It is recommended that for post-fuse inserter sheets that the applications send pages with no print data (ie. BP, EP).
- The machine can be configured with one or two finisher units:
  - Finisher SR5000 - a 3000-sheet capacity shift bin and a 500-sheet capacity proof bin.
  - Booklet Finisher SR5020 - 5-sheet, 30-copy capacity depending on the number of sheets per booklet.

A = Internal tray 1 Capacity: 500

B = Internal tray 2 (1 bin tray) Capacity: 125

C = Internal shift tray Capacity: 250

D = External tray Capacity: Internal tray 1: 250, External tray 1: 100

E = Finisher SR790 Capacity: Finisher upper tray: 250, Finisher shift tray: 1000

F = Booklet Finisher SR3020 Capacity: Finisher upper tray: 250, Finisher shift tray: 2000, Finisher booklet tray: 150

G = Finisher SR3030 Capacity: Finisher upper tray: 250, Finisher shift tray: 3000

H = Finisher SR3050 Capacity: Finisher shift tray: 500

I = Finisher SR3000 Capacity: Finisher upper tray: 100, Finisher shift tray: 1000, Finisher booklet tray: 100

Y = Yes / N = No / FUT = Finisher upper tray / FST = Finisher shift tray / FBT= Finisher booklet tray

	A	B	C	D	E	F	G	H	I
A3 (297×420 mm) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
A4 (210×297 mm) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
A4 (210×297 mm) LEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N

	A	B	C	D	E	F	G	H	I
A5 (210×148 mm) SEF/LEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
A6 (105×148 mm) SEF	Y	Y	Y	Y	FUT: Y FST: N	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
B4 (257×364 mm) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
B5 (182×257 mm) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
B5 (182×257 mm) LEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
B6 (128×182 mm) SEF	Y	Y	Y	Y	FUT: Y FST: N	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
DLT (11×17in.) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
Legal (8.5×14in.) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
Foolscap (8.5×13 in.) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
Letter (8.5×11 in.) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y
Letter (8.5×11 in.) LEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N

	A	B	C	D	E	F	G	H	I
GovernmentLG (8.25×14 in.) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
Folio (8.25×13 in.) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
F/GL (8×13in.) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
Eng Quatro (8×10in.) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
Exective (7.25× 10.5in.) SEF/LEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
HalfLetter (5.5× 8.5in.) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
Com10 (4.125× 9.5in.) SEF	Y	N	Y	Y	N	N	N	N	N
Com10 (4.125× 9.5in.) LEF	Y	N	Y	Y	N	FUT: N FST: Y FBT: N	FUT: N FST: Y	N	N
Monarch (3.875× 7.5in.) SEF	Y	N	Y	Y	N	N	N	N	N
Monarch (3.875× 7.5in.) LEF	Y	N	Y	Y	N	FUT: N FST: Y FBT: N	FUT: N FST: Y	N	N
C5 (162×229 mm) SEF	Y	N	Y	Y	N	N	N	N	N

	A	B	C	D	E	F	G	H	I
C5 (162×229 mm) LEF	Y	N	Y	Y	N	FUT: N FST: Y FBT: N	FUT: N FST: Y	N	N
C6 (114×162 mm) SEF	Y	N	Y	Y	N	N	N	N	N
C6 (114×162 mm) LEF	Y	N	Y	Y	N	FUT: N FST: Y FBT: N	FUT: N FST: Y	N	N
DL Env (110×220 mm) SEF	Y	N	Y	Y	N	N	N	N	N
DL Env (110×220 mm) LEF	Y	N	Y	Y	N	FUT: N FST: Y FBT: N	FUT: N FST: Y	N	N
8kai (267×390 mm) SEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
16kai (195×267 mm) SEF/LEF	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
12×18in.	Y	N	Y	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N
11×15in.	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
10×14in.	Y	Y	Y	Y	Y	FUT: Y FST: Y FBT: N	Y	Y	FUT: Y FST: Y FBT: N
Custom Sizes	*1	*2	*1	*1	FUT: *3	FUT: *4 FST: *4	FUT: *4 FST: *4	*3	FUT: *3 FST: *3

*1 90.0×148.0 mm to 305.0×600.0 mm
*2 93.0×148.0 mm to 297.0×432.0 mm
*3 100.0×148.0 mm to 305.0×460.0 mm
*4 100.0×148.0 mm to 305.0×600.0 mm

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 p.144 “Set Coded Font Local”, graphics order p.256 “Character Set” or p.193 “Bar Code Data Descriptor”, p.190 “Write Bar Code Control”) 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. The printer uses 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 p.251 “Code Page and Font Identification” 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 printer's control panel [Characters Per Inch] setting is used ([Characters Per Inch] 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 [*1] FW/SPACE

  In this case SPACE is the value of the Space Character increment in relative units.

[*1] 4028-type font substitution is provided as the printer's control panel feature. It is independent of the device emulation mode setting (native or 4028). Default is No Font Substitution.

Data Area	Value	Description	Error Code
Byte 0	X'00' - X'FE'	LOCAL-FONT ID	X'0219..02'
	X'FF'	Reserved	X'0218..02'
Bytes 1-2	X'0001' - X'7EFF'	FONT HOST ASSIGNED ID	X'0218..02'
			X'021F..02'
Bytes 3-4		FONT INLINE SEQUENCE	X'0247..02'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
Bytes 5-6		GCSGID	
	X'0000'	No value assigned (Note 2)	
	X'0001' - X'FFFE'	Graphic Character Set Global ID	
	X'FFFF'	All characters with assigned code points in the associated code page	
Bytes 7-8		CPGID	X'021D..02'
	X'0000'	No value assigned (Note 2)	
	X'0001' - X'FFFE'	Code Page Global ID	
	X'FFFF'	Printer Default (Configuration Setting)	
Bytes 9-10		FGID	X'021D..02'
	X'0000'	No value assigned (Note 2)	
	X'0001' - X'FFFE'	Font Global ID	
	X'FFFF'	Printer Default (Configuration Setting)	
Bytes 11-12		FW	
	X'0000'	No value assigned (Note 2)	
	X'0001' - X'7FFF'	Font Width (Ignored for Fixed Pitch Fonts)	
	X'FFFF'	Printer Default as specified by Configuration Settings	
Byte 13	X'00'	Reserved	

Data Area	Value	Description	Error Code
Byte 14		FONT ATTRIBUTES (Note 3)	
	Bit 0 0/1	Ignored (Symbol Sets)	
	Bits 1-2 00	Reserved	
	Bit 3 0/1	Ignored (Double High)	
	Bit 4 0/1	Ignored (Italics)	
	Bit 5 0/1	Ignored (Double Strike)	
	Bit 6 0/1	Bold = 1	
	Bit 7 0/1	Ignored (Double Wide)	
Byte 15	X'00'	Reserved	
Bytes 16-n		Additional LFE ENTRIES	X'023A..02'

Note

❒ 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.

❒ 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 the printer's control panel CPI defines the FGID/FW (Typographic)

❒ 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 p.138 "Write Text"). 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. The printer accepts the LPD command using any of these valid lengths.

Data Area	Value	Description	Error Code
Byte 0		UNIT-BASE (Measurement Units)	X'0264..02'
	X'00'	10 in.	
	X'01'	10 centimeters	
Byte 1		Reserved	
Bytes 2-3		Xp AND I L-units PER UNIT-BASE	X'0260..02'
	X'3840'	14400 L-units per 10 in.	
	X'1626'	5670 L-units per 10 centimeters	
	X'0960'	2400 L-units per 10 in.	
	X'03B1'	945 L-units per 10 centimeters	
Bytes 4-5		Yp AND B L-units PER UNIT-BASE	X'0261..02'
	X'3840'	14400 L-units per 10 in.	
	X'1626'	5670 L-units per 10 centimeters	
	X'0960'	2400 L-units per 10 in.	
	X'03B1'	945 L-Units per 10 centimeters	
Byte 6		Reserved	
Bytes 7-9	X'000001' - X'007FFF'	Xp-EXTENT OF LOGICAL PAGE (Width) See p.25 "Notation Conventions"	X'0262..02'
Byte 10		Reserved	
Bytes 11-13	X'000001' - X'007FFF'	Yp-EXTENT OF LOGICAL PAGE (Height) See p.25 "Notation Conventions"	X'0263..02'
Byte 14		Reserved	
Byte 15		Ignored (Ordered Data)	
Bytes 16-23		Reserved	

Data Area	Value	Description	Error Code
Bytes 24-25		I-AXIS ORIENTATION	X'0268..02'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
	X'FFFF'	Printer Default	
Bytes 26-27		B-AXIS ORIENTATION	X'0269..02'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
	X'FFFF'	Printer Default	
		Note ❒ See p.149 "Set Text Orientation" for valid combinations of I-axis and B-axis orientations.	
Bytes 28-29	X'0000' - X'7FFF'	INITIAL I PRINT COORDINATE See p.25 "Notation Conventions"	X'026A..02'
Bytes 30-31	X'0000' - X'7FFF'	INITIAL B PRINT COORDINATE See p.25 "Notation Conventions"	X'026B..02'
Bytes 32-33	X'0000' - X'7FFF'	INLINE MARGIN	X'0210..01'
		See p.25 "Notation Conventions"	
	X'FFFF'	Printer Default	
Bytes 34-35	X'0000' - X'7FFF'	INTERCHARACTER ADJUSTMENT (+)	X'0212..01'
		See p.25 "Notation Conventions"	
	X'FFFF'	Printer Default	
Bytes 36-37		Reserved	
Bytes 38-39	X'0000' - X'7FFF'	BASELINE INCREMENT	X'0211..01'
		See p.25 "Notation Conventions"	
	X'FFFF'	Printer Default	
Byte 40	X'00' - X'FE'	LOCAL FONT ID	
	X'FF'	Printer Default	

Data Area	Value	Description	Error Code
Bytes 41-42		TEXT COLOR	X'0258..03'
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue - Limited Simulated Color Support	
	X'0002' or X'FF02'	Red - Limited Simulated Color Support	
	X'0003' or X'FF03'	Pink - Limited Simulated Color Support	
	X'0004' or X'FF04'	Green - Limited Simulated Color Support	
	X'0005' or X'FF05'	Turquoise - Limited Simulated Color Support	
	X'0006' or X'FF06'	Yellow - Limited Simulated Color Support	
	X'0008'	Black	
	X'0010'	Brown - Limited Simulated Color Support	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	
	X'FFFF'	Printer Default (Black)	

Data Area	Value	Description	Error Code
Bytes 43-end		LPD Triplets • Color Specification Triplet. This optional triplet can be placed at the end of the LPD command to specify the foreground color of the object area, before any object data is placed on the object area. Any number of LPD triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.29 "Color Specification" for details. • Presentation Space Reset Mixing Triplet. This optional triplet can be placed at the end of the LPD command to specify whether or not an object area is reset to the color of medium before any object data is placed on the object area. Any number of LPD triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.31 "Presentation Space Reset Mixing" for details.	

Logical Page Position

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

Data Area	Value	Description	Error Code
Byte 0	X'00'	RESERVED	
Bytes 1-3	X'FF8000' - X'007FFF'	Xm OFFSET of the LOGICAL PAGE ORIGIN in L-Units See p.25 "Notation Conventions".	X'02A4..01' X'02AD..01'
Byte 4		PAGE PLACEMENT	
	X'00'	Default placement	
	X'10'	Partition 1, front side	
	X'11'	Partition 1, back side	
	X'20'	Partition 2, front side	
	X'21'	Partition 2, back side	
	X'30'	Partition 3, front side	
	X'31'	Partition 3, back side	
	X'40'	Partition 4, front side	
	X'41'	Partition 4, back side	
Bytes 5-7	X'FF8000' - X'007FFF'	Ym OFFSET of the LOGICAL PAGE ORIGIN in L-Units See p.25 "Notation Conventions".	X'02A5..01' X'02AD..01'
Bytes 8-9		PAGE ORIENTATION	
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
		Note ❒ Explicit placement is supported.	

Presentation Fidelity Control

The Presentation Fidelity Control (PFC) command is only valid in home state and specifies the fidelity requirements for certain presentation functions. The desired fidelity for each supported presentation function can be specified with a triplet on the PFC command. The activate flag can be used to reset all fidelity controls to their default settings before activating the settings specified in the PFC triplets. A PFC command with no triplets and with the activate flag set to B'0' resets all fidelity controls to their default settings.

Data Area	Value	Description	Error Code
Byte 0	X'00'	RESERVED	
Byte 1		FLAGS	
	Bit 0	ACTIVATE	
	0	Reset to default fidelity controls and activate PFC triplets	
	1	Just activate PFC triplets	
	Bits 1-7	Reserved	
	00000000000000		
Bytes 2-3	X'0000'	Reserved	
Bytes 4-n		Triplets (Zero or more optional PFC triplets)	X'0254..05'
		X'86' Text Fidelity Control	
		X'88' Finishing Fidelity Control	

Text Fidelity Control

The Text Fidelity triplet specifies the exception continuation and reporting rules when an unrecognized or unsupported text control sequence is encountered.

Data Area	Value	Description	Error Code
Byte 0	X'07'	LENGTH	X'0254..51'
Byte 1	X'86'	Text Fidelity Triplet ID	
Byte 2		CONTINUE	X'0254..52'
	X'01'	Stop on Exception ID X'0200..01'	
	X'02'	Continue Processing Write Text Data	
Byte 3	X'00'	Reserved	
Byte 4		REPORT	X'0254..53'
	X'01'	Report X'0200..01' Exception	
	X'02'	Do Not Report X'0200..01' Exception	
Bytes 5-6	X'0000'	Reserved	

Finishing Fidelity Control

The Finishing Fidelity triplet specifies the exception continuation and reporting rules for finishing exceptions. This fidelity control applies when a request for a specific finishing operation cannot be satisfied.

Data Area	Value	Description	Error Code
Byte 0	X'07'	LENGTH	X'0254..51'
Byte 1	X'86'	Text Fidelity Triplet ID	
Byte 2		CONTINUE	X'0254..52'
	X'01'	Stop at first finishing exception	
	X'02'	Continue without the finishing operation	
Byte 3	X'00'	Reserved	
Byte 4		REPORT	X'0254..53'
	X'01'	Report Finishing Exceptions	
	X'02'	Do Not Report Finishing Exceptions	
Bytes 5-6	X'0000'	Reserved	

Sense Type and Model

Causes the printer to place into the Special Data Area of the Acknowledge Reply (See p.38 "Acknowledgement Reply") 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.

❖ Sense Type and Model

Special Data Area	Value	Description
Byte 0	X'FF'	Convention
Bytes 1-2		Product Code
	X'2707'	Aficio MP C3001/C3501/C4501/C4501A/C5501/C5501A C9130/C9135/C9145/C9145A/C9155/C9155A MP C3001/C3501/C4501/C4501A/C5501/C5501A LD630C/LD635C/LD645C/LD645CA/LD655C/LD655CA
	X'4028'	4028 Emulation (4028)
Byte 3		Model
	X'01'	Aficio MP C3001/C4501 C9130/C9145 MP C3001/C4501 LD630C/LD645C
	X'02'	Aficio MP C3501/C5501 C9135/C9155 MP C3501/C5501 LD635C/LD655C
	X'03'	Aficio MP C4501A C9145A MP C4501A LD645CA
	X'04'	Aficio MP C5501A C9155A MP C5501A LD655CA
	X'00'	4028 Emulation (Simplex)
	X'12'	4028 Emulation (Duplex)
Bytes 4-5	X'0000'	Reserved

Note

❒ To ascertain which machine type your model corresponds to, see "Machine Types", About This Machine or Safety Information.

❖ Device-Control Command Set

Special Data Area	Value	Description
Bytes 0-1	X'nnnn'	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
Bytes 14-15	X'6201'	LOGICAL PAGE AND OBJECT AREA COLORING support
Bytes 16-17	X'7001'	MANAGE IPDS DIALOG (MID) Command support
Bytes 18-19	X'702E'	ACTIVATE RESOURCE Command support
Bytes 20-21	X'7034'	PRINT FIDELITY Command support
Bytes 22-23	X'8008'	XOA Order MARK FORM
Bytes 24-25	X'800A'	XOA Order ALTERNATE OFFSET STACKER
Bytes 26-27	X'80F2'	XOA Order DISCARD BUFFERED DATA
Bytes 28-29	X'80F4'	XOA Order REQUEST RESOURCE LIST
Bytes 30-31	X'80F6'	XOA Order EXCEPTION HANDLING CONTROL
Bytes 32-33	X'80F8'	XOA Order PRINT QUALITY CONTROL
Bytes 34-35	X'9001'	XOH Order PRINT BUFFERED DATA
Bytes 36-37	X'9003'	XOH Order SPECIFY GROUP OPERATION
Bytes 38-39	X'9004'	XOH Order DEFINE GROUP BOUNDARY
Bytes 40-41	X'9005'	XOH Order ERASE RESIDUAL PRINT DATA
Bytes 42-43	X'9007'	XOH Order ERASE RESIDUAL FONT DATA
Bytes 44-45	X'900D'	XOH Order STACK RECEIVED PAGES
Bytes 46-47	X'9013'	XOH Order EJECT to FRONT FACING
Bytes 48-49	X'9015'	XOH Order SELECT INPUT MEDIA SOURCE
Bytes 50-51	X'9016'	XOH Order SET MEDIA ORIGIN

Special Data Area	Value	Description
Bytes 52-53	X'9017'	XOH Order SET MEDIA SIZE
Bytes 54-55	X'90F3'	XOH Order OBTAIN PRINTER CHARACTERISTICS
Bytes 56-57	X'90F5'	XOH Order PAGE COUNTERS CONTROL
Bytes 58-59	X'F001'	END PERSISTENT NACK Without Leaving IPDS
Bytes 60-61	X'F200'	OBJECT DATE AND TIME STAMP TRIPLETS SUPPORTED
Bytes 62-63	X'F201'	ACTIVATION (AR) FAILED NACK SUPPORTED
Bytes 64-65	X'F202'	Font resolution and metric technology triplets supported
Bytes 66-67	X'F203'	Metric adjustment triplets supported in AR commands
Bytes 68-69	X'F204'	Data-object font support
Bytes 70-71	X'F601'	Position check highlighting support in XOA EHC
Bytes 72-73	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 74-75	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 76-77	X'FF01'	POSITION EXCEPTION SENSE FORMAT *1

*1 Independent Exception Page Print is only supported in Native mode.

❖ 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' X'FF30'	PT2 Data PT3 Data
Bytes 6-7	X'1001'	UNORDERED TEXT
Bytes 8-9	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 10-11	X'50FF'	8 TEXT ORIENTATIONS supported

❖ 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 **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 10-11	X'A004'	ALL 4 ORIENTATIONS Supported

❖ IO Image Command Set (IOCA FS10)

Special Data Area	Value	Description
Bytes 0-1	X'001E'	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'1202'	IO Image Objects Downloaded Resources in Home State
Bytes 10-11	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 12-13	X'5001'	MMR Compression algorithm supported
Bytes 14-15	X'5003'	Uncompressed Image supported
Bytes 16-17	X'5006'	RL4 Compression supported
Bytes 18-19	X'5081'	G3 Facsimile Coding Scheme (CCITT G3MR)
Bytes 20-21	X'5082'	G4 Facsimile Coding Scheme (CCITT G4MMR)
Bytes 22-23	X'5101'	Bit ordering supported
Bytes 24-25	X'5505'	Multiple Image Content Supported
Bytes 26-27	X'A004'	All four orientations supported
Bytes 28-29	X'F300'	Replicate and Trim mapping supported

Note

❒ The Replicate and Trim Mapping Control Option is not supported when IPDS Print Mode = STD (Standard 300 dpi).

❖ IO Image Command Set (IOCA FS11)

Special Data Area	Value	Description
Bytes 0-1	X'0028'	VECTOR LENGTH
Bytes 2-3	X'C9D6'	IO Image Command Set
Bytes 4-5	X'FF11'	IO/1 Level
Bytes 6-7	X'1001'	Unordered Image Blocks
Bytes 8-9	X'1202'	IO Image Objects Downloaded Resources in Home State
Bytes 10-11	X'4003'	COLOR of MEDIUM SUPPORTED MULTIPLE-COLOR SUPPORTED
Bytes 12-13	X'4020'	LIMITED SIMULATED COLOR SUPPORTED
Bytes 14-15	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 16-17	X'4401'	Extended IOCA Bi-level Image Color supported
Bytes 18-19	X'5001'	MMR Compression algorithm supported
Bytes 20-21	X'5003'	Uncompressed Image supported
Bytes 22-23	X'5008'	ABIC Compression supported
Bytes 24-25	X'500A'	Concatenated ABIC
Bytes 26-27	X'5082'	G4 Facsimile Coding Scheme (CCITT G4MMR)
Bytes 28-29	X'5083'	ISO/ITU-TSS JPEG supported
Bytes 30-31	X'5101'	Bit ordering supported
Bytes 32-33	X'5204'	Unpadded RIDIC Recording Algorithm supported
Bytes 34-35	X'5505'	Multiple Image Content supported
Bytes 36-37	X'A004'	All four orientations supported
Bytes 38-39	X'F301'	Scale-to-fill mapping supported

❖ IO Image Command Set (IOCA FS40)

Special Data Area	Value	Description
Bytes 0-1	X'0028'	VECTOR LENGTH
Bytes 2-3	X'C9D6'	IO Image Command Set
Bytes 4-5	X'FF40'	IO/1 Level
Bytes 6-7	X'1001'	Unordered Image Blocks
Bytes 8-9	X'1202'	IO Image Objects Downloaded Resources in Home State
Bytes 10-11	X'4003'	COLOR of MEDIUM SUPPORTED MULTIPLE-COLOR SUPPORTED
Bytes 12-13	X'4020'	LIMITED SIMULATED COLOR SUPPORTED
Bytes 14-15	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED **Note** ❒ p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 16-17	X'4401'	Extended IOCA Bi-level Image Color supported
Bytes 18-19	X'5001'	MMR Compression algorithm supported
Bytes 20-21	X'5003'	Uncompressed Image supported
Bytes 22-23	X'5008'	ABIC Compression supported
Bytes 24-25	X'5080'	G3 Facsimile Coding Scheme (CCITT G3MH)
Bytes 26-27	X'5081'	G3 Facsimile Coding Scheme (CCITT G3MR)
Bytes 28-29	X'5082'	G4 Facsimile Coding Scheme (CCITT G4MMR)
Bytes 30-31	X'5101'	Bit ordering supported
Bytes 32-33	X'5204'	Unpadded RIDIC Recording Algorithm supported
Bytes 34-35	X'5505'	Multiple image Content supported
Bytes 36-37	X'A004'	All four orientations supported
Bytes 38-39	X'F301'	Scale-to-fill mapping supported

❖ IO Image Command Set (IOCS FS42)

Special Data Area	Value	Description
Bytes 0-1	X'0024'	VECTOR LENGTH
Bytes 2-3	X'C9D6'	IO Image Command Set
Bytes 4-5	X'FF42'	IO/1 Level
Bytes 6-7	X'1001'	Unordered Image Blocks
Bytes 8-9	X'1202'	IO Image Objects Downloaded Resources in Home State
Bytes 10-11	X'4003'	COLOR of MEDIUM SUPPORTED MULTIPLE-COLOR SUPPORTED
Bytes 12-13	X'4020'	LIMITED SIMULATED COLOR SUPPORTED **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 14-15	X'4401'	Extended IOCA Bi-level Image Color SDF supported
Bytes 16-17	X'5001'	MMR Compression algorithm supported
Bytes 18-19	X'5003'	Uncompressed Image supported
Bytes 20-21	X'5008'	ABIC Compression supported
Bytes 22-23	X'5020'	Solid Fill Rectangle
Bytes 24-25	X'5082'	G4 Facsimile Coding Scheme (CCITT G4MMR)
Bytes 26-27	X'5101'	Bit ordering supported
Bytes 28-29	X'5204'	Unpadded RIDIC Recording Algorithm supported
Bytes 30-31	X'5505'	Multiple image content supported
Bytes 32-33	X'A004'	All four orientations supported
Bytes 34-35	X'F301'	Scale-to-fill mapping supported

❖ IO Image Command Set (IOCA FS45)

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'FF45'	IO/1 Level
Bytes 6-7	X'1001'	Unordered Image Blocks
Bytes 8-9	X'1202'	IO Image Objects Downloaded Resources in Home State
Bytes 10-11	X'4003'	COLOR of MEDIUM SUPPORTED MULTIPLE-COLOR SUPPORTED
Bytes 12-13	X'4020'	LIMITED SIMULATED COLOR SUPPORTED
Bytes 14-15	X'4022'	COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED **Note** ❒ p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 16-17	X'4401'	Extended IOCA Bi-level Image Color supported
Bytes 18-19	X'5020'	Solid Fill Rectangle supported
Bytes 20-21	X'5101'	Bit ordering supported
Bytes 22-23	X'5505'	Multiple image Content supported
Bytes 24-25	X'A004'	All four orientations supported
Bytes 26-27	X'F301'	Scale-to-fill mapping supported

❖ 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 **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 10-11	X'4100'	Set Process Color Supported
Bytes 12-13	X'4101'	GOCA Box Drawing Supported
Bytes 14-15	X'4102'	Partial Arc Drawing Supported
Bytes 16-17	X'4106'	Set Fractional Line Width Supported
Bytes 18-19	X'A004'	All 4 orientations supported

❖ Page Segment Command Set

Special Data Area	Value	Description
Bytes 0-1	X'0008'	VECTOR LENGTH
Bytes 2-3	X'D7E2'	PAGE SEGMENT Command Set
Bytes 4-5	X'FF10'	PS1 Subset
Bytes 6-7	X'1101'	EXTENDED PAGE SEGMENT SUPPORT (32K)

❖ Overlay Command Set

Special Data Area	Value	Description
Bytes 0-1	X'000A'	VECTOR LENGTH
Bytes 2-3	X'D6D3'	OVERLAY Command Set
Bytes 4-5	X'FF10'	OL1 Subset
Bytes 6-7	X'1102'	EXTENDED OVERLAY SUPPORT (32K)
Bytes 8-9	X'1506'	OVERLAY NESTING = 6 Levels

❖ Loaded Font Command Set (LF1) - Single Byte

Special Data Area	Value	Description
Bytes 0-1	X'0010'	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'B002'	LFI UNDERSCORE Width and Position USED
Bytes 10-11	X'C005'	BOUNDED BOX RASTER FONT TECHNOLOGY
Bytes 12-13	X'C100'	FIXED METRICS
Bytes 14-15	X'C101'	RELATIVE METRICS

❖ Loaded Font Command Set (LF1) - Double Byte

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

❖ Loaded Font Command Set (LF3) - Single Byte

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'FF30'	LF3 subset - code page + font character set
Bytes 6-7	X'A004'	4 CHARACTER ROTATIONS (LFI command)
Bytes 8-9	X'B002'	LFI UNDERSCORE Width and Position USED
Bytes 10-11	X'B003'	GRID PARTS REQUIRED IN LFC, LFCSC and LCPC COMMANDS
Bytes 12-13	X'B004'	Default Character Parameters in LCPC Supported
Bytes 14-15	X'C01F'	ADOBE TYPE-1 PFB OUTLINE FONT TECHNOLOGY
Bytes 16-17	X'C101'	RELATIVE METRICS

❖ Loaded Font Command Set (LF3) - Double Byte

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'B003'	GRID PARTS REQUIRED IN LFC, LFCSC and LCPC COMMANDS
Bytes 14-15	X'B004'	Default Character Parameters in LCPC Supported
Bytes 16-17	X'C01E'	CID-keyed OUTLINE FONT TECHNOLOGY
Bytes 18-19	X'C01F'	ADOBE TYPE-1 PFB OUTLINE FONT TECHNOLOGY
Bytes 20-21	X'C101'	RELATIVE METRICS

❖ 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 **Note** ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.
Bytes 10-11	X'A004'	All four orientations supported

Note

❒ See p.197 "Bar Code Type and Modifier Description and Values" for a list of supported Bar Code Types.

❖ Object Container Command Set

Special Data Area	Value	Description
Bytes 0-1	X'000A'	VECTOR LENGTH
Bytes 2-3	X'D6C3'	Object Container Command set - OC1 Subset
Bytes 4-5	X'0000'	No levels defined
Bytes 6-7	X'1201'	Data-object resource support
Bytes 8-9	X'F301'	Scale-to-fill mapping supported

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 Any state 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 p.53 "Load Copy Control") all the copies of the page will have a job separator mark included.

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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'F600'	EXCEPTION HANDLING CONTROL (EHC)	
Byte 2		EXCEPTION REPORTING	
	Bit 0: 0	Do not Report Undefined Character Check	
	Bit 0: 1	Report Undefined Character Check	
	Bit 1: 0	Do not Report Page Position Check	
	Bit 1: 1	Report Page Position Check	
	Bits 2-5: 00	Reserved	
	Bit 6: 0	Do not Highlight Position Checks	
	Bit 6: 1	Highlight Position Checks (08C1..00 and 0411..00)	
	Bit 7: 0	Do not Report All other Exceptions with AEA's	
	Bit 7: 1	Report All other Exceptions with AEA's	

Data Area	Value	Description	Error Code
Byte 3		ALTERNATE EXCEPTION ACTIONS	
	Bits 0-6: 0	Reserved	
	Bit 7: 0	Take AEA (if defined)	
	Bit 7: 1	Don't take AEA	
Byte 4		EXCEPTION PRESENTATION PROCESSING	
	Bits 0-5: 0	Reserved	
	Bit 6: 0	No Page Continuation	
	Bit 6: 1	Page Continuation Action (Independent Exception Page Print Supported)	
		Discard Page	
	Bit 7: 0	Print to point of Exception	
	Bit 7: 1	(Process limits may apply)	
		Note ❒ Independent Exception Page Print is only present in Native mode, not 4028 Emulation mode.	

XOA Request Resource List

This order causes the Resource List (See "Resource List Reply") to be placed in the Special Data Area of the Acknowledge Reply (See p.38 "Acknowledgement Reply") 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, the printer will follow either the acknowledge continuation method or the RRL-continuation method, depending on the host, as described in Intelligent Printer Data Stream Reference.

Data Area	Value	Description	Error Code
Bytes 0-1	X'F400'	REQUEST RESOURCE LIST (RRL)	
Byte 2		QUERY TYPE	X'0291..02'
	X'05'	Resource Activation Status	
	X'00' or X'FF'	General Resource Status	
Bytes 3-4	X'0000'-X'FFFF'	ENTRY CONTINUATION Indicator	
Byte 5	X'03'-X'xx'	ENTRY LENGTH **Note** ❒ Multiple-entry queries are not supported. Byte 5 indicates the length of the command.	X'0291..02'

Data Area	Value	Description	Error Code
Byte 6		RESOURCE TYPE	X'0291..02'
	X'01'	Single Byte Coded Fonts	
	X'02'	Double-byte LF1–type Coded Fonts	
	X'03'	Double-byte LF1–type Coded Font Sections	
	X'04'	Page Segments	
	X'05'	Overlays	
	X'06'	Device Version Code Pages	
	X'07'	Font Character Sets	
	X'08'	Single-byte coded-font indexes	
	X'09'	Double-byte LF1–type Coded Font Section Indexes	
	X'10'	Coded Fonts (treated as RT 01)	
	X'11'	Graphic Character Sets supported in a font character set	
	X'12'	Specific Code Pages	
	X'41'	Data-object font	
	X'42'	Data-object font component	
	X'FF'	All Resources	
Byte 7		RESOURCE ID FORMAT	X'0291..02'
	X'00'	Host-Assigned Resource ID	
	X'03'	IBM Registered Global Resource ID parts	
	X'09'	Object-OID	
Bytes 8-n		RESOURCE IDENTIFIER	

- Multiple-entry queries are not supported. Byte 5 indicates the length of the command.
- If the entire resource list does not fit in the Special Data area of the Acknowledge Reply, continuation is necessary. The printer indicates continuation 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.
- Bytes 8 and 9 are ignored when the resource type is ALL.

- 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

Data Area	Value	Description	Error Code
Byte 0	X'FF	UNORDERED LIST	
Byte 1	X'01'	END of LIST	
	X'04' - X'nn'	LENGTH of this ENTRY	
Byte 2		RESOURCE TYPE	
	X'00'	Resource Size=0. The queried Resource Type,ID Format, or ID is unknown, unsupported, or inconsistent	
	X'01'	Single Byte Coded Font	
	X'02'	Double Byte Coded Fonts	
	X'03'	Double Byte Coded-font Sections	
	X'04'	Page Segment	
	X'05'	Overlay	
	X'06'	Device Version Code Pages	
	X'07'	Font Character Sets	
	X'08'	Single Byte Coded Font Index	
	X'09'	Double Byte Coded-font Section Indexes	
	X'11'	Graphic Character Sets supported in a font character set	
	X'12'	Specific Code Pages	
	X'41'	Data-object font	
	X'42'	Data-object font component	
	X'FF'	All Resources	
Byte 3		RESOURCE ID FORMAT	
	X'00'	Host-Assigned Resource ID	
	X'03'	IBM Registered Global Resource ID parts	
Byte 4		RESOURCE SIZE Indicator	
	X'00'	Resource not present	
	X'01'	Resource present	
Bytes 5-6	X'xxxx'	Resource ID	

- Bytes 2-6 repeat for each resource type.
- 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).
- See p.251 “Code Page and Font Identification” 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.

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

❖ Media Jogging Support Matrices

A = Internal shift tray
B = Finisher SR790: Finisher shift tray
C = Booklet Finisher SR3020: Finisher shift tray
D = Finisher SR3030: Finisher shift tray
E = Finisher SR3050: Finisher shift tray
F = Finisher SR3000: Finisher shift tray

Y = Yes / N = No

	A	B	C	D	E	F
A3(297×420mm) SEF	Y	Y	Y	Y	Y	Y
A4(210×297mm) SEF/LEF	Y	Y	Y	Y	Y	Y
A5(210×148mm) SEF/LEF	Y	Y	Y	Y	N	Y
A6(105×148mm) SEF	Y	N	N	N	N	N
B4(257×364mm) SEF	Y	Y	Y	Y	Y	Y
B5(182×257mm) SEF/LEF	Y	Y	Y	Y	Y	Y

	A	B	C	D	E	F
B6 (128×182mm) SEF	Y	N	N	N	N	N
DLT (11×17in.) SEF	Y	Y	Y	Y	Y	Y
Legal (8.5×14in.) SEF	Y	Y	Y	Y	Y	Y
Foolscap (8.5×13in.) SEF	Y	Y	Y	Y	Y	Y
Letter (8.5×11in.) SEF/LEF	Y	Y	Y	Y	Y	Y
Govern-mentLG (8.25×14in.) SEF	Y	Y	Y	Y	Y	Y
Folio (8.25×13in.) SEF	Y	Y	Y	Y	Y	Y
F/GL (8×13in.) SEF	Y	Y	Y	Y	Y	Y
Eng Quatro (8×10in.) SEF	Y	Y	Y	Y	Y	Y
Exective (7.25×10.5in.) SEF/LEF	Y	Y	Y	Y	Y	Y
HalfLetter (5.5×8.5in.) SEF	Y	Y	N	N	N	Y
Com10 (4.125×9.5in.) SEF	Y	N	N	N	N	N
Com10 (4.125×9.5in.) LEF	Y	N	N	N	N	N
Monarch (3.875×7.5in.) SEF	Y	N	N	N	N	N

	A	B	C	D	E	F
Monarch (3.875×7.5in.) LEF	Y	N	N	N	N	N
C5 (162×229mm) SEF	Y	N	N	N	N	N
C5 (162×229mm) LEF	Y	N	N	N	N	N
C6 (114×162mm) SEF	Y	N	N	N	N	N
C6 (114×162mm) LEF	Y	N	N	N	N	N
DL Env (110×220mm) SEF	Y	N	N	N	N	N
DL Env (110×220mm) LEF	Y	N	N	N	N	N
8kai (267×390mm) SEF	Y	Y	Y	Y	Y	Y
16kai (195×267mm) SEF/LEF	Y	Y	Y	Y	Y	Y
12×18in. SEF	Y	Y	Y	Y	N	Y
11×15in. SEF	Y	Y	Y	Y	Y	Y
10×14in. SEF	Y	Y	Y	Y	Y	Y
Custom Sizes	90.0×1148.0mm to 305.0×600.0mm		148.0×148.0mm to 305.0×600.0mm	148.0×148.0mm to 305.0×600.0mm	182.0×148.0mm to 297.0×460.0mm	148.0×148.0mm to 305.0×460.0mm

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 self-defined fields describing printer characteristics to be placed in the Special Data Area of the requested Acknowledge 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.

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

Printable Area Self-Defining Field

- The printer provides two modes that determine the specification of the Xm Offset, Ym Offset, Xm Extent and Ym Extent of the Printable Area.
  - Restricted (No Print Border) (Guaranteed Print Legibility) (Default)
  - Unrestricted (Edge-to-Edge Addressability)
- 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 p.126 "XOH Set Media Origin".
- Actual tray capacities are determined media weight. The capacities in the following table are the maximum allowable.
- The machine supports media source tray numbering. Media source values in the printer's control panel OPC support tables represent the default settings when the printer is initially installed. An the menu mode is provided to allow customers to specify the source tray numbers to meet requirements of legacy applications. Example: customer might want to address the Manual Tray as tray 4 instead of the tray 100 (default).

Note

❒ For the tray in which "envelope" has been specified as the paper type, the tray values of the tray ID are (in ascending for each respective tray that is installed) as follows: X'8040', X'8041', etc. If a different paper type is specified for the tray, the tray values of the tray ID are (in ascending for each respective tray that is installed) as follows: X'8000', X'8001', etc. In regards to the bypass tray and default tray, even if you specify "envelope" as the paper type, the tray value will not be changed.

❒ To ascertain which machine type your model corresponds to, see "Machine Types", About This Machine or Safety Information.

Special Data Area	Value	Description
Bytes 0-1		LENGTH of this Self-Defining Field
	X′0018′ or	Machine with NO Media OID
	X′0024′ or	Machine with Single Media OID
	X′0025′ or	Machine with Double Media OID
	X′0026′ or	Machine with Triple Media OID
	X′0027′ or	Machine with Quadruple Media OID
	X′nnnn′	Machine with Media Name
Bytes 2-3	X′0001′	PRINTABLE AREA Self-Defining Field ID
Byte 4		INPUT MEDIA SOURCE (See Notes)
	X′00′	Tray 1
	X′01′	Tray 2
		Tray 3* (Machine type: Type 1 or Type 2)
	X'02'	Tray 1 + Tray 2 + Tray 3 + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 +Tray 4+ Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
		Tray 3* (Machine type: Type 3 or Type 4)
	X'02'	Tray 1 +Tray 2 + Tray 3 + Tray 4 + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray

Special Data Area	Value	Description
Byte 4	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
		Tray 3 (LCT)*
	X'02'	Tray 1 + Tray 2 + Tray3 (LCT) + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + Bypass tray
	X'02'	Tray 1 + Tray 2 + Tray3 (LCT) + LCT + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + LCT + Bypass tray
		Tray 4*
	X'03'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + Bypass tray
	X'02'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray
	X'02'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray
	X'03'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'01'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'40'	Small size paper tray 2
		Small size paper tray 3*(Machine type: Type 1 or Type 2)
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Bypass tray

Special Data Area	Value	Description
Byte 4	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 +Tray 4 + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
		Small size paper tray 3*(Machine type: Type 3 or Type 4)
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray

Special Data Area	Value	Description
Byte 4		Small size paper tray 4*
	X'40'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray
	X'41'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray
	X'42'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray
	X'40'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'41'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'41'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'42'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
		LCT*
	X'03'	Tray 1 + Tray 2 + Tray3 (LCT) + LCT + Bypass tray
	X'02'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + LCT + Bypass tray
	X'04'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'03'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray
	X'03'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'03'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X'02'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray

Special Data Area	Value	Description
Byte 4	X'01'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray
	X’63’	Bypass tray
	X’FF’	Default Tray
Byte 5	X’00’	Reserved
Byte 6	X’00’	UNIT BASE 10 in.
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)
Bytes 14-15		Xm OFFSET of the Printable Area in L-Units
	X’00E3’	Restricted (4mm)
	X’0000’	Unrestricted (0mm)
Bytes 16-17		Ym OFFSET of the Printable Area in L-units
	X’00E3’	Restricted (4mm)
	X’0000’	Unrestricted (0mm)
		Note ❒ For A4 media there is special processing with respect to reporting the Xm OFFSET and subsequentially the Xm EXTENT of the printable area. The 4028 printer used an offset of 3.386 mm for A4 paper (short edge) instead of 4 mm. This was done as a customer satisfaction issue to allow a printable area 8 in. wide.

Special Data Area	Value	Description
Bytes 18-19 (Restricted: No Print Border)		Xm EXTENT of the Printable Area in L-units
		Paper
	X'1D2A'	Statement (5.185 in.)
	X'2702'	Executive (6.935 in.)
	X'2B3A'	8in. × 10in. (7.685 in.)
	X'2E0A'	Letter (8.185 in.)
	X'30DA'	Letter Tabstock (8.685 in.)
	X'2B3A'	8in. × 13in. (7.685 in.)
	X'2CA2'	8.25in. × 13in. (7.935 in.)
	X'2E0A'	8.5 × 13 in. (8.185 in.)
	X'2E0A'	Legal (8.185 in.)
	X'367A'	10in. × 14in. (9.685 in.)
	X'367A'	10in. × 15in. (9.685 in.)
	X'3C1A'	11in. × 14in. (10.685 in.)
	X'3C1A'	11in. × 15in. (10.685 in.)
	X'3C1A'	Ledger (10.685 in.)
	X'41BA'	12in. × 18in. (11.685 in.)
	X'157B'	A6 (97 mm)
	X'1A93'	B6 (120 mm)
	X'1F1D'	A5 (140.5 mm)
	X'23E0'	170 × 210mm (162 mm)
	X'2689'	182 × 210mm (174 mm)
	X'2CBC'	210 × 340mm (202 mm)
	X'2688'	B5 (JIS) (174 mm)
	X'2CBC'	A4 (202 mm)
	X'2F86'	A4 Tabstock (214.6 mm)
	X'3724'	B4 (ISO) (249 mm)
	X'395C'	8 Kai (259 mm)
	X'296A'	16 Kai (187 mm)
	X'4000'	A3 (289 mm)
	X'145F' - X'474F'	Custom (92 mm to 322 mm)
		Transparencies/Labels
	X'2E0A'	Letter (8.185 in.)
	X'2CBC'	A4 (202 mm)

Special Data Area	Value	Description
Bytes 18-19 (Unrestricted: Edge-to-Edge Addressability)		Xm EXTENT of the Printable Area in L-units
		Paper
	X'1EF0'	Statement (5.5 in.)
	X'28C8'	Executive (7.25 in.)
	X'2D00'	8in. × 10in. (8 in.)
	X'2FD0'	Letter (8.5 in.)
	X'32A0'	Letter Tabstock (9 in.)
	X'2D00'	8in. × 13in. (8 in.)
	X'2E68'	8.25in. × 13in. (8.25 in.)
	X'2FD0'	8.5in. × 13in. (8.5 in.)
	X'2FD0'	Legal (8.5 in.)
	X'3840'	10in. × 14in. (10 in.)
	X'3840'	10in. × 15in. (10 in.)
	X'3DE0'	11in. × 14in. (11 in.)
	X'3DE0'	11in. × 15in. (11 in.)
	X'3DE0'	Ledger (11 in.)
	X'4380'	12in. × 18in. (12 in.)
	X'1741'	A6 (105 mm)
	X'1C59'	B6 (128 mm)
	X'20E3'	A5 (148.5 mm)
	X'25A6'	170 × 210mm (170 mm)
	X'284E'	182 × 210mm (182 mm)
	X'2E82'	210 × 340mm (210 mm)
	X'284E'	B5 (JIS) (182 mm)
	X'2E82'	A4 (210 mm)
	X'314C'	A4 Tabstock (222.6 mm)
	X'38EA'	B4 (ISO) (257 mm)
	X'3B21'	8 Kai (267 mm)
	X'2B30'	16 Kai (195 mm)
	X'41C6'	A3 (297 mm)
	X'1625' - X'4914'	Custom (100 mm to 330 mm)
		Transparencies/Labels
	X'2FD0'	Letter (8.5 in.)
	X'2E82'	A4 (210 mm)

Special Data Area	Value	Description
Bytes 20-21 (Restricted: No Print Border)		Ym EXTENT of the Printable Area in L-units
		Paper
	X'2E0A'	Statement (8.185 in.)
	X'394A'	Executive (10.185 in.)
	X'367A'	8in. × 10in. (9.685 in.)
	X'394A'	8in. × 10.5in. (10.185 in.)
	X'3C1A'	Letter (10.685 in.)
	X'3C1A'	Letter Tabstock (10.685 in.)
	X'475A'	8in. × 13in. (12.685 in.)
	X'475A'	8.25in. × 13in. (12.685 in.)
	X'475A'	8.5in. × 13in. (12.685 in.)
	X'4CFA'	Legal (13.685 in.)
	X'4CFA'	10in. × 14in. (13.685 in.)
	X'529A'	10in. × 15in. (14.685 in.)
	X'4CFA'	11in. × 14in. (13.685 in.)
	X'529A'	11in. × 15in. (14.685 in.)
	X'5DDA'	Ledger (16.685 in.)
	X'637A'	12in. × 18in. (17.685 in.)
	X'1F1D'	A6 (140.5 mm)
	X'2689'	B6 (174 mm)
	X'2CBC'	A5 (202 mm)
	X'2CBC'	170 × 210mm (202 mm)
	X'2CBC'	182 × 210mm (202 mm)
	X'4986'	210 × 340mm (332 mm)
	X'3724'	B5 (JIS) (249 mm)
	X'4000'	A4 (289 mm)
	X'4000'	A4 Tabstock (289 mm)
	X'4ED6'	B4 (ISO) (356 mm)
	X'5499'	8 Kai (382 mm)
	X'395C'	16 Kai (259 mm)
	X'5B3D'	A3 (412 mm)
	X'1D02 - 63A8'	Custom (131 mm to 450 mm)
		Transparencies/Labels
	X'3C1A'	Letter (10.685 in.)
	X'4000'	A4 (289 mm)

Special Data Area	Value	Description
Bytes 20-21(Unrestricted: Edge-to-Edge Addressability)		Ym EXTENT of the Printable Area in L-units
		Paper
	X'2FD0'	Statement (8.5 in.)
	X'3B10'	Executive (10.5 in.)
	X'3840'	8in. × 10in. (10 in.)
	X'3DE0'	Letter (11 in.)
	X'3DE0'	Letter Tabstock (11 in.)
	X'4920'	8in. × 13in. (13 in.)
	X'4920'	8.25in. × 13in. (13 in.)
	X'4920'	8.5in. × 13in. (13 in.)
	X'4EC0'	Legal (14 in.)
	X'4EC0'	10in. × 14in. (14 in.)
	X'5460'	10in. × 15in. (15 in.)
	X'4EC0'	11in. × 14in. (14 in.)
	X'5460'	11in. × 15in. (15 in.)
	X'5FA0'	Ledger (17 in.)
	X'20C7'	12in. × 18in. (18 in.)
	X'20E3'	A6 (148.5 mm)
	X'284E'	B6 (182 mm)
	X'2E82'	A5 (210 mm)
	X'2E82'	170 × 210mm (210 mm)
	X'2E82'	182 × 210mm (210 mm)
	X'4B4C'	210 × 340mm (340 mm)
	X'38EA'	B5 (JIS) (257 mm)
	X'41C6'	A4 (297 mm)
	X'41C6'	A4 Tabstock (297 mm)
	X'509C'	B4 (ISO) (364 mm)
	X'565F'	8 Kai (390 mm)
	X'3B21'	16 Kai (267 mm)
	X'5D03'	A3 (420 mm)
	X'1EC8 - 656D'	Custom (139 mm to 458 mm)
		Transparencies/Labels
	X'3DE0'	Letter (11 in.)
	X'41C6'	A4 (297 mm)

Special Data Area	Value	Description
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: 0/1	0 = Not an Inserter Bin; 1 = Inserter Bin
	Bits 10-15:all 0	Reserved
Bytes 24-25		Input Media ID LENGTH (Note 3)
	X'000C' or	Machine with Single OID byte
	X'000D' or	Machine with Double OID byte
	X'000E' or	Machine with Triple OID byte
	X'000F'	Machine with Quadruple OID byte
Byte 26		INPUT MEDIA ID Type
	X'10'	MO:DCA Input Media Type OID
Byte 27	X'06'	OID Encoding
Byte 28		OID LENGTH
	X'07' or	Machine with Single OID byte
	X'08' or	Machine with Double OID bytes
	X'09' or	Machine with Triple OID bytes
	X'0A'	Machine with Quadruple OID bytes
Bytes 29-34	X'2B1200040301'	Input Media ID (Common Part)
Bytes 35-36		Input Media ID (Media Specific Part)
		Paper
	X'45'	Statement (69)
	X'41'	Executive (65)
	X'8120'	8in. × 10in. (160)
	X'32'	Letter (50)

Special Data Area	Value	Description
Bytes 35-36	X'33'	Letter Colored (51)
	X'34'	Letter Transparent (52)
	X'8111'	Letter Tabstock (9×11) (145)
	No OID Returned	8in. × 13in.
	No OID Returned	8.25in. × 13in.
	X'3F'	8.5in. × 13in. (63)
	X'3C'	Legal (60)
	X'3D'	Legal Colored (61)
	No OID Returned	10in. × 14in.
	No OID Returned	10in. × 15in.
	No OID Returned	11in. × 14in.
	No OID Returned	11in. × 15in.
	X'43'	Ledger (67)
	X'9B'	12in. × 18in. (155)
	No OID Returned	A6
	No OID Returned	B6
	X'14'	A5 (20)
	X'15'	A5 Colored (21)
	No OID Returned	170 × 210mm
	No OID Returned	182 × 210mm
	No OID Returned	210 × 340mm
	X'2B'	B5 (JIS) (43)
	X'00'	A4 (0)
	X'01'	A4 Colored (1)
	X'02'	A4 Transparent (2)
	X'07'	A4 Tabstock (7)
	X'1E'	B4 (ISO) (30)
	X'1F'	B4 Colored (ISO) (31)
	No OID Returned	8 Kai
	No OID Returned	16 Kai
	X'0A'	A3 (10)
	X'0B'	A3 Colored (11)
	No OID Returned	Custom
Bytes 37-38	X'0004' - X'0013'	Input Media ID LENGTH (Note 4)

Special Data Area	Value	Description
Byte 39		Input Media ID TYPE
	X'00'	User Defined Name
Bytes 40-end		Input Media ID (Form Name)
	X'4C6574746572'(ie. Letter)	(1 to 16 Byte Form Name)

- In the OPC Acknowledge Reply, the Printable Area SDF repeats for every installed Media Source. Therefore, since printers are capable of supporting multiple installed input trays, multiple Printable Area SDF's may be returned in a single XOH-OPC Acknowledge Reply.
- The Input Media Source Characteristics (Bit 0), of the Printable Area SDF indicates the duplex ability of a given media source. See "Media Source and Destination Support Matrices", for specific details on media duplex ability.
- Input Media ID type X'06' - Media OID is only returned if a particular media has a registered MO:DCA Media Type OID.
- Input Media ID type X'00' - User Defined Name is only returned if the user defines a Form, assigns a Form Name to the Form and associates that Form with a given Input Media Source tray.

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		FONT RESOLUTIONS
	X'00'	Resolution Acceptance Mode (Only value in bytes 6-9)
	X'FF'	Resolution Independence Mode (Bytes 6-9 specify highest resolution) (240 DPI or 300 DPI or 600 DPI)
Bytes 6-7		X PIXELS per Unit Base
	X'0960'	2400 pixels/10 inches
	X'0BB8'	3000 pixels/10 inches
	X'1770'	6000 pixels/10 inches
Bytes 8-9		Y PIXELS per Unit Base
	X'0960'	2400 pixels/10 inches
	X'0BB8'	3000 pixels/10 inches
	X'1770'	6000 pixels/10 inches

- Value for byte 5 is controlled by the [Resolution] setting in the IPDS menu. 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.
- Values for bytes 6-9 are controlled by the setting of byte 5 (Font Resolutions). If byte 5 indicates Resolution Acceptance mode X'00', bytes 6-9 reflect the [Resolution] setting in the IPDS menu. If byte 5 indicates Resolution Independence mode X'FF', bytes 6-9 reflect the [Print Mode] setting in the IPDS menu. Note that the resolutions specified also apply to GOCA image if the image resolution specified in the GDD command is X'0000', indicating that no explicit GOCA image resolution was specified.
- If the [Print Mode] = STD (Standard 300 DPI), then the [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).
- For the printer 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 - Single Byte

Special Data Area	Value	Description
Bytes 0-1	X'0033'	VECTOR LENGTH
Bytes 2-3	X'0004'	STORAGE POOLS Self-Defining Field
Byte 4	X'2F'	LENGTH of each Storage Pool Self-Defining Field
Byte 5	X'01'	Triplet ID
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

Special Data Area	Value	Description
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'0050'	CODE PAGES
Bytes 47-48	X'0060'	FONT CHARACTER SETS
Bytes 49-50	X'0070'	CODED FONTS

Storage Pools Self-Defining Field - Double Byte

Special Data Area	Value	Description
Bytes 0-1	X'0039'	VECTOR LENGTH
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
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

Special Data Area	Value	Description
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

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

Installed Features Self-Defining Field

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

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
Bytes 10-11	X'0800'	MICR (If MICR Enabled)

Available Features Self-Defining Field

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

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
Bytes 10-11	X'0800'	MICR (If MICR Enabled)

RRL Resource Type and ID Format Self-Defining Field - Single Byte

Special Data Area	Value	Description
Bytes 0-1	X'002C'	VECTOR LENGTH
Bytes 2-3	X'000A'	RRL RESOURCE TYPE Self **Note** ❒ RRL query combinations that receive a non-zero Resource Type reply (See p.90 "XOA Request Resource List")
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
Bytes 8-9	X'0400'	Page Segments as Host Assigned Resource ID
Bytes 10-11	X'0500'	Overlays as Host Assigned Resource ID
Bytes 12-13	X'0600'	Device Version Code Pages as Host Assigned Resource ID
Bytes 14-15	X'0603'	Device Version Code Pages as IBM Global Resource ID
Bytes 16-17	X'0700'	Font Character Set as Host Assigned Resource ID
Bytes 18-19	X'0703'	Font Character Set as IBM Global Resource ID
Bytes 20-21	X'0800'	Single-Byte Coded Font Index as Host Assigned Resource ID
Bytes 22-23	X'1000'	Coded Fonts as Host Assigned Resource ID
Bytes 24-25	X'1003'	Coded Fonts as IBM Global Resource ID
Bytes 26-27	X'1103'	Graphic Character Sets/Subsets as IBM Global Resource ID
Bytes 28-29	X'1200'	Specific Code Pages as Host Assigned Resource ID
Bytes 30-31	X'1203'	Specific Code Pages as IBM Global Resource ID
Bytes 32-33	X'4000'	Data object resource as Host Assigned Resource ID
Bytes 34-35	X'4009'	Data object resource with Object-OID Format
Bytes 36-37	X'4100'	Data-object Font as Host Assigned Resource ID
Bytes 38-39	X'4200'	Data-object Font Components as Host Assigned Resource ID

Special Data Area	Value	Description
Bytes 40-41	X'4209'	Data-object Font Components with Object-OID Format
Bytes 42-43	X'FF00'	All Resources as Host Assigned Resource ID

RRL Resource Type and ID Format Self-Defining Field - Double Byte

Special Data Area	Value	Description
Bytes 0-1	X'0034'	VECTOR LENGTH
Bytes 2-3	X'000A'	RRL RESOURCE TYPE Self **Note** ❒ RRL query combinations that receive a non-zero Resource Type reply (See p.90 "XOA Request Resource List")
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
Bytes 8-9	X'0200'	Double-Byte Coded LF1 Fonts as Host Assigned Resource ID
Bytes 10-11	X'0203'	Double-Byte Coded LF1 Fonts as IBM Global Resource ID
Bytes 12-13	X'0300'	Double-Byte Coded LF1 Font Sect 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 Sect Index as Host Assigned Resource ID
Bytes 30-31	X'1000'	Coded Fonts as Host Assigned Resource ID
Bytes 32-33	X'1003'	Coded Fonts as IBM Global Resource ID

Special Data Area	Value	Description
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'4000'	Data object resource as Host Assigned Resource ID
Bytes 42-43	X'4009'	Data object resource with Object-OID Format
Bytes 44-45	X'4100'	Data-object Font as Host Assigned Resource ID
Bytes 46-47	X'4200'	Data-object Font Components as Host Assigned Resource ID
Bytes 48-49	X'4209'	Data-object Font Components with Object-OID Format
Bytes 50-51	X'FF00'	All Resources as Host Assigned Resource ID

Activate Resource RT and ID Format Self-Defining Field - Single Byte

Special Data Area	Value	Description
Bytes 0-1	X'001A'	VECTOR LENGTH
Bytes 2-3	X'000B'	RRL RESOURCE TYPE Self **Note** ❒ RRL query combinations that receive a non-zero Resource Type reply (See p.90 "XOA Request Resource List")
Bytes 4-5	X'0103'	Single-Byte Coded LF1 Fonts with IBM Global Resource IDs
Bytes 6-7	X'0106'	Single-Byte Coded LF1 Fonts with MVS Host Unalterable Remote Font Environment
Bytes 8-9	X'0603'	Code Pages with IBM Global Resource IDs
Bytes 10-11	X'0703'	Font Character Sets with IBM Global Resource IDs
Bytes 12-13	X'0803'	Single-Byte Coded LF1 Font Index as IBM Global Resource ID
Bytes 14-15	X'0806'	Single-Byte Coded LF1 Fonts Index as MVS Host Unalterable
Bytes 16-17	X'1003'	Single-Byte/Double-Byte Coded Fonts with IBM Global Resource IDs

Special Data Area	Value	Description
Bytes 18-19	X'1007'	Single-Byte/Double-Byte Coded Fonts with Coded Font Format
Bytes 20-21	X'4009'	Data object resource with Object-OID Format
Bytes 22-23	X'410A'	Data-object Font with Data-object Font Format
Bytes 24-25	X'4209'	Data-object Font Components with Object-OID Format

Activate Resource RT and ID Format Self-Defining Field - Double Byte

Special Data Area	Value	Description
Bytes 0-1	X'0022'	VECTOR LENGTH
Bytes 2-3	X'000B'	RRL RESOURCE TYPE Self **Note** ❒ RRL query combinations that receive a non-zero Resource Type reply (See p.90 "XOA Request Resource List")
Bytes 4-5	X'0103'	Single-Byte Coded LF1 Fonts with IBM Global Resource IDs
Bytes 6-7	X'0106'	Single-Byte Coded LF1 Fonts with MVS Host Unalterable Remote Font Environment
Bytes 8-9	X'0303'	Double-Byte Coded LF1 Font Secs with IBM Global Resource IDs
Bytes 10-11	X'0306'	Double-Byte Coded LF1 Font Secs with MVS Host Unalterable Remote Font Environment
Bytes 12-13	X'0603'	Code Pages with IBM Global Resource IDs
Bytes 14-15	X'0703'	Font Character Sets with IBM Global Resource IDs
Bytes 16-17	X'0803'	Single-Byte Coded LF1 Fonts Index as IBM Global Resource ID
Bytes 18-19	X'0806'	Single-Byte Coded LF1 Font Index as MVS Host Unalterable
Bytes 20-21	X'0903'	Double-Byte Coded LF1 Font Secs Index with IBM Global Resource ID
Bytes 22-23	X'0906'	Double-Byte Coded LF1 Font Secs with MVS Host Unalterable RMTFE
Bytes 24-25	X'1003'	Single-Byte/Double-Byte Coded Fonts with IBM Global Resource IDs
Bytes 26-27	X'1007'	Single-Byte/Double-Byte Coded Fonts with Coded Font Format

Special Data Area	Value	Description
Bytes 28-29	X'4009'	Data object resource with Object-OID Format
Bytes 30-31	X'410A'	Data-object Font with Data-object Font Format
Bytes 32-33	X'4209'	Data-object Font Components with Object-OID Format

Bar Code Type Self-Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'0013'	VECTOR LENGTH
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 Option 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 Bar code Modifier Byte Options X'00' and '01'
Byte 9	X'1C'	Data Matrix 2D Bar Code Modifier Byte Option X'00'
Byte 10	X'1D'	MaxiCode 2D Bar Code Modifier Byte Option X'00'
Byte 11	X'1E'	PDF417 2D Bar Code Modifier Byte Options X'00' and X'01'
Byte 12	X'1F'	Australia Post Bar Code Modifier Byte Options X'01' - X'08'
Byte 13	X'9A'	Rm4scc Modifier byte option X'01'
Byte 14	X'20'	QR Code 2D Bar Code Modifier Byte Option X'02'
Byte 15	X'21'	Code 93 Modifier Byte Option X'00'
Byte 16	X'91'	Code 128 Modifier Byte Option X'03'
Byte 17	X'98'	POSTNET (PLANET) Modifier Byte Option X'04'
Byte 18	X'22'	USPS Four-State Bar Code Modifier Byte Options X'00' through X'03'

Note

❒ See p.197 "Bar Code Type and Modifier Description and Values" for all Bar-Codes supported.

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 6-9		RANGES OF MEDIA DESTINATION IDs
	X'9101'	Finisher Shift Tray
	X'9101'	Internal shift tray
	X'9102'	Finisher Upper Tray
	X'9102'	External tray
	X'9103'	Finisher Booklet Tray
		Internal tray 1*(Machine type: Type 1 or Type 2)
	X'9101'	Internal tray 1
	X'9101'	Internal tray 1 + Internal tray 2(1 bin tray)
	X'9101'	Internal tray 1 + External tray
	X'9101'	Internal tray 1 + External tray + Internal tray 2(1 bin tray)
	X'9102'	Internal tray 1 + Finisher SR3050
	X'9102'	Internal tray 1 + Finisher SR3050 + Internal tray 2(1 bin tray)
	X'9103'	Internal tray 1 + Finisher SR790
	X'9103'	Internal tray 1 + Finisher SR790 + Internal tray 2(1 bin tray)
	X'9104'	Internal tray 1 + Booklet Finisher SR3000
	X'9104'	Internal tray 1 + Booklet Finisher SR3000 + Internal tray 2(1 bin tray)
		Internal tray 1*(Machine type: Type 3 or Type 4)
	X'9101'	Internal tray 1
	X'9101'	Internal tray 1 + Internal tray 2(1 bin tray)
	X'9101'	Internal tray 1 + External tray
	X'9102'	Internal tray 1 + External tray + Internal tray 2(1 bin tray)
	X'9103'	Internal tray 1 + Finisher SR3030
	X'9103'	Internal tray 1 + Finisher SR3030 + Internal tray 2(1 bin tray)
	X'9103'	Internal tray 1 + Finisher SR790

Special Data Area	Value	Description
Bytes 6-9	X'9103'	Internal tray 1 + Finisher SR790 + Internal tray 2(1 bin tray)
	X'9104'	Internal tray 1 + Booklet Finisher SR3020
	X'9104'	Internal tray 1 + Booklet Finisher SR3020 + Internal tray 2(1 bin tray)

* Available values vary depending on the installed option.

Note

❒ To ascertain which machine type your model corresponds to, see "Machine Types", About This Machine or Safety Information.

Supported Group Operations Self-Defining Field 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

Special Data Area	Value	Description
Bytes 0-1	X'0053'	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		DEVICE TYPE
	X'F0F0F3F0F0F1'	Aficio MP C3001 MP C3001 LD630C
	X'F0F0F3F5F0F1'	Aficio MP C3501 MP C3501 LD635C
	X'F0F0F4F5F0F1'	Aficio MP C4501/C4501A MP C4501/MP C4501A LD645C/LD645CA

Special Data Area	Value	Description
Bytes 7-12	X'F0F0F5F5F0F1'	Aficio MP C5501/C5501A MP C5501/MP C5501A LD655C/LD655CA
	X'F0F0F9F1F3F0'	C9130
	X'F0F0F9F1F3F5'	C9135
	X'F0F0F9F1F4F5'	C9145/C9145A
	X'F0F0F9F1F5F5'	C9155/C9155A
Bytes 13-15	X'F0F0F0'	DEVICE MODEL Aficio MP C3001/C3501/C4501/C4501A/C5501/C5501A C9130/C9135/C9145/C9145A/C9155/C9155A MP C3001/C3501/C4501/C4501A/C5501/C5501A LD630C/LD635C/LD645C/LD645CA/LD655C/LD655CA
Bytes 16-18	X'DCC9C8' (RIH)	MANUFACTURER
Bytes 19-20	X'0000'	PLANT
Bytes 21-32	X'F0F0F0F0F0F0F2F9F6F5F3F8' (ie. 296538)	SEQUENCE NUMBER (Serial number) (EBCDIC) (12 bytes)
Bytes 33-34	X'0000'	TAG
Bytes 35-43	X'F0F0F0F0F44BF5F3F0' (4.530)	IPDS CODE LEVEL (EBCDIC) (9 bytes)
Bytes 44-59	X'F0F0F0F0F0F0F0F0F0F0F0F0F14BF2F12' (1.21)	CONTROLLER CODE LEVEL (EBCDIC) (16 bytes)
Byte 60	X'17'	LENGTH of Self Defining Product ID Parameter
Bytes 61-62	X'0003'	PRINTER NAME Parameter ID
Bytes 63-82	X'nnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnnn'	PRINTER NAME

Note

❒ To ascertain which machine type your model corresponds to, see "Machine Types", About This Machine or Safety Information.

Object Container Type Support Self-Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'00A8'	LENGTH of this Self Defining Field
Bytes 2-3	X'0014'	Object Container Type Support Self Defining Field
Byte 4	X'42'	Type Record Length
Byte 5	X'01'	Type - Page or Overlay State
Bytes 6-21	X'06072b1200040101160000 0000000000'	Graphics Interchange Format (GIF)
Bytes 22–37	X'06072b12000401012F0000 0000000000'	IOCA Tile Resource
Bytes 38-53	X'06072b1200040101170000 0000000000'	JPEG File Interchange Format (JFIF)
Bytes 54-69	X'06072b12000401010E000 0 0000000000'	Tag Image File Format (TIFF)
Byte 70	X'62'	Type Record Length
Byte 71	X'02'	Type - Home state
Bytes 72-87	X'06072b1200040101160000 0000000000'	Graphics Interchange Format (GIF)
Bytes 88–103	X'06072b12000401012F0000 0000000000'	IOCA Tile Resource
Bytes 104-119	X'06072b1200040101170000 0000000000'	JPEG File Interchange Format (JFIF)
Bytes 120-135	X'06072b12000401010E000 0 0000000000'	Tag Image File Format (TIFF)
Bytes 136–151	X'06072b1200040101350000 0000000000'	TrueType/OpenType Collection
Bytes 152-167	X'06072b1200040101330000 0000000000'	TrueType/OpenType Font

Finishing Operations Self-Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'0008'	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'12'	Saddle Stitch (In)
Byte 6	X'03'	Edge Stitch
Byte 7	X'0A'	Punch

PFC Triplets Supported Self Defining Field ID

Special Data Area	Value	Description
Bytes 0-1	X'0006'	LENGTH of this Self Defining Field
Bytes 2-3	X'0016'	PFC Triplets Supported Self Defining Field
Byte 4	X'86'	Text Fidelity Triplet
Byte 5	X'88'	Finishing Fidelity Triplet

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 printers are capable of supporting multiple installed input bins, multiple configuration combinations are possible. All input media sources 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.

- Actual tray capacities are determined by media weight. The capacities indicated in the table are the maximum allowable.
- The machine supports media source tray numbering. Media source values in the SIMS support tables represent the default settings when the printer is initially installed. For this machine, the printer's control panel menu mode is provided to allow customers to specify the source tray numbers to meet requirements of legacy applications.

Note

❒ For the tray in which "envelope" has been specified as the paper type, the tray values of the tray ID are (in ascending for each respective tray that is installed) as follows: X'8040', X'8041', etc. If a different paper type is specified for the tray, the tray values of the tray ID are (in ascending for each respective tray that is installed) as follows: X'8000', X'8001', etc. In regards to the bypass tray and default tray, even if you specify "envelope" as the paper type, the tray value will not be changed.

❒ To ascertain which machine type your model corresponds to, see "Machine Types", About This Machine or Safety Information.

Data Area	Value	Description	Error Code
Bytes 0-1	X'1500'	SELECT INPUT MEDIA SOURCE	
Byte 2		INPUT MEDIA SOURCE (Reference Notes Below)	X'02C8..01'
	X'00'	Tray 1	
	X'01'	Tray 2	
		Tray 3* (Machine type: Type 1 or Type 2)	
	X'02'	Tray 1 + Tray 2 + Tray 3 + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray 3 +Tray 4+ Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Tray 3* (Machine type: Type 3 or Type 4)	
	X'02'	Tray 1 +Tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	

Data Area	Value	Description	Error Code
Byte 2	X'02'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Tray 3 (LCT)*	
	X'02'	Tray 1 + Tray 2 + Tray3 (LCT) + By-pass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Tray3 (LCT) + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + LCT + Bypass tray	
		Tray 4*	
	X'03'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'02'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'03'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'02'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'02'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'40'	Small size paper tray 2	
		Small size paper tray 3*(Machine type: Type 1 or Type 2)	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Bypass tray	

Data Area	Value	Description	Error Code
Byte 2	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 +Tray 4 + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Small size paper tray 3*(Machine type: Type 3 or Type 4)	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	

Data Area	Value	Description	Error Code
Byte 2	X'41'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		Small size paper tray 4*	
	X'40'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'41'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + Bypass tray	
	X'42'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + Bypass tray	
	X'40'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'41'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'41'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'42'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
		LCT*	
	X'03'	Tray 1 + Tray 2 + Tray3 (LCT) + LCT + Bypass tray	
	X'02'	Tray 1 + Small size paper tray 2 + Tray3 (LCT) + LCT + Bypass tray	
	X'04'	Tray 1 + Tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'03'	Tray 1 + Small size paper tray 2 + Tray 3 + Tray 4 + LCT + Bypass tray	
	X'03'	Tray 1 + Tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	
	X'03'	Tray 1 + Tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'02'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Tray 4 + LCT + Bypass tray	

Data Area	Value	Description	Error Code
Byte 2	X'02'	Tray 1 + Tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'02'	Tray 1 + Small size paper tray 2 + Tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'01'	Tray 1 + Small size paper tray 2 + Small size paper tray 3 + Small size paper tray 4 + LCT + Bypass tray	
	X'63'	Bypass tray	
	X'FF'	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.

Data Area	Value	Description	Error Code
Bytes 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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'1700'		
Byte 2		UNIT BASE (Measurement Units)	X'0274..02'
	X'00'	10 in.	
	X'01'	10 centimeters	
Bytes 3-4		L-Units per UNIT BASE	X'0270..02'
	X'3840'	14400 L-Units/10 inches	
	X'1626'	5670 L-Units/10 centimeters	
	X'0960'	2400 L-Units/10 inches	
	X'03B1'	945 L-Units/10 centimeters	
Bytes 5-6	X'0001' - X'7FFF'	Xm EXTENT of MEDIUM	X'0272..02'
		See p.25 "Notation Conventions"	
	X'FFFF'	Printer Default (Printer's control panel setting or Tray sensors)	
Bytes 7-8	X'0001' - X'7FFF'	Ym EXTENT of MEDIUM	X'0273..02'
		See p.25 "Notation Conventions"	
	X'FFFF'	Printer Default (Printer's control panel setting or Tray sensors)	

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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'F500'	OPC Order Code	
Byte 2	X'00'	Do Nothing (default)	
	X'01'	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 page counter is the first sheet in the designated group.

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	
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 printer utilizes this information to provide IPDS print job identification on the printer console display.

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'C2E4C4C7C5 E3F0F1' (i.e. BUDGET01)	MVS and VSE ID DATA Job Name (EBCDIC) (8 bytes)	

Data Area	Value	Description	Error Code
Bytes 4-11		VM ID DATA	
	X'C2E4C4C7C5 E3F0F1' (i.e. BUDGET01)	Filename (EBCDIC) (8 bytes)	
Bytes 23-32		OS/400 ID DATA	
	X'C2E4C4C7C5 E3F2F0F0F1'(i.e. BUDGET2000)	Filename (EBCDIC) (10 bytes)	
Bytes 3-End		AIX and NT ID DATA	
	X'444550544255 44474554323030 30' (i.e. DEPTBUDGET2 000)	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.

Data Area	Value	Description	Error Code
Byte 0	X'09'	LENGTH	X'027A..01' X'027B..01'
Byte 1	X'85'	Finishing Triplet ID	
Byte 2		OPERATION TYPE	X'027C..03'
	X'01'	Corner Staple	X'027C..09'
	X'03'	Edge Stitch	
	X'0A'	Punch	
	X'12'	Saddle Stitch In	
Bytes 3-4	X'0000'	Reserved	
Byte 5		REFERENCE CORNER	X'027C..04'
	X'01'	Top-right corner (SEF only)	
	X'02'	Top-left corner	
	X'03'	Bottom-left corner	
	X'FF'	Device default corner (top left corner)	

Data Area	Value	Description	Error Code
Byte 5		REFERENCE EDGE	
	X'02'	Top edge (SEF only)	
	X'03'	Left edge (LEF only)	
	X'FF'	Device default edge (top edge-SEF, left edge-LEF)	
Byte 6		FINISHING OPERATION COUNT	X'027C..05'
	X'00'	Device Default Number, Default Position	X'027C..07'
	X'02'	Punch 2 Holes, Default Position or Edge Stitch 2 Staples, Default Position	
	X'03'	Punch 3 Holes, Default Position	
	X'04'	Punch 4 Holes, Default Position	
Bytes 7-8		FINISHING OPERATION AXIS OFFSET	X'027C..06'
	X'FFFF'	Device Default Axis Offset	

❖ **Paper Finishing (Staple, Punch, and Booklet) Support:**

A = Finisher SR790
B = Booklet Finisher SR3020
C = Finisher SR3030
D = Finisher SR3050
E = Finisher SR3000

S = Staple / P = Punch / B = Booklet / Y=Yes / N=No

	A	B			C		D	E		
	S	S	P	B	S	P	S	S	P	B
A3 (297× 420mm) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
A4 (210× 297mm) SEF	Y	Y	Y *1	Y	Y	Y *1	Y	Y	Y *1	Y
A4 (210× 297mm) LEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N

	A	B			C		D	E		
	S	S	P	B	S	P	S	S	P	B
A5 (210× 148mm) SEF/ LEF	N	N	Y *1	N	N	Y *1	N	N	Y *1	N
A6 (105× 148mm) SEF	N	N	N	N	N	N	N	N	N	N
B4 (257× 364mm) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
B5 (182× 257mm) SEF	Y	Y	Y *1	Y	Y	Y *1	Y	Y	Y *1	Y
B5 (182× 257mm) LEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N
B6 (128× 182mm) SEF	N	N	N	N	N	N	N	N	N	N
DLT (11× 17in.) SEF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Legal (8.5× 14in.) SEF	Y	Y	Y *1	Y	Y	Y *1	Y	Y	Y *1	Y
Fools-cap (8.5× 13in.) SEF	Y	Y	Y *1	N	Y	Y *1	Y	Y	Y *1	N
Letter (8.5× 11in.) SEF	Y	Y	Y *1	Y	Y	Y *1	Y	Y	Y *1	Y

	A	B			C		D	E		
	S	S	P	B	S	P	S	S	P	B
Letter (8.5×11 in.) LEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N
GovernmentLG (8.25×14in.) SEF	Y	Y	Y *1	N	Y	Y *1	Y	Y	Y *1	N
Folio (8.25×13in.) SEF	Y	Y	Y *1	N	Y	Y *1	Y	Y	Y *1	N
F/GL (8×13in.) SEF	Y	Y	Y *1	N	Y	Y *1	Y	Y	Y *1	N
Eng Quatro (8×10in.) SEF	Y	Y	Y *1	N	Y	Y *1	Y	Y	Y *1	N
Executive (7.25×10.5in.) SEF	Y	Y		N	Y		Y	Y		N
Executive (7.25×10.5in.) LEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N
HalfLetter (5.5×8.5 in.) SEF	N	N		N	N		N	N		N
Com10 (4.125×9.5in.) SEF/LEF	N	N	N	N	N	N	N	N	N	N

	A	B			C		D	E		
	S	S	P	B	S	P	S	S	P	B
Monarch (3.875×7.5in.) SEF/LEF	N	N	N	N	N	N	N	N	N	N
C5 (162×229mm) SEF/LEF	N	N	N	N	N	N	N	N	N	N
C6 (114×162mm) SEF/LEF	N	N	N	N	N	N	N	N	N	N
DL Env (110×220mm) SEF/LEF	N	N	N	N	N	N	N	N	N	N
8kai (267×390mm) SEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N
16kai (195×267mm) SEF	Y	Y	Y *1	N	Y	Y *1	Y	Y	Y *1	N
16kai (195×267mm) LEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N
12×18in. SEF	Y	Y	N	Y	Y	N	N	N	N	N
11×15in. SEF	Y	Y	Y	N	Y	Y	Y	Y	Y	N
10×14in. SEF	Y	Y	Y *2	N	Y	Y *2	Y	Y	Y *2	N

*1 Not supported on 3 hole punch (inch version) or 4 hole punch except for Northren Europe type (metric version) finisher.

*2 Not supported on 3 hole punch (inch version) or 4 hole punch except for Northren Europe type (metric version) finisher.

Note

- ❒ The paper finishing functions are not supported on custom size paper.
- ❒ 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.
- ❒ The media jog and staple functions are mutually exclusive. If both are specified the staple request takes precedence.
- ❒ A single sheet cannot be stapled or stitched. If a job specifies only one sheet for stapling or stitching, it will not occur and a X'027C..02' Nack is reported to the host. Web Image Monitor menu parameter is provided to allow provided to allow customers to inhibit the report of this Nack to meet requirements of legacy applications.
- ❒ The capacity of the finishers are determined by the physical finisher installed. If a job specifies more sheets for stapling or stitching than the installed finisher can accommodate, a X'027C..02' Nack is reported to the host. Web Image Monitor parameter is provided to allow customers to inhibit the report of this Nack to meet requirements of legacy applications.
- ❒ Stapled or stitched job groups may contain mixed media sizes in the following combinations only: Letter-SEF, Legal-SEF, Folio-SEF
- ❒ Mixing of simplex and duplex groups in the finisher accumulator is supported. Therefore, it is possible to staple or stitch mixed simplex/duplex groups in a print job.
- ❒ The printer can be equipped with a Punch unit to punch 2, 3 or 4 holes. The printer punch unit can dynamically switch between 2/3 or 2/4 hole punching (depending on what unit is installed) If an unsupported punch count is specified, punching will not occur and a X'027C..05' Nack is reported to the host. Web Image Monitor menu parameter is provided to allow customers to inhibit the report of this Nack to meet requirements of legacy applications.

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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'0300'	Define Group Boundary	
Byte 2	X'00'-X'FF'	Operation Identifier	
	X'01'	Keep group together as a print unit	
	X'04'	Finish	
Byte 3	X'00'-X'FF'	Group Level	

Note

❒ For SGO Identifier (Byte 2), X'01' and X'04' are the only supported operations. All other identifiers are accepted, although no specific processing will occur.

Presentation Text Commands

Name	Command	Sub-command	Where to Look
Load Equivalence	X'D61D'		p.137 "Load Equivalence"
Write Text	X'D62D'		p.138 "Write Text"

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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'0100'	MAPPING TYPE Suppression Mapping	X'02C6..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 p.219 “Load Font Index”)
- Load Font Control (See p.216 “Load Font Control”)
- Font Local ID (See p.66 “Load Font Equivalence”)
- Resident Font Data

When the printer processes a Begin Page, it uses the values from the existing Logical Page Descriptor (See p.69 “Logical Page Descriptor”) or Initialization Default (See p.33 “IPDS Initialization Defaults”) 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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3		ABSOLUTE MOVE BASELINE	
	X'D2'	Unchained	
	X'D3'	Chained	
Bytes 4-5	X'0000' - X'7FFF'	DISPLACEMENT (Bc) See p.25 "Notation Conventions"	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.

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		ABSOLUTE MOVE INLINE	
	X'C6'	Unchained	
	X'C7'	Chained	
Bytes 4-5	X'0000' - X'7FFF'	DISPLACEMENT (Ic) See p.25 "Notation Conventions"	X'0214..01'

Begin Line

Begin Line Control Sequence begins a new line.

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Escape Sequence	
Byte 2	X'02'	LENGTH	X'021E..01'
Byte 3		BEGIN LINE	
	X'D8'	Unchained	
	X'D9'	Chained	

Begin Suppression

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

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		BEGIN SUPPRESSION	
	X'F2'	Unchained	
	X'F3'	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.

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		DRAW B-AXIS RULE	
	X'E6'	Unchained	
	X'E7'	Chained	
Bytes 4-5	X'8000' - X'7FFF'	LENGTH (Bl) See p.25 "Notation Conventions"	
Bytes 6-7		WIDTH (Bw)	
	X'8000' - X'7FFF'	Printer Default 24/1440 inch	
	X'FFFF'		
Byte 8		IGNORED	

Draw I-Axis Rule

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

Table 70. 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 p.25 "Notation Conventions"	
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.

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.

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		NO OPERATION	
	X'F8'	Unchained	
	X'F9'	Chained	
Bytes 4-255		DATA (Ignored)	

Overstrike

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

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		OVERSTRIKE	
	X'72'	Unchained	
	X'73'	Chained	
Byte 4		BYPASS IDENTIFIERS	
	Bits 0-3	Reserved	
	Bit 4: 0	Overstrike white space from RMI	
	Bit 4: 1	Bypass white space from RMI	
	Bit 5: 0	Overstrike white space from AMI	
	Bit 5: 1	Bypass white space from AMI	
	Bit 6: 0	Overstrike white space from Space or Variable Space Character	
	Bit 6: 1	Bypass white space from Space or Variable Space Character	
	Bit 7: 0	BYPASS Treat Bits 0-6 according to their set values	
	Bit 7: 1	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.

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		RELATIVE MOVE BASELINE	
	X'D4'	Unchained	
	X'D5'	Chained	
Bytes 4-5	X'8000' - X'7FFF'	INCREMENT (Br) See p.25 "Notation Conventions"	

Relative Move Inline

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

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3		RELATIVE MOVE INLINE	
	X'C8'	Unchained	
	X'C9'	Chained	
Bytes 4-5	X'8000' - X'7FFF'	INCREMENT (Ir) See p.25 "Notation Conventions"	

Repeat String

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

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		REPEAT STRING	
	X'EE'	Unchained	
	X'EF'	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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3		SET BASELINE INCREMENT	
	X'D0'	Unchained	
	X'D1'	Chained	
Bytes 4-5	X'8000' - X'7FFF'	INCREMENT (Bi)	
		See p.25 "Notation Conventions"	
	X'FFFF'	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.

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

Set Extended Text Color

The Set Extended 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.

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		SET EXTENDED TEXT COLOR	
	X'80'	Unchained	
	X'81'	Chained	
Byte 4	X'00'	RESERVED	
Byte 5		COLOR SPACE	X'020E..02'
	X'01'	RGB - Limited Simulated Color Support	
	X'04'	CMYK - Limited Simulated Color Support	
	X'06'	HCS - Limited Simulated Color Support	
	X'08'	CIELAB - Limited Simulated Color Support	
	X'40'	Standard OCA - Limited Simulated Color Support	
Bytes 6-9	X'00000000'	RESERVED	
Byte 10		1ST COLOR COMPONENT BITS	X'020E..05'
	X'01' - X'08'	(RGB, CMYK, CIELAB)	
	X'10'	(Standard OCA, Highlight)	
Byte 11		2ND COLOR COMPONENT BITS	X'020E..06'
	X'00' - X'08'	(RGB, CMYK, Highlight, CIELAB)	
Byte 12		3RD COLOR COMPONENT BITS	X'020E..07'
	X'00' - X'08'	(RGB, CMYK, CIELAB)	
Byte 13		4TH COLOR COMPONENT BITS	X'020E..08'
	X'00' - X'08'	(CMYK)	

Data Area	Value	Description	Error Code
Bytes 14-17		COLOR VALUE	X'020E..03'
		RGB Color Space	X'020E..04'
	X'nn'	Red Intensity	
	X'nn'	Green Intensity	
	X'nn'	Blue Intensity	
		CMYK Color Space	
	X'nn'	Cyan Intensity	
	X'nn'	Magenta Intensity	
	X'nn'	Yellow Intensity	
	X'nn'	Black Intensity	
		Highlight Color Space	
	X'nnnn'	Highlight Color Number	
	X'nn'	Percent Coverage	
	X'nn'	Percent Shading	
		CIELAB Color Space	
	X'nn'	Luminance (L)	
	X'nn'	Chrominance Difference (a)	
	X'nn'	Chrominance Difference (b)	
		Standard OCA Color Space	
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue	
	X'0002' or X'FF02	Red	
	X'0003' or X'FF03'	Pink	
	X'0004' or X'FF04'	Green	
	X'0005' or X'FF05'	Turquoise	
	X'0006' or X'FF06'	Yellow	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0010'	Brown	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	

Set Inline Margin

Set Inline Margin Control Sequence specifies position of an 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		SET INLINE MARGIN	
	X'C0'	Unchained	
	X'C1'	Chained	
Bytes 4-5	X'0000' - X'7FFF'	DISPLACEMENT (Ia)	X'0210..01'
		See p.25 "Notation Conventions"	
	X'FFFF'	Use LPD value. If no LPD is received, use printer default	

Set Intercharacter Adjustment

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

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		SET INTERCHARACTER ADJUSTMENT	
	X'C2'	Unchained	
	X'C3'	Chained	
Bytes 4-5	X'0000' - X'7FFF'	ADJUSTMENT (ica)	X'0212..01'
		See p.25 "Notation Conventions"	
	X'FFFF'	Use LPD value. If no LPD is received, use printer default	
Byte 6		DIRECTION	X'0212..01'
	X'00'	Increment Direction	
	X'01'	Decrement Direction	
	X'FF'	Same as X'00'	

Set Text Color

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

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		SET TEXT COLOR	
	X'74'	Unchained	
	X'75'	Chained	
Bytes 4-5		COLOR	X'0258..03'
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue - Limited Simulated Color Support	
	X'0002' or X'FF02'	Red - Limited Simulated Color Support	
	X'0003' or X'FF03'	Pink - Limited Simulated Color Support	
	X'0004' or X'FF04'	Green - Limited Simulated Color Support	
	X'0005' or X'FF05'	Turquoise - Limited Simulated Color Support	
	X'0006' or X'FF06'	Yellow - Limited Simulated Color Support	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0010'	Brown - Limited Simulated Color Support	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	
	X'FFFF'	Use LPD color value	
		Note ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.	
Byte 6	X'00' - X'01'	PRECISION	X'0258..03'
	X'FF'	Same as X'00'	

Set Text Orientation

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

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

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

```
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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'2BD3'	TEXT CONTROL Sequence	
Byte 2	X'04'	LENGTH	X'021E..01'
Byte 3		SET VARIABLE SPACE CHARACTER INCREMENT	
	X'C4'	Unchained	
	X'C5'	Chained	
Bytes 4-5	X'0000' - X'7FFF'	INCREMENT (vsi)	X'0217..01'
		See p.25 "Notation Conventions"	
	X'FFFF'	Default Variable Space Increment for Current Font	

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.

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		TEMPORARY MOVE BASELINE	
	X'78'	Unchained	
	X'79'	Chained	
Byte 4		DIRECTION	X'0298..03'
	X'00'	Baseline is Unchanged	
	X'01'	Return to Established Baseline	
	X'02'	Shift Baseline away from I-axis (Subscript)	
	X'03'	Shift Baseline toward I-axis (Superscript)	
	X'FF'	Same as X'00'	

Data Area	Value	Description	Error Code
Byte 5		PRECISION	X'0298..03
	X'00'	Accurate placement and character representation is required using the current font.	
	X'01'	A substitute font with characteristics identical to the current font may be used to simulate baseline shift (superscript/subscript). The printer accepts this value but treats it as X'00'.	
	X'FF'	Same as X'00'	
Bytes 6-7	X'0000' - X'7FFF'	TEMPORARY BASELINE INCREMENT	X'0298..03'
		See p.25 "Notation Conventions"	
	X'FFFF'	Half the current baseline increment	

Transparent Data

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

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		TRANSPARENT DATA	
	X'DA'	Unchained	
	X'DB'	Chained	
Bytes 4-255		CHARACTER STRING	

Underscore

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

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

5. IM Image Command Set

IM Image Commands

Name	Command	Sub-command	Where to Look
Write Image Control	X'D63D'		p.154 "Write Image Control"
Write Image	X'D64D'		p.157 "Write Image"

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 Control commands may be required to a complete raster image.

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001' - X'7FFF'	Pixels 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'	Pixels 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 pixel in the input image format	X'0246..01'
Byte 10		PIXEL MAGNIFICATION FACTOR	X'0247..01'
	X'01'	No Magnification Factor	
	X'02'	Magnification Factor of 2	
Byte 11		SCAN LINE MAGNIFICATION FACTOR	X'0247..01'
	X'01'	No Magnification Factor	
	X'02'	Magnification Factor of 2	
Bytes 12-13		SCAN LINE DIRECTION	X'0248..01'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
Bytes 14-15		SCAN LINE SEQUENCE DIRECTION	X'0249..01'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	

Data Area	Value	Description	Error Code
Byte 16		REFERENCE COORDINATE SYSTEM	X'024A..01'
	X'00'	Absolute I, Absolute B	
	X'20'	Absolute I, Relative B	
	X'40'	Relative I, Absolute B	
	X'60'	Relative I, Relative B	
	X'A0'	Xp, Yp	
Bytes 17-19	X'FF8000' - X'007FFF'	Xp, I or I offset coordinate of the IM image block origin	X'024A..01'
Byte 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		IMAGE COLOR (Named Color)	X'0253..01'
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue - Limited Simulated Color Support	
	X'0002' or X'FF02'	Red - Limited Simulated Color Support	
	X'0003' or X'FF03'	Pink - Limited Simulated Color Support	
	X'0004' or X'FF04'	Green - Limited Simulated Color Support	
	X'0005' or X'FF05'	Turquoise - Limited Simulated Color Support	
	X'0006' or X'FF06'	Yellow - Limited Simulated Color Support	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0009'	Dark Blue - Limited Simulated Color Support	
	X'000A'	Orange - Limited Simulated Color Support	
	X'000B'	Purple - Limited Simulated Color Support	
	X'000C'	Dark Green - Limited Simulated Color Support	
	X'000D'	Dark Turquoise - Limited Simulated Color Support	
	X'000E'	Mustard - Limited Simulated Color Support	

Data Area	Value	Description	Error Code
Bytes 24-25	X'000F'	Gray - Limited Simulated Color Support	
	X'0010'	Brown - Limited Simulated Color Support	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	
		Note ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.	

Write Image

The data is a binary representation of the raster image. In the binary data, a 1-bit represents a colored pixel and a 0-bit represents a pixel left unchanged in the page map. In other words, if a pixel 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.

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

IO Image Commands

Name	Command	Sub-command	Where to Look
Write Image Control 2	X'D63E'		p.160 "Write Image Control 2"
Image Area Position		X'AC6B'	p.160 "Image Area Position"
Image Output Control		X'A66B'	p.161 "Image Output Control"
Image Data Descriptor		X'A6FB'	p.163 "Image Data Descriptor"
Write Image 2	X'D64E'		p.164 "Write Image 2"
Begin Segment		X'70'	p.164 "Begin Segment"
Begin Image Content		X'91'	p.165 "Begin Image Content"
Image Size Parameter		X'94'	p.165 "Image Size Parameter"
Image Encoding Parameter		X'95'	p.166 "Image Encoding Parameter"
Image Data Element Size Parameter		X'96'	p.166 "Image Data Element Size Parameter"
Image Look-up Table ID Parameter		X'97'	p.167 "Image Look-up Table ID Parameter"
Image Data		X'FE92'	p.167 "Image Data"
End Image Content		X'93'	p.167 "End Image Content"
End Segment		X'71'	p.167 "End Segment"

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.

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 p.25 "Notation Conventions"	
Bytes 6-7	X'8000 - X'7FFF'	Image Object Area Origin Yp, B, or B-offset Coordinate Position See p.25 "Notation Conventions"	
Bytes 8-9		ORIENTATION OF IMAGE BLOCK	X'0203..05'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
Byte 10		COORDINATE REFERENCE SYSTEM	X'0204..05'
	X'00'	Absolute I, absolute B	
	X'20'	Absolute I, relative B	
	X'40'	Relative I, absolute B	
	X'60'	Relative I, relative B	
	X'A0'	Page Xp, Yp	

Data Area	Value	Description	Error Code
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.

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		UNIT BASE (Measurement Units)	X'0205..05'
	X'00'	10 Inches	
	X'01'	10 Centimeters	
Bytes 5-6	X'0001'-X'7FFF'	L-units per UNIT BASE	X'0206..05'
Bytes 7-8	X'0001'-X'7FFF'	X extent of IO image block in L-units for Page, Overlay and Page Segment (See p.25 "Notation Conventions")	X'0207..05'
	X'FFFF'	Use Load Page Descriptor Value	
Bytes 9-10	X'0001'-X'7FFF'	Y extent of IO image block in L-units for Page, Overlay and Page (See p.25 "Notation Conventions")	X'0207..05'
	X'FFFF'	Use Load Page Descriptor Value	
Byte 11		MAPPING CONTROL OPTION	X'0208..05'
	X'10'	Scale to fit	
	X'20'	Center and trim	
	X'30'	Position and trim	
	X'41'	Point to pixel	
	X'42'	Point to pixel with double dot	
	X'50'	Replicate and Trim	
Bytes 12-13	X'8000'-X'7FFF'	X OFFSET L-units	X'0209..05'
		See p.25 "Notation Conventions"	
Bytes 14-15	X'8000'-X'7FFF'	Y OFFSET L-units	X'0209..05'
		See p.25 "Notation Conventions"	

Data Area	Value	Description	Error Code
Bytes 16-n		IOC Triplets • Color Specification Triplet. This optional triplet can be placed at the end of the IOC command to specify the foreground color of the object area, before any object data is placed on the object area. Any number of IOC triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.29 "Color Specification" for details. • Presentation Space Reset Mixing Triplet. This optional triplet can be placed at the end of the IOC command to specify whether or not an object area is reset to the color of medium before any object data is placed on the object area. Any number of IOC triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.31 "Presentation Space Reset Mixing" for details.	

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.

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		UNIT BASE (Measurement Units)	X'0205..05'
	X'00'	10 Inches	
	X'01'	10 Centimeters	
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)	X'0207..05'
		See p.25 "Notation Conventions"	
Bytes 13-14	X'0001'-X'7FFF'	Y EXTENT of image presentation space (in image points)	X'0207..05'
		See p.25 "Notation Conventions"	
Bytes 15-end of IDD		IOCA SDFs	
Byte 0	X'F4'	Set Extended Bilevel Image Color SDF	
	X'F6'	Set Bilevel Image Color SDF *1	
Byte 1	X'04'	LENGTH	
Byte 2	X'00'	AREA	
Byte 3	X'00'	Reserved	
Bytes 4-5		Named Color	
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue - Limited Simulated Color Support	
	X'0002' or X'FF02'	Red - Limited Simulated Color Support	
	X'0003' or X'FF03'	Pink - Limited Simulated Color Support	
	X'0004' or X'FF04'	Green - Limited Simulated Color Support	
	X'0005' or X'FF05'	Turquoise - Limited Simulated Color Support	

Data Area	Value	Description	Error Code
Bytes 4-5	X'0006' or X'FF06'	Yellow - Limited Simulated Color Support	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0009'	Dark Blue - Limited Simulated Color Support	
	X'000A'	Orange - Limited Simulated Color Support	
	X'000B'	Purple - Limited Simulated Color Support	
	X'000C'	Dark Green - Limited Simulated Color Support	
	X'000D'	Dark Turquoise - Limited Simulated Color Support	
	X'000E'	Mustard - Limited Simulated Color Support	
	X'000F'	Gray - Limited Simulated Color Support	
	X'0010'	Brown - Limited Simulated Color Support	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	

*1 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

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

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 p.163 "Image Data Descriptor") 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).

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		UNIT BASE (Measurement Units)	
	X'00'	10 Inches	
	X'01'	10 Centimeters	
	X'02'	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

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		COMPRESSION ALGORITHM	X'0595..10'
	X'01'	IBM MMR compression	X'0595..11'
	X'03'	No compression	
	X'06'	RL4 compression	
	X'08'	ABIC (Bilevel Q-Coder)	
	X'80'	G3 MH (CCITT T.4 facsimile 1-D)	
	X'81'	G3 MR (CCITT T.4 G3 facsimile 2-D)	
	X'82'	G4 MMR (CCITT T.6 G4 facsimile 2-D)	
Byte 3		RECORDING ALGORITHM	X'0595..10'
	X'01'	RIDIC (Recording Image Data Inline Code) Unpadded RIDIC	
Byte 4		BIT ORDER within each image data byte	
	X'00'	Left-to-Right	
	X'01'	Right-to-Left	

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		NUMBER of BITS per PIXEL	X'0596..10'
	X'01'	1 bit per pixel	X'0500..04'
	X'08'	8 bits per pixel	X'0596..11'

If 1 is specified, the image is binary, with 1-bit representing black pixels and 0-bit representing pixels 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 pixel images by halftoning. Halftoning significantly degrades image detail. For that reason, resolutions of gray scale data greater than 120 pixels 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

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

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	X'0597..10'

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

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

Graphics Commands

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

Name	Command	Sub-command	Where to Look
Write Graphics Control	X'D684'		Graphics Area Position p.170 "Write Graphics Control"
Graphics Area Position		X'AC6B'	p.170 "Graphics Area Position"
Graphics Output Control		X'A66B'	p.171 "Graphics Output Control"
Graphics Data Descriptor		X'A6BB'	p.173 "Graphics Data Descriptor"
Write Graphics	X'D685'		p.170 "Write Graphics Control"
Begin Segment Introducer		X'70'	p.177 "Begin Segment Introducer"

Write Graphics Control

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 p.25 "Notation Conventions"	
Bytes 6-7	X'8000'-X'7FFF'	GRAPHICS BLOCK ORIGIN Yp, B, or B-offset Coordinate Position. See p.25 "Notation Conventions"	
Bytes 8-9		ORIENTATION of Graphic Block	X'0203..05'
	X'0000'	0 degrees	
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
Byte 10		COORDINATE REFERENCE SYSTEM	X'0204..05'
	X'00'	Absolute I, Absolute B	
	X'20'	Absolute I, Relative B	
	X'40'	Relative I, Absolute B	
	X'60'	Relative I, Relative B	
	X'A0'	Page Xp, Yp	
Bytes 11-n		Ignored	

Graphics Output Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'0010'-X'xxxx'	LENGTH of Graphics Output Control (GOC)	X'0202..05'
Bytes 2-3	X'A66B'	STRUCTURED FIELD ID	X'020B..05'
Byte 4		UNIT BASE (Measurement Units)	X'0205..05'
	X'00'	10 Inches	
	X'01'	10 Centimeters	
Bytes 5-6	X'0001' - X'7FFF'	L-Units per UNIT BASE	X'0206..05'
Bytes 7-8	X'0001' - X'7FFF'	X EXTENT of GRAPHICS BLOCK in L-units See p.25 "Notation Conventions"	X'0207..05'
	X'FFFF'	Use Load Page Descriptor Value	
Bytes 9-10	X'0001' - X'7FFF'	Y EXTENT of GRAPHICS BLOCK in L-units See p.25 "Notation Conventions"	X'0207..05'
	X'FFFF'	Use Load Page Descriptor Value	
Byte 11		MAPPING Control Option	X'0208..05'
	X'10'	Scale to Fit	
	X'20'	Center and Trim	
	X'30'	Position and Trim	
Bytes 12-13	X'8000' - X'7FFF'	X OFFSET L-units. See p.25 "Notation Conventions"	X'0209..05'
Bytes 14-15	X'8000' - X'7FFF'	Y OFFSET L-units. See p.25 "Notation Conventions"	X'0209..05'

Data Area	Value	Description	Error Code
Bytes 16-n		GOC Triplets • Color Specification Triplet. This optional triplet can be placed at the end of the GOC command to specify the foreground color of the object area, before any object data is placed on the object area. Any number of GOC triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.29 “Color Specification” for details. • Presentation Space Reset Mixing Triplet. This optional triplet can be placed at the end of the GOC command to specify whether or not an object area is reset to the color of medium before any object data is placed on the object area. Any number of GOC triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.31 “Presentation Space Reset Mixing” .	

Note

❒ The Graphics Output Control Self Defining Field is optional and may be omitted from the WGC command. If the GOC is omitted, the printer uses 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 p.173 “Graphics Data Descriptor”).

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'
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 p.25 "Notation Conventions"	
Bytes 16-17	X'8000'-X'7FFF'	Xg RIGHT LIMIT of Graphic Presentation Space Window. See p.25 "Notation Conventions"	
Bytes 18-19	X'8000'-X'7FFF'	Yg TOP LIMIT of Graphic Presentation Space Window. See p.25 "Notation Conventions"	
Bytes 20-21	X'8000'-X'7FFF'	Yg BOTTOM LIMIT of Graphic Presentation Space Window. See p.25 "Notation Conventions"	
Bytes 22-27	X'000000000000'	Reserved	
Bytes 28-n		INITIAL GRAPHICS DEFAULTS. See "GDD Initial Graphics Defaults Self Describing Instructions"	

If the image resolution specified in the GDD is X'0000' (indicating that no explicit resolution is specified), then the resolution used is the resolution specified in the OPC's Image and Coded Font Resolution Self-Defining Field.

❖ 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		SET Byte	X'0300..02'
	X'00'	Drawing Attributes	
	X'01'	Line Attributes	
	X'02'	Character Attributes	
	X'03'	Marker Attributes	
	X'04'	Pattern Attributes	
	X'0B'	Arc Parameters	
Bytes 3-4		MASK Bytes. See p.175 "Graphics Drawing Order Defaults and Masks"	X'0300..03'
Byte 5		DEFAULT Byte	X'0300..02'
	X'0F'	Use Standard Default	X'0300..03'
	X'8F'	Use the following Data Bytes	
Bytes 6-n		Data bytes	X'0300..21'

Note

❒ See p.177 "Drawing Orders" for valid drawing order defaults.

❖ Graphics Drawing Order Defaults and Masks

Set Byte	Mask Bit	Description
X'00'		DRAWING ATTRIBUTES
	0	Color (Named Color)
	1	Foreground Mix
	2	Background Mix
	3-15	Reserved
X'01'		LINE ATTRIBUTES
	0	Line Type
	1	Line Width
	2-15	Reserved
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 p.175 “Graphics Drawing Order Defaults and Masks”. The current value of an attribute is taken into account when the drawing order is received.

Description	Value
Color	Black
Line Type	Solid
Line Width	Normal (4 pixel)
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
Background Mix	Leave Alone
Character Precision	Character Precision
Marker Precision	Character Precision
Marker Symbol Set	Resident Set in Printer

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'
Bytes 2-5		SEGMENT ID (Ignored)	
Byte 6	X'00'	Reserved	
Byte 7		FLAGS	X'0370..01'
	Bits 0-2: 00	Reserved	X'0370..82'
	Bit 3: 0/1	No Prolog (0); Prolog (1)	
	Bit 4: 0	Reserved	
	Bits 5-6: 00/11	New Segment (reinitialize graphics defaults)/Append Segment (do not reinitialize defaults)	
	Bit 7: 0	Reserved	
Bytes 8-9	X'0000'-X'FFFF'	Length of this segment (SEGLEN)	
Bytes 10-13	X'00000000'	Reserved	
Bytes 14-n		See p.177 "Drawing Orders"	

Drawing Orders

The machine supports 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:

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

❖ Set Character Angle:

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

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

❖ Set Character Set:

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

❖ Set Color:

Data Area	Value	Description	Error Code
Byte 0	X'0A'	Order code	
Byte 1		COLOR	X'0300..04'
	X'00'	Printer Default (Black)	
	X'01'	Blue - Limited Simulated Color Support	
	X'02'	Red - Limited Simulated Color Support	
	X'03'	Pink - Limited Simulated Color Support	
	X'04'	Green - Limited Simulated Color Support	
	X'05'	Turquoise - Limited Simulated Color Support	
	X'06'	Yellow - Limited Simulated Color Support	
	X'07'	Black	
	X'08'	Color of Medium (Reset)	
		Note ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.	

❖ Set Extended Color:

Data Area	Value	Description	Error Code
Byte 0	X'26'	Order code	
Byte 1	X'02'	Length	X'0300..03'
Bytes 2-3		EXTENDED COLOR	X'0300..04'
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue - Limited Simulated Color Support	
	X'0002' or X'FF02'	Red - Limited Simulated Color Support	
	X'0003' or X'FF03'	Pink - Limited Simulated Color Support	
	X'0004' or X'FF04'	Green - Limited Simulated Color Support	
	X'0005' or X'FF05'	Turquoise - Limited Simulated Color Support	
	X'0006' or X'FF06'	Yellow - Limited Simulated Color Support	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0009'	Dark Blue - Limited Simulated Color Support	
	X'000A'	Orange - Limited Simulated Color Support	
	X'000B'	Purple - Limited Simulated Color Support	
	X'000C'	Dark Green - Limited Simulated Color Support	
	X'000D'	Dark Turquoise - Limited Simulated Color Support	
	X'000E'	Mustard - Limited Simulated Color Support	
	X'000F'	Gray - Limited Simulated Color Support	
	X'0010'	Brown - Limited Simulated Color Support	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	
		Note ❒ See p.26 "Color Simulation" for color simulation details and product support specifics.	

❖ 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):

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 Pixels Wide	
	X'0100' - X'017F'	4 Pixels Wide	
	X'0180' - X'01FF'	6 Pixels Wide	
	X'0200' - X'0F7F'	G8-60 Pixels Wide	
	X'0F80' - X'FFFF'	62 Pixels Wide	

❖ 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'
Bytes 2-3		FRACTIONAL LINE WIDTH	X'0300..04'
	X'0000'	Current default	X'0300..0E'
	X'0001' - X'007F'	1 Pixel Wide	
	X'0080' - X'00BF'	2 Pixels Wide	
	X'00C0' - X'00FF'	3 Pixels Wide	
	X'0100' - X'013F'	4 Pixels Wide	
	X'013F' - X'017F'	5 Pixels Wide	
	X'0180' - X'01BF'	6 Pixels Wide	
	X'01C0' - X'01FF'	7 Pixels Wide	
	X'0200' - X'0F7F'	8-60 Pixels Wide	
	X'0F80' - X'FFFF'	62 Pixels Wide	

❖ Set Line Width:

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

❖ Set Marker Precision:

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

❖ Set Mix:

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

❖ 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:

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

Set Process Color

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

- Character color
- Image color
- Line color
- Marker color
- Pattern 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		COLOR SPACE	X'020E..02'
	X'01'	RGB - Limited Simulated Color Support	
	X'04'	CMYK - Limited Simulated Color Support	
	X'06'	HCS - Limited Simulated Color Support	
	X'08'	CIELAB - Limited Simulated Color Support	
	X'40'	Standard OCA - Limited Simulated Color Support	
Bytes 4-7	X'00000000'	RESERVED	
Byte 8		1ST COLOR COMPONENT BITS	X'020E..05'
	X'01' - X'08'	(RGB, CMYK, CIELAB)	
	X'10'	Standard OCA Color Space	
Byte 9		2ND COLOR COMPONENT BITS	X'020E..05'
	X'00' - X'08'	(RGB, CMYK, Highlight, CIELAB)	
Byte 10		3RD COLOR COMPONENT BITS	X'020E..05'
	X'00' - X'08'	(RGB, CMYK, CIELAB)	
Byte 11		4TH COLOR COMPONENT BITS	X'020E..05'
	X'00' - X'08'	(CMYK)	

Data Area	Value	Description	Error Code
Bytes 12-15		COLOR VALUE	X'020E..03'
		RGB Color Space	X'020E..04'
	X'nn'	Red Intensity	
	X'nn'	Green Intensity	
	X'nn'	Blue Intensity	
		CMYK Color Space	
	X'nn'	Cyan Intensity	
	X'nn'	Magenta Intensity	
	X'nn'	Yellow Intensity	
	X'nn'	Black Intensity	
		Highlight Color Space	
	X'nnnn'	Highlight Color Number	
	X'nn'	Percent Coverage	
	X'nn'	Percent Shading	
		CIELAB Color Space	
	X'nn'	Luminance (L)	
	X'nn'	Chrominance Difference (a)	
	X'nn'	Chrominance Difference (b)	
		Standard OCA Color Space	
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue	
	X'0002' or X'FF02'	Red	
	X'0003' or X'FF03'	Pink	
	X'0004' or X'FF04'	Green	
	X'0005' or X'FF05'	Turquoise	
	X'0006' or X'FF06'	Yellow	
	X'0007'	White - Color of Medium (Reset)	
	X'0008'	Black	
	X'0010'	Brown	
	X'FF07'	Printer Default (Black)	
	X'FF08'	Color of Medium (Reset)	

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 supported drawing orders. Please refer to the AFP GOCA Reference, S544-5498, for complete descriptions of all GOCA 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)
X'22'	Set Arc Parameters

Code	Drawing Order
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

8. Bar Code Command Set

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

Bar Code Commands

Name	Command	Sub-command	Where to Look
Write Bar Code Control	X'D680'		p.190 "Write Bar Code Control"
Bar Code Area Position		X'AC6B'	p.190 "Bar Code Area Position"
Bar Code Output Control		X'A66B'	p.191 "Bar Code Output Control"
Bar Code Data Descriptor		X'A6EB'	p.193 "Bar Code Data Descriptor"
Write Bar Code	X'D681'		p.204 "Write Bar Code"

Write Bar Code Control

Bar Code Area Position

Data Area	Value	Description	Error Code
Bytes 0-1	X'000B'-X'xxxx'	LENGTH of Bar Code Area Position (BCAP)	X'0202..05'
Bytes 2-3	X'AC6B'	STRUCTURED FIELD ID	X'020B..05'
Bytes 4-5	X'8000'-X'7FFF'	Bar Code BLOCK ORIGIN Xp, I, or I-OFFSET coordinate position (in 1440ths)	X'0411..00'
Bytes 6-7	X'8000'-X'7FFF'	Bar Code BLOCK ORIGIN Yp, B, or B-OFFSET coordinate position (in 1440ths)	X'0411..00'
Bytes 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'
Bytes 11-n :c		Ignored	

Bar Code Output Control

Data Area	Value	Description	Error Code
Bytes 0-1	X'0010'-X'xxxx'	LENGTH of Bar Code Output Control (BCOC)	X'0202..05'
Bytes 2-3	X'A66B'	STRUCTURED FIELD ID	X'020B..05'
Byte 4		UNIT BASE (Measurement Units)	X'0205..05'
	X'00'	10 Inches	
	X'01'	10 Centimeters	
Bytes 5-6	X'0001' - X'7FFF'	L-Units per UNIT BASE	X'0206..05'
Bytes 7-8	X'0001' - X'7FFF'	X EXTENT of Bar Code BLOCK in L-units See p.25 "Notation Conventions"	X'0207..05'
	X'FFFF'	Use Load Page Descriptor Value	
Bytes 9-10	X'0001' - X'7FFF'	Y EXTENT of Bar Code BLOCK in L-units See p.25 "Notation Conventions"	X'0207..05'
	X'FFFF'	Use Load Page Descriptor Value	
Byte 11	X'30'	MAPPING CONTROL OPTION (Position)	X'0208..05'
Bytes 12-13	X'8000' - X'7FFF'	X OFFSET L-units See p.25 "Notation Conventions"	X'0209..05'
Bytes 14-15	X'8000' - X'7FFF'	Y OFFSET L-units See p.25 "Notation Conventions"	X'0209..05'

Data Area	Value	Description	Error Code
Bytes 16-n		Triplets • Color Specification Triplet. This optional triplet can be placed at the end of the BCOC command to specify the foreground color of the object area, before any object data is placed on the object area. Any number of BCOC triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.29 “Color Specification” for details. • Presentation Space Reset Mixing Triplet. This optional triplet can be placed at the end of the BCOC command to specify whether or not an object area is reset to the color of medium before any object data is placed on the object area. Any number of BCOC triplets can be received, they are processed in the order received and the resulting color of the object area depends on the last instance of the triplet received. See p.31 “Presentation Space Reset Mixing” for details.	

Bar Code Data Descriptor

Data Area	Value	Description	Error Code
Bytes 0-1	X'001B'-X'xxxx'	LENGTH of Bar Code Data Descriptor (BCDD)	X'0202..05'
Bytes 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	
Bytes 6-7	X'0001' - X'7FFF'	Xbc Units per UNIT BASE	X'0206..05'
Bytes 8-9	X'0001' - X'7FFF'	Ybc Units per UNIT BASE	X'0206..05'
Bytes 10-11	X'0001' - X'7FFF' X'FFFF'	X EXTENT of Bar Code Presentation Space in L-units. See p.25 "Notation Conventions" Use BCOC X EXTENT	X'0207..05'
Bytes 12-13	X'0001' - X'7FFF' X'FFFF'	Y EXTENT of Bar Code Presentation Space in L-units. See p.25 "Notation Conventions" Use BCOC Y EXTENT	X'0207..05'
Bytes 14-15	X'0000'	Reserved	
Byte 16		BAR CODE TYPE See p.197 "Bar Code Type and Modifier Description and Values"	X'0403..00'
Byte 17		BAR CODE MODIFIER See p.197 "Bar Code Type and Modifier Description and Values"	X'040B..00'
Byte 18	X'01' - X'FE' X'FF'	FONT LOCAL ID Default Font Local ID (Note 1)	X'0404..00'

Data Area	Value	Description	Error Code
Bytes 19-20		COLOR (Named Color)	X'0405..00'
	X'0000' or X'FF00'	Printer Default (Black)	
	X'0001' or X'FF01'	Blue - Limited Simulated Color Support	
	X'0002' or X'FF02'	Red - Limited Simulated Color Support	
	X'0003' or X'FF03'	Pink - Limited Simulated Color Support	
	X'0004' or X'FF04'	Green - Limited Simulated Color Support	
	X'0005' or X'FF05'	Turquoise - Limited Simulated Color Support	
	X'0006' or X'FF06'	Yellow - Limited Simulated Color Support	
	X'0007'	White - Color of Medium (Reset) Black	
	X'0008'	Dark Blue - Limited Simulated Color Support	
	X'0009'	Orange - Limited Simulated Color Support	
	X'000A'	Purple - Limited Simulated Color Support	
	X'000B'	Dark Green - Limited Simulated Color Support	
	X'000C'	Dark Turquoise - Limited Simulated Color Support	
	X'000D'	Mustard - Limited Simulated Color Support	
	X'000E'	Gray - Limited Simulated Color Support	
	X'000F'	Brown - Limited Simulated Color Support	
	X'0010'	Printer Default (Black)	
	X'FF07'	Color of Medium (Reset)	
	X'FF08'	Printer Default (Black)	
	X'FFFF'		

Data Area	Value	Description	Error Code
Byte 21		UNIT MODULE WIDTH	X'0406..00'
	X'07' - X'36'	Printer Default	
	X'FF'	Range and Printer Default are specified by Bar Code Type in Byte 16 (especially 2D bar codes)	
Bytes 22-23	X'0001' - X'7FFF'	ELEMENT HEIGHT in L-units See p.25 "Notation Conventions"	X'0407..00'
	X'FFFF'	Printer Default as specified by Bar Code Type in Byte 16	
Byte 24	X'01'-X'FF'	Height multiplier	X'0408..00'
Bytes 25-26		WIDE-TO-NARROW RATIO (WE I NE)	X'0409..00'
	X'0000'	Not Applicable Note 2	
	X'0002'	2: 1	
	X'0003'	3: 1	
	X'0014' to X'001E'	2.0: 1 - 3.0: 1	
	X'00C8' to X'012C'	2.00: 1 - 3.00: 1	
	X'FFFF'	Printer Default as specified by Bar Code Type (Byte 16)	
Bytes 27-end		Ignored	

- 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:

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

- 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
- 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

Bar Code Type (Byte 16)	Bar Code Description	Unit Module Width Default (mils)	Unit Module Width Range (mils)	Element Height Default (mils)	Element Height Range (mils)	Wide-to-Narrow Ratio
X′01′	3 of 9 Code AIM USS-39	14	7-54	234	234-14000	7.3
X′02′	MSI	14	7-54	300	300-14000	
X′03′	UPC/ CGPC Version A	14	7-54	1020	250-14000	
X′05′	UPC/ CGPC Version E	14	7-54	1020	250-14000	
X′06′	UPC 2 Character Supplemental (Periodicals)	14	7-54	1020	250-14000	
X′07′	UPC 5 Character Supplemental (Paperbacks)	14	7-54	1020	250-14000	
X′08′	EAN-8 (JAN Short)	14	7-54	840	250-14000	
X′09′	EAN-13 (JAN Standard)	14	7-54	1020	250-14000	
X′0A′	Industrial 2 of 5	14	7-54	234	234-14000	8:02
X′0B′	Matrix 2 of 5	14	7-54	234	234-14000	4:02
X′0C′	Interleaved 2 of 5 AIM USS-I 2/5	14	7-54	234	234-14000	3:02
X′0D′	Codabar 2 of 7 Code AIM USS-Codabar	14	7-54	234	234-14000	4:02
X′11′	Code 128 AIM USS-128	14	7-54	250	250-14000	

Bar Code Type (Byte 16)	Bar Code Description	Unit Module Width Default (mils)	Unit Module Width Range (mils)	Element Height Default (mils)	Element Height Range (mils)	Wide-to-Narrow Ratio
X'16'	EAN 2 Digit Add-on	14	7-54	1020	250-14000	
X'17'	EAN 5 Digit Add-on	14	7-54	1020	250-14000	
X'18'	POSTNET (Include PLANET)	14	7-54	1000	250-14000	
X'1A'	RM4SCC Royal Mail (Inc. Dutch KIX)	14	7-54	1000	250-14000	
X'1B'	Japan Postal	14	7-54	1000	250-14000	
X'1C'	Data Matrix 2D	21	12-254	21	12-254	
X'1D'	MaxiCode 2D					
X'1E'	PDF417 2D	14	7-254	15% of width or 0.2 in.	4*width - 524287	
X'1F'	Australia Post	14	7-54	1000	250-14000	
X'20'	QR Code 2D	14	7-254	21	12-254	
X'21'	Code 93	14	7-54	234	234-14000	7:03
X'22'	USPS Four- State	14	7-54	1000	250-14000	

❖ 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).

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
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.
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 (Check character appears in HRI).
X'11'	Code 128, AIM USS-128	X'02'	Generate check character and print with bar code.
		X'03'	Generate check character and print with bar code that supports UCC/EAN 128.
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).

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
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'04'	Print PLANET bar code symbology.
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 a 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.
		X'01'	Present a Japan Postal Bar Code symbol directly from the bar code data.
X'1C'	Data Matrix 2D	X'00'	Present a Data Matrix Bar Code symbol.
X'1D'	MaxiCode 2D	X'00'	Present a MaxiCode Bar Code symbol.

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
X'1E'	PDF417 2D	X'00'	Present a "full" PDF417 Bar Code symbol.
		X'01'	Present a "truncated" PDF417 Bar Code symbol.
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 code.
		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 code.
		X'08'	Reply Paid Bar Code (Format Code 45) - An 8 digit number representing the Sorting Code.

Byte 16 Value	Bar Code Type	Byte 17 Value	Description
X'20'	QR Code 2D	X'02'	Present a model 2 QR Code bar code symbol.
X'21'	Code 93	X'02'	Present a Code 93 bar code symbol.
X'22'	USPS Four State		USPS Specification
		X'00'	Present a USPS Four-State bar code symbol with no Routing ZIP Code. The input data for this bar code symbol must be 20 numeric digits.
		X'01'	Present a USPS Four-State bar code symbol with a 5-digit Routing ZIP Code. The input data for this bar code symbol must be 25 numeric digits. The valid values for the Routing Zip Code are 00000-99999.
		X'02'	Present a USPS Four-State bar code symbol with a 9-digit Routing ZIP Code. The input data for this bar code symbol must be 29 numeric digits. The valid values for the Routing Zip Code are 000000000-999999999.
		X'03'	Present a USPS Four-State bar code symbol with an 11 digit Routing ZIP Code. The input data for this bar code symbol must be 31 numeric digits. The valid values for the Routing Zip Code are 00000000000-99999999999.

Write Bar Code

Data Area	Value	Description	Error Code
Byte 0		FLAGS	
	Bit 0 0 1	HRI PRINTING (Not supported for postal bar code types) Print HRI No HRI	X'0410..00'
	Bits 1-2 00 01 10	HRI LOCATION Printer Default (Below symbol) Below symbol (Except UPC/EAN with 2 or 5 digit add-on) Above symbol (UPC/EAN with 2 or 5 digit add-on only)	
	Bit 3 0 1	START/STOP HRI for 3 of 9 Code (Asterisk) Do not print HRI for 3 of 9 Start/Stop pattern Print HRI for 3 of 9 Start/Stop pattern	
	Bit 4	CODE PAGE TYPE (Ignore)	
	Bit 5 0 1	BAR CODE SUPPRESSION Present the bar code symbol Suppress presentation of the bar code symbol	
	Bit 6		
	Bit 7		
Bytes 1-2	X'0001' - X'7FFF'	X COORDINATE of the symbol ORIGIN See p.25 "Notation Conventions"	X'040A..00'
Bytes 3-4	X'0001' - X'7FFF'	Y COORDINATE of the symbol ORIGIN See p.25 "Notation Conventions"	X'040A..00'
Bytes 5-End		DATA to be bar encoded	X'040C..00'

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

Note

❒ The machine does not support Secure Overlay (value X'01' in byte 2 of Include Overlay is not supported).

❒ See p.25 "Notation Conventions" regarding the notation convention for Include Overlay bytes 3-5 and 7-9.

10. Page Segment Command Set

Page Segment Function 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

11. Object Container Command Set

Object Container Function Set Commands

Name	Command	Sub-command	Where to Look
Write Object Container Control	X'D63C'		Intelligent Printer Data Stream Reference
Write Object Container	X'D64C'		Intelligent Printer Data Stream Reference
Deactivate Data-Object-Font	X'D65B'		Intelligent Printer Data Stream Reference
Deactivate Data-Object-Resource	X'D65C'		Intelligent Printer Data Stream Reference
Data-Object-Resource Equivalence	X'D66C'		Intelligent Printer Data Stream Reference
Include Data-Object	X'D67C'		Intelligent Printer Data Stream Reference

Note

❒ For specific details on the Object Container Command Set, see the Intelligent Printer Data Stream Reference, S544-3417.

12. Loaded Font Command Set

Loaded Font Function Set Commands

Name	Command	Sub-command	Where to Look
Load Code Page	X'D61B'		p.211 "Load Code Page"
Load Code Page Control	X'D61A'		p.212 "Load Code Page Control"
Load Font	X'D62F'		p.213 "Load Font"
Load Font Character Set Control	X'D619'		p.215 "Load Font Character Set Control"
Load Font Control	X'D61F'		p.216 "Load Font Control"
Load Font Index	X'D60F'		p.219 "Load Font Index"

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 LCP commands on any byte boundary and are restricted in size by the standard IPDS 32767 byte command length limit.

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 Defined/Undefined 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.

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		ENCODING SCHEME	X'02B0..02'
	Bits 0-3: 0000	Reserved	
		Number of Bytes	
	Bits 4-7: 0001	Fixed Single-byte	
	Bits 4-7: 0010	Fixed Double-byte	
	Bits 8-15: 00000000	Reserved	
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		VARIABLE SPACE CODE POINT	
	X'nn'	SBCS	
	X'nnnn'	DBCS	
Bytes n+1 to n+2		GCSGID	
	X'0000'	No Value Supplied	
	X'0001' - X'FFFE'	Specific GCSGID	
	X'FFFF'	Use Default	
Bytes n+3 to n+4		CPGID	
	X'0001' - X'FFFE'	Specific CPGID	
Bytes n+5 to n+12	X'nnnnnnnnnnnnnnnn'	GCGID Default GCGID	
Bytes n+13		GCGID PROCESSING FLAGS	
	Bit 0: 0	Defined	
	Bit 0: 1	Undefined	
	Bit 1: 0	Printing	
	Bit 1: 1	Nonprinting	
	Bit 2: 0	Incrementing	
	Bit 2: 1	Nonincrementing	

Data Area	Value	Description	Error Code
Bytes n+13	Bit 3: 0 Bit 4: 0 Bit 4: 1 Bit 5 - 7: 0000	Reserved Retired Retired Reserved	

Note

- ❒ 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.
- ❒ 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.

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.

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❖ Character ID Map

Data Area	Value	Description	Error Code
Byte 0	X′02′	IBM CHARACTER ID FORMAT (IBM Registered EBCDIC GCGID)	
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) ASCII numeric Glyph ID (used with Adobe Composite fonts)	
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)	
Zero or more Adobe Type-1 Character ID entries in the following			
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 is a form of Adobe Type-1 PFB file. Each PFB object contains the following information.

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.

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	
Byte 5	X'00'	Adobe PFB Object NAME	
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 (If MICR Installed) 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	X'nnnn'	NUMBER of GCGIDs in the CHARACTER ID MAP	
Bytes 17-18	 X'0000' X'0001' - X'FFFE' X'FFFF'	GCSGID No Value Supplied Specific GCSGID Use Default	
Bytes 19-20	 X'0001' - X'FFFE'	FGID Specific FGID	

Load Font Control

This command is 40 + (8 × 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.

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		SECTION ID	X'0243..02'
	X'00'	Single-byte fonts	
	X'41'-X'FE'	Double-byte font sections	
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		FONT TYPE BITS	X'0223..02'
	Bits 0-1: 00	Reserved	
	Bits 2-3: 01/10	FONT TYPE: Single-byte/Double-byte	
	Bits 4-5: 00	Reserved	
	Bit 6: 1/0	CHARACTER BOX SIZE: Uniform size (see bytes 6-7)/Individual size (see bytes 40-End)	
	Bit 7: 0	Reserved	
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		UNIT BASE for L-units	X'021B..02'
	X'00'	Ten in. (fixed metric technology)	
	X'02'	Relative units (relative metric technology)	
Byte 11	X'00'	Reserved	
Bytes 12-13		L-units per UNIT BASE in the X direction	X'022A..02'
		Byte 10 = X'02'	
	X'03E8'	1000	
		Byte 10 = X'00'	
	X'0960'	2400 (240 DPI)	
	X'0BB8'	3000 (300 DPI)	
	X'1770'	6000 (600 DPI)	

Data Area	Value	Description	Error Code
Bytes 14-15		L-units per UNIT BASE in the Y direction	X'022B..02'
		Byte 10 = X'02'	
	X'03E8'	1000	
		Byte 10 = X'00'	
	X'0960'	2400 (240 DPI)	
	X'0BB8'	3000 (300 DPI)	
	X'1770'	6000 (600 DPI)	
Bytes 16-17	X'0000'	Reserved	
Bytes 18-20	X'000001' - X'7FFFFF'	FONT BYTE COUNT	X'021C..02'
Byte 21		CHARACTER DATA ALIGNMENT	X'022D..02'
	X'01'	Starting address 1 byte aligned	
	X'04'	Starting address 4 byte aligned	
	X'08'	Starting address 8 byte aligned	
Bytes 22-23	X'nnnn'	GCSGID (ignored)	
Bytes 24-25	X'nnnn'	CPGID (ignored)	
Byte 26		UNIT BASE for PIXEL-Units	X'0287..02'
	X'00'	Ten in.	
Byte 27	X'00'	Reserved	
Bytes 28-29		PIXEL-Units per UNIT BASE in the X direction (only applicable if byte 10 = x'02')	X'0288..02'
	X'0960'	2400 Units per 10 in. (240 dpi)	
	X'0BB8'	3000 Units per 10 in. (300 dpi)	
	X'1770'	6000 Units per 10 in. (600 dpi)	
Bytes 30-31		PIXEL-Units per UNIT BASE in the Y direction (only applicable if byte 10 = x'02')	X'0289..02'
	X'0960'	2400 Units per 10 in. (240 dpi)	
	X'0BB8'	3000 Units per 10 in. (300 dpi)	
	X'1770'	6000 Units per 10 in. (600 dpi)	
Bytes 32-33	X'0001' - X'7FFF'	RELATIVE METRIC MULTIPLYING FACTOR	X'028A..02'
Bytes 34-35	X'nnnn'	FGID (ignored)	
Byte 36		STAGEABILITY	X'0220..02'
	X'01'	Font is not stageable (retired)	

Data Area	Value	Description	Error Code
Byte 37	Bit 0: 0/1 Bits 1-7: 0000000	INTENDED USE FLAGS: Not intended for MICR printing/Intended for MICR printing (If MICR Installed) 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	X'0000' - X'7FFF'	CHARACTER BOX X SIZE	X'0226..02'
+ 2-3 bytes	X'0000' - X'7FFF'	CHARACTER BOX Y SIZE	X'0227..02'
+ 4-7 bytes	X'00000000' - X'007FFFFE'	CHARACTER PATTERN ADDRESS	X'023E..02'

Load Font Index

This command is 32 + (256 × 16) (the (256 × 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.

Data Area	Value	Description	Error Code
Bytes 0-1	X'0001'-X'7EFF'	FONT HOST ASSIGNED ID (HAID)	X'0218..02'
Byte 2		SECTION ID	X'0243..02'
	X'00'	Single byte	
	X'41'-X'FE'	Double-byte section	
Byte 3		FLAGS	
	Bit 0: 0/1	VARIABLE SPACE: Disabled/Enabled	
	Bits 1-7: 0000000	Reserved	
Bytes 4-5		FONT INLINE SEQUENCE	X'0240..02'
	X'0000'	0 degrees	X'0246..02'
	X'2D00'	90 degrees	
	X'5A00'	180 degrees	
	X'8700'	270 degrees	
Bytes 6-7	X'0000'	Reserved	
Bytes 8-9	X'8000' - X'7FFF'	UNIFORM or MAXIMUM BASELINE OFFSET	X'023C..02'
Bytes 10-11	X'8000' - X'7FFF'	UNIFORM or MAXIMUM CHARACTER INCREMENT	X'023C..02'
Bytes 12-13	X'0000'	Reserved	
Bytes 14-15	X'0000' - X'7FFF'	MAXIMUM BASELINE EXTENT	
Byte 16		ORIENTATION FLAGS	
	Bits 0-4: 00000	Reserved	
	Bit 5: 1/0	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	
	Bit 6: 1/0	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)	

Data Area	Value	Description	Error Code
Byte 16	Bit 7: 1/0	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'		
Bytes 22-23	X'8000' - X'7FFF'		
Bytes 24-25		RECOMMENDED UNDERSCORE WIDTH	X'023C..02'
	X'0000'	No recommendation	
	X'0001' - X'7FFF'	Underscore width in L-units	
Bytes 26-27	X'8000' - X'7FFF'	RECOMMENDED UNDERSCORE POSITION (L-units)	
Bytes 28-31	X'00000000'	Reserved	
Bytes 32-4127			
+ 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'023C..02'
	X'E000'	Undefined, non-printing, non-incrementing	X'023C..02'
+ 2-3 bytes	X'0000' - X'xxxx'	PATTERN INDEX	
+ 4-5 bytes	X'8000' - X'7FFF'	CHARACTER INCREMENT	
+ 6-7 bytes	X'8000' - X'7FFF'	A-SPACE	X'023C..02'
+ 8-13 bytes	X'000000000000'	Reserved	
+ 14-15 bytes	X'8000' - X'7FFF'	BASELINE OFFSET	

13. Exception Reporting, Sense Data, and Recovery

About 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 p.37 “Device Control Command Set”.

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 p.228 “Exception Classes” 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 p.225 “Action Codes in Sense Byte 2”.
3	Reserved

Byte(s)	Description
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. **Reference** For more information about formats, see p.226 "Formats 0, 1, and 2 for Sense Bytes 4-18 and 20-23".
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.

Action Code (in hex)	Exception-Recovery Action
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.
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 occurrences 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	Format Identifier, X'02'

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 of 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 machine supports 24 Byte Sense data (See p.76 "Sense Type and Model").
- The machine supports 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

Exception ID	Description	Action Code
X'4000..00'	Printer not ready	3
X'4001..00'	Out of paper	3
X'4002..00'	Output bin full	3
X'4004..00'	Out of toner	3
X'4031..00'	Paper Length Check	3
X'4033..00'	Paper Width Check	3
X'407C..00'	Out of Staples	3
X'407C..01'	Staple jam	3
X'407C..03'	Punch waste bin full	3
X'40E6..00'	Cover open	3

IPDS Exceptions Reported

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

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

Intervention Required 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
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

Exception ID	Description	Action Code
X'40E6..00'	Cover open	03
X'40E8..nn'	Supported but not installed media source ID	1A

Equipment Check Exceptions

Exception	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

Exception ID	Description	Action Code
X'0821..00'	Undefined character	01
X'0860..00'	Numeric representation precision check	01
X'08C1..00'	Numeric representation precision check	01

IO-Image Specification 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 Size Parameter missing or out of sequence	01
X'0594..11'	IO Image Size cannot be determined	01
X'0595..0F'	IO Image Encoding Parameter out of sequence	01
X'0595..10'	IO Image Encoding Parameter unsupported value	01
X'0595..11'	IO Image Decompression error	01
X'0596..0F'	IO Image Data Element Size Parameter out of sequence	01
X'0596..10'	IO Image Data Element Size Parameter unsupported value	01
X'0596..11'	IO Image Data Element Size Parameter and Image Encoding Parameter inconsistent	01
X'0597..0F'	IO Image Look Up Table ID Parameter out of sequence	01
X'0597..10'	IO 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

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'040F..00'	Unsupported 2D bar code size	01
X'040F..01'	Invalid structured append sequence indicator	01
X'040F..02'	Structured append sequence indicator too large	01
X'040F..03'	Mismatched structured append information	01
X'040F..04'	Invalid number of structured append symbols	01
X'040F..05'	Invalid symbol mode value	01
X'040F..06'	Invalid data symbol characters per row value	01
X'040F..07'	Invalid desired number of row values	01
X'040F..08'	Too much data for a PDF417 bar code	01
X'040F..09'	Invalid security level value	01
X'040F..0A'	Incompatible combination of Data Matrix parameters	01
X'040F..0B'	Invalid structured append file identification value	01
X'040F..0C'	Invalid Macro PDF417 Control Block length value	01
X'040F..0D'	Invalid Macro PDF417 Control Block data	01
X'040F..0E'	Invalid QR Code EBCDIC Code Page value	01
X'040F..0F'	Invalid QR Code Version value	01
X'040F..10'	Invalid QR Code Error Correction-level value	01
X'040F..11'	Incompatible combination of QR Code Special-function flags	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

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
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

Exception ID	Description	Action Code
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

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
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

Exception ID	Description	Action Code
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

Exception ID	Description	Action Code
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
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

Exception ID	Description	Action Code
X'0242..01'	WIC pixel count is less than the minimum required	01
X'0243..01'	WIC command pixel 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'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'0254..41'	Invalid Finishing Fidelity Triplet Length	01
X'0254..42'	Invalid Finishing Fidelity Triplet Continue value	01
X'0254..43'	Invalid Finishing Fidelity Triplet Report value	01
X'0254..51'	Invalid Text Fidelity Triplet Length	01
X'0254..52'	Invalid Text Fidelity Triplet Continue value	01
X'0254..53'	Invalid Text Fidelity Triplet Report value	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

Exception ID	Description	Action Code
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 co-ordinate	01
X'026B..01'	Excess source image data received	01
X'026B..02'	Invalid or unsupported LPD initial B print co-ordinate	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
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

Exception ID	Description	Action Code
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 Pixel-units	01
X'0288..02'	Invalid or unsupported Load Font Control Pixel-units per unit base in the X-direction	01
X'0289..02'	Invalid or unsupported Load Font Control Pixel-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
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

Exception ID	Description	Action Code
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
X'02B2..01'	Parent character set not activated	01
X'02B2..02'	Font character set extension not valid with pattern technology	01

Exception ID	Description	Action Code
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

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
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:

- After power is switched on, all counter values equal X'0000'.
- When a counter containing X'FFFF' increments, the counter wraps to X'0000'.
- The counters are updated as shown in the following table as each condition is detected.
- 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
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 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 No change No change No change No change No change No change No change No change

Condition (in hex)	Counters	Counter Adjustments
Action Code 1E	Received Page Counter	Set to Committed Page Counter
	Committed Page Counter	No change
	Committed Copy Counter	No change
	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
All other action codes	Received Page Counter	No change
	Committed Page Counter	No change
	Committed Copy Counter	No change
	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
Command XOA - Discard Buffered Data	Received Page Counter	Set to Committed Page Counter
	Committed Page Counter	No change
	Committed Copy Counter	No change
	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
Normal Counter Wrap (on a Per-Counter Basis)	Received Page Counter	Reset to 0
	Committed Page Counter	Reset to 0
	Committed Copy Counter	Reset to 0
	Operator Viewing Page Counter	Reset to 0
	Operator Viewing Copy Counter	Reset to 0
	Jam Recovery Page Counter	Reset to 0
	Jam Recovery Copy Counter	Reset to 0
	Stacked Page Counter	Reset to 0
	Stacked Copy Counter	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	For details about XOH PCC command, see p.37 "Device Control Command Set".

Note

❒ Should not be incremented for page in error (that is, any partial page is discarded).

❒ The Received Page Counter should be incremented if a partial or complete page is printed.

❒ 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

Condition (in hex)	Counters	Counter Adjustments
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

Condition (in hex)	Counters	Counter Adjustments
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

14. Code Page and Font Identification

About Code Page and Font Identification

The machine supports 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 Any state command p.90 "XOA Request Resource List" with the appropriate Resource Type and RIDF.

They can also be determined by using the information under p.262 "Resident IPDS Fonts" with the criteria described in the following sections:

Note

- The machine supports Download and Capture of Font Resources. There is Date/Time stamp information to help identify versions of font resources. p.262 "Resident IPDS Fonts" includes the Date/Time stamps for the resident fonts.
- The machine will report DBCS raster font (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.

RRL RT'06' Code Page (CPGID)

Values are listed in p.271 "IBM Core Interchange Resident Code Page Set", p.279 "4028 Compatibility Resident Code Page Set", and p.282 "IBM Coordinated Font Set Code Page Set", and will be reported via XOA-RRL RT 06 RIDF 03.

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

Valid combinations are listed in p.271 "IBM Core Interchange Resident Code Page Set", p.279 "4028 Compatibility Resident Code Page Set", and p.282 "IBM Coordinated Font Set Code Page Set", 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 p.282 "GCSGID Subsets for the Strategic Font Set 2" and will be reported via XOA-RRL RT 11 RIDF 03.

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

- Valid combinations for the IBM Core Interchange Set are listed in p.264 "IBM Core Interchange Resident Scalable Font Set", 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.
  - p.270 "GCSGID Subsets for IBM Core Interchange Fonts" shows the subset GCSGIDs for each of the listed superset GCSGIDs in p.264 "IBM Core Interchange Resident Scalable Font Set". 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.
- Valid combinations for the IBM Coordinated Set are listed in p.280 "Resident PSC Strategic Scalable Font Set 2" 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.
  - p.282 "GCSGID Subsets for the Strategic Font Set 2" shows the subset GCSGIDs for each of the listed superset GCSGIDs in p.280 "Resident PSC Strategic Scalable Font Set 2". 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.
- Valid combinations for the 4028 Compatibility Set require p.277 "4028 Compatibility Resident Font Set" (FGID/FW) and p.279 "4028 Compatibility Resident Code Page Set" (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).
    The GCSGIDs are obtained by finding the Code Page(s) in p.279 "4028 Compatibility Resident Code Page Set" that matches the Code Page(s) listed for a given FGID/FW entry in p.277 "4028 Compatibility Resident Font Set". The GCSGID for each of the Code Pages listed with an FGID is a valid combination entry.
    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.

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

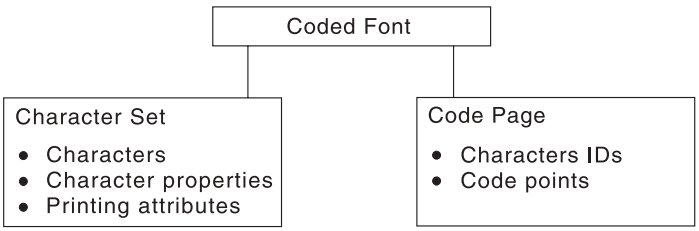
- Valid combinations for the IBM Core Interchange Set require p.264 "IBM Core Interchange Resident Scalable Font Set" (superset GCSGID/FGID/FW), p.270 "GCSGID Subsets for IBM Core Interchange Fonts" (GCSGID subsets) and p.271 "IBM Core Interchange Resident Code Page Set" (GCSGID/CPGID), and will be reported 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 p.271 "IBM Core Interchange Resident Code Page Set". For each pair, determine which FGIDs in p.264 "IBM Core Interchange Resident Scalable Font Set" can combine with them. This is done by finding the superset GCSGID in p.270 "GCSGID Subsets for IBM Core Interchange Fonts" which contains the p.271 "IBM Core Interchange Resident Code Page Set" 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 p.271 "IBM Core Interchange Resident Code Page Set" which are subsets of the superset GCSGID 1269.
- Valid combinations for the IBM Coordinated Set require p.280 "Resident PSC Strategic Scalable Font Set 2" (superset GCSGID/FGID/FW), p.282 "GCSGID Subsets for the Strategic Font Set 2" (GCSGID subsets) and p.271 "IBM Core Interchange Resident Code Page Set" and p.282 "IBM Coordinated Font Set Code Page Set" (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 p.271 "IBM Core Interchange Resident Code Page Set" and p.282 "IBM Coordinated Font Set Code Page Set". For each pair, determine which FGIDs in p.280 "Resident PSC Strategic Scalable Font Set 2" can combine with them. This is done by finding the superset GCSGID in p.282 "GCSGID Subsets for the Strategic Font Set 2" which contains the p.271 "IBM Core Interchange Resident Code Page Set" 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 p.271 "IBM Core Interchange Resident Code Page Set" and p.282 "IBM Coordinated Font Set Code Page Set". which are subsets of the superset GCSGID 2039.

- Valid combinations for the 4028 Compatibility Set require p.277 “4028 Compatibility Resident Font Set” (FGID/FW) and p.279 “4028 Compatibility Resident Code Page Set” (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 p.279 “4028 Compatibility Resident Code Page Set” that match the Code Page(s) listed for a given FGID/FW pair in p.277 “4028 Compatibility Resident Font Set”.

IBM Font Structure

In IBM AFP terminology, a font has three components. They are:

- Coded font
- Character set
- Code page



Note

❒ These terms have different meanings in Operating System/400 (OS/400). See p.259 “Operating System/400 Terms” 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:

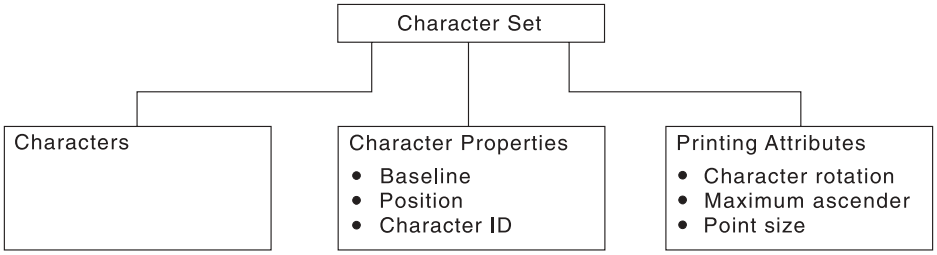
- References to specific character sets
- References to specific code pages

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.



❖ 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.

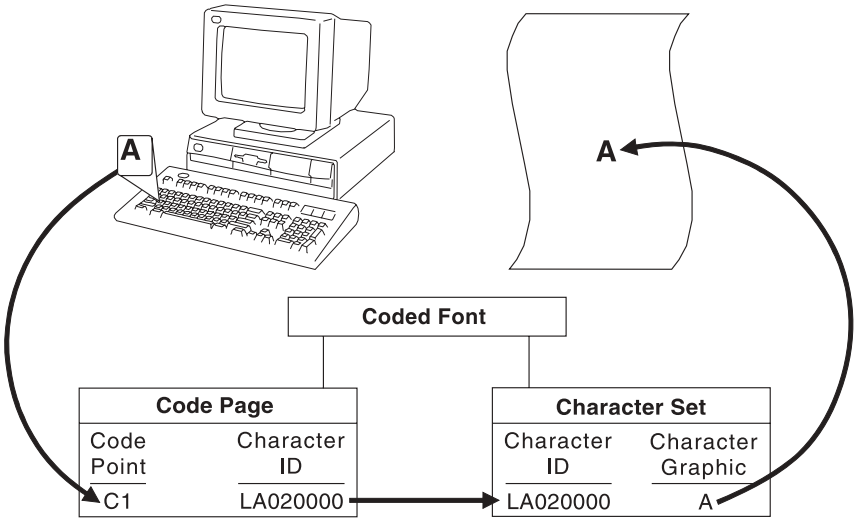
Code Page

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.

Character IDs and Code Points

In IBM font structure, a code page maps each character of text to the characters in a character set. The following figure 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 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" have the same character ID (LA020000). Character IDs also are called graphic character identifiers (GCIDs).

Binary: 11000001

Decimal: 193

Hexadecimal: C1

The following figure 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	- SP130000	ø LO610000	Ø LO620000	° SM190000	µ SM1A0000	^ SD150000	{ SM1B0000	} SM1C0000	\ SM1D0000	0 ND100000
-1	SP300000	é LE110000	/ SP230000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC050000	A LA020000	J LJ020000	÷ SA060000	1 ND110000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC060000	B LB020000	K LK020000	S LS020000	2 ND120000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND130000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	ø SM230000	D LD020000	M LM020000	U LU020000	4 ND140000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND150000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND160000
-7	å LA290000	ï LI170000	Å LA300000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040400	G LG020000	P LP020000	X LX020000	7 ND170000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF050400	H LH020000	Q LQ020000	Y LY020000	8 ND180000

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 i (lowercase e accent acute, character ID LE110000) has the following code point assignment 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 158 lists the IBM AFP font terminology and describes how it is used with the OS/400 printing interfaces.

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)

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.

❖ **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 p.259 "Font Terms" 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.

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.

Note

❒ When using an application that does not allow selection of font width, use the alternate FGID when available to access typographic fonts.

Resident IPDS Fonts

Printer will support outline fonts from both the IBM Core Interchange Font Set and the IBM Coordinated Font Set as resident fonts. In addition, selections 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
```


Resident Font Activation Methods

Fonts resident within the Printer 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 Printer has 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 Printer.

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'

Resource Type	RT Hex	Resource ID Format	RIDF Hex
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'

IBM Core Interchange Resident Scalable Font Set (IPDS only)

The IBM Core Interchange fonts as shown in Table 159 will be supported as resident fonts in the following language groups:

- Latin 1/2/3/4/5
- Symbols
- Arabic
- Cyrillic Greek
- Hebrew
- Thai
- Lao
- Katakana

p.264 "IBM Core Interchange Resident Scalable Font Set" lists the typefaces resident in the Printer and includes the valid FGID and code pages for each font. The Date Stamp on the character sets with GCSGIDs of 1269, 1275, 1300, 1264, and 1265 is 94350, and the Time Stamp used is 00:00:00.00. The Date Stamp on the character sets with a GCSGID of 1355 is 98152 and the Time Stamp used is 00:00:00.00. The Date Stamp used on the remaining character sets is 02185, and the Time Stamp used is 00:00:01.00.

p.270 "GCSGID Subsets" 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 159 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 p.251 "Code Page and Font Identification".

❖ IBM Core Interchange Resident Scalable Font Set

Typeface	FGID	GCSGID	Font Width	Code Pages
Latin 1/2/3/4/5 with Euro and Vietnamese				
Times New Roman Medium	2308	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Times New Roman Bold	2309	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Times New Roman Italic Medium	2310	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Times New Roman Italic Bold	2311	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Helvetica Roman Medium	2304	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Helvetica Roman Bold	2305	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Helvetica Italic Medium	2306	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Helvetica Italic Bold	2307	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Courier Roman Medium	416	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Courier Roman Bold	420	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Courier Italic Medium	424	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Courier Italic Bold	428	1503	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Symbols with Euro				
Times New Roman Medium	2308	1191	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Times New Roman Bold	2309	1191	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".

Typeface	FGID	GCSGID	Font Width	Code Pages
Helvetica Roman Medium	2304	1191	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Helvetica Roman Bold	2305	1191	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Roman Medium	416	1191	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Roman Bold	420	1191	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
APL2				
APL2	307	1364	Scalable	293, 310, 910
APL2 Bold	322	1364	Scalable	293, 310, 910
Cyrillic Greek with Euro				
Times New Roman Medium	2308	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Times New Roman Bold	2309	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Times New Roman Italic Medium	2310	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Times New Roman Italic Bold	2311	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Helvetica Roman Medium	2304	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Helvetica Roman Bold	2305	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Helvetica Italic Medium	2306	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Helvetica Italic Bold	2307	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Roman Medium	416	1504	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.

Typeface	FGID	GCSGID	Font Width	Code Pages
Courier Roman Bold	420	1504	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Courier Italic Medium	424	1504	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Courier Italic Bold	428	1504	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Arabic with Euro				
ITC Boutros Setting Medium	2308	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Setting Bold	2309	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Setting Italic Medium	2310	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Setting Italic Bold	2311	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Modern Rokaa Medium	2304	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Modern Rokaa Bold	2305	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Modern Rokaa Italic Medium	2306	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
ITC Boutros Modern Rokaa Italic Bold	2307	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Boutros Typing Medium	416	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Boutros Typing Bold	420	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Boutros Typing Italic Medium	424	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Boutros Typing Italic Bold	428	1506	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".

Typeface	FGID	GCSGID	Font Width	Code Pages
Hebrew with Euro				
Narkissim Medium	2308	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkissim Bold	2309	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkissim Italic Medium	2310	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkissim Italic Bold	2311	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkiss Tam Medium	2304	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkiss Tam Bold	2305	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkiss Tam Italic Medium	2306	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Narkiss Tam Italic Bold	2307	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Shalom Medium	416	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Shalom Bold	420	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Shalom Italic Medium	424	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Shalom Italic Bold	428	1362	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Thai				
Burirum Medium	2308	1505	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".
Burirum Bold	2309	1505	Scalable	See p.271 "IBM Core Interchange Resident Code Page Set".

Typeface	FGID	GCSGID	Font Width	Code Pages
Burirum Italic Medium	2310	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Burirum Italic Bold	2311	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Thonburi Medium	2304	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Thonburi Bold	2305	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Thonburi Italic Medium	2306	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Thonburi Italic Bold	2307	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Thai Medium	416	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Thai Bold	420	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Thai Italic Medium	424	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Thai Italic Bold	428	1505	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Lao				
Kaewfah Medium	2308	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Kaewfah Bold	2309	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Kaewfah Italic Medium	2310	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Kaewfah Italic Bold	2311	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Pusuwan Medium	2304	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.

Typeface	FGID	GCSGID	Font Width	Code Pages
Pusuwan Bold	2305	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Pusuwan Italic Medium	2306	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Pusuwan Italic Bold	2307	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Lao Medium	416	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Lao Bold	420	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Lao Italic Medium	424	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Courier Lao Italic Bold	428	1341	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Katakana				
Katakana Gothic	304	1306	Scalable	290, 897, 1027, 1041, 1139

GCSGID Subsets

The following table provides a mapping of the valid subsets of the GCSGIDs listed for the IBM Core Interchange fonts.

❖ 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, 1243, 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
1300	0218, 0925, 0960, 0981, 0985, 0996, 0998, 1150, 1190, 1231, 1235, 1249, 1251, 1276, 1401
1279	1102, 1395, 1396
1304	380, 963, 1113
1306	332, 1122, 1164, 1172, 1187
1364	1304, 1330, 1340
1362	1265, 1356, 1357, 1358, 1360
1502	969
1503	1305, 1336, 1346, 1347, 1355, 1375, 1377, 1378, 1380, 1391, 1392, 1393, 1394, 1397, 1410, 1414, 1418, 1421
1504	1300, 1331, 1338, 1371, 1373, 1381, 1383, 1385, 1387, 1388, 1390, 1411, 1413, 1441
1505	1279
1506	1264, 1461, 1463, 1464, 1465

IBM Core Interchange Resident Code Page Set

The following 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 the following lists with the correct IBM Core Interchange Font GCSGID superset in p.270 "GCSGID Subsets for IBM Core Interchange Fonts" to determine which code pages apply to a particular font family.

❖ 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		
37	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
1140	695	US English, Canadian English, Canadian French, Dutch, Brazilian Portuguese, Portuguese ECECP
1141	695	Austrian, German ECECP
1142	695	Danish, Norwegian ECECP
1143	695	Finnish, Swedish ECECP
1144	695	Italian ECECP
1145	695	Castillian Spanish, Latin American Spanish ECECP

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
1146	695	UK English ECECP
1147	695	French, Catalan ECECP
1148	695	Multinational ECECP, Belgium French, Belgium Dutch, Swiss French, Swiss German, Swiss Italian
1149	695	Icelandic ECECP
Latin 1 EBCDIC Publishing Code Pages		
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	Portuguese (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

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
1112	1305	Baltic, Multi EBCDIC
1257	1421	Windows, Baltic Rim
Latin 2/3/4/5 EBCDIC and ASCII Code Pages		
852	982	Croatian, Czech, East German, Hungarian, Polish, Romanian, Slovak, Slovenian
852	1377	Croatian, Czech, East German, Hungarian, Polish, Romanian, Slovak, Slovenian with Euro
870	959	Latin 2 Multilingual
912	959	Latin 2 ISO/ ANSI 8 Bit
1153	1375	Latin 2 Multilingual with Euro
1250	1410	Windows Latin 2
853	983	Latin 3 Multilingual PC
905	1286	Latin 3 Multilingual
913	1286	Latin 3 Multilingual
1069	1256	Latin 4 EBCDIC
914	1256	Latin 4 ISO/ASCII
857	987	Latin 5 Turkey PC
857	1380	Latin 5 Turkey PC with Euro
1155	1378	EBCDIC Turkey with Euro
857	987	Latin 5 PC
920	1152	Latin 5 ISO/ANSI 8 Bit
1026	1152	Latin 5
1254	1414	Windows, Turkish
1157	1391	EBCDIC Estonia with Euro
922	1347	Estonia, PC
902	1392	8-bit Estonia with Euro
1156	1393	EBCDIC Baltic Multilingual with Euro
921	1346	PC Baltic Multilingual
901	1394	PC Baltic Multilingual with Euro
Latin 9 EBCDIC and ASCII Code Pages		
923	1353	Latin 9
924	1353	Latin 9 EBCDIC

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
Vietnamese		
1130	1336	Vietnamese EBCDIC
1164	1397	Vietnamese EBCDIC with Euro
1129	1336	Vietnamese ISO-8
1163	1397	Vietnamese ISO-8 with Euro
1258	1418	Windows Vietnamese
Thailand		
838	1279	Thailand
889	1102	Thailand
874	1279	Thailand, PC
1160	1395	Thailand, EBCDIC with Euro
1161	1395	Thailand, PC with Euro
1162	1396	Windows Thailand
Lao		
1132	1341	Lao EBCDIC
1133	1341	Lao ISO-8
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
1251	1411	Windows, Cyrillic
423	218	Greek 183 (Primary = 875)
813	925	Greek ISO/ASCII 8 Bit
813	1371	Greek ISO/ASCII 8 Bit with Euro
851	981	Greek PC (Primary = 869)
869	998	Greek PC
869	1373	Greek PC with Euro

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
875	925	Greek
875	1371	Greek with Euro
1039	1258	GML List Symbols
1253	1413	Windows, Greek
1253	1381	EBCDIC Cyrillic Multi. with Euro
808	1385	PC, Cyrillic, Russian with Euro
1131	1338	PC, Cyrillic, Belo Russian
849	1387	PC, Cyrillic, Belo Russian with Euro
808	1385	PC, Cyrillic, Russian with Euro
1158	1388	EBCDIC Cyrillic, Ukraine with Euro
1125	1331	PC, Cyrillic, Ukrainian
848	1390	PC, Cyrillic, Ukrainian with Euro
872	1383	Cyrillic PC with Euro
1166	1441	EBCDIC Cyrillic Multi. with Euro
Arabic EBCDIC and ASCII Code Pages		
420	235	Arabic Bilingual
420	1461	Arabic Bilingual with Euro
864	994	Arabic PC
864	1463	Arabic PC with Euro
1008	1162	Arabic ISO/ASCII 8 Bit
1008	1464	Arabic ISO/ASCII 8 Bit with Euro
1029	1154	Arabic Extended ISO/ASCII 8 Bit
1046	1177	Arabic Extended ISO/ASCII 8 Bit
1046	1465	Arabic Extended ISO/ASCII 8 Bit with Euro
1039	1258	GML List Symbols
Hebrew EBCDIC and ASCII Code Pages		
916	941	Hebrew ISO/ASCII 8 Bit
1028	941	Hebrew Publishing
424	941	Hebrew
424	1356	Hebrew with Euro
803	1147	Hebrew Character Set A (Primary = 424)
803	1357	Hebrew Character Set A (Primary = 424) with Euro
856	986	Hebrew PC (Primary = 862)

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)	Language Supported
856	1358	Hebrew PC (Primary = 862) with Euro
862	992	Hebrew PC
867	1360	Israel with Euro
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
1039	1258	GML List Symbols
Katakana		
1027	1172	Japanese Latin Extended
290	332	Japan Katakana
290	1172	Host/PC Japanese Katakana Extended
897	1164	Japan PC #1
1041	1187	Japanese Extended PC
1139	1122	Japan Alphanumeric Katakana
APL2		
293	1340	APL USA
310	963	Graphic Escape APL/TN
910	1330	APL ASCII

4028 Compatibility Resident Font Set

The following lists the typefaces resident in the Printer 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. The Date Stamp on FGID 701 is 96309 with a Time Stamp of 08230800 for all GCSGIDs except 695, where the Date Stamp is 98124 and the Time Stamp is 13492000. Fonts listed with an "Alt FGID", are used as a substitute for the requested "Alt FGID".

The Printer will substitute Times New Roman (from the IBM Core Interchange Set) for the Times Roman fonts listed in Table 162. 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 p.280 "Resident PSC Strategic Scalable Font Set 2").

See p.279 "4028 Compatibility Resident Code Page Set" for an explanation of the groups used in the "Code Pages" column.

Note

- 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 159. 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.
- 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.
- To match the 4028 and 3116 printed font sizes, the FGIDs 254, 256, 281, and 290 are scaled anamorphically (internal to the Printer) as follows:

FGID	Vertical × Horizontal Scale Factors (points)
254	7.8 vpt × 7.0 hpt
256	7.8 vpt × 7.0 hpt
281	7.0 vpt × 6.0 hpt
290	5.0 vpt × 4.5 hpt

❖ 4028 Compatibility Resident Font Set

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
Boldface	159		Proportional	12	120	A, B
Prestige PSM Roman Medium	164		Proportional	12	120	A, B
Courier	11		10	12	144	259, A, B
Courier	85		12	10	120	259, A, B
Courier	223		15	8	96	A, B
Courier.17ss	254		17.1	7.8	84	A, B
Courier Bold	46		10	12	144	A, B
Courier Bold	108		12	10	120	A, B
Courier Italic	92		12	10	120	A, B
Letter Gothic	281		20	7	72	A, B
OCR A	19		10	12	144	892
OCR B	3		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	7.8	96	A, B
Prestige	256		17.1	8.5	84	A, B
Prestige PSM	164		Proportional	12	120	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
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

Typeface	FGID	Alt FGID	Pitch	Point Size	Font width	Code Pages
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

The following lists provides an explanation of the groups as used in the Code Pages column of p.277 “4028 Compatibility Resident Font Set”.

❖ 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 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

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)
Miscellaneous	
310	963
259	340
892	968
893	969
1303 (Used internally for resident Code 128 barcode font and postal bar code font support)	n/a

IBM Coordinated Font Set (IPDS)

p.280 “Resident PSC Strategic Scalable Font Set 2” lists the scalable IBM Coordinated font set typefaces resident in the Printer and includes the valid FGID and code pages for each font.

Where the IBM Core Interchange code pages are referenced in p.271 “IBM Core Interchange Resident Code Page Set”, only the Latin 1 Country Extended, Latin 1 EBCDIC Publishing, Latin 1 ASCII and Latin EBCDIC DCF code pages are supported.

GCSGID Subsets

The following lists provides an a mapping of the valid subsets of the GCSGIDs listed for the PSC Strategic Font Set 2.

❖ Resident PSC Strategic 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	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Boldface (Euro)	20224	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Gothic Text	304	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Gothic Text (Euro)	304	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Letter Gothic	400	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.

Typeface	FGID	GCSGID	Font width	Code Pages
Letter Gothic (Euro)	400	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Letter Gothic Bold	404	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Letter Gothic Bold (Euro)	404	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
OCR A	305	968	Scalable	876, 892
OCR B	306	969	Scalable	877, 893
OCR B (Euro)	306	1502	Scalable	877, 893
Prestige	432	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Prestige (Euro)	432	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Prestige Bold	318	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Prestige Bold (Euro)	318	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Prestige Italic	319	2039	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Prestige Italic (Euro)	319	2041	Scalable	See p.271 “IBM Core Interchange Resident Code Page Set”.
Katakana Gothic	304	1306	Scalable	290, 897, 1027, 1041

IBM Coordinated Font Set Code Page Set

The following lists provides the GCSGIDs and CPGIDs for the individual Code Pages listed in the Code Pages column of p.280 "Resident PSC Strategic Scalable Font Set 2".

❖ IBM Coordinated Font Set Code Page Set

Code Page Global ID (CPGID)	Graphic Character Set ID (GCSGID)
293	380
310	963
910	1113
876, 892	968
877, 893	969
877, 893	1502
290, 1027	1172
897	1164
1041	1187

❖ 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, 1243, 1353, 1412, 2039

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 printer's control 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 printer's control panel. The printer's control 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 printer's control 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:

- An invalid/unsupported CPGID becomes Code Page 037 (Group A).
- An invalid/unsupported Font Width (CPI) becomes 10.0 CPI (which will translate to 12 points).
- For a Group A CPGID, an invalid/unsupported FGID becomes 416 Courier Roman Medium.
- For a Group B CPGID, the FGID is automatically 304 Gothic Katakana.
- For a Group C CPGID, the FGID is automatically 305 OCR A. Font Width is 10.0 CPI.
- For a Group D CPGID, the FGID is automatically 306 OCR B. Font Width is 10.0 CPI.
- 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 printer's control 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 printer's control 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

Code-Page/Group	Code Page Description
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

FGID/Group	FGID Description
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, printer's control 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 details, 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 p.277 “4028 Compatibility Resident Font Set”.

Code page 1303 is also resident to be used for printing code 128 bar codes.

IPDS Font Bolding

The Printer 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/double strike 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.

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