# IPDS Technical Reference 2

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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 how to configure the IPDS card for the machine. It also explains about items selectable from the Web browser.

**IPDS Printing Configuration Guide (IPDS_CONF.pdf) *English Only**

Explains about the environment necessary for connecting the mainframe to the machine and performing IPDS printing.

**IPDS Technical Reference 1 (IPDS_TEC1.pdf) *English Only**

Explains about commands and functions for IPDS printing.

**IPDS Technical Reference 2 (IPDS_TEC2.pdf)*English Only**

Explains about IPDS commands.

**Note**

- For details about the necessary environment and how to install the IPDS card and machine, consult your sales or service representative. For details about the necessary environments and operation of the mainframe, contact IBM.

# Notice

## 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.

# 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.

[ ]

Indicates the names of keys on the machine's display or control panels.

# 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.

# 1. 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:


- page 10 "Acknowledgement Reply"
- page 13 "Activate Resource"
- page 22 "Begin Page"
- page 23 "Deactivate Font"
- page 26 "End"
- page 27 "End Page"
- page 28 "Load Copy Control"
- page 46 "Load Font Equivalence"
- page 50 "Logical Page Descriptor"
- page 55 "Logical Page Position"
- page 57 "Presentation Fidelity Control"
- page 59 "Sense Type and Model"
- page 73 "Execute Order Any State (XOA)"
- page 73 "XOA Mark Form"
- page 73 "XOA Exception Handling Control"
- page 84 "Execute Order Home State (XOH)"
- page 84 "XOH Obtain Printer Characteristics"
- page 115 "XOH Select Input Media Source"
- page 116 "XOH Set Media Origin"
- page 117 "XOH Set Media Size"
- page 118 "XOH Page Counter Control"
- page 118 "XOH Define Group Boundary"
- page 130 "XOH Specify Group Operation"
- "XOA-RRL Replies for Font Character Sets", IPDS Technical Reference 1

# 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 data stream 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.<br>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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | | ACKNOWLEDGEMENT TYPE:<br>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 | |
| 1-2 | X'0000' - X'FFFF' | Received Page Counter*<br>* Incremented when the End Page processing is completed. | |
| 3-4 | X'0000'- X'FFFF' | Committed Page Counter*<br>* Incremented by the number of pages on a sheet when the last copy of the sheet is stacked. | |
| 5-6 | X'0000'- X'FFFF' | Committed Copy Counter*<br>* Incremented by the number of pages on a sheet when the sheet is stacked. | |
| 7-8 | X'0000'- X'FFFF' | Operator Viewing Page Counter*<br>* Incremented by the number of pages on a sheet when the last copy of the sheet is stacked. | |
| 9-10 | X'0000'- X'FFFF' | Operator Viewing Copy Counter*<br>*Incremented by the number of pages on a sheet when the sheet is stacked. | |
| 11-12 | X'0000'- X'FFFF' | Jam Recovery Page Counter*<br>*Incremented by the number of pages on a sheet when the last copy of the sheet is stacked. | |
| 13-14 | X'0000'- X'FFFF' | Jam Recovery Copy Counter*<br>*Incremented by the number of pages on a sheet when the sheet is stacked. | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 15-16 | X'0000'-X'FFFF' | Stacked Page Counter*<br>*Incremented by the number of pages on a sheet when the last copy of the sheet is stacked. | |
| 17-18 | X'0000'-X'FFFF' | Stacked Copy Counter*<br>*Incremented by the number of pages on a sheet when the sheet is stacked. | |
| 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 page 84 "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 page 23 "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).

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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' | |
| 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 | |
| 3-4 | X'0001'-X'7EFF' | HOST ASSIGNED ID | X'028F..01' |
| 5 | X'41'-X'FE' | Ignored for RT=X'01', X'06', X'07', X'08' and X'10' | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 7-8 | | FONT INLINE SEQUENCE | X'028F.. 01' |
| | X'0000' | 0 degrees | |
| | X'2D00' | 90 degrees | |
| | X'5A00' | 180 degrees | |
| | X'8700' | 270 degrees<br>That the Font Inline Sequence is ignored for RT=X'06' and X'07'.<br>For outline fonts with RT=X'10', FIS is used to select the character metrics for a specific writing mode. | |
| 9-10 | X'0000' | Reserved | |
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 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) | |
| 16-17 | | FONT GLOBAL ID | X'028F.. 02' |
| | X'0000' | No value supplied | |
| | X'0001' - X'FFFE' | FGID | |
| | X'FFFF' | Default FGID (Configuration Settings) | |
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12-13 | | CRC | |
| 14-21 | | Ignored (MVS Host System ID) | |
| 22-27 | | Ignored (VOLSER of Host library) | |
| 28-71 | | Ignored (DSNAME of Host library) | |
| 72-77 | | Date Stamp | |
| 78-85 | | Time Stamp | |
| 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 | |
| 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) | |
| 98-99 | | CRC | |
| 100-107 | | Ignored (MVS Host System ID) | |
| 108-113 | | Ignored (VOLSER of Host library) | |
| 114-157 | | Ignored (DSNAME of Host library) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 158-163 | | Date Stamp | |
| 164-171 | | Time Stamp | |
| 172-179 | | Ignored (Host Library Member Name) | |
| 180-181 | | FONT GLOBAL ID | X'028F..02' |
| | X'0000' | No value supplied | |
| | X'0001' - X'FFFE' | FGID | |
| | X'FFFF' | Default FGID (Configuration Settings) | |
| 182-183 | | FONT WIDTH | X'028F..02' |
| | X'0000' | X'0000' No value supplied | |
| | X'0001' - X'FFFE' | FW | |
| | X'FFFF' | Default FW (Configuration Settings) | |

## Resource ID example with RIDF = Coded Font

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12-13 | | FONT CHARACTER SET HAID | |
| | X'0000' | No value supplied | |
| | X'0001' - X'7FFF' | FCS HAID | |
| 14-15 | | CODE PAGE HAID | |
| | X'0000' | No value supplied | |
| | X'0001' - X'7FFF' | CP HAID | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 18-19 | | CODE PAGE GLOBAL ID | |
| | X'0000' | No value supplied | |
| | X'0001' - X'FFFE' | CPGID | |
| | X'FFFF' | Default Code Page (Configuration Settings) | |
| 20-21 | | FONT GLOBAL ID | |
| | X'0000' | No value supplied | |
| | X'0001' - X'FFFE' | FGID | |
| | X'FFFF' | Default FGID (Configuration Settings) | |
| 22-23 | | FONT WIDTH | |
| | X'0000' | No value supplied | |
| | X'0001' - X'FFFE' | FW | |
| | X'FFFF' | Default FW (Configuration Settings) | |
| 24 | | PATTERN TECHNOLOGY ID | |
| | X'00' | No value supplied | |
| | X'1E' | Composite technology | |
| | X'1F' | Adobe Type-1 PFB | |
| 25 | | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 26-27 | | VERTICAL SCALE FACTOR | |
| | X'0000' | No value supplied | |
| | X'0001' - X'7FFF' | VSF in 1440th of an inch | |
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12 | | IDENTIFIER | |
| | X'06' | Short Form OID | |
| 13 | | OID LENGTH | |
| | X'00' - X'7F' | | |
| 2 to end | | Unique OID | |
| | Any Value | | |

## Resource ID example with RIDF = Data-object font

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12-13 | | Base Font HAID | |
| | X'0001' - X'7EFF' | TrueType/OpenType font or<br>TrueType/OpenType collection | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 14-15 | | CODE PAGE HAID | |
| | X'0000' | No Value supplied | |
| | X'0001' - X'7EFF' | CP HAID | |
| 16-17 | | TTC Font Index | |
| | X'0000' - X'FFFF' | Font Identifier | |
| 2 to end | | Triplets<br>(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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | | DEACTIVATION TYPE | X'0217..02'<br>X'02C5..01'<br>X'02C6..01' |
| | X'11' | Deactivate one single-byte LF1 Coded Font and related indexes | |
| | 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 1-2 | X'0001' - X'7EFF' | HOST ASSIGNED ID (Deactivation Types X'11', X'12', X'20', X'21', X'22',<br>X'30', X'40', X'50' and X'51') | X'0214..02'<br>X'0215..02'<br>X'02C5..01'<br>X'02C6..01' |
| 3 | | SECTION ID | |
| | X'00' | Single-byte font | |
| | X'41' - X'FD' | Double-byte font (Deactivation types X'20', X'21' and X'22') | |
| 4-5 | | FONT INLINE SEQUENCE<br>(Deactivation Type X'12' and X'22') | X'0240..02' |
| | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'02' - X'FE' | COPY SUBGROUP DEFINITION LENGTH | |
| 1 | X'01' - X'FF' | NUMBER OF IDENTICAL COPIES | X'0231..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-n | | COPY MODIFICATION KEYWORDS | X'0232..01' |
| | | Media Source (Reference Notes) | |
| | X'8000' | Tray 1 | X'02C2..02' |
| | X'8001' | Tray 2 | X'02C8..01' |
| | X'8002' | Tray 3 | |
| | X'8002' | Tray 3 (LCT) | |
| | X'8003' | Tray 4 | |
| | | Large capacity tray (LCT)*1 | |
| | X'8003' | Tray 1 + Tray 2 + Tray 3 (LCT) + LCT + Bypass tray | |
| | X'8004' | Tray 1 + Tray 2 + Tray 3 + Tray 4+ LCT + Bypass tray | |
| | X'8063' | Bypass tray | |
| | X'80FF' | Default tray | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-n | | Media Destination (Byte Pairs) | |
| | X'9101' | Internal shift tray | X'0237..04' |
| | X'9101' | Finisher shift tray | X'0237..04' |
| | | Internal tray 1*1 | |
| | X'9101' | Internal tray 1 | |
| | X'9101' | Internal tray 1 + Internal tray 2 | |
| | X'9101' | Internal tray 1 + External tray | |
| | X'9101' | Internal tray 1 + External tray + Internal tray 2 | |
| | X'9103' | Internal tray 1 + Finisher SR3210 | |
| | X'9103' | Internal tray 1 + Finisher SR3230 | |
| | X'9103' | Internal tray 1 + Finisher SR3210 + Internal tray 2 | |
| | X'9103' | Internal tray 1 + Finisher SR3230 + Internal tray 2 | |
| | X'9104' | Internal tray 1 + Booklet Finisher SR3220 | |
| | X'9104' | Internal tray 1 + Booklet Finisher SR3240 | |
| | X'9104' | Internal tray 1 + Booklet Finisher SR3220 + Internal tray 2 | |
| | X'9104' | Internal tray 1 + Booklet Finisher SR3240 + Internal tray 2 | |
| | X'9102' | Finisher upper tray | X'02C1..01' |
| | X'9102' | External tray | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-n | | Internal tray 2*1 | |
| | X'9102' | Internal tray 1 + Internal tray 2 | |
| | X'9102' | Internal shift tray + Internal tray 2 | |
| | X'9102' | Internal Finisher SR3130 + Internal tray 2 | |
| | X'9103' | Internal tray 1 + Internal tray 2 + External tray | |
| | X'9104' | Internal tray 1 + Internal tray 2 + Finisher SR3210 | |
| | X'9104' | Internal tray 1 + Internal tray 2 + Finisher SR3230 | |
| | X'9105' | Internal tray 1 + Internal tray 2 + Booklet Finisher SR3220 | |
| | X'9105' | Internal tray 1 + Internal tray 2 + Booklet Finisher SR3240 | |
| | X'9103' | Finisher booklet tray | X'02C3..01' |

*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 page 84 "Printable Area Self-Defining Field".

**Media Source and Destination Support Matrices**

A = Tray 1, Capacity: 550

B = Tray 2, Capacity: 550

C = Tray 3, Capacity: 550

D = Tray 3 (LCT), Capacity: 1,000 + 1,000

E = Tray 4, Capacity: 550

F = Large capacity tray (LCT), Capacity: 1,500

G = Bypass tray, Capacity: 100

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

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| A3 (297 × 420 mm) | | ○ | ○ | | ○ | | ○ |
| A4 (210 × 297 mm) | △ | ○<br>△ | ○<br>△ | △ | ○<br>△ | △ | ○<br>△ |
| A5 (210 × 148 mm) | △ | ○<br>△ | ○<br>△ | | ○<br>△ | | ○<br>△ |
| A6 (105 × 148 mm) | | ○ | ○ | | ○ | | ○ |
| B4 (257 × 364 mm) | | ○ | ○ | | ○ | | ○ |
| B5 (182 × 257 mm) | △ | ○<br>△ | ○<br>△ | | ○<br>△ | △ | ○<br>△ |
| B6 (128 × 182 mm) | | ○ | ○ | | ○ | | ○ |
| DLT (11 × 17 in.) | | ○ | ○ | | ○ | | ○ |
| Legal (8.5 × 14 in.) | | ○ | ○ | | ○ | | ○ |
| Foolscap (8.5 × 13 in.) | | ○ | ○ | | ○ | | ○ |
| Letter (8.5 × 11 in.) | △ | ○<br>△ | ○<br>△ | △ | ○<br>△ | △ | ○<br>△ |

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| GovernmentLG (8.25 × 14 in.) | | ○ | ○ | | ○ | | ○ |
| Folio (8.25 × 13 in.) | | ○ | ○ | | ○ | | ○ |
| F/GL (8 × 13 in.) | | ○ | ○ | | ○ | | ○ |
| Eng Quatro (8 × 10 in.) | | ○ | ○ | | ○ | | ○ |
| Executive (7.25 × 10.5 in.) | | ○<br>△ | ○<br>△ | | ○<br>△ | | ○<br>△ |
| HalfLetter (5.5 × 8.5 in.) | | ○ | ○ | | ○ | | ○ |
| Com 10 (4.125 × 9.5 in.) | | ●<br>▲ | ●<br>▲ | | ●<br>▲ | | ●<br>▲ |
| Monarch (3.875 × 7.5 in.) | | ● | ● | | ● | | ●<br>▲ |
| C5 (162 × 229 mm) | | ●<br>▲ | ●<br>▲ | | ●<br>▲ | | ●<br>▲ |
| C6 (114 × 162 mm) | | ●<br>▲ | ●<br>▲ | | ●<br>▲ | | ●<br>▲ |
| DL Env (110 × 220 mm) | | ●<br>▲ | ●<br>▲ | | ●<br>▲ | | ●<br>▲ |

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 8K (267 × 390 mm) | | ○ | ○ | | ○ | | ○ |
| 16K (195 × 267 mm) | | ○ △ | ○ △ | | ○ △ | | ○ △ |
| 12 × 18 in. | | ○ | ○ | | ○ | | ○ |
| 11 × 15 in. | | ○ | ○ | | ○ | | ○ |
| 10 × 14 in. | | ○ | ○ | | ○ | | ○ |
| SRA3 (320 × 450 mm) | | ○ | ○ | | ○ | | ○ |
| SRA4 (225 × 320 mm) | | | | | | | ○ △ |
| 8.5 × 13.4 in. | | ○ | ○ | | ○ | | ○ |
| Custom Sizes | - | *1 | *1 | - | *1 | - | *2 |

*1 90.0 × 148.0 mm to 320.0 × 457.2 mm

*2 90.0 × 148.0 mm to 320.0 × 600.0 mm

A = Internal tray 1, Capacity: 500

B = Internal tray 2, Capacity: 125

C = Internal shift tray, Capacity: 250

D = External tray, Capacity: 125

| | A | B | C | D |
|---|---|---|---|---|
| A3 (297 × 420 mm) SEF | Yes | Yes | Yes | Yes |

| | A | B | C | D |
|---|---|---|---|---|
| A4<br>(210 × 297 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| A5<br>(210 × 148 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| A6<br>(105 × 148 mm)<br>SEF | Yes | Yes | Yes | Yes |
| B4<br>(257 × 364 mm)<br>SEF | Yes | Yes | Yes | Yes |
| B5<br>(182 × 257 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| B6<br>(128 × 182 mm)<br>SEF | Yes | Yes | Yes | Yes |
| DLT<br>(11 × 17 in.)<br>SEF | Yes | Yes | Yes | Yes |
| Legal<br>(8.5 × 14 in.)<br>SEF | Yes | Yes | Yes | Yes |
| Foolscap<br>(8.5 × 13 in.)<br>SEF | Yes | Yes | Yes | Yes |

| | A | B | C | D |
|---|---|---|---|---|
| Letter<br>(8.5 × 11 in.)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| GovernmentLG<br>(8.25 × 14 in.)<br>SEF | Yes | Yes | Yes | Yes |
| Folio<br>(8.25 × 13 in.)<br>SEF | Yes | Yes | Yes | Yes |
| F/GL<br>(8 × 13 in.)<br>SEF | Yes | Yes | Yes | Yes |
| Eng Quatro<br>(8 × 10 in.)<br>SEF | Yes | Yes | Yes | Yes |
| Executive<br>(7.25 × 10.5 in.)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| HalfLetter<br>(5.5 × 8.5 in.)<br>SEF | Yes | Yes | Yes | Yes |
| Com 10<br>(4.125 × 9.5 in.)<br>SEF/LEF | Yes | Yes | Yes | Yes (SEF) / No (LEF) |
| Monarch<br>(3.875 × 7.5 in.)<br>SEF/LEF | Yes | Yes | Yes | Yes (SEF) / No (LEF) |

| | A | B | C | D |
|---|---|---|---|---|
| C5<br>(162 × 229 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| C6<br>(114 × 162 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes (SEF) / No (LEF) |
| DL Env<br>(110 × 220 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes (SEF) / No (LEF) |
| 8K<br>(267 × 390 mm)<br>SEF | Yes | Yes | Yes | Yes |
| 16K<br>(195 × 267 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| 12 × 18 in.<br>SEF | Yes | Yes | Yes | Yes |
| 11 × 15 in.<br>SEF | Yes | Yes | Yes | Yes |
| 10 × 14 in.<br>SEF | Yes | Yes | Yes | Yes |
| SRA3<br>(320 × 450 mm)<br>SEF | Yes | Yes | Yes | Yes |
| SRA4<br>(225 × 320 mm)<br>SEF/LEF | Yes | Yes | Yes | Yes |
| 8.5 × 13.4 in.<br>SEF | Yes | Yes | Yes | Yes |

| | A | B | C | D |
|---|---|---|---|---|
| Custom Sizes | *1 | *2 | *1 | *2 |

*1 90.0 × 148.0 mm to 320.0 × 600.0 mm

*2 90.0 × 148.0 mm to 320.0 × 457.2 mm

A = Internal Finisher SR3130, Capacity: 500

B = Finisher SR3210, Capacity: 250 (Finisher upper tray) / 1,000 (Finisher shift tray)

C = Finisher SR3230, Capacity: 250 (Finisher upper tray) / 2,000 (Finisher shift tray)

D = Booklet Finisher SR3220, Capacity: 250 (Finisher upper tray) / 1,000 (Finisher shift tray) / 125 (Finisher booklet tray)

E = Booklet Finisher SR3240, Capacity: 250 (Finisher upper tray) / 2,000 (Finisher shift tray) / 150 (Finisher booklet tray)

| | A | B | C | D | E |
|---|---|---|---|---|---|
| A3<br>(297 × 420 mm)<br>SEF | Yes | Yes | Yes | Yes | Yes |
| A4<br>(210 × 297 mm)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: Yes (SEF) / No (LEF) | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: Yes (SEF) / No (LEF) |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| A5<br>(210 × 148 mm)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| A6<br>(105 × 148 mm)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| B4<br>(257 × 364 mm)<br>SEF | Yes | Yes | Yes | Yes | Yes |
| B5<br>(182 × 257 mm)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: Yes (SEF) / No (LEF) | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: Yes (SEF) / No (LEF |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| B6<br>(128 × 182 mm)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| DLT<br>(11 × 17 in.)<br>SEF | Yes | Yes | Yes | Yes | Yes |
| Legal<br>(8.5 × 14 in.)<br>SEF | Yes | Yes | Yes | Yes | Yes |
| Foolscap<br>(8.5 × 13 in.)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| Letter<br>(8.5 × 11 in.)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No (SEF) / Yes (LEF) | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: Yes (SEF) / No (LEF) |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| GovernmentLG<br>(8.25 × 14 in.)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | Yes |
| Folio<br>(8.25 × 13 in.)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | Yes |
| F/GL<br>(8 × 13 in.)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| Eng Quatro<br>(8 × 10 in.)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| Executive<br>(7.25 × 10.5 in.)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| HalfLetter<br>(5.5 × 8.5 in.)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| Com 10<br>(4.125 × 9.5 in.)<br>SEF/LEF | Yes | No | No | No | No |
| Monarch<br>(3.875 × 7.5 in.)<br>SEF/LEF | Yes | No | No | No | No |
| C5<br>(162 × 229 mm)<br>SEF/LEF | Yes | No | No | No | No |
| C6<br>(114 × 162 mm)<br>SEF/LEF | Yes | No | No | No | No |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| DL Env<br>(110 × 220 mm)<br>SEF/LEF | Yes | No | No | No | No |
| 8K<br>(267 × 390 mm)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| 16K<br>(195 × 267 mm)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| 12 × 18 in.<br>SEF | Yes | Yes | Yes | Yes | Yes |
| 11 × 15 in.<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | Yes |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 10 × 14 in.<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | Yes |
| SRA3<br>(320 × 450 mm)<br>SEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No |
| SRA4<br>(225 × 320 mm)<br>SEF/LEF | Yes | Yes | Yes | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: No | • Finisher upper tray: Yes<br>• Finisher shift tray: Yes<br>• Finisher booklet tray: Yes (SEF) / No (LEF) |
| 8.5 × 13.4 in.<br>SEF | Yes | Yes | Yes | Yes | Yes |

| | A | B | C | D | E |
|---|---|---|---|---|---|
| Custom Sizes | *1 | • Finisher upper tray: *1<br>• Finisher shift tray: - | *2 | *2 | • Finisher upper tray: *2<br>• Finisher shift tray: *2<br>• Finisher booklet tray: *3 |

*1 90.0 × 148.0 mm to 320.0 × 600.0 mm

*2 90.0 × 148.0 mm to 320.0 × 457.2 mm

*3 182.0 × 257.0 mm to 304.8 × 457.2 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 page 141 "Set Coded Font Local", page 200 "Bar Code Data Descriptor", page 198 "Write Bar Code Control", or graphics order "Character Set", IPDS Technical Reference 1) 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 (described in "Code Page and Font Identification", IPDS Technical Reference 1) 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'00' - X'FE' | LOCAL-FONT ID | X'0219..02' |
| | X'FF' | Reserved | X'0218..02' |
| 1-2 | X'0001' - X'7EFF' | FONT HOST ASSIGNED ID | X'0218..02'<br>X'021F..02' |
| 3-4 | | FONT INLINE SEQUENCE | X'0247..02' |
| | X'0000' | 0 degrees | |
| | X'2D00' | 90 degrees | |
| | X'5A00' | 180 degrees | |
| | X'8700' | 270 degrees | |
| 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 | |
| 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) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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) | |
| 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 | |
| 13 | X'00' | Reserved | |
| 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) | |
| 15 | X'00' | Reserved | |
| 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 page 133 "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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | | UNIT-BASE (Measurement Units) | X'0264..02' |
| | X'00' | 10 in. | |
| | X'01' | 10 centimeters | |
| 1 | | Reserved | |
| 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 | |
| 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 | |
| 6 | | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 7-9 | X'000001' - X'007FFF' | Xp-EXTENT OF LOGICAL PAGE (Width)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0262..02' |
| 10 | | Reserved | |
| 11-13 | X'000001' - X'007FFF' | Yp-EXTENT OF LOGICAL PAGE (Height)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0263..02' |
| 14 | | Reserved | |
| 15 | | Ignored (Ordered Data) | |
| 16-23 | | Reserved | |
| 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 | |
| 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<br>See page 149 "Set Text Orientation" for valid combinations of I-axis and B-axis orientations. | |
| 28-29 | X'0000' - X'7FFF' | INITIAL I PRINT COORDINATE<br>See "Notation Conventions", IPDS Technical Reference 1. | X'026A..02' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 30-31 | X'0000' - X'7FFF' | INITIAL B PRINT COORDINATE<br>See "Notation Conventions", IPDS Technical Reference 1. | X'026B..02' |
| 32-33 | X'0000' - X'7FFF' | INLINE MARGIN<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0210..01' |
| | X'FFFF' | Printer Default | |
| 34-35 | X'0000' - X'7FFF' | INTERCHARACTER ADJUSTMENT (+)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0212..01' |
| | X'FFFF' | Printer Default | |
| 36-37 | | Reserved | |
| 38-39 | X'0000' - X'7FFF' | BASELINE INCREMENT<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0211..01' |
| | X'FFFF' | Printer Default | |
| 40 | X'00' - X'FE' | LOCAL FONT ID | |
| | X'FF' | Printer Default | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 43-end | | LPD Triplets<br>• 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. For details, see "Color Simulation", IPDS Technical Reference 1.<br>• 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. For details, see "Presentation Space Reset Mixing", IDPS Technical Reference 1. | |

# Logical Page Position

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



| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'00' | RESERVED | |
| 1-3 | X'FF8000' - X'007FFF' | Xm OFFSET of the LOGICAL PAGE ORIGIN in L-Units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'02A4..01'<br>X'02AD..01' |
| 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 | |
| 5-7 | X'FF8000' - X'007FFF' | Ym OFFSET of the LOGICAL PAGE ORIGIN in L-Units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'02A5..01'<br>X'02AD..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 8-9 | | PAGE ORIENTATION | |
| | X'0000' | 0 degrees | |
| | X'2D00' | 90 degrees | |
| | X'5A00' | 180 degrees | |
| | X'8700' | 270 degrees<br>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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'00' | RESERVED | |
| 1 | | FLAGS | |
| | Bit 0 | ACTIVATE | |
| | 0 | Reset to default fidelity controls and activate PFC triplets | |
| | 1 | | |
| | Bits 1-7 | Reserved | |
| | 0000000 0000000 | | |
| 2-3 | X'0000' | Reserved | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'07' | LENGTH | X'0254..51' |
| 1 | X'86' | Text Fidelity Triplet ID | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2 | | CONTINUE | X'0254..52' |
| | X'01' | Stop on Exception ID X'0200..01' | |
| | X'02' | Continue Processing Write Text Data | |
| 3 | X'00' | Reserved | |
| 4 | | REPORT | X'0254..53' |
| | X'01' | Report X'0200..01' Exception | |
| | X'02' | Do Not Report X'0200..01' Exception | |
| 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.

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

# Sense Type and Model

Causes the printer to place into the Special Data Area of the Acknowledge Reply (See page 10 "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**

| Offset | Range | Meaning |
|---|---|---|
| 0 | X'FF' | Convention |
| 1-2 | | Product Code |
| | X'2707' | MP C4504SP / MP C4504exSP / MP C4504ASP / MP C4504exASP / MP C4504exSPG / MP C4504SP TE / MP C4504exSP TE<br>MP C5504SP / MP C5504exSP / MP C5504ASP / MP C5504exASP<br>MP C6004SP / MP C6004exSP / MP C6004exSPG / MP C6004SP TE / MP C6004exSP TE |
| | X'4028' | 4028 Emulation (4028) |
| 3 | | Model |
| | X'01' | MP C4504SP / MP C4504ASP / MP C4504SP TE |
| | X'02' | MP C5504SP / MP C5504ASP |
| | X'03' | MP C6004SP / MP C6004SP TE |
| | X'04' | MP C4504exSP / MP C4504exASP / MP C4504exSPG / MP C4504exSP TE |
| | X'05' | MP C5504exSP / MP C5504exASP |
| | X'06' | MP C6004exSP / MP C6004exSPG / MP C6004exSP TE |
| | X'00' | 4028 Emulation (Simplex) |
| | X'12' | 4028 Emulation (Duplex) |
| 4-5 | X'0000' | Reserved |

### Device-Control Command Set

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'nnnn' | VECTOR LENGTH |
| 2-3 | X'C4C3' | DEVICE CONTROL Command-Set ID |
| 4-5 | X'FF10' | DC1 Subset ID |
| 6-7 | X'6001' | MULTIPLE COPY and COPY-SUBGROUP support in LCC |
| 8-9 | X'6002' | Media-source-selection support in LCC |
| 10-11 | X'6003' | Media-destination-selection support in LCC |
| 12-13 | X'6101' | Explicit Page Placement and Orientation Support |
| 14-15 | X'6201' | LOGICAL PAGE AND OBJECT AREA COLORING support |
| 16-17 | X'7008' | Set Presentation Environment |
| 18-19 | X'702E' | ACTIVATE RESOURCE Command support |
| 20-21 | X'7034' | PRINT FIDELITY Command support |
| 22-23 | X'706B' | ICMR command support |
| 24-25 | X'8008' | XOA Order MARK FORM |
| 26-27 | X'800A' | XOA Order ALTERNATE OFFSET STACKER |
| 28-29 | X'80F2' | XOA Order DISCARD BUFFERED DATA |
| 30-31 | X'80F4' | XOA Order REQUEST RESOURCE LIST |
| 32-33 | X'80F6' | XOA Order EXCEPTION HANDLING CONTROL |
| 34-35 | X'80F8' | XOA Order PRINT QUALITY CONTROL |
| 36-37 | X'9001' | XOH Order PRINT BUFFERED DATA |
| 38-39 | X'9003' | XOH Order SPECIFY GROUP OPERATION |
| 40-41 | X'9004' | XOH Order DEFINE GROUP BOUNDARY |
| 42-43 | X'9005' | XOH Order ERASE RESIDUAL PRINT DATA |
| 44-45 | X'9007' | XOH Order ERASE RESIDUAL FONT DATA |
| 46-47 | X'900D' | XOH Order STACK RECEIVED PAGES |

| Offset | Range | Meaning |
|---|---|---|
| 48-49 | X'9013' | XOH Order EJECT to FRONT FACING |
| 50-51 | X'9015' | XOH Order SELECT INPUT MEDIA SOURCE |
| 52-53 | X'9016' | XOH Order SET MEDIA ORIGIN |
| 54-55 | X'9017' | XOH Order SET MEDIA SIZE |
| 56-57 | X'e000' | CMRs can be captured |
| 58-59 | X'e004' | Host-activated indexed CMRs supported |
| 60-61 | X'707B' | RPO command support |
| 62-63 | X'90F3' | Obtain Printer Characteristics |
| 64-65 | X'90F5' | Page Counters Control |

**Presentation Text Command Set**

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' | VECTOR LENGTH |
| 2-3 | X'D7E3' | PRESENTATION TEXT Command Set - TX1 Subset |
| 4-5 | X'FF30' | PT3 Data |
| 6-7 | X'1001' | UNORDERED TEXT |
| When B&W Print is specified | | |
| 8-9 | X'4022' | COLOR of MEDIUM SUPPORTED<br>LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| When color Print is specified | | |
| 8-9 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 10-11 | X'50FF' | 8 TEXT ORIENTATIONS supported |

### IM Image Command Set

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' | VECTOR LENGTH |
| 2-3 | X'C9D4' | IM IMAGE Command Set - IM1 Subset |
| 4-5 | X'FF10' | IMD1 Data |
| 6-7 | X'1001' | UNORDERED IMAGE BLOCKS |
| 8-9 | X'4022' | COLOR of MEDIUM SUPPORTED<br>LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| 10-11 | X'A004' | ALL 4 ORIENTATIONS Supported |

### IO Image Command Set (IOCA FS10)

| Offset | Range | Meaning |
|---|---|---|
| When B&W Print is specified | | |
| 0-1 | X'0022' | VECTOR LENGTH |
| When color Print is specified | | |
| 0-1 | X'0024' | VECTOR LENGTH |
| 2-3 | X'C9D6' | IO Image Command Set |
| 4-5 | X'FF10' | IO/1 Level |
| 6-7 | X'1001' | Unordered Image Blocks |
| 8-9 | X'1202' | IO Image Objects Downloaded Resources in Home State |
| When B&W Print is specified | | |
| 10-11 | X'4022' | COLOR of MEDIUM SUPPORTED<br>LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |

| Offset | Range | Meaning |
|---|---|---|
| When color Print is specified | | |
| 10-11 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 12-13 | X'4401' | Extended IOCA bi-level color support. |
| 14-15 | X'5001' | MMR Compression algorithm supported |
| 16-17 | X'5003' | Uncompressed Image supported |
| 18-19 | X'5006' | RL4 Compression supported |
| 20-21 | X'5081' | G3 Facsimile Coding Scheme (CCITT G3MR) |
| 22-23 | X'5082' | G4 Facsimile Coding Scheme (CCITT G4MMR) |
| 24-25 | X'5101' | Bit ordering supported |
| 26-27 | X'5204' | Unpadded RIDIC Recording Algorithm supported |
| 28-29 | X'5505' | Multiple Image Content Supported |
| 30-31 | X'A004' | All four orientations supported |
| 32-33 | X'F300' | Replicate and Trim mapping supported |
| 34-35 | X'F301' | Scale-to-fill 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)

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0024' | VECTOR LENGTH |
| 2-3 | X'C9D6' | IO Image Command Set |
| 4-5 | X'FF11' | IO/1 Level |
| 6-7 | X'1001' | Unordered Image Blocks |
| 8-9 | X'1202' | IO Image Objects Downloaded Resources in Home State |

| Offset | Range | Meaning |
|---|---|---|
| When B&W Print is specified | | |
| 10-11 | X'4022' | COLOR of MEDIUM SUPPORTED<br>LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| When color Print is specified | | |
| 10-11 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 12-13 | X'4401' | Extended IOCA Bi-level Image Color supported |
| 14-15 | X'5001' | MMR Compression algorithm supported |
| 16-17 | X'5003' | Uncompressed Image supported |
| 18-19 | X'5008' | ABIC Compression supported |
| 20-21 | X'500A' | Concatenated ABIC |
| 22-23 | X'5082' | G4 Facsimile Coding Scheme (CCITT G4MMR) |
| 24-25 | X'5083' | ISO/ITU-TSS JPEG supported |
| 26-27 | X'5101' | Bit ordering supported |
| 28-29 | X'5204' | Unpadded RIDIC Recording Algorithm supported |
| 30-31 | X'5505' | Multiple Image Content supported |
| 32-33 | X'A004' | All four orientations supported |
| 34-35 | X'F301' | Scale-to-fill mapping supported |

### IO Image Command Set (IOCA FS40)

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0026' | VECTOR LENGTH |
| 2-3 | X'C9D6' | IO Image Command Set |
| 4-5 | X'FF40' | IO/1 Level |

| Offset | Range | Meaning |
|---|---|---|
| 6-7 | X'1001' | Unordered Image Blocks |
| 8-9 | X'1202' | IO Image Objects Downloaded Resources in Home State |
| When B&W Print is specified | | |
| 10-11 | X'4022' | COLOR of MEDIUM SUPPORTED<br>LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| When color Print is specified | | |
| 10-11 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 12-13 | X'4401' | Extended IOCA Bi-level Image Color supported |
| 14-15 | X'4402' | Extended IOCA Tile-Set Color support |
| 16-17 | X'5001' | MMR Compression algorithm supported |
| 18-19 | X'5003' | Uncompressed Image supported |
| 20-21 | X'5008' | ABIC Compression supported |
| 22-23 | X'5080' | G3 Facsimile Coding Scheme (CCITT G3MH) |
| 24-25 | X'5081' | G3 Facsimile Coding Scheme (CCITT G3MR) |
| 26-27 | X'5082' | G4 Facsimile Coding Scheme (CCITT G4MMR) |
| 28-29 | X'5101' | Bit ordering supported |
| 30-31 | X'5204' | Unpadded RIDIC Recording Algorithm supported |
| 32-33 | X'5505' | Multiple image Content supported |
| 34-35 | X'A004' | All four orientations supported |
| 36-37 | X'F301' | Scale-to-fill mapping supported |

### IO Image Command Set (IOCA FS42)

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0024' | VECTOR LENGTH |
| 2-3 | X'C9D6' | IO Image Command Set |
| 4-5 | X'FF42' | IO/1 Level |
| 6-7 | X'1001' | Unordered Image Blocks |
| 8-9 | X'1202' | IO Image Objects Downloaded Resources in Home State |
| When B&W Print is specified | | |
| 10-11 | X'4022' | COLOR of MEDIUM SUPPORTED |
| When color Print is specified | | |
| 10-11 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 12-13 | X'4401' | Extended IOCA Bi-level Image Color SDF supported |
| 14-15 | X'4402' | Extended IOCA Tile-Set Color support |
| 16-17 | X'5001' | MMR Compression algorithm supported |
| 18-19 | X'5003' | Uncompressed Image supported |
| 20-21 | X'5008' | ABIC Compression supported |
| 22-23 | X'5020' | Solid Fill Rectangle |
| 24-25 | X'5082' | G4 Facsimile Coding Scheme (CCITT G4MMR) |
| 26-27 | X'5101' | Bit ordering supported |
| 28-29 | X'5204' | Unpadded RIDIC Recording Algorithm supported |
| 30-31 | X'5505' | Multiple image content supported |
| 32-33 | X'A004' | All four orientations supported |
| 34-35 | X'F301' | Scale-to-fill mapping supported |

### IO Image Command Set (IOCA FS45)

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'001C' | VECTOR LENGTH |
| 2-3 | X'C9D6' | IO Image Command Set |
| 4-5 | X'FF45' | IO/1 Level |
| 6-7 | X'1001' | Unordered Image Blocks |
| 8-9 | X'1202' | IO Image Objects Downloaded Resources in Home State |
| When B&W Print is specified | | |
| 10-11 | X'4022' | COLOR of MEDIUM SUPPORTED<br>LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| When color Print is specified | | |
| 10-11 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 12-13 | X'4401' | Extended IOCA Bi-level Image Color supported |
| 14-15 | X'4402' | Extended IOCA Tile-Set Color support |
| 16-17 | X'5020' | Solid Rectangle Fill support |
| 18-19 | X'5101' | Bit ordering supported |
| 20-21 | X'5204' | Unpadded RIDIC Recording Algorithm supported |
| 22-23 | X'5505' | Multiple image Content supported |
| 24-25 | X'A004' | All four orientations supported |
| 26-27 | X'F301' | Scale-to-fill mapping supported |

### Graphics Command Set

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'001A' | VECTOR LENGTH |

| Offset | Range | Meaning |
|---|---|---|
| 2-3 | X'E5C7' | GRAPHICS Command Set - GR1 Subset |
| 4-5 | X'FF30' | GRS3 Data |
| 6-7 | X'1001' | UNORDERED GRAPHICS BLOCKS |
| When B&W Print is specified | | |
| 8-9 | X'4022' | COLOR of MEDIUM SUPPORTED LIMITED<br>SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| When color Print is specified | | |
| 8-9 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 10-11 | X'4100' | Set Process Color Supported |
| 12-13 | X'4101' | GOCA Box Drawing Supported |
| 14-15 | X'4102' | Partial Arc Drawing Supported |
| 16-17 | X'4106' | Set Fractional Line Width Supported |
| 18-19 | X'4108' | Normal line width default |
| 20-21 | X'4109' | Process Color default |
| 22-23 | X'4112' | Clockwise partial arc |
| 24-25 | X'A004' | All 4 orientations supported |

**Page Segment Command Set**

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0008' | VECTOR LENGTH |
| 2-3 | X'D7E2' | PAGE SEGMENT Command Set |
| 4-5 | X'FF10' | PS1 Subset |
| 6-7 | X'1101' | EXTENDED PAGE SEGMENT SUPPORT (32K) |

### Overlay Command Set

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' | VECTOR LENGTH |
| 2-3 | X'D6D3' | OVERLAY Command Set |
| 4-5 | X'FF10' | OL1 Subset |
| 6-7 | X'1506' | OVERLAY NESTING = 6 Levels |
| 8-9 | X'1102' | EXTENDED OVERLAY SUPPORT (32K) |
| 10-11 | X'A004' | page-overlay-rotation support; all 4 orientations |

### Loaded Font Command Set (LF1) - Single Byte

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0010' | VECTOR LENGTH |
| 2-3 | X'C3C6' | LOADED FONT Command Set |
| 4-5 | X'FF10' | LF1 subset - fully described font + font index |
| 6-7 | X'A004' | 4 CHARACTER ROTATIONS (LFI command) |
| 8-9 | X'B002' | LFI UNDERSCORE Width and Position USED |
| 10-11 | X'C005' | BOUNDED BOX RASTER FONT TECHNOLOGY |
| 12-13 | X'C100' | FIXED METRICS |
| 14-15 | X'C101' | RELATIVE METRICS |

### Loaded Font Command Set (LF1) - Double Byte

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0012' | VECTOR LENGTH |
| 2-3 | X'C3C6' | LOADED FONT Command Set |
| 4-5 | X'FF10' | LF1 subset - fully described font + font index |
| 6-7 | X'A004' | 4 CHARACTER ROTATIONS (LFI command) |
| 8-9 | X'B001' | Double-Byte coded fonts supported |

| Offset | Range | Meaning |
|---|---|---|
| 10-11 | X'B002' | LFI UNDERSCORE Width and Position USED |
| 12-13 | X'C005' | BOUNDED BOX RASTER FONT TECHNOLOGY |
| 14-15 | X'C100' | FIXED METRICS |
| 16-17 | X'C101' | RELATIVE METRICS |

**Loaded Font Command Set (LF3) - Single Byte**

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0014' | VECTOR LENGTH |
| 2-3 | X'C3C6' | LOADED FONT Command Set |
| 4-5 | X'FF30' | LF3 subset - code page + font character set |
| 6-7 | X'A004' | 4 CHARACTER ROTATIONS (LFI command) |
| 8-9 | X'B002' | LFI UNDERSCORE Width and Position USED |
| 10-11 | X'B003' | GRID PARTS REQUIRED IN LFC, LFCSC and LCPC COMMANDS |
| 12-13 | X'B004' | Default Character Parameters in LCPC Supported |
| 14-15 | X'B005' | Extended (Unicode mapping) code page support |
| 16-17 | X'C01F' | ADOBE TYPE-1 PFB OUTLINE FONT TECHNOLOGY |
| 18-19 | X'C101' | RELATIVE METRICS |

**Loaded Font Command Set (LF3) - Double Byte**

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0018' | VECTOR LENGTH |
| 2-3 | X'C3C6' | LOADED FONT Command Set |
| 4-5 | X'FF30' | LF3 subset - code page + font character set |
| 6-7 | X'A004' | 4 CHARACTER ROTATIONS (LFI command) |
| 8-9 | X'B001' | Double-Byte coded fonts supported |
| 10-11 | X'B002' | LFI UNDERSCORE Width and Position USED |

| Offset | Range | Meaning |
|---|---|---|
| 12-13 | X'B003' | GRID PARTS REQUIRED IN LFC, LFCSC and LCPC COMMANDS |
| 14-15 | X'B004' | Default Character Parameters in LCPC Supported |
| 16-17 | X'B005' | Extended (Unicode mapping) code page support |
| 18-19 | X'C01E' | CID-keyed OUTLINE FONT TECHNOLOGY |
| 20-21 | X'C01F' | ADOBE TYPE-1 PFB OUTLINE FONT TECHNOLOGY |
| 22-23 | X'C101' | RELATIVE METRICS |

**Bar Code Command Set**

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' | VECTOR LENGTH |
| 2-3 | X'C2C3' | BAR CODE Command Set - BC1 Subset |
| 4-5 | X'FF20' | BCD2 Data |
| 6-7 | X'1001' | UNORDERED BAR CODE BLOCKS |
| When B&W Print is specified | | |
| 8-9 | X'4022' | COLOR of MEDIUM SUPPORTED LIMITED SIMULATED COLOR SUPPORTED<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. |
| When color Print is specified | | |
| 8-9 | X'4003' | COLOR of MEDIUM SUPPORTED<br>MULTIPLE-COLOR SUPPORTED |
| 10-11 | X'4400' | Extended bar code color support |
| 12-13 | X'A004' | All four orientations supported |

**Note**

- See page 205 "Bar Code Type and Modifier Description and Values" for a list of supported Bar Code Types.

### Object Container Command Set

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' | VECTOR LENGTH |
| 2-3 | X'D6C3' | Object Container Command set - OC1 Subset |
| 4-5 | X'0000' | No levels defined |
| 6-7 | X'1201' | Data-object resource support |
| 8-9 | X'F301' | Scale-to-fill mapping supported |
| 10-11 | X'5800' | Image resolution triplet 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 page 28 "Load Copy Control") all the copies of the page will have a job separator mark included.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'F600' | EXCEPTION HANDLING CONTROL (EHC) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 3 | | ALTERNATE EXCEPTION ACTIONS | |
| | Bits 0-6: 0 | Reserved | |
| | Bit 7: 0 | Take AEA (if defined) | |
| | Bit 7: 1 | Don't take AEA | |
| 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)<br>Discard Page | |
| | Bit 7: 0 | Print to point of Exception | |
| | Bit 7: 1 | (Process limits may apply)<br>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 page 10 "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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'F400' | REQUEST RESOURCE LIST (RRL) | |
| 2 | | QUERY TYPE | X'0291..02' |
| | X'05' | Resource Activation Status | |
| | X'00' or X'FF' | General Resource Status | |
| 3-4 | X'0000'-X'FFFF' | ENTRY CONTINUATION Indicator | |
| 5 | X'03'-X'xx' | ENTRY LENGTH<br>Multiple-entry queries are not supported. Byte 5 indicates the length of the command. | X'0291..02' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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'40' | Data Object Resource | |
| | X'FF' | All Resources | |
| 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 | |
| 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**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'FF | UNORDERED LIST | |
| 1 | X'01' | END of LIST | |
| | X'04' - X'nn' | LENGTH of this ENTRY | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 3 | | RESOURCE ID FORMAT | |
| | X'00' | Host-Assigned Resource ID | |
| | X'03' | IBM Registered Global Resource ID parts | |
| 4 | | RESOURCE SIZE Indicator | |
| | X'00' | Resource not present | |
| | X'01' | Resource present | |
| 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).
- For details about a description of the supported GCSGID/CPGID/FGID/FW combinations, see "Code Page and Font Identification", IPDS Technical Reference 1.

## 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0A00' | Alternate Offset Stacker | |

Internal shift tray

**Media Jogging Support Matrices**

A = Internal shift tray

B = Internal Finisher SR3130: Finisher shift tray

C = Finisher SR3210: Finisher shift tray

D = Finisher SR3230: Finisher shift tray

E = Booklet Finisher SR3220: Finisher shift tray

F = Booklet Finisher SR3240: Finisher shift tray

Y = Yes

N = No

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A3 (297 × 420 mm) SEF | Y | Y | Y | Y | Y | Y |
| A4 (210 × 297 mm) SEF/LEF | Y | Y | Y | Y | Y | Y |

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A5 (210 × 148 mm) SEF/LEF | Y | Y | Y | Y | Y | Y |
| A6 (105 × 148 mm) SEF | Y | N | N | N | N | N |
| B4 (257 × 364 mm) SEF | Y | Y | Y | Y | Y | Y |
| B5 (182 × 257 mm) SEF/LEF | Y | Y | Y | Y | Y | Y |
| B6 (128 × 182 mm) SEF | Y | N | Y | Y | Y | Y |
| DLT (11 × 17 in.) SEF | Y | Y | Y | Y | Y | Y |
| Legal (8.5 × 14 in.) SEF | Y | Y | Y | Y | Y | Y |

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Foolscap (8.5 × 13 in.) SEF | Y | Y | Y | Y | Y | Y |
| Letter (8.5 × 11 in.) SEF/LEF | Y | Y | Y | Y | Y | Y |
| GovernmentLG (8.25 × 14 in.) SEF | Y | Y | Y | Y | Y | Y |
| Folio (8.25 × 13 in.) SEF | Y | Y | Y | Y | Y | Y |
| F/GL (8 × 13 in.) SEF | Y | Y | Y | Y | Y | Y |
| Eng Quatro (8 × 10 in.) SEF | Y | Y | Y | Y | Y | Y |
| Executive (7.25 × 10.5 in.) SEF/LEF | Y | Y | Y | Y | Y | Y |
| HalfLetter (5.5 × 8.5 in.) SEF | Y | N | Y | Y | Y | Y |

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Com 10 (4.125 × 9.5 in.) SEF/LEF | Y | N | N | N | N | N |
| Monarch (3.875 × 7.5 in.) SEF/LEF | Y | N | N | N | N | N |
| C5 (162 × 229 mm) SEF/LEF | Y | N | N | N | N | N |
| C6 (114 × 162 mm) SEF/LEF | Y | N | N | N | N | N |
| DL Env (110 × 220 mm) SEF/LEF | Y | N | N | N | N | N |
| 8K (267 × 390 mm) SEF | Y | Y | Y | Y | Y | Y |
| 16K (195 × 267 mm) SEF/LEF | Y | Y | Y | Y | Y | Y |
| 12 × 18 in. SEF | Y | N | Y | Y | Y | Y |

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 11 × 15 in.<br>SEF | Y | Y | Y | Y | Y | Y |
| 10 × 14 in.<br>SEF | Y | Y | Y | Y | Y | Y |
| SRA3<br>(320 × 450 mm)<br>SEF | Y | N | N | N | N | N |
| SRA4<br>(225 × 320 mm)<br>SEF/LEF | Y | Y (SEF) / N (LEF) | Y (SEF) / N (LEF) | Y (SEF) / N (LEF) | Y (SEF) / N (LEF) | Y (SEF) / N (LEF) |
| 8.5 × 13.4 in.<br>SEF | Y | Y | Y | Y | Y | Y |
| Custom Sizes | *1 | *2 | *3 | *4 | *3 | *4 |

*1 90.0 × 148.0 mm to 320.0 × 600.0 mm

*2 148.0 × 148.0 mm to 297.0 × 431.8 mm

*3 139.7 × 148.0 mm to 304.8 × 457.2 mm

*4 125.0 × 148.0 mm to 304.8 × 457.2 mm

# Execute Order Home State (XOH)



Each Execute Order Home state 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 XOHSMO command, as described in page 116 "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.

| Offset | Range | Meaning |
|---|---|---|
| 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 |
| 2-3 | X'0001' | PRINTABLE AREA Self-Defining Field ID |
| 4 | | INPUT MEDIA SOURCE |
| | X'00' | Tray 1 |
| | X'01' | Tray 2 |
| | X'02' | Tray 3 |
| | X'02' | Tray 3 (LCT) |
| | X'03' | Tray 4 |
| | | Large capacity tray (LCT)*1 |
| | X'03' | Tray 1 + Tray 2 + Tray 3 (LCT) + LCT + Bypass tray |
| | X'04' | Tray 1 + Tray 2 + Tray 3 + Tray 4+ LCT + Bypass tray |
| | X'63' | Bypass tray |
| | X'FF' | Default tray |
| | X'00' | Reserved |
| 6 | X'00' | UNIT BASE 10 in. |
| 7 | X'00' | Reserved |
| 8-9 | X'3840' | L-units per UNIT BASE |

| Offset | Range | Meaning |
|---|---|---|
| 10-11 | X'0001' - X'xxxx' | WIDTH of the Medium Presentation Space in L-units (determined by configuration) |
| 12-13 | X'0001' - X'xxxx' | LENGTH of the Medium Presentation Space in L-units (determined by configuration) |
| 14-15 | | Xm OFFSET of the Printable Area in L-Units |
| | X'00EE' | Edge-to-edge: Off (4.2 mm) |
| | X'0000' | Edge-to-edge: On (0 mm) |
| 16-17 | | Ym OFFSET of the Printable Area in L-units |
| | X'01DC' | Edge-to-edge: Off (4.2 mm) |
| | X'0000' | Edge-to-edge: On (0 mm) |

| Offset | Range | Meaning |
|---|---|---|
| 18-19 | | Xm EXTENT of the Printable Area in L-units |
| Edge-to-edge print: Off | X'3FEA' | A3 |
| | X'2CA6' | A4 |
| | X'3FEA' | A4 |
| | X'1EEB' | A5 |
| | X'2CA6' | A5 |
| | X'1565' | A6 |
| | X'370E' | B4 |
| | X'2672' | B5 |
| | X'370E' | B5 |
| | X'1A7D' | B6 |
| | X'3C04' | DLT |
| | X'2DF4' | Legal |
| | X'2DF4' | Foolscap |
| | X'2DF4' | Letter |
| | X'3C04' | Letter |
| | X'2C8C' | GovernmentLG |
| | X'2C8C' | Folio |
| | X'2B24' | F/GL |
| | X'2B24' | Eng Quatro |
| | X'26EC' | Executive |
| | X'3934' | Executive |

| Offset | Range | Meaning |
|---|---|---|
| 18-19<br>Edge-to-edge print: Off | X'1D14' | Half Letter |
| | X'1558' | Com 10 |
| | X'3394' | Com 10 |
| | X'13F0' | Monarch |
| | X'2854' | Monarch |
| | X'2204' | C5 |
| | X'30DB' | C5 |
| | X'1763' | C6 |
| | X'2204' | C6 |
| | X'1680' | DL Env |
| | X'2EDC' | DL Env |
| | X'3945' | 8K |
| | X'2953' | 16K |
| | X'3945' | 16K |
| | X'41A4' | 12 × 18 in |
| | X'3C04' | 11 × 15 in |
| | X'3664' | 10 × 14 in |
| | X'4502' | SRA3 |
| | X'2FF8' | SRA4 |
| | X'4502' | SRA4 |
| | X'2DF4' | $8^1/_2 \times 13^2/_5$ in |
| | X'121C' - X'44F5' | Custom (90.0 mm to 320.0 mm) |

| Offset | Range | Meaning |
|---|---|---|
| 18-19 | | Xm EXTENT of the Printable Area in L-units |
| Edge-to-edge print: On | X'41C6' | A3 |
| | X'2E82' | A4 |
| | X'41C6' | A4 |
| | X'20C7' | A5 |
| | X'2E82' | A5 |
| | X'1741' | A6 |
| | X'38EA' | B4 |
| | X'284E' | B5 |
| | X'38EA' | B5 |
| | X'1C59' | B6 |
| | X'3DE0' | DLT |
| | X'2FD0' | Legal |
| | X'2FD0' | Foolscap |
| | X'2FD0' | Letter |
| | X'3DE0' | Letter |
| | X'2E68' | GovernmentLG |
| | X'2E68' | Folio |
| | X'2D00' | F/GL |
| | X'2D00' | Eng Quatro |
| | X'28C8' | Executive |
| | X'3B10' | Executive |

| Offset | Range | Meaning |
|---|---|---|
| 18-19<br>Edge-to-edge print: On | X'1EF0' | Half Letter |
| | X'1734' | Com 10 |
| | X'3570' | Com 10 |
| | X'15CC' | Monarch |
| | X'2A30' | Monarch |
| | X'23E0' | C5 |
| | X'32B7' | C5 |
| | X'193F' | C6 |
| | X'23E0' | C6 |
| | X'185C' | DL Env |
| | X'30B8' | DL Env |
| | X'3B21' | 8K |
| | X'2B2F' | 16K |
| | X'3B21' | 16K |
| | X'4380' | 12 × 18 in |
| | X'3DE0' | 11 × 15 in |
| | X'3840' | 10 × 14 in |
| | X'46DE' | SRA3 |
| | X'31D4' | SRA4 |
| | X'46DE' | SRA4 |
| | X'2FD0' | $8^1/_2 \times 13^2/_5$ in |
| | X'13F8' - X'46D1' | Custom (90.0 mm to 320.0 mm) |

| Offset | Range | Meaning |
|---|---|---|
| 20-21 Edge-to-edge print: Off | | Ym EXTENT of the Printable Area in L-units |
| | X'5B27' | A3 |
| | X'3FEA' | A4 |
| | X'2CA6' | A4 |
| | X'2CA6' | A5 |
| | X'1EEB' | A5 |
| | X'1EEB' | A6 |
| | X'4EC0' | B4 |
| | X'370E' | B5 |
| | X'2672' | B5 |
| | X'2672' | B6 |
| | X'5DC4' | DLT |
| | X'4CE4' | Legal |
| | X'4744' | Foolscap |
| | X'3C04' | Letter |
| | X'2DF4' | Letter |
| | X'4CE4' | GovernmentLG |
| | X'4744' | Folio |
| | X'4744' | F/GL |
| | X'3664' | Eng Quatro |
| | X'3934' | Executive |
| | X'26EC' | Executive |

| Offset | Range | Meaning |
|---|---|---|
| 20-21<br>Edge-to-edge print: Off | X'2DF4' | Half Letter |
| | X'3394' | Com 10 |
| | X'1558' | Com 10 |
| | X'2854' | Monarch |
| | X'13F0' | Monarch |
| | X'30DB' | C5 |
| | X'2204' | C5 |
| | X'2204' | C6 |
| | X'1763' | C6 |
| | X'2EDC' | DL Env |
| | X'1763' | DL Env |
| | X'5482' | 8K |
| | X'3945' | 16K |
| | X'2953' | 16K |
| | X'6364' | 12 × 18 in |
| | X'5284' | 11 × 15 in |
| | X'4CE4' | 10 × 14 in |
| | X'61CC' | SRA3 |
| | X'4502' | SRA4 |
| | X'2FF8' | SRA4 |
| | X'4984' | $8^1/_2 \times 13^2/_5$ in |
| | X'1EEF' - X'8300' | Custom (148.0 mm to 600.0 mm) |

| Offset | Range | Meaning |
|---|---|---|
| 20-21 | | Ym EXTENT of the Printable Area in L-units |
| Edge-to-edge print: On | X'5D03' | A3 |
| | X'41C6' | A4 |
| | X'2E82' | A4 |
| | X'2E82' | A5 |
| | X'20C7' | A5 |
| | X'20C7' | A6 |
| | X'509C' | B4 |
| | X'38EA' | B5 |
| | X'284E' | B5 |
| | X'284E' | B6 |
| | X'5FA0' | DLT |
| | X'4EC0' | Legal |
| | X'4920' | Foolscap |
| | X'3DE0' | Letter |
| | X'2FD0' | Letter |
| | X'4EC0' | GovernmentLG |
| | X'4920' | Folio |
| | X'4920' | F/GL |
| | X'3840' | Eng Quatro |
| | X'3B10' | Executive |
| | X'28C8' | Executive |

| Offset | Range | Meaning |
|---|---|---|
| 20-21<br>Edge-to-edge print: On | X'2FD0' | Half Letter |
| | X'3570' | Com 10 |
| | X'1734' | Com 10 |
| | X'2A30' | Monarch |
| | X'15CC' | Monarch |
| | X'32B7' | C5 |
| | X'23E0' | C5 |
| | X'23E0 | C6 |
| | X'193F | C6 |
| | X'30B8 | DL Env |
| | X'185C | DL Env |
| | X'565E | 8K |
| | X'3B21 | 16K |
| | X'2B2F | 16K |
| | X'6540 | 12 × 18 in |
| | X'5460 | 11 × 15 in |
| | X'4EC0 | 10 × 14 in |
| | X'63A8 | SRA3 |
| | X'46DE | SRA4 |
| | X'31D4 | SRA4 |
| | X'4B60 | $8^1/_2 \times 13^2/_5$ in |
| | X'20CB'-X'84DC' | Custom (148.0 mm to 600.0 mm) |

| Offset | Range | Meaning |
|---|---|---|
| 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 |
| 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 |
| 26 | | INPUT MEDIA ID Type |
| | X'10' | MO:DCA Input Media Type OID |
| 27 | X'06' | OID Encoding |

| Offset | Range | Meaning |
|---|---|---|
| 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 |
| 29-34 | X'2B1200 040301' | Input Media ID (Common Part) |

| Offset | Range | Meaning |
|---|---|---|
| 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) |
| | 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) |

| Offset | Range | Meaning |
|---|---|---|
| 35-36 | 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 |

| Offset | Range | Meaning |
|---|---|---|
| 37-38 | X'0004' - X'0013' | Input Media ID LENGTH (Note 4) |
| Byte 39 | | Input Media ID TYPE |
| | X'00' | User Defined Name |
| 40-end | | Input Media ID (Form Name) |
| | X'4C6574 746572'(i e. Letter) | (1 to 16 Byte Form Name) |

*1 Available values vary depending on the installed option.

- 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

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000A' | LENGTH of this Self-Defining Field |
| 2-3 | X'0003' | IMAGE and CODED FONT RESOLUTION Self-Defining Field |
| 4 | X'00' | UNIT BASE 10 inches |
| 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) |

| Offset | Range | Meaning |
|---|---|---|
| 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 |
| 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

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0033' | VECTOR LENGTH |
| 2-3 | X'0004' | STORAGE POOLS Self-Defining Field |
| 4 | X'2F' | LENGTH of each Storage Pool Self-Defining Field |

| Offset | Range | Meaning |
|---|---|---|
| 5 | X'01' | Triplet ID |
| 6 | X'00' | STORAGE POOL ID |
| 7-10 | X'nnnnnnnn' | Storage pool varies based on installed memory and features |
| 11-14 | X'00000000' | Reserved |
| 15-16 | X'0011' | PAGE GRAPHICS Data |
| 17-18 | X'0012' | PAGE IMAGE Data |
| 19-20 | X'0013' | PAGE TEXT Data |
| 21-22 | X'0014' | PAGE BAR CODE Data |
| 23-24 | X'0021' | OVERLAY GRAPHICS Data |
| 25-26 | X'0022' | OVERLAY IMAGE Data |
| 27-28 | X'0023' | OVERLAY TEXT Data |
| 29-30 | X'0024' | OVERLAY BAR CODE Data |
| 31-32 | X'0031' | PAGE SEGMENT GRAPHICS Data |
| 33-34 | X'0032' | PAGE SEGMENT IMAGE Data |
| 35-36 | X'0033' | PAGE SEGMENT TEXT Data |
| 37-38 | X'0034' | PAGE SEGMENT BAR CODE Data |
| 39-40 | X'0040' | Single-Byte CODED FONT Index Tables |
| 41-42 | X'0041' | Single-Byte CODED FONT Descriptors |
| 43-44 | X'0042' | Single-Byte CODED FONT Patterns |
| 45-46 | X'0050' | CODE PAGES |
| 47-48 | X'0060' | FONT CHARACTER SETS |
| 49-50 | X'0070' | CODED FONTS |

## Storage Pools Self-Defining Field - Double Byte

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0039' | VECTOR LENGTH |
| 2-3 | X'0004' | STORAGE POOLS Self-Defining Field |
| 4 | X'35' | LENGTH of each Storage Pool Self-Defining Field |
| 5 | X'01' | Triplet ID |
| 6 | X'00' | STORAGE POOL ID |
| 7-10 | X'nnnnnnnn' | Storage pool varies based on installed memory and features |
| 11-14 | X'00000000' | Reserved |
| 15-16 | X'0011' | PAGE GRAPHICS Data |
| 17-18 | X'0012' | PAGE IMAGE Data |
| 19-20 | X'0013' | PAGE TEXT Data |
| 21-22 | X'0014' | PAGE BAR CODE Data |
| 23-24 | X'0021' | OVERLAY GRAPHICS Data |
| 25-26 | X'0022' | OVERLAY IMAGE Data |
| 27-28 | X'0023' | OVERLAY TEXT Data |
| 29-30 | X'0024' | OVERLAY BAR CODE Data |
| 31-32 | X'0031' | PAGE SEGMENT GRAPHICS Data |
| 33-34 | X'0032' | PAGE SEGMENT IMAGE Data |
| 35-36 | X'0033' | PAGE SEGMENT TEXT Data |
| 37-38 | X'0034' | PAGE SEGMENT BAR CODE Data |
| 39-40 | X'0040' | Single-Byte CODED FONT Index Tables |
| 41-42 | X'0041' | Single-Byte CODED FONT Descriptors |
| 43-44 | X'0042' | Single-Byte CODED FONT Patterns |

| Offset | Range | Meaning |
|---|---|---|
| 45-46 | X'0048' | Double-Byte CODED FONT Index Tables |
| 47-48 | X'0049' | Double-Byte CODED FONT Descriptors |
| 49-50 | X'004A' | Double-Byte CODED FONT Patterns |
| 51-52 | X'0050' | CODE PAGES |
| 53-54 | X'0060' | FONT CHARACTER SETS |
| 55-56 | X'0070' | CODED FONTS |

## Color Support Self-Defining Field

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0006' | LENGTH of this Self-Defining Field |
| 2-3 | X'0005' | COLOR SUPPORT Self-Defining Field |
| 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.

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' or X'000E' | LENGTH of this Self Defining Field |
| 2-3 | X'0006' | INSTALLED FEATURES Self Defining Field |
| 4-5 | X'0100' | DUPLEX |
| 6-7 | X'0300' | CUT SHEET Output |
| 8-9 | X'0600' | OFFSET STACKER |
| 10-11 | X'0700' | Envelopes |
| 12-13 | 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.

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'000C' or X'000E' | LENGTH of this Self Defining Field |
| 2-3 | X'0007' | AVAILABLE FEATURES Self Defining Field |
| 4-5 | X'0100' | DUPLEX |
| 6-7 | X'0300' | CUT SHEET Output |
| 8-9 | X'0600' | OFFSET STACKER |
| 10-11 | X'0700' | Envelope |
| 12-13 | X'0800' | MICR (If MICR Enabled) |

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

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0022' | VECTOR LENGTH |
| 2-3 | X'000A' | RRL RESOURCE TYPE Self<br>RRL query combinations that receive a non-zero Resource Type reply (See page 75 "XOA Request Resource List") |
| 4-5 | X'0100' | Single-Byte Coded Fonts as Host Assigned Resource ID |
| 6-7 | X'0103' | Single-Byte Coded Fonts as IBM Global Resource ID |
| 8-9 | X'0400' | Page Segments as Host Assigned Resource ID |
| 10-11 | X'0500' | Overlays as Host Assigned Resource ID |
| 12-13 | X'0600' | Device Version Code Pages as Host Assigned Resource ID |
| 14-15 | X'0603' | Device Version Code Pages as IBM Global Resource ID |
| 16-17 | X'0700' | Font Character Set as Host Assigned Resource ID |
| 18-19 | X'0703' | Font Character Set as IBM Global Resource ID |

| Offset | Range | Meaning |
|---|---|---|
| 20-21 | X'0800' | Single-Byte Coded Font Index as Host Assigned Resource ID |
| 22-23 | X'1000' | Coded Fonts as Host Assigned Resource ID |
| 24-25 | X'1003' | Coded Fonts as IBM Global Resource ID |
| 26-27 | X'1103' | Graphic Character Sets/Subsets as IBM Global Resource ID |
| 28-29 | X'1200' | Specific Code Pages as Host Assigned Resource ID |
| 30-31 | X'1203' | Specific Code Pages as IBM Global Resource ID |
| 32-33 | X'FF00' | All Resources as Host Assigned Resource ID |

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

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0034' | VECTOR LENGTH |
| 2-3 | X'000A' | RRL RESOURCE TYPE Self<br>RRL query combinations that receive a non-zero Resource Type reply (See page 75 "XOA Request Resource List") |
| 4-5 | X'0100' | Single-Byte Coded Fonts as Host Assigned Resource ID |
| 6-7 | X'0103' | Single-Byte Coded Fonts as IBM Global Resource ID |
| 8-9 | X'0200' | Double-Byte Coded LF1 Fonts as Host Assigned Resource ID |
| 10-11 | X'0203' | Double-Byte Coded LF1 Fonts as IBM Global Resource ID |
| 12-13 | X'0300' | Double-Byte Coded LF1 Font Sect as Host Assigned Resource ID |
| 14-15 | X'0400' | Page Segments as Host Assigned Resource ID |
| 16-17 | X'0500' | Overlays as Host Assigned Resource ID |
| 18-19 | X'0600 | Device Version Code Pages as Host Assigned Resource ID |
| 20-21 | X'0603' | Device Version Code Pages as IBM Global Resource ID |
| 22-23 | X'0700' | Font Character Set as Host Assigned Resource ID |
| 24-25 | X'0703' | Font Character Set as IBM Global Resource ID |

| Offset | Range | Meaning |
|---|---|---|
| 26-27 | X'0800' | Single-Byte Coded Font Index as Host Assigned Resource ID |
| 28-29 | X'0900' | Double-Byte Coded Font Sect Index as Host Assigned Resource ID |
| 30-31 | X'1000' | Coded Fonts as Host Assigned Resource ID |
| 32-33 | X'1003' | Coded Fonts as IBM Global Resource ID |
| 34-35 | X'1103' | Graphic Character Sets/Subsets as IBM Global Resource ID |
| 36-37 | X'1200' | Specific Code Pages as Host Assigned Resource ID |
| 38-39 | X'1203' | Specific Code Pages as IBM Global Resource ID |
| 40-41 | X'4000' | Data object resource as Host Assigned Resource ID |
| 42-43 | X'4009' | Data object resource with Object-OID Format |
| 44-45 | X'4100' | Data-object Font as Host Assigned Resource ID |
| 46-47 | X'4200' | Data-object Font Components as Host Assigned Resource ID |
| 48-49 | X'4209' | Data-object Font Components with Object- OID Format |
| 50-51 | X'FF00' | All Resources as Host Assigned Resource ID |

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

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0014' | VECTOR LENGTH |
| 2-3 | X'000B' | RRL RESOURCE TYPE Self<br>RRL query combinations that receive a non-zero Resource Type reply (See page 75 "XOA Request Resource List") |
| 4-5 | X'0103' | Single-Byte Coded LF1 Fonts with IBM Global Resource IDs |
| 6-7 | X'0106' | Single-Byte Coded LF1 Fonts with MVS Host Unalterable Remote Font Environment |
| 8-9 | X'0603' | Code Pages with IBM Global Resource IDs |
| 10-11 | X'0703' | Font Character Sets with IBM Global Resource IDs |

| Offset | Range | Meaning |
|---|---|---|
| 12-13 | X'0803' | Single-Byte Coded LF1 Font Index as IBM Global Resource ID |
| 14-15 | X'0806' | Single-Byte Coded LF1 Fonts Index as MVS Host Unalterable |
| 16-17 | X'1003' | Single-Byte/Double-Byte Coded Fonts with IBM Global Resource IDs |
| 18-19 | X'1007' | Single-Byte/Double-Byte Coded Fonts with Coded Font Format |

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

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0022' | VECTOR LENGTH |
| 2-3 | X'000B' | RRL RESOURCE TYPE Self<br>RRL query combinations that receive a non-zero Resource Type reply (See page 75 "XOA Request Resource List") |
| 4-5 | X'0103' | Single-Byte Coded LF1 Fonts with IBM Global Resource IDs |
| 6-7 | X'0106' | Single-Byte Coded LF1 Fonts with MVS Host Unalterable Remote Font Environment |
| 8-9 | X'0303' | Double-Byte Coded LF1 Font Secs with IBM Global Resource IDs |
| 10-11 | X'0306' | Double-Byte Coded LF1 Font Secs with MVS Host Unalterable Remote Font Environment |
| 12-13 | X'0603' | Code Pages with IBM Global Resource IDs |
| 14-15 | X'0703' | Font Character Sets with IBM Global Resource IDs |
| 16-17 | X'0803' | Single-Byte Coded LF1 Fonts Index as IBM Global Resource ID |
| 18-19 | X'0806' | Single-Byte Coded LF1 Font Index as MVS Host Unalterable |
| 20-21 | X'0903' | Double-Byte Coded LF1 Font Secs Index with IBM Global Resource ID |
| 22-23 | X'0906' | Double-Byte Coded LF1 Font Secs with MVS Host Unalterable RMTFE |
| 24-25 | X'1003' | Single-Byte/Double-Byte Coded Fonts with IBM Global Resource IDs |
| 26-27 | X'1007' | Single-Byte/Double-Byte Coded Fonts with Coded Font Format |
| 28-29 | X'4009' | Data object resource with Object-OID Format |

| Offset | Range | Meaning |
|---|---|---|
| 30-31 | X'410A' | Data-object Font with Data-object Font Format |
| 32-33 | X'4209' | Data-object Font Components with Object- OID Format |

## Bar Code Type Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0013' | VECTOR LENGTH |
| 2-3 | X'000E' | BAR CODE TYPE Self Defining Field |
| 4 | X'0D' | CODABAR Modifier Byte Options X'01' and X'02' |
| 5 | X'11' | CODE 128 Modifier Byte Option X'02' |
| 6 | X'18' | POSTNET Modifier Byte Options X'00' - X'03' |
| 7 | X'1A' | RM4SCC Modifier Byte Option X'00' |
| 8 | X'1B' | Japan Postal Bar code Modifier Byte Options X'00' and '01' |
| 9 | X'1C' | Data Matrix 2D Bar Code Modifier Byte Option X'00' |
| 10 | X'1D' | MaxiCode 2D Bar Code Modifier Byte Option X'00' |
| 11 | X'1E' | PDF417 2D Bar Code Modifier Byte Options X'00' and X'01' |
| 12 | X'1F' | Australia Post Bar Code Modifier Byte Options X'01' - X'08' |
| 13 | X'9A' | Rm4scc Modifier byte option X'01' |
| 14 | X'20' | QR Code 2D Bar Code Modifier Byte Option X'02' |
| 15 | X'21' | Code 93 Modifier Byte Option X'00' |
| 16 | X'91' | Code 128 Modifier Byte Option X'03' |
| 17 | X'98' | POSTNET (PLANET) Modifier Byte Option X'04' |
| 18 | X'22' | USPS Four-State Bar Code Modifier Byte Options X'00' through X'03' |

**Note**

- See page 205 "Bar Code Type and Modifier Description and Values" for all Bar Codes supported.

## Media-Destinations Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'001A' | LENGTH of this Self Defining Field |
| 2-3 | X'0010' | Media-Destinations self-defining ID |
| 4-5 | X'nnnn' | Default media-destination ID (Determined by Configuration) |
| 6-7 | X'0001' | First number in a range of available, contiguous media-destination IDs |
| 8-9 | X'nnnn' | Last number in a range of available, contiguous media-destination IDs; this ID must be greater than or equal to the value specified in bytes +0-1 for this set |

## Supported Group Operations Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0005' | LENGTH of this Self-Defining Field |
| 2-3 | X'0012' | SUPPORTED GROUP OPERATIONS Self-Defining Field |
| 4 | X'01' | Keep group together as a print unit |

## Product Identifier Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0053' | LENGTH of this Self Defining Field |
| 2-3 | X'0013' | PRODUCT IDENTIFIER Self Defining Field ID |
| 4 | X'38' | LENGTH of Self Defining Product ID Parameter |
| 5-6 | X'0001' | UNIQUE PRODUCT IDENTIFIER Parameter ID |

| Offset | Range | Meaning |
|---|---|---|
| 7-12 | | DEVICE TYPE |
| | X'F0F0F4F5F0F4' | MP C4504SP / MP C4504exSP / MP C4504ASP / MP C4504exASP / MP C4504exSPG / MP C4504SP TE / MP C4504exSP TE |
| | X'F0F0F5F5F0F4' | MP C5504SP / MP C5504exSP / MP C5504ASP / MP C5504exASP |
| | X'F0F0F6F0F0F4' | MP C6004SP / MP C6004exSP / MP C6004exSPG / MP C6004SP TE / MP C6004exSP TE |
| 13-15 | | DEVICE MODEL |
| | X'F0F0F0' | MP C4504SP / MP C4504exSP / MP C4504ASP / MP C4504exASP / MP C4504exSPG / MP C4504SP TE / MP C4504exSP TE<br>MP C5504SP / MP C5504exSP / MP C5504ASP / MP C5504exASP<br>MP C6004SP / MP C6004exSP / MP C6004exSPG / MP C6004SP TE / MP C6004exSP TE |
| 16-18 | X'DCC9C8' (RIH) | MANUFACTURER |
| 19-20 | X'0000' | PLANT |
| 21-32 | | SEQUENCE NUMBER (Serial number) |
| | X'F0F0F0F0F0F0F2F9F6F5F3F8' (ie. 296538) | (EBCDIC) (12 bytes) |
| 33-34 | X'0000' | TAG |
| 35-43 | | IPDS CODE LEVEL |
| | X'F0F0F0F0F44BF5F3F0' (4.530) | (EBCDIC) (9 bytes) |

| Offset | Range | Meaning |
|---|---|---|
| 44-59 | | CONTROLLER CODE LEVEL |
| | X'F0F0F0F 0F0F0F0F 0F0F0F0F 0F14BF2F 12' (1.21) | (EBCDIC) (16 bytes) |
| 60 | X'17' | LENGTH of Self Defining Product ID Parameter |
| 61-62 | X'0003' | PRINTER NAME Parameter ID |
| 63-82 | X'nnnnnnn nnnnnnnnn nnnnnnnnn nnnnnnnnn nnnnnn' | PRINTER NAME |

## Object Container Type Support Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0148' | LENGTH of this Self Defining Field |
| 2-3 | X'0014' | Object Container Type Support Self Defining Field |
| 4 | X'82' | length of the Type record |
| 5 | X'01' | Type - Page or Overlay State |
| 6-21 | X'06072b 1200040 1011600 0000000 00000' | Graphics Interchange Format (GIF) |
| 22–37 | X'06072b 1200040 1012F00 0000000 00000' | IOCA Tile Resource |

| Offset | Range | Meaning |
|---|---|---|
| 38-53 | X'06072b 1200040 1011700 0000000 00000' | JPEG File Interchange Format (JFIF) |
| 54-69 | X'06072b 1200040 1010E00 0000000 00000' | Tag Image File Format (TIFF) |
| 70-85 | X'06072b 1200040 1013C00 0000000 00000' | TIFF without transparency |
| 86-101 | X'06072b 1200040 1013D00 0000000 00000' | TIFF multi-image file with transparency |
| 102-117 | X'06072b 1200040 1013E00 0000000 00000' | TIFF multi-image file without transparency |
| 118-133 | X'06072b 1200040 1014200 0000000 00000' | AFPC TIFF |
| 134 | X'C2' | length of the Type record |
| 135 | X'02' | home state Type |

| Offset | Range | Meaning |
|---|---|---|
| 136-151 | X'06072b1200040 1011600 0000000 00000' | Graphics Interchange Format (GIF) |
| 152-167 | X'06072b1200040 1012F00 0000000 00000' | IOCA Tile Resource |
| 168-183 | X'06072b1200040 1011700 0000000 00000' | JPEG File Interchange Format (JFIF) |
| 184-199 | X'06072b1200040 1010E00 0000000 00000' | Tag Image File Format (TIFF) |
| 200-215 | X'06072b1200040 1013C00 0000000 00000' | TIFF without transparency |
| 216-231 | X'06072b1200040 1013D00 0000000 00000' | TIFF multi-image file with transparency |
| 232-247 | X'06072b1200040 1013E00 0000000 00000' | TIFF multi-image file without transparency |

| Offset | Range | Meaning |
|---|---|---|
| 248-263 | X'06072b 1200040 1013500 0000000 00000' | TrueType/OpenType Collection |
| 264-279 | X'06072b 1200040 1013300 0000000 00000' | TrueType/OpenType Font |
| 280-295 | X'06072b 1200040 1013900 0000000 00000' | Color Management Resource |
| 296-311 | X'06072b 1200040 1011400 0000000 00000' | Color Mapping Table setup file |
| 312-327 | X'06072b 1200040 1014200 0000000 00000' | AFPC TIFF |

## Device-Appearance Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0006' | LENGTH of this Self Defining Field |
| 2-3 | X'0022' | Device appearance Self Defining Field |
| 4-5 | X'0001' | Device-default monochrome appearance |

### Finishing Operations Self-Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0008' | LENGTH of this Self Defining Field |
| 2-3 | X'0018' | FINISHING OPERATIONS Self Defining Field |
| 4 | X'01' | Corner Staple |
| 5 | X'12' | Saddle Stitch (In) |
| 6 | X'03' | Edge Stitch |
| 7 | X'0A' | Punch |

### PFC Triplets Supported Self Defining Field ID

| Offset | Range | Meaning |
|---|---|---|
| 0-1 | X'0008' | LENGTH of this Self Defining Field |
| 2-3 | X'0016' | PFC Triplets Supported Self Defining Field |
| 4 | X'75' | Color Fidelity Triple |
| 5 | X'86' | Text Fidelity Triplet |
| 6 | X'88' | Finishing Fidelity Control Triplet |
| 7 | X'96' | CMR Tag 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'1500' | SELECT INPUT MEDIA SOURCE | |
| 2 | | INPUT MEDIA SOURCE | X'02C8..01' |
| | X'00' | Tray 1 | |
| | X'01' | Tray 2 | |
| | X'02' | Tray 3 | |
| | X'02' | Tray 3 (LCT) | |
| | X'03' | Tray 4 | |
| | | Large capacity tray (LCT)*1 | |
| | X'03' | Tray 1 + Tray 2 + Tray 3 (LCT) + LCT + Bypass tray | |
| | X'04' | Tray 1 + Tray 2 + Tray 3 + Tray 4+ LCT + Bypass tray | |
| | X'63' | Bypass tray | |
| | X'FF' | Default tray | |

*1 Available values vary depending on the installed option.

## 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'1600' | SET MEDIA ORIGIN | |
| 2 | | MEDIA ORIGIN | X'026F..02' |
| | X'00' | Top-left corner | |
| | X'01' | Top-right corner<br>(Bottom-left corner if back side of duplex sheet) | |
| | X'02' | Bottom-right corner | |
| | X'03' | Bottom-left corner<br>(Top-right corner if back side of duplex sheet) | |

## XOH Set Media Size

This order specifies SIZE of the physical medium.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'1700' | Set Media Size (SMS) order code | |
| 2 | | UNIT BASE (Measurement Units) | X'0274..02' |
| | X'00' | 10 in. | |
| | X'01' | 10 centimeters | |
| 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 5-6 | X'0001' - X'7FFF' | Xm EXTENT of MEDIUM<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0272..02' |
| | X'FFFF' | Printer Default (Printer's control panel setting or Tray sensors) | |
| 7-8 | X'0001' - X'7FFF' | Ym EXTENT of MEDIUM<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0273..02' |
| | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'F500' | OPC Order Code | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0400' | Define Group Boundary | X'018F..00'<br>X'0277..01'<br>X'0278..01'<br>X'027A..01'<br>X'027B..01' |
| 2 | X'00' | Initiate Group | |
| | X'01' | Terminate Group | |
| 3 | X'00' - X'FF' | Group Level | |
| 4-end of command | See specific triplet description. | X'00' Group ID triplet | |
| | | X'6E' Group information triplet | X'027C..01' |
| | | X'85' Finishing Operation triplet | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'02'-X'FF' | LENGTH | X'027A..01'<br>X'027B..02' |
| 1 | X'01' | Group ID Triplet | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2 | | HOST FORMAT | |
| | X'01' | MVS and VSE print-data | |
| | X'02' | VM print-data | |
| | X'03' | OS/400 print-data (4 char spool file #) | |
| | X'06' | AIX and NT print-data | |
| | X'13' | OS/400 print-data (6 char spool file #) | |
| 4-11 | | MVS and VSE ID DATA | |
| | X'C2E4C4C7C5E3F0F1' (i.e. BUDGET01) | Job Name (EBCDIC) (8 bytes) | |
| 4-11 | | VM ID DATA | |
| | X'C2E4C4C7C5E3F0F1' (i.e. BUDGET01) | Filename (EBCDIC) (8 bytes) | |
| 23-32 | | OS/400 ID DATA | |
| | X'C2E4C4C7C5E3F2F0F0F1'(i.e. BUDGET2000) | Filename (EBCDIC) (10 bytes) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 3-End | | AIX and NT ID DATA | |
| | X'4445505442554447455432303030' (i.e. DEPTBUDGET2000) | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'09' | LENGTH | X'027A..01'<br>X'027B..01' |
| 1 | X'85' | Finishing Triplet ID | |
| 2 | | OPERATION TYPE | X'027C..03'<br>X'027C..09' |
| | X'01' | Corner Staple | |
| | X'03' | Edge Stitch | |
| | X'0A' | Punch | |
| | X'12' | Saddle Stitch In | |
| 3-4 | X'0000' | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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)<br>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) | |
| 6 | | FINISHING OPERATION COUNT | X'027C..05'<br>X'027C..07' |
| | X'00' | Device Default Number, Default Position | |
| | X'02' | Punch 2 Holes, Default Position<br>or<br>Edge Stitch 2 Staples, Default Position | |
| | X'03' | Punch 3 Holes, Default Position | |
| | X'04' | Punch 4 Holes, Default Position | |
| 7-8 | | FINISHING OPERATION AXIS OFFSET | X'027C..06' |
| | X'FFFF' | Device Default Axis Offset | |

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

A = Internal Finisher SR3130

C = Finisher SR3210

D = Finisher SR3230

E = Booklet Finisher SR3220

F = Booklet Finisher SR3240

S = Staple

P = Punch

B = Booklet

Y = Yes

N = No

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| A3 (297 × 420 mm) SEF | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| A4 (210 × 297 mm) SEF | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y | Y*1 | Y |
| A4 (210 × 297 mm) LEF | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | N |
| A5 (210 × 148 mm) SEF | N | N | N | Y*1 | N | Y*1 | N | Y*1 | N | N | Y*1 | N |
| A5 (210 × 148 mm) LEF | N | N | N | Y*1 | N | Y*1 | N | Y*1 | N | N | Y*1 | N |

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| A6 (105 × 148 mm) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| B4 (257 × 364 mm) SEF | Y | Y*2 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| B5 (182 × 257 mm) SEF | Y | Y*2 | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y | Y*1 | Y |
| B5 (182 × 257 mm) LEF | Y | Y*2 | Y | Y | Y | Y | Y | Y | N | Y | Y | N |
| B6 (128 × 182 mm) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| DLT (11 × 17 in.) SEF | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| Legal (8.5 × 14 in.) SEF | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y | Y*1 | Y |
| Foolscap (8.5 × 13 in.) SEF | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | N |
| Letter (8.5 × 11 in.) SEF | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y | Y*1 | Y |
| Letter (8.5 × 11 in.) LEF | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | N |
| GovernmentLG (8.25 × 14 in.) SEF | Y | N | Y | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | Y |
| Folio (8.25 × 13 in.) SEF | Y | N | Y | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | Y |
| F/GL (8 × 13 in.) SEF | N | N | Y*4 | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | N |

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| Eng Quatro (8 × 10 in.) SEF | N | N | Y*4 | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | N |
| Executive (7.25 × 10.5 in.) SEF | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | N |
| Executive (7.25 × 10.5 in.) LEF | Y | N | Y | Y | Y | Y | Y | Y | N | Y | Y | N |
| HalfLetter (5.5 × 8.5 in.) SEF | N | N | N | Y*1 | N | Y*1 | N | Y*1 | N | N | Y*1 | N |
| Com 10 (4.125 × 9.5 in.) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| Com 10 (4.125 × 9.5 in.) LEF | N | N | N | N | N | N | N | N | N | N | N | N |

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| Monarch (3.875 × 7.5 in.) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| Monarch (3.875 × 7.5 in.) LEF | N | N | N | N | N | N | N | N | N | N | N | N |
| C5 (162 × 229 mm) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| C5 (162 × 229 mm) LEF | N | N | N | N | N | N | N | N | N | N | N | N |
| C6 (114 × 162 mm) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| C6 (114 × 162 mm) LEF | N | N | N | N | N | N | N | N | N | N | N | N |

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| DL Env (110 × 220 mm) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| DL Env (110 × 220 mm) LEF | N | N | N | N | N | N | N | N | N | N | N | N |
| 8K (267 × 390 mm) SEF | Y | Y*3 | Y | Y | Y | Y | Y | Y | N | Y | Y | N |
| 16K (195 × 267 mm) SEF | Y | Y*3 | Y | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | N |
| 16K (195 × 267 mm) LEF | Y | Y*3 | Y | Y | Y | Y | Y | Y | N | Y | Y | N |
| 12 × 18 in. SEF | N | N | Y*4 | N | N | N | Y | N | Y | N | N | Y |
| 11 × 15 in. SEF | N | N | Y*4 | Y | Y | Y | Y | Y | N | Y | Y | Y |

| | A | | C | | D | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S | P | S | P | S | P | S | P | B | S | P | B |
| 10 × 14 in. SEF | N | N | Y*4 | Y*5 | Y | Y*5 | Y | Y*5 | N | Y | Y*5 | Y |
| SRA3 (320 × 450 mm) SEF | N | N | N | N | N | N | N | N | N | N | N | N |
| SRA4 (225 × 320 mm) SEF | N | N | Y*4 | N | Y | N | Y | N | N | Y | N | Y |
| SRA4 (225 × 320 mm) LEF | N | N | N | N | N | N | N | N | N | N | N | N |
| 8.5 × 13.4 in. SEF | Y | Y*1 | Y | Y*1 | Y | Y*1 | Y | Y*1 | N | Y | Y*1 | Y |

*1 Not supported on 3 hole punch (Region B model) or 4 hole punch (Region A model) except for Northern Europe type finisher.

*2 Supported on 2 hole punch (Region A model) and 4 hole punch for Northen Europe type finisher only.

*3 Supported on 2 hole punch (Region A model) only.

*4 Not supported on Staple-free stapling.

*5 Not supported on 4 hole punch (Region A model) except for Northren Europe type finisher.

**Note**

- The punch units in this manual are given in two units of measure: metric and inch. If your machine is a Region A model, refer to the metric units. If your machine is a Region B model,

refer to the inch units. For details about the region of your machine, see "Model-Specific Information", Getting Started.

- 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.

## 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0300' | Define Group Boundary | |
| 2 | X'00'-X'FF' | Operation Identifier | |
| | X'01' | Keep group together as a print unit | |
| | X'04' | Finish | |
| 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.

# 2. Presentation Text Command Set

## Presentation Text Commands

| Name | Command | Sub-command | Where to Look |
|---|---|---|---|
| Load Equivalence | X'D61D' | | page 133 "Load Equivalence" |
| Write Text | X'D62D' | | page 133 "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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | | MAPPING TYPE | X'02C6..02' |
| | X'0100' | Suppression Mapping | |
| 2-3 | X'0001' - X'00FF' | INTERNAL VALUE from BS..ES Pair | X'02C1..02'<br>X'02C8..02' |
| 4-5 | X'0001' - X'007F' | EXTERNAL VALUE from LCC | X'02C8..02' |
| 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 page 234 "Load Font Index")
- Load Font Control (See page 229 "Load Font Control")
- Font Local ID (See page 46 "Load Font Equivalence")
- Resident Font Data



When the printer processes a Begin Page, it uses the values from the existing Logical Page Descriptor (See page 50 "Logical Page Descriptor") or Initialization Default (See "IPDS Initialization Defaults", IPDS Technical Reference 1) 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' | LENGTH | X'021E..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 3 | | ABSOLUTE MOVE BASELINE | |
| | X'D2' | Unchained | |
| | X'D3' | Chained | |
| 4-5 | X'0000' - X'7FFF' | DISPLACEMENT (Bc)<br>See "Notation Conventions", IPDS Technical Reference 1. | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'04' | LENGTH | X'021E..01' |
| 3 | | ABSOLUTE MOVE INLINE | |
| | X'C6' | Unchained | |
| | X'C7' | Chained | |
| 4-5 | X'0000' - X'7FFF' | DISPLACEMENT (Ic)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0214..01' |

## Begin Line

Begin Line Control Sequence begins a new line.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'02' | LENGTH | X'021E..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'03' | LENGTH | X'021E..01' |
| 3 | | BEGIN SUPPRESSION | |
| | X'F2' | Unchained | |
| | X'F3' | Chained | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'04' or X'07' | LENGTH | X'021E..01' |
| 3 | | DRAW B-AXIS RULE | |
| | X'E6' | Unchained | |
| | X'E7' | Chained | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 4-5 | X'8000' - X'7FFF' | LENGTH (Bl)<br>See "Notation Conventions", IPDS Technical Reference 1. | |
| 6-7 | | WIDTH (Bw) | |
| | X'8000' - X'7FFF' | Printer Default 24/1440 inch | |
| | X'FFFF' | | |
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'04' or X'07' | LENGTH | X'021E.. 01' |
| 3 | | DRAW I-AXIS RULE | |
| | X'E4' | Unchained | |
| | X'E5' | Chained | |
| 4-5 | X'8000' - X'7FFF' | LENGTH (Il)<br>See "Notation Conventions", IPDS Technical Reference 1. | |
| 6-7 | | WIDTH (Iw) | |
| | X'8000' - X'7FFF' | Printer Default 24/1440 inch | |
| | X'FFFF' | | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'03' | LENGTH | X'021E..01' |
| 3 | | END SUPPRESSION | |
| | X'F4' | Unchained | |
| | X'F5' | Chained | |
| 4 | X'01' - X'FF' | SUPPRESSION ID | X'0202..01'<br>X'0204..01'<br>X'0298..01' |

## No Operation

No Operation Control Sequence has no effect on presentation.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'02' - X'FF' | LENGTH | X'021E..01' |
| 3 | | NO OPERATION | |
| | X'F8' | Unchained | |
| | X'F9' | Chained | |
| 4-255 | | DATA (Ignored) | |

## Overstrike

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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'05' | LENGTH | X'021E..01' |
| 3 | | OVERSTRIKE | |
| | X'72' | Unchained | |
| | X'73' | Chained | |
| 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 | |
| 5 | | IGNORED | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Escape Sequence | |
| 2 | X'04' | LENGTH | X'021E.. 01' |
| 3 | | RELATIVE MOVE BASELINE | |
| | X'D4' | Unchained | |
| | X'D5' | Chained | |
| 4-5 | X'8000' - X'7FFF' | INCREMENT (Br)<br>See "Notation Conventions", IPDS Technical Reference 1. | |

## Relative Move Inline

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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' | LENGTH | X'021E.. 01' |
| 3 | | RELATIVE MOVE INLINE | |
| | X'C8' | Unchained | |
| | X'C9' | Chained | |
| 4-5 | X'8000' - X'7FFF' | INCREMENT (Ir)<br>See "Notation Conventions", IPDS Technical Reference 1. | |

## Repeat String

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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2 | X'04' - X'FF' | LENGTH | X'021E.. 01' |
| 3 | | REPEAT STRING | |
| | X'EE' | Unchained | |
| | X'EF' | Chained | |
| 4-5 | X'0000' - X'7FFF' | REPEAT LENGTH (RL) | X0219..01 ' |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' | LENGTH | X'021E.. 01' |
| 3 | | SET BASELINE INCREMENT | |
| | X'D0' | Unchained | |
| | X'D1' | Chained | |
| 4-5 | X'8000' - X'7FFF' | INCREMENT (Bi)<br>See "Notation Conventions", IPDS Technical Reference 1. | |
| | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'03' | LENGTH | X'021E..01' |
| 3 | | SET CODED FONT LOCAL | |
| | X'F0' | Unchained | |
| | X'F1' | Chained | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'14' - X'16' | LENGTH | X'021E..01' |
| 3 | | SET EXTENDED TEXT COLOR | |
| | X'80' | Unchained | |
| | X'81' | Chained | |
| 4 | X'00' | RESERVED | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 6-9 | X'00000000' | RESERVED | |
| 10 | | 1ST COLOR COMPONENT BITS | X'020E.. 05' |
| | X'01' - X'08' | (RGB, CMYK, CIELAB) | |
| | X'10' | (Standard OCA, Highlight) | |
| 11 | | 2ND COLOR COMPONENT BITS | X'020E.. 06' |
| | X'00' - X'08' | (RGB, CMYK, Highlight, CIELAB) | |
| 12 | | 3RD COLOR COMPONENT BITS | X'020E.. 07' |
| | X'00' - X'08' | (RGB, CMYK, CIELAB) | |
| 13 | | 4TH COLOR COMPONENT BITS | X'020E.. 08' |
| | X'00' - X'08' | (CMYK) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 14-17 | | COLOR VALUE | X'020E..03'<br>X'020E..04' |
| | | RGB Color Space | |
| | 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) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 14-17 | | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' | LENGTH | X'021E..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 3 | | SET INLINE MARGIN | |
| | X'C0' | Unchained | |
| | X'C1' | Chained | |
| 4-5 | X'0000' - X'7FFF' | DISPLACEMENT (Ia)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0210..01' |
| | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' or X'05' | LENGTH | X'021E..01' |
| 3 | | SET INTERCHARACTER ADJUSTMENT | |
| | X'C2' | Unchained | |
| | X'C3' | Chained | |
| 4-5 | X'0000' - X'7FFF' | ADJUSTMENT (ica)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0212..01' |
| | X'FFFF' | Use LPD value. If no LPD is received, use printer default | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' or X'05' | LENGTH | X'021E..01' |
| 3 | | SET TEXT COLOR | |
| | X'74' | Unchained | |
| | X'75' | Chained | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'06' | LENGTH | X'021E.. 01' |
| 3 | | SET TEXT ORIENTATION | |
| | X'F6' | Unchained | |
| | X'F7' | Chained | |
| 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 | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'04' | LENGTH | X'021E..01' |
| 3 | | SET VARIABLE SPACE CHARACTER INCREMENT | |
| | X'C4' | Unchained | |
| | X'C5' | Chained | |
| 4-5 | X'0000' - X'7FFF' | INCREMENT (vsi)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0217..01' |
| | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'03' or X'06' | LENGTH | X'021E..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 3 | | TEMPORARY MOVE BASELINE | |
| | X'78' | Unchained | |
| | X'79' | Chained | |
| 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' | |
| 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' | |
| 6-7 | X'0000' - X'7FFF' | TEMPORARY BASELINE INCREMENT<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0298..03' |
| | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'02' - X'FF' | LENGTH | X'021E..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 3 | | TRANSPARENT DATA | |
| | X'DA' | Unchained | |
| | X'DB' | Chained | |
| 4-255 | | CHARACTER STRING | |

## Underscore

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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'2BD3' | TEXT CONTROL Sequence | |
| 2 | X'03' | LENGTH | X'021E..01' |
| 3 | | UNDERSCORE | |
| | X'76' | Unchained | |
| | X'77' | Chained | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |

# 3. IM Image Command Set

## IM Image Commands

| Name | Command | Sub-command | Where to Look |
|---|---|---|---|
| Write Image Control | X'D63D' | | page 156 "Write Image Control" |
| Write Image | X'D64D' | | page 160 "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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0001' - X'7FFF' | Pixels per scan line in the output image | X'0242..01'<br>X'0243..01' |
| 2-3 | X'0001' - X'7FFF' | Number of scan lines in the output Image | X'0244..01'<br>X'0245..01' |
| 4-5 | X'0001' - X'7FFF' | Pixels per scan line in the input image | X'0242..01'<br>X'0243..01' |
| 6-7 | X'0001' - X'7FFF' | Number of scan lines in the input image | X'0244..01'<br>X'0245..01' |
| 8 | X'00' | Uncompressed input image | X'0246..01' |
| 9 | X'00' | One bit per pixel in the input image format | X'0246..01' |
| 10 | | PIXEL MAGNIFICATION FACTOR | X'0247..01' |
| | X'01' | No Magnification Factor | |
| | X'02' | Magnification Factor of 2 | |
| 11 | | SCAN LINE MAGNIFICATION FACTOR | X'0247..01' |
| | X'01' | No Magnification Factor | |
| | X'02' | Magnification Factor of 2 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12-13 | | SCAN LINE DIRECTION | X'0248..01' |
| | X'0000' | 0 degrees | |
| | X'2D00' | 90 degrees | |
| | X'5A00 | 180 degrees | |
| | X'8700' | 270 degrees | |
| 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 | |
| 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 | |
| 17-19 | X'FF8000' - X'007FFF' | Xp, I or I offset coordinate of the IM image block origin | X'024A..01' |
| 20 | X'00' | Reserved | |
| 21-23 | X'FF8000' - X'007FFF' | Yp, B or B offset coordinate of the IM image block origin | X'024A..01' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 24-25 | X'000F' | Gray - Limited Simulated Color Support | |
| | X'0010' | X'0010' Brown - Limited Simulated Color Support | |
| | X'FF07' | Printer Default (Black) | |
| | X'FF08' | Color of Medium (Reset)<br>For details about color simulation and product support specifics, see "Color Simulation", IPDS Technical Reference 1. | |

# 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.



| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-End | | Binary RASTER IMAGE | X'026A..01'<br>X'026B..01'<br>X'0264..01' |

# 4. IO Image Command Set

## IO Image Commands

| Name | Command | Sub-command | Where to Look |
|---|---|---|---|
| Write Image Control 2 | X'D63E' | | page 162 "Write Image Control 2" |
| Image Area Position | | X'AC6B' | page 162 "Image Area Position" |
| Image Output Control | | X'A66B' | page 163 "Image Output Control" |
| Image Data Descriptor | | X'A6FB' | page 165 "Image Data Descriptor" |
| Write Image 2 | X'D64E' | | page 168 "Write Image 2" |
| Begin Segment | | X'70' | page 168 "Begin Segment" |
| Begin Image Content | | X'91' | page 168 "Begin Image Content" |
| Image Size Parameter | | X'94' | page 168 "Image Size Parameter" |
| Image Encoding Parameter | | X'95' | page 169 "Image Encoding Parameter" |
| Image Data Element Size Parameter | | X'96' | page 170 "Image Data Element Size Parameter" |
| Image Look -up Table ID Parameter | | X'97' | page 171 "Image Look-up Table ID Parameter" |
| Image Data | | X'FE92' | page 171 "Image Data" |

| Name | Command | Sub-command | Where to Look |
|---|---|---|---|
| End Image Content | | X'93' | page 172 "End Image Content" |
| End Segment | | X'71' | page 172 "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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'000B' - X'xxxx' | LENGTH of Image Area Position | X'0202..05' |
| 2-3 | X'AC6B' | STRUCTURED FIELD ID | X'020B..05' |
| 4-5 | X'8000' - X'7FFF' | Image Object Area Origin Xp, I, or Ioffset Coordinate Position<br>See "Notation Conventions", IPDS Technical Reference 1. | |
| 6-7 | X'8000 - X'7FFF' | Image Object Area Origin Yp, B, or B-offset Coordinate Position<br>See "Notation Conventions", IPDS Technical Reference 1. | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| 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 | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0010' - X'xxxx' | LENGTH of Image Output Control | X'0202..05' |
| 2-3 | X'A66B' | Structured Field ID | X'020B..05' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 4 | | UNIT BASE (Measurement Units) | X'0205..05' |
| | X'00' | 10 Inches | |
| | X'01' | 10 Centimeters | |
| 5-6 | X'0001'-X'7FFF' | L-units per UNIT BASE | X'0206..05' |
| 7-8 | X'0001'-X'7FFF' | X extent of IO image block in L-units for Page, Overlay and Page Segment<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| | X'FFFF' | Use Load Page Descriptor Value | |
| 9-10 | X'0001'-X'7FFF' | Y extent of IO image block in L-units for Page, Overlay and Page<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| | X'FFFF' | Use Load Page Descriptor Value | |
| 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 | |
| 12-13 | X'8000'-X'7FFF' | X OFFSET L-units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0209..05' |
| 14-15 | X'8000'-X'7FFF' | Y OFFSET L-units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0209..05' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 16-n | | IOC Triplets<br>• 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. For details, see "Color Specification", IPDS Technical Reference 1.<br>• 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. For details, see "Presentation Space Reset Mixing", IPDS Technical Reference 1. | |

**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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'000F' - X'xxxx' | LENGTH of Image Data Descriptor | X'0202..05' |
| 2-3 | X'A6FB' | STRUCTURED FIELD ID | X'020B..05' |
| 4-5 | X'0000' | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 6 | | UNIT BASE (Measurement Units) | X'0205..05' |
| | X'00' | 10 Inches | |
| | X'01' | 10 Centimeters | |
| 7-8 | X'0001'-X'7FFF' | X image points per unit base | X'0206..05' |
| 9-10 | X'0001'-X'7FFF' | Y image points per unit base | X'0206..05' |
| 11-12 | X'0001'-X'7FFF' | X EXTENT of image presentation space (in image points)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| 13-14 | X'0001'-X'7FFF' | Y EXTENT of image presentation space (in image points)<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| 15-end of IDD | | IOCA SDFs | |
| 0 | X'F4' | Set Extended Bilevel Image Color SDF | |
| | X'F6' | Set Bilevel Image Color SDF *1 | |
| 1 | X'04' | LENGTH | |
| 2 | X'00' | AREA | |
| 3 | X'00' | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| | 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 | |
| 4-5 | 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'70' | Begin Segment | X'0570..0F' |
| 1 | X'00'-X'FF' | Length | |

### Begin Image Content

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'91' | Begin Image Content | X'0591..0F' |
| 1 | X'01'-X'FF' | Length | X'0500..03' |
| 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 page 165 "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).

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

## Image Encoding Parameter

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'95' | IMAGE ENCODING | X'0595..0F' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 1 | X'02'-X'FF' | LENGTH of the following bytes | X'0500..03' |
| 2 | | COMPRESSION ALGORITHM | X'0595..10'<br>X'0595..11' |
| | X'01' | IBM MMR compression | |
| | 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) | |
| 3 | | RECORDING ALGORITHM | X'0595..10' |
| | X'01' | RIDIC (Recording Image Data Inline Code) Unpadded RIDIC | |
| 4 | | BIT ORDER within each image data byte | |
| | X'00' | Left-to-Right | |
| | X'01' | Right-to-Left | |

## Image Data Element Size Parameter

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'96' | IMAGE DATA ELEMENT SIZE | X'0596..0F' |
| 1 | X'01'-X'FF' | LENGTH of the following bytes | X'0500..03' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2 | | NUMBER of BITS per PIXEL | X'0596..10'<br>X'0500..04'<br>X'0596..11' |
| | X'01' | 1 bit per pixel | |
| | X'08' | 8 bits per pixel | |

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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'97' | Image Look-up Table ID Parameter | X'0597..0F' |
| 1 | X'01'-X'FF' | LENGTH of the following bytes | X'0500..03' |
| 2 | X'00' | Look up table ID | X'0597..10' |

## Image Data

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'FE92' | Image Data | X'0592..0F' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-3 | X'0001'-X'FFFF' | Length | X'0500..03"<br>X'0594..01' |
| 4-end | X'x...x' | Image Data | X'0597..10' |

## End Image Content

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'93' | End Image Content | X'0593..0F' |
| 1 | X'00'-X'FF' | Length | |

## End Segment

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'71' | End Segment | X'0571..0F' |
| 1 | X'00'-X'FF' | Length | |

# 5. Graphics Command Set

## 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' | | page 173 "Write Graphics Control" |
| Graphics Area Position | | X'AC6B' | page 173 "Graphics Area Position" |
| Graphics Output Control | | X'A66B' | page 174 "Graphics Output Control" |
| Graphics Data Descriptor | | X'A6BB' | page 176 "Graphics Data Descriptor" |
| Write Graphics | X'D685' | | page 181 "Write Graphics" |
| Begin Segment Introducer | | X'70' | page 182 "Begin Segment Introducer" |

### Write Graphics Control

#### Graphics Area Position

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'000B'-X'xxxx' | LENGTH of Graphics Area Position | X'0202..05' |
| 2-3 | X'AC6B' | Structured Field ID. | X'020B..05' |
| 4-5 | X'8000'-X'7FFF' | GRAPHICS BLOCK ORIGIN Xp, I, or I-offset Coordinate Position.<br>See "Notation Conventions", IPDS Technical Reference 1. | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 6-7 | X'8000'-X'7FFF' | GRAPHICS BLOCK ORIGIN Yp, B, or B-offset Coordinate Position.<br>See "Notation Conventions", IPDS Technical Reference 1. | |
| 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 | |
| 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 | |
| 11-n | | Ignored | |

## Graphics Output Control

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0010'-X'xxxx' | LENGTH of Graphics Output Control (GOC) | X'0202..05' |
| 2-3 | X'A66B' | STRUCTURED FIELD ID | X'020B..05' |
| 4 | | UNIT BASE (Measurement Units) | X'0205..05' |
| | X'00' | 10 Inches | |
| | X'01' | 10 Centimeters | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 5-6 | X'0001' - X'7FFF' | L-Units per UNIT BASE | X'0206..05' |
| 7-8 | X'0001' - X'7FFF' | X EXTENT of GRAPHICS BLOCK in L-units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| | X'FFFF' | Use Load Page Descriptor Value | |
| 9-10 | X'0001' - X'7FFF' | Y EXTENT of GRAPHICS BLOCK in L-units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| | X'FFFF' | Use Load Page Descriptor Value | |
| 11 | | MAPPING Control Option | X'0208..05' |
| | X'10' | Scale to Fit | |
| | X'20' | Center and Trim | |
| | X'30' | Position and Trim | |
| 12-13 | X'8000' - X'7FFF' | X OFFSET L-units.<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0209..05' |
| 14-15 | X'8000' - X'7FFF' | Y OFFSET L-units.<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0209..05' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 16-n | | GOC Triplets<br>• 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. For details, see "Color Specification", IPDS Technical Reference.<br>• 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. For details, see "Presentation Space Reset Mixing", IPDS Technical Reference 1. | |



**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 page 176 "Graphics Data Descriptor").

## Graphics Data Descriptor

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'001C'-X'xxxx' | LENGTH of Graphics Data Descriptor (GDD) | X'0202..05' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-3 | X'A6BB' | STRUCTURED FIELD ID | X'020B..05' |
| 4 | | UNIT BASE (Measurement Units) | X'0205..05' |
| | X'00' | 10 Inches | |
| | X'01' | 10 Centimeters | |
| 5 | X'00' | Reserved | |
| 6-7 | X'0001' - X'7FFF' | Xg UNITS per UNIT BASE | X'0206..05' |
| 8-9 | X'0001' - X'7FFF' | Yg UNITS per UNIT BASE Yg = Xg | X'0206..05' |
| 10-13 | X'00000000' | Reserved | |
| 14-15 | X'8000'-X'7FFF' | Xg LEFT LIMIT of Graphic Presentation Space Window. See "Notation Conventions", IPDS Technical Reference 1. | |
| 16-17 | X'8000'-X'7FFF' | Xg RIGHT LIMIT of Graphic Presentation Space Window. See "Notation Conventions", IPDS Technical Reference 1. | |
| 18-19 | X'8000'-X'7FFF' | Yg TOP LIMIT of Graphic Presentation Space Window. See "Notation Conventions", IPDS Technical Reference 1. | |
| 20-21 | X'8000'-X'7FFF' | Yg BOTTOM LIMIT of Graphic Presentation Space Window. See "Notation Conventions", IPDS Technical Reference 1. | |
| 22-27 | X'000000000000' | Reserved | |
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'21' | SET CURRENT DEFAULTS | X'0300..21' |
| 1 | X'04'-X'FF' | LENGTH of Data | X'0300..03' |
| 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 | |
| 3-4 | | MASK Bytes. See "Graphics Drawing Order Defaults and Masks" | X'0300..03' |
| 5 | | DEFAULT Byte | X'0300..02' |
| | X'0F' | Use Standard Default | X'0300..03' |
| | X'8F' | Use the following Data Bytes | |
| 6-n | | Data bytes | X'0300..21' |

**Note**

- See page 182 "Begin Segment Introducer" (Drawing Orders) for valid drawing order defaults.

### Graphics Drawing Order Defaults and Masks

| Set Byte | Mask Bit | Meaning |
|---|---|---|
| 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 |

| Set Byte | Mask Bit | Meaning |
|---|---|---|
| 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 page 176 "Graphics Data Descriptor" (Graphics Drawing Order Defaults and Masks). The current value of an attribute is taken into account when the drawing order is received.

| Meaning | Range |
|---|---|
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'70' | BEGIN SEGMENT code | |
| 1 | X'0C' | LENGTH of the following parameters | X'0370..C1' |
| 2-5 | | SEGMENT ID (Ignored) | |
| 6 | X'00' | Reserved | |
| 7 | | FLAGS | X'0370..01'<br>X'0370..82' |
| | Bits 0-2: 00 | Reserved | |
| | 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 | |
| 8-9 | X'0000'-X'FFFF' | Length of this segment (SEGLEN) | |
| 10-13 | X'00000000' | Reserved | |
| 14-n | | See page 182 "Begin Segment Introducer" (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:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'0D' | Order code | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 1 | | BACKGROUND MIX ATTRIBUTE | X'0300..04' X'0300..0E' |
| | X'00' | Drawing default | |
| | X'05' | Leave Alone | |

**Set Character Angle:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'34' | Order code | |
| 1 | X'04' | Length | X'0300..03' |
| 2-3 | X'8000' - X'7FFF' | Xg COORDINATE | X'0334..00' |
| 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:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'39' | Order code | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 1 | | PRECISION TYPE | X'0300..04' X'0300..0E' |
| | X'00' | Current default | |
| | X'01' | String Precision | |
| | X'02' | Character Precision | |

**Set Character Set:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'38' | Order code | |
| 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:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'0A' | Order code | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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)<br>For details about color simulation and product support specifics, see "Color Simulation" IPDS Technical Reference 1. | |

**Set Extended Color:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'26' | Order code | |
| 1 | X'02' | Length | X'0300..03' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-3 | 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)<br>For details about color simulation and product support specifics, see "Color Simulation" IPDS Technical Reference 1. | |



**Set Line Type:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'18' | Order code | |
| 1 | | LINE TYPE | X'0300..04'<br>X'0300..0E' |
| | X'00' | Current default | |
| | 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):**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'11' | Order code | |
| 1 | X'02' | Length | X'0300..03' |
| 2-3 | | FRACTIONAL LINE WIDTH | X'0300..04'<br>X'0300..0E' |
| | X'0000' | Current default | |
| | 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):**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'11' | Order code | |
| 1 | X'02' | Length | X'0300..03' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 2-3 | | FRACTIONAL LINE WIDTH | X'0300..04'<br>X'0300..0E' |
| | X'0000' | Current default | |
| | 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:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'19' | Order code | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 1 | | LINE WIDTH | X'0300..04' X'0300..0E' |
| | X'00' | Current default | |
| | X'01' - X'0F' | 2-58 Pixels Wide (4 pixels increments) | |
| | X'10' - X'FF' | 62 Pixels Wide | |

**Set Marker Precision:**



| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'3B' | Order code | |
| 1 | | MARKER PRECISION | X'0300..04' X'0300..0E' |
| | X'00' | Drawing default | |
| | X'01' | Character Precision | |
| | X'02' | Stroke Precision | |

**Set Mix:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'0C' | Order code | |
| 1 | | MIX ATTRIBUTE | X'0300..04' X'0300..0E' |
| | X'00' | Drawing default | |
| | X'02' | Overpaint | |

**Set Pattern Set:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'08' | Order code | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 1 | X'00' | PATTERN SET ID | X'0368..03' |

**Set Pattern Symbol:**

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'28' | Order code | |
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'B2' | Order Code | |
| 1 | X'12' - X'14' | LENGTH | X'0300..03' |
| 2 | X'00' | RESERVED | |
| 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 | |
| 4-7 | X'00000000' | RESERVED | |
| 8 | | 1ST COLOR COMPONENT BITS | X'020E..05' |
| | X'01' - X'08' | (RGB, CMYK, CIELAB) | |
| | X'10' | Standard OCA Color Space | |
| 9 | | 2ND COLOR COMPONENT BITS | X'020E..05' |
| | X'00' - X'08' | (RGB, CMYK, Highlight, CIELAB) | |
| 10 | | 3RD COLOR COMPONENT BITS | X'020E..05' |
| | X'00' - X'08' | (RGB, CMYK, CIELAB) | |
| 11 | | 4TH COLOR COMPONENT BITS | X'020E..05' |
| | X'00' - X'08' | (CMYK) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12-15 | | COLOR VALUE | X'020E..03'<br>X'020E..04' |
| | | RGB Color Space | |
| | 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 12-15 | 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 |

| Code | Drawing Order |
|---|---|
| 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) |

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

# 6. 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' | | page 198 "Write Bar Code Control" |
| Bar Code Area Position | | X'AC6B' | page 198 "Bar Code Area Position" |
| Bar Code Output Control | | X'A66B' | page 199 "Bar Code Output Control" |
| Bar Code Data Descriptor | | X'A6EB' | page 200 "Bar Code Data Descriptor" |
| Write Bar Code | X'D681' | | page 214 "Write Bar Code" |

# Write Bar Code Control

## Bar Code Area Position

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'000B'-X'xxxx' | LENGTH of Bar Code Area Position (BCAP) | X'0202..05' |
| 2-3 | X'AC6B' | STRUCTURED FIELD ID | X'020B..05' |
| 4-5 | X'8000'-X'7FFF' | Bar Code BLOCK ORIGIN Xp, I, or IOFFSET coordinate position (in 1440ths) | X'0411..00' |
| 6-7 | X'8000'-X'7FFF' | Bar Code BLOCK ORIGIN Yp, B, or B-OFFSET coordinate position (in 1440ths) | X'0411..00' |
| 8-9 | | ORIENTATION OF Bar Code BLOCK | X'0203..05' |
| | X'0000' | 0 degrees | |
| | X'2D00' | 90 degrees | |
| | X'5A00' | 180 degrees | |
| | X'8700' | 270 degrees | |
| 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 | |
| 11-n :c | | Ignored | |

## Bar Code Output Control

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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 16-n | | Triplets<br>• 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. For details, see "Color Specification", IPDS Technical Reference.<br>• 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. For details, see "Presentation Space Reset Mixing", IPDS Technical Reference 1. | |



## Bar Code Data Descriptor

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'001B'-X'xxxx' | LENGTH of Bar Code Data Descriptor (BCDD) | X'0202..05' |
| 2-3 | X'A6EB' | STRUCTURED FIELD ID | X'020B..05' |
| 4 | | UNIT BASE (Measurement Units) | X'0205..05' |
| | X'00' | 10 Inches | |
| | X'01' | 10 Centimeters | |
| 5 | X'00' | Reserved | |
| 6-7 | X'0001' - X'7FFF' | Xbc Units per UNIT BASE | X'0206..05' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 8-9 | X'0001' - X'7FFF' | Ybc Units per UNIT BASE | X'0206..05' |
| 10-11 | X'0001' - X'7FFF' | X EXTENT of Bar Code Presentation Space in L-units.<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| | X'FFFF' | Use BCOC X EXTENT | |
| 12-13 | X'0001' - X'7FFF' | Y EXTENT of Bar Code Presentation Space in L-units.<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0207..05' |
| | X'FFFF' | Use BCOC Y EXTENT | |
| 14-15 | X'0000' | Reserved | |
| 16 | | BAR CODE TYPE<br>See page 205 "Bar Code Type and Modifier Description and Values" | X'0403..00' |
| 17 | | BAR CODE MODIFIER<br>See page 205 "Bar Code Type and Modifier Description and Values" | X'040B..00' |
| 18 | X'01' - X'FE' | FONT LOCAL ID | X'0404..00' |
| | X'FF' | Default Font Local ID (Note 1) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 19-20 | 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' | | |
| 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) | |
| 22-23 | X'0001' - X'7FFF' | ELEMENT HEIGHT in L-units<br>See "Notation Conventions", IPDS Technical Reference 1. | X'0407..00' |
| | X'FFFF' | Printer Default as specified by Bar Code Type in Byte 16 | |
| 24 | X'01'-X'FF' | Height multiplier | X'0408..00' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 25-26 | | WIDE-TO-NARROW RATIO (WE\|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) | |
| 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 | |

| 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'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 USSCodabar | 14 | 7-54 | 234 | 234-14000 | 4:02 |
| X'11' | Code 128 AIM USS-128 | 14 | 7-54 | 250 | 250-14000 | |
| 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 | |

| 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'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 | Meaning |
|---|---|---|---|
| X'01' | 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. |

| Byte 16 Value | Bar Code Type | Byte 17 Value | Meaning |
|---|---|---|---|
| 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). |

| Byte 16 Value | Bar Code Type | Byte 17 Value | Meaning |
|---|---|---|---|
| X'07' | UPC 5-Character Supplemental (Paperbacks) | X'00' | Print the 5 supplemental digits (bar/space pattern and HRI). |
| X'08' | EAN-8 (JAN Short) | X'00' | Print bar code symbol. Input variable data is 7 digits (2 flag and 5 article ID digits). |
| X'09' | EAN-13 (JAN Standard) | X'00' | Print bar code symbol. Input variable data is 12 digits (2 flag and 10 article ID digits). |
| X'0A' | 2 of 5 Industrial | X'01' | Print bar code with no printer-generated check character. |
| | | X'02' | Generate check character and print with bar code. |
| 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 | Meaning |
|---|---|---|---|
| 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). |

| Byte 16 Value | Bar Code Type | Byte 17 Value | Meaning |
|---|---|---|---|
| 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. |
| X'1E' | PDF417 2D | X'00' | Present a "full" PDF417 Bar Code symbol. |
| | | X'01' | Present a "truncated" PDF417 Bar Code symbol. |

| Byte 16 Value | Bar Code Type | Byte 17 Value | Meaning |
|---|---|---|---|
| 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, az, 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 | Meaning |
|---|---|---|---|
| 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

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | | FLAGS | |
| | Bit 0 | HRI PRINTING (Not supported for postal bar code types) | |
| | 0 | Print HRI | X'0410..00' |
| | 1 | No HRI | |
| | | | |
| | Bits 1-2 | HRI LOCATION | |
| | 00 | Printer Default (Below symbol) | |
| | 01 | Below symbol (Except UPC/EAN with 2 or 5 digit add-on) | |
| | 10 | Above symbol (UPC/EAN with 2 or 5 digit add-on only) | |
| | | | |
| | Bit 3 | START/STOP HRI for 3 of 9 Code (Asterisk) | |
| | 0 | Do not print HRI for 3 of 9 Start/Stop pattern | |
| | 1 | Print HRI for 3 of 9 Start/Stop pattern | |
| | | | |
| | Bit 4 | CODE PAGE TYPE (Ignore) | |
| | | | |
| | Bit 5 | BAR CODE SUPPRESSION | |
| | 0 | Present the bar code symbol | |
| | 1 | Suppress presentation of the bar code symbol | |
| | | | |
| | Bit 6 | | |
| | Bit 7 | | |
| 1-2 | X'0001' - X'7FFF' | X COORDINATE of the symbol ORIGIN<br>See "Notation Conventions", IPDS Technical Reference 1. | X'040A..00' |
| 3-4 | X'0001' - X'7FFF' | Y COORDINATE of the symbol ORIGIN<br>See "Notation Conventions", IPDS Technical Reference 1. | X'040A..00' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 5-End | | DATA to be bar encoded | X'040C..00' |

# 7. Overlay Command Set

## 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 |

# 8. 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 |

# 9. 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.

# 10. Loaded Font Command Set

## Loaded Font Function Set Commands

| Name | Command | Sub-command | Where to Look |
|---|---|---|---|
| Load Code Page | X'D61B' | | page 223 "Load Code Page" |
| Load Code Page Control | X'D61A' | | page 224 "Load Code Page Control" |
| Load Font | X'D62F' | | page 226 "Load Font" |
| Load Font Character Set Control | X'D619' | | page 228 "Load Font Character Set Control" |
| Load Font Control | X'D61F' | | page 229 "Load Font Control" |
| Load Font Index | X'D60F' | | page 234 "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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-7 | (8 Bytes) | GRAPHIC CHARACTER GLOBAL ID | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 8 | Bit 0: 0/1 | PROCESSING FLAGS | |
| | Bit 1: 0/1 | Defined/Undefined | |
| | Bit 2: 0/1 | Defined/Undefined | |
| | Bits 3-7 | Incrementing/Nonincrementing Reserved | |
| 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0001' - X'7EFF' | CODE PAGE HOST ASSIGNED ID | X'02B0..00'<br>X'02B0..01' |
| 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 | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 4-7 | X'000000 0A'- X'FFFFFFFF' | BYTE COUNT for subsequent LCP commands | X'02B0..0 4'<br>X'02B0..0 5' |
| 8-9 | X'0000' | Reserved | |
| 10-n | | VARIABLE SPACE CODE POINT | |
| | X'nn' | SBCS | |
| | X'nnnn' | DBCS | |
| n+1 to n +2 | | GCSGID | |
| | X'0000' | No Value Supplied | |
| | X'0001' - X'FFFE' | Specific GCSGID | |
| | X'FFFF' | Use Default | |
| n+3 to n +4 | X'0001' - X'FFFE' | CPGID<br>Specific CPGID | |
| n+5 to n +12 | | GCGID | |
| | X'nnnnnnn nnnnnnnnn ' | Default GCGID | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |
| | Bit 3: 0 | Reserved | |
| | Bit 4: 0 | Retired | |
| | Bit 4: 1 | Retired | |
| | Bit 5 - 7: 0000 | 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-n | Any Value in conformance with LFC Font Byte Count | FONT DATA in LF1 FORMAT (Character Patterns) | X'022E..02'<br>X'0232..02' |

## LF3 Format

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

### Character ID Map

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0 | X'02' | IBM CHARACTER ID FORMAT (IBM Registered EBCDIC GCGID) | |
| 1 | X'03'<br>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 | | | |
| +0-7 | | IBM CHARACTER ID (GCGID) | X'02B1..04' |
| +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 | | | |
| ++0 | X'02'-X'80' | LENGTH of Adobe Type-1 Character ID entry (including this field) | X'02B1..03' |
| +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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-3 | X'0000000A' - X'FFFFFFFF' | LENGTH of Adobe Type-1 PFB file (including this field) | X'02B1..08' |
| 4-7 | | CHECKSUM | X'02B1..09' |
| 8-9 | X'0002' - X'FFFF' | LENGTH of Adobe PFB object NAME | X'02B1..0A |
| 10-n | | Adobe PFB Object NAME | |
| (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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0001' - X'7EFF' | FONT CHARACTER SET HAID | X'02B0..0A'<br>X'02B0..0B' |
| 2-3 | X'0000' | Reserved | |
| 4 | | PATTERN TECHNOLOGY ID | |
| | X'1F' | Type 1 PFB | |
| 5 | X'00' | Adobe PFB Object NAME | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 6 | | INTENDED USE FLAGS | X'02B2..04'<br>X'02B2..01'<br>X'02B2..02' |
| | Bit 0: 0/1 | Not intended for MICR printing/Intended for MICR printing (If MICR Installed) | |
| | Bit 1: 0/1 | This is NOT a FCS extension/This IS a FCS extension | |
| | Bits 2-7: 000000 | Reserved | |
| 7-10 | X'00000002' - X'FFFFFFFF' | NUMBER of BYTES in the LOAD FONT COMMANDS | X'022E..02'<br>X'0232..02'<br>X'02B0..0E' |
| 11-14 | X'00000002' - X'FFFFFFFF' | NUMBER of BYTES in the CHARACTER ID MAP | X'02B0..0F' |
| 15-16 | X'nnnn' | NUMBER of GCGIDs in the CHARACTER ID MAP | |
| 17-18 | | GCSGID | |
| | X'0000' | No Value Supplied | |
| | X'0001' - X'FFFE' | Specific GCSGID | |
| | X'FFFF' | Use Default | |
| 19-20 | | FGID | |
| | X'0001' - X'FFFE' | Specific FGID | |

12

## 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0001'-X'7EFF' | FONT HOST ASSIGNED ID | X'0218..02'<br>X'0239..02' |
| 2 | | SECTION ID | X'0243..02' |
| | X'00' | Single-byte fonts | |
| | X'41'-X'FE' | Double-byte font sections | |
| 3 | X'00' | Reserved (Font-index Format) | X'0221..02' |
| 4 | X'05' | Pattern Data Format (bounded box) | X'0222..02' |
| 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 | |
| 6-7 | X'0001' - X'7FFF' | UNIFORM or MAXIMUM CHARACTER BOX X SIZE | X'0226..02' |
| 8-9 | X'0001' - X'7FFF' | UNIFORM or MAXIMUM CHARACTER BOX Y SIZE | X'0227..02' |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 10 | | UNIT BASE for L-units | X'021B.. 02' |
| | X'00' | Ten in. (fixed metric technology) | |
| | X'02' | Relative units (relative metric technology) | |
| 11 | X'00' | Reserved | |
| 12-13 | | L-units per UNIT BASE in the X direction<br>Byte 10 = X'02' | X'022A.. 02' |
| | X'03E8' | 1000<br>Byte 10 = X'00' | |
| | X'0960' | 2400 (240 DPI) | |
| | X'0BB8' | 3000 (300 DPI) | |
| | X'1770' | 6000 (600 DPI) | |
| 14-15 | | L-units per UNIT BASE in the Y direction<br>Byte 10 = X'02' | X'022B.. 02' |
| | X'03E8' | 1000<br>Byte 10 = X'00' | |
| | X'0960' | 2400 (240 DPI) | |
| | X'0BB8' | 3000 (300 DPI) | |
| | X'1770' | 6000 (600 DPI) | |
| 16-17 | X'0000' | Reserved | |
| 18-20 | X'000001' - X'7FFFFF' | FONT BYTE COUNT | X'021C.. 02' |
| 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 | |
| 22-23 | X'nnnn' | GCSGID (ignored) | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 24-25 | X'nnnn' | CPGID (ignored) | |
| 26 | X'00' | UNIT BASE for PIXEL-Units Ten in. | X'0287..02' |
| 27 | X'00' | Reserved | |
| 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) | |
| 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) | |
| 32-33 | X'0001' - X'7FFF' | RELATIVE METRIC MULTIPLYING FACTOR | X'028A..02' |
| 34-35 | X'nnnn' | FGID (ignored) | |
| 36 | | STAGEABILITY | X'0220..02' |
| | X'01' | Font is not stageable (retired) | |
| 37 | Bit 0: 0/1 | INTENDED USE FLAGS: Not intended for MICR printing/ Intended for MICR printing (If MICR Installed) | |
| | Bits 1-7: 0000000 | Reserved | |
| 38-39 | X'nnnn' | Font width (ignored) | |
| 40-n | | Zero or more CHARACTER PATTERN DESCRIPTORS in the following format | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| + 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.

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 0-1 | X'0001'-X'7EFF' | FONT HOST ASSIGNED ID (HAID) | X'0218..02' |
| 2 | | SECTION ID | X'0243..02' |
| | X'00' | Single byte | |
| | X'41'-X'FE' | Double-byte section | |
| 3 | | FLAGS | |
| | Bit 0: 0/1 | VARIABLE SPACE: Disabled/Enabled | |
| | Bits 1-7: 0000000 | Reserved | |
| 4-5 | | FONT INLINE SEQUENCE | X'0240..02'<br>X'0246..02' |
| | X'0000' | 0 degrees | |
| | X'2D00' | 90 degrees | |
| | X'5A00' | 180 degrees | |
| | X'8700' | 270 degrees | |
| 6-7 | X'0000' | Reserved | |
| 8-9 | X'8000' - X'7FFF' | UNIFORM or MAXIMUM BASELINE OFFSET | X'023C..02' |
| 10-11 | X'8000' - X'7FFF' | UNIFORM or MAXIMUM CHARACTER INCREMENT | X'023C..02' |
| 12-13 | X'0000' | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 14-15 | X'0000' - X'7FFF' | MAXIMUM BASELINE EXTENT | |
| 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) | |
| | 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) | |
| 17 | X'00' | Reserved | |
| 18-19 | X'8000' - X'7FFF' | UNIFORM or MINIMUM A-SPACE | X'023C.. 02' |
| 20-21 | X'0000' - X'FFFF' | | |
| 22-23 | X'8000' - X'7FFF' | | |
| 24-25 | X'0000' | RECOMMENDED UNDERSCORE WIDTH | X'023C.. 02' |
| | X'0001' - X'7FFF' | No recommendation Underscore width in L-units | |
| 26-27 | X'8000' - X'7FFF' | RECOMMENDED UNDERSCORE POSITION (L-units) | |
| 28-31 | X'00000000' | Reserved | |

| Offset | Range | Meaning | Error Code |
|---|---|---|---|
| 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 | |

# 11. Appendix

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