

PRINTRONIX®

*IPDS™ Twinax Emulation
Programmer's Reference Manual*

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164306-001, Rev. A

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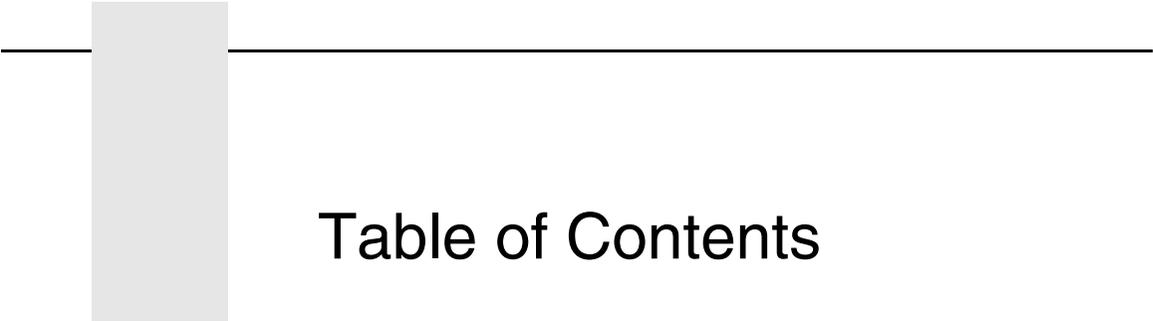


Table of Contents

1	Introduction	7
	About This Guide	7
	Sources of Additional Information	7
	Warnings and Special Information	7
	Compatible System Attachments	8
	Defining IPDS	8
	The Protocol	8
	The Printer Environment	8
	Emulations and Data Streams	8
2	Configuring with IPDS Commands	9
	Overview	9
	The IPDS Emulation	9
	The Command Sets	9
	The Data Towers	10
	The States	10
	Processing a Page	11
	The Command Syntax	12
	The Text Commands	13
	Load Equivalence (LE)	13
	Write Text (WT)	13
	Images	15
	The IM Image Command Set	15
	Write Image Control (WIC)	15
	Write Image (WI)	15
	Graphics	16
	The Graphics Command Set	17
	Write Graphics Control (WGC)	17
	Write Graphics (WG)	17
	Bar Codes	17
	The Bar Code Command Set	18
	Write Bar Code Control (WBCC)	18
	Write Bar Code (WBC)	18
	The Page Segment Command Set	18
	Begin Page Segment (BPS)	18
	Delete Page Segment (DPS)	18

Include Page Segment (IPS)	18
The Overlay Command Set.....	19
Begin Overlay (BO).....	19
Delete Overlay (DO)	19
Include Overlay (IO).....	19
The Device Control Commands	19
Begin Page (BP)	19
End	19
End Page (EP).....	20
Load Copy Control (LCC)	20
Load Font Equivalence (LFE)	20
Load Page Descriptor (LPD).....	20
Load Page Position (LPP)	20
No Operation (NOP)	20
Sense Type and Model (STM).....	20
Set Home State (SHS).....	21
Execute Order Anystate (XOA).....	21
Execute Order Home State (XOH)	22
Exception Processing and IDs	22
A Glossary	31

1

Introduction

About This Guide

This manual contains the IPDS™ configuration menu, lists the command sets and provides error messages.

This manual assumes you are familiar with IPDS and programming in IPDS. This book is not a tutorial-it does not explain how to program nor does it describe which applications support which commands. For detailed information, refer to the list below.

Sources of Additional Information

- *IBM® Intelligent Printer Data Stream™ Reference*
- *IBM System/36 Concepts and Programmer's Guide*
- *IBM System/38 Guide to Program Product Installation and Device Configuration*
- *Forms Design Reference Guide for Printers*
- *IBM 9370 Information System: Customizing the Work Station Subsystem*
- *IBM 9370 Information System: Work Station Subsystem and Reference*
- *IBM AS/400® Programming: Data Management Guide*
- *4234 Printer Models 007, 008, 011, and 012 Product and Programming Description*
- *Guide to Programming for Printing, Version 2*

Warnings and Special Information

For your safety and to protect valuable equipment, it is very important that you read and comply with all information highlighted under special headings:

- WARNING** **Conditions that could harm you as well as damage the equipment.**
- CAUTION** **Conditions that could damage the printer or related equipment.**
- IMPORTANT** **Information vital to proper operation of the printer.**
- NOTE:** Information and helpful tips about printer operation.

Compatible System Attachments

With a twinax interface, you can attach your IPDS-compatible printer to the following systems:

- System/36 (SSP 5.1 plus IPDS PRPQ P84094)
- System/38 (with Rel. 8 System/38 Control Program Facility)
- AS/400 processor
- 5294/5394/5494 control units

(The coax IPDS emulation is currently not used.)

IPDS characteristics available on each of the above attachments are not completely uniform, but the emulation printers are as fully functional on these attachment as provided by the host vendor.

Defining IPDS

IPDS is both a protocol and a printer mode. The two terms do *not* mean the same thing.

The Protocol

A protocol is a set of rules governing the exchange of information between the printer and the host computer. The rules are codes that manipulate and print data and allow for machine-to-machine communication. A printer and the host computer must use the same protocol.

IPDS is the protocol for your printer. Refer to your IBM documentation for details about commands, etc.

The printer uses EBCDIC character codes to print text, numbers, and punctuation. Some EBCDIC characters, singly and in groups, are used as control codes. Control codes instruct the printer to perform specific functions.

The Printer Environment

The printer operates under “IPDS” (text and graphics) mode. In the IPDS mode, the data stream has special sequences to denote IPDS commands.

Emulations and Data Streams

Your IPDS printer emulates only IBM 4234 twinax models 008 and 012.

Twinax printers always use IPDS data streams for sending commands. Even a simple job, such as a screen print, is IPDS data in a twinax attachment. Because the printer definition on a twinax host is either set automatically (by auto configuration) or manually, the printer type is already known.

NOTE: Sending a non-IPDS data stream to an IPDS printer and vice versa will result in a hung spool file or writer.

2

Configuring with IPDS Commands

Overview

This chapter summarizes IPDS, lists control codes, and lists error messages. For detailed information, refer to “Sources of Additional Information” on page 7.

The IPDS Emulation

IPDS consists of the following command sets, which are defined in more detail beginning on page 13.

The Command Sets

Text	This set contains the commands used to present text information on a page, on a page segment, or on an overlay.
IM Image	The commands for this functional area output raster image data on a page, a page segment, or on an overlay.
IO Image	Not available for impact IPDS printers.
Graphics	To present vector graphics on a page, a page segment or on an overlay, use the commands in this set.
Bar Code	This set contains the commands and data controls needed to produce bar codes.
Page Segment	The commands used to store and present page segments that contain text, graphics, image, and bar code information.
Overlay	The commands used to store and present overlays that contain text, graphics, image, and bar code information.
Device Control	This set contains commands that let you set up a page and manage printer-host communication.

The Data Towers

Most of the IPDS commands contain data fields. The type of data is categorized into the following data towers:

Text	The Presentation Text Object Content Architecture (PTOCA) commands are a part of the text data tower. This information is necessary to print text in a page, a page segment, or an overlay.
IM Image	The image data enables the printer to print images in a page, a page segment, or an overlay.
IO Image	This is not supported.
Graphics	The Graphic Object Content Architecture (GOCA) commands are a part of the graphics data tower. This information is necessary to print images in a page, a page segment, or an overlay.
Bar Code	The Bar Code Object Content Architecture™ (BCOCA™) commands are a part of the bar code data tower. This information is necessary to print bar codes in a page, a page segment, or an overlay.

Some of the data towers contain only one level of commands; some contain two.

PTOCA, GOCA, and BCOCA are described in more detail in your IBM documentation.

The States

IPDS-capable printers are known as “state machines.” As the printer recognizes a specific command, it operates in the state identified with that command. Figure 1 shows the transition of the different states.

Home State	The initial operating state. The printer returns to this state after a page, an overlay, or a page segment has been sent.
Block States	The printer establishes the processing conditions for a data block to be accepted. There are three block states: IM image, graphics, and bar code.
Page State	While printing a logical page, the printer is in the Page State.
Overlay State	This state permits overlay data blocks to be stored. An overlay is a block of data that is frequently accessed. It can be a block of text, images, graphics, or bar codes. An overlay can be a predefined page or part of a page and is often used for forms.
Page Segment State	Page segment data is stored when the printer is in this state. A page segment is a frequently accessed resource; it can be a block of text, images, graphics, or bar codes. Page segments can be a part of an overlay.
Anystate	Some commands can be received in any state.

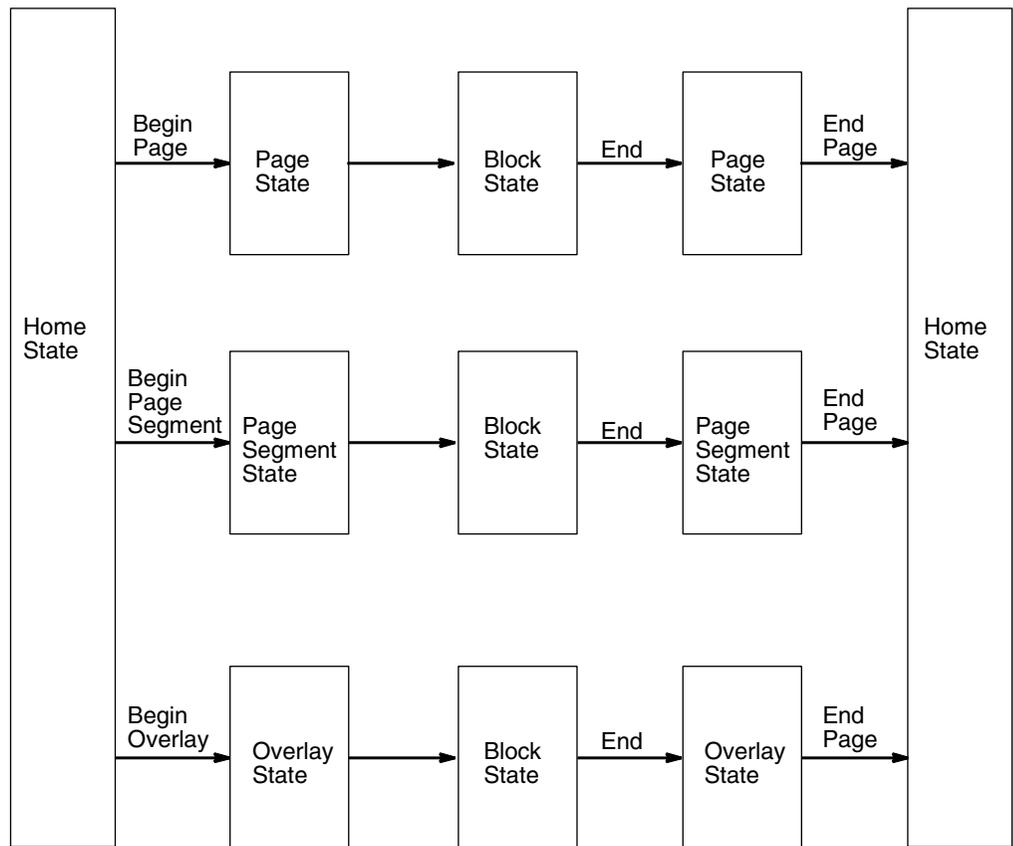


Figure 1. State Transition

Processing a Page

Your printer can print page by page or it can behave as a line printer. This section describes how the printer prints page by page. (The *User's Manual* explains the two printing methods in more detail.)

Your IPDS-capable printer builds a page by gathering all the page descriptor commands and data blocks that are specified in the data stream.

Page descriptor commands instruct the printer to create and position a logical page, which rests within the perimeter of the physical page.

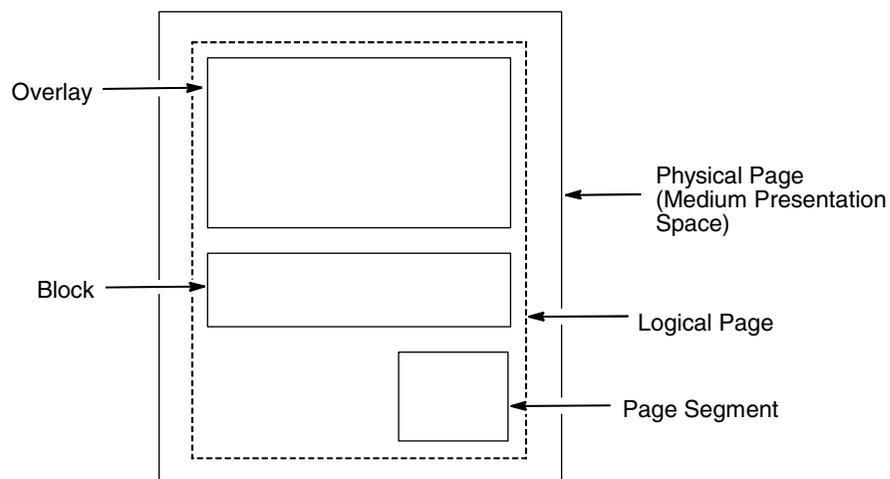


Figure 2. Processing a Page

Blocks contain images, graphics, bar codes, coded fonts, and text. Each block is recognized by specific, functional commands. To print a bar code, for example, Bar Code commands must be in the data stream.

As each type of data block is stored in memory, the printer moves from state to state. For example, when the printer is reading the Bar Code commands, it is in the bar code state.

Once all the data has been stored, the page can be closed with an End Page command and the printer, which is now in the Home State, is ready to print the page.

The Command Syntax

The commands on the following pages use this syntax:

	Byte Count	D6XX	Flag	CID	Data
Byte Count	A two-byte field. Specifies the length of the command.				
D6XX	A two-byte field. "D6" denotes an IPDS command; "XX" is the hex code for the IPDS command.				
Flag	A one-byte field containing the IPDS command stream flags. You can request an Acknowledgement Required response from the printer in this field.				
CID	Correlation ID. A two-byte field that identifies the command. If an exception (error) occurs, the printer will respond with a Negative Acknowledge Reply and the CID associated with the command.				
Data	0-32760 bytes if CID is present; 0-32762 bytes if CID is not present. This field contains parameters, orders, and data necessary for implementing the command.				

The Text Commands

The following commands are used to present text blocks in a page, a page segment, or an overlay.

Load Equivalence (LE)

Byte Count	D61D	Flag	CID	Data
---------------	------	------	-----	------

This command allows the printer to use a single suppression ID for more than one suppression pair.

Write Text (WT)

Byte Count	D62D	Flag	CID	Presentation Text Object; Content Architecture control codes and character data
---------------	------	------	-----	---

Use this command to send character data and controls to the printer. The data and controls can begin in one Write Text command chain and end in another Write Text command chain.

Controls are listed on the following pages. The first control is preceded by the escape sequence 2B D3. Subsequent controls will follow as long as the preceding code is a chained code.

Table 1. Control Codes

Control Sequence	Unchained Hex Code	Chained Hex Code
Absolute Move Baseline (AMB)	D2	D3
Absolute Move Inline (AMI)	C6	C7
Begin Line (BLN)	D8	D9
Begin Suppression (BSU)	F2	F3
Draw B-Axis Rule (DBR)	E6	E7
Draw I-Axis Rule (DIR)	E4	E5
End Suppression (ESU)	F4	F5
No Operation (NOP)	F8	F9
Overstrike (OVS)	72	73
Relative Move Baseline (RMB)	D4	D5
Relative Move Inline (RMI)	C8	C9
Repeat String (RPS)	EE	EF
Set Baseline Increment (SBI)	D0	D1
Set Coded Font Local (SCFL)	F0	F1
Set Inline Margin (SIM)	C0	C1
Set Intercharacter Adjustment (SIA)	C2	C3
Set Text Color (STC)	74	75
Set Text Orientation (STO)	F6	F7
Set Variable Space Character Increment (SVI)	C4	C5
Temporary Baseline Move (TBM)	78	79
Transport Data (TRN)	DA	DB
Underscore (USC)	76	77
Absolute Move Inline (AMI)	C6	C7
Begin Line (BLN)	D8	D9
Begin Suppression (BSU)	F2	F3
Draw B-Axis Rule (DBR)	E6	E7
Draw I-Axis Rule (DIR)	E4	E5
End Suppression (ESU)	F4	F5

Images

The physical page is the actual medium used, such as a continuous form or an 8 1/2 x 11 inch sheet of paper.

The logical page is mapped onto the physical page; you can set its size and position inside the physical page. The logical page contains the image blocks, text blocks, segment and overlay blocks. A block is an area where the image is mapped to.

The image presentation space contains the image that will be mapped to the block. The image presentation space contains the entire image.

An image block can be the same size, larger or smaller than the image presentation space.

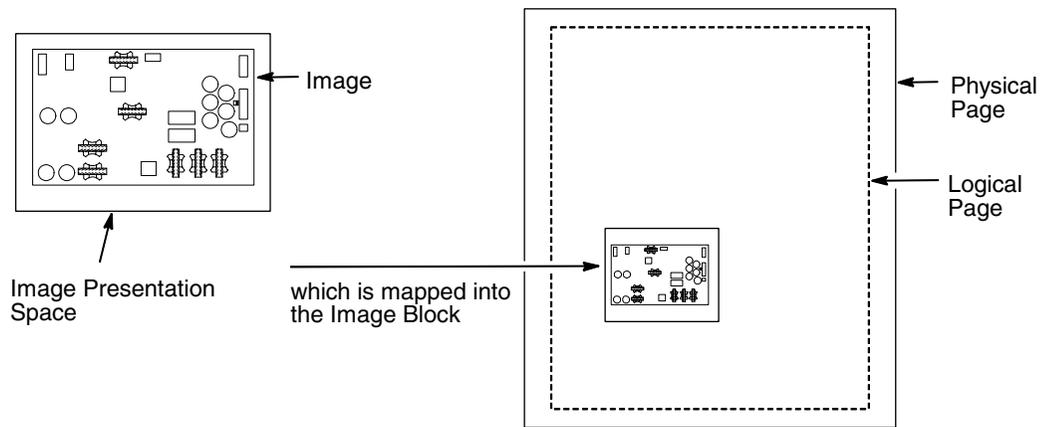


Figure 3. Generating Images

The IM Image Command Set

The following commands are used to present image data (raster format) in a page, a page segment, or an overlay.

Write Image Control (WIC)

Byte Count	D63D	Flag	CID	Data
---------------	------	------	-----	------

This command defines the following: the image presentation space size and resolution, the image block size, position and orientation on the logical page, and the mapping of the image presentation space into the image block. You can specify that the image presentation space fits into the image block or you can crop a portion of the presentation space and map that to the image block.

Write Image (WI)

Byte Count	D64D	Flag	CID	Data
---------------	------	------	-----	------

This command is used to denote image data to be printed.

Graphics

Graphics contain line drawings, such as arcs and lines.

The area containing the entire drawing is called the graphics presentation space. Usually, only a part of the drawing will be printed. This part is referred to as the graphics presentation space window.

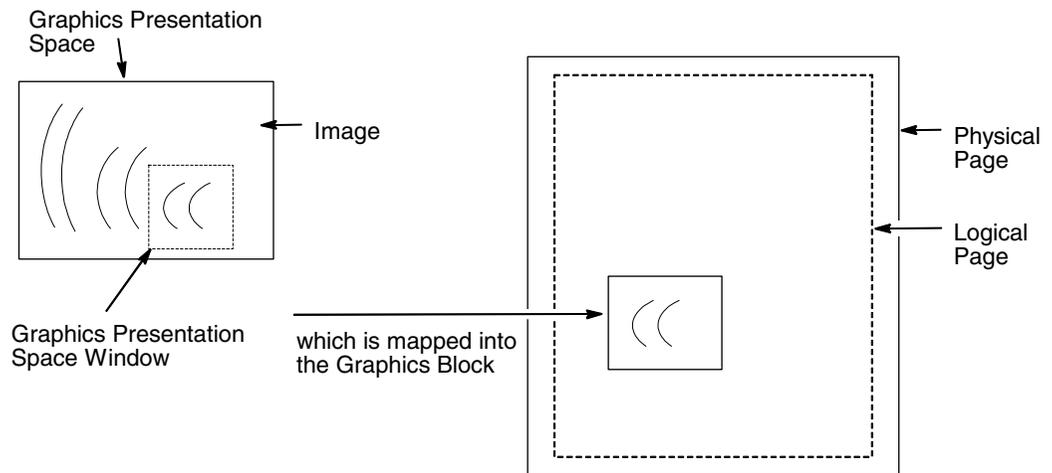


Figure 4. Generating Graphics

In order to place the graphics presentation space window onto a logical page, it must be mapped to a graphics block on the logical page. This block can be the same size, larger, or smaller than the graphics presentation space.

When you map the window to the graphics block, you have three methods to choose from:

- Scale to fit mapping - The window will be the same size as the graphics block.
- Center and trim mapping - The window is centered inside the graphics block.
- Position and trim mapping - The window's top left corner is mapped to the graphics block and is affected by the graphics block's offset parameters.

The Graphics Command Set

The following commands are used to present graphics in a page, a page segment, or an overlay.

Write Graphics Control (WGC)

Byte Count	D684	Flag	CID	Graphics Area Position; Graphics Output Control; Graphics Data Descriptor
-----------------------	-------------	-------------	------------	--

WGC specifies the graphics block position, size and orientation; it specifies the graphics presentation space window size and location inside the graphics presentation space; and it defines how the window will map into the graphics block.

Write Graphics (WG)

Byte Count	D685	Flag	CID	Begin Segment Introducer and drawing orders
-----------------------	-------------	-------------	------------	--

The WG command follows the Write Graphics Control command and contains information about the graphics presentation space. This data is referred to as drawing orders.

Bar Codes

Bar codes contain information that can be read by optical scanners and are widely used.

A bar code resides in a bar code presentation space, which is mapped to a bar code block that exists on the logical page. This block can be the same size, larger, or smaller than the bar code presentation space.

The entire bar code presentation space must be mapped to the bar code block; you cannot trim and cut any of the bar code presentation space.

The Bar Code Command Set

The following commands are used to present bar codes in a page, a page segment, or an overlay.

Write Bar Code Control (WBCC)

Byte Count	D680	Flag	CID	Bar Code Area Position; Bar Code Output Control; Bar Code Data Descriptor
------------	------	------	-----	---

Use this command to set the bar code block position, size, and orientation; to set the bar code presentation size; the bar code to be used; and to set how the bar code presentation space will map into the bar code block.

Write Bar Code (WBC)

Byte Count	D681	Flag	CID	Data
------------	------	------	-----	------

This command sends Bar Code Object Content Architecture data to the printer and applies to only one bar code symbol. To print another bar code symbol, you must send another WBC command.

The Page Segment Command Set

The following commands are used to access printer data by name and merge on the logical page.

Begin Page Segment (BPS)

Byte Count	D65F	Flag	CID	Data
------------	------	------	-----	------

This command identifies the data following as data for a page segment.

Delete Page Segment (DPS)

Byte Count	D66F	Flag	CID	Data
------------	------	------	-----	------

DPS instructs the printer to delete one or all of the stored page segments.

Include Page Segment (IPS)

Byte Count	D67F	Flag	CID	Data
------------	------	------	-----	------

When you issue an IPS command, a stored page segment can be processed as if the printer had just received it.

The Overlay Command Set

Overlays contain data that is frequently accessed and can be stored by name for future use. You can create an overlay so that it fills the entire page or fills part of a page. The following overlay commands are used to access printer data by name and merge on the logical page.

Begin Overlay (BO)

Byte Count	D6DF	Flag	CID	Data
---------------	------	------	-----	------

This command tells the printer to store the following parameters (including Logical Page Descriptor, Load Font Equivalence, and Load Equivalence) for an overlay and not to print immediately.

Delete Overlay (DO)

Byte Count	D6EF	Flag	CID	Data
---------------	------	------	-----	------

The Delete Overlay command instructs the host to delete one or all of the stored overlays. The host can reuse the deleted overlay identification numbers for new overlays.

Include Overlay (IO)

Byte Count	D67D	Flag	CID	Data
---------------	------	------	-----	------

Issue an Include Overlay command to place an overlay on a logical page.

The Device Control Commands

The following commands are used to set up the page format, to communicate control commands, and to oversee the acknowledge reply.

Begin Page (BP)

Byte Count	D6AF	Flag	CID	Data
---------------	------	------	-----	------

This command indicates the beginning of a page and causes the printer to enter the page state.

End

Byte Count	D65D	Flag	CID	Binary Data
---------------	------	------	-----	-------------

This command notes the end of a block containing: an image, graphics, or bar codes.

End Page (EP)

Byte Count	D6BF	Flag	CID	Binary Data
------------	------	------	-----	-------------

This command notes the end of a page, a page segment, or an overlay and returns the printer to the home state.

Load Copy Control (LCC)

Byte Count	D69F	Flag	CID	Data
------------	------	------	-----	------

This command is effective only in the home state and controls the number of times you want to print the current logical page.

Load Font Equivalence (LFE)

Byte Count	D63F	Flag	CID	Data
------------	------	------	-----	------

This command is used to re-identify local font data IDs to host specified font resource IDs.

Load Page Descriptor (LPD)

Byte Count	D6CF	Flag	CID	Data
------------	------	------	-----	------

The LPD command sets the logical page's characteristics, such as the units for positioning text, the margins, and line spacing, etc.

Load Page Position (LPP)

Byte Count	D66D	Flag	CID	Data
------------	------	------	-----	------

The LPP command sets the position of the logical page on the physical page, which allows for any required offsetting.

No Operation (NOP)

Byte Count	D603	Flag	CID	Data
------------	------	------	-----	------

This command tells the printer to perform no operation.

Sense Type and Model (STM)

Byte Count	D6E4	Flag	CID
------------	------	------	-----

This command asks the printer to identify its capabilities. The printer responds with one or more Acknowledge Replies, which contain general information and command set vectors that identify supported IPDS function sets and subsets.

Set Home State (SHS)

Byte Count D697 Flag CID Data

SHS instructs the printer to return to the home state. If the printer is in the process of printing (in page state), the current page ends and prints the data up to the time of the SHS command. Depending when the SHS command was sent, either a complete or partially completed page prints.

If the printer is processing a page segment, an overlay, or a font, the printer deletes the block of data and returns to the home state.

If you send an SHS command while the printer is in the home state, the printer treats it as an NOP command.

Execute Order Anystate (XOA)

Byte Count D633 Flag CID Data (Code and Parameters)

The XOA command is used to identify an order that is effective immediately, no matter what state the printer is in. You can specify only one order for each XOA command.

Valid orders are listed in Table 2.

Table 2. Execute Order Anystate Commands

Order	Function	Hex Code
Discard buffered data	Deletes all data in the buffer, including the current job.	F200
Exception Handling Control	Exception Handling Control, which enables the host to control how the printer reports and processes exceptions.	F600
Print Quality Control	Specifies the print quality: AB - FE = NLQ 56 - AA = DP 01 - 55 = Draft FF = Printer Default	F800
Request Resource List	The host inquires about the printer's current resources (page segments, overlays, fonts).	F400

Execute Order Home State (XOH)

Byte Count	D68F	Flag	CID	Data (Code and Parameters)
------------	------	------	-----	----------------------------

The following orders are valid only when the printer receives them in the home state. The XOH command identifies these orders.

Table 3. Execute Order Home State Commands

Order	Function	Hex Code
Erase Residual Print Data	Prevents access to resident print data.	0500
Obtain Printer Characteristics	Used for Acknowledge Replies.	F300
Print Buffered Data	All data in the buffer prints.	0100
Set Media Size	Specifies the page size.	1700

Exception Processing and IDs

Unlike some other protocols, IPDS allows the host to control exception (error) processing, which can free up the printer cpu.

The host can request one of two methods:

- the printer must print the pages as requested
- the printer does not allow any page that has a data stream error to print

The first method applies for situations such as printing checks; the second method applies for printing drafts or when troubleshooting the data streams.

The following tables list the exception IDs and the error conditions. The exception ID consists of three parts. For example:

```
8001..00
80 = sense byte 0, which indicates a command reject
00 = sense byte 1
00 = sense byte 2
```

Table 4. Exceptions: Rejected Comands

Exception ID	Condition
800100	Invalid IPDS command code
800200	Invalid IPDS command sequence
80E000	Invalid IPDS command length

Table 5. Exceptions: Data Check

Exception ID	Condition
082100	Undefined character
086000	Numeric representation precision check
08C100	Position check

Table 6. Exceptions: Specification Check - Bar Code

Exception ID	Condition
040000	Symbol Reference point outside Logical page
040200	Attempt to print Barcode or HRI character out of presentation space
040300	Invalid or unsupported bar code type
040400	Unsupported font local ID or font not available
040500	Invalid or unsupported bar code color
040600	Invalid or unsupported module width
040700	Invalid or unsupported element height
040800	Invalid or unsupported height multiplier
040900	Invalid or unsupported wide-to-narrow ratio
040A00	Invalid or unsupported symbol origin
040B00	Invalid or unsupported bar code modifier
040C00	Invalid or unsupported bar code data length
040E00	Check-digit calculation
041000	Invalid or unsupported human-readable interpretation location
041100	Attempt to print portion of symbol outside block or VPA

Table 7. Exceptions: Specification Check - Graphics Data

Exception ID	Condition
030001	Unallocated or unsupported graphics order or command code
030002	Reserved byte exception or invalid attribute set
030003	Incorrect drawing order length
030004	Invalid attribute value
030008	Truncated order
03000C	Segment prolog
03000E	Unsupported attribute value
030021	Invalid or unsupported default
033400	Character angle value not supported
033E00	Invalid End Prolog
036000	Area bracket
036800	Begin Area received incorrectly
036801	Area truncated
036802	Supported order invalid in area
036803	Pattern Set not supported
036804	Undefined pattern symbol
037001	Unsupported Begin Segment introducer segment flag
037082	Invalid Begin Segment introducer segment flag
0370C1	Invalid Begin Segment introducer length
0370C5	Insufficient segment data
039200	Graphics image order sequence
039201	Image data discrepancy
039300	Graphics image bracket
039301	Incorrect number of Image Data drawing orders
03C200	Marker Set not supported
03C201	Undefined marker code
03C202	Mismatched marker set
03C300	Font not available

Table 7. Exceptions: Specification Check - Graphics Data (continued)

Exception ID	Condition
03C301	Undefined graphics character code
03C302	Mismatched character set
03C601	Arc drawing check
03D100	Truncated graphics image
03D101	Invalid order in graphics image
03D102	Graphics image format not supported
03D103	Image width greater than maximum supported
03D104	Image height greater than maximum supported
03E100	Relative line outside coordinate space

Table 8. Exceptions: Specification Check - General

Exception ID	Condition
020003	Character exceeds presentation text object space
020001	Embedded control sequence code
020201	End Suppression (ESU) control-sequence
020202	Invalid or unsupported IPDS command length
020205	Invalid data self-defining-field length
020302	IPDS command header length too small
020305	Invalid or unsupported block orientation
020401	EP command encountered
020402	Invalid use of Acknowledgement-Continuation Bit
020405	Invalid or unsupported value for area-position reference system
020501	Invalid spanning sequence
020505	Invalid or unsupported self-defining-field unit base
020601	Invalid Begin Suppression (BSU)
020605	Invalid or unsupported units per unit base
020705	Invalid or unsupported self-defining-field extents
020805	Invalid or unsupported mapping option

Table 8. Exceptions: Specification Check - General (continued)

Exception ID	Condition
020905	Invalid or unsupported axis offsets
020A05	Data within a block might be outside the VP Data within a block might be outside the VP (asynchronously detected)
020B05	Invalid self-defining-field identifier
020F01	Invalid or unsupported Set Text Orientation (STO)
021001	Invalid or unsupported Set Inline Margin (SIM)
021101	Invalid or unsupported Set Baseline Increment (SBI)
021201	Invalid or unsupported Intercharacter adjustment
021301	Invalid or unsupported Absolute Move Baseline (AMB)
021401	Invalid or unsupported Absolute Move Inline (AMI)
021402	The font, font section, or font index to be deleted is not found
020502	Unsupported baseline move
021501	Invalid or unsupported Relative Move Inline (RMI)
021502	Invalid or unsupported DF command font or font-section ID
021601	Invalid or unsupported Relative Move Baseline (RMB)
021701	Invalid or unsupported Set Variable-Space Increment (SVI)
021702	Invalid or unsupported value for DF command deletion type
021802	Invalid, unsupported, or unavailable font ID
021901	Invalid or unsupported value for Repeat String (RPS) repeat length
021902	Multiple occurrences of the same LFE font-equivalence number
021C01	Invalid escape sequence
021D02	Invalid or unsupported value for the Load Font Equivalence GRID
021E01	Invalid WT control-sequence length
021E02	Mismatch between font and the XOA Print Quality Control (PQC) command
021F01	Repeat String (RPS) length
021F02	Mismatch of LFE command font Host-Assigned IDs
022E02	Insufficient font data received
023001	Insufficient storage for LCC copy-control record
023101	Invalid or unsupported value for Load Copy Control number of copies
023201	Invalid or unsupported Load Copy Control Keyword in copy-group entry

Table 8. Exceptions: Specification Check - General (continued)

Exception ID	Condition
023401	Invalid or unsupported value for Load Copy Control entry-byte count
023601	Invalid or unsupported Load Copy Control simplex/duplex parameter
023801	Maximum supported number of overlays per LCC copy group exceeded
023901	Maximum supported number of suppression per LCC copy group exceeded
023F02	STO-SCFL-LFE mismatch
024201	WIC Pel count is less than the minimum required
024301	WIC command pel count is greater than the maximum supported value
024401	WIC command scan count is less than the minimum required
024501	WIC command scan count is greater than the maximum supported value
024601	Invalid WIC source image format
024701	Invalid or unsupported value for Write Image Control magnification factor
024702	Invalid or unsupported value for Load Font Equivalence font-inline sequence
024801	Invalid or unsupported value for Write Image Control scan-line direction
024901	Invalid scan-line-sequence direction in a WIC command
024A01	Invalid or unsupported value for Write Image Control image block location
025301	Invalid or unsupported value for Write Image Control image color
025803	Invalid or unsupported value for test color
025C02	Invalid or unsupported parameter in a DUA command
026002	Invalid or unsupported value for Logical Page Descriptor units per unit base (X_p and l)
026102	Invalid or unsupported value for Logical Page Descriptor units per unit base (Y_p and B)
026202	Invalid or unsupported value for LPD X_p extent or XOH-SMS X_m extent
026302	Invalid or unsupported value for LPD Y_p extent or XOH-SMS Y_m extent
026401	Insufficient control storage
026402	Invalid or unsupported value for Logical Page Descriptor unit base
026802	Invalid or unsupported value for Logical Page Descriptor inline-sequence direction
026902	Invalid baseline-sequence direction in the LPD command
026A01	Insufficient source image data

Table 8. Exceptions: Specification Check - General (continued)

Exception ID	Condition
026A02	Invalid or unsupported value for Logical Page Descriptor initial 1 print coordinate
026B01	Excess source image data received
026B02	Invalid or unsupported value for Logical Page Descriptor initial B print coordinate
027002	Invalid or unsupported value for XOH Set Media Size units per unit base
027202	Invalid or unsupported value for XOH Set Media Size X_m extent
027302	Invalid or unsupported value for XOH Set Media Size Y_m extent
027402	Invalid or unsupported value for XOH Set Media Size unit base
028101	Insufficient storage for a page segment or overlay
028501	Invalid or unsupported value for Delete Overlay command overlay ID
028A01	Invalid or unsupported value for Delete Page Segment command page segment Host-Assigned ID
029001	Invalid or unsupported overlay ID
029101	BO overlay ID already loaded
029102	Invalid or unsupported value for XOA Request Resource List entry
029201	Overlay ID not loaded
029202	Invalid XOA Print-Quality Control (PQC) parameter
029301	Recursive overlay invocation
029401	Invalid or unsupported value for page segment Host-Assigned ID
029501	Page segment Host-Assigned ID already loaded
029601	Page segment Host-Assigned ID not loaded
029701	Overlay nesting limit exceeded
029801	Invalid or unsupported suppression number
029803	Invalid or unsupported value for Temporary Baseline Move control sequence
02A401	Page boundary in the X-direction cannot be represented in the printer
02A501	Page boundary in the Y-direction cannot be represented in the printer
02AC01	Insufficient main storage to print the sheet
02AD01	Invalid or unsupported value for Logical Page Position command
02AE01	Invalid or unsupported parameter in an IO command

Table 8. Exceptions: Specification Check - General (continued)

Exception ID	Condition
02AF01	Insufficient storage to print the sheet (Asynchronously detected insufficient storage to print the sheet)
02C101	Maximum number of simplex or duplex keywords in an LCC command
02C102	Internal value not unique in an LE command
02C602	Invalid mapping type in an LE command
02C801	An unsupported input Media Source ID was specified
02C802	Invalid or unsupported internal value or external value in an Load Equivalence command
02FF02	Exceptions detected but not queued

A

Glossary

Acknowledge Reply	A message about printer information or exceptions that the printer sends to the host. It can be a positive or negative reply. ([N]ACK can contain status resource or counter information.)
bar code	A printed code consisting of parallel bars of varied width and spacing and designed to be read by a one-dimensional scanning device.
bar code block	It is a rectangular space that has a specified size, position, and orientation on a logical page. It is the area into which the bar code presentation space is mapped.
bar code presentation space	It is a rectangular, conceptual space where a bar code is generated. The entire bar code presentation space must be mapped to the bar code block.
bold	A print attribute specifying text of a heavy line thickness. <i>See also</i> character weight.
buffer	A reserved area in memory that data is written to and read from during data transfers.
character set	A protocol instructing the printer how to construct a set of printable characters, including symbols, punctuation, numbers, diacritical markings, and alphabet characters. Each character is assigned a unique address in memory.
character weight	The degree of lightness and thickness of printed text. For example: “ Bold ” refers to a heavy or thick character weight. “Medium,” “normal,” or “book weight” refer to the character weight used in this sentence.
control sequence	A series of bytes that instruct the printer to perform a specific function.
correlation ID (CID)	Identifies a specific command/data transmission from the host. This two-byte value is used to match any exceptions (errors or conditions specified in an Acknowledge Reply) with the IPDS command.
cpi	<i>Abbrev. for</i> characters per inch. A measurement of monospaced fonts indicating the horizontal character density. For example, 10 cpi means 10 characters can be printed in one horizontal inch.
default	A value, parameter, attribute, or option assigned by a program or system if another is not specified by the user.

deferred printing	The printer prints page by page: It gathers all of the page descriptor commands and data blocks for each page and then prints the page.
diagnostic	Pertains to the detection and isolation of printer malfunctions or mistakes.
emulation	Refers to the ability of a printer to execute the commands of another printer language (protocol).
environment	The parameters that affect how data will display on a page, such as the dimensions, orientation, and location of the logical page on the physical page. An overlay has its own environment; a page segment is affected by the environment that is placed into.
expanded	A font enhancement referring to larger-than-normal character width with no change in character height.
exception	A condition in which the printer notifies the host and will sometimes require the host to resend data. An exception can also be in response to an invalid data stream.
family (or type)	A set of all variations and sizes of a type style.
fixed-pitch fonts	See font.
FOCA	<i>Abbrev for</i> Font Object Content Architecture. A collection of methods and rules for describing fonts.
font	Referred to as a resource that is stored in memory. The complete set of a given size of type, including characters, symbols, figures, punctuation marks, ligatures, signs, and accents. To fully describe a font, you must specify seven characteristics: <ol style="list-style-type: none"> 1) typeface 2) spacing (proportional or monospaced) 3) type size (12 point, 14 point, etc.) 4) scale factor (character height/width ratio) 5) type style 6) character weight 7) character proportion (normal, condensed, expanded).
GOCA	<i>Abbrev for</i> Graphic Object Content Architecture. A collection of methods and rules for describing graphic data.
graphics	Lines, arcs, etc. used to draw a picture. Differs from an image.
graphics block	Rectangular space that has a specified size, position, and orientation on a logical page. It is the area where the graphics presentation space (or the graphics presentation space window) is mapped to.
graphics presentation space	Rectangular, conceptual space where graphics are generated.
graphics presentation space window	You can specify a part of the presentation space to be

	mapped to the graphics block. This portion is called the graphics presentation space window. Specifying a window is synonymous to cropping or trimming.
home state	The initial state of the printer before it begins downloading overlays, page segments, and/or fonts. After the printer prints the page, the printer returns to the home state.
host assigned ID	The host assigns an ID to every resource (page segment, overlay, or font). These IDs are used for loading and calling.
host computer	The computer that stores, processes, and sends data to be printed, and which communicates directly with the printer. The term “host” indicates the controlling computer, since modern printers are themselves microprocessor-controlled computer systems.
image	An illustration or picture. Differs from graphics.
image block	Rectangular space that has a specified size, position, and orientation on a logical page. The image block contains the image. It is the area where the image presentation space is mapped to.
image presentation space	Rectangular, conceptual space where an image is generated. It is mapped to the image block. Once mapped, the image is ready to be printed.
initialization	A series of processes and self-tests to set power-up default conditions and parameters.
interface	The hardware components used to link two devices by common physical interconnection, signal, and functional characteristics.
invoke	To put into effect or operation.
IPDS	Intelligent Printer Data Stream. Allows sophisticated printing, such as merging text and graphics.
lpi	<i>Abbrev. for</i> lines per inch. A measurement indicating the vertical spacing between successive lines of text. For example, 8 lpi means 8 lines of text for every vertical inch.
logical page	A rectangular area on a physical page. The logical page has a specified size, orientation, location, and offset. The logical page is the area where bar code blocks, image blocks, graphics blocks, and text is printed. Printing occurs in the area common to the physical page and the logical page.
logical link	The parameters that specify data transfer, control, or communication operations.
no operation	This command causes the printer not to process anything, but instead, to proceed to the next command sequence.

object	Another term for a font, graphics, image, text, or a combination of these.
offset	An offset is a measurement indicating displacement. For example, you can specify the logical page to rest in the lower left hand corner of the physical page.
ordered printing	The printer behaves like a line printer: It begins printing as soon as you send the data.
orientation	The degrees of rotation of a presentation space or a data block.
overlay	This is usually a form. It can contain text, graphics, an image, and bar code data. You can also merge a page segment into an overlay. The overlay can encompass the entire logical page or a portion of it. The overlay has its own environment, unlike a page segment.
overlay ID	The host assigns an ID to every overlay so that it can be identified for particular commands, such as Begin Overlay, Delete Overlay, Include Overlay, etc.
overlay state	This state permits overlay data to be downloaded and produced.
page	See logical page <i>and</i> physical page.
page segment	Contains a font, image, text, or graphics and is merged onto a logical page. A page segment has an ID and can be stored for future use. It does not have its own environment; instead, it uses the environment that it is merged into. You can load a page segment into an overlay.
page segment state	This state allows page data to be loaded and produced.
parity (check)	Parity checking is the addition of non-data bits to data, resulting in the number of 1 bits being either always even or always odd. Parity is used to detect transmission errors. Parity represents the value in the check digit of the received or transmitted data.
physical page	The medium that the printer prints data on.
pixel	Derived from picture element. The smallest displayable picture element on a video monitor or printable unit. In printing, a pixel is a dot.
point	A unit of length in printing and typography, used to specify type sizes, heights of font characters, etc. There are 72 points in a vertical inch; thus, one point equals 1/72 inch, or approximately 0.0138 inch. Some examples of point sizes are: <i>This is 8 point type.</i> <i>This manual is printed in 10 point type.</i> This is 14 point type.
port	A channel used for receiving data from or transmitting data to one or more external devices.

presentation space	A space where data can be generated before it is mapped onto the logical page. The presentation space uses an X-axis and Y-axis to specify addresses.
protocol	A set of rules or conventions governing the exchange of information between computer systems. For computer printers, a protocol is the coding convention used to convey and print data. A printer protocol includes character codes, printer function codes, and machine-to-machine communication codes.
RAM	<i>Acronym for random-access memory.</i> Also called “main memory” or “working memory.” RAM is the active memory of a printer, into which programs are loaded. This memory can be read from or written to at any time—hence the term “random-access.” RAM is also termed “volatile” because whatever is in RAM is lost when power is turned off or interrupted.
read	To retrieve data from memory (RAM, NVRAM) or mass storage (hard disk, floppy diskette, etc.).
reset	To turn off, deactivate, disable, or return to a previously determined state.
resolution	A measure expressing the number of units in a given range used to create an image. In printing, this is expressed as the number of dots per inch (dpi) horizontally and vertically.
ROM	<i>Acronym for read-only memory.</i> Programs, instructions, and routines permanently stored in the printer. ROM is not lost when power is turned off and cannot be written to, hence the term “read-only.” ROM-resident fonts are fonts permanently stored in a printer and available at any time.
set	To turn on, activate, invoke, or enable.
string	Two or more bytes of data or code treated as a unit.
twinax	Twinaxial. A type of cable with two wires surrounded by insulation and a braided shield.
type style	Refers to either the upright or italic character style in a specific font family. Roman is upright, <i>italic is slanted.</i>
typeface	A descriptive name or brand name that identifies a particular design of type. Also called type family.
weight	<i>See character weight.</i>
write	To place data in memory (RAM, NVRAM).

Index

A

Acknowledge reply, managing, 19
Anystate, 10

B

Bar codes, 17
 command set, 9
 commands, 9, 18
 data tower, 10
 errors, 23
Begin Overlay command, 19
Begin Page command, 19
Begin Page Segment command, 18
Block state, 10

C

Center and trim mapping
 graphics, 16
Commands
 bar codes, 18
 device control, 19
 overlay, 19
 page segment, 18
 rejected, 22
 syntax, 12
Compatible systems, 8
Correlation ID, 12

D

Data streams, 8
Data towers, 10
Deferred printing, 11
Delete Overlay command, 19
Delete Page Segment command, 18

Device control
 commands, 9, 19

E

Emulation, 8
End command, 19
End Page command, 20
Environment, IPDS, 8
Error codes, 22
Exceptions, 22
 data check, 23
 rejected commands, 22
 specification check - bar code, 23
 specification check - general, 25
 specification check - graphics data, 24
Execute Order Anystate command, 21
Execute Order Home State command, 22

G

Glossary, 31
Graphic Object Content Architecture (GOCA), 10
Graphics command set, 9
Graphics data
 errors, 24
Graphics presentation space, 16
 window, 16
Graphics tower, 17

H

Home state, 10

I

IM Image command set, 9, 15
Image presentation space, 15
Images, 15

Include Overlay command, 19
Include Page Segment command, 18
Interface, supported, 8
IO Image command set, 9
IPDS
 architecture, 9
 mode, 8
 protocol, 8

L

Load Copy Control command, 20
Load Equivalence command, 13
Load Font Equivalence command, 20
Load Page Descriptor command, 20
Load Page Position command, 20
Logical page, 11

M

Mapping
 bar codes, 17
 graphics presentation space window, 16
 image presentation space, 15
Medium presentation space, 11

N

No Operation command, 20

O

Overlay
 commands, 9, 19
 state, 10

P

Page segment
 commands, 18
 state, 10
 tower, 9
Page state, 10
Position and trim mapping
 graphics, 16

Presentation Object Content Architecture, 10
Printer operation, 11
 generating graphics, 16
 generating images, 15
Processing of a page, 11
Processing of a page See States, IPDS, 11
Protocol, 8

R

Reference documents, 7

S

Scale to fit mapping
 graphics, 16
Sense bytes, 22
Sense Type and Model command, 20
Set Home State command, 21
States
 IPDS, 10
Syntax
 commands, 12
Systems
 compatible, 8

T

Text command set, 9
Text tower, 13
Troubleshooting, 22
Twinax printer emulation
 data streams, supported, 8
 system attachments, 8

W

Write Bar Code command, 18
Write Bar Code Control command, 18
Write Graphics command, 17
Write Graphics Control command, 17
Write Image command, 15
Write Image Control command, 15
Write Text command, 13

PRINTRONIX, INC.

17500 CARTWRIGHT ROAD
P.O. Box 19559
IRVINE, CA 92623-9559
PHONE: (949) 863-1900
FAX: (949) 660-8682
TECHNICAL SUPPORT: (949) 221-2686

PRINTRONIX

NEDERLAND BV
P.O. Box 163, NIEUWEWEG 283
NL-6600 AD WIJCHEN
THE NETHERLANDS
PHONE: (31) 24 6489489
FAX: (31) 24 6489499

PRINTRONIX A.G.

42 CHANGI SOUTH STREET 1
CHANGI SOUTH INDUSTRIAL ESTATE
SINGAPORE 486763
PHONE: (65) 542-0110
FAX: (65) 543-0220

VISIT OUR WEBSITE AT:

<http://www.printronix.com>

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